
EXECUTIVE SUMMARY

PRA is a conventional method of involving project beneficiaries in project activities to create belongingness about the project. PRA in Faridpur Sadar Upazila was arranged as a part of project activity. In total 20 PRAs were held, 11 unions and 9 Pourashava Wards. All the union PRAs were held in the respective Union Parishad offices, while Pourashava ward PRAs were held in the Ward Councilors office. Union PRAs were held between 05 December to 10 December 2015, while PRA in Pourashava wards were held on 01 December 2016. The participants were from cross section of local citizens, ward councilors, imam, engineer, school teacher, farmer, business community representatives, occasionally female ward councilors were present.

In each union and Pourashava wards the PRAs were held in three sessions after introductory wards. In the first session a social map was drawn by the participants; in the second session a long list of problems were prepared, wherefrom a short list of five major problems identified. Next, potentials/resources of the union were listed up and again from the long list a short list of five major potentials were drawn. All these activities were performed by the participants with the assistance of the facilitator and his aides.

In union PRAs the major problems identified by the participants are the problems of road communication, lack of drainage, lack of pure drinking water, health problems and sanitation problems. When compared with the major problems of unions we find the problems in Pourashava wards a bit similar. In wards, road communication, drainage problem, lack of pure drinking water, electricity problem and water logging are been found to be more acute problems.

Regarding potentials, each union/ward participants, from their long list of potentials, selected five major potentials. In unions, the most common potentials are, agricultural land, availability of manpower, nearby Market, fisheries and cattle rearing. In wards, the most common potentials are fertile agricultural land, active manpower, domestic rearing, excessive khas land and fish farming

After identification of major problems and potentials they themselves prioritized the fulfillment of their desires and demands in three periods-short term, mid-term and long term. In unions, the most common short term issues include, improvement of health service, improvement of agriculture, development of educational system, drainage development, employment opportunity, development of communication system, provision of pure drinking water etc. In wards, the most common short term issues include, development in communication, safe drinking water, improvement of drainage system, electricity connection, agricultural development, recreational facility, drug eradication etc.

Not much variations have been found between the desires of the unions and Pourashava wards. When asked to group execution of their desires into three phases according to priority, the participants put their most urgent needs in the short term period, next came the comparatively lesser important issues in the mid-term phase. The most common short term issues include, drainage development and supply of safe drinking water. As common mid-term priorities the participants marked establishment of industry and recreational facilities as the issues. In the long term the participants listed installation of gas line is a more common demand from almost all wards.

It is evident from the prioritization of needs prepared by both the participants in unions and in Pourashava wards, they like to see their needs come true immediately. They feel that their demands are so acute that they cannot wait for long to get them realized.

CHAPTER ONE: PARTICIPATORY RAPID APPRAISAL APPROACH AND PROCESS

1.1 Introduction

Participatory Rapid Appraisal (PRA) is considered to be one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-Up approach and from blueprint to the learning process. In fact, it is a shift from extractive survey questionnaires to experience sharing by local people. PRA emphasizes local people to assume an active role in analyzing their own living conditions, problems and potentials in order to seek a change in their situation.

Participatory methods have gained momentum in recent years as field practices and development experts have sought more effective ways to involve local people in decision-making. It is a way of learning from, and with, community members to investigate, evaluate constraints and opportunities and make timely decisions regarding development projects. It is a method by which a planning team can quickly and systematically collect information for the general analysis of specific topic, question, needs assessment, feasibility studies, identifying and prioritizing projects, and finally, the project evaluation. The PRA tools are implemented to achieve increased accuracy at low costs both in terms of time and money. Participatory appraisals methods are useful for accelerated knowledge, not just overall speed, but rapid rounds of field relations that result in the increasingly precise knowledge. Participation means involving local people in the development of plans and activities designed to change their lives.

1.2 Project Context for PRA

Considering the benefit of PRA, Urban Development Directorate (UDD) under Ministry of Housing and Public Works has taken initiative to collect the information on local problems with causes, impact and local potentials as well as development priorities of the local people for preparing 20 years long development plan of fourteen Upazilas under the GoB funded project entitled “Preparation of Development plan for Fourteen Upazilas. In this regard, UDD management has taken decision to conduct Participatory Rapid Appraisal (PRA) Sessions at each Union level in the rural areas and one session each ward under municipality areas. Participatory Rapid Appraisal (PRA) session has been conducted on 05 December to 10 December 2015 at the unions of Faridpur sadar Upazila where 292 participants were involved. PRA session has been conducted on 01 December 2016 at Faridpur Paurashava. Social Mapping, Problems Identification and Prioritization, Potentials Identification and Prioritization, Cause and Effect Diagram and Technology of Participation (TOP) are the three PRA tools that have been applied for collecting the opinions of community people in preparing development plan for 20 years in Faridpur sadar Upazila.

Map 1.1: Faridpur Sadar Upazila



1.3 Purpose of PRA

The main purpose of PRA is to understand local level problems from the people living in the locality. However, there are three main objectives/purpose as described below:

1.3.1 Mapping Resources and Identifying Areas

The PRA method Social mapping have been for collecting the available social, environmental and natural resources with the spatial location of the target area. This also helps the planning team to build a picture of the relevant existing structures and key actors in the target area. This process helps them to understand the social and Institutional context of their work and gives them early and essential information to different individuals, groups, and organizations who are contributing towards social well-being of the Upazila. The purpose of mapping resources are:

- To know the actual scenarios of the target area which will be helpful to the planning team in decision making for future planning.
- To identify different problems and resources in the area through social/resource mapping exercising which will be helpful to select intervention in order to minimize or reduce the problems.

1.3.2 Identifying Problems and Potentials

Venn diagram is a popular and easy PRA tool for identifying the problem including severity, severity of impact of institute/organization with comparison, people's interaction with institute/organization etc. of target area. The Venn Diagram tool has been applied for analyzing the available problems with its severity. The causes, effect/ impact and potentials of problems will find out through cause, effect and potential analysis. The purpose of identifying problems and potentials are

- To identify the problems/risks (social and environmental) cause & effects and potentials of the area.
- To suggest potentials in order to minimize or reduce the problems

1.3.3 Proposing Development Priorities

Technology of Participation (ToP) has been applied for classifying the needs in context of short term, medium and long term planning. The short term means 2-5 years, the medium term means 5-10 years

and the long term is more than 10 years up to 20 years. In the ToP session of PRA, participants will categorize the identified problems which will identify through social and Venn diagram method. The purpose of Top are:

- To categorize the problems which are identified through the Venn Diagram exercise.
- To involve the local people in the planning process which will be helpful to create ownership approach among the local people and can possible to prepare realistic/demand based planning for the area.
- To develop short, medium and long term plan in order to meet the people's needs

1.4 PRA Tools

Three tools namely Social Mapping, Venn diagram and Technology of Participation have been selected to exercise at field level for collecting information from the field as per requirement of the Project. As per decision one PRA has conducted for each union in the case of rural area and one PRA for nine wards in the municipal area of Faridpur sadar Upazila.

1.4.1 Social Resource Mapping

Social/Resource mapping is a visual method of showing the relative location of households and the distribution of different types of people (such as male, female, adult, child, landed, landless, literate, and illiterate) together with the social structure and institutions of an area. Union/Pourashava Map, drawing paper, sketch pen; pencils, color pencils, pencil cutter, eraser, gum, sticky wall, masking tape, chalk, floor mat etc. have been needed for social/resource mapping.

Purpose of Social Mapping

Social mapping is a useful PRA tool which is helpful in knowing the actual scenarios of the target area that can assist planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems. It is the way to involve the local people in the planning process that can helpful to create ownership approach among the local people and can possible to prepare realistic/demand based planning for the area.

Procedure of Social/Resource Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

Step-1:

First the facilitator has selected two or three persons for preparation of social map who have vast knowledge about the study area as well as good hand for drawing/sketeches.

Step-2

Explained the purpose to the participants for exercising the social mapping. Logistic Manager has supplied an A3 paper which has pre-drawn boundary of union through digital technology and also supplied other necessary instruments like pencil, eraser, color pencil etc

Step-3

Asked the participants to mark the North direction of the map and to draw the wards as well as mouza boundary on the supplied paper.

Step-4

Asked the participants to draw all resources in the Union and have explained that “resources” are buildings, organizations, people, or services that are available to the community when they are needed. For example: roads, houses, health facilities (pharmacies, hospitals, clinics etc.), post office, schools/college/madrassa, religious buildings, graveyard, crematorium, water wells, markets, schools, factories, rivers, beel, pond, embankment, flood/hazard prone area, flood shelter, bus stand, launch ghat, agricultural land, forest etc.

Step-5

Asked the participants to mark where different groups in the community are living (i.e. the wealthy persons, the laborers, different religious groups, different ethnic groups etc.).

Step-6

The whole process has been watched carefully and resources in the areas have been identified and marked on the map accordingly..

Step-7

After completion of the map, facilitator has asked to the participants to identify any missing object and requested to incorporate the object (if any) in to the map.

Step-8

The completed map have been presented in the large group for verifying and discussing problems and resources which have noted for next course of action.

1.4.2 Venn Diagram (Problems and Potentials)

Another PRA tool, Venn diagram has been selected for identifying the prioritized problems and potentials for each Union/Ward. The facilitator has explained the way of performing the whole PRA session and divided the participants in to two groups. Some participants (small group) have engaged in preparing social map who have vast knowledge and clear idea about their area and also good hand in map preparation. Some participants have engaged in identifying the problems with prioritization, causes effect/impact as well as identifying potentials with prioritization. The facilitator has selected a person among the participants’ for assistance to cut the paper into circular form of different size for Venn diagram and stick them on poster paper. Color poster paper has been cut into circular form according the severity of the problems and stick them on the white color poster paper. The biggest circular sized paper indicate the most severe problem. The size of the circle has been reduced according to descending order. The main area has been stickled at the center of the poster paper. Necessary correction has been made in the problems diagram by participants. Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. After a long discussion, the participants have come to the consensus to identify the five major problems on priority basis. Then the prioritized problems and potentials were represented by the Venn diagram.

1.4.3 ToP Consensus Workshop on Development Needs

Technology of Participation is very purposeful PRA tool because it is unparalleled for getting people’s in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations. It is also effective to engage all the group members in contributing thoughts and ideas and participate in generating a clear plan of action for a specific event or activity which is helpful to prepare problem minimizing sustainable plan. Flip chart, sticky wall, spray, masking tape,

sticky glue, board pin, Meta cards, white papers, color markers, sign pens, poster papers, registration signup sheets, camera and videos, etc. are needed to prepare ToP. The tool is effective to identify the short, medium and long term development priorities.

Step-1

At the beginning of the session, the facilitator has explained the objectives of the ToP, those are as follows;

- To identify priorities for development and planning for next 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram.
- To get in people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.
- In all cases spatial dimension of local people's information will be checked for development planning purpose.

Step-2

The facilitator has ensured all necessary materials including Social/Resource Map, identified problems as well as potentials with prioritization through Venn diagram and hanged on the wall.

Step-3 (This session is called Brainstorming)

The facilitator has asked to participants what they have got in the previous sessions (Problems, Causes, Impact and Potentials) for planning and requested to close their eyes for 1 (one) minute and visualize their dream, what they want to see their upazila as a whole or what they wanted to see taking place in next 20 years in their area.

Step-4 (The session is called Organizing)

Then the facilitator has asked the participants to think individually on the focus question and write 5 ideas in note book in next 5 minutes. The facilitator suggested them to write best two ideas on separate Meta card as well. The Co-Facilitator has collected 1st Meta card and read each card and checked if all are clear on the theme, if not then asked the writer to clarify the content and hanged on the wall, then the facilitator asked the participants for pairing on wall and afterwards he collected the 2nd Meta card in same way.

Step-5 (The session is called Naming)

Then the facilitator has categorized the cards according to the consensus of the participants in considering the similarity and has given a common title of each group. Then all the Meta cards of each group have posted on the wall under the common title.

Step-6 (Conversation on Priorities)

For identifying development priorities for short-term (within 5 years), medium (5-10 years) and long term (10-20 years) planning, the facilitator has asked the followings:

Which of these are you most passionate about?

Which of these would be easiest to make happen? Hardest?

Which would make the most difference for us in the community? (Each person puts a blue dot on the title card they choose)

Which needs to happen first so other things can happen? (Put a red dot)

Which would take the longest to accomplish and can be done later? (Put a yellow dot)

Step-7 (Closing reflection)

At the end of PRA with ToP, the facilitator has asked following questions:

What one thing/term/phrase do you remember from the day?

What one activity you did today?

What did you like? High point?

What didn't you like? Low point?

What did go well? What went wrong?

What one thing you will take from here? Participants will be asked to make a comment or to express one thing they will do after this event.

1.5 PRA Participants and Facilitators

1.5.1 The Participants

15-20 participants has been selected from each union for rural area and each Nine wards under municipal area. The category of target participants were: Ward Members, Ward/Union Councilors, Teachers, Businessmen/Dealers/Brokers/Traders, NGOs/CSOs/Union, Imams/religious priests or leaders, Farmers/laborers, Journalist, Professional (physician/engineers), Local elite/politician/Others. The participants were also be knowledgeable, showing willingness to participate and local residents. PRA team has communicated frequency to the concerned union parishad officials in order to ensure the participation of different categories of people from the concerned union/ward as mentioned earlier.

Total 292 participants have attended in the PRA sessions in nine different study locations of Faridpur sadar Upazila from 05-10 December 2016 towards. PRA session has started at 10:00 a.m. and continued up to 13:30 p.m.

1.5.2 Field Facilitators

As per ToR (see Annexure-I), PRA team has formed comprising one Planner, one Social Scientist (Facilitator), one Graduate from any field (Co-Facilitator cum Rapporteur) and one Logistics Manager. Half day training was given to the team members on the selected PRA tools and techniques. Two teams have worked together in two unions as a part of on the job training for team members at the beginning stage and then teams have worked individually. Name and Designation of PRA team members shown in Table-01.

Table 01: PRA Team and Organization

PRA Team	Organization
<p>Conducted and Reported by: Md. Abdur Razzak Co-Facilitator: Md,Mahbubur Rahman Logistics: Mehedi Hasan Sree Rapporteur: Afnan Mohammad</p>	<p>Engineering Consultants and Associates Ltd</p>

1.6 PRA Settings, and Schedule of PRA Sessions

PRA workshops were conducted in a convenient time when the Union Chairman, and members along with local knowledgeable and experienced participants were able to spend few hours at a convenient location decided by the local people. Facilitators contacted with local contact persons and arranged timely arrival and facilitation of these workshops. Up officials and the planning team of the Package 3 set several times to discuss the goals and procedures of the PRA. Then the Project Director and his UDD team set with the social expert with other planning team members to finalize the tools of PRA, the detailed steps of PRA techniques followed, and the formats of the sessions, the criteria of participants, and the reporting were settled. Then half day training was given to the team members on the selected PRA tools and techniques. Two teams have worked together in two unions as a part of on the job training for team members at the beginning stage and then teams have worked individually. PRA session has been scheduled before lunch and continued up to 3-4 hours with the participants. After PRA session preparation of materials and social/resource mapping has been conducted.

Table 02: PRA Date and Place

	Faridpur sadar Upazila		Faridpur Pourashava	
	Name of Union	PRA Date	Name of Ward	PRA Date
01	Aliabad Union	08-12-2015	All wards	01-12-2016
02	Ambikapur Union	06-12-2015		
03	Charmadhabdia Union	05-12-2015		
04	Decrerchar Union	10-12-2015		
05	Gerda Union	7-12-2015		
06	IsnaGopalpur Union	5-12-2015		
07	Kaijuri Union	7-12-2015		
08	Kanaipur Union	9-12-2015		
09	Krishnanagar Union	9-12-2015		
10	Machar Union	6-12-2015		
11	North channel	8-12-2015		

1.7 PRA Process

1.7.1 Preparation

Necessary materials like flipchart paper, poster paper, drawing paper, meta card, A4 size paper, art line pen, sketch pen, wooden pencils, erasers, pencil cutter, scotch tape, scissors, wall mat for displaying meta card etc have purchased for conducting PRA sessions. Banner and some digital festoons have prepared based on sample and objectives of Social mapping, Venn diagram and Technology of Participation (ToP) for the purpose of practically acquaint to the participants on the methods during PRA sessions. Digital festoon also prepared on Norms of the PRA session for maintaining the discipline in the whole sessions during conduction

1.7.2 Fieldwork

Trained field facilitators have been responsible for contacting, inviting and confirming minimum number of participants of PRA representing the target area (Union Parshad/Municipal Ward)

maintaining professional standards and integrity by informing the purpose of contacts, the role of host and consulting agencies of the project, the previous visits and contacts by the project team, the procedure of conducting PRA sessions. PRA sessions were scheduled in consultation with the Ward Members/Ward Councilors, Teachers, Businessmen/Dealers/Brokers/Traders, NGOs/CSOs/Union, Imams/religious priests or leaders, Farmers/laborers, Journalist, Professional (physician/engineers), Local elite/politician/Others of the area. 15-20 participants has been selected from each union for rural area and each nine wards under municipal area. PRA session has been held at Union Parishad Complex of all unions. Chairs have been provided for siting of participants. Everybody has been encouraged to talk and not letting someone dominate rather building consensus.

