



Urban Development Directorate

Inception Report

Strategic Environmental Assessment

under

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism



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CEGIS

Center for Environmental and Geographic Information Services

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Abbreviations and Acronyms

CIA	Cumulative impact assessment
CITES	Convention on International Trade in Endangered Species
DIA	Direct Influence Area
EIA	Environmental Impact Assessment
ESMF	Environmental and Social Management Framework
GIS	Geographical Information System
IIA	Indirect Influence Area
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unregulated, Unreported
KBA	Key Biodiversity Areas
PKCP	Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism
PFS	Pre-Feasibility Study
RAP	Resettlement Action Plan
SAP	Strategic Action Plan
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Program
SoP	Series of Projects
ToR	Terms of Reference
UDD-GoB	Urban Development Directorate of the Government of Bangladesh
UNFCCC	United National Framework Convention on Climate Change
VEC	Valued ecosystem component

1. Introduction

This is the Inception Report for the assignment: Support to the Urban Development Directorate of the Government of the People's Republic of Bangladesh (UDD-GoB), to Prepare a Strategic Environmental Assessment of the Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP). It represents the first deliverable by the Consultant (CEGIS).

The purpose of an inception report is to clarify the tasks required in completing the assignment and the extent to which the consultants have a clear understanding of what is expected from them. The resultant inception meeting will enable the client and consultant to clarify any points as might be necessary. The ToRs require the inception report to include:

- Introduction
- Description of objectives
- Description and scope of sub-activities
- Team formation and structure
- Work schedule for the assignment
- Immediate action taken after signing agreement
- Method and materials for each activity
- Required resources allocation
- List of working papers

As can be seen in the following pages, this Inception Report provides substantially more than required as a first deliverable in the ToRs. However, we have structured the report slightly differently to the stipulation in the ToRs. We believe that the revised structure provides greater detail and a better flow for the reader.

There was a short turnaround time between finalising the contracting and the delivery of this inception report. Because there has not yet been time for meaningful research, data collection, stakeholder consultation or any detailed fieldwork, our understanding of the PKCP and its relationship with other projects, potential cumulative impacts, the direct and indirect areas of influence of the plan, and Valued Ecosystem Components, is very limited.

In spite of the above limitations, we have started gathering a growing body of literature. We are slowly developing an understanding of the biophysical and socio-economic components of the landscape. Though we have just begun this assignment, we have a preliminary Table of Contents for the SEA and SEMP Reports (see Appendices A and B). Regardless, a quick visit has been given to the study sites to talk with the relevant department and line agencies regarding their understanding of the upcoming development plan. This visit also gives the study team a little bit insight of preliminary assessing the working sectors and its cross cutting aspects.

Over the next few months, our team of specialists will gain a better understanding and thus enable a robust analysis and sound advice on the application of social and environmental safeguards for the PKCP. The stakeholder consultation process will also be initiated in due course.

As soon as time permits, CEGIS proposes that an Inception Meeting will be held with the UDD-GoB. CEGIS would like to propose points for the agenda for such meeting in the coming days and these points will be solved during the inception workshop.

1.1 Study Background

The Strategic Environment Assessment (SEA) is an important tool that can provide guidance to the UDD-GoB and other stakeholders on systematically integrating environmental and socio-economic concerns in policy, regulations and planning.

With this in mind, the likely series of projects (SoPs) in the area are expected to provide a significant boost to Payra-Kuakata's socio-economic development. The planned SoPs may, however, create adverse social and environmental impacts in a local and regional context. This is not just during the construction phase of the SoPs, but may extend into the operational phases. These impacts can affect the environment in a profound way because they may result in cumulative impacts, which overlap in time and space.

Despite there being similarities to a site specific EIA, the SEA has a much larger scope in terms of time, space and coverage and enables a holistic assessment of the entire Payra-Kuakata area through identification and analysis of the cumulative and residual impacts of the PKCP and other developments.

The ToRs state that the objective of this study is to "weigh and recommend environmentally-optimal regional land-use planning guidelines for coastal regions". Apparently "the present malaise is assessed, as regards inefficiencies, non-suitability, non-sustainability, enhancing factors of environmental degradation, and potentially destructive consequences of current land-use alteration". It is expected that the SEA will result in guidance for addressing key environmental and socio-economic concerns during land-use planning decision-making.

1.2 Broader Objective of the SEA

The Strategic Environment Assessment (SEA) is an important tool that can guide the UDD-GoB and other stakeholders on systematically integrating environmental and socio-economic concerns in policy, regulations, and planning.

With this in mind, the likely series of projects (SoPs) in the area are expected to provide a significant boost to Payra-Kuakata's socio-economic development. The planned SoPs may, however, create adverse social and environmental impacts in a local and regional context. This is not just during the construction phase of the SoPs but may extend into the operational phases. These impacts can profoundly affect the environment because they may result in cumulative impacts, which overlap in time and space.

Despite there being similarities to a site-specific EIA, the SEA has a much larger scope in terms of time, space, and coverage and enables a holistic assessment of the entire Payra-Kuakata area through identification and analysis of the cumulative and residual impacts of the PKCP and other developments.

1.3 SEA Scope of Works

The study may have the following scopes but not limited to:

- Identify relevant development PPPs (Policies, Plans and Programs) through screening for the relevant sectors likely to be affected by the UDD development plans till 2041 for both public and private segments;
- Conduct pre-screening beforehand to rapidly narrow down list of PPPs to determine whether the PPPs will be taken to the next level of screening or not.
- Scoping to identify the effect on existing environmental and socio-economic conditions due to development initiatives in the selected South-Central Region;
- Review of selected existing policies, laws and institutions relevant to the identified sectors as well as past national and international SEA studies for deeper understanding of the process and possible type of outcomes;
- Identify key environmental issues and challenges imposed by both natural and human interventions that significantly impact the conservation of the biodiversity and their habitats in the region including inshore marine environment;

- Development for pertinent objectives, indicators and targets for each environmental issues and identify specific criteria against which the performance of each selected PPP will be evaluated;
- Establish baseline on the current status of the study area (7 Upazilas) in line with the relevant sectors with respect to a selected period;
- Identify environmental and ecological parameters for the existing ecosystems which will be indicators in determining impacts;
- Identify the present and potential sources of pollution as well as pollutant carriers that are important for conservation of the different types of ecosystems exists there including inshore marine environment;
- Estimate probable future pollution levels and their impacts through internationally accepted standard mathematical modeling tools and techniques and prepare an environmental quality benchmark with projections for future levels of pollution;
- Identify key stakeholders pertinent to each individual sector (selected sectors) on the basis of the relevant challenges, issues and impacts of development initiatives through consultation of relevant agencies and expert judgment;
- Integrate the outcomes of the consultative meetings with stakeholders within the scoping process to obtain clear knowledge on relative bio-physical and socio-economic issues;
- Conduct multi-level stakeholder consultations at local and national level to identify the sustainability criteria for determining strategic alternative options;
- Assess the potential direct, indirect and cumulative impacts due to policies, plans and programs relevant to the identified sectors of the SEA;
- Recommend strategic alternative measures for formulation of future PPPs as well as adjustment of existing PPPs (if needed);
- Integration of environmental principles such as polluter-pays-principle and the precautionary principle into the development, appraisal, and selection of PPPs;
- Identify suitable alternatives by considering the strategic aims of the selected PPPs;
- Provide a Strategic Environmental Management Plan (SEMP) with identified strategic alternative measures; and
- Establish monitoring protocol and prepare comprehensive environmental auditing plan.

1.4 Outputs of the SEA

- Screening and Scoping Report along with the database on primary data/information collected under this SEA;
- Detailed SEA Report;
- Detailed Strategic EMP Report;
- Monitoring and Auditing Framework;

1.5 Comments on the ToR

In order to clarify our understanding of the ToRs, we propose a slight rewording as follows:

the primary objective of the SEA is to guide holistic and environmentally-sustainable planning for the implementation of the PKCP, whilst bearing in mind other relevant socio-economic and infrastructural development within the PKCP area of influence.

The secondary objectives are:

- To document existing socio-economic and environmental baseline information in the PKCP area of influence;
- At a strategic level, to ascertain the key positive and negative social and environmental impacts associated with the implementation of the PKCP, bearing in mind all ongoing and planned major development activities that overlap in time and space with the PKCP;
- Proposing feasible prevention and mitigation measures for negative impacts identified in the SEA;
- To undertake appropriate public consultation and document the public consultation and disclosure requirements; and
- To prepare the SEA, including a SEMP – the latter for managing the implementation of the PKCP.

A key concern regarding the current ToRs is that they overemphasise the baseline chapters. Whilst it is important to understand the baseline situation, compiling the baseline chapters should not absorb more than approximately 20% of time and other resources. Given that this is a strategic assessment, only essential and relevant baseline information is needed, and this can be collected as quickly as possible. The bulk of the effort in a SEA should be developing a clear understanding of the issues and options – through analysis (using a variety of analytical tools), stakeholder consultation, and careful consideration of reasonable alternatives. The consultants therefore propose reducing the bulk of baseline reports and increasing the allocation of time and other resources for critical analysis.

1.6 SEA Team

The key and non-key staff members as well as the management on the SEA project team are shown in Appendices D and E.

We propose that the level of effort for the team members is regarded as indicative and that CEGIS be allowed to maintain a degree of flexibility, within reason, in this regard. Since we know from experience that SEA is not recipe-driven, as is often the case with project-level EIA, the consultant is often required to adjust the resources for a specific sub-task, and redeploy these for other sub-tasks. In the previous SEA that this team conducted in Bangladesh (2021-1), some staff had to be replaced because of a death (in one case) and illnesses in other cases. The flexibility of resource mobilisation based on professional judgment is thus important for ensuring that the assignment is properly executed to the highest possible standard.

2. Reconnaissance Visit

2.1 Introduction

Reconnaissance is a mission to obtain information by visual observation or other detection methods, about the activities and resources about the meteorological, hydrographic, or geographic characteristics of a particular area. Under this SEA study, a reconnaissance visit has been conducted from 22nd May to 26th May 2022 in different administrative boundaries in the study area. A multi-expert team consists of 7 professionals have visited the area for the said duration. The team comprised of (i) socio-economic expert, (ii) water resources expert, (iii) land use expert, (iv) ecologist, (v) agricultural expert, (vi) hazard management expert, and (vii) environmental expert.

The objectives of the reconnaissance mission were to-

- physical/direct observation of the natural settings and socio-economic condition of the area;
- scoping of major habitats and socio-economic aspects;
- identify the likelihood triggering sectors/environmental components for the upcoming UDD development plans;
- finalize the SEA approach and methods to be followed for the assigned tasks;

2.2 Documentation of Institutions and Project Site Visits

The team visited different departments and line agencies in the region to evaluate the reconnaissance objectives. The details of the officers are presented in the Table 2.1.

Table 2.1: Details of the Officers and Organization Visited during Reconnaissance Visit

SL	Officers Name	Designation and Department	Cell Number
1	Md. Jamal Uddin	Upazilla Secondary Education Officer, Barguna Sadar	01712 792579
2	S. M. Sohel	Upazilla Academic Supervisor, Barguna Sadar	01738 194532
3	Md. Shahidul Islam	Senior Upazila Fisheries Officer, Barguna Sadar	01714 907953
4	Mr. Sanjit Kumar Das	Deputy Director Department of Youth Development, Barguna Sadar	01712 798698
5	Md Nurul Amin	Forest Guard ACF Office, Barguna Sadar	01714 933851
6	Md Moniruzzaman	Range Officer Upazilla Nursery Office, Amtali	01714 901410
7	Md. Mostafizur Rahman	Upazilla Agriculture Officer, Barguna Sadar	01712 976795
8	Md. Rasel	Agriculture Extension Officer, Amtoli	01752 606853
9	Mr. Sohel Hafiz	Entrepreneur, Suranjana Eco Tourism and Resort Barguna Sadar	01727 122440



Figure 2.1: Upazila Senior Fisheries Officer, Barguna Sadar



Figure 2.2: Youth Development Deputy Director, Barguna Sadar



Figure 2.3: Agriculture Extension Officer, Amtali



Figure 2.4: Agriculture Extension Officer, Barguna Sadar



Figure 2.5: Meeting with Suranjana Eco Tourism and Resort Center



Figure 2.6: Range Office, Barguna Sadar



Figure 2.7: Boroitala Ferry Ghat



Figure 2.8: Walking Trail in Suranjana Eco Tourism and Resort

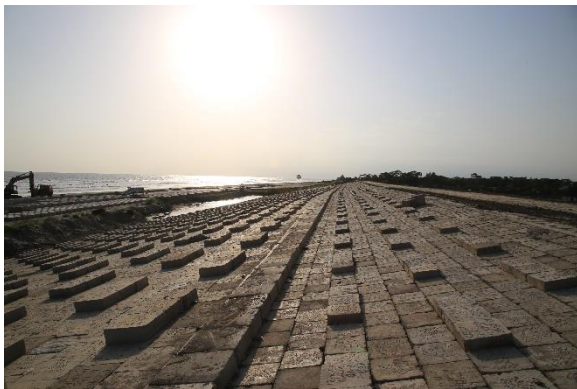


Figure 2.9: Sea Dyke Protection Work by BWDB under CEIP



Figure 2.10: Beach Protection Work at Kuakata SEA Beach By BWDB



Figure 2.11: Flood Protection Work by LGED



Figure 2.12: Payra Port Authority

2.3 Findings of Reconnaissance Visit

The field findings have been assessed respecting the Regional Development Plan of the Urban Development Directorate. The major development sectors have been considered here to assess the different aspects of the present situation, issues and problems, and suggestions to improve the respective condition in the study area. The field findings have been portrayed in the Tables of 2.2-2.7.

2.3.1 Socio-economic Aspects

The detailed field findings on socio-economic aspects are presented in Table 2.2.

Table 2.2: Field Findings of Socio-economic Aspects

Plans	Facilities development	Socio-economic issues
Socio-economic conditions development	Educational institution	<ul style="list-style-type: none"> The number of educational institutes should be increased according to the local growth rate of the population; The literacy rate is moderate at present; Overall dropout rate at the high school level is also noticeable, triggered by the early marriage of females and livelihood support for households by male members; The ratio of teacher and student is less, so, more teachers are required at the high school level; Infrastructure of many schools is very poor, which often hinders enabling environment; Health centers are needed for quality health services and facilities There are a number of important high-value crops, which can also be exported. Eventually, the development of market and growth centers is appreciated; To protect people and their assets from coastal cyclones and flooding, cyclone shelters in the coastal areas are needed. However, these shelters must be friendly for women, elderly people, physically challenged and children;
	Health centers	
	Growth centers and markets	
	Cyclone shelters	
Regional land use development	Commercial area development	<ul style="list-style-type: none"> Local and regional commerce, especially for agro-based production, involves a great potential. The regional development need to be focus-oriented; Since agriculture is the mainstay of local livelihood and commerce, the preservation of agricultural zone, particularly in productive areas, is highly required; The proposed plan shall urbanize the entire project area, which needs zone-wise planning; For development work, land acquisition will be required, for which the land losers need to be paid properly and hassle-free;
	Residential area development	
	Agricultural zone	
	Park and recreation	
	Wetlands	
Rural settlement		
Tourism development	Transportation	<ul style="list-style-type: none"> The study area, especially the coastal bank and chars have a great potential for tourism. These areas can be promoted but must be focused on environmental friendliness; Some areas need to have their own branding and tourism promotion strategy, which will guide the local natural resource-based tourism; Tourist facilities are very poor at this moment. Only the Kuakata has some infrastructures, therefore, facilities need to be enhanced; If large private entrepreneurs do not invest, local level small scale promoters need to be promoted;
	Utilities	
	Accommodation	
	Marketing and management	
	Safety and security of tourists	
	Environmental safeguards	
Transportation	Road network development	<ul style="list-style-type: none"> The transportation system in the entire project area is very poor. Therefore, this system need to be improved; The roadway network needs to be improved;
	Navigation route development	
Payra port development	Port navigation development	
	Warehouse development	

Plans	Facilities development	Socio-economic issues
	Terminals development	<ul style="list-style-type: none"> At present, the Payra port is underused. The port can be extended following the plan, but it must be based on future needs and demands; The land acquisition process should be in a proper way and hassle-free;
	Jetty development	
	Four lane connecting roads	
	Airport development	
	Railway network	
	Exclusive economic zone	
	Power plant development	
	LNG terminals	
	Shipyards	
Payra Development Authority and Integrated Development	Beach conservation	<ul style="list-style-type: none"> The entire development plan should be in an integrated way based on the macro and micro needs; The proposed plan needs to be consulted widely with respective stakeholders; The overall plan should be shared with concerned department, local people and civil society people; Emphasis should be given to sustainable planning;
	Depression area conservation	
	Mangroves conservation	
	Existing urban area	
	Urban Promotional area	
	Port centric urban zone	
	Eco town	
	Rural growth center	
	Tourism center development	
	Island-based tourism	
	Forest based tourism	
	Agricultural zone development	

2.3.2 Ecology and Ecosystems

The detailed field findings on socio-economic aspects are presented in Table 2.3.

Table 2.3: Field Findings of Ecology and Ecosystems

Plans	Facilities development (Plans and programmes)	Major concern on Ecological Resources	Triggered policies
Socio-economic conditions development	Educational institution	<ul style="list-style-type: none"> Wetland filling and squeezing due to land development for educational institution, health centers, growth centers and markets; Habitat encroachment for wildlife; Aquatic habitat degradation due to spillage of solid and liquid waste from growth centers and markets; Disturbance to wildlife due to noise from growth centers and markets; Lighting effects to nocturnal animals; 	<ul style="list-style-type: none"> Wetland Policy 1998
	Health centers		<ul style="list-style-type: none"> National Water Policy 1999
	Growth centers and markets		<ul style="list-style-type: none"> Bangladesh Water Act, 2018
	Cyclone shelters		<ul style="list-style-type: none"> Wildlife (Conservation and Security) Act, 2012
Regional landuse development	Commercial area development	<ul style="list-style-type: none"> Mangrove forest degradation for construction of parks and recreation sites; 	National Environment Management Action Plan (NEMAP, 1995)
	Residential area development		National Environment Policy, 1992

Plans	Facilities development (Plans and programmes)	Major concern on Ecological Resources	Triggered policies
	Agricultural zone	<ul style="list-style-type: none"> Inland vegetation damage and habitat conversion for commercial and residential area development; Wetland reshaping, filling and squeezing for commercial or residential area development, parks and recreation sites construction; Encroachment of wildlife habitat for land development; Aquatic habitat degradation due to spillage of solid and liquid waste from residential, commercial and park areas; Disturbance to wildlife due to noise and lighting commercial areas, parks and recreation sites; 	National Agri-policy-1999
	Park and recreation		National Environmental Policy (2018)
	Wetlands		National Forest Policy-1994
	Rural settlement		<ul style="list-style-type: none"> Wetland policy - 1998 National Land-use Policy 2001 Wildlife (Conservation and Security) Act, 2012
Tourism development	Transportation	<ul style="list-style-type: none"> Mangrove vegetation damage due to tourist facilities establishment; Disturbance to wildlife due to noise and lighting from tourist spots; Disturbance to nocturnal birds for excess lighting from security post and hotels; Aquatic habitat degradation due to spillage of solid and liquid waste from tourist spots; Management of waste and environmental degradations for ensure environmental safeguards; 	Wildlife (Conservation and Security) Act, 2012
	Utilities		Noise Pollution (Control) Rules, 2006
	Accommodation		National Environmental Policy (2018)
	Marketing and management		-
	Safety and security of tourists		-
	Environmental safeguards		-
Transportation	Road network development	<ul style="list-style-type: none"> Habitat conversion for land development of roads; Wetland encroachment and squeezing for road construction; Disturbance to dolphins due to underwater noise during dredging of navigation route; Risk of collision of dolphins with water vessels Aquatic habitat degradation due to spillage of oil and grease from the water vessels; 	Wildlife (Conservation and Security) Act, 2012
	Navigation route development		<ul style="list-style-type: none"> The Inland Water Transport Authority Ordinance, 1958 Bangladesh Water Act, 2018
Payra port development	Port navigation development	<ul style="list-style-type: none"> Temporary disturbance to dolphins while dredging of the channel; Terrestrial habitat conversion for connecting road and railway construction, warehouse and terminal development; Degradation of mudflats for construction of jetty, terminals and shipyard; 	Wildlife (Conservation and Security) Act, 2012
	Warehouse development		National Environmental Policy (2018)
	Terminals development		Bangladesh Water Act, 2018
	Jetty development		-
	Four lane connecting roads		-

Plans	Facilities development (Plans and programmes)	Major concern on Ecological Resources	Triggered policies
	Airport development	<ul style="list-style-type: none"> Wetland encroachment and squeezing for airport, railway and connecting road construction and development; Aquatic habitat degradation due to spillage of solid and liquid waste from maritime vessels; Aquatic habitat degradation due to spillage of warm water from power plant and ballast water from maritime vessels; 	-
	Railway network		-
	Exclusive economic zone		-
	Power plant development		-
	LNG terminals		-
	Shipyards		-
Payra Development Authority and integrated Development	Beach conservation	<ul style="list-style-type: none"> Habitat conservation for shorebirds and red crabs due to beach conservation; Ensure habitats for water dependent birds and amphibians due to conservation of depressions and mangroves; Risk of encroachment of mangrove forest for tourism center development or expansion of forest-based tourism; Degradations of mudflats and shorebird habitat for tourist movements along the island peripheries; 	National Environment Policy - 2018
	Depression area conservation		Wildlife (Conservation and Security) Act, 2012
	Mangroves conservation		Bangladesh Water Act, 2018
	Existing urban area		-
	Urban Promotional area		-
	Port centric urban zone		-
	Eco town		-
	Rural growth center		-
	Tourism center development		-
	Island based tourism		-
	Forest based tourism		-
Agricultural zone development	-		

2.3.3 Agriculture

The detailed field findings on agriculture are presented in Table 2.4.

