

URBAN DEVELOPMENT DIRECTORATE (UDD)
Government of the People's Republic of
Bangladesh

Inception Report

on

Package -03:

Establishment of BM Pillars, Physical Feature, Landuse & Topographic Survey under “Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)”

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Submitted by

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1. Introduction

1.1 Background

Physical planning comprises of spatial arrangement relating to physical resources to achieve functional efficiency, public safety and aesthetic quality. Physical/structure planning is primarily concerned with good management and development of land. Strategic Planning provides the mechanism for making comprehensive decision about the use of land and resources. It is an approach that intertwines all segments related to social, economic, physical and environmental dimensions. Many countries, like third world countries have rapidly urbanized and developed in an unplanned manner. Many continue to do so in an unprecedented rate. This has generated the conversion of forest lands, agricultural lands, wetlands, and aquifer recharge areas to industrial and urban uses. This trend has enormous impacts on productive agricultural lands and ecological resources and ecosystems. Industrial and urban development has likewise led to the segregation of land uses, e.g. separation of residential houses, shopping centers, and employment centers. Such land use development patterns have impacts on energy and resource consumption, which have turned out to be unsustainable for humanity, i.e. emergence of global warming and climate change.

Impacts due to unplanned and unsustainable land use development patterns have increased the risks to natural hazards. Vegetation and forest clearance, soil erosion, saline soils and decreasing water tables resulting from unsustainable land uses have brought more droughts, flooding, and landslides. Locations of houses and infrastructures in hazard prone areas have led to unthinkable deaths as well as resource degradation. It could be seen that land reservations such as river deltas, wetlands, coastal marshes, and coastal reservations had been developed for human settlements, making people extensively exposed to natural disasters. It is this link between development and disasters, i.e. development increasing vulnerability, which is consideration of disaster risks has to systematically become part of land use planning. UN Habitat suggests that land use planning is perhaps the most fundamental tool for reducing disaster risk especially when accompanied by political support and resource commitment. It is essential that national governments recognize the vulnerability of populations with respect to the physical environment, especially with regard to land, water, and natural resources. The integration of DRR in the land use planning process is vital in ensuring that development would reduce vulnerability to environmental and natural disasters.

Urban Development Directorate (UDD) is the only government Organization at the apex for preparing land use plan in Bangladesh. Since its creation, UDD has prepared 50 land use master plan for 50 district towns and 392 Upazila towns from 1984 to 1996. In the recent past UDD has prepared land use master plan for 26 Upazila town / Pourashava / district town by employing its own man power. Besides, UDD has implemented

Structure plan, Master plan and Detailed Area plan for Sylhet and Barisal Divisional Towns and Preparation of Development Plan of Cox's Bazar town and Sea-Beach up to Teknaf. But no attempt has been yet made to integrate Disaster Risk Reduction (DRR) into land use planning directly. UDD has created a new dimension in planning by adding geotechnical consideration for planning in Bangladesh.

For this reason, the following dimensions have been introduced into land use planning for the first time in Bangladesh

- Geo-morphological structure
- PRA (participatory rapid appraisal)
- 3-D (Three Dynamics) GIS Survey
- Social dynamics of social Space
- Historical pattern of spatial Transformation

1.2 Regional Setting

Barguna Sadar Upazila (barguna district) area 454.39 sq km, located in between 21°58' and 22°15' north latitudes and in between 89°59' and 90°14' east longitudes. It is bounded by betagi, mirzaganj and patuakhali sadar upazila upazilas on the north, bay of bengal and amtali upazila on the south, Amtali upazila on the east, patharghata and bamna upazilas on the west. Population Total 237613; male 120830, female 116783; Muslim 220057, Hindu 17376, Buddhist 26, Christian 137 and others 17. Water bodies burishwar, bishkhali, Khagdon and Nalidon rivers and Patkata, Barguna, Junia, Lalbongola and Phuldhalaria canals are notable. Administration Barguna Thana was formed in 1904 and it was turned into an upazila in 1984.

Barguna Sadar Upazila consists of 1 Municipality, 10 Union, 51 Mouza, 191 villages.

All the wards and unions of the upazila are under rural electrification net-work. However, 15.24% of the dwelling households have access to electricity. Sources of drinking water are tube-well 92.68%, tap 1.27%, pond 5.82% and others 0.24%. Sanitation 44.15% (rural 38.69% and urban 90.8%) of dwelling households of the upazila use sanitary latrines and 50.97% (rural 56.32% and urban 5.18%) of dwelling households use non-sanitary latrines; 4.89% of households do not have latrine facilities (Source: Banglapedia, 2018).

Patharghata Upazila (barguna district) area 387.36 sq km, located in between 22°14' and 22°58' north latitudes and in between 89°53' and 90°05' east longitudes. It is bounded by mathbaria and bamna upazilas on the north, bay of bengal on the south, barguna sadar and the bishkhali river on the east, sarankhola upazila and the Haringhata river on the west. Total population are 162025, male 82687, female 79338; Muslim 143466, Hindu 18464, Buddhist 18, Christian 21 and others 56. Water bodies are main rivers: Bishkhali, Haringhata, Baleshwari. The Patharghata thana is now an upazila, was formed in 1925.

All the wards and unions of the upazila are under rural electrification net-work. However, 5.43% of the dwelling households have access to electricity. Sources of drinking water Tube-well 81.34%, tap 15.76%, pond 1.75% and others 1.15%.

Sanitation 47.64% (rural 44.02% and urban 67.63%) of dwelling households of the upazila use sanitary latrines and 46.66% (rural 49.82% and urban 29.24%) of dwelling households use non-sanitary latrines; 5.7% of households do not have latrine facilities (Source: Banglapedia, 2018).

1.3 Objectives

The objective of the project is to optimize resources and activities for sustenance of marginal people. The activities and resources are very important to the economy and life of the people of Bangladesh whose living conditions are inextricably linked to the productivity and sustainability of the region. There is no long term Holistic Development Plan for the Project area. Coastal zone needs to be integrated with the mainstream of development process of the country. So, an interdisciplinary development planning approach is urgent to optimize livelihood of the region. The Physical development planning problems, needing attention, are as follows:

- I. To integrate ecology, economy and social resources with the mainstream of development process of the country
- II. To frame policies for the best use of land and its control for the Patharghata and Barguna Sadar Upazila.
- III. To optimize environment for sustenance of people.
- IV. Formulation of Policies and plans for mitigation of different types of hazards, minimizing the adverse impacts of climate change and recommend possible adaptation strategies for the region.
- V. Formulation of Policies and plans for gradual nucleation of settlements with policies and plans for development of growth centers of the area.
- VI. Formulation of a guideline for development of tourism in Patharghata and Barguna Sadar Upazila, and also to accommodate future changes in existing land use pattern, socio-economic condition of the area and quality of life of the people.

1.4 Scope of Services and Activities

The scope of service and activities to prepare a land use development plan relating to the project “Package-3: Physical feature survey and scanning of mouza map, digitization, editing, printing etc.” under Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP) are prescribed in the following according to the ToR:

1.4.1 Scope of Services

Under the scope of service the detailed task have been categorized into three broad categories a) Preparation of Base Map through Satellite image and Mouza Map, b) Attribute data collection, database development and report preparation. Under broad categories the detail tasks have to be accomplished under this project are described below-

a) Preparation of Base Map through Satellite image and Mouza Map

i. Collection of Mouza Maps

Required processed satellite images will be collected from the client Urban Development Directorate (UDD).

ii. Collection of Digitized Features from Stereo Satellite Image

The Maps will be projected in BTM coordinates. Survey Firm will be needed to collect the appropriate parameters and implement it during the map projections.

iii. Satellite Image Collection

Satellite image and data will be collected from UDD with necessary georeferencing and ground trothing.

iv. Base Map Preparation

Base will be prepared using the data extracted from satellite image and mouza data.

b. Attribute Data Collection, Database Development and Report Preparation

i. Map Printing at Proper Scale

After completing the survey and all the GIS processing, the Maps has to be printed by the survey firm. Maps would be printed at the scale 1:990 with proper annotations, titles and legend. The color grading and symbols for the map layout should be in accordance with the standards of the Client.

ii. Attribute Data Base of the Digitized Mouza Map

We will submit all attribute data of all the features in the mouza map including individual plot number that would be generated from the spatial database.

iii. Survey Report

After completing all the surveys, a survey report including both spatial and attribute database has to be submitted by the Survey Firm along with its progress report.

iv. Institutional Arrangement

The client will form a committee to communicate, monitor and check the tasks accomplished by the Survey Firm.

v. Team Composition

The Survey Firm will form a highly qualified team to accomplish the tasks as specified in the ToR. Adequate personnel and technical capabilities for providing training on the above-mentioned tasks.

vi. Construction and Establishment of Bench Mark (BM)/Ground Control Point (GCP)

Pillars covering the project area including approximately 5 km. grid in rural area (pillar 10"X10", Base 3'X 3', height 5'). RCC pillars are to be constructed marking unique identification number Coordinate X, Y of these pillars along with Z value is to be marked on base map for future reference.

vii. Physical Feature Surveys

Physical feature survey will have to be conducted for the whole of project (rural or rural-urban fringe) area. Location and dimension (X, Y, Z value) of all existing structures including building type, height, floor type and use of each floor, year of construction/age, collection of household population data, Ownership of the building and to transfer the data compatible to cohort population forecast, homestead boundary, homestead area, cropping pattern, cropping intensity, location of riser of gas of each household, location of well, tube well, pond, tap water etc, toilet with sewerage facility, safety tank and open drain etc. all water control structures including khal (natural and man-made), cross section of waterbodies specially khal, hill areas with one feet interval and existing routes/ roads, embankments, dykes, box culvert, sluice gate etc., vegetation cover, culmination between flood Plain and homestead, ground water harvesting devise, river ghat/ganj, railway station and railway line, all type of roads, location of all existing exposed light/electric, telephone posts and national electric grid/towers/transformer, gas, water, sewerage line etc. Tiller also will conduct survey with RTK GPS and total station survey for 15.58 sq.km and 13.11 sq.km urban areas of Barguna and Patharghata respectively, Rural survey with Satellite image and ground-checking of major settlements through RTK GPS and total station survey of the Project area (All kind of Survey Uses by RTK GPS). Two nos BM Pillar for Barguna Municipality area, Two nos BM Pillar for Patharghata Municipality area. Rural survey with Satellite image and ground-checking of major settlements through RTK GPS and total station survey for the rural area. One nos BM Pillar for rural survey area each union. Different Types of Survey (as Directed by PD) and Studies (Different scale of survey maps and print outs will be finalized in consultation with the PD).

viii. Topographic Survey

The Topographic database shall be obtained from geo-referenced 3-D (four band) image and further cross-checked and ground truthing by using RTK-GPS and Total Station to obtain and verify 3-D data (X, Y, Z value) on location and alignment of all data obtained from physical feature survey including roads, flood embankments and other drainage divides. Location and alignment of all drainage and irrigation channels/canals showing depth and direction of flow. Closed boundary/outline of homestead, water bodies, swamps, forest etc. junctions, spot heights or land levels at roughly 10 m intervals for the Plain area, appropriate interval for sea area and close interval as and when required such as dyke, embankment, roads, rail-roads, river bank, rail line etc.

ix. Other Surveys and Studies

a. Survey of Development Activities:

Site plan, land acquisition plans of new development projects shall have to be collected and presented in the map of RF 1: 990.

b. Population Studies:

The population statistic shall have to be collected from all possible sources, such as:

(a) Census. (b) Municipal Record,

Analysis of existing population should bring out the following characteristics—

- (i) Male/Female ratio, (ii) Age-sex pyramid, (iii) Reasons for population growth/decline (Birth rates, Death rates, Immigration, emigration)/extension of Municipal boundary, etc. and
- (iv) General economic conditions of the people.

c. Road Surveys:

In this survey detail of existing roads like type and condition of pavement, existing width and possibility for future extension should be studied and presented with appropriate explanatory notes. Road survey would include hierarchy, network and circulation pattern. Open space, relationships, etc.

d. Water Supply:

- (a) Source and extend of existing supplies shall have to be recorded on maps and its future program of expansion should be shown side by side in different colors.
- (b) The capacity and system of water supply and future program of expansion from municipality or public Health Engineering Department or any other appropriate agency.

e. Power Supply:

- (a.) Capacity of the existing power supply sources and probable future expansion shall have to be presented in appropriate maps.
- (b) Existing supply lines and the future probable lines should be presented on the same map side by side preferably in different colors.

f. Telephone Service:

- (a) Types of Telephones Exchange and future program.
- (b) Existing Communication lines and future probable expansion shall be shown side by side.

g. Growth of the Town:

Historical background with graphic materials on the existing Municipal area along with proposal for future expansion should be collected and presented with detail information.

h. Shopping:

Shops and Commercial establishments differentiated into wholesale and retail shopping should be recorded. Growth or decline of shopping during the last 10 years should be collected and presented with explanatory notes on the causes for growth or decline.

i. Municipal Budget:

Municipal Budget for last five years should be collected and presented with explanatory notes on the capacity of Municipality with respect to their development activities.

j. Municipal Achievements:

Maps and publications on the town itself in the form of books and book-lets, etc. should be collected and presented.

k. Disposal Services:

The methods of collection and disposal of garbage should be surveyed and presented with comments. The graveyards, Cremation ground, etc. should, be surveyed and presented. The methods of sewage disposal should be surveyed and presented with comments with probable location of treatment plant.

l. Hydrology:

Drainage network, drainage depth, width at 50-meter interval, flow diversion, water level, Drainage condition (Katcha, Pucca, Semi-pucca) for both urban and rural area, covered/uncovered, type of drainage, die of pipe drain, outlet, cross-section etc. Identification of Catchment & Sub catchment and delineation of Primary, Secondary and Tertiary drain, flow direction, general slope of drain etc.

m. Agriculture Survey:

Total agriculture land, Soil Type, Cropping Pattern, Intensity, Seasonal Variation, Agriculture Land covered by Irrigation, Rate of agriculture land reduction etc.

The survey firm shall prepare report on the basis of output of the obtained surveyed and studied data showing a possible quality of existing and possible future pollution in the project area with tentative remedial measures and adaptation for Project area. All the collected environmental pollution and disaster related attribute and spatial data shall be linked with other spatial database by the survey firm. All Information should be transport to mouza map and GIS Database.

1.4.2 Scope of Activities

a. Visit to the PKCP Area

The survey firms' team leader and/ or other team members of the project need to pay visit to PKCP area mainly for two purposes:

- Firstly, to acquire a firsthand knowledge about the area, its problems and prospects, and
- Secondly, to make the people and the local stakeholders aware of the need for a disaster resilient land use plan.

b. Determination of Study Area

- The survey team has determined the study area (or the area has been covered under the current PKCP package), based on existing condition, local demand including potential for future development/expansion, capacity, disaster resilient capacity, external and other ancillary local factors/conditions in and around the center.
- Structure plan area conduct shall be the Pourashava and its adjacent (urban and rural) fringe area and will be prepared in consultation with the Pourashava and local stakeholders keeping in views the need over a period of 20 years Structure Plan (Strategic Level). UDD has already organized PRA sessions and workshop which was Conducted at Pourashava, Surrounding ten Unions, Civil society, Journalist and general people of Barguna Sadar and Patharghata Upazila. Besides two workshops have been conducted to know the vision, attitude, views and development prospects of the project area. The implementation would act as the basis for the plan.

c. Surveys to Ascertain Existing Situation

- We will carry out detailed physical feature survey and studies of PKCP area according to approved format and shall also collect data from primary and secondary sources.
- The survey firms will responsible for all kind of survey report.
- Collect/obtain socio-economic and demographic information and data both from primary and secondary sources in the study area and also in the municipality and national urbanization as well.
- Analyze collected data and information, find out possible area of intervention for the forecasted future population of two municipalities (15-20 years), vis-à-vis assess their requirements for different services, physical and social infrastructure facilities, employment generation, housing, right of way and land requirements for various services and facilities like proposed roads, drains, playgrounds, recreation centers, other environmental and social infrastructure.
- In the Planning package, for development of the town, identify suitable location of respective zones/uses, circulation network, utility services, social services/facilities to be provided and their future requirements depending on the projected size of population and physical development patterns that will take place over time.

d. Data Collection

- UDD will assess and collect essential data relating to Pourashava map, master plan, and land use plan, regional and national high way development plans, accident statistics, fire hazard, number and type of vehicles registered in the Pourashava and road improvements on going and proposed.
- UDD will assess additional data requirements, critical additional data not currently available will be collected through reconnaissance and traffic surveys.