1.7.3 Documentation

Survey has been conducted by various rapporteurs. Facilitators compiled all notes and checked meta cards, flip charts and sticky wall materials to document individual PRA report cover the group dynamics, description of the Union/Municipality, and outputs like social map, identification of problems and potentials, and long-, medium- and short term development needs after completing each PRA session. During PRA session, after the preparation and fieldwork, documentation is needed. PRA has been written at night of the same day of survey. During Social mapping session the facilitator asked to the selected persons to draw the map. Then logistic Manager has supplied an A3 paper which has pre-drawn boundary of union through digital technology and also supplied other necessary instruments. The completed map have been presented in the large group for verifying and discussing the problems and resources which have noted to the next course of action. After that, to identify problems and potentials, Venn Diagram method was followed. According to this Method, for the five major problems or potentials, five circles have been used on a large sheet of paper. According to the priority list, the most prominent problem/potential is holding the big circle then next one is having the less bigger one, after that rest of problems/ potentials are following the ascending rule. At the end, the less important one is indicating the smallest circle. Then, to follow ToP method the facilitator has categorized the meta cards according to the consensus of the participants in considering the similarity and has given a common title of each group. Then all the Meta cards of each group have posted on a big sheet hanging on the wall under the common title.

1.8 Quality Control Measures

Project management officer of Urban Development Directorate (UDD) has visited the site suddenly with his team. Team leader of this project has also suddenly visited the place. They fixed PRA session with people. Different type of people (from local leader to common people) have participated in this session. After day to day PRA session they finished their documents at night. They also checked sitting arrangement of people who have been participated in that session.

CHAPTER TWO: PRAs AT MUNICIPAL WARD LEVEL

2.1 Overview of Faridpur Sadar/Pourashava

Faridpur Sadar came into existence as a thana in 1894. The upazila occupies an area of 407.02 sq.km. The Administration Faridpur Sadar Thana was formed in 1896 and it was turned into an upazila in 1983. The area of Faridpur Pourashava is 22.65sq.km. Total population is 74080 and total no of ward is 9. Population density of this paurashava is 4413. Paurashavas have different institutions, infrastructures and facilities more or less similar to other Pourashavas (see Table-2.1). The boundary of the Paurashava is as follows:

Map 1: Faridpur Paurashava

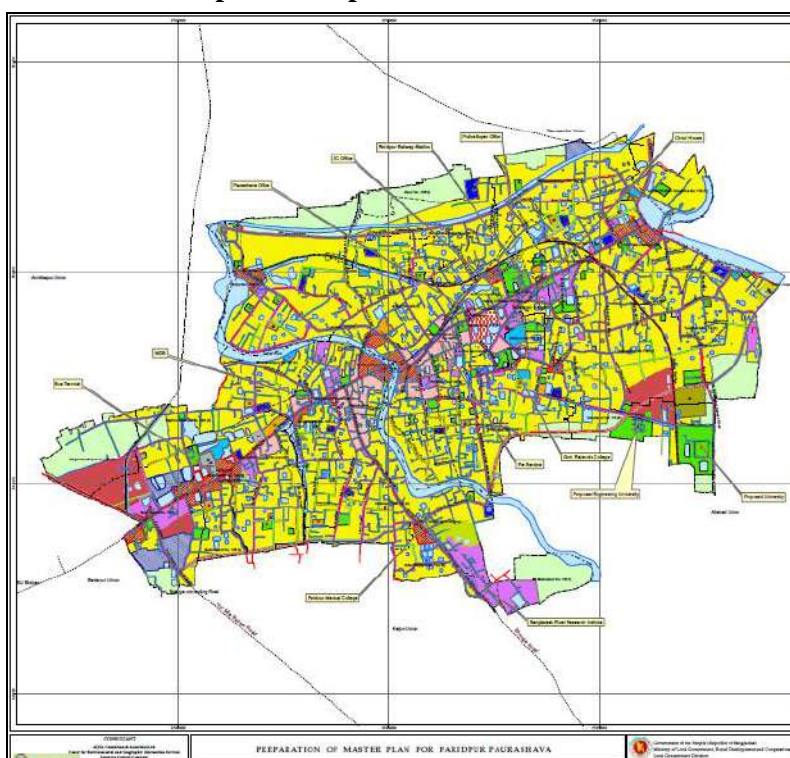


Table 2.1: Faridpur Paurashava

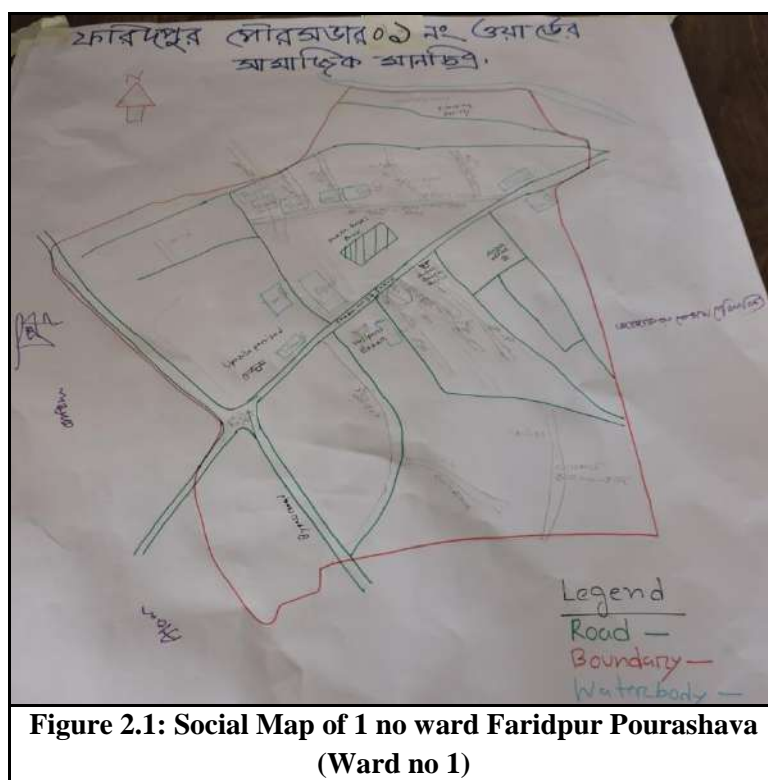
AT A GLANCE	
Features/ Characteristics	Remarks
1. Annoucement of Faridpur Paurashava	1869
2. Area of Paurashava	22.65 sq km
3. Population	74080
4. Male	38813
5. Female	35287
6. Literacy Rate	49.2%
8. College	1
9. High school	13
10. Primary school	25
11. College (Govt. and Non Govt)	5
12. Govt. Hospital	2

Source: Faridpur Pourashava, 2015

2.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Faridpur Pourashava by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc) and also identify valuable resources such as School, Hospital, Road, Market, Masque, Pond, River, Canal, Government Office, etc



**Figure 2.1: Social Map of 1 no ward Faridpur Pourashava
(Ward no 1)**

2.3 Major Problems and Potentials

2.3.1 Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. The following problems have been identified during PRA which are as follows:

Table 2.2: Major Problems of Faridpur Paurashava

Major Problems of Faridpur Paurashava	
Type of problems	Ward No
<ul style="list-style-type: none"> • Drainage problem • Road communication • Pure drinking water and sanitation • Entertainment center • Drug addiction and unemployment • Public toilet • Dog killing • Public toilet • Playground/ community center facility lacking • Graveyard • Dustbin • Water logging • Problem of employment • water without arsenic • No playing field • Lack of security 	All Wards

Source: PRA, 2015

*Note: * Individual PRA at Municipal Ward Level has been attached in Annexure: II*

2.3.2 Problems Prioritization through Venn diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Poor transportation system
2. Problem of drainage facilities
3. Pure drinking water and sanitation
4. Water logging
5. Drug addiction and unemployment

2.3.3 Identification of Potentials through Venn diagram

After identification of problems with prioritization, the next step has to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

Table 2.3: Major Potentials of Faridpur Paurashava

Major Potentials of Faridpur Paurashava	
Type of potentials	Ward No
<ul style="list-style-type: none"> • River • Small and cottage industries • Bus stand • Municipality market • Natural channel • Main road in city • Fisheries project • Hard working people • Tree Plantation • Educated man power • Vocational training center 	All Wards

2.3.4 Identification of Prioritized Problems, Cause, Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials have furnished in the following table;

Table 2.4: Problems, Cause, Impact and Potentials

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> • Katcha road • Silm roam • Broken road • Water logging in road 	<ul style="list-style-type: none"> • People are extreme suffering by accident 	<ul style="list-style-type: none"> • Existing necessary materials for repairing • Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> • No slab • Some places are dirt full • Some are no drain 	<ul style="list-style-type: none"> • People are severe suffering by drainage problems 	<ul style="list-style-type: none"> • Have mentality to setting slab • Trying to clean drain everyday • Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> • Shortage of deep tub well • Unplanned sanitary system 	<ul style="list-style-type: none"> • Crisis of pure drinking water • People are suffering various water related diseases • Environment are polluted 	<ul style="list-style-type: none"> • People are ready to establish tub well to every homes • Every home have enough spaces to build personal sanitary tank

4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lack of employment People are lack of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to law and order force

Source: PRA, 2016

Note: * Individual PRA at Municipal Ward Level has been attached in Annexure: II

2.4 Perceived Development Priorities

Based on Individual Ward Level PRA reports (please see Annexure: II), the recommended development priorities of Faridpur Paurashava have been outlined in Table-2.4, 2.5 & 2.6. It has been found that short-term development priorities are those related to availing urban facilities such as improvement of communication system, connection of gas supply, establishing hospitals, drains and street light etc. which urban people generally expect from the Municipality. Their mid-term priorities are entertainment/recreational facilities, Municipality's own building/ Pourabhaban and eradication of drug addiction. Their long term priorities are development of modern transportation system and modern health facilities in the Paurashava which consequently will improve their quality of life in future. People of Faridpur Paurashava have a common understanding that if they could get the Pourabhaban, other development priorities could be achieved easily.

Table 2.5: Short Term Development Priorities of Faridpur Paurashava

Short Term Development Priorities	Ward No
<ul style="list-style-type: none"> Education system development Drug free society Waste management Better communication system Pure drinking water Terrorism free society Entertainment center Health Facilities Removing water logging 	All Wards

Table 2.6: Mid Term Development Priorities of Faridpur Paurashava

Mid Term Development Priorities	Ward No
<ul style="list-style-type: none"> • Developing electricity • Play ground • Education infrastructure development • Demand developed gas service system • Demand developed health services 	All Wards

Table 2.7: Long Term Development Priorities of Faridpur Paurashava

Long Term Development Priorities	Ward No
<ul style="list-style-type: none"> • Better communication • planned city • employment • Market development • education system development • Health facility 	All Ward

CHAPTER THREE: PRAs at UNION LEVEL

3.1 Overview

FaridpurSadar came into existence as a thana in 1894. The upazila occupies an area of 407.02 sq.km. It is located between 23° 29' and 23° 34' north latitudes and between 89° 43' and 89° 56' east longitudes Total Population is 413485 and 11 unions.FaridpurSadarUpazila is consisted of 11 Unions named: Aliabad Union, AmbikapurUnion, IshanGopalpur Union, Uttar Channel Union, Kanaipur Union, Krishnanagar Union, Kaijuri Union, Greda Union, Char MadhabdiaUnion, DecreercharUnion, Majchar Union.

North: On the north side of the study area,Goalandaupazila of Rajbarizilla and Shibalaya and Harirampurupazilas of Manikganjzila are situated

South: On the south side of the study area, Nagarkanda and Boalmariupazilas are located

East: On the east side of the study area, Char Bhadrassanupazila is located

West: On the west side of the study area, Madhukhaliupazila and RajbariSadarupazila of Rajbarizila are situated.

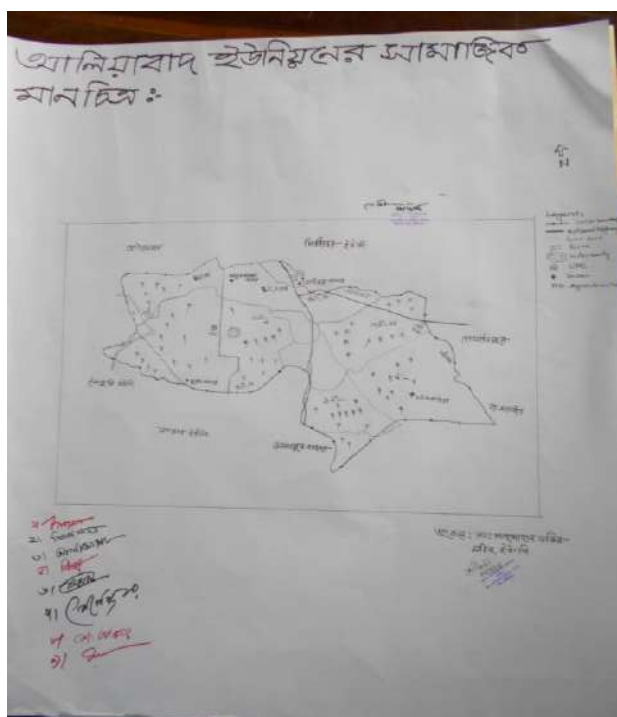
Map 3.1: FaridpurUpazila



3.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two or three persons for preparing the social map of FaridpurUpazila who have vast knowledge about the area as well as good hand for drawing of map. Then the participants were asked the participants to draw all resources in the Union and have explained that “resources” are buildings, organizations, people, or services that are available to the community when they are needed. “like; roads, houses, health facilities (pharmacies, hospitals, clinics etc.), post office, schools/college/madrassa, religious buildings, graveyard, crematorium, water wells, public baths, markets, schools, factories, rivers, beel, pond, embankment, flood/hazard prone area, flood shelter, bus stand, launch ghat, agricultural land, forest, etc.



Photograph 3.1.1: Social Map of one Union (AliabadUnion)

3.2.1 Findings of Social Mapping

The major findings of social map are as follows:

- Drainage problem is severe here.
- Most of the land are agricultural land and deep tube well is the major source of irrigation water.

3.3.Major Problems and Potentials

3.3.1 Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. It has been found from Individual PRA Report at Union Level (please see Annexure-III) that there are around 16 (sixteen) problems identified in different unions (please see Table-3.1) of FaridpurUpazila. Among them, poor transportation, lack of drainage, lack of pure drinking water, lack of proper education facilities, infrastructure problems and lack of modern education system are more significant. Among other notable problems there are problems of agriculture field irrigation, river erosion and unemployment problems prevail in rural areas of FaridpurSadarUpazila.

Table 3.1: Major problems of Eleven Unions of FaridpurUpazila

Major Problems	Unions*
1. Education	All Unions
2. Sanitation	
3. Health service	
4. Communication	
5. Pure drinking water	
6. Waterlogging	
7. Lack of Local Government Empowerment	
8. Unemployment	
9. Banking	
10. Electricity	
11. Market	
12. Agricultural equipments	
13. Fire service	

Source: PRA Survey, 2016

3.3.2. Problems Prioritization Analyzing Venn diagram

After a long discussion, the participants have come to the consensus to identify the 8 major problems as priority basis. The major problems are as follows:

1. Communication
2. Pure drinking water
3. Education
4. Sanitation
5. Health service

3.3.3.Major Potential Identification

There were threadbare discussions on potentials of rural Faridpurto overcome the previously identified problems. Most of the participants indicated that their fertile agriculture land, availability of manpower, close proximity to river, livestock rearing, foreign remittance from abroad are major potentials of Faridpur which can be utilized for their future development (please see Table 3.2).

Table 3.2: Major Potentials of Eleveen Unions of Faridpur Upazila

Major Potentials	Unions*
1. Agricultural land	All Unions
2. Fruit garden	
3. Cattle farming	
4. Fish farming	
5. Brick field	
6. Educational institution	
7. Man power	
8. Agricultural land	
9. Fruit garden	
10. Cattle farming	
11. Fish farming	

Source: PRA Survey, 2016

3.3.4. Potentials Prioritization Analyzing Venn diagram

After identification of problems with prioritization, the next step has to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows:

1. Agricultural land
2. Sand
3. Fisheries
4. Remittance
5. Home cattle

3.3.5. Identification of Prioritized Problems, Cause, Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effects/impacts of problems and potentials in the area. The problems, causes, impact and potentials have furnished in Table 3.3.