Table 2.4: Field Findings of Agriculture

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
Socio-economic conditions development	Educational institution	<ul style="list-style-type: none"> Crop damage due to development work; Agricultural production loss due to Agricultural land acquisition for development work; People are concern about crop marketing (farmers and DAE officials are mainly concern about middle-man) but have no idea about food processing (juice 	<ul style="list-style-type: none"> National Agriculture Policy, 2018 Agricultural Extension Policy, 2015 (draft) Integrated Minor Irrigation Policy, 2017 Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012
	Health centers		
	Growth centers and markets		
	Cyclone shelters		

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
		<p>from water melon and Mung bean processing for ready to cook);</p> <ul style="list-style-type: none"> Development of Irrigation facilities at community level with proper drainage system; 	<ul style="list-style-type: none"> National Seed Policy, 1993 [EXCLUDED]
Regional land use development	Commercial area development	<ul style="list-style-type: none"> Existing cropping pattern and distribution of single, double and triple crop land; Land types with crop suitability; Soil quality and water quality (irrigation purpose); Existing agro-farming system (if present); Existing Irrigation facilities and drainage system; 	<ul style="list-style-type: none"> National Agriculture Policy, 2018 Agricultural Extension Policy, 2015 (draft) National Land Use Policy, 2001 National Integrated Pest Management Policy, 2002 Integrated Minor Irrigation Policy, 2017 Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 National Seed Policy, 1993 [EXCLUDED]
	Residential area development		
	Agricultural zone		
	Park and recreation		
	Wetlands		
Rural settlement			
Tourism development	Transportation	<ul style="list-style-type: none"> Agricultural production loss due to Agricultural land acquisition for tourism development work; Flower or ornamental crops cultivation may increase; 	<ul style="list-style-type: none"> National Agriculture Policy, 2018 Agricultural Extension Policy, 2015 (draft) Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 National Seed Policy, 1993 [EXCLUDED] Bangladesh Second Country Investment Plan Nutrition-sensitive food system, 2016-2020
	Utilities		
	Accommodation		
	Marketing and management		
	Safety and security of tourists		
Environmental safeguards			
Transportation	Road network development	<ul style="list-style-type: none"> Lack of Modern agro-transportation system (considering perishability of crops); Need development of water transportation system for agro-products like fertilizer, pesticides, insecticides, seeds etc.; 	<ul style="list-style-type: none"> National Agriculture Policy, 2018 Agricultural Extension Policy, 2015 (draft) Integrated Minor Irrigation Policy, 2017 Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012
	Navigation route development		
Payra port development	Port navigation development	<ul style="list-style-type: none"> Crop damage due to development work; Agricultural production loss due to Agricultural land acquisition for development work; 	<ul style="list-style-type: none"> National Organic Agriculture Policy, 2016 National Agriculture Policy, 2018 Agricultural Extension Policy, 2015 (draft)
	Warehouse development		
	Terminals development		

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
	Jetty development Four lane connecting roads Airport development Railway network Exclusive economic zone Power plant development LNG terminals Shipyards	<ul style="list-style-type: none"> Export quality crop production may increase like Organic crop production, Safe vegetable production etc.; Agro-food processing industry may establish like water melon juice processing industry, pulse (Mung bean) processing industry etc.; High value crop production may take place 	<ul style="list-style-type: none"> Integrated Minor Irrigation Policy, 2017 National Integrated Pest Management Policy, 2002 Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 National Seed Policy, 1993 [EXCLUDED]
Payra Development Authority and integrated Development	Beach conservation Depression area conservation Mangroves conservation Existing urban area Urban Promotional area Port centric urban zone Eco town Rural growth center Tourism center development Island based tourism Forest based tourism Agricultural zone development	<ul style="list-style-type: none"> Existing cropping pattern and distribution of single, double and triple crop land; Land types with crop suitability; Soil quality and water quality (irrigation purpose); Existing Irrigation facilities and drainage system; High value crop production may take place; People are concern about crop marketing (farmers and DAE officials are mainly concern about middle-man) but have no idea about food processing (juice from water melon and Mung bean processing for ready to cook); Agro-food processing industry may establish like water melon juice processing industry, pulse (Mung bean) processing industry etc.; 	<ul style="list-style-type: none"> National Agriculture Policy, 2018 National Organic Agriculture Policy, 2016 Agricultural Extension Policy, 2015 (draft) National Integrated Pest Management Policy, 2002 Integrated Minor Irrigation Policy, 2017 Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 National Seed Policy, 1993 [EXCLUDED] Bangladesh Second Country Investment Plan Nutrition-sensitive food system, 2016-2020 National Land Use Policy, 2001

2.3.4 Water Resources

The detailed field findings on water resources are presented in Table 2.5.

Table 2.5: Field Findings of Water Resources

Plans	Facilities development	Water resources	Related Policy
Socio-economic conditions development	Educational institution	<ul style="list-style-type: none"> Land reclamation, if required for this development, can lead to canal filling which play a vital role in agricultural sector; Socio-economic development will attract people to migrate and thus the navigation routes of the surrounding rivers are likely to be damaged due to frequent use and may need dredging or other sorts of rehabilitation; The developments can be located on the floodplains, if so; it is likely to cause lowering the conveyance capacity of the rivers just by occupying the floodplain area. After all, making room for the river is essential; The reduction of the conveyance capacity can result in lesser discharge into the river, which will eventually cause salinity intrusion into the water resources; During monsoon, water level is likely to increase if the cross-sectional area of the river or canal is incapable to withstand the additional amount of flow; Indiscriminate use of the limited existing water resources; 	National Water Policy (1999)
	Health centers		Coastal Zone Policy (2005)
	Growth centers and markets		Bangladesh Water Act (2013)
	Cyclone shelters		-
Regional landuse development	Commercial area development	<ul style="list-style-type: none"> Groundwater table depletion may occur if it is used by both the commercial or residential area without any management plan for adequate distribution; Keeping balance in water supply is likely to be difficult if both commercial and residential developments are located close to each other; Agricultural zoning may cause some of the existing Water Control Structures ineffective and obsolete; Occasional heavy precipitation can make the draining mechanism more difficult in commercial zone and thus can cause urban flood for days; Water based recreational facilities can make more eddies in rivers and then wave propagation breaking at the banks lead to bank erosion; Wetland reshaping can cause hindrance in groundwater recharge process. Wetland can also attenuate flood. Therefore, reshaping the wetlands for rural settlement can lead to floods with increased duration; 	National Water Policy (1999)
	Residential area development		Coastal Zone Policy (2005)
	Agricultural zone		Bangladesh Water Act (2013)
	Park and recreation		-
	Wetlands		-
	Rural settlement		-
Tourism development	Transportation	<ul style="list-style-type: none"> Tourism development can hamper the ongoing projects of coastal revetment construction; Beach erosion can occur and can result in the need for beach nourishment; 	Coastal Zone Policy (2005)
	Utilities		-
	Accommodation		-

Plans	Facilities development	Water resources	Related Policy
	Marketing and management	<ul style="list-style-type: none"> Disturbed wave action can cause adverse effect on the beach morphology by causing net movement of the sediment up the beach, steeping the beach profile; Planform of the shoreline can change unfavorably with such developments; Deposited sediment pattern of the beaches can be altered; If beach morphology gets disturbed, dissipation of wave energy along the coast will be disturbed too and thus, it can devour coastal settlements or protective works; 	-
	Safety and security of tourists		-
	Environmental safeguards		-
Transportation	Road network development	<ul style="list-style-type: none"> Dredging at certain channels may be required for navigation route development. In that case, the dredged material, if deposited near other resources, they can fall into the water causing increase in the quantity of suspended sediment. Sometimes, mismanagement of the dredged material may cause riverbed siltation and river encroachment; The process to make one channel navigable can impart negative impact on the existing navigation routes by raising the riverbed and water level of other resources; Unplanned dredging alignment can create scour holes in riverbed and thus increased discharge will likely cause bank erosion at those locations; 	National Water Policy (1999)
	Navigation route development		-
Payra port development	Port navigation development	<ul style="list-style-type: none"> Payra port development requires flat land to build the infrastructures. Therefore, to reclaim the necessary amount of flat land, they are filling up the low-lying terrains and cutting high ground to provide sufficient space for the proposed facilities construction. This can result in sewage congestion, poor local drainage and water logging; The developed facilities can have an adverse effect on the surrounding canal systems via emitted pollutants; Vessels visiting the port may discharge their garbage into the river; Construction of terminals and airport may involve land reclamation and dredging work. During the construction phase, if not properly planned, may cause erosion and accretion in the southern part of Bangladesh, which can result in coastline change; Terminal construction can cause water stagnation; Construction of breakwater can alter the flow direction resulting in erosion and sediment deposition at port or location of other facilities. Small vessels may face trouble maneuvering near the facilities if the flow pattern becomes unfavorable to them; 	Coastal Zone Policy (2005)
	Warehouse development		National Water Policy (1999)
	Terminals development		Bangladesh Water Act (2013)
	Jetty development		-
	Four lane connecting roads		-
	Airport development		-
	Railway network		-
	Exclusive economic zone		-
	Power plant development		-
	LNG terminals		-
	Shipyards	-	
Payra Development	Beach conservation	<ul style="list-style-type: none"> Depression area conservation may benefit accumulating rainwater or floodwater, on the 	National Water Policy (1999)

Plans	Facilities development	Water resources	Related Policy
Authority and integrated Development	Depression area conservation	<p>contrary, it can cause accelerated seepage into the unsaturated zone of the soil resulting in elevated groundwater table that can be harmful towards growth of agricultural crops and natural percolation of rainwater;</p> <ul style="list-style-type: none"> Urban zone development can increase the probability of urban flood occurrence; Island based tourism may cause island instability; Improper resource management may lead to drainage congestion and insufficient water supply for both household and drinking purposes; 	Coastal Zone Policy (1999)
	Mangroves conservation		Bangladesh Water Act (2013)
	Existing urban area		-
	Urban Promotional area		-
	Port centric urban zone		-
	Eco town		-
	Rural growth center		-
	Tourism center development		-
	Island based tourism		-
	Forest based tourism		-
	Agricultural zone development		-

2.3.5 Land Use

The detailed field findings on land use changes are presented in Table 2.6.

Table 2.6: Field Findings of Land Use

SL No.	Issue/Sector	Check If Present	Observed impacts, magnitude/ severity, area if quantifiable
1.	Land use		
	<ul style="list-style-type: none"> Aquaculture Cropland Grassland Forest land Settlements Wetlands 		<ul style="list-style-type: none"> Less aquaculture, more open water. Cropping intensity more than 200%. Grass land: Few Forest land: Mangrove forest and Social forest Wetland: Khal, Canal
2.	Transportation		
	<ul style="list-style-type: none"> Road network Rail network Waterways Navigation Network Ferries Ports 	✓	<ul style="list-style-type: none"> The road network from district to district is well developed, but road network is not good at Upazila level. The road network comprising of road category of Zila road and regional roads exhibit high operating speed and the local road networks are operating at lower speed. Also, bottle necks in the study area can only be seen at points where there is a ferry, i.e., construction of bridges will alleviate that congestion. There is no rail network yet. However, a rail network is proposed from Payra to Dhaka. Water navigation network is good.

SL No.	Issue/Sector	Check If Present	Observed impacts, magnitude/ severity, area if quantifiable
			<ul style="list-style-type: none"> There are at least 2 ferry ghats in all the Upazila. However, the number of ferries must be increased. There is a River port in Patuakhali. A deep sea port in Payra is under construction.
3.	Facilities and Utilities (Water, Electricity, etc.)		
	<ul style="list-style-type: none"> Facilities Utilities 	✓	<ul style="list-style-type: none"> There are educational institutions, growth centers, markets, hotels, resorts, stationary, cyclone centers etc. Since this is a cyclone-prone area, more cyclone centers are needed. Industries are not developed; Electricity is available everywhere, but water facilities are not available everywhere except in the municipality. Feasibility of undertaking a project should be explored to supply electricity produced in non-grid Bhola Island to Rangabali by setting up a gridline from Bhola.
4.	Social Structure		
	<ul style="list-style-type: none"> Livelihood pattern Religion Ethnic group Economic status of inhabitants Social Security system 	✓	<ul style="list-style-type: none"> Their main occupations are: agriculture, fishing, grocery shop, selling vegetables in the market, selling tea/coffee, hotel business. Community include people of different religions such as Buddha, Muslim, Hindu etc. Rakhine and Mog ethnic community are living in Kuakata. Economically the people are of mixed classes varying from poor to solvent. There are Police, Ansar, Administration, village police, Mayor, Chairman, Commissioner etc. Social security needs to be increased. Already the government of 'Bangladesh has formulated "Tourist Police". But their capacity in terms of human resources and infrastructure need to be strengthened.
5.	Tourism Demand		
	<ul style="list-style-type: none"> People's opinion on tourism as livelihood Impact of tourism on environment and ecosystem Tourism based knowledge Security system 	✓	<ul style="list-style-type: none"> People want mangrove based eco-tourism if communication can be improved. If tourism develops, pressure may increase on the eco-system. Environmental pollution may increase. There is no solid waste, liquid waste management scheme. Tourism based knowledge is very low. There is no programme to make tourists aware. There is no institutional training. Training can be arranged with the help of Jubo Unnayan Proshikhyon Kendra i.e. Youth Development Training Centre. The security system is not well developed. Lack of adequate police, watch tower.
6.	Environmental and Ecosystem		
	<ul style="list-style-type: none"> Agriculture Fisheries Flora Fauna 	✓	<ul style="list-style-type: none"> Agricultural production is good. Apart from rice, fruits and vegetables such as Watermelon, sunflower, Mugdal (Lentil) are also grown. Cold storage needs to be increased for agriculture and fisheries. Capture and culture fisheries are practiced which are both economically beneficial. Ecosystem comprises river ecosystem, lowland ecosystem, mudflow/charland and mangrove ecosystem. Flora includes Shundari, Golpata etc. Fauna includes Deer, Buffaloes etc.

SL No.	Issue/Sector	Check If Present	Observed impacts, magnitude/ severity, area if quantifiable
7.	On site-Off site projects		
	Payra Port		<ul style="list-style-type: none"> • Payra Port Authority requires land to build infrastructures. It may cause loss of natural and recreational areas. • Infrastructure development of Payra port may be reduced access to culturally important areas and landscapes, reduced viability of commercial fishing land, reduced road and marine safety. • Physical displacement of people and their settlements may occur. • Economic displacements of agricultural and fisheries livelihoods. • It can create primary employment, business opportunities, property values and marketability, demand for housing which can contribute to the economy.

2.3.6 Hazard and Disaster Risks Reduction

The detailed field findings on hazard and disaster risks reduction are presented in Table 2.7.

Table 2.7: Field Findings of Hazard and Disaster Risks Reduction

Plans	Facilities development	Hazard and Disaster Risks Reduction
Socio-economic conditions development	Educational institution	<ul style="list-style-type: none"> • Establishment of institutions and other socio-economic development at the Upazilla level will be effective but its effectiveness needs to be conditioned by the existence of effective government institutions, cyclone shelters, endured building structures and embankments protection; • Education and other well-being facilities improvement will lead to enhance the ultimate awareness of DRR concept among the community and will reduce its comprehensive damage; • Improved livelihoods opportunities can reduce vulnerability but agro-based livelihoods in disaster-prone contexts can be unproductive unless a resilience approach is used. • Land acquisition for the development may cause the canal blockage and drainage congestion which will in turn increase the likelihood of the flash flood, seasonal flood and water logging; • Though inadequate, there are cyclone shelter and school buildings that are being used as alternative shelter during cyclone and other natural disaster in each surveyed upazilla. • Behavioral changes to the community people are important, as many do not even attempt to seek refuge in a shelter as they know the shelter is there is inadequate space available, unhygienic, unsecured for the women and also do not want to abandon their assets in their homesteads; • Extensive Training and awareness program within the community may reduce the consequences of the fatality and loss of other household assets;
	Health centers	
	Growth centers and markets	
	Cyclone shelters	
Regional landuse development	Commercial area development	<ul style="list-style-type: none"> • Land Use plan (LUP) and zoning is essential tool for a sustainable and disaster resistant urbanization for these proposed Upazilas; • As the whole study area (7 Upazilas) is more or less disaster influenced area, the most hazardous and risk prone areas should be identified to avoid the construction and if plan to
	Residential area development	
	Agricultural zone	
	Park and recreation	

Plans	Facilities development	Hazard and Disaster Risks Reduction
	Wetlands	<p>establish any infrastructures, proper protective or mitigation measures should be designed to reduce the risk accordingly;</p> <ul style="list-style-type: none"> • DRR into land use planning can be a way to achieve safer and more sustainable development by protecting communities, houses, livelihoods, schools and hospitals and other components of development from disaster; • Land acquisition might be required by the bank of the river and other floodplain area for commercial and industrial zoning which will be at high risk of flooding and other hydrological disaster. Riverbank protection by revetment and other structural measures, Land elevation, Room for river concept, flood-wall etc. can be possible options to reduce the risk; • Being a disaster-prone area, most of the residents at Barguna and Patuakhali district are living in Impoverished situation who can be dislocated due to Urbanization and other facilities development. Proper and safer resettlement must be ensured to protect them from the natural and other associated disasters; • Nature Based Solution (NBS) concept can be initiated to reduce the disaster risks. To do so Afforestation zone should be incorporated while prepare the regional land-use development plan;
	Rural settlement	
Tourism development	Transportation	<ul style="list-style-type: none"> • Imperative attempts need to be taken to incorporate a rigorous geological and geotechnical site characterization, including a potential risk analysis in preparing comprehensive plan focusing on Eco-Tourism within the project influenced area in Barguna and Patuakhali District; • Safe and setback distances should be strictly followed while constructing tourism facilities and other infrastructures; • Possibilities of construction the tourism development at the vicinity in the coastal area must be assessed properly; • River bank protection, nearby cyclone shelter and Emergency Reponses Plan (ERP) should be ensured before the project implementation;
	Utilities	
	Accommodation	
	Marketing and management	
	Safety and security of tourists	
	Environmental safeguards	
Transportation	Road network development	<ul style="list-style-type: none"> • Transportation networks development need to be carried out in such a way that the existing drainage system and other water-ways remains unblock and clean. The blockage of the drainage system inside the Upazilla and distributary mouths of the main rivers may cause and persist the seasonal and flash flood miseries; • Drainage and dredging works may reduce the disaster risks • Emergency access road to and from the evacuation and cyclone shelter should be improved to decrease the fatality;
	Navigation route development	
Payra port development	Port navigation development	<ul style="list-style-type: none"> • Construction of breakwaters and terminals involves huge reclamation and dredging works. These reclamations and dredging works may cause erosion or accretion in the southern part of Bangladesh resulting in coastline change; • Burning of fossil fuel will cause ozone depletion and global warming which will lead the natural disaster; • Destroying mangrove may limit the global capacity of carbon and may cause climate change impact including temperature rise and ocean acidification; • Riverbank erosion, storm, tidal surge are the notable natural disasters occurring in this area. River embankment protection
	Warehouse development	
	Terminals development	
	Jetty development	
	Four lane connecting roads	
	Airport development	
	Railway network	
	Exclusive economic zone	

Plans	Facilities development	Hazard and Disaster Risks Reduction
	Power plant development LNG terminals Shipyards	<p>work, land elevation, floodwall etc. may be introduced to reduce the risks of these disaster;</p> <ul style="list-style-type: none"> • Hazard and Risk Assessment Safety Training is essential for workers in order to reduce the risks associated with accidents, internal and external threats, and natural disaster; • An Emergency Response Plan (ERP) is mandatory to provide a systematic approach for the protection of employees, assets and the environment from impact of serious incidents. An ideal ERP will be designed by fire exit and evacuation plan about fire and explosion related disasters; immediate medical emergency due to injuries; leakage of hazardous materials; natural disasters (floods, cyclones etc.);
Payra Development Authority and integrated Development	Beach conservation Depression area conservation Mangroves conservation Existing urban area Urban Promotional area Port centric urban zone Eco town Rural growth center Tourism center development Island based tourism Forest based tourism Agricultural zone development	<ul style="list-style-type: none"> • Port Authority should design the land use development keeping consider Patuakhali is a most disaster prone area; • Beach protection is mandatory to protect the bank from erosion; • Shared cyclone center can be constructed for both port workers and the local community; • NBS concept can be initiated by the port authority to reduce the risk of the natural disaster in this area;

3. SEA Process and Methodology

The overall SEA process and methodology has been prepared in line with the Good Practice Guidance of Applying SEA¹. The Guideline structured the SEA process into four major steps – i) Establishing the context, ii) Implementing the SEA, iii) Inform and influencing the decision making, and iv) Monitoring and evaluation. Additionally, the methodology has been aligned with the guidance of the ToR. The ToR specifically helped to establish the context and to scope the SEA.