This will help estimate present traffic volume and forecast the future traffic growth and also identify travel pattern, areas of traffic conflicts and their underlying causes.

1.5 Categories of Activities

1.5.1 Signing of Contract

The contract between UDD and Tiller has been signed on 21 June, 2018 for Package-3: Establishment of BM Pillars, Physical Feature, Landuse & Topographic Survey under “Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)”

1.5.2 Preparation of the Work Schedule

Preparation and adjustment of the work schedule for the project activities is finalized with Microsoft Project. Draft Plan was submitted and discussed with PMO and revised schedule has incorporated this report.

2. Understanding the Project

2.1 Project Objectives

The objectives of preparation of Strategic planning at PKCP area, laid down in the TOR are as follows:

a. Prepare a Mainstreaming DRR into Development Planning Processes at the Upazila Town

- The structure plan will be drawn the importance of mainstreaming DRR in development plans local levels as well as in the physical framework.
- The land use plan will be the guiding document for implementation by all concern.
- Analyze the risk that the area faces from natural and manmade hazards

b. Facilitate Public and Private Sectors Development (at Upazila Towns)

The structure plan should be taken under with cooperation from other development agencies.

- Ensure an environment so that other development agencies cooperate in the plan preparation process:
 - i. Provide public services and facilities in a planned way.
 - ii. Ensure participatory process for a congenial environment for implementation.

c. Prepare Multi-Sector Investment Plan

- Identify area-based priority:
 - i. Disaster risk reduction plan
 - ii. Transportation and traffic management plan,
 - iii. Other need specific plan as per requirements.

d. Provide Controls for Private Sector Development

- Ensure clarity and security with regard to future development.

e. Provide Guide Lines for Development

- Consider the opportunity and constraints of future development (of district town).

f. Provide Planned Development

- Ensure sustainable environment.

2.2 Project Component

The terms of reference do not give a very clear view about the land use plan. As conceptualized from the TOR of the current master plan package, three components of hierarchical categories of plans will have to be prepared under the project, namely, Structure Plan, Urban Area Plan and Action Plan/Detail Area plans. Following are the details of each type.

2.2.1 Structure Plan

a. Concept and Aim of Structure Plan

The structure plan shall identify the order of magnitude and direction of anticipated urban growth in the regional context of PKCP area and define a broad set of policies deemed to be necessary to achieve the overall plan objectives. Structure Plan, in fact an indicative plan which is open-ended, providing a broad policy framework for area development and for action plans and development programs. It is a broad framework for major development and guideline subsequent lower level plans viz structure plan and Ward Action Plans and/or Detailed Area Plans. The plan will guide the growth and changes for distribution and redistribution of population, activities and their relationship and the pattern of land use that the activities will give rise all together with a network of communication, circulation and utility services.

b. Components of Structure Plan

The Structure Plan, in the current planning package, will cover policy issues on aspects like, transport and communication, housing, open space and recreation, municipal services-water supply, drainage, solid waste, sanitation, environment, urban heritage, legal aspects of plan and development, institutional aspects, urban finance and development planning administration and management. It will also describe the scale of map, duration of the plan, and the procedure of its revision and amendments.

c. Style and Format of Structure Plan

The Structure Plan will be presented in the form of text in report, spatial translation of sectoral priorities for development trend, growth direction, identification of problem and location them on map. Policy issues translated into maps for visual understanding. The map will only show the broad future possible built up area, restricted areas for development, areas for development potentials, major existing and proposed communication network and other existing major features and land marks. Structure Plan will be prepared for 20 years period. The structure plan would come up with spatial guideline for balanced development.

2.2.2 Urban Area plan

a. Concept and Aim

Urban area Plan, in this planning package, will comprise the spatial translation of the Structure Plan policies and strategies in the form of development proposal in broad level. The aim of the urban area Plan will be to enable the concerned authority to undertake specific development projects in order to promote organized urban development and revitalize the urban living environment. The major objective of preparing this plan is the consolidation of development activities by various agencies in areas that have strongest potential for growth in the medium term and can accommodate the anticipated volume of growth. Other purpose of preparing urban area plan is to facilitate the development control function.

- Urban area plan proposal will be based on land use categories and map designation following structure plan policies and will indicate purpose and intent, permitted and conditional uses in the planning zones and occupancy classes.
- Land development techniques for realizing plan objectives.
- General development provisions with the purpose of establishing reasonable standards relating to land development, which are generally applicable to any use or site irrespective of the zoning category in which it is located.
- Preparation of coordinated multi-investment programs of drainage/flood protection, road transport and utility services in line with plan prioritized sequence of development.

b. Components of Urban Area Plan

Urban area Plan, in current planning package, will cover almost all area level land use development and related aspects in broad level. These are

- Land-use Plan
- Transportation and Traffic Management Plan
- Drainage and Environmental Management Plan

c. Style and Format of Land Use Plan

The Land Use Plan will be the composite functional plan with spatial translation in but not limited to 1:1980 scale map in one sheet supported by necessary maps, charts etc. and report. It shows the broad land use zones on a more detailed scale of maps as derived from Structure Plan. As the desired scale of the plan is the same as that of cadastral map, and the plan provides detailed land use zoning and building controls, the development control function becomes easier to implement PKCP area Land Use Plan. Such Land Use Plan also shows land reservations required for essential uses and major infrastructure development.

Basically, the Land Use Plan will be an interpretation of the Structure Plan over the 10 years. The coverage of the Land Use Plan will be for existing urban areas and their immediate surroundings with the purpose of providing development guidance in these areas where most of the urban development activities are expected to take place over the next 20 years. It will contain more details and specific plan as appropriate

C. Detail Area Plans

The Detail Area Plans will be prepared considering the following aspects:

- Existing Condition: Review of the existing situation of the with respect to land use, community facilities, public services, utilities, infrastructure etc.
- Problems and Opportunities: Discussion of problems which demands immediate intervention and scope of development
- Current Investment Program: Discussion of current investment programs of various urban and rural area.

Project selection will be need based and at this stage it can just be imagined that they may include water supply, road and drainage improvement, improved sanitation, provision of social facilities, upgrading of slum settlements etc. The projects may also be non-physical in nature. Depending on type, the projects may be formulated by the PKCP area at local level, using public-private partnership arrangements with the NGOs, CBOs, and national agencies. Despite multiplicity of the development agencies involved, all their activities have to be incorporated in a single list so that an integrated approach to area level development can be pursued over a given period of time. For better performance, emphasize should be given for selection of the projects that could be implemented using available resources through Annual Development Program (ADP) rather than those requiring new resources and/ or institutional capacity for their implementation. In carrying out the tasks for identification of priority projects, certain critical criteria to be addressed are as follows:

- whether self-financing or not (i.e. resource mobilization)
- equity consideration
- acceptability to all parties concerned
- compatibility with other projects
- sustainability
- environmental impacts

The project area, experiencing haphazard and unplanned growth, requires a comprehensive development plan for balanced development. The development planning package with its three major components, first is Structure Plan, second is Urban Area Plan and third one is Action plan or detail area plan which can help guide the development authorities on development issues for a livable pourashahar and rural area at PKCP boundary, which is not only healthy and safer but also efficient and better.

2.3 Implementation Arrangement

The UDD shall perform planning monitoring and coordinated functions (including resource mobilization and investment co-ordination) and in the process out sources survey firms for conducts different survey which is essential for preparation development plan. The municipality will exercise regulatory and supervisory authority and the delivery of municipality wide services within the municipality and its adjacent fringe area without diminishing the autonomy of the (sectoral) development authorities, public and private including NGO's and civil societies concerning local matters.

Private sector may be upgrading of infrastructure supply systems with emphasize in improving accessibility at the level of secondary distributor roads. While public sectors will take care of early implementation of new roads and/or other modes of transportation as is required, and remove existing constrains of present poor accessibility.

3. Location and History of the Project area

3.1 Introduction

This chapter describes the basic information about the Barguna district area and PKCP (Urban & Rural) area. The information presented in this chapter has been collected directly from the field as well as from many other secondary sources including National Population Census Reports of BBS and other relevant document.

3.2 Location and History of the Project area

3.2.1 The project location

The proposed project would be prepared on a regional development perspective considering the region as a part of whole of Barguna Sadar Upazila, its 10 union and Patharghata Upazila, its 7 Union. In this development planning package since its location is strategically important from the geographical context because these Upazila as for sea beach and Sundarban.

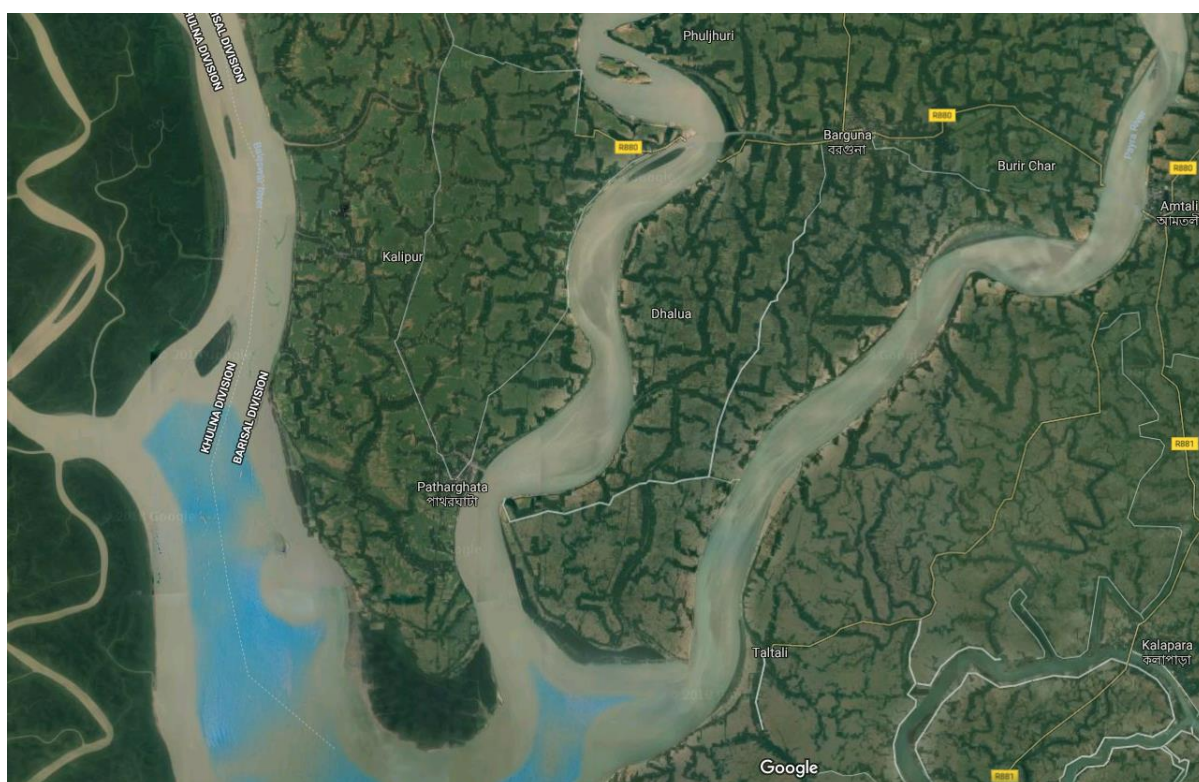


Figure 1: Project location in Google Map (Online)

Source: Google Map

3.2.2 Description of the Project Area

A detailed description of the Project Area is given below:

Table 1: Area, Population and Density of the Project Area

Barguna Sadar Upazila								
Municipality	Union	Mouza	Village	Population		Density (per sq km)	Literacy Rate (%)	
				Urban	Rural		Urban	Rural
1	10	51	191	26954	210659	523	71.9	52.9
Patharghata Upazila								
Municipality	Union	Mouza	Village	Population		Density (per sq km)	Literacy Rate (%)	
				Urban	Rural		Urban	Rural
1	7	42	66	24488	137537	418	67.4	62.4

Haringhata Forest Eco Park, Laldia Forest of Patharghata Upazila and Padma Parjatan Kendra of Barguna Sadar Upazila - regions have the greater potential for tourism development as there are abundant resources to attract tourists. Especially Patharghata is developing very rapidly due to the ample opportunity for tourism development, which is acting as pull factor for private sector developers but the development was in an unplanned way. Hence, this project has been under taken to protect the region from depletion of its natural resources and character and tourism development as well. Moreover, honorable Prime Minister has already expressed his heartiest interest to develop char of this Upazila.

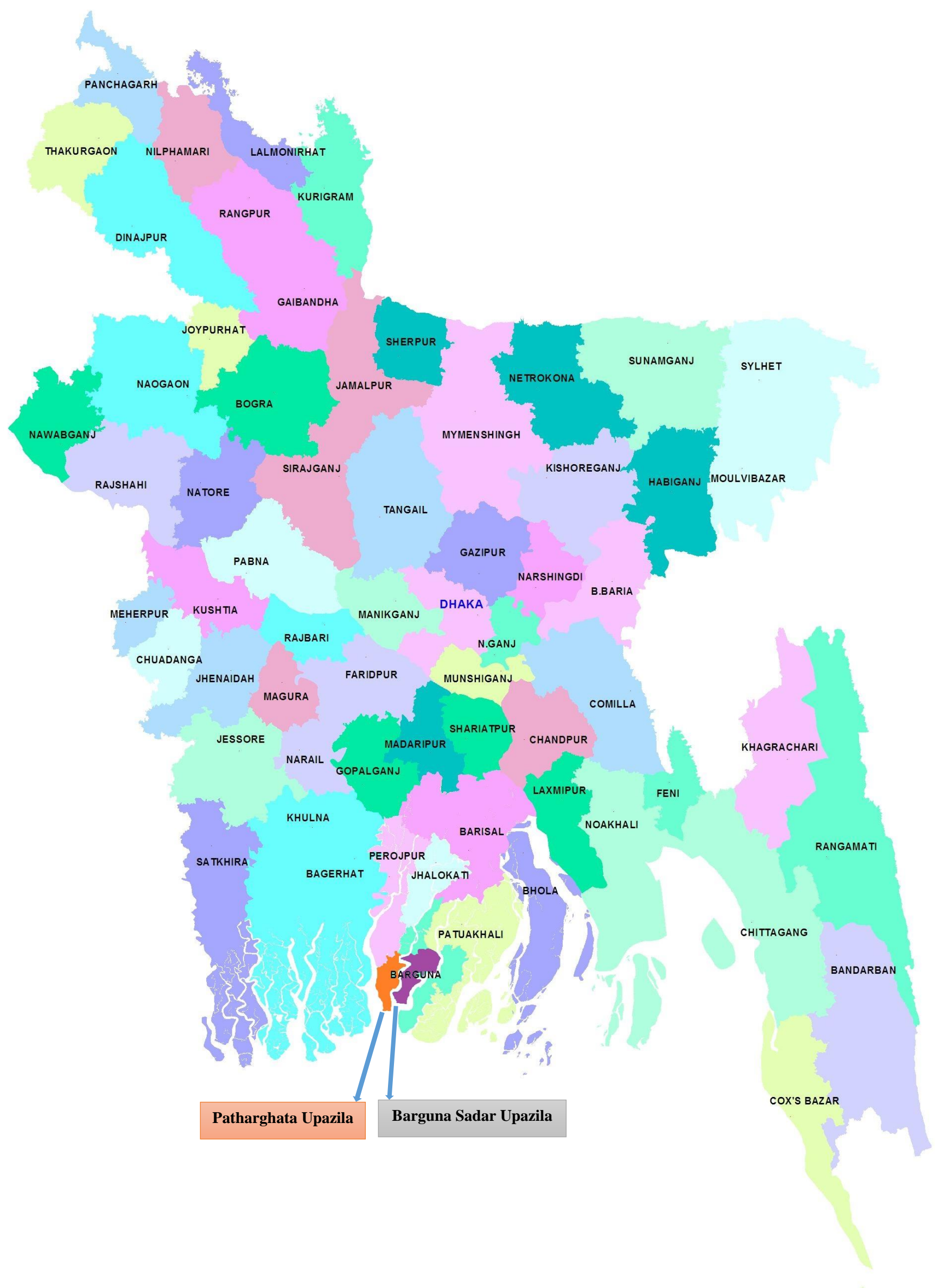


Figure 2: Project location in Bangladesh map

Source: Edited from LGED Map, 2018

3.3 List of Unions/Municipalities of the Study Area

Patharghata Upazila is comprised of 1 municipality and 7 union which covers an area of about 387.4 sq. km and Barguna Sadar Upazila is comprised of 1 municipality and 10 union which covers an area of about 454.4 sq. km.