Table 3.3: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Lack of local Govt. empowerment	<ul style="list-style-type: none"> • Political influence and • Lack of integrated planning 	<ul style="list-style-type: none"> • Mismanagement of project implementation. 	<ul style="list-style-type: none"> • Cooperation of union parishad can be strength
2. Communication problem	<ul style="list-style-type: none"> • Due to recent flood, • Broken, mud road and broken bridge • Lack of Govt. Importance 	<ul style="list-style-type: none"> • Creation problem in transferring agricultural goods and medical treatment lacking. 	<ul style="list-style-type: none"> • Local manpower and materials like sand, bamboo and wood

3.Sanitation	<ul style="list-style-type: none"> • Lack of public awareness, • Govt. Allocation and poverty. 	<ul style="list-style-type: none"> • Different type of disease 	<ul style="list-style-type: none"> • Tax collection and local land tax
4.Lacking in education system	<ul style="list-style-type: none"> • Lack of quality education, • Qualified teacher, • Frequent natural disaster, • Incompatibility in teacher student 	<ul style="list-style-type: none"> • Education level among the students are decreasing day by day. 	<ul style="list-style-type: none"> • 17 primary schools, 2 high schools, 6 madrasas can be potential factor
5.Unemployment	<ul style="list-style-type: none"> • Lack of local industry, • Agricultural land and proper education, 	<ul style="list-style-type: none"> • Local young generation are facing frustration, drug, family relationship degradation and insecurity. 	<ul style="list-style-type: none"> • Local 50 MW electricity supply center can be used for industrial attraction to create local employment.
6.Health problem	<ul style="list-style-type: none"> • Lack of hospital and qualified doctor in local level, • Proper treatment 	<ul style="list-style-type: none"> • People has to go a long way to meet their demands and its very costly. 	<ul style="list-style-type: none"> • A FWC clinic in local level can be a potential to mobilize treatment practice.

Source: PRA Survey, 2016

3.4 Perceived Development Priorities for twenty four unions of FaridpurSadarUpazila of FaridpurDistrict.

3.4.1 Short-term Development Priorities: During the ToP Consensus session, participants identified different short-term priorities which they demanded to be fulfilled within 3-5 years period and these are termed as short-term development priorities which need immediate intervention. Among the priorities, most common demands were provision of safe water and improvement of electricity system as well as communication, development of roads, bridges and transportation system and development of entertainment. (Please see Table 3.4). Practically, their short-term development priorities match with the problems identified in earlier section of this chapter.

Table 3.4: Short term Development Priorities for Eleven Unions of FaridpurUpazila

Short Term Development Priorities	Unions*
<ul style="list-style-type: none"> • Communicational development • Improved drainage • Educational development • Water supply • Electricity • Drug eradication • Development of agriculture • Employment opportunity • Sanitation • Health Facilities 	All Unions

Source: PRA Survey, 2016

3.4.2 Mid-term Development Priorities

During the ToP Consensus session, participants identified different mid-term priorities which they demanded to be fulfilled within 5-10 years period and these are termed as mid-term development priorities which the participants understand that these are time-bound and needs fund allocation from central government. Among the priorities, most common demands were development of agriculture and veterinary, development of education system and industrialization to create employment opportunity (Please see Table 3.5). Practically, participants put emphasis on development of utility facilities (electricity, gas)in both short term and mid-term priorities as they wanted it any period of time at least let the process roll on for them.

Table 3.5: Mid-term Development Priorities for Eleven Unions of FaridpurUpazilla

Long Term Development Priorities	Unions*
<ul style="list-style-type: none"> • Development in communication • Agricultural development • Employment • Sanitation • Quality education • Food management • Improved drainage 	All Unions

Source: PRA Survey, 2016

3.4.3 Long-term Development Priorities

There were threadbare discussions among participants to identify their different long-term priorities which were actually the vision to see their entire upazila what it would become in next 20 years. Among the priorities, most common demand was creating employment opportunities to fight poverty. They also wanted initiatives from Govt. to development transportation system to flourish local economy. They were found very optimistic on establishing Economic Zone at FaridpurUpazila. Moreover, they gave emphasis on introducing modern agricultural system to increase productivity.

Table 3.6: Long term Development Priorities for Eleven of FaridpurUpazila

Long Term Development Priorities	Unions*
<ul style="list-style-type: none"> Better communication Agricultural development Model union 	All Unions

Source: PRA Survey, 2016

CHAPTER FOUR: CONCLUSION

4.1 Key Observations

The key observations of PRA study are:

- From the social mapping, it is evident that Faridpur Paurashava and all 11 unions are having almost common problems. All the problems or issues indicated or identified by the local skilled persons with the spatial location of the issues.
- Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. Poor communication system, Lack of Drainage System, Lack of pure drinking water, Water logging, Drug addiction and Unemployment problems services are the common problems in all locations. Again, Lack of good Educational infrastructure, Playground/ community center facility lacking, Poverty, Lack of recreation, Problem of dogs, Lack of security are also identified as their less important problems. Among all the study areas, in spite of being a Paurashava, Faridpur Paurashava is also suffering from Poor transportation system, Drainage problem, Lack of pure drinking water, Drug Addiction and Unemployment, Water logging and so on.
- From the opinions of local people, there is no proper drinking water system in the study locations. The people from IshanGopalpurUnion, Uttar Channel Union, Kanaipur Union, Krishnanagar Union, Kaijuri Union,Decreerchar union and MajcharUnion are suffering fromsanitation problems. All the study areas' communication systems and education systems are very poor. All the study areas' have scarcity of pure drinking water. Aliabad Union, Ambikapur Union,Krishnanagar Union are experiencing serious water logging problems.There is a limitations of improved health services, modern hospital, experienced doctor and other medical facilities in all the areas. In the context of health facilities, all the areasare suffering most. Again the people also spoke about Lack of electricity, Lack of market, weak local Govt, Unemployment, and Drug Addictionas their less prominent problems.
- The local inhabitants also identify the potentials of the respective area which may be used as resources during planning. Most of the participants mentioned Agricultural land, Availability of manpower, Hat Bazar, Domestic rearing, Remittance Excessive khas land, Fish farming as their main potential to development among all the identified potentials.
- The participants have demanded the development in many aspects which needs to be fulfilled for improving their lifestyle as well as environment. The demands are not same for all the areas and sometime the demands are asked by more than one participant. It is found that, most of the demands are concentrated in the communication, education, sanitation, weak local Government, health service, drainage, safe water and electricity, waterlogging,employment sector found almost all the area. On the other hand employment, market, Law and order and agricultural equipment's are asked by few people from a few unions.

4.2 Limitations of PRA Sessions

PRA teams have faced many challenges during the sessions which are summarized as follows;

- Session couldn't not possible to start in notified time 9.00 AM due to lack of participants
- It was very difficult to draw the boundary of the Wards and Union.
- It was very difficult to express the affected area in the unit and cost of assets damaged also.
- It was difficult to complete three PRA methods within 3.5 H.
- People are in confusion that whether the plan will implement in future or not.

4.3 Implications of PRA Findings

There are certain important implications of PRA findings. First, the findings are first hand, gathered for directly from the people who face the problems. Outsiders' views are not usually appropriate for decision making at local level.

Second, PRA methodological processes are kind of techniques which make the participants aware of the area, context of the activities at local level and exercise thinking of their own for identifying and solving problems. Even if they perceive some of the issues wrong, the facilitators can bring them on the right track.

Third, since PRA sessions include a diversified participants, such as rich and poor, well-educated and less educated, man and woman and leaders and common people, it gives an inclusive process of getting insights into the problems. Through such exercise real issues and problems can be observed by the facilitators and planners.

Finally, PRA findings can be used as cross check for other findings generated through conventional methods. PRA also gives the participants a level of confidence and a feeling that they are important actors in the development of their own area.

References

1. *Banglapedia(2005), Asiatic Society of Bangladesh, 2005.*
2. *BBS (2011), Population Census 2011, BBS.*
3. *Upazila(2015), Upazila at a Glance, Faridpur Upazila Parishad, 2015*

ANNEXURE-I

TERMS OF REFERENCE OF PRA

(This Terms of Reference has been prescribed by the UDD)

A. Purpose of PRA

- i) To involve the local people in the planning process by letting the local people identify their own problems, potentials, development needs and planning priorities for next 20 years.
- ii) To match PRA findings matching with technical analysis of different sectoral findings, particularly for spatial analysis and GIS mapping, and to supplement other data sources.
- iii) To make participants own the project and its activities towards realizing participatory planning approach.

B. PRA Tools to be used:

1. Social Mapping
2. Venn Diagram
3. Technology of Participation (ToPTM) Consensus Workshop

C. Duration of PRA Session: 3 hours 30 minutes – 4 hours

D. Venue: UP meeting room for union level PRA, school or community space for municipal ward level PRA

E. Field Facilitators:

Facilitator and Co-Facilitator and Rapporteur: These three persons will be responsible for communication with and confirming participants, facilitating sessions and documenting. Among three, two persons will interchangeably play role as facilitator and co-facilitator and are responsible to communicate, coordinate and facilitate the PRA session; material distribution, assist facilitators and participants and one person responsible for taking notes, record and take photos/videos of the PRA Session.

F. PRA Participants

For each PRA, 15-20 persons who are knowledgeable, willing and local representing Union or municipal wards are must. The participants include --- Ward Members/Ward Councilors, Teachers, Businessmen/dealers/brokers/traders, NGOs/CBOs/Clubs, Imams/religious priests or leaders, Farmers/laborer, Journalist, Professional (physician/engineers), Local elite/politician/Other.

G. Roles of Field Facilitators in the Field

1. Collection of Materials and Contact Lists

Field facilitators will ensure collection of materials including maps and logistics, official letter, and contact lists and any other administrative and logistics in consultation with the management. In case of any issue, social expert needs to be informed by field facilitators for necessary action. No excuse for any delay or failure will be desirable for the greater interest of the project. 3

2. Selection and Invitation of Participants

Trained field facilitators are responsible for contacting, inviting and confirming minimum number of participants of PRA representing the target area (Union/Municipal Ward). With due respect and professional standards, they must inform about their purpose of contacts, the host and consulting agencies of the project, previous visits by the project team and as following the PRA session and their roles, the procedure of conducting the session will describe to participant by the PRA team.

3. Facilitate Sessions and Reflection for Better Facilitation

As trained, field facilitators are solely responsible for facilitating PRA sessions in each Union/Municipal Ward of project Upazilas using selected tools to ensure PRA outcomes. At the end of each day, they will do peer discussion and reflect on what they did and how they can do better in next sessions.

4. Documentation and Compilation of PRA

After completing a PRA session, field facilitators will write and compile all notes and check PRA documents, and document individual PRA report as per the prescribed/ standard format (Annexure 1). For every PRA session, one report will be prepared by field facilitators covering objectives, methods, team description, group dynamics, description and analysis of the community and its context, and outputs like social map, identification of problems and potentials, and long-, medium- and short term development needs.

5. Report Preparation of PRA/deliverable

Field facilitators ensure quality, reliability and validity of PRA outcomes keeping in mind that PRA analysis will be matched with other technical analysis (13 surveys including socioeconomic survey) and compile all PRA reports and field notes to submit to social expert/assigned person for the final deliverable – a working paper. The team leader will integrate PRA findings and socioeconomic survey data with other spatial topographic, hydro-geological, and environmental, land use, transport data during the comprehensive development planning stage.

H. Session Format

Each PRA will begin at 10 am with registration sheet sign up. The concerned UP chairman or Municipal Mayor/ward councilor will open the session. The presence of Upazilla chairman or Mayor would be appreciated. In the opening session, participants will be introduced and oriented to the goals and objectives as well different methods of PRAs reminding the debriefing meetings conducted prior to PRA meeting. Major development and planning sectors will be introduced to the participants. Participants will be requested to provide accurate data and views to the best possible.

Facilitators will maintain the following format for each session of 3.5-4 hours.

- i) Registration (sign up)
- ii) Opening, introductions, expectations
- iii) Social mapping
- iv) Venn diagram
- v) Lunch break
- vi) Technology of Participation (ToP) Consensus Workshop
- vii) Reflection and closing

Annexure II: Individual PRA Report of Faridpur Municipality

1. Introduction

Participatory Rural Appraisal (PRA) is considered to be one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to Bottom-UP approach, and from blueprint to the learning process. In fact, it is a shift from extractive survey questionnaires to experience sharing by local people. PRA is based on village experiences where communities effectively manage their natural resources.

Participatory methods have gained momentum in recent years as field practices and development experts have sought more effective ways to involve local people in decision-making. It is a way of learning from, and with, community members to investigate, and evaluate constraints and opportunities and make timely decisions regarding development projects. It is a method by which a planning team can quickly and systematically collect information for the general analysis of specific topic, question, or problem, needs assessment, feasibility studies, identifying and prioritizing projects, and finally, the project evaluation. The PRA tools are implemented to achieve increased accuracy at low costs both in terms of time and money. Participatory appraisals methods are useful for accelerated knowledge, not just overall speed, but rapid rounds of field relations that result in the increasingly precise knowledge. Participation means involving local people in the development of plans and activities designed to change their lives.

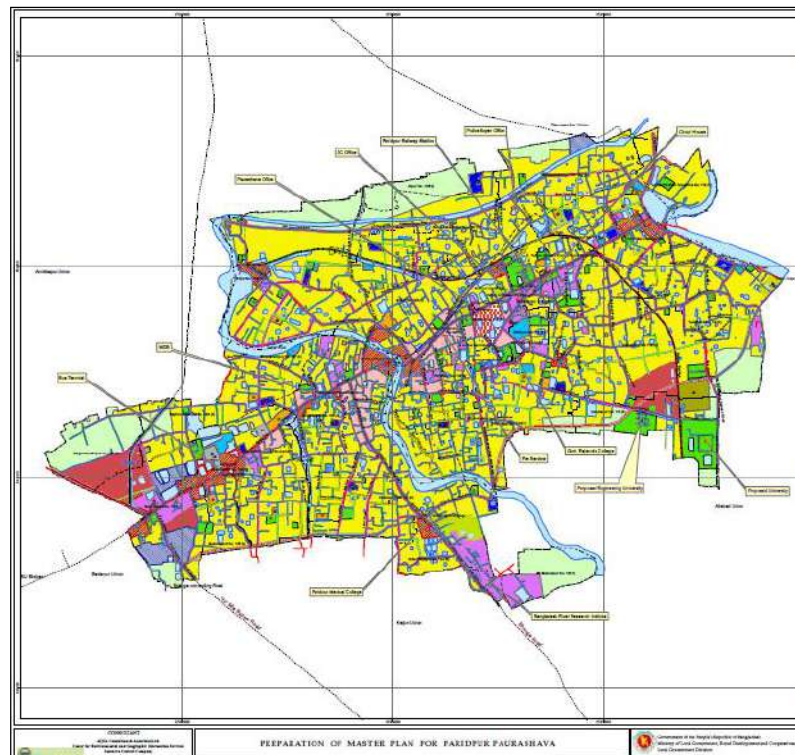
2. Project Context for PRA

Considering the benefit of PRA, Urban Development Directorate (UDD) under Ministry of Housing and Public Works has taken initiative to collect the information on local problems with causes, effect/impact and local potentials as well as development priorities from the local people for preparing 20 years long development plan of fourteen Upazilas. In this regard, UDD management has taken decision to conduct Participatory Rural Appraisal (PRA) Session at each Union level in the rural areas and one session in the three ward under municipality areas. A Participatory Rural Appraisal (PRA) session has been conducted on 01 December 2016 at Paurashava Auditorium where 27 participants were involved. Social Mapping, Problems Identification and Prioritization, Potentials Identification and Prioritization, Cause and Effect Diagram and Technology of Participation (ToP) PRA methods have been applied for collecting the opinions of community people in preparing development plan for 20 years in Faridpur Sadar Upazila.

The Faridpur Paurashava (Ward No 1, 2, 3, 4, 5, 6, 7, 8 and 9) is under the jurisdiction of Faridpur Sadar Upazila of Faridpur district. The pourashava area consists of 22.65sq.km. The boundary of the Paurashava is as follows

West: On the west side of the study area, Madhukhali upazila and Rajbari Sadar upazila of Rajbari zila are situated.

Map 1: Faridpur Paurashava



4. Participants Introduction and Objectives Explained

UP officials, PRA team members and all other participants have been introduced to each other by themselves. After this self-introduction, the Facilitator has explained the objectives of PRA which were as follows:

- Identify the local problems and potentials in study area.
- Identify the spatial location of problems and potentials in the study area.
- Identify all features with productivity in the study area.
- Identify the problems with severity, causes, effect/impact and related potentials in the area.
- Ensure local people participation in identifying the short, medium and long term needs of interventions in order to reduce/minimize the problems and develop the short, medium and long term plan.