3.1 Establishing the Context

3.1.1 Objective of SEA

With the aim of integrating the Strategic Environmental Assessment into the ongoing regional, land-use and structural planning of the Kuakata-Patuakhali region focusing on ecotourism, the objectives of the SEA were set for:

- Identifying the main environmental and social concerns and indicators;
- Exploring the environmental and social impacts of the strategic measures/decision of the plan;
- Identifying possible strategic mitigation measures to be included in the plan for ensuring environmental and social sustainability of the plan;
- Finally, this SEA would set a guideline of environmental and social management for the land use and regional planning.

3.1.2 Defining SEA Boundary

The spatial boundary of SEA would consider the Kuakata-Patuakhali Regional Plan Area which was defined taking the Upazila administrative boundary of the potential interventions into the consideration. Therefore, the study area would include the seven Upazilas-Patharghata, Barguna Sodor, Amtali, Taltoli, Galachipa, Kalapara, and Rangabali. It would thus include the footprint of the structural and strategic interventions, the Area of Influence (direct and indirect influence area) and the control area (Figure 3.1). It would cover the both mainland areas and the estuarine chars of the Patuakhali-Kuakata region.

The temporal boundary of SEA would be defined considering the past event which triggered major changes and the future plausible impacts. In Kuakata-Patuakhali region, inception of the Payra Port (the Payra Port Act was enacted in 2013 and the construction started soon after the enactment of the Act) and Payra Thermal Power Plant (EPC was signed in 2015 and the first unit came into operation in 2020) triggered infrastructural development, industrialization, economic development and overall socio-economic changes. Therefore, the past temporal boundary can be considered as 2013. The future boundary would be defined considering timeline and the plausible impacts of the Patuakhali-Kuakata. The plan aims to achieve its outcome by 2041 in line with the country's Perspective Plan. Therefore, the future temporal boundary of the Sea can be considered as 2041 as well.

¹ OCED 2006. DAC Guidelines and Reference Series: Applying Strategic Environmental Assessment, Good Practice guidance for Development Co-operation. Organization for Economic Co-operation and Development (OECD). Available at <https://www.oecd-ilibrary.org/docserver/9789264026582-en.pdf?expires=1653808578&id=id&accname=guest&checksum=98B4545E88B2AFA532E743C28543C0E7>

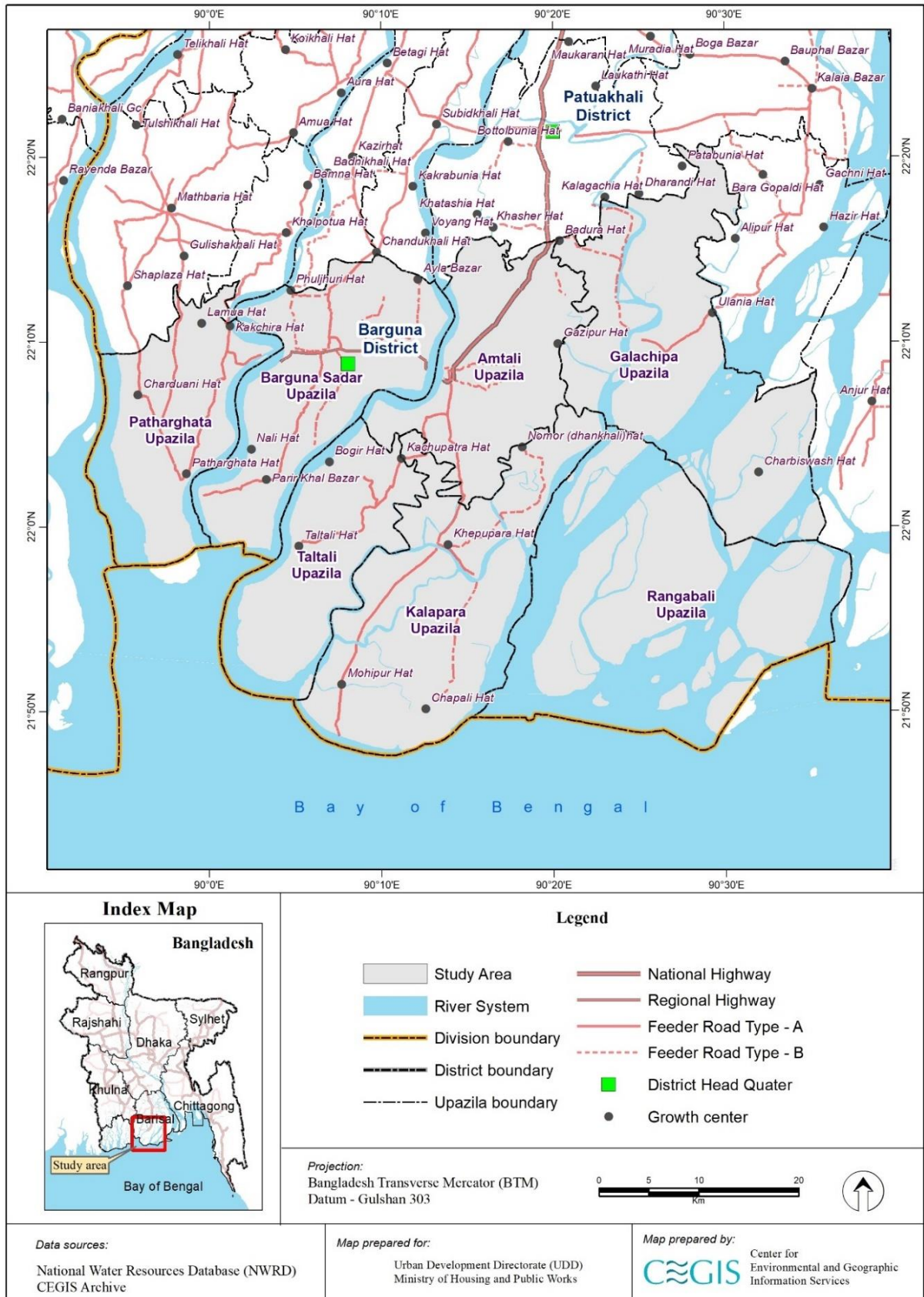


Figure 3.1: SEA Boundary

3.1.3 *Understanding the Context of the Ongoing Kuakata Patuakhali Regional, Structural and Land Use Plan*

Introduction

Sustainable development of the Payra-Kuakata Coastal Region is the desired goal of the regional plan, to be achieved by integrated planning and implementation through multi organizational involvement and community participation for optimum utilization of resources and reduction of poverty. The planning area includes seven Upazilas from Patuakhali and Barguna district, namely, Galachipa, Kalapara, Rangabali, Barguna Sadar, Patharghata, Amtali, and Taltali.

Objectives

The **overall objectives** to achieve coordination and integration of proposed planning initiatives are as follows:

- make optimal use of development opportunities;
- minimize negative externalities on existing development;
- safeguard ecological processes;
- ensure equitable distribution of benefits for poverty alleviation.

The specific objectives of the plan are to:

- translation of outputs from upper tier plan at Regional Plan to integrate coastal zone with the mainstream of development process of the country;
- assess functional and land use requirement for a Regional Plan in area with hazard vulnerability;
- formulate Strategic Development Plan for Regional Plan considering functional and land use requirement with hazard vulnerability;
- formulation of urban area plan and action plan at local level;

Project Area Status

Landform, Soil, and Agriculture:

The planning area mainly falls under the Ganges Tidal floodplain which is at risk of being affected by the sea level rise due to climate change. Forests in the planning area are not much prominent and mostly are reserved areas.

Hydrology and environmental characteristics

A diverse nature of flora and fauna and several trees from the Sundarbans can be found here and these are being affected by over exploitation, deforestation, inefficient forest management, agriculture and industrial pollution. Main crops of the area are rice, wheat, jute, pulses etc. The Upazilas are also crisscrossed by numerous rivers and contains large number of pond areas.

Basic services

Most households have kutchha houses and water sources are tap, tube-well and others. According to census data of 2011, the Upazilas are mainly served by Tube-Well for the purpose of drinking water in both urban and rural areas. Both urban and rural areas suffer from a lack of sanitary toilet facilities to some extent. There exists a disparity between urban and rural areas of Patuakhali and Barguna district. There are not many private health facilities in the planning area.

Vulnerabilities and Challenges

People in the Payra-Kuakata region live in an extremely dynamic estuarine environment facing such threats as: cyclone and storm surge, land erosion, flood, drainage congestion, salinity intrusion, drought, tectonic process and deteriorating coastal ecosystems. Besides, there are threats of climate change and upstream effects, and water uses. These threats affect almost every aspect of life and limit livelihood choices of the people.

These vulnerabilities create a context of insecurity, which in turn, discourage investments, limit economic activities and squeeze employment opportunities. An effective disaster warning system is being developed and comprehensive disaster management program (CDMP) is being implemented. Agricultural activities suffer greatly by different degree of water and soil salinity as well as lack of safe drinking water. The water supply sector has achieved commendable success over the last few decades; overall about 95 percent of the population now has access to water from tube-wells, taps or ring-wells. The coastal zone of Bangladesh experiences extensive ecosystem degradation. Some of the interventions to cause degradation are drainage for agriculture; dredging and canalization for navigation; conversion of land for aquaculture, commercial, industrial or residential purposes;; construction of dykes for flood control and irrigation and other structures; discharge of pesticides and herbicides; disposal of solid waste, domestic and industrial waste; agricultural runoff and sedimentation; ; hydrological alternation by canals; building of roads and other structures; and subsidence due to extraction of groundwater.

Assessment and Development of Socio-Economic Facilities

One major problem is the disparity among the Upazilas in terms of service facilities. In this study the need for a facility has been determined based on population threshold for that facility. The facilities have been broadly categorized into four groups:

1. Educational facilities: Primary schools, high schools, and Madrashes.
2. Commercial facilities: Growth Centres and Rural Markets.
3. Health facilities: Upazila Health Complexes/Hospitals, Family Welfare Centres and Community Clinics.
4. Disaster management facility: Cyclone Shelters.

Land Use Suitability Analysis for Urban and Infrastructure Development

In the present study, several suitability analyses have been done considering different impacts and every suitability analysis has been sub categorized into logical sub parameters observing its extent. The major suitability analyses are outlined below:

- Agricultural Suitability;
- Hydro-Geological Suitability;
- Flood Depth Analysis;
- Urban Land Use Suitability;

Urban Suitability analysis has been done after taking into consideration of all suitability analysis mentioned above and a composite land use/infrastructure suitability map has been prepared based on various types of suitability analysis. According to the map, most of the area is moderately suitable (approx. 33.31%) to poorly suitable (approx. 35.35%) for infrastructure development.

Development Potentials of the Upazilas

A union level multi-criteria analysis shows the potential areas for development and the criteria are- Road length in the union, Structure frequency in the union, Number of various socio-economic facilities available in the union, and Population size of the union. By combining these criteria, an index value was developed and based on the index values, 14 unions or pourashavas were found to be of high development potential.

18 pourashavas or union were found to be moderately potential for development. A further analysis was performed to identify the potential location for eco-town development. All eco-towns should comply with planning policy statements including those relating to sustainable development such as: climate change adaptation, pollution control, open space, biodiversity, transport, and flooding, housing and economic development. Excluding Payra port area and 10-minute walking distance buffer area, flowing suitable areas has been identified.

Tourism Development

Payra-Kuakata region offers ample opportunities for creating facilities for tourists. The region is home to unique flora and fauna and possesses many panoramic views beauties. Forests, beaches, lakes and rivers make the region ideal place for ecotourism development. Based on various locations that could be attractive for tourists, a composite tourist zoning map has been prepared that identifies 13 zones which have important characteristics that may attract tourists both domestic and international. Three of these locations are attractive because of high quality beach, five have a combination of forest and char (small island) and another five have both beach and mangrove forest. For proper development of these zones recommendations have been made for provision of adequate and proper Tourist Service Infrastructure for attracting tourists from home and abroad.

Transportation System Development

A comprehensive plan is to promote tourism and to enhance socio-economic and infrastructural development as such transportation network needs to be developed and regional connectivity well established. The transportation model suggests that the proposed land use change will significantly increase vehicular movement in the network for the future scenario, i.e., expansion of road network can handle the future traffic demand and the network will not be congested, i.e., decent operating speed can be achieved. This also justifies that the proposed road network is sufficient. Recommendations have also been made to improve the water transportation system by addressing the problems related to (i) siltation, (ii) day & night navigational problems, (iii) shortage of passenger & cargo handling facilities including transit shed at river ports, (iv) Presence of manual loading/unloading of cargo at river ports, (v) underdeveloped rural launch landing stations, inadequate number of watercrafts etc.

Payra Port development and its impacts in the Region

The Payra Port Authority and the port were established on 19 November 2013 through the Payra Sea Port Act 2013, started commercial operations from August 2016 under the port authority. Payra deep seaport is still under construction. It is situated in the Southern part of Bangladesh, in Patuakhali District's Kalapara Upazilla. The port and related facilities (airport, free trade zone etc.) would employ about 13000 people in different sectors. Total employment (direct and indirect) in the new township adjacent to the port may be 43,550 with a total population of about 1,26,000.

Economic Growth Potentials of Upazilas

Taltali and Amtali upazila are revealed to be fast-growing in terms of regionally located advantages. From economic base analysis, Taltali upazila has grown substantially from 2003 period with the second highest percentage increase in employment (116%) which is faster than other upazilas. When the basic employment of the sectors is observed, it is seen that the Education sector has the greatest number of basic employments indicating this sector serves people coming from outside the region most among all the sectors. From the shift-share analysis, it was found that only Amtali upazila can be considered Fast-Growing in terms of regional growth. Other upazilas are lagging the national growth. All the upazilas are found to be Slow-Growing region in terms of Industry Mix (IM).

Strategies for Regional Development

Mitigating Natural Disasters

In order to address the increasing risks pertaining extreme events due to climate change such as cyclone, storm surge, coastal flood, windstorm etc., a substantial magnitude of public investment program is required. The purpose is to create resilient infrastructure, including drainage and flood control, water supply, sanitation, cyclone shelters, emergency access roads and bridges, slum improvements, bus terminals, boat landings, and markets. All the projects selected for such programme should be assessed considering effects of climate change based on agreed technical criteria and climate projections for 2040. Institutional capacity to integrate climate and disaster risks into urban and regional planning and infrastructure management also need to be addressed. The priority investment program for mitigating natural disasters and ensuring safety and protection of the coastal population should focus on the following: Coastal embankment construction and rehabilitation, Flood control and drainage, and Infrastructure and urban services.

Integrated Development of the Region

The Payra-Kuakata region includes environmentally sensitive areas which need protection from harmful human intervention. At the same time, development activities are also needed for poverty reduction and livelihood activities which requires formulation and enforcement of integrated development plan. The focus areas are: Management of the coastal environment including its protection and regeneration, management of the water resources in the region, facilitating sustainable economic development of coastal communities, development of productive economic activities, development of infrastructure, and development of social facilities including education, health, water and sanitation, mitigation of natural disasters.

Investment and Implementation

For the development of the coastal zone, two sectors – tourism and fisheries, are identified where investments in projects can be done. For investment, among others mitigation measures, environment management and water resource management, should be prioritized. Implementation of these strategies require the support of national and local government budgets, private investment (including foreign investment), NGO program resources, and multilateral and bilateral donors.

3.1.4 Screening and Selection of Relevant Sectors and PPPs

Screening is the process of deciding whether a policy, plan or programme (PPP) requires a SEA. In this case UDD-GoB already made the decision to prepare a SEA of the Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP). At first, this comprehensive plan is framed by the regional plan which then will be drawn upazila-wise structural plan. Therefore, observing and understating the types of the interventions and their degree of the development, this study will identify the PPPs in respect to the major sectors and its cross-cutting issues in the region.

Though there is a regional plan developed by the UDD, but the report itself is unable to express the major environmental and socio-economic components/sectors of the area. Therefore, the study team will identify the major key sectors at first visiting the study area and relating the regional development plan with the existing natural resources and secondly sitting with the relevant department, line agencies, ministries and formal and informal stakeholders. These key major sectors are linked with many sectoral aspects and as per the international practice those sectoral aspects should be included to assess the environmental and socio-economic impacts of the regional developmental plan.

These PPPs will then be screened to determine which ones are likely to have significant environmental and/or socio-economic impacts, and therefore will be included in the assessment process.

At this inception stage the team has preliminary identified a number of PPPs potentially relevant to this SEA which are listed in Table 3.1 below.

Table 3.1: Preliminary List of PPPs

Sector	Name of PPP / Mega project
Nine key sectors identified in ToR	
Forestry	Forestry Policy 1994
	National Forest Policy 2016 (draft)
	Forestry Master Plan, 1995-2015 (being updated)
Fisheries	National Fisheries Policy 1998
	National Shrimp Policy, 2014
	The Shrimp Mohal Management Policy, 1992
	The National Fisheries Strategy (2006)
	New Fisheries Management Policy (NFMP), 1986
Water	National Water Policy 1997, 1999
	National Water Management Plan 2001, 2004
	National Strategy for Water Supply and Sanitation (2014)
	Public Water Body (Jalmahal) Management Policy (PWBMP), 2009
Power and energy	Power and Energy Sector Strategy Paper (SSP), September 2018 Programming
	Power & Energy System Master Plan 2016
	Intended Nationally Determined Contributions (INDC), September, 2015
	The Power and Energy Sector of Bangladesh: Challenges of Moving beyond the Transition Stage, 2019
	The Alternative Power and Energy Plan for Bangladesh, 2017
	Energy Efficiency and Conservation Master Plan up to 2030, (2015)
	Gas Sector Master Plan 2018
Tourism	National Tourism Policy 2010
	Tourism Master Plan 1988 (being updated)
	Bangladesh Tourism Vision 2020
Urbanisation	National Urban policy 2011 (draft)
	Integrated Development Plan of Payra Development Authority
Industry	National Industrial Policy 2016
	National Policy for the Management of Radioactive Waste and Spent Nuclear Fuel-2019
	National Textile Policy 2017
	Leather and Leather Products Development Policy, 2019
	Development Plan of Payra Energy Hub
Transport/communication	Integrated Multi-Modal Transport Policy 2013
	National Land Transport policy 2004
	Road Master Plan 2009
	Railway Master Plan (2010-2030)
	Concept Paper for Dredging and Re-excavation of River, Canal and Pond in Bangladesh, 2017

Sector	Name of PPP / Mega project
Shipping	National Shipping Policy 2000
	Payra Port Development Plan of Payra Port Authority
Other sectors	
Environment	Protected Area Management Rule, 2017
	National Biodiversity Strategy and Action Plan for Bangladesh (NBSAP),B), 2004 (under updating)
	Country Investment Plan (CIP) for Environment Forestry and Climate Change (2016-21)
	National Adaptation Plan of Action (NAPA) – for climate change, 2005, updated 2009
	Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009
	Bangladesh Climate Change and Gender Action Plan (ccGAP) 2013
	National Adaptation Plan (Draft), 2022
	National Environment Policy, 2013
	e-waste Policy, 2017 (Draft)
	National Environment Management Action Plan (NEMAP) 1995
	Environment Forestry and climate Change National Action Plan, 2017 (2016-2021)
National Policy for Arsenic Mitigation 2004	
Agriculture	National Agriculture Policy, 2018
	National Organic Agriculture Policy, 2016
	Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012
	New Agricultural Extension Policy, 1996 (proposed upgradation, 2015)
	National Agricultural Extension Policy (NAEP) 2012
	National Livestock Extension Policy, 2013 (Final Draft)
	National Livestock Development Policy, 2007
	National Integrated Livestock Manure management Policy, 2015 (Draft)
	National Milk Development Policy, 2016
	National Poultry development policy, 2008
	National Integrated Pest Management Policy, 2002
	Pesticide Rules, 1985
	National Seed policy, 1993 (proposed upgradation, 2018)
	Agricultural Ground Water Management policy, 2019
Seed Rules, 1997	
Integrated Minor Irrigation Policy, 2017	
Cultural affairs	National Cultural Policy 2006
Defence	National Defence Policy (draft) 2018
Disaster management & relief	National Plan for Disaster Management 2010-2015
Economy	Export Policy, 1997-2002
	Sector Development Framework -2004
Education	National Education Policy 2010
Food	National Food Policy, 2006