Table 2: Project location in Bangladesh map

SL	Municipality/Union	Name
1.	Municipality	Barguna Municipality
2.	Union	Aylapatakata
3.	Union	Badarkhali
4.	Union	Burir Char
5.	Union	Dhalua
6.	Union	Fuljhury
7.	Union	Gaurichana
8.	Union	Keorabunia
9.	Union	M.Baliatali
10.	Union	Naltona
11.	Union	Aylapatakata
12.	Municipality	Patharghata Municipality
13.	Union	Patharghata
14.	Union	Charduani
15.	Union	Kakchira
16.	Union	Kalmegha
17.	Union	Kanthaltali
18.	Union	Nachna Para
19.	Union	Raihanpur

Source: LGED 2017



Figure 3: Union Map of Barguna Sadar Upazila

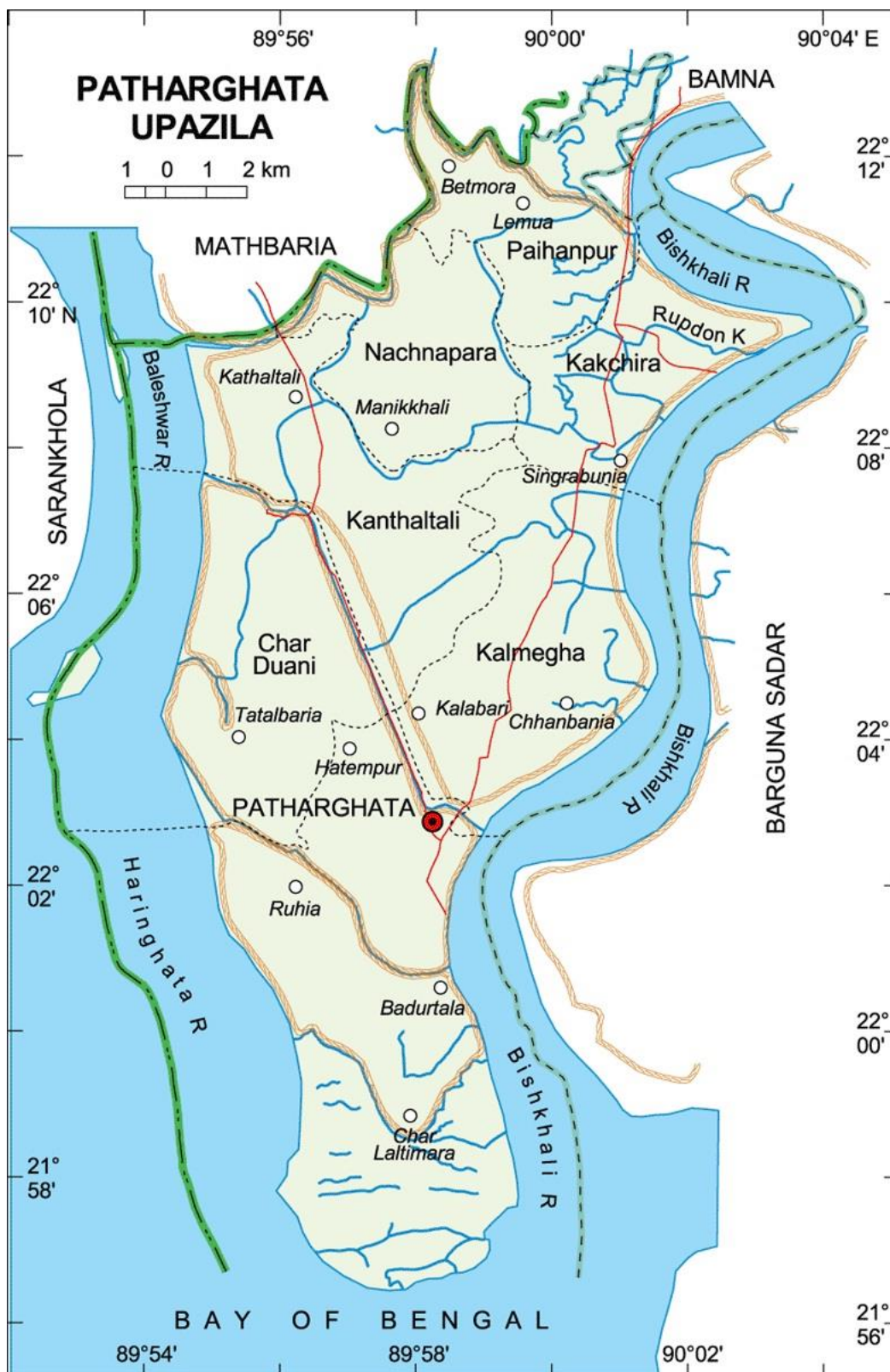


Figure 4: Union Map of Patharghata Upazila

4. PKCP and Linkage with National Development Plan

4.1 Introduction

This chapter explains the inter-relationship between the Payra-Kuakata Comprehensive Plan and the national development plans of the country. The national development plans studied in this report include, The Seventh Five Year Plan and the Poverty Reduction Strategy Paper (PRSP). It is more rational to study on going and current plans instead of plans that were prepared long back.

4.2 Special Consideration

National development plans are prepared considering the overall needs and aspirations of the country with respect to different sectors of development. Policies, strategies and objectives are set and budget allocation is made to realize development targets. Sectoral budgets are again splited down into program and projects under each sector for implementation through various ministries. Any development initiative at the local level must relate to the national level plans in order to achieve cohesion and integrity with overall development of the country to attain the national development objectives. It is therefore necessary to study how the Development plans are related to the national development plans of the country.

4.2.1 Aspects of Development Planning Framework

Development frameworks and processes are complex and multi-faceted encompassing a range of elements that make up development as a whole. Many countries like disaster vulnerable, within the region use a similar framework on which the details of each component can be built upon to form the development process as a whole. These frameworks can be loosely broken down into three key areas, Visioning, policy and planning, and implementation. Planning however is not a linear process and is achieved through a range of planning cycles.

Vision serves as the overall guide to the planning process. Based on the learnings from the implementation of the previous plans, building on the strengths and also addressing the weaknesses, a long-term vision is set where all citizens reap the benefits of socio-economic development and are empowered. Though the vision does not specifically mention disaster risk reduction or safety from natural hazards, however, reducing the risk from natural hazards in the country would only contribute to the achievement of the said vision.

Policy is necessary to meet the Vision; the identified challenges of the present and the perceived threats and opportunities of the future. These policies guide identification of

goals, objectives, targets, strategies and projects and programs which is detailed out in the development plan. For example, the national physical framework is a broad policy determining the spatial feature of proposed development in terms of settlement, production and protection land use, infrastructure etc. The physical framework in turn helps in identifying the socio-economic goals, objectives, targets and ultimately leading to programs and projects. As development factors such as society, economics and environment, are ever changing aspects of daily life and developmental growth, the formulation and implementation of policy must evolve to make sure that it does not become outdated. With this in mind, decision makers and policy developers, while creating policy, often use a cyclical process with clearly defined steps to ensure policy does not become outdated.

4.2.2 Integrating DRR into Physical Planning/Land Use Planning

DRR integration is best undertaken during the formulation stage of a physical framework/land use plan. It is at this planning stage that a risk assessment is invaluable in coming up with DRR-sensitive land use plan. The risk assessment forms the basis for understanding implications of current and future land use management and development. Given the levels of risk in identified geographical areas, the broad objectives/strategies for risk reduction in relation to land use management and development are to be determined. These include: avoidance; prevention; reduction; offsetting the impacts.

The analysis of risk impacts to land use guides planners and policy makers in determining where and what development could be further undertaken in their localities, as well as what could be done to improve current development conditions, thereby reducing risks to population and properties. The goals and objectives of land use and development plans should reflect this analysis and translate them into the planned specific programs and projects.

Population and urban development places a huge challenge in land use and development planning. Land use regulations or controls are important in this respect as they are the principal mechanisms for local governments to manage and regulate growth management and regulation of growth and development ensures the protection of fragile ecosystems and the reduction of vulnerability to risks posed by natural hazards. Zoning has been the principal land use regulation used by municipalities and cities. Zoning identifies and distributes the location of different types of land uses (e.g. residential, commercial, industrial, agricultural, forests and protected areas) for purposes of regulating density of population and development.

Disaster risk reduction and land use planning are both multi-disciplinary arenas, they require a multi-stakeholder participation. Within government, both are collaborative endeavors that need to be undertaken together by various ministries/departments. Land use planning goes beyond inter-ministry and agency collaboration, from the national to the local levels of government. As land use is an arena of competing

interests, planning requires the participation of communities, e.g. farmers, urban settlers, environmental managers, indigenous peoples, as well as developers.

4.2.3 Mainstreaming DRR in National Development Plan

Mainstreaming DRR in the medium-term national planning process helps to ensure that longer-term concerns such as risk reduction are not overshadowed by more immediately pressing issues, and relative political stability, implying the potential ability to sustain long-term programs and initiatives. (Benson, 2009). Typically, the national development plan provides the link between the social, economic and institutional agenda with the spatial development agenda and acts as the blueprint for development of the country over a specified period of time. It provides an opportunity to apply the lessons learned from the past and provide strategies for growth.

The national development plan also reflects a shared vision of the future of the country as a whole and hence attempts to be inclusive. Along with the sectoral priorities, the national development plan also provides an opportunity to outline the cross-cutting development themes which needs to be addressed as they have implications on the performance across all sectors. The themes typically include decentralized governance, women in development and environment.

Typically, all development plans include a specific section on the performance of the previous plan or challenges which have been hindering the process of development in the country. This analysis covers all the major sectors, individual sub-sector plans, the parameters and/or indicators by which they were based on, as well as internal and external developments that may have affected the implementation of the plan.

4.2.4 HYGO Framework for DRR Management

In 2004, Bangladesh experienced one of the most devastating floods in nearly 50 years. About 38% of the country went under water. The damage caused by the flood was to the tune of US\$ 2 billion. Millions of people were affected. The most affected were the poor the most vulnerable in such disasters.

On January 18-22, 2005 the World Conference on Disaster Reduction was held in Kobe Japan. About 4,000 participants from 168 States, 78 observer organizations from the UN and other inter-governmental organizations, 161 NGOs and 154 media organizations attended the conference. The broad objective of the conference was building the resilience of nations and communities to substantially reduce the losses in lives and social, economic and environmental assets of communities. The conference produced a 10-year Framework document called **“Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities** Drawing on the conclusions of the review of the Yokohama Strategy, and on the basis of deliberations at the Conference and especially the agreed expected outcome and strategic goals, the World Conference on Disaster Reduction adopted the following five priorities for action:

- Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
- Identify, assess and monitor disaster risks and enhance early warning
- Use knowledge, innovation and education to build a culture of safety and resilience at all levels
- Strengthen disaster preparedness for effective response at all levels
- Reduce the disaster related risk factors

4.2.5 Disaster Management Strategy in the SFYP

The SFYP will carry forward the implementation of the approved National Disaster Management Plan 2010-2015. It will continue the comprehensive all hazard, all risk and all sector approach and be built on the foundations laid in the last several years and learn from the positive experiences. The Bangladesh Disaster Management Model which made the basis for revising the disaster management policy and planning documents has mainly comprised of two inter-related elements: Disaster Risk Reduction and Emergency Response. The plan will focus more on Disaster Risk Reduction (DRR) in order for reducing the relief and recovery needs and also be prepared to deal with any emergencies. The government accords the focus on community level preparedness, response, recovery and rehabilitation emphasizing the following three broad-based strategies:

1. Disaster management would involve the management of both risk and consequences of disasters that would include prevention, emergency response, and post disaster recovery.
2. Community involvement for preparedness programs to protect lives and properties would be a major focus. Involvement of local government bodies would be an essential part of the strategy. Self-reliance should be the key for preparedness, response, and recovery.
3. Non-structural mitigation measures such as community disaster preparedness training, advocacy, and public awareness must be given a high priority; this would require an integration of structural mitigation with non-structural measures.

The priorities on DRR during the SFYP will broadly include: These include:

- Professionalizing the Disaster Management systems and institutions through execution of the Disaster Management Regulatory Framework already established.
- Strengthening the Disaster Management Bureau's capacity to monitor and take part in cross government mainstreaming of disaster risk reduction through pre, during and post disaster assessment.
- Strengthening institutional capacity of government sectoral ministries, departments and other technical and academic actors in ensuring inclusion of

DRR and Climate Change adaptation (CCA) issues and agendas within their respective sectoral policies, plans, programs and allocations of businesses.

- Empowering at risk communities to withstand and cope up with the disastrous situations through community and household level risk reduction interventions and livelihood support services.
- Reducing vulnerabilities of at risk communities through social safety nets – ensuring protection of women, children, the aged and differently able people giving due attention to their special needs.
- Preparedness for Earthquake
- Building Knowledge on DRR and CCA through piloting and adaption research
- Strengthening and improving an all Hazard Early Warning Systems through technical, technological and physical capacity strengthening of Bangladesh Meteorological Department and Flood Forecasting and Warning Center.
- Establishing and strengthening regional networks for real time data/information sharing
- Establishing an effective Community Alerting System through capacity strengthening of Cyclone Preparedness Program and Disaster Management Committees (DMC) at District, Upazila and Union levels.
- Introducing Contingency Planning and Disaster Preparedness across all sectors and at all levels.
- Establishing and improving Search and Rescue Mechanism
- Strengthening GO-NGO and private sector co-ordinations on relief and emergency management.
- Developing and establishing a well-coordinated multi-sectoral post-disaster recovery and reconstruction mechanism.
- Establishing and operational a National Disaster Management Information Centre connected with all the 64 Districts and high-risk Upazila DMCs

4.3 Poverty Reduction Strategy Paper (PRSP)

In September 2000, at the Millennium Summit, the United Nations issued the Millennium Declaration, signed by 189 countries, committing themselves to a series of targets, most of which are to be achieved by 2015. This is known as Millennium Development Goals (MDGs); they represent a framework for achieving human development and broadening its benefits. The Millennium Development Goals provide a road map for the international community's efforts for development. They encompass a set of eight goals:

- (1) Eradicate extreme poverty and hunger.
- (2) Achieve universal primary education.
- (3) Promote gender equity and empower women.
- (4) Reduce mortality.
- (5) Improve maternal health.

- (6) Combat HIV/AIDS, malaria and other diseases.
- (7) Ensure environmental sustainability.
- (8) Develop a global partnership for development.

In persuasion of achieving the MDGs in 2003 Poverty Reduction Strategy Paper (PRSP) was prepared. PRSP has taken over the place of Five-Year Plans. The Planning Commission under the Ministry of Finance initiated the Interim Poverty Reduction Strategy (IPRSP) in March 2003 and a full blown Poverty Reduction Strategy Paper (PRSP) was prepared in 2005. PRSP aims to targets of at least 20 sectors on special priority basis.

Physical planning, water supply and housing sector in the Planning Commission is now implementing development program of nine Ministries through the Annual Development Program (ADP) under Ministry of Planning. UNDP & UNICEF assisted "Reduce Urban Poverty through Local Partnership" project is under implementation, which is very relevant with the objectives of the Poverty Reduction Strategy Paper (PRSP). The completion of the Interim Poverty Reduction Strategy Paper (I-PRSP) titled *A National Strategy for Economic Growth, Poverty Reduction and Social Development*, in March 2003, marked an important milestone in the process of renewing the national goal of policy ownership over the formulation of Poverty Reduction Strategies (PRS). PRSP is prepared for unlocking the potentials using government's own resources and by local experts; thematic reports, prepared by the Ministries in their own areas, serve as background papers for the PRSP.

4.3.1 Strategy for Poverty Reduction in the SYFP

The review of past progress with poverty reduction has a number of important implications for poverty reduction strategy in the SFYP.

First, poverty still remains at a very high level and the number of people living below poverty line remains almost the same as it was in 1991-92 (about 56 million). The most startling consequence of widespread poverty is that a quarter of the country's population- 36 million people- cannot afford an adequate diet, according to the 2005 estimates of food poverty or extreme poverty. Chronically underfed and highly vulnerable, they remain largely without assets (other than their own labor power) to cushion lean-season hunger or the crushing blows of illness, flooding, and other calamities.