Photograph 1: Part of PRA session

5 The Participants

5.1 Participants (Ward No: 1)

Total 16 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 1: Category of Participants (Ward No: 1)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	02	01	02		04

Source: Field Survey, 2016

5.2 Participants (Ward No: 2)

Total 12 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 2: Category of Participants (Ward No: 2)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	01	01	01		02

Source: Field Survey, 2016

5.3 Participants (Ward No: 3)

Total 16 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 3: Category of Participants (Ward No: 3)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	02	01	02		04

Source: Field Survey

5.4 Participants (Ward No: 4)

Total 13 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 4: Category of Participants (Ward No: 4)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01		01	01	01		04

Source: Field Survey, 2016

5.5 Participants (Ward No: 5)

Total 20 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 5: Category of Participants (Ward No: 5)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	01		02	04	06

Source: Field Survey, 2016

5.6 Participants (Ward No: 6)

Total 20 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 6: Category of Participants (Ward No: 6)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	01	01	01	03	07

Source: Field Survey, 2016

5.7 Participants (Ward No: 7)

Total 20 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 7: Category of Participants (Ward No: 7)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01	01	01	01	01	04	06

Source: Field Survey, 2016

5.8 Participants (Ward No: 8)

Total 15 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 4: Category of Participants (Ward No: 8)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01		01	01	01	02	04

Source: Field Survey, 2016

5.9 Participants (Ward No: 9)

Total 13 participants have attended in the PRA session at Paurashava meeting room on 1 December, 2016. PRA session has started at 10:00 a.m. and continued UP to 02:30 p.m. The participant's categories are as follows;

Table 9: Category of Participants (Ward No: 9)

Category of Participants	PS Representative	Business-man	Engineer	Teacher	Paurashava Mayor	Imam	Farmer	Doctor	Local Politician	NGO Representative	Others
Nos.	02	01	01	01	01		01	01	01		04

Source: Field Survey, 2016

6 Methodology Applied for Conducting PRA

6.1 Scope of Work

In the Job description of Socio-Economic Expert mentioned that Participatory Rural Appraisal (PRA) to be performed for collecting the information on local problems, causes, impact, potential and identifying the development priorities from the local people. Therefore, project authority has organized a prior meeting on 28.05.15 with all Socio Economic and GIS Experts for identifying the activities which need to be performed before and during PRA. Many important activities were chalked out in the meeting which were as follows;

6.2 Formation and Mobilization of PRA Team

As per decision of meeting, PRA team has formed comprising one Planner, one Social Scientist (Facilitator), one Graduate from any field (Co-Facilitator cum Rapporteur) and one Logistics Manager. Half day training has paid to the team members on the selected PRA tools and techniques. Two teams have worked together in two unions as a part of on the job training for team members at the beginning stage and then teams have worked individually.

6.3 PRA Team Member

Name and Designation of PRA team members in context of PRA and organizations were as follows;

Table 4: PRA Team members and Organizations

PRA Team	Organization
Conducted and Reported by: Md. Abdur Razzak Co-Facilitator: Md,MahbuburRahman Logistics: Mehedi Hasan Rapporteur: Afnan Ahmed	.Engineering consultants and Associates Ltd

6.4 Ensure Target Participants

15-20 participants have been selected from each union for rural area and all wards under municipal area. The category of target participants were Ward Members/Ward Councilors, Teachers, Businessmen/Dealers/Brokers/Traders, NGOs/CSOs/Clubs, Imams/religious priests or leaders, Farmers/laborers, Journalist, Professional (physician/engineers), Local elite/politician/Others. The participants were also be knowledgeable, willingness and local residents. PRA team has remaindered to the concerned Union Parishad officials in order to ensure the participants as per mentioned in the notice.

6.5 Preparation of Materials and Festoons

Necessary materials like flipchart paper, poster paper, drawing paper, meta card, A4 size paper, art line pen, sketch pen, wooden pencils, erasers, pencil cutter, scotch tape, scissors, wall mat for displaying meta card etc. have purchased for conducting PRA sessions. Banner and some digital festoons have prepared based on sample and objectives of Social mapping, Venn diagram and Technology of Participation (ToP) for the purpose of practically acquaint to the participants on the methods during PRA sessions. Digital festoon also prepared on Norms of the PRA session for maintaining the discipline in the whole sessions during conduction.

6.6 Selection of PRA Method and Number

Three methods (Social Mapping, Venn diagram and Technology of Participation) have selected to exercise at field level for collecting information from the field as per requirement of the Project. As

per decision one PRA has conducted for each union in case of rural area and for three wards in the municipal area.

7.0 Conduction of PRA

Then, the facilitator has explained the way of perform the whole session and divided the participants in to two groups. Some participants (small group) have engaged in preparing social map who have vast knowledge and clear idea about their area and also good hand in map preparation. Some participants have engaged in identifying the problems with prioritization, causes effect/impact as well as identifying potentials with prioritization. The groups have started the assignment as per following sequence;

7.1 Social Resource Mapping

Social mapping is a visual method of showing the relative location of households and the distribution of different types of people (such as male, female, adult, child, landed, landless, literate, and illiterate) together with the social structure and institutions of an area.

7.2 Purpose of Social Mapping

Social mapping is useful PRA tool which is helpful in knowing the actual scenarios of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems. It is the way to involve the local people in the planning process that can helpful to create ownership approach among the local people and can possible to prepare realistic/demand based planning for the area.

7.3 Preparation of Social Map

7.3.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

Step-1:

First the Facilitator has selected two or three persons for preparation of social map who have vast knowledge about the study area as well as good hand for drawing of map

Step-2

Then he explained the purpose to the participants for exercising the social mapping. Logistic Manager has supplied an A3 paper which has pre-drawn boundary of union through digital technology and also supplied other necessary instruments.

Step-3

After that, he asked the participants to mark the north direction of the map and to draw the wards as well as *mouza boundary on the supplied paper*.

Step-4

Then he asked the participants to draw all resources in the Union and have explained that “resources” are buildings, organizations, people, or services that are available to the community when they are needed. “like; roads, houses, health facilities (pharmacies, hospitals, clinics etc.), post office, schools/college/madrasha, religious buildings, graveyard, crematorium, water wells, public baths, markets, schools, factories, rivers, beel, pond, embankment, flood/hazard prone area, flood shelter, bus stand, launch ghat, Fertile Agricultural land, forest, etc.

Step-5

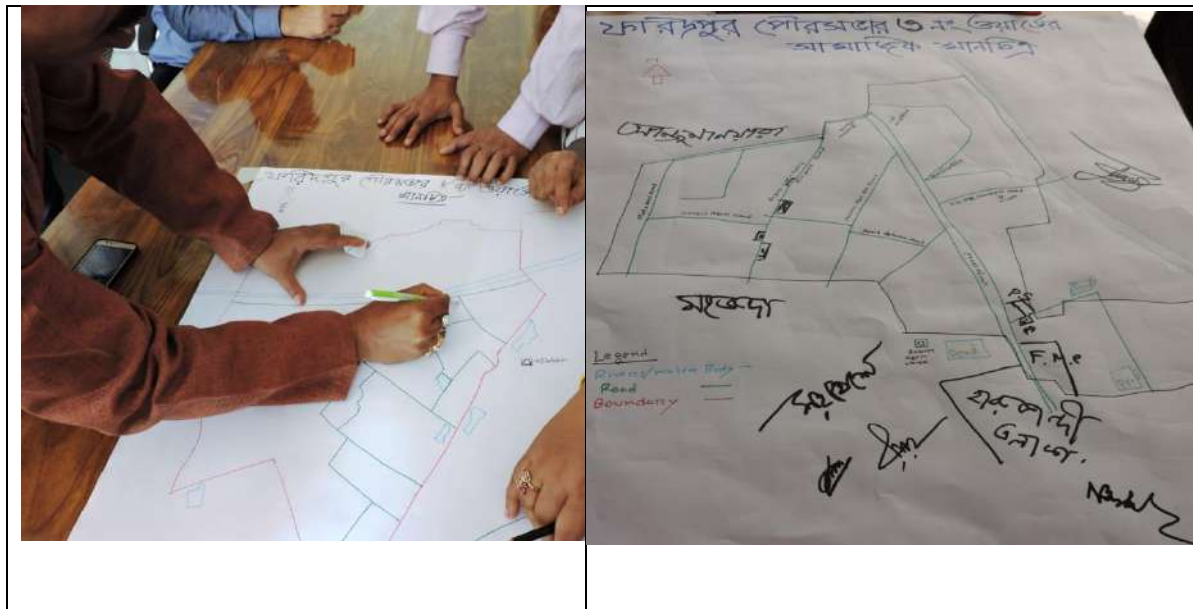
Again, he asked the participants to mark where different groups in the community are living (i.e. the wealthy persons, the laborers, different religious groups, different ethnic groups etc.).

Step-6

The whole process has been watched carefully as it was the main problems and resources in the areas and marked on the map accordingly.

Step-7

After completion of the map, facilitator asked the participants to identify any missing object and requested to incorporate the object (if any) in to the map.



Photograph 3: Preparing Social Map	Photograph 4: Social Map of Paurashava(Ward No. 03)
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8 Problems Identification and Prioritization, Causes, Impact and Potentials through Venn diagram.

8.1 Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

Ward no 1

- Shortage of Playing
- Water logging
- Road Broken
- Lack of security
- Shortage of pure drinking water
- Problem of drug addiction
- Insufficient market

Ward no 2

- Drainage problem
- Unemployment
- Road communication(lalonnagar,rothkhola,lahoripara)
- Traffic jam(vanga raster mour to hajratola)
- Crowd full area
- Unplanned Slam(lalonnagar,rothkola,robidas pally)
- Water logging
- No dust bin
- Insufficient pure drinking water
- No road light(rothkola)
- No night guard
- Shortage of land

Ward no 3

- Shortage of Dust bin(paschimkhabashpur to medical bazaar)
- Drainage problem(total area)
- Illegal structure (paschimkhabashpur,old bus stand and front of medical)

- Road communication problem(mazipara,jahura begum uschobidaloy east side and bot tola)
- Drug business in slam area
- No road light
- Problem Water line (total area)
- Unemployment (total area)
- Sanitation problem
- Lack of entertainment and cultural activities (harukandi)
- No bridge in majipara
- Shortage of pure drinking water (paschimbashpur 2 no sarak)

Ward no 4

- Insufficient drinking water
- Drainage problem
- Road communication
- Not good quality education(no primary school)
- Problem of pure drinking water(chakbazermosjidbari)
- No road cross system(Mojibsarak)
- Drainage
- Water and sanitation line slim(last line taltola)
- Old homes and unsafe water
- Side passion of durnitydomon commission
- Unplanned electricity and supply problem
- Lack of drinking water
- Drainage problem
- Problem by over number of dog
- Road communication
- Public toilet

Ward no 5

- Iron and waste in drinking water
- Drainage problem
- Road infrastructure problem (zahirmolla road)
- No graveyard
- Lots of dog
- Public toilet
- No playground, community center
- Drug addiction
- Water logging
- Malaria and lots of mosquito

Ward no 6

- lack of drinking water
- Sanitation
- Water logging
- Drainage
- Play ground
- Lack of entertainment
- Labor's health
- Library
- Graveyard
- Community center
- Lack of cleanness on bus stand
- Public toilet
- Drug addiction
- Dustbin
- Lack security of pedestrians
- Open drainage
- Community clinic
- Congestion solving
- Women employment
- Vocational training
- River water pollution
- Law maintenances

Ward no 7

- water logging (1 no sarak, ambikapur; ambikapur rail colony, masuk's house to grave yard))
- Lack of pure drinking water
- Rail station area
- Broken road(hasibulhasanlavlusarak,saplasarak)
- Lack of adequate dustbin)alauddinsarak)
- Drainage (jasimUddinsarak)
- Unemployment
- Lack of community center
- Broken culvert and bridge (west alipur, amolghosh's house)
- Market problem
- Lack of hospital
- Lack of playground

Ward no 8

- Water logging (especially badamtoli road)
- Narrow roads

- Unplanned slum
- Lack of color in speed breaker in road
- Drainage (badamtoli road)
- No pitched road (tobimollahsarak, beside rail line)
- Drug
- Road light and security
- No river flow and malaria
- No vegetable market or lack of facility in market

Ward no 9

- water logging
- Bad environment (cow hat)
- River erosion
- Old tepakho; a bazar
- River erosion
- Drainage (vcatilokkhipur, zahid engineer; 2no habilogopalpur, razibUddinsarak)
- Lack of pure drinking water
- Slum (rail slum)
- Dustbin
- Drug
- Public toilet
- Grave yard
- Dog

8.2 Problems Prioritization through Venn diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

Ward no 1

1. Shortage of pure drinking water
2. Road Broken
3. Water logging
4. Unemployment to Woman
5. Problem of drug addiction and Entertainment

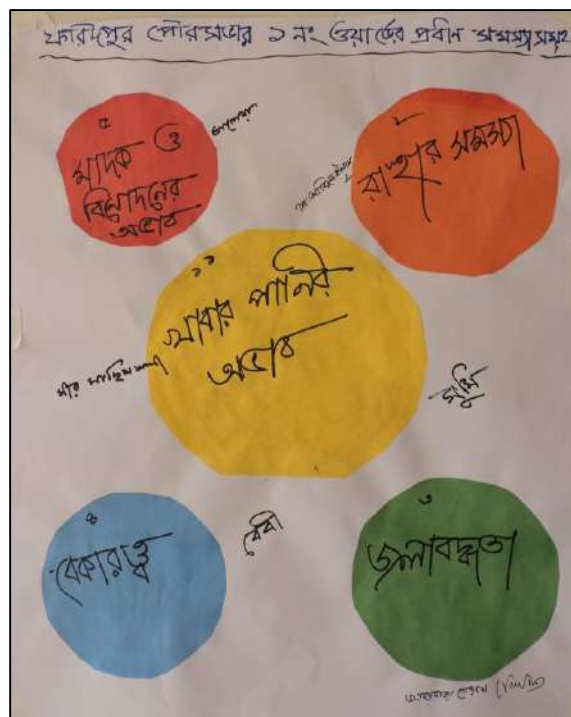


Figure-1: Major five Problems (Ward No: 1)

Ward no 2

1. Drainage problem
2. Traffic jam
3. Crowd full area
4. Road communication
5. Unemployment

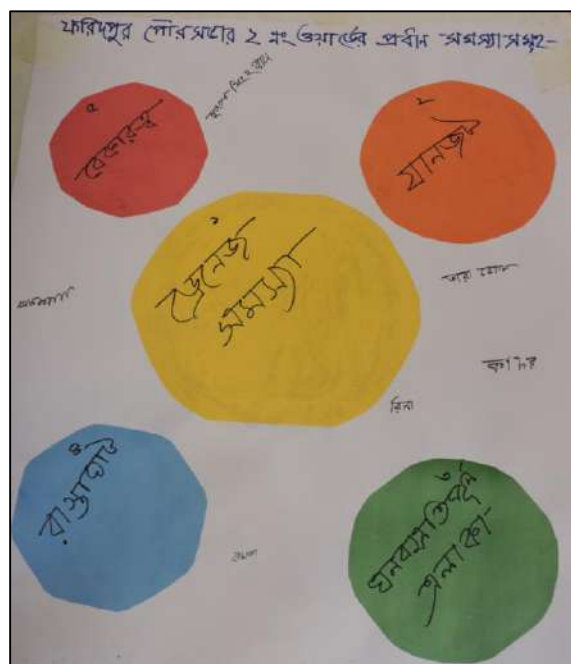


Figure-2: Major five Problems (Ward No: 2)

Ward no 3

1. Problem of Broken road
2. Drainage
3. Pure drinking water and sanitation
4. Entertainment center
5. Drug addiction and unemployment

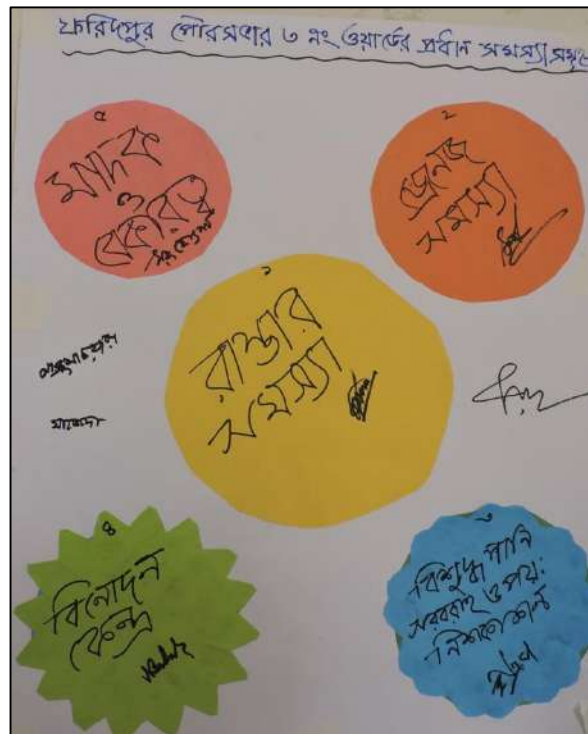


Figure-3: Major five Problems (Ward No: 3)

Ward no 4

1. Lack of drinking water
2. Drainage problem
3. Problem by over number of dog
4. Road communication
5. Public toilet



Figure-4: Major five Problems (Ward No: 4)

Ward no 5

1. Lack of drinking water
2. Drainage problem
3. Dog killing
4. Road infrastructure development
5. Public toilet



Figure-5: Major five Problems (Ward No: 5)

Ward no 6

1. Lack of pure drinking water
2. Drug addiction
3. Playground/ community center facility lacking
4. Graveyard
5. Dustbin