Sector	Name of PPP / Mega project
	The National Food Policy Plan of Action (2008 - 2015)
	National food and nutrition safeguard policy, 2020 (Proposed)
	Bangladesh Second Country Investment Plan Nutrition-sensitive food system (2016-2020)
Health & family welfare	National Health Policy (2011)
Housing & public works	Regional Plan of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism
Land	National Land Use Policy, 2001
Local government, rural development and cooperatives	National Rural Development Policy -2001
Population	Bangladesh Population Policy, 2012
Posts, telecommunications & information	Right to Information Policy 2009
	Right to Information Strategic Plan (2015-2021)
	National ICT Policy 2009
Poverty	Pro-Poor Strategy-2005
	Poverty Reduction Strategy of 2005
Science & technology	National Science and Technology Policy 2011
Waste management	The National Sanitation Strategy 2005
	National Water Policy 1999
Women and children affairs	National Women Development Policy 2011
	National Children Policy 2011
	National Action Plan on Women, Peace and Security- 2019-2022
National and cross-sector plans	
	Eighth Five Year Plan, FY 2020-2025
	National Sustainable Development Strategy (2010-21), 2013
	Sustainable Development goals, (SDGs)
	National Land Use Policy, 2001
	Bangladesh Delta Plan 2100
	Investment Program, Bangladesh Delta Plan 2100
	Perspective Plan for Bangladesh: 2010-2021
	Second Perspective Plan of Bangladesh (2021-2041)
	Mujib Climate Prosperity Plan (for 2030), 2021
	Integrated Resources Management Plan for the Sundarbans (2010-2020)
	Coastal Zone Policy 2005
Projects and mega projects	
Infrastructural Development Projects	<ol style="list-style-type: none"> 1. Payra Power Hub 2. Payra Port 3. Padma Bridge 4. A total of 48 Infrastructural Development Project in the Patuakhali-Kuakata region listed in the Regional Plan (Figure 2.2)

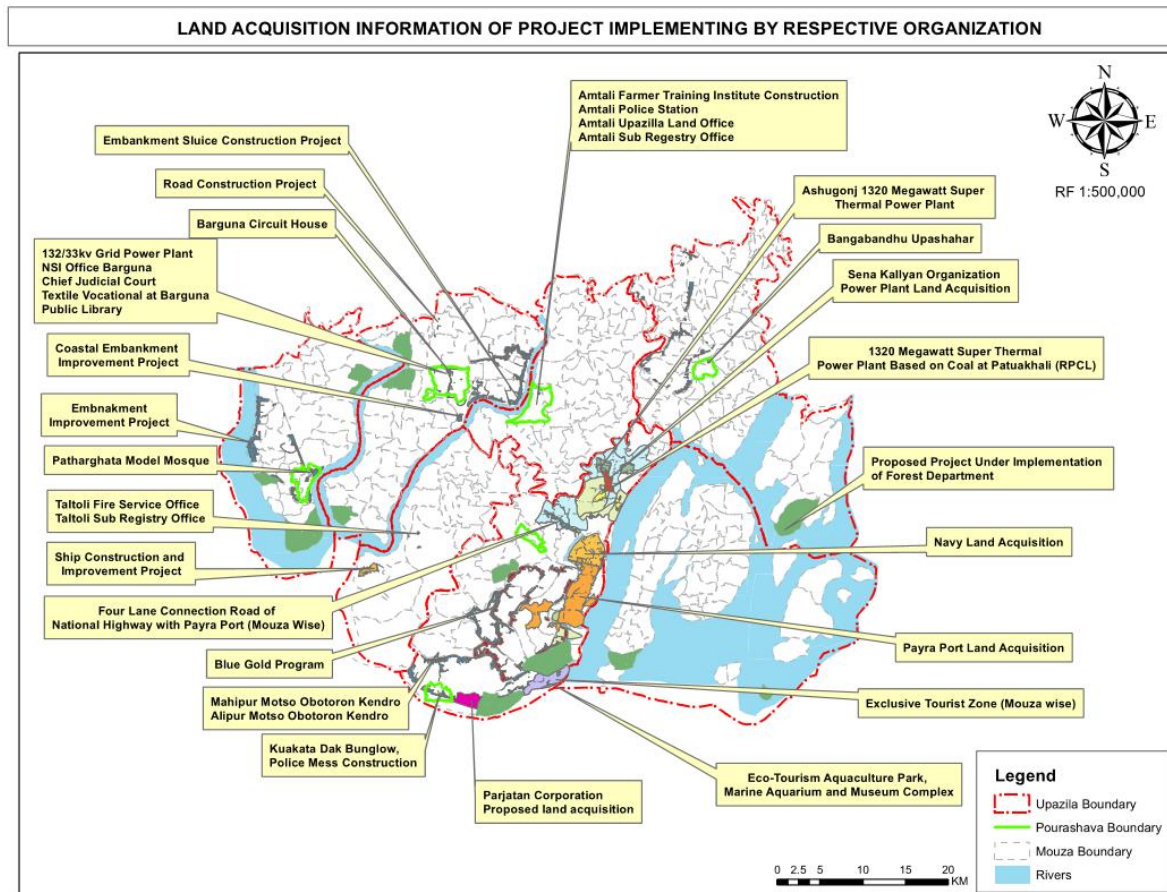


Figure 3.2: Ongoing Infrastructural Development Project in the Patuakhali-Kuakata Region

The preliminary list of the PPPs would be further updated and screened for final selection following the screening methodology described in the Table 3.2 below.

Table 3.2: Methodology of Screening PPPs

PPP	Environmental Impact (-ve)			Social Impact (-ve)		
	High	Medium	Low	High	Medium	Low
PPP-1						
PPP-2						
PPP-3						

3.1.5 Selection of Relevant Stakeholders and the Engagement Plan

A key principle of SEA is that it should be a participatory process, which enables concerned stakeholders - including those organisations and individuals have a significant interest in a policy, plan or programme (PPP), and those who are likely to be directly or indirectly affected by the PPP - to raise issues of concern to them, and to contribute inputs to strategic decision-making in a meaningful way. Typically, stakeholders fall into three categories, those who (i) can influence, (ii) will be affected by, and (iii) are involved in PPPs.

One of the initial steps in the SEA process will be to undertake 'stakeholder analysis' to help understand the power relations between different actors, their influences on the PPPs and, conversely, how the PPPs influence them, and also their mutual interactions with regard to the changing circumstances.

The objectives of the SEP are:

- To outline stakeholder consultation and communication activities throughout the SEA,
- To identify the key stakeholder groups, and
- To identify resources needed and length of time to achieve effective participation in each stage of the process.

The SEA in this case will assess at a strategic-level, the cumulative impacts of the SoPs in the PKCPs area of influence. It needs to take into account the representative views of the relevant stakeholder groups. The Stakeholder Engagement Plan (SEP) will be designed in accordance with best practice.

The steps of stakeholder engagement will be as follows:

Determining 'stakes' in relation to PPPs

Stakes refer to the likely environmental, social or economic consequences of implementing PPPs, i.e. how they will likely impact on and influence physical, biological, environmental and social conditions and resources in the study area. These stakes will be determined by reviewing relevant literatures relevant to the SW region (such as policies, plans, programs/project documents, study reports, articles etc.), consulting with the concerned officials/representatives of targeted sectors and other relevant sectors through expert judgment and discussions among the SEA study team, etc.

Identifying potential stakeholders

An initial listing of stakeholders will be made, covering all relevant sectors and levels (national to local). Additional stakeholders may be included as the study proceeds and they are identified.

Typically, stakeholders are categorized as primary, secondary, and tertiary; as well as, internal and external. However, for this study, it may be difficult to use this approach due to the uncertain nature of roles, powers and interests. Therefore, all stakeholders will be classified according to a 'continuum of interacting layers':

- **policy** (top) layer: organisations and individuals who set visionary goals and are involved in policy-making, e. g. the legislative body of government, policy-makers, national and international NGOs, intellectuals, etc.
- **institutional** (mid) layer): the implementing departments of the government and non-government, especially all key sectors. Relevant officials from these sectors will be consulted throughout the study process;
- **local** (bottom) layer: local people, local government representatives and private sector entities.

These layers are summarised in Figure 3.3.

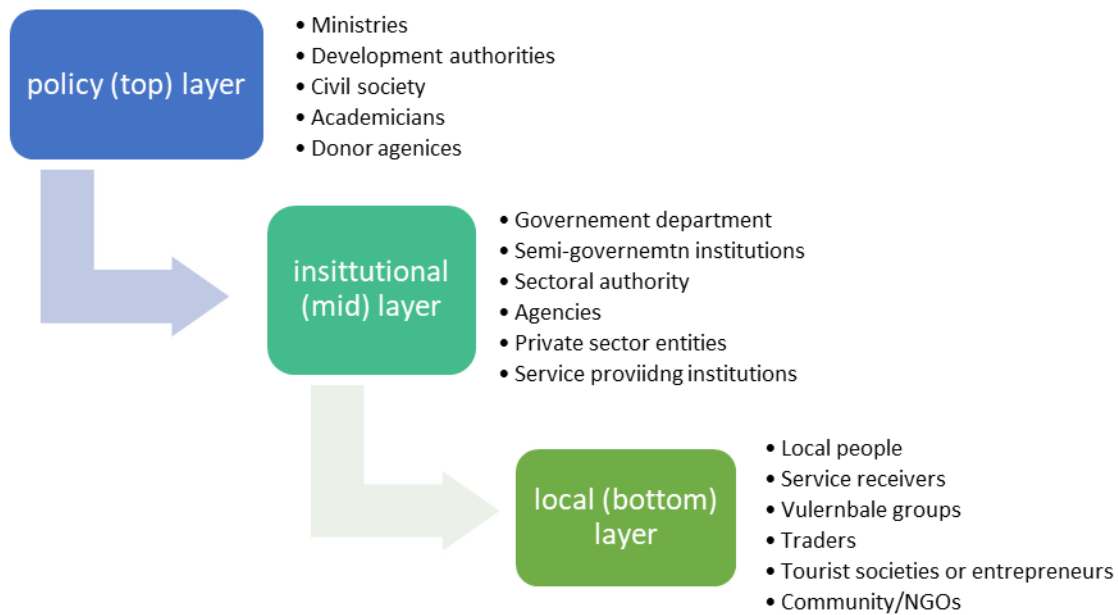


Figure 3.3: Stakeholder Continuum

Mapping Stakeholders

Stakeholders falling into the above layers will be mapped out using a ‘power-interest continuum’ (Figures below). Here, the X axis reflects the power of stakeholders (low-medium-high) to influence the Master plan or sectoral plans; and the Y axis reflects the interests of stakeholders (low-medium-high). This analysis will help to identify stakeholders including their influence and interests.

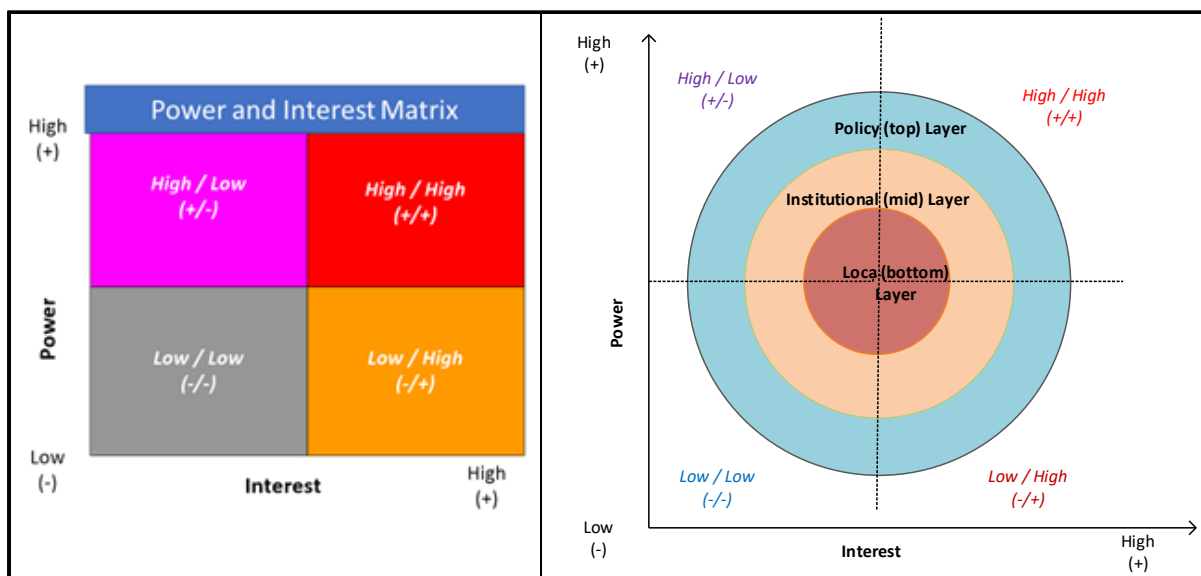


Figure 3.4: Stakeholder Mapping Framework

Analyzing Stakeholders

All identified and mapped out stakeholders will be analyzed with a matrix given below. All stakeholders from related sectors will be put together by layers—policy (top) layer, institutional (mid) layer, local (bottom) layer—and analyzed in terms of their interests and influences or power. The degrees of interest and power/influences will be ranked as high, medium and low. Alongside, each degree of power/influence and interest will be interpreted textually.

Table 3.3: Stakeholder Analysis Framework

Component /Sector	Stakeholders	Interest		Influence/power	
		Degree*	Interpretation**	Degree	Interpretation
Tourism	Policy (top) layer				
	• Ministries				
	• Development authorities				
	• Civil society				
	Institutional (mid) layer				
	• Government department				
	• Sectoral authority				
	• Private sector entities				
	• Service providing institutions				
	Local (bottom) layer				
	• Local people				
	• Service receivers				
	• Tourist societies or entrepreneurs				
	• Vulnerable groups				
	• Community/NGOs				

* Degree refers to: H= High, M= Medium, L= Low; ** Textual interpretation of power and interest

Stakeholder engagement will be organized as follows. Following types of consultations will be carried out:

National level consultation

One round of national-level multi-stakeholder level dialogues/consultations will be carried out, involving organisations/individuals representing all types of stakeholders (policy, institutional and local layers).

District level consultations

Two district level consultations in Barguna and Patuakhali will be carried out. This consultation will be for multi-stakeholders.

Upazila (sub-district) level consultations

The study area covers seven Upazilas or sub-districts. Consultations will also be carried out in all of these Upazilas. These consultations will be multi-stakeholders.

Key Informant Interviews

One or more interviews (as required) will be conducted with officials/individuals from relevant government departments who are involved in implementation, non-government organizations, bodies representing interest groups, and influential and knowledgeable individuals (at national to local levels). Semi-structured questionnaires will be used.

Informal interviews

Semi-structured and informal interview will be conducted with local people on a random basis during field visits to better understand existing conditions other issues.

Focus Group Discussions (FGDs)

A number of FGDs will be conducted with homogeneous occupational groups, who have been affected and/or likely to be affected by the Master plan or sectoral plans. These groups will be identified based on

their type of occupations (e.g. farmers, fisher folk), their particular locations (e.g. in or near sensitive areas or industries), and the likely impacts on them across all relevant sectors.

The implementation of SEP will contain the following:

- Describe regulatory and/or other requirements for consultation and disclosure;
- Identify and prioritize key stakeholder groups;
- Provide a strategy and timetable for sharing information and consulting with each of these groups, this will include a plan of how the consultation process will be undertaken;
- Describe resources and responsibilities for implementing stakeholder engagement activities.
- Describe how stakeholder engagement activities will be incorporated into the PKCP;

The Consultant will develop a number of interview guides that will cover the spectrum of activities to be covered in the SEA, with key experts developing a manner of questions that will enable clear answers. The questionnaire will be used in the field by teams that will approach the stakeholders for responses.

Where relevant announcements will be made (in English and local language, as appropriate) on local media about the SEA and how stakeholders can submit views, comments and information, or attend meetings.

An outline of the content of the SEP for PKCP SEA is shown in table 3.4 below:

Table 3.4: Outline of the Content of the Stakeholder Engagement Plan

SL.	Chapter Title	Description of Contents
1	Introduction	Description of the PKCP including design elements and potential social and environmental issues. A map will be including showing the spatial extent of the area.
2	Regulations and Requirements	A summary of the legal and regulatory requirements pertaining to stakeholder engagement applicable to the PKCP. This may involve public consultation and disclosure requirements related to the social and environmental assessment process.
3	Summary of any Previous Stakeholder Engagement Activities	A summary of the type of information disclosed, in what forms (e.g. oral, brochure, reports, posters, radio, etc.), and how it was disseminated. The locations and dates of any meetings undertaken to date. Which individuals, groups, and/or organizations that have been consulted. Key issues discussed and key concerns raised. GoB response to issues raised, including any commitments or follow-up actions. The process undertaken for documenting these activities and reporting back to stakeholders.
4	Project Stakeholders	List the key stakeholder groups will be compiled and will include persons/group that: <ul style="list-style-type: none"> • Are directly and/or indirectly affected by the PKCP; • Have “interests” in the PKCP that determine them as stakeholders; • Have the potential to influence PKCP outcomes or operations;
5	Stakeholder Engagement Program	This chapter will contain a summary of the purpose and goals of the program. It will provide a description of the information that will be disclosed, in what formats and the types of methods that will be used to communicate this information to each of the stakeholder groups identified in Chapter 4. This may include: <ul style="list-style-type: none"> • Media such as newspapers, posters, radio, television; • Information centres and exhibitions or other visual displays; • Brochures, leaflets, posters, non-technical summary documents and reports;

SL.	Chapter Title	Description of Contents
		<ul style="list-style-type: none"> • Methods used to consult; • Views of women and minorities; • Engagement activities and participatory processes;
6	Timetable	Schedule outlining dates and locations when various stakeholder engagement activities, including consultation.
7	Resources and Responsibilities	Indication of staff and resources devoted to managing and implementing the SEP.
8	Grievance Mechanisms	Process by which people affected by the PKCP can bring their grievances.
9	Monitoring and Reporting	Plans to involve project stakeholders (including affected communities) in the monitoring of project impacts and mitigation programs.
10	Management Functions	Indication of how stakeholder engagement activities will be integrated into the implementation of the PKCP.
11	Annexes	Questionnaire responses (if applicable).

3.2 Implementation of SEA

3.2.1 Environmental and Social Baseline Survey and Data Collection

The 2018 Inception Report on Socio-Economic & other related Survey under “Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)”, provides an initial overview of certain components of the environment. This study will generate a detailed baseline on the relevant sectors and its associated sub-sectors. However, the ToRs list the following as key environmental and, to a lesser extent, social concerns:

Table 3.5: Key Environmental Concerns

Environmental issues and concerns	Comment /examples of potential impacts
<p>1. <i>Pollution and waste (solid and liquid):</i></p> <ul style="list-style-type: none"> • Surface water pollution. Brackish and sea water • Groundwater pollution • Air pollution • Oil • Waste treatment and disposal • Plastics 	Pollution & waste management is a major concern for the ecological integrity of the SWR of Bangladesh and the Sundarbans due to different developmental initiatives.
2. <i>Water flow dynamics in rivers</i>	Reduction of water flow in rivers of SWR may change the region's economic sustainability/integrity as well as livelihood patterns and crop production.
<p>3. <i>Sedimentation and siltation (fluvial and tidal)</i></p> <ul style="list-style-type: none"> • Dredging and disposal 	Sedimentation and siltation management is a challenge to maintain river flows. Disposed dredged materials can affect the regeneration of trees & survival of existing forests as well as benthic aquatic biodiversity.
<p>4. <i>Salinity:</i></p> <ul style="list-style-type: none"> • Groundwater • Soil 	Due to reduced flow of upstream fresh water and channel siltation, and resultant sea water intrusion/inundation, soil and groundwater salinity has increased and soil productivity has decreased as well as livelihood diversity
5. <i>Noise</i> - particularly due to shipping in the rivers, especially in Rabanabad Channel	Noise from the regular movement of ships (notably along major rivers of the project area) can disrupt wildlife movement, cause localisation of populations and result in inbreeding.