Second, faster poverty reduction during the 1990s was also accompanied by rising inequality measured by income as well as expenditure distribution, which is a major concern for policy makers. Rising inequality has the potential to dampen the pace of economic growth and poverty reduction outcomes while also contributing to social instability and must be addressed comprehensively.

Third, there are significant regional variations in poverty. Poverty is more pronounced in some areas and regions of the country which suffer from flooding, river erosion, mono cropping and similar disadvantages. Poverty is highest in the western region of

the country (Rajshahi Division) followed by Khulna, Barisal and Chittagong. This lagging regions problem is a serious social challenge.

Finally, while these static point-in-time poverty estimates are useful for a snapshot of the poverty situation, they are not much useful to explain the gross movement of households in and out of poverty. Empirical evidence suggests that the gross movements in and out of poverty are much larger than the net aggregate poverty outcomes indicated by static estimates

In light of the above lessons of experience, the main elements of the poverty reduction strategy in the SFYP will consist of policies and programs to:

- promote growth by sustaining increases in labor productivity and job creation in manufacturing and services;
- increase farm income through better productivity;
- enhance the access of the poor to production inputs (fertilizer, seed, irrigation water, power, rural roads) and to institutional finance
- expand employment opportunities in lagging regions by improving connectivity with growth poles through better infrastructure and by investing in human capital;
- facilitate migration from poor areas given the poverty-reducing impact of remittances;
- Undertake entrepreneurship development scheme/strategy/mechanism for the Returnee Migrant;
- stimulate women's participation in the labor force;
- Promote overseas employment including women migration to the new destination and expand the existing overseas labor market;
- Sustain Bangladesh's past successes in reducing fertility;
- improve poor households access to and quality of education, health and nutrition services;
- strengthen the coordination, targeting and coverage of social protection programs; enhance the access to micro finance;
- ensure stable food prices; and
- to mitigate the adverse consequences of climate change

Based on the projected acceleration of real economic activity, the shift in employment to more productive sectors of the economy, and implementation of related measures to enhance the human and physical capital of the poor a significant reduction in poverty is expected throughout the Plan period. The reduction in the head count poverty rate is projected to range between 8-10 percentage points depending on the elasticity of poverty reduction with respect to GDP growth and assuming unchanged income distribution.

The reduction in poverty will essentially be driven by the growth in the per capita income which is projected to grow on average at more than 6% per year with the growth in per capita income steadily accelerating to 6.9% in the terminal year of the

Plan. The poverty elasticity of growth method is used to project the head-count poverty rates for the plan years. However, there are different estimates of Bangladesh's poverty elasticity of growth. Using the long-term decline in poverty between 2000 and 2010, the value of the elasticity turns out to be 0.76. Based on this value, the head-count poverty rate in the terminal year of the Sixth Five Year Plan becomes 24.5 percent. However, using the more recent 2005-2010 poverty figures, the elasticity estimate becomes 0.89, which is significantly higher. Based on this higher elasticity value the head-count poverty rate in the terminal year becomes 22.5 percent. The Sixth Plan aims to achieve this lower poverty rate target.

4.3.2 Review of PRSP and Linkage between National Plans and Local Level Plans

The PRSP needs to gear up specially the improvement of slum living condition and accelerated poverty reduction programs. But as the fund allocation by the donor agency remains insufficient by this fiscal year PRSP has been extended up to June, 2008 instead of June 2007. Besides this PRSP implementation committee noted that the indicators which have been used to measure the economic growth of our country has not been sufficient enough. Due to lack of data, it becomes difficult to calculate the employment generation rate through the government allocation in different development sectors for poverty reduction (Source: Prothom Alo). So it is necessary to fix relevant indicators and also prepare adequate data base for the measurement of allocation of resources for overall growth and development.

Moreover, the process of PRSP implemented so far, is not sufficiently responsive to the uniqueness of Bangladesh. In order to prepare a genuine strategy document for the core of government's mainstream five-year planning process, it needs to be locally conceived rather than formulated under the guidance of the Bank and the Fund. The voice of grassroots people is so crucial for devising responsive and pragmatic programs is noticeably missing.

To achieve MDGs for cities, four distinct groups of policies can be identified:

- (a) Overall macro-economic policy for cities which affects economic growth.
- (b) City infrastructure and planning, including planned towns and improving local governance mechanisms through capacity building,
- (c) Employment generation.
- (d) Law and order measures.

The present system of national level planning hardly links the local level plans with that of the national level. The present system of national development budget allocation for urban local government is a top down approach, which is highly influenced by political objectives. Population is a loosely followed basis for budget allocation, instead of actual need. As a result, local people's needs and aspirations are not always reflected in national development plans. Through political power, the local ruling party strongmen often manage development projects according to his own will, setting aside the desire of

the local people. As a result, many problems of the local level remain unresolved. Therefore, it is important to establish a linkage between the local plans and the national development plan so that aspirations of the people can be realized. This necessitates following a top down approach of development planning and the budget allocation should be made according to the choice of the local governments who are accountable to the people directly. Budget should be allocated according to the priority list of the projects prepared by the local authority that is supposed to reflect the needs of the Pourashava and rural people as the list will be prepared by the Councilors and the Mayor who are directly elected by the people.

The aim of the current project is to prepare a development plan for the Barguna project area. In the process of planning large number of development projects will be identified in different sectors. Implementation of development projects will require improved infrastructure which intern will help improve infrastructure and services facilities much needed for a healthy environment and for harnessing local resources. This will attract more investment in the locality to generate new employment. New employment, again, will generate income for the poor people and shall improve the poverty situation, which is the main objective of PRSP. New jobs will also be created during implementation of various development projects. New and improved road infrastructure will also increase mobility vis- a -vis economic activities of the Pourashava and its adjacent rural area that will help address the problems of unemployment.

4.4 A Review of past Policies and Programs for Management of Urbanization

During the last two decades, Bangladesh has followed broad sector directions while policies on specific themes have been issued periodically. The national Housing Policy 1993 aimed for “housing for all” and recognized the importance of planned development of human settlements. The Urban Management Policy statement 1994 envisioned sustainable and equitable urban development through decentralized development, public awareness and sector participation. Later on, the government updated the statement and issued Urban Management Policy Statement 1999 which provides a basic policy framework to guide and sustain the process of gradual decentralization. The purpose of this policy statement is to improve upon and augment the existing policy statement, with a view towards efficient urban management and increased decentralization in the longer term. The National Urban Sector Policy drafted in 2006 envisioned a decentralized and participatory process of urban development in which the national and local government, private sector and civil society play complementary roles. The policy prescribes far reaching actions on multiple dimensions of urban management and national level institutional changes and public participation structures at the city and sub-city levels. Other developments relevant to the urban sector includes the national Policy for Safe Water Supply and sanitation (1998), Water Supply and Sanitation Sector Development Plan, National Policy for Arsenic Mitigation,

The National Sanitation Strategy and the pro-poor water and sanitation and cost sharing strategies. Many of these policies have attempted to give coherent directions to developments in the urban sector including adoption of principles like devolution of powers, resources and responsibilities to local governments and community groups, treating resources as economic goods, using awareness generation and mobilization and motivational tools for sanitation and solid waste management, tempering off subsidies on sanitation hardware and promoting private-public partnerships. The recommendations made by the Committee on Urban Local Governments for long-term municipal development and urban sector programming, property tax system, improved financial system management etc. are now under active consideration of the government. Past urban sector interventions mostly tried to address the long neglected infrastructure maintenance and rehabilitation needs and to develop the capacity of the Municipalities specially to raise income, improve financial management capacity and design municipal services in a planned way. But not much has been done to establish strong urban institutions that are capable of meeting the future service demand of the projected urbanization pattern.

4.4.1 Lessons Learned from Past Development Initiatives and Key Constraints

Municipalities in Bangladesh have witnessed nearly two decades of urban infrastructure initiatives with STIDP-I and II, MSP and the on-going UGIIP-1 since 2003. The MSP and its successor institution, Bangladesh Municipal Development Fund, presented a model of supporting decentralization especially by opening up access to infrastructure funding based on objective financial and institutional criteria outside the government's inter-governmental fiscal transfer frame. UGIIP-1 made a radical departure from earlier initiatives in linking performance of Municipalities in achieving action based governance improvements to access infrastructure funding in phases. Focusing on governance improvements and a performance based approach urban infrastructure improvements have proved very successful;

- It addresses a wide range of areas simultaneously from improved participation of various stakeholder groups in service delivery to increased financial accountability and improved administrative procedures;
- Local governments feel full ownership in improving governance reforms, considering these reforms as an opportunity to improve their financial and administrative shortcomings.

They have been able to adapt to the new governance practices within a short period of time. The following lessons learned:

- The performance of the Municipalities has been particularly good in areas where the identified governance indicators are concise and output oriented;

- municipalities took greater ownership and interests in areas where their legitimacy and performance in the local public eye improved immediately and turned out to be credible;
- Adopting governance improvements require substantive and timely capacity building inputs.

Based on an extensive review of previous projects focusing on governance improvement and a performance based approach, the following opportunities for improving this approach have been identified;

- Ensure that mechanisms are in place to deepen participatory planning ensuring prioritization of the needs of the poor;
- Refine the governance improvement action plan to include more qualitative achievements and ensure that the achievements will sustain beyond project implementation;
- Inculcating the practice of responsible financial decisions and discipline through financing and repayment mechanisms;
- Strengthening citizen's interface and accountability of the municipalities;
- Greater focus on capacity building of institutions at the municipality level
- Improvements in O&M management. One of the most significant lessons is the criticality of national level support to municipalities in terms of sector wide policy support, legislative and executive actions to enable more effective functioning of municipalities and supportive measures to improve their finance and financial management.

In this regard the parliament has already passed the Pourashava Bill 2009 and City Corporations Bill 2009.

4.4.3 Urbanization Strategy under the Seventh Five Year Plan

A review of past policies, institutions and programs suggest that the urbanization strategy needs to change substantially to meet the challenges of future urbanization in Bangladesh. In the past much of the focus has been on implementing piecemeal programs. Multitudes of local government agencies, weak planning, poor governance, inadequate resources and weak project implementation capacity have limited the progress with meeting the urban challenge. The Seventh Plan will internalize these lessons of experience and shift the emphasis to the development of sound urban institutions, improve city governance and create compact, networked, resilient, competitive, inclusive and smart urban development. The following objectives will be the guiding principles for the overall development of the urban sector:

1. Ensuring regionally balanced urbanization through polycentric decentralized development and hierarchically structured urban system;
2. Ensuring legitimate comprehensive development plans for future development

3. Facilitating economic development, employment generation, reduction of inequality and poverty eradication through especially public-private partnerships;
4. Ensuring better utilization of land resources and mitigating increased demand for housing and urban services;
5. Protecting, preserving and improving the urban environment, particularly water bodies;
6. Devolving authority at the local urban level and strengthening local governments so that it can improve on resource mobilization
7. Involve the community, including women and poor, in the decision-making and implementation processes;
8. Involving public and private agencies with the urban local government institutions; and
9. Strengthen coordination among urban service providers.

5. Approach and Methodology

5.1. Introduction

The approach & methodology, and work task to be performed to accomplish the stated objectives and activities stated in the TOR and as summarized in Section 4 are presented in this chapter. However, before presenting the methodologies, in the light of TOR our understanding regarding the scope of work and the major steps of activities are discussed.

5.1.1 Activity -1 Mobilization

The Survey firm recognize that one of the key requirements for the success of the work program will be rapid and effective mobilization of the team members to start the required work without delay. This is generally true for all project but it's particularly true for the time constrained survey work of the project.

5.1.2 Activity-2 Discussion and meeting

Discussion with project authority for successfully completion of the project according to the ToR. The Survey Firm after initiation of office would call on PD. They will have held in depth discussion with

*Project Director (PD)

*project Manager (PM)

The survey firm also visit the related Pourashava, EZ and its union office.

5.1.3 Activity -3 Collection of Documents

i. Collection and review of Database

For Map Preparation, basic data will be needed on Mouza maps, road network, river/khal network, population, holding numbers, social, economic and physical conditions in the project area etc. Most of this information will be collected from existing studies, plans and programs, government publications, public authorities, statistical digests, documentation of external agencies, as well as the records of DLR, respective authorities and other development agencies working in the area. Reference will be made to relevant national reports, plans etc.

Major data gaps will be identified and will be collected through sector studies/surveys to be undertaken.

ii. Mouza Map Collection

Mouza sheets/maps of RS/CS or latest version will be collected covering the entire project area. The mouza sheets having distortion due to rapping or pasting cloths/tape in the mouza maps will be avoided during collection of mouza maps.

Before scanning of Mouza maps all collected mouza maps will be submitted to UDD for review and quality check/authentication.

5.1.4 Activity -4 Reconnaissance survey

In conjunction with the data gathering, the survey firm will conduct reconnaissance survey of the entire project area to devalued particularly the space zoning with the respect layout considering the overall service levels.

5.1.5 Activity -5 Survey Plan

This will be a highly qualified group of well-equipped and well-organized staff for its field survey and GIS mapping projects. The most modern survey equipment like Total Station, Digital level, and satellite-based survey equipment like RTK-GPS, DGPS will be engaged for the field survey and data acquisition campaign. A quality Control team lead by a Quality Control Manager will be engaged. The quality control will be maintained in two stages, in the field and in the office.

i Quality Control in the Field

- Use of satellite based advanced survey technique,
- Maintain & monitor daily log sheets and level books in the field,
- Daily checking of the field equipment before starting the work,
- Routine check and calibration of the survey equipment,
- Frequent field visit by the joint team comprising the senior staff of Consultants and project officials of UDD, and
- Interaction with project officials in the field level

ii. Quality Control in the Office

- Daily review meeting with survey groups,
- Spatial and temporal Comparison of the survey data,
- Daily updating and processing data and Maps, and
- Frequent interaction and review meeting with project officials

In addition to those, progress as well as quality control of survey and data processing work will be reviewed in the progress meeting by the project authority.

5.1.6 Activity - 6 Physical feature surveys

The approach & methodology, and work task to be performed to accomplish the stated objectives and activities stated in the TOR and as summarized in Section 4 are

presented in this chapter. However, before presenting the methodologies, in the light of TOR our understanding regarding the scope of work and the major steps of activities are discussed.

i. Collection and Review of Database

For map preparation, basic data will be needed on Mouza maps, road network, river/khal network, population, holding numbers, social, economic and physical conditions in the project area etc. Most of this information will be collected from existing studies, plans and programs, government publications, public authorities, statistical digests, documentation of external agencies, as well as the records of DLR, respective authorities and other development agencies working in the area. Reference will be made to relevant national reports, plans etc.

Major data gaps will be identified and will be collected through sector studies/surveys to be undertaken

5.2 Methodology of Key Issues

5.2.1 Preparation Base Map

Preparation of base map for the project area needs following items of works:

Construction and Establishment of Bench Mark (BM) Ground Control Point (GCP):

Pillars covering the project area including approximately 5 km. grid in rural area (pillar 10"x10", Base 3'x3', height 5'). RCC pillars are to be constructed marking unique identification number coordinate X, Y of these pillars along with Z value is to be marked on base map for future reference.