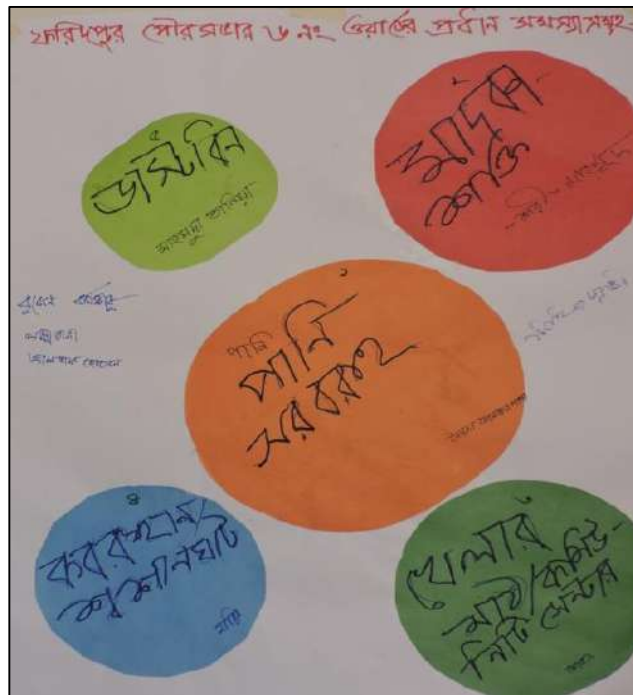


Figure-6: Major five Problems (Ward No: 6)

Ward no 7

1. Problem of road communication
2. Drainage
3. Drug Addiction
4. Water logging
5. Problem of employment

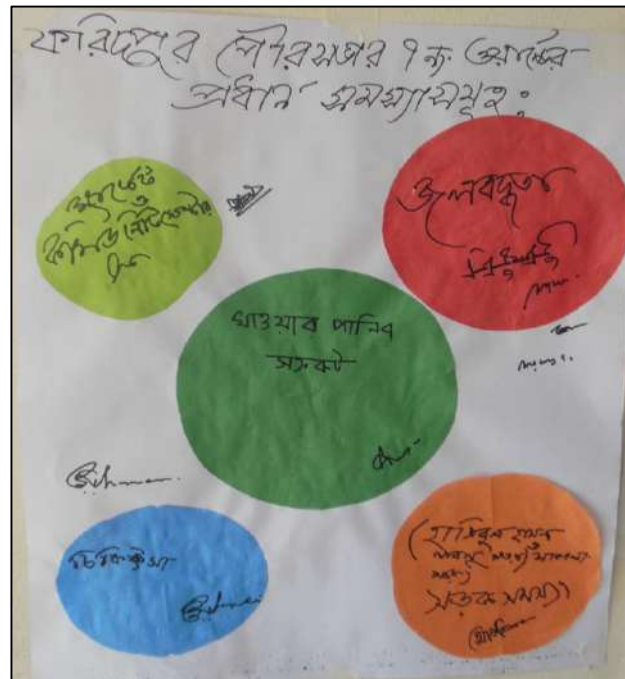


Figure-7: Major five Problems (Ward No: 7)

Ward no 8

1. Problem of road communication
2. Water logging
3. drainage
4. drug
5. water without arsenic

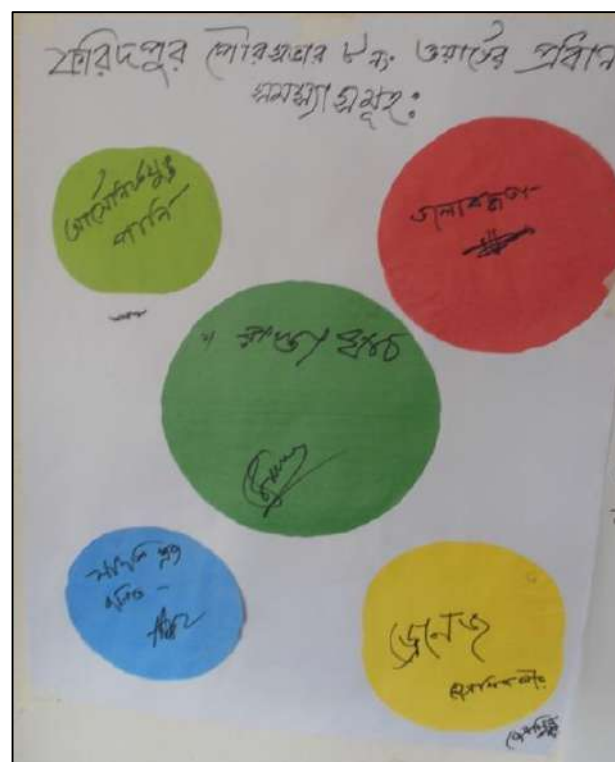


Figure-8: Major five Problems (Ward No: 8)

Ward no 9

1. Problem of road communication
2. Water logging
3. Old market infrastructure (tepakhola bazar)
4. Lack of pure drinking water
5. No playing field



Figure-9: Major five Problems (Ward No: 9)

8.3 Identification of Potentials through Venn diagram

After identification of problems with prioritization, the next step has to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

Ward no 1

1. River
2. Children park
3. Natural channel
4. Bus stand
5. Main road in city

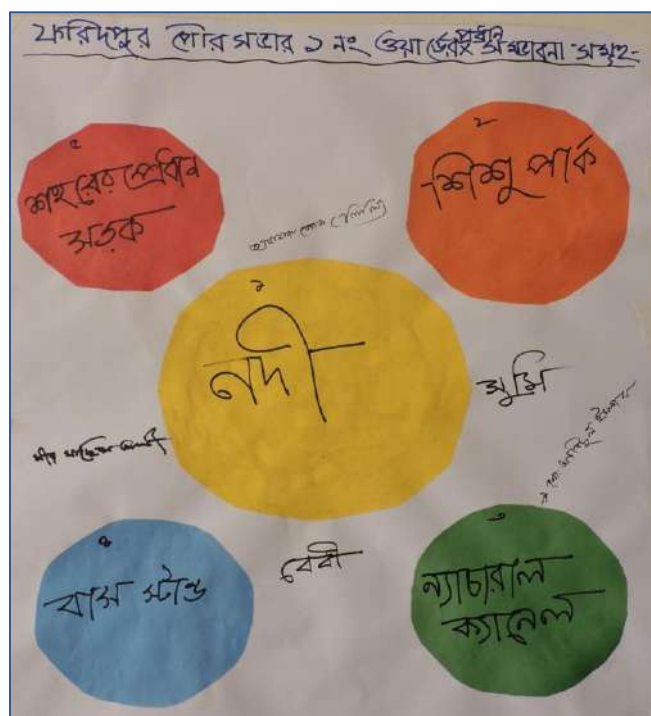


Figure-1: Major five Potentials (Ward No: 1)

Ward no 2

1. River
2. Children park
3. Natural channel
4. Bus stand
5. Main road in city

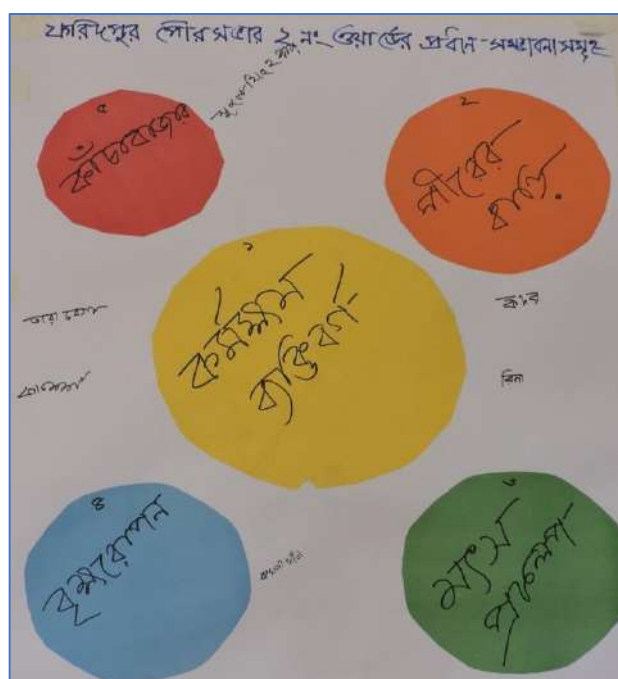


Figure-2: Major five Potentials (Ward No: 2)

Ward no 3

1. Medical college and hospital
2. Fisheries project
3. River research institute (RRI)
4. Nursing training centre
5. kumer river

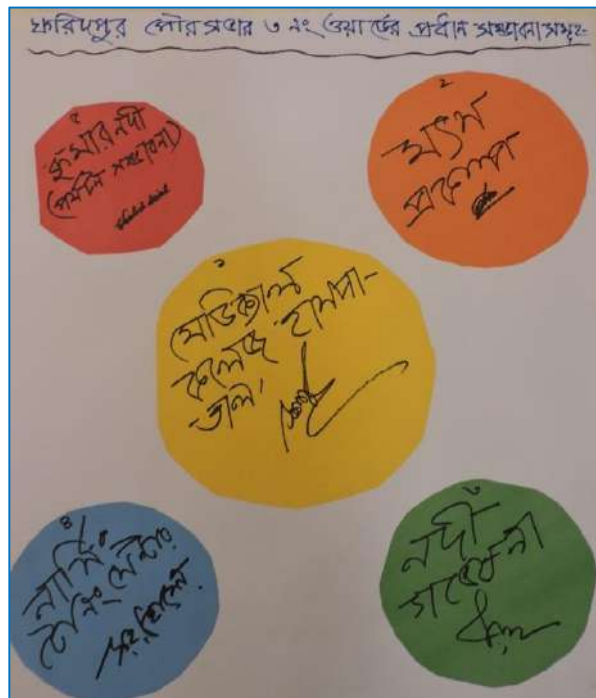


Figure-3: Major Five Potentials (Ward No: 3)

Ward no 4

1. Fisheries
2. Land suitable for tree plantation
3. Entertainment center
4. Young unemployed people
5. Vocational training center

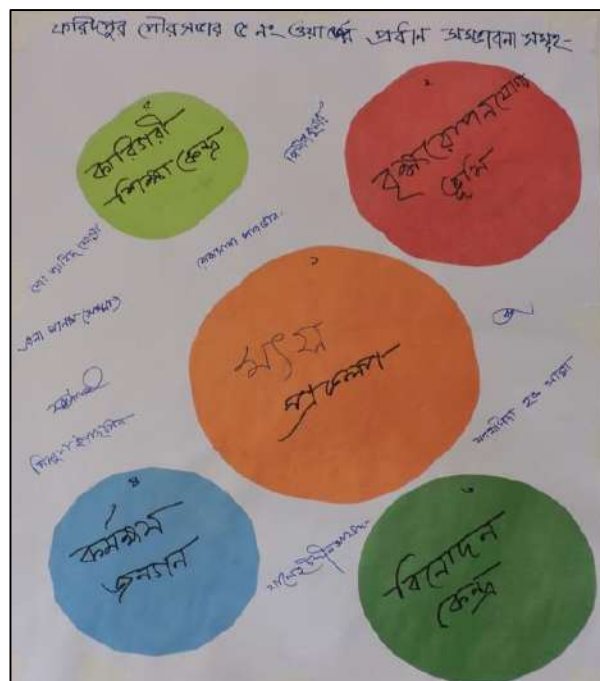


Figure-4: Major Five Potentials (Ward No: 4)

Ward no 5

1. Fisheries
2. Tree plantation
3. Entertainment center
4. Educated man power
5. Vocational training center



Figure-5: Major Five Potentials (Ward No: 5)

Ward no 6

1. Lake
2. Vubonessor river
3. Public library
4. Govt. Yasin collage
5. Educated man power

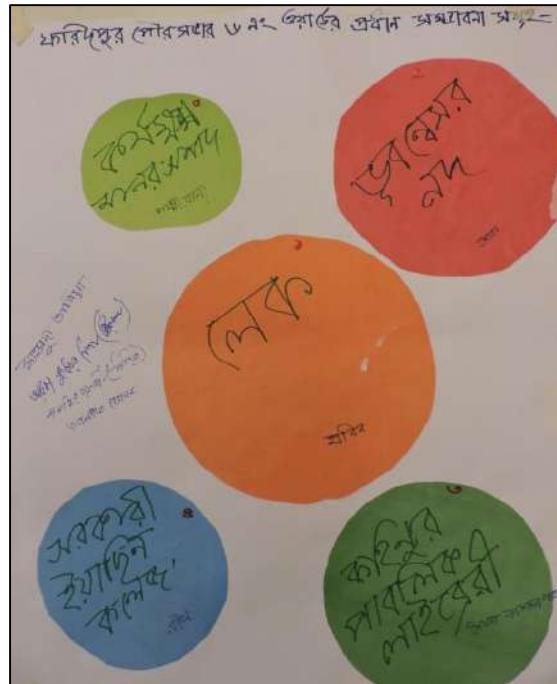


Figure 6: Major Five Potentials (Ward No: 6)

Ward no 7

1. Govt. land
2. Tourist attraction place
3. Natural kumar river
4. Industry (rail slip)
5. Rail station

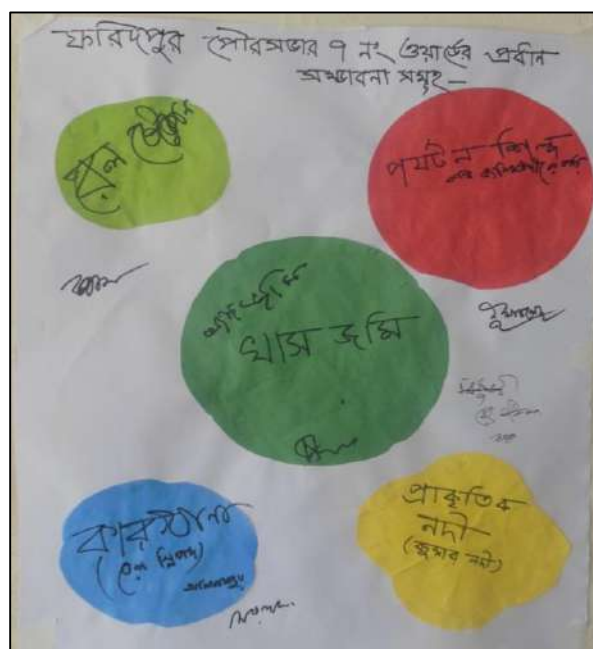


Figure-7: Major Five Potentials (Ward No: 7)

Ward no 8

1. Biogas plant
2. Solar panel
3. Cottage industry
4. Tourist attraction
5. Fisheries industry



Figure-8: Major Five Potentials (Ward No: 8)

Ward no 9

1. Playground and entertainment center
2. Kumar river
3. Cow hat
4. Tepakhola market
5. Pond in slum area



Figure 9: Major Five Potentials (Ward No: 9)

8.4 Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, effect/impact and potentials have furnished in the following table:

Table-10: Problems, Cause, Impact and Potentials (Ward No: 1)

Identified Problems	Causes	Impact	Potentials/Probability
1.Shortage of pure drinking water	<ul style="list-style-type: none"> • Shortage of water trunk. • Jam and dirty water line 	<ul style="list-style-type: none"> • Causes water related diseases • People are suffering 	<ul style="list-style-type: none"> • People are willingness to run connection • Existing natural channel
2.Broken Road	<ul style="list-style-type: none"> • Broken road • Slim Road 	<ul style="list-style-type: none"> • Problem of communication • Problem of transportation • People are suffering by accident 	<ul style="list-style-type: none"> • Existing fellow land • People are united to make sure good communication

3.water logging	<ul style="list-style-type: none"> No available drain Block drain 	<ul style="list-style-type: none"> Making bed smelling Water polluted 	<ul style="list-style-type: none"> People has strong willingness
4.Unemployment	<ul style="list-style-type: none"> Lake of available job opportunity Drug addiction problem Less of literacy 	<ul style="list-style-type: none"> Involved with drug addiction Movement with bed company 	<ul style="list-style-type: none"> Existing honest consulting people Proper planning
5. Problem of drug addiction and Entertainment	<ul style="list-style-type: none"> No play ground Problem of unemployment 	<ul style="list-style-type: none"> People are going to wrong way Children are not found facility to playing Problems of walking general people 	<ul style="list-style-type: none"> Existing fellow land People are united to solve the problem

Table-11: Problems, Cause, Impact and Potentials (Ward No:2)

Identified Problems	Causes	Impact	Potentials/Probability
1.Drainage problem	<ul style="list-style-type: none"> Lake of initiative to well drainage All and places to falling dirty 	<ul style="list-style-type: none"> People are suffering by mosquito and bees Creates always bed smell 	<ul style="list-style-type: none"> Government willing to take initiative Strong capable people People are hopefully willingness
2. Traffic jam	<ul style="list-style-type: none"> Increases transportation and vehicles Intersectional zone Old bus stand and sardasoundori school No available drain No deepness in drain Drain are floating by conservancy Drains are high than road As per cow bazaar conservancy 	<ul style="list-style-type: none"> Time losses More Money spend Fall in accident Life is always in with death Causes of raining increases Water logging People are not moving Problems of school going children People are suffering by various water connected diseases People are suffering for getting daily shopping 	<ul style="list-style-type: none"> Take initiative to reduce auto car Obey the rule of trafficking All of people support to ensure reduce jam Available spaces for build new drains. Have high and low drains Hardworking people exist for construction of new road
3.Crowd full area	<ul style="list-style-type: none"> More slam. More people than land Increases more poor people 	<ul style="list-style-type: none"> No education environment Problem of living place Increases dirty place 	<ul style="list-style-type: none"> Established new high rise buildings Have enough empty space