Environmental issues and concerns	Comment /examples of potential impacts
6. <i>Habitat isolation</i>	Increased numbers of vessels passing along the navigable channels, the noise they cause and use of lights at night may also disrupt the dispersal of fauna. These factors tend to disturb animal behaviour (eg feeding, breeding) and may lead to genetic isolation and also threaten effective biodiversity conservation.
7. <i>Loss of biodiversity</i>	Some environmental as well as regional & local activities may affect biodiversity, with loss of keystone species and their prey base due to poaching and habitat degradation as a result anthropogenic activity. Biodiversity losses may also occur due to climate change and natural dynamic changes in the ecosystem.
8. <i>Invasive alien species</i>	Water hyacinth has become a major problem, clogging baors and ponds, and some water channels. Prosopis Juliflora is also spreading on embankments although it is used as a fuelwood by local people. At present, however, forest managers are concerned about their potential future spread and impacts.
9. <i>River bank erosion – due to port expansion and boats</i>	River bank erosion is a particular concern in the project area due to bow waves from the increased numbers of fast-moving ships and due to river bed siltation, formation of new islands and changed river courses, as well as increasing sea water inflow in this area.
10. <i>Climate change</i> <ul style="list-style-type: none"> • Sea level rise • Salt water intrusion • Erratic rainfall & distribution • Increased average temperatures • Cyclones & storm surges • Greenhouse gas emissions 	<ul style="list-style-type: none"> • Sea level rise is a global threat that will impact on the region. • Many factors have reduced river flow in the region, decreasing flushing time, with increased periods of saltwater exposure. • Shifting of monsoon with erratic rainfall has impacted on the cropping season and pattern. • There is no evidence of significant increased temperatures yet, but climate models predict a significant increase in the future. • Cyclones making landfall impact on livelihoods (killing people and causing damage). Cyclone frequency has decreased but may rise in the future. • Rapid industrialisation and urbanisation is likely to lead to increased carbon dioxide emissions from power and energy sector (including transport). Expansion of flood-irrigated paddy rice has increased methane emissions.
11. <i>Exceptional floods (with potentially damaging water levels):</i> <ul style="list-style-type: none"> • Freshwater floods (due to rain) upstream • Tidal • Poor drainage infrastructure 	Freshwater flooding may occur due to: heavy rain in the upstream/catchment areas of this area, lack of drainage infrastructure and high tidal flow.
12. <i>Industrialisation:</i> <ul style="list-style-type: none"> • Power generation – oil, gas, coal • Pipelines • Petroleum • Cement • Special economic zones 	Industrialization of the inland parts of this area can create air & water pollution as well as other potential impacts on biodiversity & livelihoods of the region. Hilsa fish breeding ground is facing threats.
13. <i>Urbanization</i>	Rapid urbanization as well as in the environmentally critical area can affect the extent of air & water pollution and agricultural productivity etc.
14. <i>Land use changes</i>	Land use changes are arising due to population & economic growth of this area, e.g. shrimp cultivation, infrastructures & urbanization, etc.

Environmental issues and concerns	Comment /examples of potential impacts
	Impacts of this include loss of biodiversity, reduced soil productivity and loss of livelihood opportunities.
<p>15. <i>Livelihoods:</i></p> <ul style="list-style-type: none"> • Conflicts between economic sectors • Access to resources (e.g. in Sundarbans) • Salinity 	<ul style="list-style-type: none"> • Salinity intrusion causes conflicts, e.g.: shrimp cultivators vs crop producers; powerful/rich land controller's vs the powerless, smallholder and marginalized people, etc. • Access by forest-dependent people to forest resources (to support their livelihood options) is limited so as to prevent exploitation and to maintain a sustainable flow of resources. • Causes health problems (e.g. skin conditions), reduces drinking water quality – impairing people's ability to work, and affects crop production, etc.
16. <i>Out-migration</i>	Both involuntary and economic out-migration (mainly poor people) is common in this area. Much is driven by disasters, indebtedness, dispossession/land grabbing, lack of livelihood options, etc. Poor people move to unhealthy urban slums and become further marginalised in an uneven job market. Some educated people move to urban areas /overseas for employment. Migrant remittances can supplement family incomes and contribute national economy.
<p>17. <i>Health & sanitation:</i></p> <ul style="list-style-type: none"> • Water-borne, respiratory & salinity-related diseases • Diet • Negative health impacts of air pollution (mainly pollution by particulate matter) • Inadequate health facilities and access • Arsenic contamination (of drinking water & irrigated rice) 	<ul style="list-style-type: none"> • Local people, especially children and elderly people, are particularly susceptible to water-borne, respiratory and salinity- related skin diseases. • Poor diet causes malnutrition. • The dominant way of cooking causes indoor air pollution which has a serious impact on human health. • Health service providers are based in city/urban and peri-urban areas. They are not easily accessible by people and/or emergency patients living in remote areas, due to poor communication networks. • Lack of public toilets in urban and semi urban areas. As a result, local people, especially women face problems during public gatherings and at local markets. • This is a serious issue in parts of the Ganges River floodplain and the northern part of the tidal floodplain.
18. <i>Gender-related issues</i>	Women face socio-political exclusion in decision-making processes - both in the home and society. They also bear a heavy burden for collecting potable water, Women often encounter security problem while travelling alone to/from remote areas.
<p>18. <i>Education:</i></p> <ul style="list-style-type: none"> • Low environmental awareness • High male dropout 	<ul style="list-style-type: none"> • Males from poor households need to support family income, resulting in high drop out and/or lower attendance at school. • Poor communication network in the rural area often discourages school attendance.
19. <i>Loss of traditional knowledge</i>	Technological advancement & other development activities may be causing loss of traditional knowledge.
20. <i>Loss of cultural heritage</i>	Lack of proper maintenance & negligence due to low revenue return, inadequate budget allocation, etc.
21. <i>Security – kidnapping of resource extractors</i>	Kidnapping of forest produce extractors for ransom is an important issue for the management of the forest.
22. <i>Seasonal tourism</i>	Uncontrolled tourism causes loss of biodiversity, disruptive noise and water pollution etc.

Environmental issues and concerns	Comment /examples of potential impacts
<p>23. <i>Illegal activities:</i></p> <ul style="list-style-type: none"> • Poaching and hunting • Poison fishing • Illegal tree cutting • Trafficking of wildlife products • Corruption 	<p>These issues are of major concern in this area, causing loss of habitat and biodiversity (terrestrial & aquatic) & economic loss for communities.</p>
<p>24. <i>Institutional issues</i></p>	<p>Lack of manpower, capacity development & logistics are major institutional issues – impeding environmental management (In general).</p>

Each of the relevant environmental issues and concerns will be detailed out respecting the aspects of-

- Past trend to present status;
- Impacts;
- Management framework and current practices etc.;

To do so, each of the environmental and socio-economic issues will be detailed out using secondary information generally. However, the primary environmental and ecological data will also be used those are being collected under this study as per the ToR. The details plan for the environmental and ecological data collection are attached in Appendix E.

The secondary information and data collection sources will be but not limited to-

- Relevant department, line agencies and ministries;
- Relevant formal and informal stakeholders;
- Project documents from government and non-government line agencies;
- National governmental and public-private partnership websites, database, knowledge hub etc.;
- Information from client's project document;
- CEGIS archives;
- World database and information centers;
- Research documents from universities and institutional entities;
- Access to national and international peer reviewed journals, articles and other documents;

3.2.2 *Thematic Baseline Papers*

As part of scoping, the team will prepare a series of baseline papers. The ToRs require 13 baseline theme papers, which are outlined in the following Table 3.6.

Table 3.6: Outline of the Thematic Baseline Papers

SL	Topics of thematic baseline papers	Scope of paper (beyond the common sections mentioned above)
1	Climate and climate change	<ul style="list-style-type: none"> • Baseline climate of project area and related issues; • Review of evidence for climate change, trends, projections; • Climate change scenarios; • Potential climate change impacts; • Adaptation and mitigation measures.
2	Pollution and waste	<ul style="list-style-type: none"> • GHG emissions; • Pollution: air, water, soil, noise – impacts and futures scenarios; • Waste and waste management – municipal, rural, industrial, agricultural, e-waste, wrecked, cars, waste oil, plastics, hazardous waste (e.g. obsolete pesticides) and recycling
3	Delta morphology, river dynamics, floods and water management	<ul style="list-style-type: none"> • Hydrological setting: river system, freshwater, water levels, tidal and drainage characteristics, future projections; • Morphological setting: river planform analysis, coast line changes, sedimentation, projections for erosion/accretion; • Natural disaster: floods, cyclones, tidal surges; • Development of water infrastructure; • Present and future risks; • Future plans to mitigate potential risks.
4	Land resources	<ul style="list-style-type: none"> • Physical conditions: geography, physiography, land types, geology, hydro-meteorology; • Agro- and bio-ecological regions and land cover; • Soils; • Land resources management practices: agriculture, fisheries, forestry; • Major challenges ;
5	Ecosystem and wildlife conservation	<ul style="list-style-type: none"> • Landscapes; • Protected areas and sanctuaries; • Flora and fauna; • Management of the existing ecosystems; • Extraction of resources; • Challenges and issues.
6	Tourism	<ul style="list-style-type: none"> • Status of tourism industry: major attractions and spots; facilities; limitations of sector development; visitor numbers and capacity; community involvement, culture tourism; • Development potential/future prospects for tourism: ecotourism, cultural tourism, archaeological & historical tourism, riverine & rural tourism; • Impacts of COVID-19 on tourism.
7	Fisheries, agriculture and other land uses	<ul style="list-style-type: none"> • Land use data; • Determinants of land use; • Land use policy; • Agriculture; • Forestry; • Fisheries; • Cities, towns and settlements; • Land use change and its impacts.
8	Infrastructure	<ul style="list-style-type: none"> • History & background information on infrastructure and communications; • Current infrastructure estate and trends (2011-2020);

SL	Topics of thematic baseline papers	Scope of paper (beyond the common sections mentioned above)
		<ul style="list-style-type: none"> • Road transport; • Water transport: inland water ways, navigation and shipping; • Communications; • Other infrastructure; • Summary of five-year and two-year plans; • Projections for transport sub-sectors; • Mega projects.
9	Power and energy	<ul style="list-style-type: none"> • Basic information: energy sources, consumption, production, infrastructure (power plants and networks), indicators, impacts, accidents, etc.; • Outlook: projections of energy production and consumption; intended new power plants, networks, pipelines etc.; • Air pollution (current status and outlook); • GHG emissions (current status and outlook).
10	Urbanization	<ul style="list-style-type: none"> • Background; • Cities and towns, functions and services: locations; land uses; • Trends and challenges: area & population; urbanization and land use changes; urbanization trends; key issues; waste management; air quality; transport; • Impact of urbanization; • Ongoing and proposed projects related to urbanization.
11	Economic and industrial development in the project area	<ul style="list-style-type: none"> • State of the economy: employment; food security; exports/imports; prices; incentives; • Taxation and subsidy policies; • Economic activities: industries, SMEs; transport; agriculture; forestry; fishing; services; tourism; mining; shipping; etc. – and impacts; marketing; • Development of Special Economic Zones; • Labour and employment opportunities and co-operatives; • Challenges in economic and industrial development;
12	Social issues and challenges	<ul style="list-style-type: none"> • Population; • Education; • Livelihoods; • Health; • Gender perspectives and children; • Culture, heritage and traditional knowledge; • Conflict, contestations, power structure; • Security, law and order situation;
13	Institutional governance	<ul style="list-style-type: none"> • Background to institutional governance; • Central, regional and local government institutional hierarchy; • Governance of environmental assessment; • Major governance issues; • Relations between government and other organizations; • Institutional capacities.

As noted earlier, the consultants are concerned that the requirements for baseline papers as set out above are potentially onerous and that the effort required to compile these papers will be disproportionate. We know that there is some baseline information from previous studies, including the recently completed SEA for the SW Region.

3.2.3 Selection of Alternative Scenarios

The alternative scenario of the Patuakhali–Kuakata region in line with the Comprehensive Regional Plan (focusing on ecotourism) would be developed through stakeholder consultation. Preliminary scenarios would be developed by the SEA team which would be further corrected, updated, and validated with the UDD team and relevant stakeholders. These scenarios would be the basis of the identification of plausible impacts of the proposed Regional Plan, Land-use Plan and Structural Plan.

3.2.4 Selection of Valued Environmental and Social Components (VESC)s

The VECs have not yet been identified. The specialists on our team will be tasked with, inter alia, identifying VECs for elaboration and inclusion in the SEA report. Also, it is acknowledged that the VECs are traditionally nature-based, with little consideration for heritage, social, gender, health or economic considerations. Currently, we view this as a major weakness requiring considerably more attention in the SEA. Having said this, it is equally valid to note that in an area where people and national economies rely disproportionately on ecosystem services and primary production, nature-based VECs are undoubtedly important from a broader perspective. Moreover, there is no doubt that a healthy natural environment and properly functioning ecosystems are vital in the context of climate resilience. Connecting these dots and illustrating the linkages across coupled social-ecological systems is needed.

As noted earlier, our view is that focusing on key habitats and critical ecological processes is far more important than producing volumes of baseline data that may only be of marginal value for decision making. In our experience, VECs are a much more meaningful tool for guiding decision-making at both strategic and project levels.

3.2.5 Sustainability Assessment Matrix

The ToRs note that “the procedure of SEA is inextricably linked to decision making. The SEA report is a decision-support instrument aimed at providing as detailed a picture as possible of the environmental and social impacts related to the implementation of a plan, policy or programme. In the case of plans, the SEA report must contain sufficient information to assess the acceptability of the impacts, and consequently to propose suitable modifications and mitigations”. In response to this, we propose using a Sustainability Assessment Matrix methodology to inform future decision making.

Though there is a diversity of meanings people attach to the concept of sustainable development (or sustainability), the United Nations (UN) Sustainable Development Goals (SDGs) provide a useful and practical framework. Since the GoB has signed up to the SDGs, there is already high-level commitment towards implementing them. Therefore, the SA criteria includes a cross-reference to the SDGs to enable a more complete picture.

We propose to use the SA matrix to evaluate the key components of the draft PKCP against the sustainability criteria. The evaluation consists of a colour-coded rating between 2- (negative contribution) and 2+ (positive contribution) entered into the matrix. The “scores” are colour-coded (shades of green for positive and red for negative, white being neutral) to provide a visual representation of the scores.

The appraisal of the key components of the Draft PKCP against a set of sustainability assessment criteria enables the assessment of the PKCP in terms of its contribution to sustainability, where it might have an adverse effect, and where any positive effects could be enhanced.

An “on balance” sustainability impression of each key component is provided.

As noted earlier, the overall goal of the PKCP is to lead the development or redevelopment of Patharghata Upazila in order to enhance the residents' socioeconomic circumstances through the following broad objectives:

- Enhancing biodiversity and aesthetic beauty through the planned introduction of indigenous plants along development sites.

- Assessing hydro-geological properties to identify spatial distribution of quality and quantity of water considering seasonal variation and high recharge area considering interaction between surface and ground water source.
- Exploring geomorphological, geological, engineering geological, and geophysical properties (shear wave velocity) of the surface and subsurface condition of the study area to rank suitable sites for physical development and to prepare risk sensitive landuse plan.
- Protecting local people's sustenance and integrating the community into the mainstream development process of the country through improved transportation and communication system.

We propose a slight rewording of these four goals to sufficiently align them at a high philosophical level with the UN SDGs and to inform the sustainability criteria in Table 3.7, below.

Table 3.7: Sustainability Assessment Criteria

Objective	Criteria	Guiding question: Will there be an impact from the proposed actions on	SDG relevance
Ecosystem health	Biodiversity protection and ecosystem resilience	Conservation and sustainable utilisation of aquatic, marine and terrestrial resources?	Life below water (14), Life on land (15), Clean water & sanitation (6)
		The integrity of nature conservation sites, habitats and species?	
		Water quality?	
		Underwater noise?	
Causes and effects of climate change	Greenhouse gas emissions?	Climate action (13)	
		Resilience and/or adaptation to climate change?	
Social and economic benefits	Sustainable economic growth	Economic benefits generated by key economic sectors?	Decent work & economic growth (8), Industry, innovation & infrastructure (9), Responsible consumption & production (12)
		Ease of doing business?	
		The growth of any sector activity without detriment to another? (opportunity costs)	
		Sustainable use of living natural resources?	
	Access to decent employment opportunities	Employment creation? (and balance of full and part-time work?)	Decent work & economic growth (8)
		Attract and retain high-level skills?	
Maintenance of human health and well-being	Human health and well-being (including any vulnerable groups)?	Good health & well-being (3)	
Research and monitoring for decision making	Data collection and dissemination, and open access to information.	Research and monitoring?	Peace, justice & strong institutions (16)
		The availability of and open access to data and information?	
Good spatial governance	Inter-sectoral collaboration, planning and management	Inter-sectoral collaboration? (including across aquatic, marine and terrestrial habitats)	Partnerships for the goals (17)
		Policy development and decision-making?	
		Stakeholder engagement in marine planning?	

Table 3.8: Example Sustainability Assessment Matrix for PKCP Key Components

Criteria								
Key components of the PKCP	Biodiversity	Climate change	Economic growth	Employment opportunities	Health & well-being	Research & monitoring	Inter-sectoral planning & mgmt.	On-balance summary
Component 1								
Component 2 etc.								
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

3.2.6 Preparation of SEA Report

As noted in the ToRs, the SEA report is a decision-support instrument aimed at providing as detailed a picture as possible of the environmental impacts related to the implementation of a plan, policy or programme. As required by the ToRs, in the case of plans, the SEA report must contain sufficient information to assess the acceptability of the impacts, and consequently to propose suitable modifications and mitigations. Most of this information will have a spatial component because geographical distribution of impacts plays a relevant role in determining how they are perceived by decision-makers, as well as by the affected stakeholders and the general public.

The method we will use to develop the spatial decision-support tool will consist of three main stages:

1. Identifying the main environmental concerns and indicators;
2. Spatially resolving the main effects of the Plan;
3. Assessing the effects using suitable environmental indicators.

Identification of concerns and indicators: the SEA will appraise the key components of the plan against a set of relevant social and environmental parameters (see elsewhere for a description of the SD Matrix that will be used).

Spatial effects of the Plan: The ToRs correctly note that SEA is affected by a greater level of uncertainty than project EIA. Even though a spatial plan sometimes provides indications whose effects are unequivocal (e.g., siting of main infrastructures), most issues are addressed in more general terms (e.g., policies to control soil erosion). As noted in the ToRs the SEA must try to identify, and spatially resolve, the outcomes of implementing the plan proposal. Thereafter we will attempt to assess the expected changes caused by the implementation of the Plan. The analysis will focus on the changes that are most instrumental in causing environmental impacts, and that have a spatial representation, given that some SEA impacts are by nature not spatially fixed.

Environmental impacts of the Plan: Impacts should be assessed against explicit social and environmental criteria, and with respect to a baseline environment. Our main methodology will be the SD matrix described elsewhere in this report.

The proposed table of contents for the SEA report is presented in Appendix A.

3.2.7 Preparation of SEMP Report

As noted earlier, the ToRs state that “the procedure of SEA is inextricably linked to decision making. The SEA report is a decision-support instrument aimed at providing as detailed a picture as possible of the environmental impacts related to the implementation of a plan, policy or programme. In the case of plans, the SEA report must contain sufficient information to assess the acceptability of the impacts, and consequently to propose suitable modifications and mitigations”.

In response to this, we propose developing a Strategic Environmental Management Plan (SEMP) to guide the implementation of the “mitigation hierarchy”.

Since the SEMP will be based on the results of the SEA the SEMP and the SEA report are critically linked documents. Both will refer to baseline materials and analyses contained in earlier reports produced during the SEA process.

The PKCPs area of influence has both local, regional and possibly global significance due to its diversity, uniqueness, biological productivity and rich ecosystems, with a number of rare or endangered species, including terrestrial and aquatic mammals, birds and reptiles. Its habitats provide essential ecological services such as nursery grounds for many fish species, and coastal erosion protection against storms, tidal surges and cyclones.

But, recently, concerns have been raised about the potential impacts of existing and planned developments in the area.

The SEA will help with the understanding of positive impacts versus more risks and negative environmental and socio-economic impacts relating to the implementation of the PKCP and associated developments. The SEMP will be the key instrument to guide the enhancement of benefits and promote synergies, and to avoid or mitigate negative outcomes and counteract antagonisms.

This SEMP will set out what needs to be done, who needs to do it, when and how, and indicate associated requirements (resources – financial, manpower, equipment). It will also propose a coordination mechanism for overseeing its implementation. This is exactly what the ToRs require.

The management actions detailed in this SEMP, and the indicators chosen for ongoing monitoring, will be the best current options but it is anticipated that the SEMP will be refined and updated over time, based on the lessons learnt and changing circumstances during the process of implementation. Whilst this is normal and expected, the foundations laid by this first iteration should provide a solid platform for future versions.