- Geo-referencing of Mauza Maps, and
Preparation of GIS Map Layout

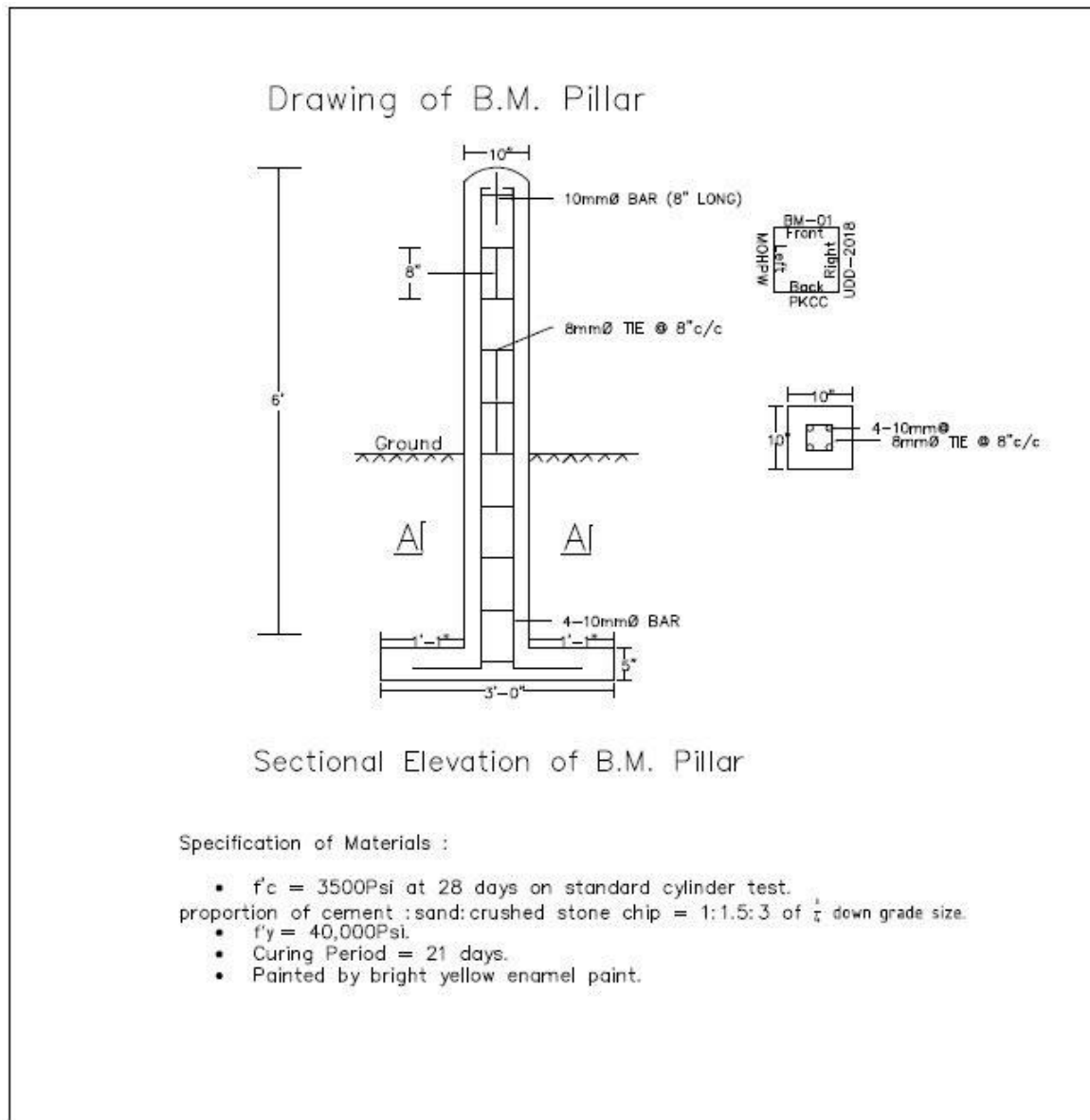


Figure 5: BM pillar design

5.2.2 GPS and GIS Technique

The automation, digitization and geo-reference of planning information deserves attention to the quality, vision of the extent of future applications, flexibility for the possible user groups and openness to easy access, all of which we are lacking in our country. Now a days, all the planning activities need to deal with a large amount of digital and spatial data and maps, charts and reports. The Planners also need an automated information system like Geographical Information System (GIS) capable of dealing with spatial database to make their task efficient and effective. For which a digital and geo-reference data and information are very much needed. A comprehensive GIS includes software and hardware used to capture, store, organize, manipulate, analyze and display spatially referenced information. Easy manipulation

and display of information helps to facilitate the decision-making process by allowing planners to customize the maps and models produced.

5.2.3 GPS Based Advanced Survey Technique

Digitizing of existing mouza maps is time consuming with possibility of error, which can be easily converted to digital map by using scanner and processing through appropriate software with high accuracy. Spatial data collection and geo-reference digital mapping have now become very easy with satellite based advanced survey techniques using Global Positioning System (GPS) and Geographical Information System (GIS) with accuracy of millimeter level. Furthermore, the development of high-resolution images helps to determine the spatial features as well as verify the survey data more accurately.

The Global Positioning System (GPS) is worldwide all-weather radio-navigation and positioning system formed from a constellation of 24 satellites and their 5 nos. ground control & monitor stations. GPS receivers use these US Navigation Satellites for Timing and Ranging (NAVSTAR) to calculate positions accurate to matter of meters. GPS receives radio waves, modulated for positioning, transmitted by a maximum number of 24 satellites, which enables to work out the distance between satellite and observation points. By receiving radio waves from four satellites simultaneously it is possible to find out the three-dimensional co-ordinates and time (UTC) of the observation point with an accuracy level which cannot be conceived in traditional ground survey. The facility of GPS has been utilized in different kinds of ground surveys including geodetic, topographic and hydrographic survey in the recent times. Differential Global Positioning System (DGPS) is different versions of GPS technology, each with its own range of applicability and accuracy level. GPS based surveying has a number of advantages over conventional surveying methods. These are:

- Highly accurate
- Very fast
- Line of sight not required
- Digital/Computerized data storage, processing facility
- Unified 3-dimensional global co-ordinate system (x,y,z) output

GPS based survey with its computer based data storage and processing facility on and off the field offers immense flexibility in map production under a GIS environment. To ensure precision and accuracy in survey work and to facilitate georeferenced/digital map production by GIS software and finally to complete the whole work in a rather shortened time schedule, GPS technology was the best and logical approach to be followed.

5.2.4 Differential Global Positioning System (DGPS)

To obtain precise position from a GPS receiver, we use techniques called “Differential GPS”. This involves at least two GPS receivers. One is stationary, at a known point or bench mark, we call this the “Base or Reference” receiver/unit and the other rover receiver/unit. The base unit ties all the satellite measurements into a solid local reference i.e. known point or bench mark. The Base receiver measures and records the timing errors and then transmit correction information to the other receivers those are roving around. The roving GPS receivers, possibly moving at an unknown point, calculates precise position by using the signals it receives from the satellites, and the correction information receives via radio from the Base. The correction information could be transmitted through online radio communication system or could be incorporated by off-line data processing software. Differential GPS usually gives about one-meter accuracy.

5.3 Real Time Kinetics (RTK) GPS

RTK is a special form of Differential GPS that gives about one hundred times greater accuracy. The GPS system uses a coded signal from which a receiver derives distance and thus position. The GPS satellite provides the equivalent of tape measure from space. The tape labeled tick marks at ~300m intervals (the C/A code), as well as unlabeled tick marks at ~20m intervals (the carrier). A GPS receiver can measure the code to one-meter (1m) precisions, and the carrier to one-centimeter (1cm) precision. A receiver that can compute the “Labels” on the carrier can then deliver centimeter position accuracy. This is what RTK does.

10-20 km radius



5.3.1 Establishment of Reference Station for DGPS Survey

Reference stations for Differential Global Positioning System (DGPS) survey will be established in the project area. RTK-GPS static survey and baseline network adjustment technique will be used for this purpose. JICA BMs in or around the project area will be used as reference for establishment of DGPS reference stations. These reference stations will be used for recording and transmitting differential correction for DGPS rover units.

5.3.2 Approach and Methodology of Survey and GIS Mapping

GPS based advanced survey technique will be used for preparing the Georeference Topographic, Physical Feature and Land Use Map of the project area. ArcGIS based GIS software will be used for mapping purposes. The methodology of field survey, data processing and GIS mapping are described below:

5.3.3 Baseline Survey by RTK-GPS

The Baseline survey, simultaneous data collection in static mode at two or more fixed points using two or more dual frequency GPS receivers. The measurement network for RTK-GPS baseline survey will be planned by connecting the BM points to be established and the selected reference BM points (known Latitude, longitude and ellipsoidal height) available inside and around the project area. A line connecting two measurement points is known as baseline. It is important to emphasize that the configuration of network was based on practical considerations rather than requirements of an ideal network.

The GPS measurements consist a simultaneous static measurement with dual frequency GPS receivers at the ends of a baseline concerned. Measurement or logging time for a session is usually one hour. During the measurements the GPS receivers at the two points record the information or data (Latitude, Longitude, Ellipsoidal Height) on the configuration of available satellite at the time, which at the end of day's work will be processed using Trimble Geomatic Office software. If results from the field measurements found unacceptable, measurements will be repeated.

The verified results of each baseline will be stored for the subsequent network adjustment. After completing the baseline survey, network adjustment will be done with respect to the known values (Latitude, Longitude, and Ellipsoidal Height) of selected reference BMs available inside and around the project area. The adjustment module of Trimble Geomatic Office software will be used for network adjustment. After network adjustment the precise co-ordinates (Latitude, Longitude, and Ellipsoidal Height) of each BM will be obtained.

The survey team & their responsibilities have been listed below:

<i>Feature</i>	<i>Survey Activities</i>
1. <i>Point, Line and Closed Boundary</i> <i>Features (where satellites signal available)</i> <i>survey</i> <i>DGPS closed boundary survey</i>	<i>DGPS position survey</i> <i>DGPS alignment</i>
2. <i>Establishment of Secondary Control</i> <i>Points for Total Station Team (Team-C)</i> <i>GEOID Model</i>	<i>RTK fast Static Survey</i> <i>and use of project</i>
3. <i>Point, Line and Closed Boundary</i> <i>boundary and</i>	<i>Position, alignment, spot/ land</i>
4. <i>Water bodies</i> <i>bed level survey</i>	<i>Alignment, boundary and</i>

5.3.4 DGPS Survey (Line, Point and Closed Boundary/Polygon Features)

DGPS experts of the DGPS group will walk over the both sides of the road or embankment with the DGPS rover unit in a backpack to measure and store the alignment in x and y co-ordinates of roads, embankment and other line features roughly at 1 to 3m intervals. The point and closed boundary features also surveyed by the DGPS groups. The optical teams will pick up the crest level of the road. DGPS group is also responsible for taking the position and the information of the structures (hydraulic structures, bridges and culverts etc.). At the end of day's survey, the DGPS data will be downloaded and post-processed in the office using Pathfinder Office software and stored into GIS database.

5.4 RTK-GPS Fast Static Survey (Establishment of Secondary Control Points for TS Survey)

The Secondary Control Point (SCP) will be established using RTK fast static survey technique and GEOID Model of the project. These SCPs will be used by the total station groups as reference points (Station and Back Points) for feature and land topography survey.

5.4.1 Physical Infrastructure Survey

Physical feature surveys provide the basis for understanding many planning problems. In a planning work such as Detailed Area Planning, precise locations and dimensions of physical features such as rivers, drainage channels, building, roads etc. are important. Thus to know existing information about physical features of an area, physical feature survey is carried out.

From the physical feature map information such as access to the area, available roads in different conditions (such as metaled, non-metaled, kutcha), right of way, location of natural barriers, structures, utility services, etc. are collected. These information is aid in planning. Decision can be taken whether a new access is required, or if there is any scope for expansion/improvement of roads. If a new link road is proposed, it is going to interact with the existing structures and natural barriers. for examples a bridge may be required over a road.

Physical Features:

Table 3: Description of physical feature

	Physical features	Illustrated
a.	River	Indicate alignment, direction of flow & width
b.	Khal	Indicate alignment, direction & width
c.	Drainage Channels	Natural and improved (with flow direction & width)
d.	Ponds/Tanks/Ditches	Indicate them
e.	Marshlands/Flood Prone Area	Land liable to flooding during monsoon
f.	Building / Structures	Pucca / semi pucca structures & story
g.	Roads	Pucca/HBB/Kutcha, earth etc.
h.	Bus/Trucks Terminals	Indicate right of way and any areas that are covered by the electricity system.
i	Flood Works	Embankments, pumps stations, sluice gates length, width, condition of abutments and wing-walls.
j.	Bridge / Culverts	Indicate location, covered area, type of structure
k.	Utility Mains and Row	Electric, gas and telephone etc.
l.	Utility Substations	Electric, Water works, waste disposal and treatment, gas, telephone line etc.
m.	Deep Tube well Stations	R.C.C. DPHE and other deep tube well stations and output
n.	Mouza, Union/Ward, Thana and District Boundary	Administrative boundaries

The features identified above should be provided in the Base map. Names of settlements, village, rivers, khal, lakes, roads, markers, etc. must be indicated in the maps.

Physical Infrastructure:

Table 4: Physical infrastructure

Survey Item		Illustrated
a.	Physical Infrastructure	<p>Type, width, length and name of road, road level above datum, slopes, borrow pit.</p> <ul style="list-style-type: none"> - Identification of any bridge or culvert with their length & width. - Identification of the water supply system, location of overhead water tank and its capacity, location of pumps for direct supply - Identification, location and capacity of electric substation, telephone exchange, gas substation etc. Treatment plant, waste disposal sites. - Identification, location of electricity, telephone, gas and other utility lines of different capacity.
b.	Other Items	<ul style="list-style-type: none"> - If any new items identified during the survey.

5.4.2 Total Station Survey (Line, Polygon and Point Features)

Location and dimension of most of the physical infrastructures will be surveyed and stored using RTK-GPS supported Total Station (TS) survey technique. The cross-sections of road, drainage divide, drainage channel and borrow pits will also have surveyed using Total Station where actual representative of the cross and longitudinal section of the feature can be drawn using GIS or other software. Data will be recorded in the TS memory card with separate ID or code number for each structure. Later on the TS data will be transferred directly to the GIS database where the feature will be kept in separate layer wise as per specified code or ID.

5.4.3 DGPS Survey (Point Features)

Location of point features such as telephone, electricity poles, small hydraulic structures etc. will be surveyed using Data Logger Pro XR DGPS. Position data of such features will be stored in DGPS handheld computer with individual ID or code. Later on this data will be transferred to GIS database in layer wise after incorporating the differential correction and necessary processing.

5.4.3.1 Attribute Data Collection and Field Verification

Attribute data of the features will be collected from the field after producing base map. It will be a step by step procedure. GPS and total station will be used for field object verification.

5.4.4 Map Updating

Attribute data and missing map object collected from the field, will be incorporated into the features in this stage.



Figure 6: Update map with attribute data

5.4.5 Field Check

Field checking will be done check the following:

- Dimension and shape of the features
- Accuracy of feature's attributes

5.4.6 Data Delivery

Final map data will be produced and delivered to client for approval. For better understanding a table have been attached in the annexure a2.

5.4.6.1 Topographic Survey

Topographic survey will be conducted by Optical Level in respect to established bench mark (BM) of Survey of Bangladesh (SoB) and 3d Stereo Satellite Image. Topographic data (DTM Points) having X, Y and Z values will be collected at 5 meter grid in urban area and 10 meter grid in rural area.

5.4.6.2 Land use survey

Land use planning is basically concerned with the location, intensity and amount of land development required for various space-using functions of city life. As planning is concerned with the use and development of land, studies of the existing pattern of land use are fundamental to the subject. This is done through land use surveys. Land use survey basically records the use of land by its functional activity such as residential, industrial or commercial. These are major land uses. As the scale of the map is enlarged, areas with these predominant uses may be further subdivided as required until the individual use of each building and plot of land can be shown.

Total Station and DGPS survey technique will be used for land use survey and land use data will be cross checked by Stereo Satellite Image. Each survey feature will be recorded with individual ID or code. Later on land use features will be identified and classified using the recorded code and separated in different layers during data processing stage, from where the category wise land use map can be drawn using the identification layers of each land uses features. According to the ToR the land use will have to be classified which is mentioned in the Annexure.

5.5 GIS Mapping (Arc Info Coverage and Map Lay Out in ArcView)

Topographic mapping will be done by using PC Arc/Info and Arc GIS based GIS software. All data will be provided both in soft (x, y, z) with and hard copy.