			<ul style="list-style-type: none"> Available enough people
4. Road communication	<ul style="list-style-type: none"> Lake of proper management Increase heavy vehicles Havey raining 	<ul style="list-style-type: none"> Time losses More Money spend Fall in accident Life is always in with death 	<ul style="list-style-type: none"> Ready to Proper management Have enough land People are encourage to help
5. Unemployment	<ul style="list-style-type: none"> Shortage of working opputunity More unemployed people than work 	<ul style="list-style-type: none"> Increase poor people People fall in Problem of proper living 	<ul style="list-style-type: none"> Have enough working force Have available educated people

Table-12: Problems, Cause, Impact and Potentials (Ward No: 3)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silm roam Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dart full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank

4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lake of employment People are lake of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to low and order force

Table-13: Problems, Cause, Impact and Potentials (Ward No: 4)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silm roam Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dart full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lake of employment People are lake of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to low and order force

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Table-14: Problems, Cause, Impact and Potentials (Ward No: 5)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silm roam Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dirt full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lack of employment People are lack of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to low and order force

Table-15: Problems, Cause, Impact and Potentials (Ward No: 6)

Identified problems	Causes	Impact	Potentials/probability
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1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silm roam Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dart full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lake of employment People are lake of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to low and order force

Table-16: Problems, Cause, Impact and Potentials (Ward No: 7)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silm roam Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dart full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain

3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> Lack of employment People are lack of education 	<ul style="list-style-type: none"> Young boys are going to derailed Children are affected to drug addiction 	<ul style="list-style-type: none"> People are aware to scope employment People are mentally ready increase to law and order force

Table-17: Problems, Cause, Impact and Potentials (Ward No: 8)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> Katcha road Silt road Broken road Water logging in road 	<ul style="list-style-type: none"> People are extreme suffering by accident 	<ul style="list-style-type: none"> Existing necessary materials for repairing Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> No slab Some places are dirt full Some are no drain 	<ul style="list-style-type: none"> People are severe suffering by drainage problems 	<ul style="list-style-type: none"> Have mentality to setting slab Trying to clean drain everyday Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> Shortage of deep tub well Unplanned sanitary system 	<ul style="list-style-type: none"> Crisis of pure drinking water People are suffering various water related diseases Environment are polluted 	<ul style="list-style-type: none"> People are ready to establish tub well to every homes Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> No initiative Economical fund crisis 	<ul style="list-style-type: none"> Children are not found facility to playing and entertainment People are not found any walking 	<ul style="list-style-type: none"> Have space to establish entertainment centre

5. drug addiction and unemployment	<ul style="list-style-type: none"> • Lack of employment • People are lack of education 	<ul style="list-style-type: none"> • Young boys are going to be derailed • Children are affected to drug addiction 	<ul style="list-style-type: none"> • People are aware to scope employment • People are mentally ready increase to low and order force

Table-18: Problems, Cause, Impact and Potentials (Ward No: 9)

Identified problems	Causes	Impact	Potentials/probability
1. Problem broken road	<ul style="list-style-type: none"> • Katcha road • Silt road • Broken road • Water logging in road 	<ul style="list-style-type: none"> • People are extreme suffering by accident 	<ul style="list-style-type: none"> • Existing necessary materials for repairing • Enough space for built road
2. Drainage problem	<ul style="list-style-type: none"> • No slab • Some places are dirt full • Some are no drain 	<ul style="list-style-type: none"> • People are severe suffering by drainage problems 	<ul style="list-style-type: none"> • Have mentality to setting slab • Trying to clean drain everyday • Municipality trying to build new drain
3. Shortage of pure drinking water And sanitation	<ul style="list-style-type: none"> • Shortage of deep tub well • Unplanned sanitary system 	<ul style="list-style-type: none"> • Crisis of pure drinking water • People are suffering various water related diseases • Environment are polluted 	<ul style="list-style-type: none"> • People are ready to establish tub well to every homes • Every home have enough spaces to build personal sanitary tank
4. Entertainment centre	<ul style="list-style-type: none"> • No initiative • Economical fund crisis 	<ul style="list-style-type: none"> • Children are not found facility to playing and entertainment • People are not found any walking 	<ul style="list-style-type: none"> • Have space to establish entertainment centre
5. drug addiction and unemployment	<ul style="list-style-type: none"> • Lack of employment • People are lack of education 	<ul style="list-style-type: none"> • Young boys are going to be derailed • Children are affected to drug addiction 	<ul style="list-style-type: none"> • People are aware to scope employment • People are mentally ready increase to low and order force

9. Technology of Participation (ToP)

9.1 Methodology for Conducting the ToP

ToP is very purposeful PRA tool because it is unparalleled for getting people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations. It is also effective to engage all the group members in contributing thoughts and ideas and participate in generating a clear plan of action for a specific event or activity which is helpful to prepare problem minimizing friendly plan. So, the tool is effective to identify the short, medium and long term development priorities

Step-1

At the beginning of the session, the facilitator has explained the objectives of the ToP, those are as follows;

- To identify priorities for development and planning for next 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram.
- To get in people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.
- In all cases spatial dimension of local people's information will be checked for development planning purpose.

Step-2

The facilitator has ensured all necessary materials including Social Map, identified problems as well as potentials with prioritization through Venn diagram and hanged on the wall.

Step-3

The facilitator has asked to participants what they have got in the previous sessions (Problems, Causes, Impact and Potentials) for planning and requested to close their eyes for 1 (one) minute and visualize their dream, what they want to see practically after 20 years.

Step-4

Then the facilitator has asked the participants to think individually on the focus question and write 5 ideas in note book in next 5 minutes. The facilitator suggested them to write best two ideas on separate Meta card as well. The Co-Facilitator has collected 1st Meta card and hanged on the wall and afterwards he collected the 2nd Meta card in same way.

Step-5

Then the facilitator has categorized the cards according to the consensus of the participants in considering the similarity and has given a common title of each group. Then all the Meta cards of each group have posted on the wall under the common title. The participants demands for the next 20 years has furnished in the following table.

9.2 Identification of Development Priorities of Faridpur Paurashava under Faridpur District.

The recommended development priorities of Faridpur Paurashava are as follows

Table-19: Development Priorities of Faridpur Paurashava (Ward No-1)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Demand formed drug addiction free society • Demand pure drinking water supply • Demand availability of employment • Demand developed modern communication system • Demand formed modern drainage system Demand established modern Education systems • Demand clean environment 	<ul style="list-style-type: none"> • Demand established modern Education systems • Demand place of Entertainment • Demand clean environment 	<ul style="list-style-type: none"> • established modern Education systems • Demand availability of employment • Demand clean environment

Table-20: Development Priorities of Faridpur Paurashava (Ward No-2)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Demand solve drain problem • Demand developed road communication system • Demand kills mad dogs • Crowd full area • Demand pure drinking water supply • Demand Built more bath room • Demand built toilet • Demand night guard • Demand road light 	<ul style="list-style-type: none"> • Demand Built more bath room • Demand built toilet • Demand night guard 	<ul style="list-style-type: none"> • Demand Tub well • Demand road light • Demand prepare strong papers for development • Demand road light

Table-21: Development Priorities of Faridpur Paurashava (Ward No-3)

Short term	Midterm	Long term
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<ul style="list-style-type: none"> • Demand developed electricity connection • Demand established modern Education systems • Demand supply • Pure drinking water • Demand development of drainage system • Demand remove unemployment • Demand developed education system • Demand developed entertainment facility • Demand developed health services • Demand developed gas service system • Demand established playing field 	<ul style="list-style-type: none"> • Demand Established play ground • Demand developed electricity connection • Demand developed gas service system • Demand developed education system • Demand developed health services 	<ul style="list-style-type: none"> • Demand Established play ground • Demand established modern Education systems • Demand developed electricity connection • Demand developed gas service system
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Table-22: Development Priorities of FaridpurPaurashava (Ward No-4)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Violence free education system • Public toilet • Entertainment center • Hospital • Market • Planned drainage • Employment • Dog killing • Drug free society • Pure drinking water • 'water logging 	<ul style="list-style-type: none"> • Fisheries • Community center • Employment • Entertainment • Library • Graveyard • Health facility 	<ul style="list-style-type: none"> • Employment • Communication • Health facility • Library • • •

Table-23: Development Priorities of FaridpurPaurashava (Ward No-5)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Terrorism free education system • Kazi office • Public toilet • Entertainment center • Pure drinking water • Local market • Drug free society • Employment unplanned drainage • Water logging • • 	<ul style="list-style-type: none"> • Health facility • Community center • Employment • Fisheries • Entertainment • Library • Grave yard • • • • 	<ul style="list-style-type: none"> • Entertainment • Road network • Health facility • library • •

Table-24: Development Priorities of FaridpurPaurashava (Ward No-6)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Pure drinking water • Pollution free environment • Dustbin • Community center • Drug free society • Communication system • Child marriage eradication 	<ul style="list-style-type: none"> • Communication development • Grave yard • Public library • Gymnasium establishment • employment 	<ul style="list-style-type: none"> • employment • community hospital • education system development

Table-25: Development Priorities of FaridpurPaurashava (Ward No-7)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Proper treatment • Overall development • Development in education system • Removing water logging • Market • Community center • Road development • Pure drinking water 	<ul style="list-style-type: none"> • Developing infrastructure • Market • Better education system • Community development 	<ul style="list-style-type: none"> • Market development • Overall development

Table-26: Development Priorities of FaridpurPaurashava (Ward No-8)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • proper communication • water logging solution • education for all • dreg free society • Equality 	<ul style="list-style-type: none"> • Poverty reduction • Planned city • equality 	<ul style="list-style-type: none"> • poverty reduction • planned city

Table-27: Development Priorities of FaridpurPaurashava (Ward No-9)

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Entertainment center • Education system development • Drug free society • Waste management t • Better communication system • Pure drinking water • Terrorism free society 	<ul style="list-style-type: none"> • Developing electricity • Play ground • Education infrastructure development • Better communication 	<ul style="list-style-type: none"> • Better communication • planned city • employment

10. Challenges and observation

PRA teams have faced many challenges during the sessions which are summarized as follows;

- Session couldn't not possible to start in notified time 9.00 a.m. due to lack of participants
- It was very difficult to draw the boundary of the Wards and Union.
- It was very difficult to express the affected area in the unit and cost of assets damaged also.
- It was difficult to complete three PRA methods within 3.5 Hrs.
- People are happy for identifying the development priorities for their union.

11. Closing with Conclusion



In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rapid Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rapid Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

Annexure-III: Individual PRA Report at Union Level of Faridpur Sadar Upazila

1.0 Aliabad Union

1.1 Overview

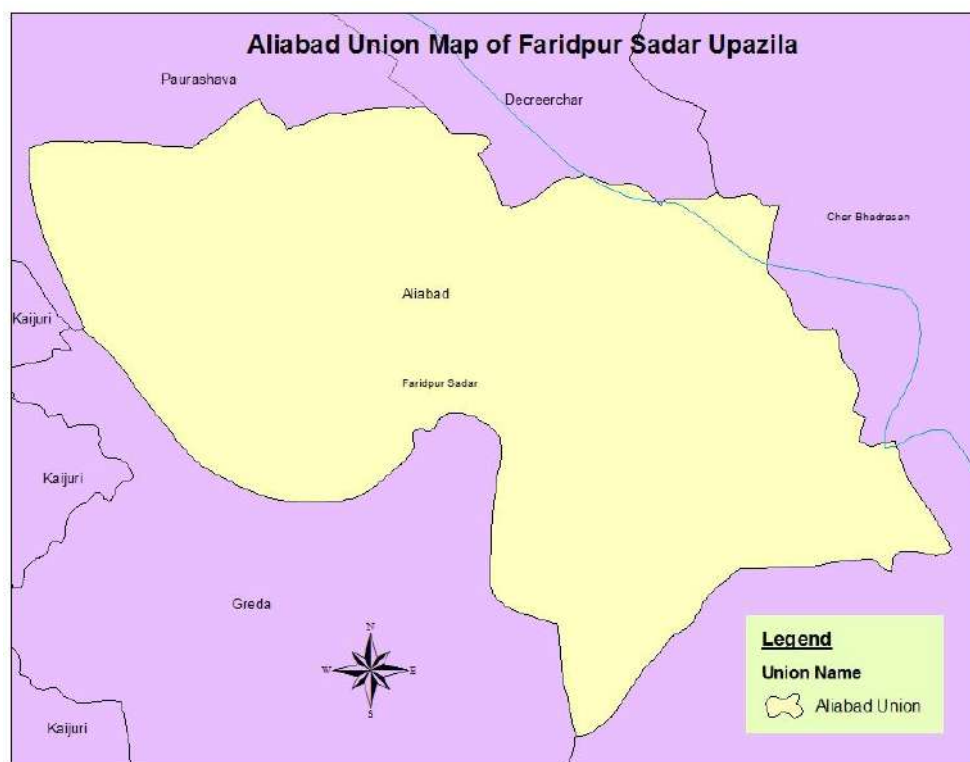
Aliabad union is one of the unions of Faridpur Sadar Upazilla in Faridpur district has an area of 30.003 km. Total number of population of this union is 39530. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 1.1: Aliabad Union

1.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

আলিআবাদ ইউনিয়নের গ্রামাঞ্চল মানচিত্র :-

Figure 1.1: Social Map of Aliabad Union

1.3.a Problems Identification

1. Communication Problem
2. Water logging
3. Potable drinking problem (Arsenic and Iron)
4. Lack of pure drinking water.
5. No High school, primary school, madrasa and college
6. Infrastructural problem in educational problem
7. No Bank
8. Inability to sell agricultural product to the government.
9. Lack of drainage system
10. Shortage in electricity supply
11. Unemployment
12. Sanitation problem

13. Poverty
 14. No hospital
 15. Lack of advanced and modern education
 16. Insufficient of educational institutions
 17. Lack of agricultural training
 18. Lack of repair for religious institution
- No allotment

1.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Communication problem
2. Lack of pure drinking water
3. Weak local government
4. Unemployment
5. Water logging

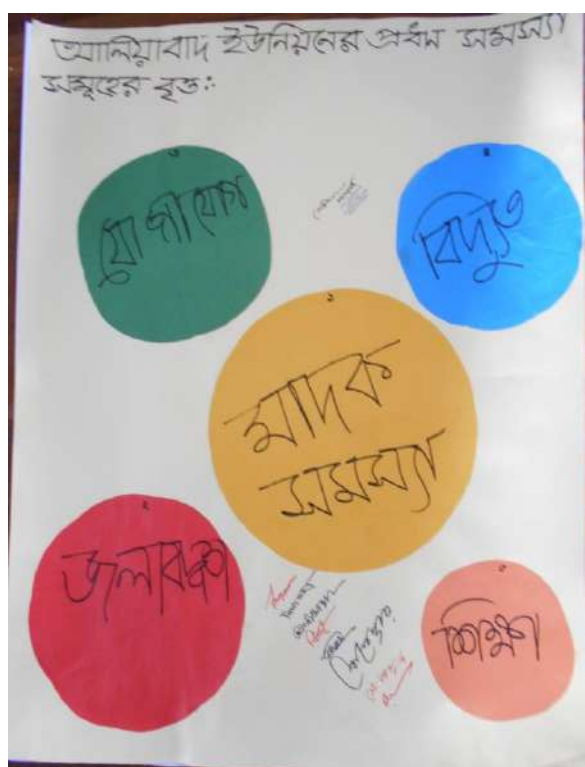


Figure 1.2: Venn diagram of Major Five Problems

1.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land (Chili, Jute, Paddy, Cucumber)

2. Foreign remittance
3. Beel
4. Manpower
5. Fisheries/ many large ponds and swamps
6. Livestock
7. Fallow land
8. Free land for tree plantation
9. Village market (No. 10)

1.3.d Potential Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potential are as follows;

1. Agricultural land
2. Manpower
3. Livestock
4. Foreign remittance
5. Haat Bazar

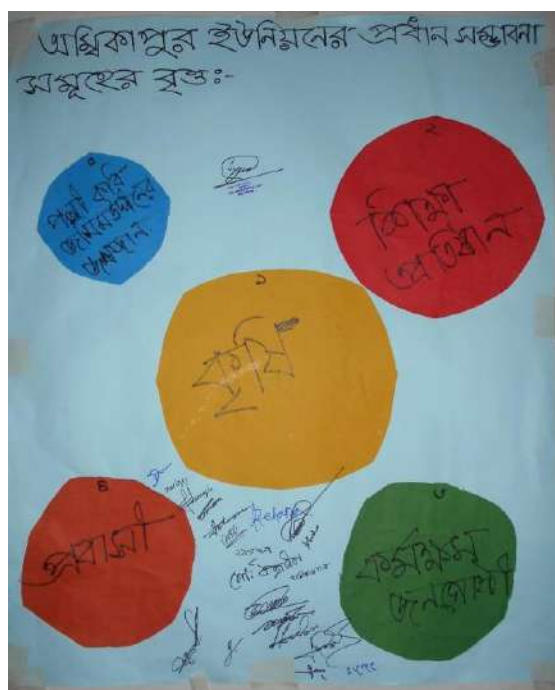


Figure 1.3: Venn Diagram of Major Five Potentials

1.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 1.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Drug	<ul style="list-style-type: none"> • Unemployment which result from unemployment, • Abuse of technology • Estranged family relation. 	<ul style="list-style-type: none"> • Young generation are deteriorating. 	<ul style="list-style-type: none"> • Aware and cordial people can be strength
2. Water logging	<ul style="list-style-type: none"> • Unplanned road • Infrastructure development. 	<ul style="list-style-type: none"> • Encroachment of agricultural land • Economic deficiency 	<ul style="list-style-type: none"> • Available manpower can be a potential strength
3. Communication	<ul style="list-style-type: none"> • Katcha road • Allocation of insufficient budget 	<ul style="list-style-type: none"> • Deficiency of other facilities. • 	<ul style="list-style-type: none"> • Available land and work force
4. Electricity	<ul style="list-style-type: none"> • Bureaucracy 	<ul style="list-style-type: none"> • Due to administrative attention 	<ul style="list-style-type: none"> • Available land and work force
5. Education	<ul style="list-style-type: none"> • Lack of budget 	<ul style="list-style-type: none"> • Literacy rate is dropping and problem like drug addiction 	<ul style="list-style-type: none"> • There are many attentive student as well as their aware parents.