The organization of this SEMP will follow a standard, commonly used framework. Its aim will be to guide future planning, management decisions and monitoring in the area as regards environmental, social and linked economic concerns. It will be compiled through team meetings and consultation workshops with a SEMP Liaison Group comprising representatives of key government ministries that are likely to be responsible for its implementation. This should ensure that the recommendations are realistic, practical and implementable, and that the main implementing parties are already aware of what is expected of them so that they can plan and budget for the necessary management actions to be taken.

Usually there are *six categories* of responses required for the implementation of the SEMP. These are:

1. Establishing an appropriate institutional arrangement for managing the SEMP, inclusive of developing conducive working relationships with implementing and supporting sector agencies, mostly within government, but also with civil society, academia and the private sector.
2. Adjusting existing policies so that they are either (a) better able to respond to the needs of delivering progress towards achieving the goals of higher-level Plans or (b) better aligned with each other – i.e. removing inter-sector contradictions and improving synergies.
3. Diligent application of existing social and environmental safeguards (e.g. EIA and EMP) using existing legal and regulatory frameworks, and perhaps improving this over time.

4. Monitoring of indicators – these will be listed in the SEMP.
5. Linked to response No. 4, is the possible need for undertaking new studies for issues regarded as important, but where information is lacking.
6. Suggested actions for the improved management of the area.

3.3 Informing the Planning and Decision-Making Process

This SEA would be a Strategic Policy Planning Tool to guide the land use, regional and spatial planning. Translating this SEA guide the planning and decision-making process (through the development of SESMP) would be the first principle to contextualize the method and process of SEA. Traditionally SEA is treated as a compliance tool (depending on the legal, institutional, procedural and political factors) to correct a program or plan, or a tool to ensure stakeholder participation or a tool to analyze and compare different alternatives. With the advancement and evolution of the SEA, now SEA is also treated as a strategic tool to guide the plan formulation process. In this assignment based on our understanding of the ToR we foresee that this SEA should be a strategic planning tool to guide the formulation of the Payra-Kuakata comprehensive plan focusing on ecotourism.

SEA to be based on Regional Environmental Socio-cultural, economic and institutional analysis: The context of the proposed SEA to be based on the regional environmental, socio-cultural, economical and institutional settings. Our earlier engagement of SEA for SW region was based on sectoral analysis but here the ToR recommends to follow a different approach – to be based on environmental, Socio-cultural Economic and Institutional Context.

Blend of Impact-Institution Centered: There are two major division of SEA – one is focused on impacts and safeguard and identify the strategic mitigation /action to avoid/mitigate/minimize/offset the impacts or risk. The another is “institution centric” which analyze the institutions, institutional capacity, implementation mechanism, capacity of managing E&S risk and impacts and eventually suggest management action to ensure E&S risk management capacity. But there is a third one, which is also becoming very common – the blend of ‘impact-centric’ and ‘institution-centric’ approach. The ToR indicates to follow the blending approach of impact-institution centered.

Stakeholder Participation should be the core of SEA process. CEGIS adopts a systematic approach of stakeholder engagement through a series of consultation, stakeholder workshop, FGDs, etc. Besides, the Final Documents can be launched on web for a period of time to receive feedback/comment from the mass.

Making the Recommendation in Dialogue with the Stakeholders: The strategic recommendations (in the SESMP) for ensuring the environmental and social safeguards and overall sustainability of the proposed development plan would be finalized in dialogue with the relevant stakeholders (mostly the implementing agencies, local government and local community community).

3.3.1 Linking SEA to Land Use Planning in the Integrated Approach

The strategic assessment needs to cover regional planning (e.g. coastal zone), area specific spatial planning and project planning. Any regional environmental development plan should give attention to regional economic considerations so that all proposed environmental projects will be economically sound. Regional Planning potentially allows linkages between sectoral national planning and project planning and between physical and socio-economic and spatial linkages through which project impacts are visible.

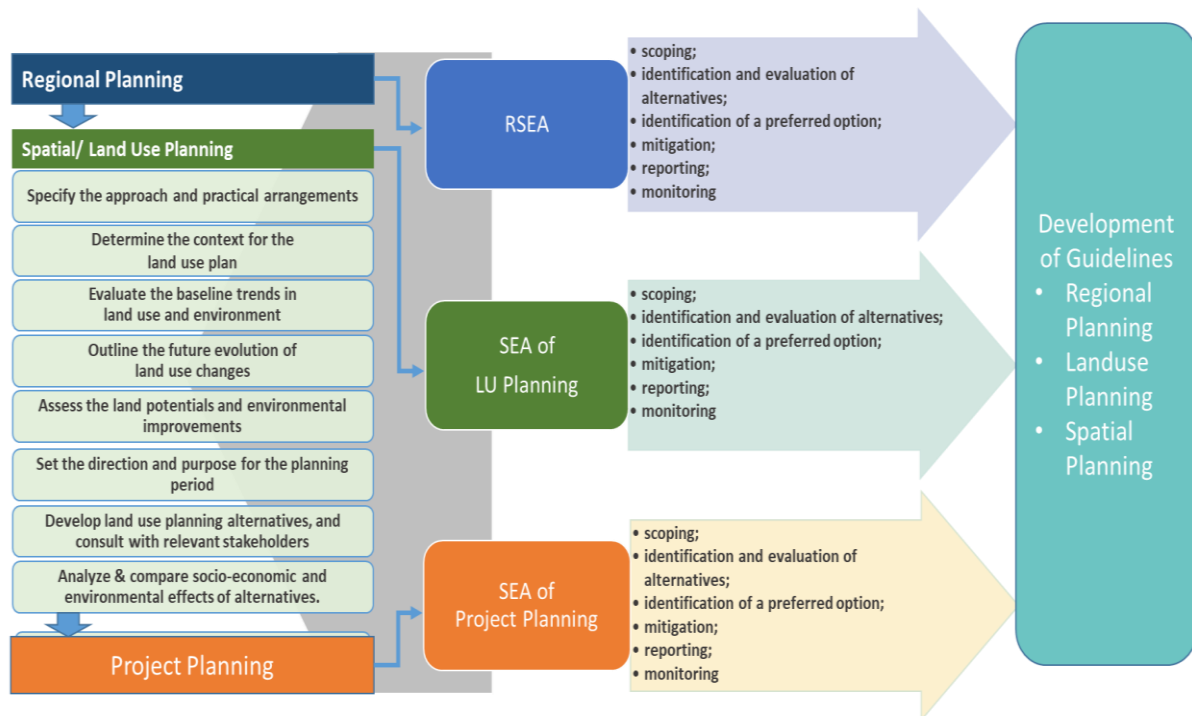


Figure 3.5: Methodology for Linking SEA to Land Use Planning in the Integrated Approach

3.3.2 Integration of Strategic Environmental Assessment into Regional Planning

The integration of environmental concerns within regional planning aims to reduce the possibility of any dislocation between environmental, economic and spatial processes. Regional planning deals with the efficient placement of land use activities, infrastructure, and settlement growth across a larger area of land than an individual city or town. Integrated regional economic environmental development plans are not simply a compilation of separate economic and environmental plans. They should show the linkages between the economic development, resource use and the production of residuals and impacts on environmental quality and communities.

Integrated land use planning, urban planning, rural planning, environmental planning (e.g. conservation & protected areas, watershed management etc.), adaptation planning for climate change, and regional energy strategic planning will be carried out as part of Integrated Coastal Zone and Marine Spatial Planning (Figure 3.6).



Figure 3.6: Different Types of Planning under Integrated Coastal Zone and Marine Spatial Planning

Regional Planning also allows the identification of the institutional arrangements necessary to ensure beneficial integration of projects into the economy of a sub-national area. An understanding of Regional Planning is essential for defining the role that Environmental Land Use Planning can play in the regional development. Therefore, Regional Strategic Environmental Assessment (RSEA) is a process designed to systematically assess the potential environmental effects, including cumulative effects, of alternative strategic initiatives, plans, or programmes for a region. In doing so, RSEA can support the preparation of a preferred regional development strategy and environmental management framework, and inform subsequent project based environmental assessment and decision processes.

3.4 Monitoring and Evaluation of Implementation

The SESMP would include a plan along with the proposal of an institutional arrangement to monitor and evaluate the adoption, implementation and impacts of the strategic recommendations and decisions (strategic E&S measures, decision, arrangement for ensuring sustainability and safeguards).

4. SEA Work Plan

The Contract for the SEA assignment was signed between the UDD-GoB and CEGIS on 1 April 2022 in Dhaka, Bangladesh. The Contract is set to run for 12 calendar months and the SEA is thus scheduled to be completed by End-March 2023. For various reasons, start-up was slightly delayed but the consultants are confident that the pace will be accelerated in due course and that deliverables will be on time.

A Schedule of Activities is provided in Appendix C. As is the case with staff deployment and level of effort, we propose that the schedule of activities be regarded as indicative and that CEGIS be allowed to maintain a degree of flexibility, within reason, in this regard. As noted above, we know from experience that SEA is not recipe-driven, as is often the case with project-level EIA. The consultant is often required to adjust the time required to complete a specific sub-task (either needing less or more time, as the case may be). We have seen how the recent COVID pandemic wreaked havoc with project timelines in various parts of the world, including Bangladesh. Other factors such as natural disasters, unrest, etc. also need to be considered as these are external factors that are usually not in the control of the consultants. Flexibility based on professional judgment is important for ensuring that the assignment is properly executed to the highest possible standard and within the overall contract period.

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Appendix A: Table of Contents for the SEA Report

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3. *Methodology followed in developing the SEMP*
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5. *Environmental & socio-economic objectives, targets and indicators*
6. *Management, monitoring, mitigation & reporting framework*
7. *Institutional roles & responsibilities, capacity, skills, equipment and budget requirements*
8. *Conclusions & recommendations*

Annexes

Annex A. Guidelines and model ToR (for sectors, EIAs, etc.)

Annex b. Glossary and abbreviation

Annex c. Acknowledgments

Annex d. References (if any)

Appendix D: Revised Hours of Works

Sl. No	Name of Staff	Position	Staff-Man-month Inputs												Total Staff-month Input			
			Input	1	2	3	4	5	6	7	8	9	10	11	12	Office	Field	Total
1	Peter Tarr	Strategic Environmental Assessment (SEA) Expert	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
2	Dr. S M Zobaidul Kabir	Environmental Analyst	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
3	Dr Kazi Md. Noor Newaz	Ecologist	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
4	Dr. Md. Shibly Sadik	Hazard Management Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
5	Malik Fida A. Khan	Climate Change Adaptation Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
6	Mohammad Nur Nobil	Economist (Blue Economy)	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
7	Dr. MA Quassem	Institutional Management Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
8	Farhana Ahmed, PhD	Land Use Planner	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
9	Syed Monowar Hussain	Navigation Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
10	Md. Wasiul Islam	Tourism Development Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
11	Mohammad Abdur Rashid	Agronomist	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
12	Zahir Uddin Ahmed	Forest Resource Management Expert	Office	0.25	0.25	0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.25	0.5	0.5	4.75		4.75
			Field	0.25	0.25	0	0	0.25	0	0	0	0	0.25	0.25	0	0		1.25
13	Mir Fahim Shaunak	GIS Database Manager	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
14	Md. Amanat Ullah	Ecology/Environmental Associate (Ecology)	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
15	H M Nurul Islam	Ecology/Environmental Associate (Environment)	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
16	Mohammad Kamruzzaman	Ecology/Environmental Associate (Wildlife)	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
17	Md. Habibur Rahman	GIS Associate	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
18	Md. Firoz Alam	GIS Associate	Office	0.5	0.5	1	1	0.5	1	1	1	0.5	0.5	1	1	9.50		9.50
			Field	0.5	0.5	0	0	0.5	0	0	0	0	0.5	0.5	0	0		2.5
Total															133	35	168	

Appendix E: Personnel and Sub-consultants

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
Dr. Peter Tarr	CEGIS	<p>Ph.D. in Environmental Management and Planning from University of Aberdeen, Scotland, 1995-1999.</p> <p>M.Sc. in Environmental Management and Planning from University of Aberdeen, Scotland, 1994-1995.</p> <p>National Diploma Nature Conservation from Pretoria Technikon, South Africa, 1980-1982.</p> <p>More than 40 years of experienced in:</p> <ul style="list-style-type: none"> • Strategic Environmental Assessments, Environmental Impact Assessments, Integrated Environmental Assessments, and Environmental Sustainability Appraisals. • Policy formulation, strategy, programme, project appraisal and review • Land use and environmental planning, and land evaluation for sustainable natural resource management • Protected area management; • Community-based natural resource management. 	Strategic Environmental Assessment (SEA) Expert/Team Leader	<p>He will be responsible:</p> <ul style="list-style-type: none"> • To conduct the SEA of Project areas and prepare all aspects of planning, liaison and reporting; • Identify the SEA Procedure of the project • Screening of Policies, Programs, Plans (PPPs) that have significant socio-economic and environmental impacts to be included in SEA in the field of urbanization • Review of PPPs with baseline socio-economic and environmental data of various sectors identified through screening, stakeholder analysis, legal and regulatory framework, environmental and socio-economic objectives, For SEA, Scenario Development issues including setting environmental and socio-economic objectives of the concerned sector, identifying institutional capacity, level of environmental pollution • Deeper Assessment of Preferred Alternative based on Initial Impact (Positive and Negative) Assessment (High, Medium, Low) and Initial Impact Assessment of different sectoral PPPs for SEA. • Preparation of Strategic Environmental Management Plan (SEMP) based on SEA, including Critical Issues, Role and Responsibilities of Concerned

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				Institutions/Agencies, Mitigate to Negative Impact of PPPs and Coordination for Implementation of SEMP for Positive Impact and Monitoring Mechanism
Dr SM Zobaidul Kabir	CEGIS	<p>Doctor of Philosophy (Sustainable Resource Management with particular focus on Environmental Policy and Legislations) Master of Environmental Management and Development Graduate Diploma in Environmental Management and Development 25 years of experience</p> <ul style="list-style-type: none"> • Worked as Environmental and Ecological Specialist to carry out IEE, EIA, CEIA, ESIA and ESHIA studies. • Experience in SEA • prepared and implemented Environmental Management Plan (EMP) including Environmental Monitoring Plan • Thorough knowledge and experiences on Ecosystem, Biodiversity including forest, wetlands and Natural Resources management 	Environmental Analyst	<p>He will be responsible for</p> <ul style="list-style-type: none"> • Evaluating environmental changes/trends during the last 10 years – analyze influence of land-use patterns on this trend; • Outline future evolution of environmental changes/trends if no land use plan intervention is taken; • Assessing Land Potentials and Environmental Improvements; • To delineate spaces in terms environmental parameter; • Analyze and Compare Socio-economic and Environmental Effects of Alternatives; • Develop Land Use Planning Alternatives, and Consult with Relevant Stakeholders; • Formulate EMP
Dr Kazi Md. Noor Newaz	CEGIS	<p>Ph.D. in Biological Science/ particularly Ecology (Adaptation and distribution of species in natural environment) M.Sc. in Environmental Science M.Sc. Part-I (research) in Env. Microbiology 37 years of experience including</p> <ul style="list-style-type: none"> • Research and conducting environmental ecological studies • Ecological reports (inventory of flora, fauna and their habitats, ecological habitat restoration and enhancement of ecosystem services), ESIA, CEIA, DIA and ESHIA • Involved as ecologist, biodiversity management and compliance specialist in SEA study of SW region of Bangladesh 	Ecologist	<p>He will be responsible</p> <ul style="list-style-type: none"> • To make an inventory of all types existing flora and fauna; • To identify the potentiality of the natural resources (flora and fauna); • To identify hazards that might be imparted on the flora and fauna due to proposed development; • To prepare a map of habitat for existing flora and fauna;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				<ul style="list-style-type: none"> To earmark the conservation areas, which would not be disturbed by any kind of development To identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources; Developing and preparing Management plan of wildlife resources
Dr. Md. Shibly Sadik	CEGIS	<p>Ph.D. in Civil and Earth Resources Engineering from Kyoto University in 2019</p> <p>Research on Post-Disaster Recovery after Cyclone Aila</p> <p>M.Sc. in Technology for Integrated Water Management from University of Gent, Belgium in 2013.</p> <p>M.Sc. in Water Resources Development from Bangladesh University of Engineering and Technology in July 2009.</p> <p>B.Sc. in Environmental Science from Khulna University in 2006.</p> <p>More than 15 years of experience in</p> <ul style="list-style-type: none"> Conducting environmental assessment including SEA, IEE, EIA, ESIA, and environmental monitoring Preparation of hazard map, hazard assessment and hazard mitigation guideline preparation, noise modeling, air quality modeling, preparation of ESMP for noise reduction, and environmental pollution. 	Hazard Management Expert	<p>He will be responsible for</p> <ul style="list-style-type: none"> Shortlisting national level policies for coastal region regarding hazard management and formulate strategies for spatial plan of Payra-Kuakata; Prepare composite hazard map (flood and cyclone) and guidelines for hazard mitigation including climate change; Integrate the engineering geological and DRR data with urban and regional planning database to prepare risk sensitive spatial
Malik Fida A Khan	CEGIS	<p>M.Sc. in Hydro informatics</p> <p>B.Sc. in Civil Engineering</p> <p>30 years of working experience in:</p> <ul style="list-style-type: none"> Climate Change and vulnerability assessment, analysis and mitigation measures Coastal and river system management water resources and, integrated and strategic planning 	Climate Change Adaptation Expert	<p>He will be responsible for:</p> <ul style="list-style-type: none"> Shortlisting national level policies for coastal region and formulate strategies for the spatial plan; Projection of water requirement with seasonal variation; Assess coastal hazards and prepare hazard map, guidelines for hazard mitigation including climate change;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				<ul style="list-style-type: none"> • Generate erosion and accretion model; • Identify, evaluate and quantify climate change impacts on the region; • Coordinate the climate change related activities and data collection; • Analyze and interpret the historical climate data; (viii) Project next 20 years climate change scenario
Mohammad Nur Nobil	CEGIS	<p>M.Sc. in Environmental Economics and Management from Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden, 2013.</p> <p>M.S.S. in Economics from University of Chittagong, Chittagong, Bangladesh, 2000.</p> <p>B.S.S. (Hons) in Economics from University of Chittagong, Chittagong, Bangladesh, 1999.</p> <p>More than 15 years of working experience in:</p> <ul style="list-style-type: none"> • Natural Resource and Environmental Economics • Assessment and valuation of ecosystem services, blue economy, tourism, and sustainable development 	Economist (Blue Economy)	<p>He will be responsible for</p> <ul style="list-style-type: none"> • Assessment of coastal and marine resource of the region; • Assess scope further expansion of port related facilities; • Assess scope for further scope for fishing in the coast; • Assess the scope for eco-tourism in the region; • Assessment of Pollution from ports and other coastal activities and propose measures to limit pollution
Dr. M A Quassem	CEGIS	<p>PhD in Participatory Management, Barrington University, USA, 1998.</p> <p>Post-Graduate Diploma in Rural Policy and Planning, (specialization in monitoring and evaluation) Institute of Social Studies, The Hague, 1988.</p> <p>Post-Graduate Diploma in Hydraulic Engineering, International Institute of Hydraulic Engineering, Delft, 1979.</p> <p>B.Sc. Engineering (Civil) from Bangladesh University of Engineering and Technology (BUET), 1966.</p> <p>More than 40 years of working experience in:</p> <ul style="list-style-type: none"> • Planning and research, construction, operation & management • Working with government at different levels and delivering high quality outputs 	Institutional Management Expert	<p>He will be responsible</p> <ul style="list-style-type: none"> • To propose organizational setup for Payra-Kuakata Development Authority; • Charter of duties for the professionals; • Procedure of coordination among the agencies; • Role of UDD after the completion of current development plan