GIS data processing and mapping cover the following activities:

- Survey data processing,
- Development of GIS data base, and
- Development of Map layout and legend

As per ToR Geodetic reference, grid and vertical datum for GIS mapping is as below:

- Scale : As per TOR,
- Map size : As per TOR,
- No. of maps : As per TOR,
- Software : GIS (ArcView & ArcInfo),
- Plotting by : HP Plotter using GIS software,
- Geodetic reference : BTM (Bangladesh Transverse Mercator),
- Projection parameter : Scale factor : 0.9996,
Central meridian : 90° E,
False easting : 500,000m,
False northing : -2,000,000m, and
Latitude of origin : 0° (equator),
- Spheroid : Everest 1830,
Semi-major axis a : 6,377,276.345m,
Semi-minor axis b : 6,356,075.413m, and

- | | | |
|---------------------------|--------------------------|----------------|
| | Inverse flattening 1/f : | 3008017, |
| • Datum shifts from WGS84 | : Rotation x : | 0.00, |
| | Rotation y : | 0.00, |
| | Rotation z : | 0.00, |
| | Translation x : | -283.729m, |
| | Translation y : | -735.942m, |
| | Translation z : | -261.143m, and |
| | Scale : | 0 ppm |
- Reference vertical datum : m PWD (Public Works Department), Bangladesh

5.6 Survey Data Processing (GPS and Total Station Data)

GPS and TS data can be stored in WGS84 format (latitude, longitude, ellipsoidal height in meter) or in any projection such as the BTM (Northing, Easting, ellipsoidal height in meter). In order to minimize the error, the data will be stored in BTM projection system (as specified in the TOR) in an available file format such as .gen, .shp, .dxf, or .fat. However, conversion of data will be done in the *.gen format. i.e. in Arc/Info format.

5.6.1 Development of GIS Database

All spatial information or data from different survey such as line and point features, structures dimensions etc. will be processed and stored under a comprehensive GIS database component. Geographic information System (GIS) software such as ArcView and Arc/Info will be used for data processing and preparing maps. Later on digitized and geo-referenced mouza maps will be incorporated in the surveyed map.

5.6.2 Preparation of Coverage Description/Information Log-sheet

The log sheet will be maintained for all the developed coverage (created and updated in PC ArcGIS) where detailed description will be noted down with specific technical terminology of Arc/Info format. The log sheets will be supplied to the client during hand over data and maps. In the TOR, instruction and format of such log-sheet is mentioned as below:

5.6.3 Preparation of Map Layout and Legend

A standard map layout will be developed by consultation with concern project officials. Leading GIS software for map production ArcView 3.2 will be used to develop the standard layout for mapping. Legend for map features will be selected from the available symbol palettes in ArcView 3.2 and all the soft data will be supplied as PC Arc/Info 3.5 format. Proposed coverage description and legends (compatible to use in PC ArcInfo and ArcView) are enclosed in the below table. If required, later on this legend will be updated and finalized as per suggestion by UDD.

Base maps will be prepared on the enlarged map for the project area indicates following features:

Table 5: Proposed shapefile description

Proposed Coverage Name	Feature Type	Coverage Type
• Mauza name and Boundary	Line	Shape/Coverage
• Ward no. and boundary	Line	Shape/Coverage
• Zone no. and boundary	Line and annotation	Shape/Coverage
• Pourashava boundary	Line	Shape/Coverage
• Thana name and boundary	Line	Shape/Coverage
• Mahalla name and bundary	Line and annotation	Shape/Coverage
• Plot boundary	Line/Polygon	Shape/Coverage
• Holding no. and boundary	Point and line	Shape/Coverage
• Park and playground with name	Point/Polygon	Shape/Coverage
• Vacant land with name	Line/Polygon	Shape/Coverage
• Location of primary school with name	Point/Polygon	Shape/Coverage
• Location of high school with name	Point/Polygon	Shape/Coverage
• Location of college with name	Point/Polygon	Shape/Coverage
• University with name	Point/Polygon	Shape/Coverage
• Road with name	Line/Polygon	Shape/Coverage
• Railway line	Line	Shape/Coverage
• River, khal, pond and other water bodies with name	Line/Polygon	Shape/Coverage
• Bridge, under pass and over pass	Point	Shape/Coverage
• Road divider and road island	Line/Polygon	Shape/Coverage
• Footpath	Line/Polygon	Shape/Coverage
• Dustbin and container	Point/Polygon	Shape/Coverage
• Mosque	Point/Polygon	Shape/Coverage
• Mazar	Point/Polygon	Shape/Coverage
• Madrasa	Point/Polygon	Shape/Coverage
• Mandir	Point/Polygon	Shape/Coverage
• Temple	Point/Polygon	Shape/Coverage
• Graveyard	Point/Polygon	Shape/Coverage
• Hospital	Point/Polygon	Shape/Coverage
• Clinic	Point/Polygon	Shape/Coverage
• Health facilities	Point/Polygon	Shape/Coverage
• Community center	Point/Polygon	Shape/Coverage
• Slum with name	Point/Polygon	Shape/Coverage
• Plot wise land use	Polygon	Shape/Coverage
• important establishment with name	Point/Polygon	Shape/Coverage

5.7 Other relevant Study

It will be made both at the aggregate level by time series analysis and at the disaggregate level by cohort survival method. However, monthly national level assumptions regarding survival and fertility rate will be used for disaggregate projections.

5.7.1 Drainage & Environmental Study

The protection of environmental with the provision of mitigation measures and monitoring plan in any physical and utilities development process is the prime consideration starting from its planning to implementation and operation& maintenance. The aim of the environmental study is to improve the general environment in the project and surrounding area and keep the parameters up to the tolerable limit of the human health and ecosystem including water, air, sound. In the urban area special consideration is made in water supply, sanitation, solid waste management, drainage, flooding, air, sound, food and health hazards, etc. The consultant will carry out Initial Environmental Examination prior to formulation of plan along with the survey activities in an integrated manner so that some of the interrelated parameters can be collected with respective surveys. In addition, special PRA will carry out to get the basic information of urban environment. Environmental Impact Assessment (EIA) of the project due to planning of land-use/land management, infrastructure planning, physical facilities planning, transportation planning, etc. will be duly assessed and mitigation measures for the negative impacts be suggested to incorporate in the planning.

5.7.2 Housing, Slums and Squatters Settlement Survey

A separate housing sector, slums and squatter settlement survey will be carried out as required in the TOR. The main purpose of this study is to prepare an inventory of housing in the study area. For each major housing area, a summary of population, density, housing conditions, provision of services, sanitation, drainage, employment, tenure and income levels have to be determined.

6. Reconnaissance survey and activity

6.1 Overview

Reconnaissance survey has done to clarify the brief survey of the study area that can provide the assessment team with valuable information to help plan the field data collection. After a meeting between Project Director (PD) and Project manager (PM) with the consultants for reconnaissance survey was scheduled to start from 11 July, 2018. An official letter was issued for the Reconnaissance survey which have been included in the annexure of this report.

6.2 Team Member of the reconnaissance survey

1. Tamzidul Islam, Managing Director, Tiller
2. Mehedi Mudasser, Urban Planner
3. Romim Samaddar, GIS Analyst

6.3 Meeting with Local Stakeholders

In the reconnaissance survey several meeting were held with the following stake holders

1. Mayor, Barguna Sadar Municipality
2. Mayor, Patharghata Municipality
3. Chairman, Barguna Sadar Upazila
4. Chairman, Patharghata Upazila
5. Assistant Engineer, Patharghata Municipality
6. Assistant Engineer, Barguna Sadar Municipality
7. Meeting with Local people
8. Meeting in tea stall

6.4 Document and Maps Collected During the Reconnaissance Survey

1. Geology map-sedimentation
2. Geology map-fault lines
3. Hydrology map-SRTM DEM
4. Hydrology map
5. Soil major type
6. Topographic maps of 1942
7. Broad landuse map
8. Statistical Data from Bangladesh Bureau of Statistics (BBS)
9. Pourashava map, UDD

6.5 Major Findings of the Reconnaissance Survey

Several times the physical plan have been done in this area, especially in the municipality area, but none of those plan has been implemented. The development should be in a proper manner by maintaining rules and regulation to protect the liveable environment. Lack of infrastructure, drainage, waste disposal point, recreational spot etc. are the major problems of these areas.

6.5.1 Basic Information of the Study area

In Barguna Sadar Upazila and Patharghata Upazila the population are 261343 and 163927 where population density is 575.15 and 423.19 per sq. km. in a literacy rate of 62.0% and 63.2% respectively. The basic information of Barguna Sadar and Patharghata are given bellow which have been collected from secondary sources.

Table 6: List of institution of the project area: Barguna Sadar Upazila

SL No.	Name	Number
1.	Govt. Primary Schools:	106
2.	Private Primary School	104
3.	Community Primary School	11
4.	Junior High School	11
5.	High School	58
6.	Madrasas	41
7.	Hat Bazaars	17
8.	Post Offices	32
9.	Upazila Health Complex	11
10.	Upazila Health and Family Planning Center	07

Table 7: List of institution of the project area: Patharghata Upazila

SL No.	Name	Number
1.	Govt. Primary Schools:	61
2.	Non-Registered Primary School	1
3.	Registered Primary School	76
4.	Kindergarten School	6
5.	NGO School	21
6.	Govt. High School	0
7.	Non-Govt. High School	29
8.	Madrasas	18
9.	Hat Bazaars	23
10.	Post Offices	19
11.	Upazila Health Complex	4

Source: BBS 2011

Table 8: Small scale industries

Upazila	Small scale and cottage industry					
	Weaving/ handloom	Handy	Husking crafts mill	Goor processing	Biri factory	Dry fish processing
Barguna Sadar	3	3	267	3	2	0
Patharghata	78	120	0	0	0	16
Total	226	162	712	1053	2	216

Source: BBS 2011

Table 9: Number of growth centre, hat /bazar, poultry farm, dairy farm, nursery, horticulture centre, brick kiln

Upazila	Growth center	Hat /bazar	Poultry farm	Dairy farm	Nursery	Horticulture center	Brick kiln	Decorato r service
Barguna Sadar	9	22	141	7	67	1	5	10
Patharghata	5	23	50	15	0	0	7	7
Total	27	119	355	49	131	1	34	65

Source: BBS 2011

Table 10: Occurrence of river erosion during the years 2008-2011

Upazila	2008	2009	2010	2011
Barguna Sadar	No	No	No	No
Patharghata	No	No	No	No

Source: BBS 2011



Figure 7: Growth center map in Barguna Sadar upazila

Source: LGED digital map

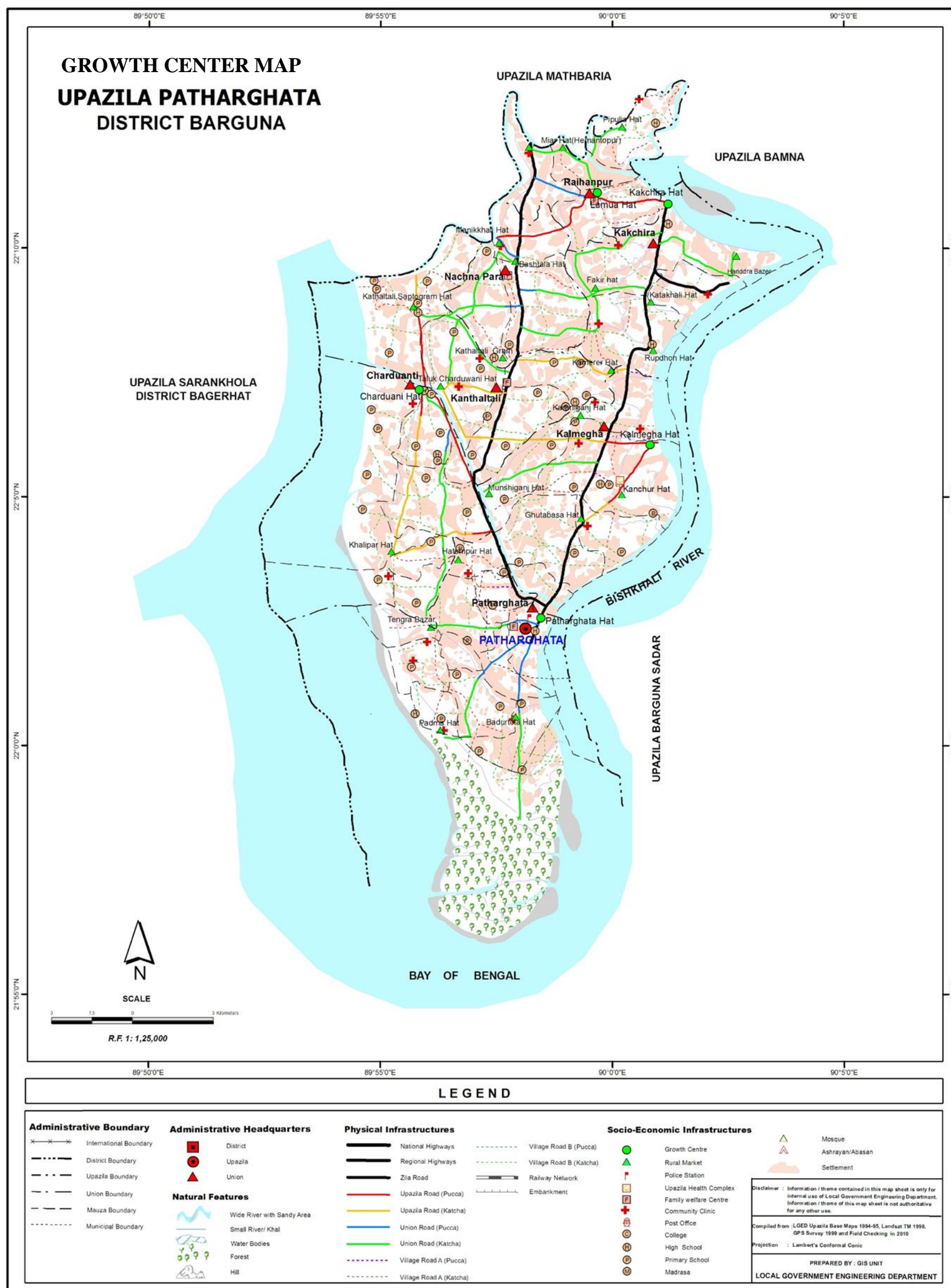


Figure 8: Growth center map in Patharghata Upazila

Source: LGED digital map

6.6 Meeting with Stakeholders and Project Area during Reconnaissance Survey

The survey firm has conducted reconnaissance survey including Focus Group Discussion, Tea Stall Meeting etc.; meeting with the local public representatives including Mayor of the municipalities, Upazila chairman, counsellor etc. The photos of the reconnaissance survey have been attached below.

6.6.1 Meeting with Municipalities

There are two municipalities (Barguna Sadar and Patharghata) in the Barguna Sadar and Patharghata Upazila. By discussion with the municipality member and official it is found that there is a lot of problem in plan implementation. Lack of infrastructure like-road, water supply, electricity etc. is a common phenomenon. In the present situation these two Upazila might be a virtuous economic hub in the economic development of Bangladesh and they are very much enthusiastic for the Payra-Kuakata Comprehensive Plan. The Upazila Chairman of Patharghata Upazila requested to prepare the plan considering the tourism development. He mentioned the lack of recreational park in the Pourashava area, huge drainage problem, and scarcity of electricity. The Chairman of Barguna Sadar Upazila's is not out of that. He also mentioned same type of problems. Both Chairmen said that unemployment problem is the main hindrance of their region. The Mayor of the Patharghata Upazila said that generally the wastage at household level are being dumped besides the river which created water pollution and overall environmental pollution. He requested to dredge the khal of the Upazila. The Upazila Chairman proposed that if any ship building industry and other industries related to fishing can be established to vibrant the economy of the Upazila. As besides the Payra port, the Upazila is not developed. Many infrastructural development is an urgent need. Both Mayor mentioned about the low budget which are given to them per year about 60 lac taka. These are not sufficient at all. During rainy season the two upazilas become gonr under the water. Some specific issues came out from the voice of the Mayor of Barguna Sadar Upazila are -footpath and drainage are urgent need for the people of Barguna, ensure amusement park for the purashava people, in Upazila Health complex people can't get proper treatment due to the unavailability of doctors. The khas ponds should be re-excavated to attain the rain water which ensure the demand of drinking water of the Barguna Sadar Upazila people, illegal infrastructures should be demolished from the Varani Khal and Khaddo river to save the Pourashava from water logging, truck terminal is necessary to reduce traffic jam, after establishing bridges on Bishkhali and Payra river in future, a bypass road is necessary to build at the south side of the Pourashava, the educational institutions have to be newly established or repaired. Eco tourism can be finalized in Balaituli, Gulbunia, Noltona, Ferryghat char, and Majher char, Majher Char can be declared as the economic zone, Veribadh road is necessary, more cyclone shelter cum school are

needed and finally the Pourashava office should be replaced in dedicated zone so that the activities can be run properly.