1.4 Perceived Development Priorities for Aliabad Union.

The recommended development priorities of Aliabad Union are as follows;

Table 1.2: Development Priorities for Aliabad Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Development of communication system • Development of agriculture • Employment opportunity • Sanitation • Eradication of Drug • Developed and modern health facilities • 100% electrification 	<ul style="list-style-type: none"> • Eradication of Drug • Water logging • Employment • Improvement of medical service 	<ul style="list-style-type: none"> • Employment opportunity • Eradication of Drug

1.5. List of Participants

Figure 1.4: PRA attendance sheet

2.0 Ambikapur Union

2.1 Overview

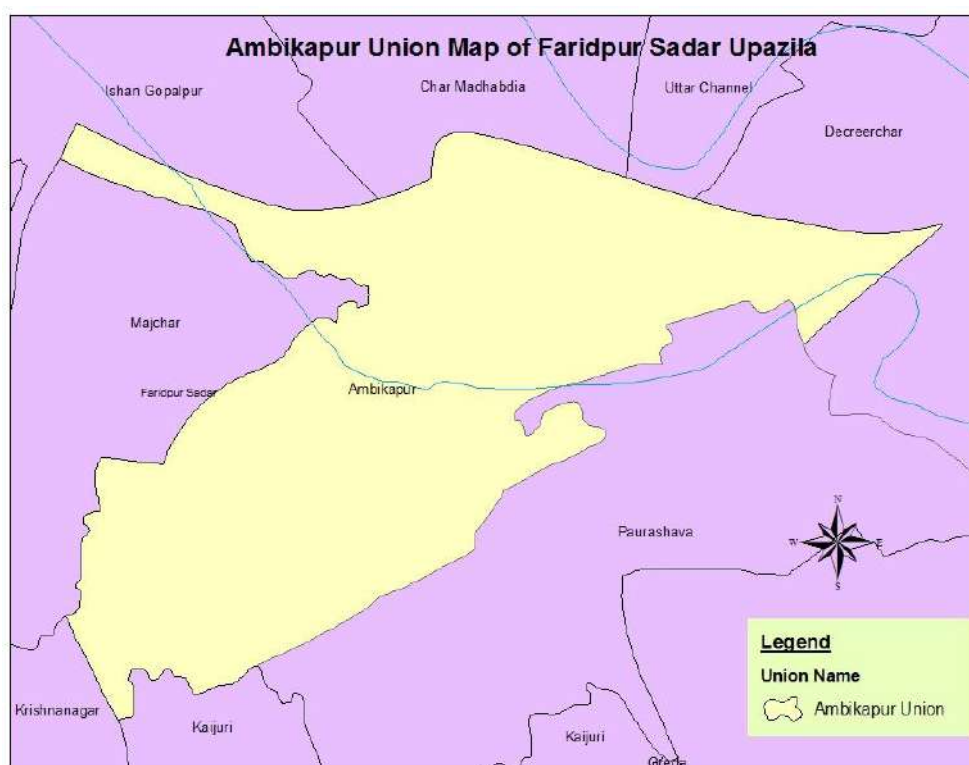
Ambikapur Union is under the administrative jurisdiction of Faridpur Sadar Upazilla in Faridpur district has an area of 41.93 km². Total population is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 2.1: Ambikapur Union

2.2 Spatial Aspects

Social mapping is a useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist the planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can help to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Ambikapur union by one group and another group found out the causes and effects, related

potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, waterlogging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc). It should be mentioned here that when the social mapping and Venn diagram respectively finished, the facilitator asked the whole group to check if the identified major problems and potentials are already located in the social map, if missed then they located on the map.

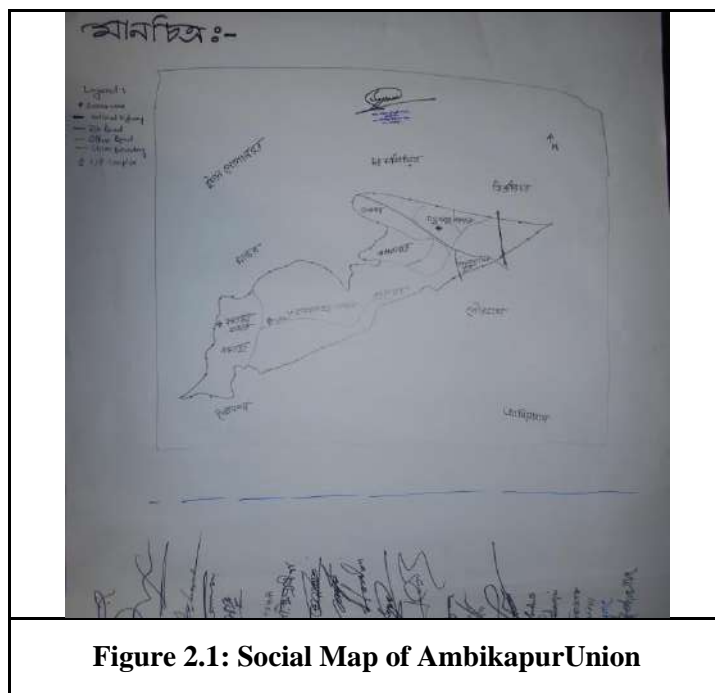


Figure 2.1: Social Map of Ambikapur Union

2.3 Major Problems and Potentials

2.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication problem
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation seed, instrument, fertilizer lacking
11. Lack of Cold Storage
12. Unemployment
13. Drug addiction
14. Unplanned market

15. Corruption in distributing relief goods
16. No animal treatment hospital
17. Lack of funding
18. Breaking social equity through political interruption
19. No social security allowance
20. River and canal erosion
21. Lack of availability of primary
22. medicine in local market
23. Unwillingness of public participation in development works

2.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Lack of local Govt. empowerment
2. Water logging
3. Unemployment
4. Communication problem
5. Unhealthy drinking water and sanitation

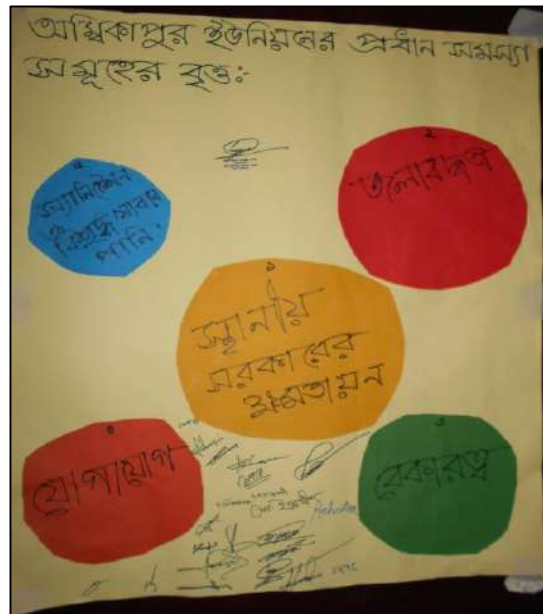


Figure 2.2: Venn diagram of Major Five Problems

2.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural Crop (onion, jute, paddy)
2. Man power
3. Poet JasimUddin's house
4. Educational institute
5. Muslim mission school

6. Marine academy
7. Remittance

2.3.d Potential Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potential are as follows;

1. Agricultural Crop (onion, jute, paddy)
2. Educational institute
3. Man power
4. Remittance
5. Poet JasimUddin's house

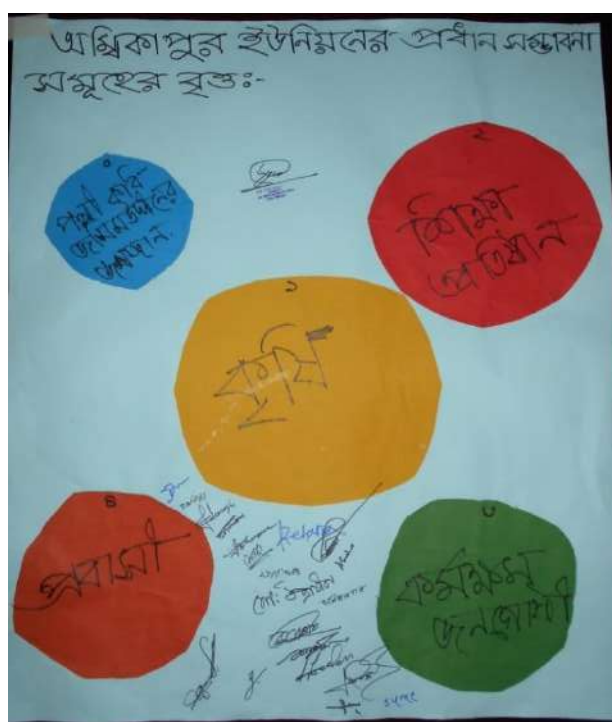


Figure 2.3: Venn diagram of Major Five Potentials

2.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 2.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Lack of local Govt. empowerment:	<ul style="list-style-type: none"> political influence lack of integrated planning 	<ul style="list-style-type: none"> mismanagement of project implementation. 	<ul style="list-style-type: none"> Cooperation of Union Parishad can be strength.

Identified Problems	Causes	Impacts	Potentials/Probability
2. Water Logging	<ul style="list-style-type: none"> • lack of proper drainage planning, • unplanned development and coordination 	<ul style="list-style-type: none"> • economic loss every year through damage in infrastructure and crops. 	<ul style="list-style-type: none"> • Unemployed local people can be strength
3. Unemployment	<ul style="list-style-type: none"> • Lack of industrialization and opportunity 	<ul style="list-style-type: none"> • increased poverty and drug addiction 	<ul style="list-style-type: none"> • Willingness of local leaders as well as people to remove this problem can be a potential.
4. Communication	<ul style="list-style-type: none"> • Katcha road, • broken road • allocation of insufficient budget 	<ul style="list-style-type: none"> • deprivation of other facilities 	<ul style="list-style-type: none"> • Available land, soil and work force can be potentials.
5. Pure drinking water	<ul style="list-style-type: none"> • Lack of budget, • lack of tube well, • presence of arsenic and iron 	<ul style="list-style-type: none"> • people are suffering from various water related diseases and facing difficulty in maintaining regular life 	<ul style="list-style-type: none"> • Water table is not too low and people's willingness

2.4 Perceived Development Priorities for Ambikapur Union.

The recommended development priorities of Ambikapur Union are given in Table-2.2.

Table 2.2: Development Priorities for Ambikapur Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Communicational development • Improved drainage • Educational development • Water supply • Electricity • Drug eradication • Empowerment of local government • Market • Agricultural development • Health service • Improved health service 	<ul style="list-style-type: none"> • Development in communication • Agricultural development • Employment • Sanitation • Quality education • Better treatment • Local govt. empowerment • Model union • Food management • Improved drainage 	<ul style="list-style-type: none"> • Better communication • Agricultural development • Improved drainage • Model union

2.5. List of Participants

খুলনা ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রশাসনিক অঞ্চল (উত্তর) অঞ্চল (খানেক ৩)
PRA (সহকারী উপস্থিতি) তালিকা

উপজেলা: **ফরিদপুর সদর** তারিখ: **০৬/০২/১৫**
ইউনিয়ন: **আমিরাপুর** সময়: **সন্ধ্যা ১০:০০**
নাম: **ইউ.পি. কমিটি**

সং	নাম	পদবী	ওয়ার্ড/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
০১	কামাল হোসেন	সহকারী	ওয়ার্ড-০১	০১৭২৮৫৫৭৮	
০২	আবু হোসেন	সহকারী	ওয়ার্ড-০২	০১৭২৮৫৫৭৮	
০৩	আবু হোসেন	সহকারী	ওয়ার্ড-০৩	০১৭২৮৫৫৭৮	
০৪	আবু হোসেন	সহকারী	ওয়ার্ড-০৪	০১৭২৮৫৫৭৮	
০৫	আবু হোসেন	সহকারী	ওয়ার্ড-০৫	০১৭২৮৫৫৭৮	
০৬	আবু হোসেন	সহকারী	ওয়ার্ড-০৬	০১৭২৮৫৫৭৮	
০৭	আবু হোসেন	সহকারী	ওয়ার্ড-০৭	০১৭২৮৫৫৭৮	
০৮	আবু হোসেন	সহকারী	ওয়ার্ড-০৮	০১৭২৮৫৫৭৮	
০৯	আবু হোসেন	সহকারী	ওয়ার্ড-০৯	০১৭২৮৫৫৭৮	
১০	আবু হোসেন	সহকারী	ওয়ার্ড-১০	০১৭২৮৫৫৭৮	
১১	আবু হোসেন	সহকারী	ওয়ার্ড-১১	০১৭২৮৫৫৭৮	
১২	আবু হোসেন	সহকারী	ওয়ার্ড-১২	০১৭২৮৫৫৭৮	
১৩	আবু হোসেন	সহকারী	ওয়ার্ড-১৩	০১৭২৮৫৫৭৮	
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১৫	আবু হোসেন	সহকারী	ওয়ার্ড-১৫	০১৭২৮৫৫৭৮	
১৬	আবু হোসেন	সহকারী	ওয়ার্ড-১৬	০১৭২৮৫৫৭৮	
১৭	আবু হোসেন	সহকারী	ওয়ার্ড-১৭	০১৭২৮৫৫৭৮	
১৮	আবু হোসেন	সহকারী	ওয়ার্ড-১৮	০১৭২৮৫৫৭৮	
১৯	আবু হোসেন	সহকারী	ওয়ার্ড-১৯	০১৭২৮৫৫৭৮	
২০	আবু হোসেন	সহকারী	ওয়ার্ড-২০	০১৭২৮৫৫৭৮	

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নাম: **ইউ.পি. কমিটি**

সং	নাম	পদবী	ওয়ার্ড/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
২১	আবু হোসেন	সহকারী	ওয়ার্ড-২১	০১৭২৮৫৫৭৮	
২২	আবু হোসেন	সহকারী	ওয়ার্ড-২২	০১৭২৮৫৫৭৮	
২৩	আবু হোসেন	সহকারী	ওয়ার্ড-২৩	০১৭২৮৫৫৭৮	
২৪	আবু হোসেন	সহকারী	ওয়ার্ড-২৪	০১৭২৮৫৫৭৮	
২৫	আবু হোসেন	সহকারী	ওয়ার্ড-২৫	০১৭২৮৫৫৭৮	
২৬	আবু হোসেন	সহকারী	ওয়ার্ড-২৬	০১৭২৮৫৫৭৮	
২৭	আবু হোসেন	সহকারী	ওয়ার্ড-২৭	০১৭২৮৫৫৭৮	
২৮	আবু হোসেন	সহকারী	ওয়ার্ড-২৮	০১৭২৮৫৫৭৮	
২৯	আবু হোসেন	সহকারী	ওয়ার্ড-২৯	০১৭২৮৫৫৭৮	
৩০	আবু হোসেন	সহকারী	ওয়ার্ড-৩০	০১৭২৮৫৫৭৮	

Figure 2.4: PRA attendance sheet

3.0 Char Madhabdia Union

3.1 Overview

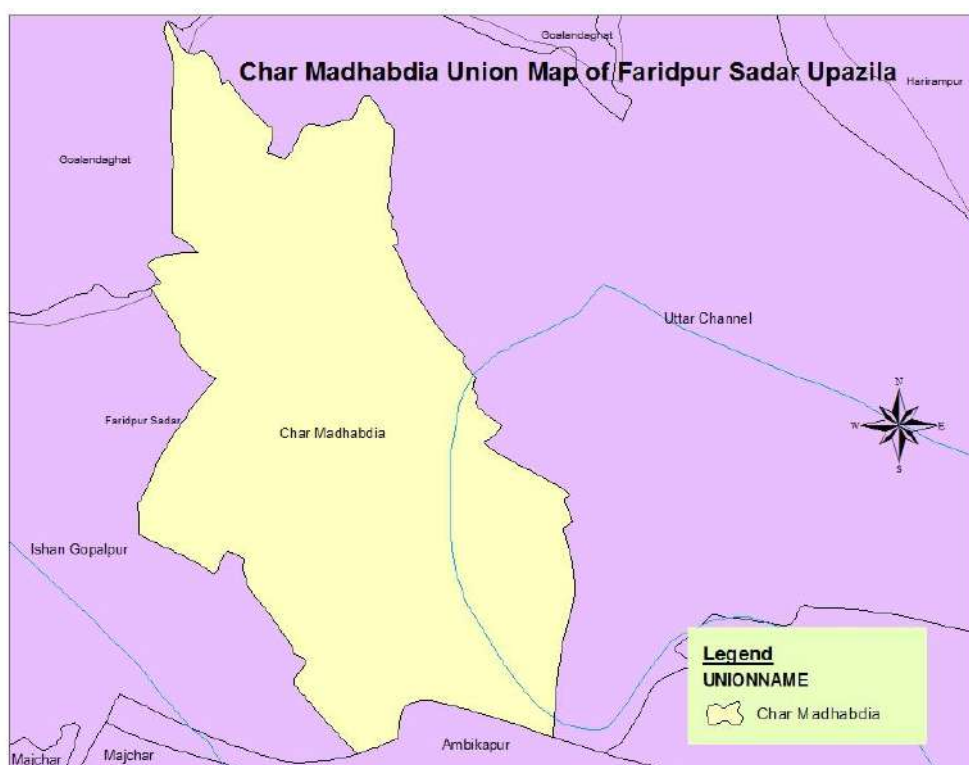
Char Madhabdia Union is under the administrative jurisdiction of Bagmara Upazila in Rajshahi District has an area of 7 km². Total population of this union is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 3.1: Char Madhabdia Union

3.2 Spatial Aspects

Social mapping is a useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist the planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can be helpful to select interventions in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Char Madhabdia Union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked to locate

roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).