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<ul style="list-style-type: none"> Public and private sector organizations in a management capacity and advising to institutional reform and on improving organizational performance and business development 		
Dr. Farhana Ahmed	CEGIS	<p>Ph.D. on Resilient Adaptation to Flood Risks under Urban Growth and Climate Change Dynamics from Vrije University of Amsterdam, the Netherlands, July 2019.</p> <p>M.Sc. in Environmental Science (Specialization in Environmental Planning and Management), UNESCO-IHE, The Netherlands, April 2008.</p> <p>Masters of Urban and Regional Planning (M.U.R.P), BUET, Dhaka, December 2008.</p> <p>Bachelor of Urban and Regional Planning (B.U.R.P), BUET, Dhaka, April, 2002.</p> <p>More than 15 years of working experience in:</p> <ul style="list-style-type: none"> Urban planning, regional planning, landscape planning and design Conducting various environmental and socio-economic studies focusing on planning at local and regional level, strategy formulation, vulnerability assessment and adaptation to climate change Formulation of Urban Sector Policy to support Urban Governance Reform of Bangladesh Preparing adaptive flood management for urban areas in the delta regions in light of the changing urban and climatic environment 	Land Use Planner	<p>She will be responsible</p> <ul style="list-style-type: none"> To formulate structure plan policies from strategic environmental assessment; To formulate Structure plan considering sectoral policies; To formulate Growth centre plan for the region; (iv) Formulate Urban Area Plan
Syed Monowar Hussain	CEGIS	<p>Masters in Port Management and Harbor Administration, University of Antwerp (Belgium), 1994-95</p> <p>Post Graduate Diploma in Personnel Management, Bangladesh Institute of Management, 1985-86</p> <p>M.A. Dhaka University, Bangladesh, 1976.</p> <p>B.A. (Hons), Dhaka University, Bangladesh, 1974</p> <p>More than 35 years of working experience in:</p> <ul style="list-style-type: none"> Management and operation of all inland ports and landing stations 	Navigation Expert	<p>He will be responsible for</p> <ul style="list-style-type: none"> Assessment of River navigation baseline condition of the in the region; Impact assessment of existing and future vessel movements in region; Identify impacts of water navigability and Prepare carrying capacity of rivers and canals in the region;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<ul style="list-style-type: none"> Outsourcing the actual operation of the ports and stations including the employment of labor in the ports Traffic analysis Intermodal connectivity. Regulatory and infrastructure requirement for handling of both international and domestic goods, development planning according to traffic demand, bilateral and regional transport connectivity, inland container handling, private sector participation, regulatory provisions in respect of transport and handling of goods. 		<ul style="list-style-type: none"> Suggest facilities for improvement for inland port related facilities; Assess facilities and connectivity on inland ports due to Payra port
Dr. Md. Wasiul Islam	CEGIS	<p>Ph.D. in School of Business (Tourism Discipline), The University of Queensland (under G8), St. Lucia Campus, Brisbane, QLD 4072, Australia, January 2014 to March 2018.</p> <p>Master of Science in Forest and Nature Conservation, Faculty of Environment Science, Wageningen University and Research Center, the Netherlands, September 2007 to August 2009.</p> <p>Master of Science in Forestry, Forestry and Wood Technology Discipline, Khulna University, Bangladesh, June 2000 to November 2002.</p> <p>B.Sc. (Hon's) in Forestry, Forestry and Wood Technology Discipline, Khulna University, Bangladesh, June 1995 to December 1999.</p> <p>More than 15 years of working experience in:</p> <ul style="list-style-type: none"> Tourism management, planning and development Tourist carrying capacity analysis and community-based tourism Preparing adaptive co-management plans in tourism destinations Formulating EMP for tourism sector 	Tourism Development Expert	<p>He will be responsible for</p> <ul style="list-style-type: none"> Assessment of Baseline Condition of the Tourism sector in the region; Assessment of Impacts on Tourism sector; Identify impacts due to development of Tourism sector in the region; Preparing relevant environmental management plan
Mohammad Abdur Rashid	CEGIS	<p>M.S in Agricultural Engineering (FPM), Bangladesh Agricultural University, Mymensingh, 2005.</p> <p>B.Sc. Agricultural Engineering, Bangladesh Agricultural University, Mymensingh, 2000.</p> <p>More than 15 years of experience in</p> <ul style="list-style-type: none"> IEE, EIA and SIA studies of Water Resources, Communication, Power, Gas and Planning sector projects. 	Agronomist	<p>He will be responsible for</p> <ul style="list-style-type: none"> Identifying problems (including climate change) of recent practice in agriculture with spatial pattern; Strategy for distribution of agriculture infrastructures in different settlement hierarchy;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<ul style="list-style-type: none"> • Agriculture planning, crop modeling, crop water demand assessment, irrigation water management, and climate change and disaster management. 		<ul style="list-style-type: none"> • Integrate rural settlement with agricultural activities; • Integrate agriculture activities in urban areas; • Assessing the impacts of the proposed interventions agricultural practices; • Policy measures to conserve agricultural land and integrate it with land use plan.
Zahir Uddin Ahmed	CEGIS	<p>M.Sc. Forestry, University of Chittagong, 1988. M.Sc. Chemistry, Dhaka University, 1981. B.Sc. (Hons.) Chemistry, Dhaka University, 1980. More than 15 years of working experience in:</p> <ul style="list-style-type: none"> • Forest resources assessment particularly health assessment, forest service assessment. • Plantation program in Coastal regions. • Sustainable management of forest resources. • Supervising forest plantation programs (coastal mangrove forest high forest). • Developing forest management plan. • Analysis of the paradigm shifting of forest management in Bangladesh. • Impact assessment on forest resources due to natural and anthropogenic causes. • Policy formulation on forest resources management. • ESIA and SEA experiences in Bangladesh. 	Forest Resource Management Expert	<p>He will be responsible for</p> <ul style="list-style-type: none"> • Preparing baseline of the forest, flora and fauna in the region; • Compare all existing and previous management plans and suggest guideline to prepare future management plan; • Assessment of impact on forest due to development and human intervention; • Policy measures to integrate forest resource management with spatial plan;
Mir Fahim Shaunak	CEGIS	<p>MURP (Masters of Urban and Regional Planning), Department of Urban and Regional Planning, Jahangirnagar University. BURP (Bachelor of Urban and Regional Planning), Department of Urban and Regional Planning, Jahangirnagar University. More than 13 years of working experience in:</p>	GIS Database Manager	<p>He will be responsible for</p> <ul style="list-style-type: none"> • Manage all related Spatial and attribute database of the project (not only SEA component) and check consistency;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<ul style="list-style-type: none"> Executing Remote Sensing/GIS and Urban Planning based activities such as DTM Generation, City Clutter Mapping with geodatabase, Extracting Features from images, Image Processing (Image referencing, Image mosaic, Image interpretation, Image Classification, Ground Truthing, Accuracy Assessment, Mosaic and Subset Images, Enhancement of Images), 3D City Modelling, 3D Vector Mapping from Aerial Photograph, GPS and DGPS Field Survey, Socioeconomic Survey, Landscape Design, etc. 		<ul style="list-style-type: none"> Integrate SEA database with the GIS database; Perform Spatial and environmental analysis for strategic planning; Prepare Regional, Structure, Urban Area Planning database; Prepare map layout for Regional, Structure, Urban Area Plan
Md. Amanat Ullah	CEGIS	<p>M.Sc. in Botany from National University, 2001 B.Sc. (Hons.) in Botany from National University, 2000 More than 10 years of working experience in:</p> <ul style="list-style-type: none"> Floral inventory survey in the coastal areas. Identification of flora habitat. Threats assessment for the floral vegetation in respect to land use changes and climate change. Spatial mapping and habitat suitability assessment of the vegetation in coastal areas. Conducting feasibility, IEE, EIA and Environmental Monitoring studies of water resources, power, forestry, climate change, communication and various planning sector projects. Natural resources management and ecological impact assessment, biodiversity assessment, preparation of ecological management plans, plantation design, evaluation of ecosystem services and biodiversity conservation. 	Ecology Associate (Ecology)	<p>He will be responsible for</p> <ul style="list-style-type: none"> Conduct field survey to make an inventory of all types existing flora; Field study to identify the potentiality of the natural resources (flora); Conduct field trip to identify hazards that might be imparted on the flora due to proposed development; Collection of field data to prepare a map of habitat for existing flora; Field verification of the conservation areas, which would not be disturbed by any kind of development; Data analysis and report writing;
H M Nurul Islam	CEGIS	<p>Master in Limnology and Wetland Management; M.Sc. (2017) and B.Sc. (2008) in Environmental Science. More than 10 years' experience in</p> <ul style="list-style-type: none"> Assessment of floral and faunal biodiversity. Identification of environmental problems and issues in rivers, wetlands, terrestrial ecosystem, and in generally to natural resources. 	Environmental Associate (Environment)	<p>He will be responsible for</p> <ul style="list-style-type: none"> Conduct field survey to identify the environmental issues related to flora and fauna and lastly the ecosystem; Tourism impact assessment on natural vegetation, fauna, the terrestrial and aquatic ecosystems;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<ul style="list-style-type: none"> • Tourist carrying capacity assessment of any tourism center or island or any region. • Conservation management zones assessment for the coastal forests, and other landscapes. • Environmental monitoring of the resources. • Ecosystem service capacity assessment. • Wetland management and habitat suitability assessment of flora and fauna. 		<ul style="list-style-type: none"> • Water quality assessment, monitoring assessment of seasonal variation; • Conduction of survey for air quality, noise quality assessment in the study area; • Meteorological information measuring and collection of secondary information from the BMD; • Waste characteristics analysis and waste dumping and recycling mapping development; • Carrying capacity assessment of the tourism center or areas. • Data analysis and report writing;
Mohammad Kamruzzaman	CEGIS	<p>M.Sc. (Wildlife Ecology, Management and Conservation Biology) in 2000 University of Chittagong, B.Sc. (Honors) Zoology in 1999 University of Chittagong.</p> <p>More than 10 years of working experience in:</p> <ul style="list-style-type: none"> • Inventory of fauna scientifically. • Habitat mapping of faunal biodiversity. 	Ecology Associate (Wildlife)	<p>He will be responsible for</p> <ul style="list-style-type: none"> • Conducting field survey to make an inventory of all types existing fauna; • Field study to identify the potentiality of the natural resources (fauna); • Conduct field trip to identify hazards that might be imparted on the fauna due to proposed development; • Collection of field data to prepare a map of habitat for existing fauna; • Field verification of the conservation areas, which would not be disturbed by any kind of development; • Field study to Identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources; • Data analysis and report writing;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
Md. Habibur Rahman	CEGIS	M.Sc. in GIS for Environment and Development B.Sc. in Civil Engineering Diploma Engineering in Civil More than 18 years of working experience in: <ul style="list-style-type: none"> • GIS data development, system analysis and development, designing survey form and database structure, organizing data entry and data cleaning job • Data collection with Differential GPS, Spatial analysis of different aspects, generating contours from water level data, Transferring data in between different systems, Geo-referencing and geographic databases. • preparing spatial database to use GIS as planning tool in both Vector GIS and Raster GIS, making data usable, structuring databases, analyzing database, aerial photo interpretation, graphics design, cartographic design for display presentation and hard copy map production. • Designing and developing methodology for capturing spatial and tabular data to create GIS database and to produce thematic information for various fields. • Topographic survey with Total Station to generate contours and DEM (Digital Elevation Model). 	GIS Associate	He will be responsible for <ul style="list-style-type: none"> • To manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; • To integrate SEA database with the GIS database; • To perform Spatial and environmental analysis for strategic planning; • To prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area;
Md. Firoz Alam	CEGIS	Masters in Information Technology (GIS-RS), IIT, Jahangirnagar University, 2017; B.Sc. in Civil Engineering, World University of Bangladesh, 2012; Diploma in Civil Engineering, Dhaka Polytechnic Institute, 1991 More than 25 years of working experience in: <ul style="list-style-type: none"> • GIS data development, system analysis and development, designing survey form and database structure, organizing data entry and data cleaning job • Data collection with Differential GPS, Spatial analysis of different aspects, generating contours from water level data, Transferring 	GIS Associate	He will be responsible for <ul style="list-style-type: none"> • To manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; • To integrate SEA database with the GIS database; • To perform Spatial and environmental analysis for strategic planning; • To prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		<p>data in between different systems, Geo-referencing and geographic databases.</p> <ul style="list-style-type: none">• Preparing spatial database to use GIS as planning tool in both Vector GIS and Raster GIS, making data usable, structuring databases, analyzing database, aerial photo interpretation, graphics design, cartographic design for display presentation and hard copy map production.• Designing and developing methodology for capturing spatial and tabular data to create GIS database and to produce thematic information for various fields.• Topographic survey with Total Station to generate contours and DEM (Digital Elevation Model).		

Appendix F: Environmental and Ecological Baseline Data Collection Plan

1. Sampling Plan of Surface Water Quality Assessment

To assess the surface water quality, the ToR suggests 3 sampling locations. However, it was very difficult to assess the baseline water quality status by such few sampling locations. Therefore, the study team increase the number of sampling locations as per the expert judgement. The detail sampling locations and the water quality parameters are presented in Table 1 and Figure 1. Standard sampling procedure will be followed during the sampling, preservation and transportation of the samples to the laboratory. All the listed water quality parameters will be tested at the DPHE Central Laboratory, Dhaka and BCSIR Dhaka Laboratory. The physical water quality parameters will be measured following in-situ technique using the water quality monitoring devices from CEGIS Environmental Laboratory.

Table 1: Sampling locations of surface water quality assessment

SL	Sampling Sites	Parameters	Sampling Techniques	Field Visit
1	Site 1 Barguna Sadar	pH, Temperature, DO, Turbidity, EC, Salinity, TDS	<ul style="list-style-type: none"> - In situ for onsite monitoring - Ex-situ for laboratory testing 	23 rd May to 30 th May 2022
2	Site 2 Bainchotki Ferry Ghat			
3	Site 3 Payra River Amtali Bazar	TSS, Total Alkalinity, Total Hardness, Chloride, Sulphate, Sodium, Potassium, Nitrate, Phosphate, Total Phosphorous, BOD, COD		
4	Site 4 Kalapara			
5	Site 5 Galachipa River	Nickel, Cadmium, Chromium, Copper, Lead, Iron, Manganese, Zinc		
6	Site 6 Near Kodek Bazar			
7	Site 7 Char Montaz	Oil and Grease, Phenol		

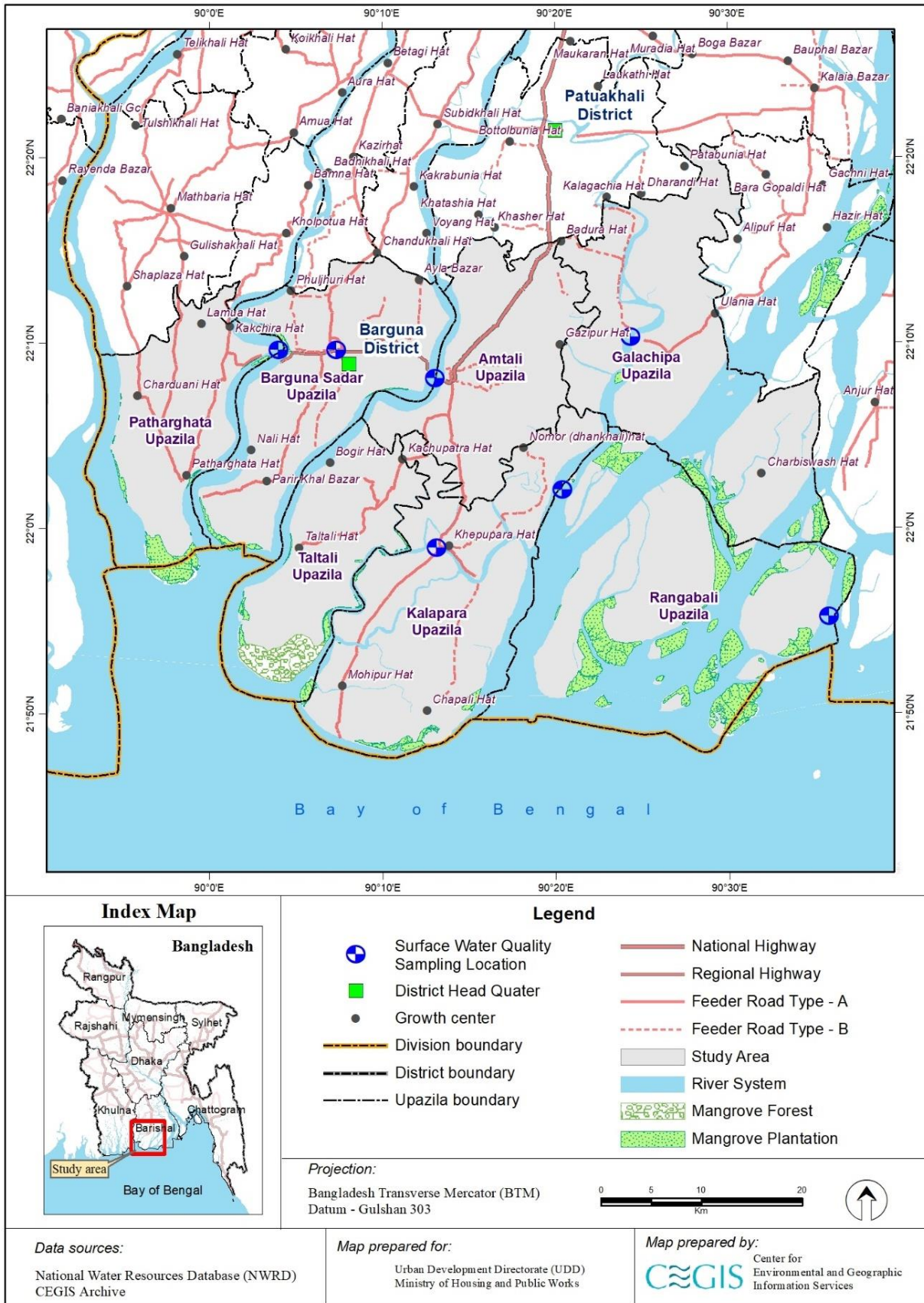


Figure 1: Sampling Locations (7 sites) of Surface Water Quality Assessment

2. Sampling Plan of groundwater Quality Assessment

To assess the groundwater quality, the ToR suggests 2 sampling locations. However, it was very difficult to assess the baseline water quality status by such few sampling locations. Therefore, the study team increase the number of sampling locations as per the expert judgement. The detail sampling locations and the water quality parameters are presented in Table 2 and Figure 2. Standard sampling procedure will be followed during the sampling, preservation and transportation of the samples to the laboratory. All the listed water quality parameters will be tested at the DPHE Central Laboratory, Dhaka and BCSIR Dhaka Laboratory. The physical water quality parameters will be measured following in-situ technique using the water quality monitoring devices from CEGIS Environmental Laboratory, Dhaka.

Table 2: Sampling locations of groundwater quality assessment

SL	Sampling Sites	Parameters	Sampling Techniques	Field Visit
1	Site 1 Barguna Sadar	pH Temperature, DO, Turbidity, EC, Salinity, TDS	<ul style="list-style-type: none"> - In situ for onsite monitoring - Ex-situ for laboratory testing 	23 rd May to 30 th May 2022
2	Site 2 Chaduanir Bazar	TSS, Total Alkalinity, Total Hardness, Chloride, Sulphate, Sodium, Potassium, Nitrate, Phosphate, Total Phosphorous, BOD, COD		
3	Site 3 Kalapara			
4	Site 4 Taltoli Bazar	Nickel, Cadmium, Chromium, Copper, Lead, Iron, Manganese, Zinc		
5	Site 5 Horidebpur Bazar			
6	Site 6 Char Montaz	Oil and Grease, Phenol		



Figure 2: Sampling Locations (6 Sites) of Groundwater Quality Assessment

3. Model Boundary Sampling Locations (Surface Water)

One of the main task of a SEA study is to project the cumulative impacts to the natural resources due to the upcoming PPPs for a specific area. This study, therefore, will do the same for many of the selected sectors. This study, select the surface water quality modeling for the parameters of nitrate and phosphate as these two nutrients act as a liming nutrient for marine and freshwater systems respectively. To set up the model, status of nitrate and phosphate baseline situation needs to be assessed and therefore 12 sampling locations have been identified and detailed in Table 3 and Figure 3. The samples will be tested at the CEGIS Environmental Laboratory using Ultra-Violate Spectrophotometer.