Figure 9: Meeting with Mayor of Barguna Sadar Pourashava (Right) and Patharghata Pourashava (Left)



Figure 10: Meeting with Chairmen of Barguna Sadar Upazila (Right) and Patharghata Upazila (Left)

6.6.2 Tea Stall Meeting at in front of Barguna Sadar Paurasava

During reconnaissance survey a tea stall meeting was done to understand the people's perception about present situation of the study area. Most of the people are concerned with road, drain, pure drinking water. They requested to prepare 'Ghatla' in the water for the other side of the people detached from the Pourashava. They have suffered a lot in crossing the khal. The women and children can't come to the Pourashava at that way. They have to pass a long distance to come to the Pourashava is the main hindrance of getting better education and health treatment.

Table 11: List of people joined in tea stall meeting

SI	Name	Address
01	Md. Lal Mia	2 No. Ward, Barguna Sadar Pourashava
02	Abdul Kobir Haoladar	4 No. Ward, Barguna Sadar Pourashava
03	Ripon Mollik	6 No. Ward, Barguna Sadar Pourashava
04	Raju Molla	6 No. Ward, Barguna Sadar Pourashava
05	Md. Shafiq Sheikh	7 No. Ward, Barguna Sadar Pourashava



Figure 11: Meeting with local people at tea stall

5.6.3 Focus Group Discussion (FGD) at Main Bazar of Barguna Sadar and Kathbazar in Patharghata

A focus group discussion was arranged at main bazar of Barguna Sadar and Kathbazar in Patharghata Upazila to understand the local scenario of socio-economic activities and the problems they actually face to live and lead a happy life. They are very much enthusiastic about the development plan of Barguna Sadar and Patharghata Upazila. They need more economic activities so that more job opportunities can create. They said that electricity, medical facilities and communication system are the main problem. Both Upazilas' people mentioned that outside the Pourashava areas most of the roads are katcha suffered a lot for the people living outside the Pourashava areas. The people of Barguna Upazila said that especially 4, 6 and 7 no. ward are more vulnerable in that case. They are not satisfied with services delivered from the local govt. Both groups mentioned the water logging problem. Besides they are very much concerned with industrial development that hinder the livable environment.



Figure 12: Focus group discussion with local people

5.7 Housing and Household Characteristics

5.7.1 Household, Population and Density

Table 12: Household, population and density of the two Upazila

Upazila	Household	Population (000)		Both sex	Sex ratio (M/F)	Average size of household	Density per sq. km.
		Male	Female				
Barguna Sadar	62086	129	133	262	97	4.2	575
Patharghata	43085	81	83	164	97	3.8	423
Total	215842	438	455	893	96	4.1	488

5.7.2 Type of Housing Structure

Housing structures observed in both Upazila for dwelling households are jhupri, kutcha, semi-pucca and pucca. Among housing structures in the upazila, predominant is kutcha structure. In Barguna Sadar Upazila, dwelling households having such structures are 76.61% in the upazila. The kutcha housing structures is reported as 78.86% for rural Dwelling households compared to 57.37% Urban Dwelling households. Dwelling households with pucca housing structures are only 1.45% in the upazila. Rural and Urban Dwelling households are better in housing standard because as many as 35.09% of them are found having semi-pucca and pucca structure, in contrast to merely 1.57% Rural Dwelling households.

And in Patharghata Upazila, dwelling households having such structures are as many as 68.40%. The kutcha housing structure is reported as 67.54% for rural dwelling households compared to 73.22% urban dwelling households. Dwelling households with pucca housing structure are only 0.62% in the upazila. Rural and

urban dwelling households with pucca housing structure are found 0.22% and 2.79% respectively. Urban dwelling households are better in housing standard because as many as 9.29% of them are found having both semi-pucca and pucca structures, in contrast to merely 1.59% rural dwelling households.

5.7.3 Exposure to Risk

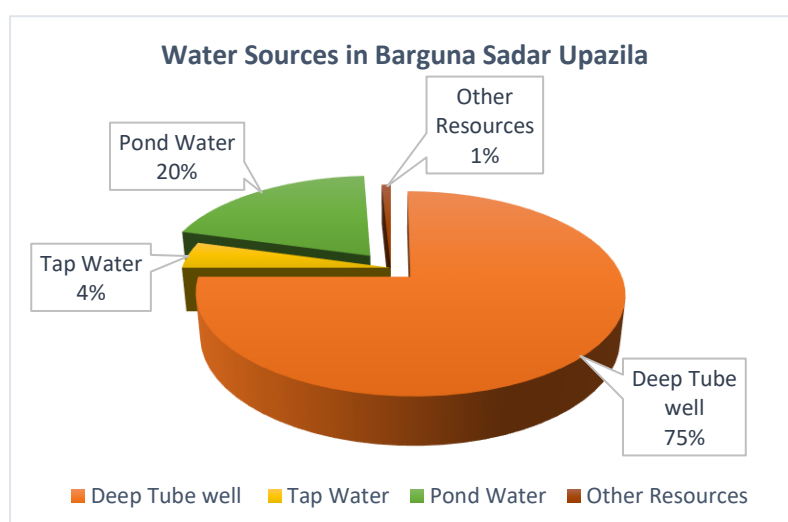
Table 13: Union-wise population exposure to risk in Barguna Sadar and Patharghata Upazila

Upazila	Union	High Risk area	Risk zone	Risk free zone
		%	%	%
Barguna Sadar	Ayla Patakata, Badarkhali, Barguna, Burir	17.05	7.93	3.03
Patharghata	Char Duanti, Kakchira, Kalmegha,	19.09	-	-

Source: (Tamima, 2009)

5.7.4 Source of Drinking Water

In Barguna sadar Upazila, among source of drinking water, tube-well is predominant. Dwelling households reported using this source is 70.68% on the other hand dwelling households found drink deep tube-well water are 22.0%, tap water 1.27%, pond water 5.82% and water of other sources 0.24%.



In Barguna Sadar Upazila, among sources of drinking water, pond water is predominant. Dwelling households reported drinking pond water is 51.25%. On the other hand, dwelling households found drink tube-well water is 30.09%, deep tube-well water 15.76%, tap water 1.75% and water of other sources

5.7.5 Sanitation

Access to sanitary latrines in Barguna Sadar upazila is recorded for 44.15% Dwelling households; in rural segment such households are counted 38.69% and in urban locality much higher 90.80%. Non sanitary latrines are found being used by 50.97% dwelling households. In rural and urban regions such households are 56.32% and 5.18% respectively. Dwelling households making use of open spaces in the upazila are 4.89%. And Access to sanitary latrines in Patharghata upazila is recorded for 44.15% dwelling households; in rural segment such households are counted 38.69%

and in urban locality much higher 90.80%. Non sanitary latrines are found being used by 50.97% dwelling households. In rural and urban regions such households are 56.32% and 5.18% respectively. Dwelling households making use of open spaces in the upazila are 4.89%.

5.7.6 Access to Electricity

In Barguna Sadar and Patharghata Upazila, dwelling households Connected to the power network are found 15.24% and 5.43%. 56.49% and 25.41% urban households and 10.41% and 1.81% rural households are found connected to power supply in Barguna Sadar and Patharghata Upazila respectively.

6.9 Broad Classification of the Area

In Barguna Sadar and Patharghata Upazila mixed Landuse are existing in terms of broad categories. The below table and map shows the broad classification of land in the project area.

Table 14: Broad classification of area 2011

Upazila	Total area	Land area	Reserve forest	Riverine area
Barguna Sadar	454.38	311.67	8.26	134.45
Patharghata	387.36	234.11	37.29	115.96
Total	841.74	545.78	45.55	250.41

Source: BBS 2011

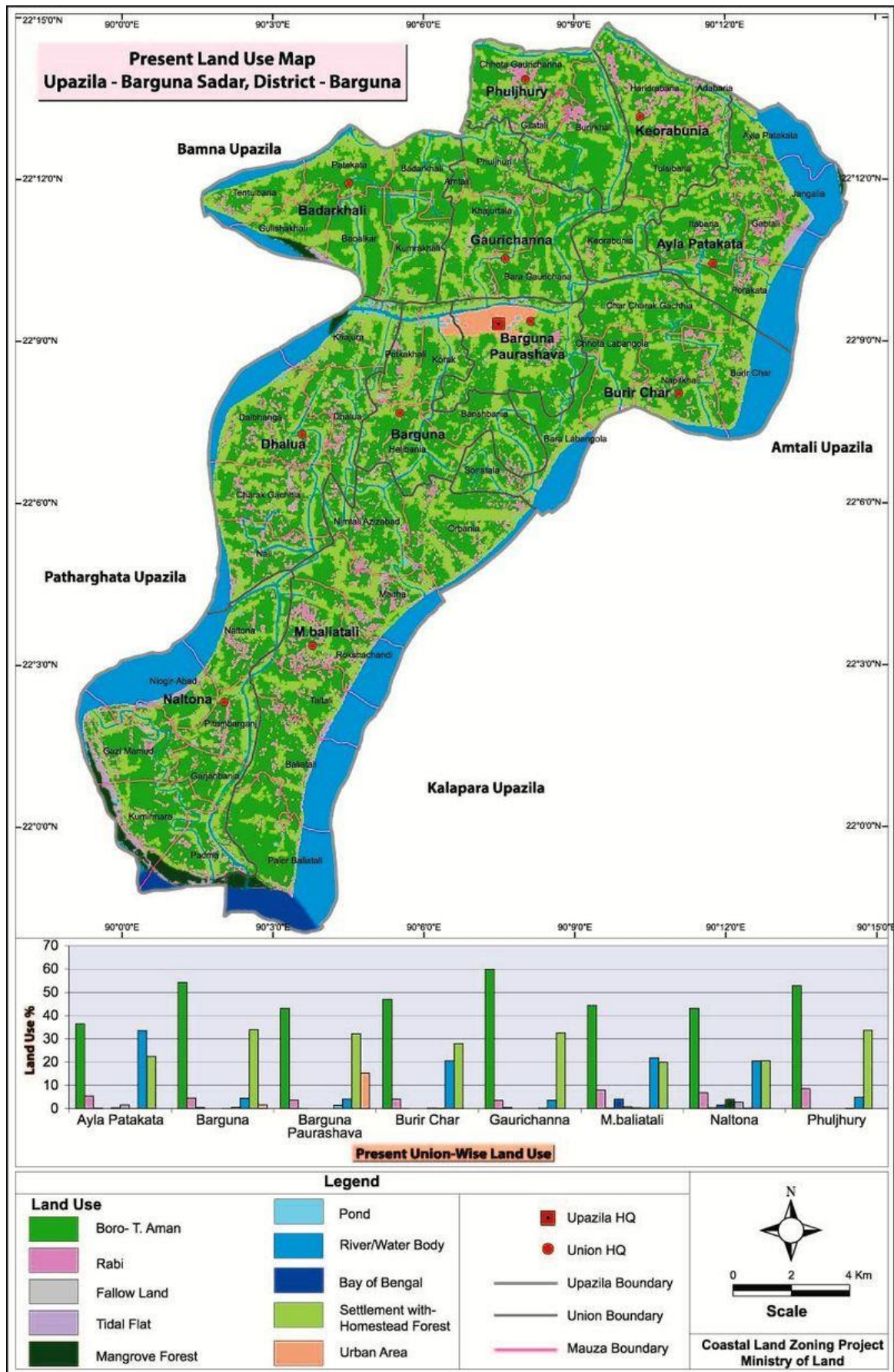


Figure 13: Land Use wise Union Map of Barguna Sadar Upazila and Patharghata Upazila (Source: Ministry of Land, 2017)

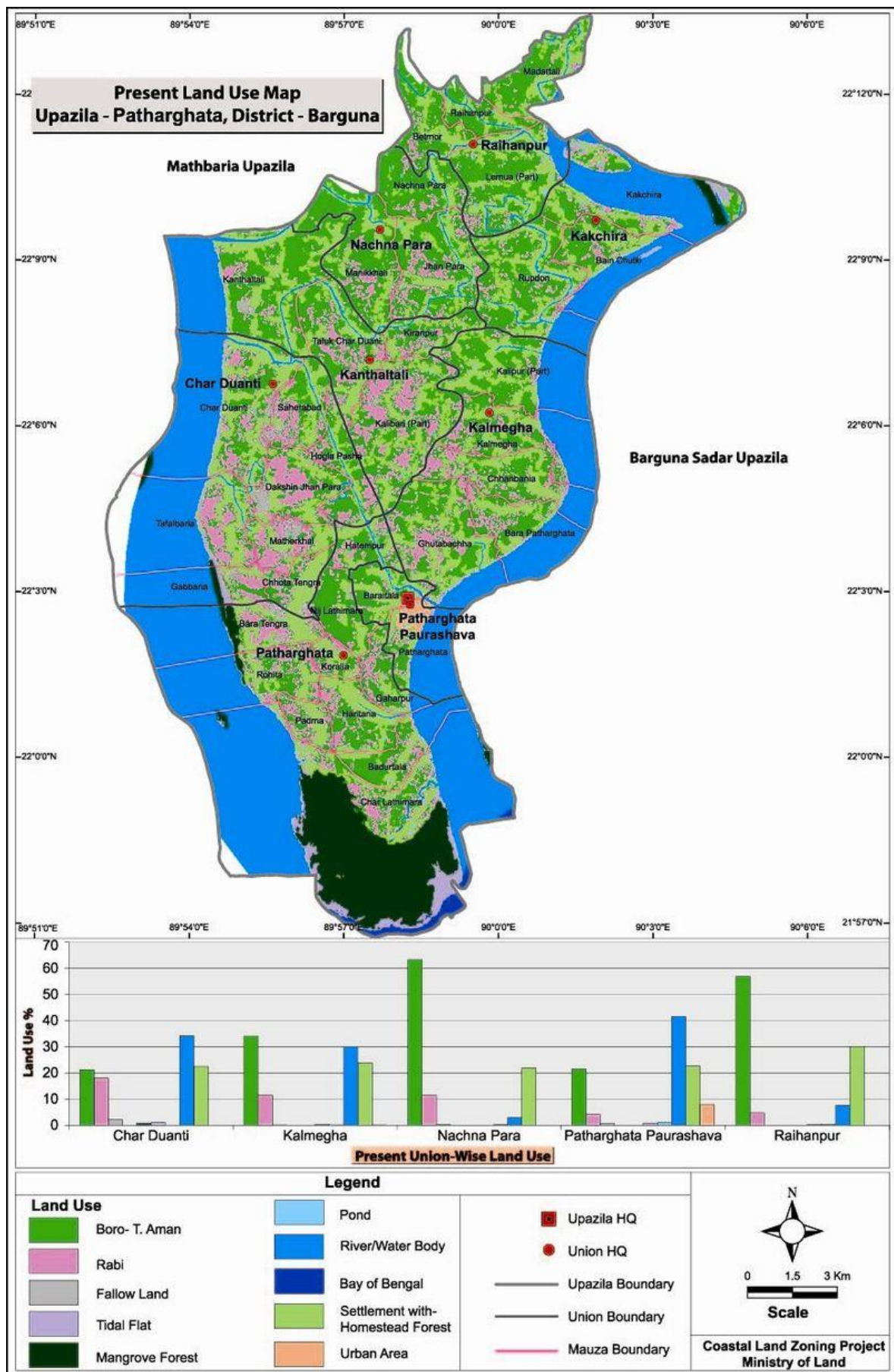


Figure 14: Land Use wise Union Map of Barguna Sadar Upazila and Patharghata Upazila (Source: Ministry of Land, 2017)

7. Future Task and Activity

7.1 Data Processing

GPS and RS data can be stored in WGS84 format (latitude, longitude, ellipsoidal height in meter) or in any projection such as the BTM (Northing, Easting, ellipsoidal height in meter). In order to minimize the error the data will be stored in BTM projection system (as specified in the TOR) in an available file format such as .gen, .shp, .dxf, or .fat. However, conversion of data will be done in the .gen format. i.e. in Workstation format. Socioeconomic, formal and informal economic activity data and other data will be processed by appropriate system as per TOR such as SPSS and so on.

7.2 Survey Equipment

The Survey firms will use all the survey equipment as per TOR to ensure the accuracy of the survey. This equipment is DGPS with post processing facilities, Real Time Kinematic Global Positioning System (RTK-GPS), Total Station capable to identify point, line and polygon feature, Optical Level.

7.3 Layout

Topographic and other mappings will be done by using Workstation and Arc GIS based software. The Inverse Distance Weighted (IDW) method will be applied to analyzing the contour of the study area. As the ToR provides specific Projection system of GIS mapping, the survey firms will follow the parameters among which some are contemporarily used by UDD. Details have presented in Methodology section.