Table 3: Model boundary sampling locations

SL	Sampling Sites	Parameters	Sampling Techniques	Field Visit
1	Site 1 Ramna Ferry Ghat	Nitrate, and Phosphate	Ex-situ for laboratory testing	23 rd May to 30 th May 2022
2	Site 2 Chadunair Bazar			
3	Site 3 Chairman Bari Mosque			
4	Site 4 Taltoli			
5	Site 5 Kuakata National Yard			
6	Site 6 Kochu Patra Old Bazar			
7	Site 7 Payra Port			
8	Site 8 Dhulausar Sea Beach			
9	Site 9 Aliapur Golachipa River			
10	Site 10 Bodnatoli Khea Ghat			
11	Site 11 Near Pathargahta Bazar			
12	Site 12 Near Patakata Bazar			

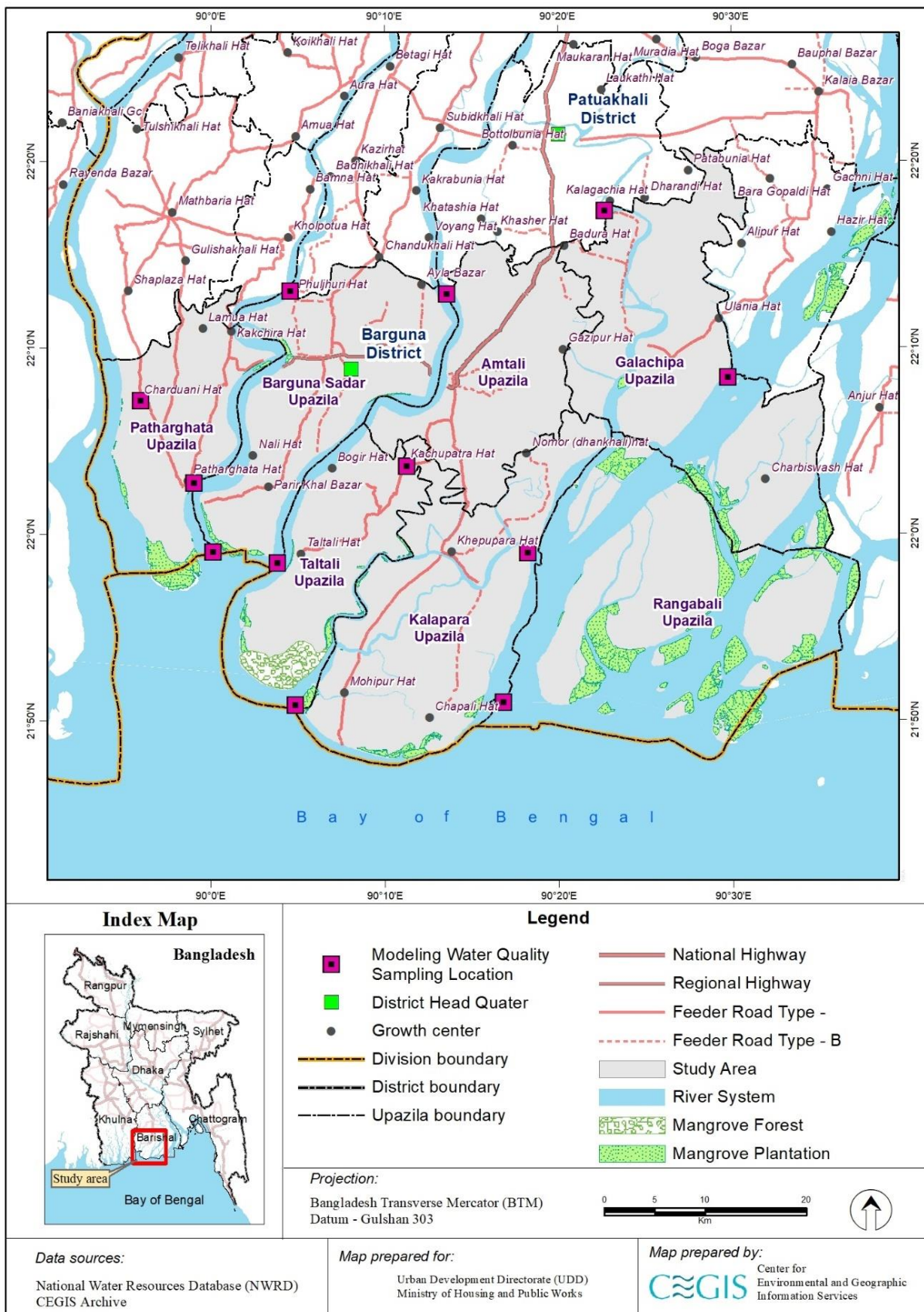


Figure 3: Model Boundary Sampling Locations (12 locations)

4. Sampling Plan of Soil Quality Assessment

The study ToR also urges to assess the soil quality in the study area by assessing pH, porosity, soil texture and electrical conductivity. The plan includes total 12 sampling locations in the study area. The study team selects these sampling locations following the criteria of urban area, peri-urban area and agricultural fields. The details locations and the techniques are presented in Table 4 and Figure 4. The porosity will be tested at the laboratory of Soil Water and Environment Department, University of Dhaka. The other three will be tested at the Soil Resource Development Institute (SRDI), Dhaka Laboratory.

Table 4: Sampling locations of soil quality assessment

SL	Sampling Sites	Parameters	Sampling Techniques	Field Visit
1	Site 1 Agri Field Fuljuri Bazar	<ul style="list-style-type: none"> - pH - Porosity - Soil Texture - Electrical Conductivity 	Ex-situ for laboratory testing	23 rd May to 30 th May 2022
2	Site 2 Urban Area Barguna Zilla School			
3	Site 3 Peri urban Area Chaduanir Bazar			
4	Site 4 Peri Urban Area Patharghata Bazar			
5	Site 5 Ayla Patakata Area			
6	Site 6 Charland Aulia Pur			
7	Site 7 River Bank Horidebpur Bazar			
8	Site 8 Agri Field Patabunia			
9	Site 9 Dulaswar Mangrove Forest			
10	Site 10 Charland Char Montaz			
11	Site 11 Kalapara Urban Area			
12	Site 12 Peri urban area Taltoli Bazar			

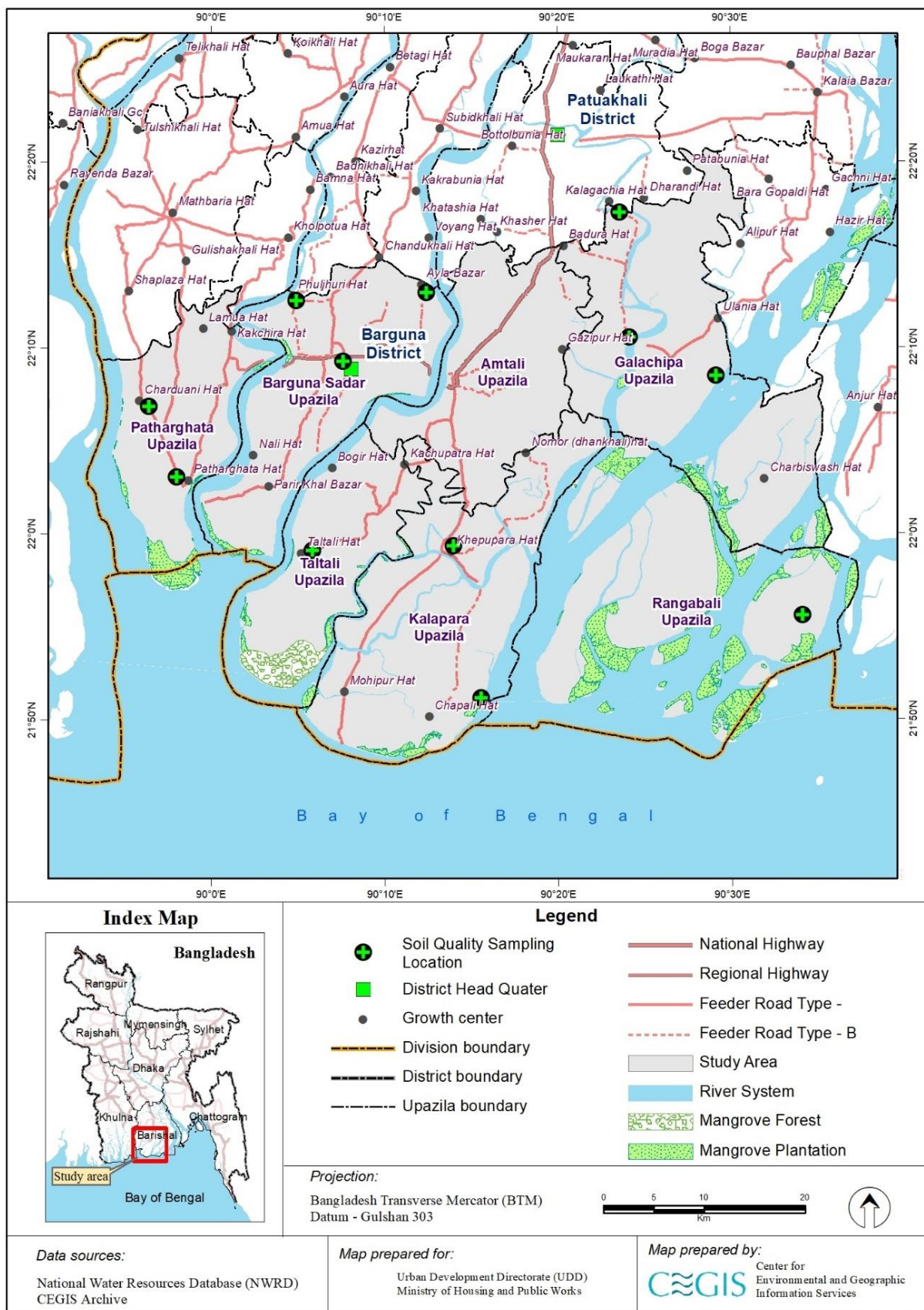


Figure 4: Sampling Locations (12 sites) of Soil Quality Assessment

5. Sampling Plan of Air Quality and Noise Level Measurement

To understand the present air quality and noise level at the market, residential area, urbanized area, industrial zone and the rural area in the study area, an air quality and noise level measuring plan has been developed through expert judgement. The details of the measuring techniques and the sampling locations are presented in Table 5 and Figure 5 respectively.

Table 5: Air quality and noise level measuring sampling locations

Activities	Parameters	Tools and technique	Survey Area	Number of Sampling points	Location of sampling points and others	Frequency	Tour Plan and Required days
Assessment of Ambient air quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , VOCs	Respirable Dust Sampler (Model-Envirotech India APM-460 BL) and Fine Particulate Sampler (Model-Envirotech India APM-550) will be used to collect air samples from the selected sites for PM _{2.5} , PM ₁₀ (gravimetric method). The concentration of SO ₂ will be analyzed by West-Gaeke method. Likewise, the concentration of NO _x will be tested by Jacob and Hochheiser method. VOCs will be analyzed by Non-methane Hydrocarbon Analysis FID Technology.	Different selected locations within the study area	Twelve (12) locations as per the ToR.	<ol style="list-style-type: none"> 1. Patharghata Upazilla HQ 2. Borguna City area 3. Mahipur Bridge 4. Khepupara township area 5. Kuakata Jhau Bon 6. Kuakata zero point 7. Rangabali Launch Ghat 8. Pyra Thermal power plant and port 9. Amtali Upazilla 10. Galacipa HQ 11. Patabunia bazar 12. Char Anda 	12 Locations, Twice in 2 seasons	<p>Air quality equipment (ADROIT/Mitra) with one CEGIS professional.</p> <p>(Field Visit Plan is from 7th June to 20th June 2022)</p>
Ambient Noise level	Noise level mapping (acoustic environment LAeq)	ANSI II type portable noise level meter	Different selected locations within the study area	Twelve (12) locations as per the ToR.	Noise level will be assessed considering the sensitivity of receptors. (12 locations as depicted in the air quality sampling points)	12 Locations, Twice in 2 seasons	<p>One CEGIS professional</p> <p>(Field Visit Plan is from 7th June to 20th June 2022)</p>

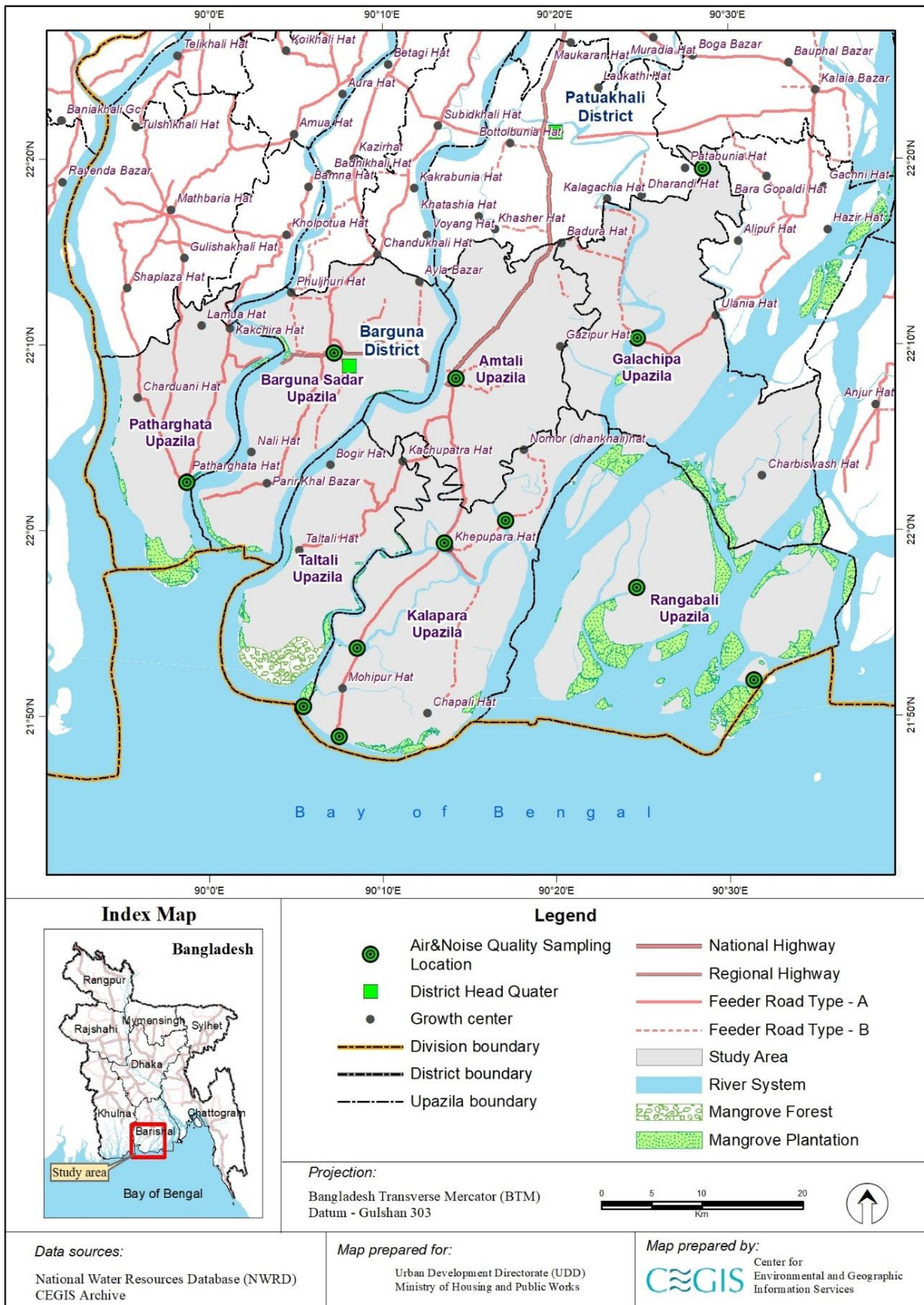


Figure 5: Air Quality and Noise Level Measurement Sites (12 sites for each)

6. Meteorological Parameters Monitoring Plan

Monitoring Parameters

The study team will consider Wind Speed, Wind Direction, Temperature, Relative Humidity, and Rainfall as monitoring parameters to understand the microclimatic information.

Monitoring Frequency and Locations

A 90 days long meteorological monitoring activities will be conducted for Barguna Sadar and Galachipa Upazilas in the study area. The existing weather station of Kalapara Upazila will be also considered for the selected meteorological data collection. The CEGIS will purchase the meteorological information for Kalapara Station from Bangladesh Meteorological Department, Dhaka for the selected 90 days.

Site Selection Criteria

To get the accurate weather information, it is necessary to take care in deciding weather station sitting location. Selection of the meteorological monitoring station siting is the most important factor in ensuring accurate readings. Following considerations will be the monitoring location:

Monitoring Parameters	Considerations
Wind Speed and Wind Direction	<ul style="list-style-type: none"> The standard wind measurement should be taken at 10 meters (33 feet) or higher above the ground or on a roof-top. It is necessary to make the anemometer the highest object around. A minimum 7 feet or more above the surrounding obstructions.
Temperature	<ul style="list-style-type: none"> The thermometer sensor never receives direct sunlight. The thermometer receives plenty of ventilation and is not blocked from the wind. The thermometer should be at least 5 feet above the surface or the roof-top. The thermometer is at least 50 feet from the nearest paved surface.
Relative Humidity	Humidity measurements reflect the humidity of the general atmosphere in your location. Waterbodies and plants may influence humidity measurements. Hence, it will make sure the humidity sensor is at least 50 feet away from the nearest tree or body of water.
Rainfall	<ul style="list-style-type: none"> The rain gauge should be placed with at least 5 feet horizontal clearance from the nearest obstruction. If a nearby obstruction is just over 5 feet away, that obstruction should be no more than 10 feet tall.

Sampling Techniques and Testing Methods: Mini weather station will be set at the suitable locations.

Data Collection Time: 7th June to 7th August 2022

7. Data Collection Plan of Ecological Resources

To assess the ecological resources, assessment of flora, fauna and their habitats will be assessed. To do so, the ecologists will visit at the different ecological hotspots considering their habitat patterns and biodiversity richness. Table 6 and 7 represents the survey techniques and plan of flora and fauna resources in the study area.

Table 6: Flora resources and their Habitat Survey Plan

SL	Activities	Parameters	Tools and technique	Survey Area	Location of sampling points and others	Frequency	Tour Plan and Required days
1	Sensitive Habitat identification	Location of sensitive habitats and its threats	Satellite Image analysis and literature reviews	Whole study area	N/A	Once through desktop activities and ground truthing while other field activities	Dhaka-Barguna (1 day)>Barguna-Patharghata-Barguna(2days)>Barguna Surroundings (1 day)>Barguna-Amtali-Kuakata (1 day)>Kuakata-Taltali-Kuakata (1 day)>Kuakata Surroundings (3 days)-Galachipa>Galachipa-Rangabali-Char Montaz (2 days)>Char Montaz-Sonar Char (2 days)>Sonarchar-Rangabali-Dhaka (2 days) = 15 days/season/2 professionals The data collection will be started from 6 th June 2022.
2	Floral Survey	Species composition, economic and ecological values of the species	Transect and quadrat survey	Different selected locations within the study area	Mangrove forests, homestead forests and embankment plantations	Two time in whole study period (Once in Dry season and once in wet season)	
5	Aquatic habitat survey	Area, importance, threats and species conservation significance	Physical observation	Different selected locations within the study area	Inland waterbodies and khals	Once in wet season	
4	Institutional visit	Species Plantation	KII	BFD Range Offices and Conservation NGOs	Patuakhali and Barguna Forest Range Offices	Once in any time	
5	Bird and Wildlife Survey	Species composition, approximate population, migration season, breeding season and threats	Point Transect Survey, Physical observation and public discussion	Different selected locations within the study area	Mangrove forests and char lands	Once in any time	
6	Dolphin Survey	Encounter rate	Point count	Different selected locations within the study area	River confluences and estuaries	1 time rainy season (July), 1 time Dry season (February)	

Table 7: Detailed Fauna Resources and their Habitat Survey Plan

Group	Methods	Study Area	Expected habitat\Area	Time	Research Assistant Number
Amphibians	Plot count and opportunistic survey, Night Survey	All study sites	Different types of wetlands	Summer and Rainy Season	4
Reptiles (Lizard, Snakes)	Plot count and opportunistic survey	All study sites	Homestead forest, Marshland, Agricultural land, Wetland	Summer and Rainy Season	4
Turtle (Both Freshwater and Marine)	Questionnaires survey on fishers communities	Kuakata, Patharghata, Rangabali (Fish landing center and coastline)	Local fish market and fishers area	Fishing Period	4
Sea Snake	Questionnaires survey on fishers communities	Kuakata, Patharghata, Rangabali (Fish landing center and coastline)	Local fish market and fishers area	Fishing Period	4
Inland Bird Survey	Transect line Method	All study sites	Homestead forest, Marshland, Agricultural land, Wetland, Urban and rural habitat	Throughout the year	6
Costal Bird Survey	Boat Survey, Grid survey, Opportunistic survey, Line transect survey	Different island, coast line in coastal region (Rangabali, Kuakata, Patharghata) **	Costal Island	Mid-Winter (December and January)	6
Terrestrial Mammals Survey	Transect line survey, Night Survey	All study sites	Homestead forest, Marshland, Agricultural land, Wetland, Urban and rural habitat	Throughout the year	4
Aquatic Mammal Survey	Questionnaires survey on fishers communities	Different island, coast line in coastal region (Rangabali, Kuakata, Patharghata)	Local fish market and fishers area	Fishing Period	4

Notes: Beside different mangrove forest (Fatrar Char, Harina Ghata, Kuakata National Park, and Sonar Char) will be surveyed during the study period for collecting data of different groups of wildlife.

**Important costal island for bird survey.

Char Kukri-mukri, Char Mantaz, Char hera, Sonar Char, Chalita Bunia, Kuakata Sea beach, Kuakata National Park, Fatrar Char, Harinaghata. Location of the study sites will be updated after conducting pilot survey.