7.4 Legend Checklist for Survey and Studies

Checklist and a standard map layout will be developed by consultation with concern project officials. Leading GIS software for map production Arc GIS will be used to develop the standard layout for mapping. Legend for map features will be selected from the available symbol palettes in Arc GIS and all the soft data will be supplied as Workstation format. Details of proposed coverage description and legends (compatible to use in PC Workstation and Arc View) are enclosed. If required, later on this legend will be updated and finalized as per suggestion from UDD.

7.5 Printing and Submission of Maps

According to the Terms of Reference the Joint team needs to submit the following maps and plans.

Table 15: Status of printing and submission of maps

Sl. No.	Description	No. of Copies to be Submitted	
		Draft	Final
1.	Base Map	As per Requirement	
2.	Physical Feature Survey		
3.	Land Use Survey		
4.	Socio-economic Survey		
5.	Topographic Survey		
6.	Field Survey (original survey marking)		
7.	Utility Service (thematic)	As per Requirement	
	a. Road network		
	b. River/khal/drainage		
	c. Gas/electricity/water supply		
	d. Plan (thematic) on base map		

8. Work Plan with Time Schedule

8.1 Introduction

The current chapter describes the activities of the project to be undertaken by the survey firm. The activities have been arranged as per tasks and time schedule. The activity schedule follows the reporting schedule too. A list of reports has been presented against the time schedule as per TOR.

8.2 Commencement of Work

The contract between UDD and Tiller has been signed on the 21 June, 2018 for the survey work entitled Package-1: Physical Feature Survey and Scanning of Mouza Map, Digitization, Editing, Printing etc. Under “Establishment of BM Pillars, Physical Feature, Landuse & Topographic Survey under “Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)”. Tiller has initiated the project activities with immediate action just after signing of contract.

8.3 Team Composition

As an integral part of the survey team response to provide quality services which is consistent with the requirements of the TOR. The project Team for the intended survey work has been selected very carefully comprising of highly qualified and experienced professionals for the survey work. The team has been organized as per the requirements of the scope of work as described in the TOR for succeed and timely completion of the survey work .The JV firm, in this connection, has applied its vast experience in the selection procedures of appropriate professionals to from the survey team. The members of the team have been selected based on blend of experience, aptitude and competence for the said job.

8.4 Assignment of the Project Team

The survey team comprises of Team Leader along with 9 Experts of different disciplines and other support staff. The assignment of the project team of the survey team would be constituted as follows:

The Team Leader is mainly responsible for carrying out the assignment. The main responsibility of the Team Leader is to lead the team of experts for the preparation of Inception report and to prepare work programme in consultation with the Project Director.

The assignments of the GIS experts are (i) to prepare and compile base maps and other maps in different layers need to be incorporated into the GIS, (ii) to supervise survey activities assisted by the support staff, (iii) to collect all basic information

regarding plan preparation, carry out relevant studies and prepare reports, (iv) any other planning tasks.

Transport Planning Expert is responsible to carry out the transport and traffic studies and to prepare transport planning proposals including other tasks as per TOR.

The responsibilities of the GIS Specialist are to supervise GPS survey, data processing and all other digital map production with analysis. Besides, the survey team also includes Demographer/Statistician, Urban Development Economist, Municipal Engineer, Architect Planner and Legal Expert requested for fulfillment of the TOR objectives.

Table 16: Team composition and the task assignment

Position	Tasks Assigned
Coordinator	<ul style="list-style-type: none"> i. Overall communication ii. Supervision of the survey work
Survey Expert	<ul style="list-style-type: none"> i. To design different surveys for the project ii. To conduct, coordinate and monitor physical feature, topographical and land use, transportation and other related surveys and studies. iii. Ensure quality and accuracy of survey data. iv. To compile all the survey data into digital form. v. To assist the GIS Expert in transferring survey data into GIS vi. To arrange survey trainings for UDD staff. vii. Preparation for working paper, report and plan of the project as assigned by the PD. viii. Any other survey and studies related Jobs.
GIS expert	<ul style="list-style-type: none"> i. To prepare topographic, physical feature, land use and other related map of the area. ii. To prepare, supervise, manage and monitor digital database (Spatial and attribute) of the project. iii. Installation and troubleshooting of GIS in UDD project office and head office. iv. Ensure the quality of the map and related work. v. To work with a multi-disciplinary team environment to synchronize the multi-sectoral data into GIS database. vi. Preparation of working paper, reports and plan of the project as assigned by the PD. vii. Any other related Jobs.
Photogrammetric Expert	<ul style="list-style-type: none"> i. To prepare topographic, physical feature, land use and other related map of the area. ii. To prepare, supervise, manage and monitor digital

Position	Tasks Assigned
	<p>database (Spatial and attribute) of the project.</p> <p>iii. Installation and troubleshooting of GIS in UDD project office and head office.</p> <p>iv. Ensure the quality of map and related work.</p> <p>v. To work with a multi-disciplinary team environment to synchronize the multi-sectoral data into GIS database.</p> <p>vi. Preparation of working paper, reports and plan of the project as assigned by the PD.</p> <p>vii. Any other related Jobs.</p>
Surveyor	<p>i. Topographic, physical feature survey</p> <p>ii. GCP collection</p> <p>iii. Plan and conduct ground surveys designed to establish baselines, elevations, and other geodetic measurements</p> <p>iv. Data updating</p>

8.5 Activity Time Schedule

The systematic planning of the activities always ensures quality of implementation of the project. And as such an effective works program is one of the major components of the project performance for its successful implementation, monitoring and progress reporting. The survey team has made an in-depth assessment of the requirements in the TOR, both in respect of tasks and demanding time schedule in particular, for achieving the project objectives on time.

Following are the schedule of activities of project components.

Table 17: Work plan of the project

Work Plan of Physical Feature survey for Payra Kuakata Comprehensive Plan - P03																			
ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Timeline												
							2018				2019								
							Qtr 4, 2017	Qtr 1, 2018	Qtr 2, 2018	Qtr 3, 2018	Qtr 4, 2018	Qtr 1, 2019	Qtr 2, 2019	Qtr 3, 2019					
							Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1		Agreement Sign	1 day	Thu 6/21/18	Thu 6/21/18														
2		Agreement Sign	0 days	Thu 6/21/18	Thu 6/21/18	1													
3		Mobilization Report	15 days	Sun 6/24/18	Thu 7/12/18	1													
4		Mobilization Report Submission	0 days	Thu 7/12/18	Thu 7/12/18	3													
5		Inception Report	15 days	Sun 7/15/18	Thu 8/2/18	4													
6		Inception Report Submission	0 days	Thu 8/2/18	Thu 8/2/18	5													
7		BM Establishment	35 days	Sun 8/5/18	Thu 9/20/18	3													
8		BM Location Fixation	10 days	Sun 8/5/18	Thu 8/16/18	6													
9		BM Construction and Instalation	15 days	Sun 8/19/18	Thu 9/6/18	8													
10		BM Establishment by RTK GPS and Reporting	10 days	Sun 9/9/18	Thu 9/20/18	9													
11		Base Map Preparation	7 days	Sun 8/5/18	Mon 8/13/18														
12		Processed Sattelite Image collection from UDD	5 days	Sun 8/5/18	Thu 8/9/18	6													
13		Digitized Physical Feature collection from UDD	5 days	Sun 8/5/18	Thu 8/9/18	6													
14		Georeference Digital Mouza database collection from UDD	5 days	Sun 8/5/18	Thu 8/9/18	6													
15		Superimpose Mouza Map with Physical Feature	2 days	Sun 8/12/18	Mon 8/13/18	13													
16		Physical Feature Survey	215 days	Tue 8/14/18	Mon 6/10/19														
17		Base Map Print for Field survey	90 days	Tue 8/14/18	Mon 12/17/18	15													
18		Physical Feature Survey: Attribute Collection	180 days	Tue 8/21/18	Mon 4/29/19	17SS+5 days													
19		Map Update and database joining	180 days	Tue 8/28/18	Mon 5/6/19	18SS+5 days													
20		Draft Map prepared for final Check	90 days	Tue 1/15/19	Mon 5/20/19	19FF+10 days													
21		Update and Finalize GIS map and database	15 days	Tue 5/21/19	Mon 6/10/19	20													
22		DEM Update	10 days	Tue 5/7/19	Mon 5/20/19														
23		DTM and Countour Field Check and update	10 days	Tue 5/7/19	Mon 5/20/19	19													
24		Interim Report Submission	0 days	Mon 1/14/19	Mon 1/14/19	19SS+100 days													
25		Reporting	35 days	Tue 6/11/19	Mon 7/29/19														
26		Physical Feature database analysis	10 days	Tue 6/11/19	Mon 6/24/19	21													
27		Draft Survey Report Prepare	10 days	Tue 6/25/19	Mon 7/8/19	26													
28		Draft Survey Report submission	0 days	Mon 7/8/19	Mon 7/8/19	27													
29		Report update and finalization	15 days	Tue 7/9/19	Mon 7/29/19	28													
30		Final Report Submission	0 days	Mon 7/29/19	Mon 7/29/19	29													
Project: WorkPlan_Physical Fea		Task		Project Summary		Manual Task		Start-only		Deadline									
		Split		Inactive Task		Duration-only		Finish-only		Progress									
		Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress									
		Summary		Inactive Summary		Manual Summary		External Milestone											
Page 1																			

9. Conclusion

The Inception Report is one of the basic documents to discuss and interact on the basic issues regarding the methodological approach among the tripartite agencies like the Consultants; Survey firms the Pourashava and UDD. Detailed activities in this context would actually unfold the realities to be addressed.

The Approach and Methodology developed at the inception level have been updated with all details and in line with the TOR. The works program and time schedule have been based on the outcome of the review of the preliminary data and information including reconnaissance surveys under taken in PKCP areas. Analytical methods of the surveys and investigations have been assessed. In this Report, the surveys firms have tried to highlight the methodological procedure of all kind of survey. The detailed works program and outline of analytical studies have been discussed with the UDD. It is expected that necessary support and participation of the concerned agencies will ensure successful implementation of the survey process and thus help materialize the project objective in time. In reality a lot of issues that may come up in the process are to be resolved in a professional manner.

SURVEY FORMAT

A) Physical Infrastructure Survey Format

Sl. No	Physical Feature Name	Data Type			Z Value (Z measurement level)			Description
		Poi nt	Li ne	Polyg on	On Top	On Ground/level	Not Required	
1A. Water bodies								
1	1. River Edge			x		x		
2	2. Khal Edge			x		x		
3	3. Drainage Channels			x		x		Name, width
4	4. River/khal centreline		x			x		Name, width
5	5. Flow direction	x					x	
6	6. Ponds/Tanks/Diches			x		x		
7	7. Coastline		x			x		
B. Building/Structure		Pucca / Semi pucca / stories, Building area>15 sqm (Depending on map Scale)						
8	1. House			x	x			Residential Building
9	2. Industry			x	x			Industrial Building
10	3. Commercial			x	x			Commercial Building
11	4. Mixed			x	x			Mixed Use
12	5. Boundary Wall		x		x			Wall use as boundary
C. Roads								
13	1. Road Pucca		x	x		x		Ashphalt Road
14	2. Road HBB		x	x		x		HBB Road
15	3. Road Katcha		x	x		x		Katcha Road
16	4. Path Pucca		x	x		x		Pucca Path
17	5. Path Katcha		x	x		x		Katcha Path
18	6. Traffic Island/		x	x		x		

	Divider							
19	8. Road/Path Centreline		x			x		Name, width
D. Railways								
20	1. Railway Row Line		x			x		
21	2. Railway centreline		x			x		
22	3. Railway Junction Points	x				x		
E. Other Structure and Flood works				Length, width, condition of abutments and wing-walls				
23	1. Bridge / Culverts			x	x			Type, area, Name
24	2. Embankments			x	x			Name, length
25	3. Pump Station for Flood			x		x		Name
26	4. Sluice Gates		x		x			Name
27	5. Bus/Trucks Terminals			x		x		Indicate right way and areas
28	Harbor/ Bathing/boat Jetty		x		x			Harbor, Boat jetty
F. Natural Features								
29	1. Forest			x	x			Area > 2500 Sqm
30	2. Group of trees			x	x			Area < 2500 Sqm
31	3. Group of Trees Point	x			x			
32	4. Wetlands / Bog/ Marshland/ Flood prone area			x		x		Area > 2500 Sqm
33	5. Sand/Sand Dunes			x		x		Area > 2500 Sqm
34	Significant Single Tree	x				x		Easily identified single tree
E. Utility Services								
35	1. High voltage Electric Line		x		x			National/regional grid
36	2. Telephone Line		x		x			
37	3. Gas Line		x			x		

38	4. Utility Substation	x				x		Electric, Telephone exchange, Gas
39	5. Overhead Water Tank			x	x			Name, Capacity
40	4. Waste disposal and treatment points	x				x		A dustbin of municipality and other informal points
41	3. Water work			x		x		
42	5. Deep Tube well Stations	x				x		R.C.C EPHE and other deep tube well stations and output
F. Area Polygon								
43	Residential Area			x		x		Planned, Unplanned, Density (High, Middle, Low)
44	Commercial Area			x		x		Established markets with ancillary shop, groups of shops including small workshops
45	Institutional, Educational, Health Govt office			x		x		School/college/madrassa, clinics, hospital, govt office
46	Industrial (as classified by acts and rules)			x		x		Main activity, type of waste effluent
47	Agricultural Area			x		x		All types of agricultural uses

48	Recreation / sports			x		x		Parks/play/sports ground, indoor facilities, zoological garden. Stadium area
49	Religious / cemetery			x		x		Mosques, Temples, Church, Mazar and others
49	Graveyard. Cemetery			x		x		Sites
51	Historic Place			x		x		Sites
52	Borrow Pits			x		x		Areas cut for filling material
53	Vacant Land			x		x		Vacant land with no apparent use
54	Public gathering			x		x		Place of public meeting, open-air cultural performance and religious gathering
55	Garden			x		x		Indication Rea, pineapple etc
56	Disaster prone areas			x		x		Flood, (indicating the flood affected area in 1998) Earthquake and fault line

B) Spot Level Survey Format

Sl. No	Survey Item	Illustrated			
	Special DEM Object	Map object which may be used if registered with a view to DEM use			
		As break line	As terrain points	For delimitation of unsurveyed	For Mask Areas
	Spot height	Road Pucca		Coastline	Building
	Special elevation point	Road Katcha		Pond	Pond
	Contour line	Path Pucca			Wetland/bog/marsh land
	Break line	Path Katcha			
	Mask Area	River Edge			
	Unsurveyed Area	Khal Edge			
	DEM Boundary	Pond			
		Drain channel			

Note: Name of settlements, village, roads, khals, markets, etc. will be clearly indicated in the physical features' maps.

C) Occupancy Type and Use Class

Occupancy Type		Code	Nature of Use or Occupancy
A:	Residential	A1	Detached single family dwelling
		A2	Flats or apartments
		A3	Mess, boarding house dorms, hostels
		A4	Minimum standard housing
		A5	Hostels & lodging hours
B:	Educational	B1	Educational facilities
		B2	Pre-school facilities
C:	Institutional	C1	Child care Institutional
		C2	Custodial institutions for physically handicapped
		C3	Custodial institutions for physically capable
		C4	Penal mental institutions

D:	Health care	D1	Normal medical facilities
		D2	Emergency medical facilities
E:	Assembly	E1	Large assembly with fixed seat
		E2	Small assembly with fixed seat
		E3	Large assembly with fixed seat
		E4	Small assembly with fixed seat
		E5	Sports facilities
F:	Business Mercantile	F1	Offices
		F2	Small shops & markets
		F3	Large shops & markets
		F4	Garages & petrol stations
		F5	Essential services
		F6	Footloose business/ mechanism
G:	Industrial	G1	Low hazard industries
		G2	Moderate hazard industries
H:	Storage	H1	Less fire risk storage
		H2	Moderate fire risk storage
J:	Hazardous	J1	Explosion hazard buildings
		J2	Chemical hazard buildings
K:	Misc.	K1	Private garages & special structures
		K2	Fences, tanks & towers
L:	Open Space	L1	Cropping including forestry
		L2	Fishing
		L3	Livestock
		L4	Recreational
		L5	Reserved
M:	Mixed use	M1	As applicable