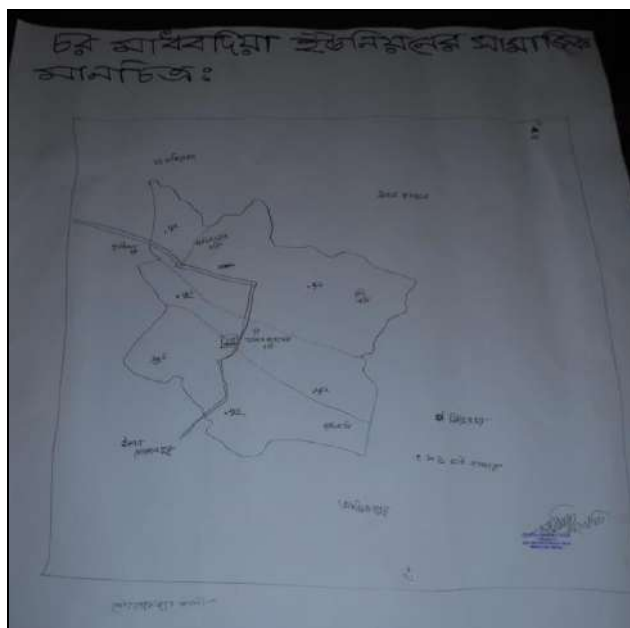


Figure 3.1: Social Map of Char Madhabdia Union

1.3 Major Problems and Potentials

1.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

3.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Education
2. Sanitation

3. Banking
4. Communication
5. Pure drinking water

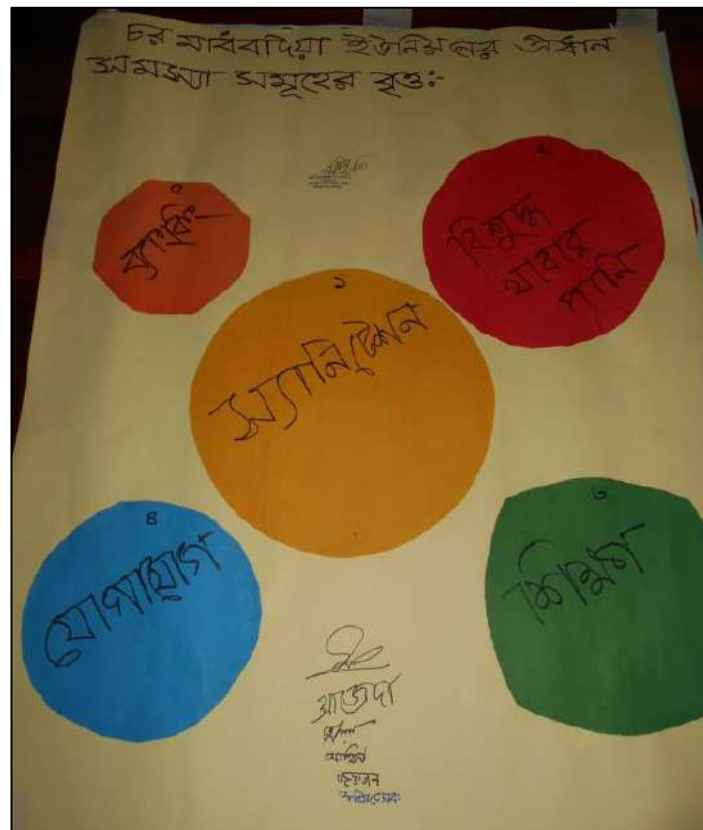


Figure 3.2: Venn diagram of Major Five Problems

3.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market
7. Man power

3.3.d Potential Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potential are as follows;

1. Agriculture
2. Vegetables
3. Active manpower
4. Expatriates
5. Educated man power

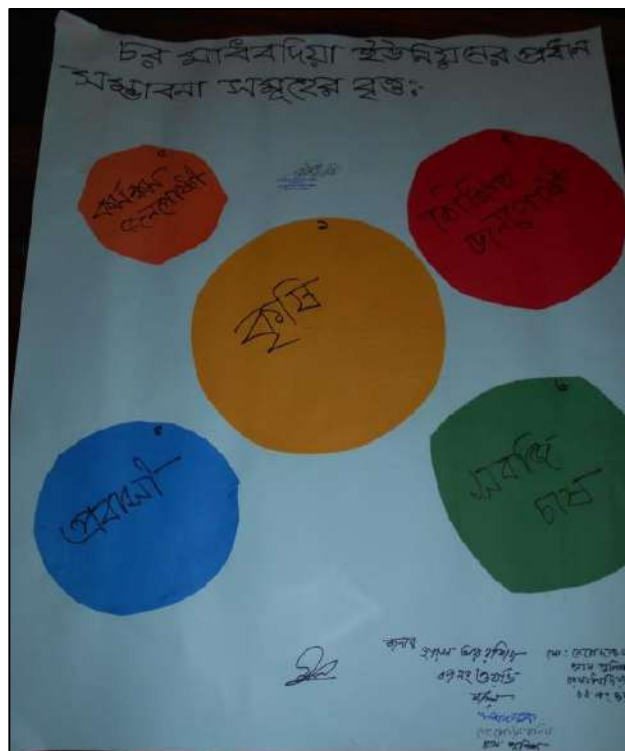


Figure 3.3: Venn diagram Major Five Potentials

3.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 3.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Education problem	<ul style="list-style-type: none"> • Lack of budget, • lack of teachers and schools • lack of infrastructure 	<ul style="list-style-type: none"> • unemployment • less qualified man power 	<ul style="list-style-type: none"> • Available space and manpower can be strengths.
2. Pure drinking water	<ul style="list-style-type: none"> • Lack of budget, • lack of tube well, • presence of arsenic and iron 	<ul style="list-style-type: none"> • people are suffering from various diseases. 	<ul style="list-style-type: none"> • Projects of different NGOs like save the children are a positive strength.

Identified Problems	Causes	Impacts	Potentials/Probability
3.Sanitation	<ul style="list-style-type: none"> Lack of budget, lack of consciousness 	<ul style="list-style-type: none"> various health and environment related problems. 	<ul style="list-style-type: none"> Available land and work force
4. Communication	<ul style="list-style-type: none"> Katcha road and allocation of insufficient budget 	<ul style="list-style-type: none"> deficiency of other facilities. 	<ul style="list-style-type: none"> Available land and work force
5.Banking	<ul style="list-style-type: none"> Indifference of the authority 	<ul style="list-style-type: none"> investment is decreasing and people face various problems in money transaction 	<ul style="list-style-type: none"> Available manpower

3.4 Perceived Development Priorities for Char Madhabdia.

The recommended development priorities of Char Madhabdia Union are as follows;

Table 3.2: Development Priorities for Char Madhabdia Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Electricity Improved health service Educational development Employment opportunity Pure drinking water Village police Empowerment of local government Market Agricultural development Health service Bank 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Bank Empowerment of local government Pure drinking water Educational development Digital union Market Employment opportunity 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Industrialization Model union Pure drinking water Irrigation Bank Employment opportunity Model union

4.0 Decree Char Union

4.1 Overview

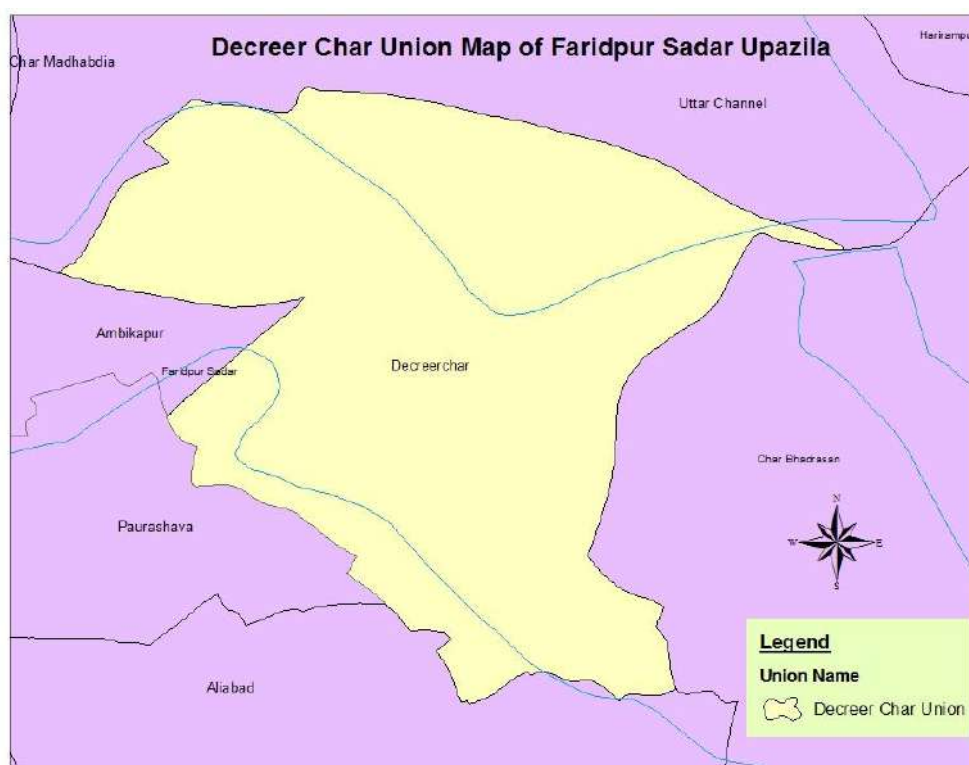
Decree Char Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 41.94 km². Total population is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 4.1: Decree Char Union

4.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Decree Char union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging

area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc)

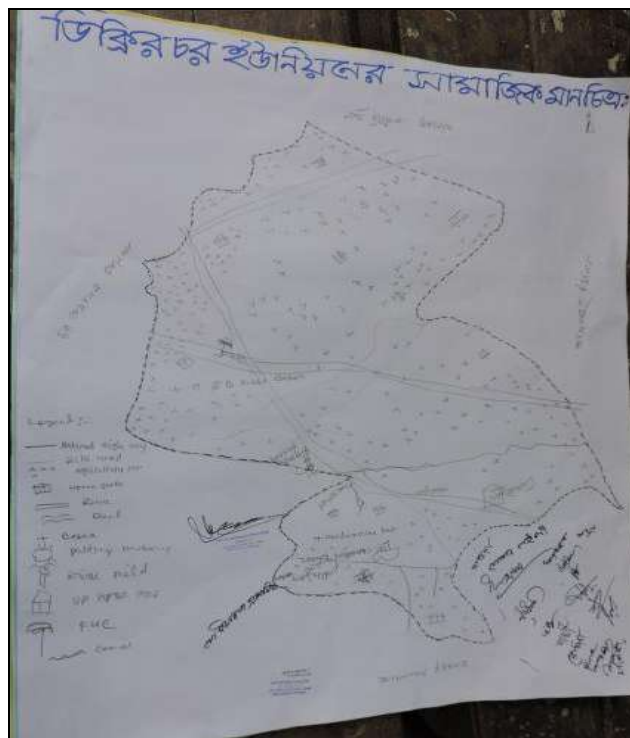


Figure 4.1: Social Map of Decreeer Char Union

4.3 Major Problems and Potentials

4.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

4.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Education

2. Sanitation
3. Health service
4. Communication
5. Pure drinking water

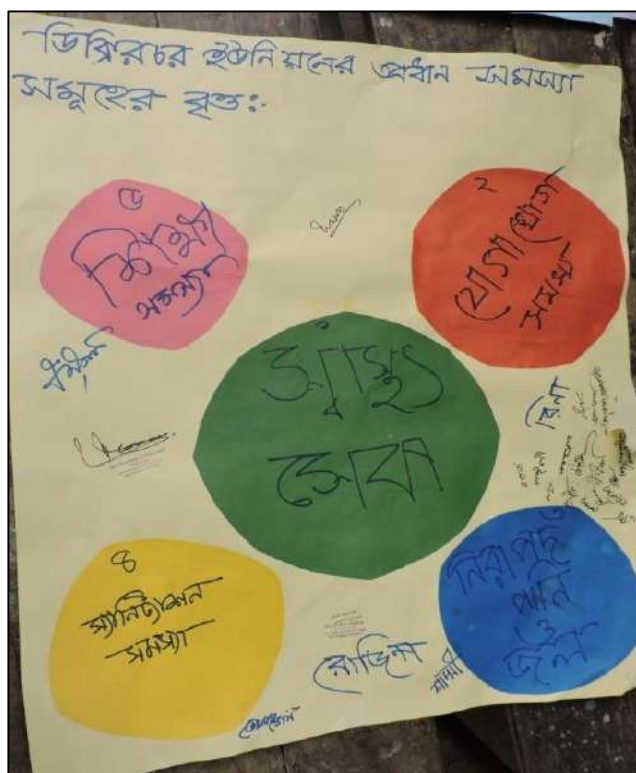


Figure 4.2: Venn diagram of Major Five Problems

4.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market
7. Man power

4.3.d Potential Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potential are as follows;

1. Agriculture
2. Vegetables

3. Active manpower
4. Expatriates
5. Educated man power

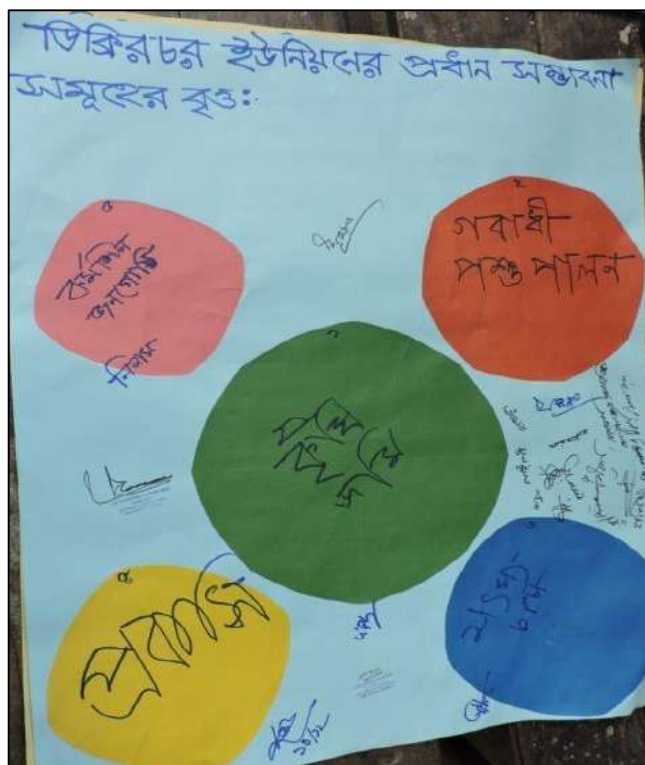


Figure 4.3: Venn diagram Major Five Potentials

4.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 4.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Education problem	<ul style="list-style-type: none"> • Lack of budget, • lack of teachers and schools • lack of infrastructure. 	<ul style="list-style-type: none"> • unemployment and less qualified man power. 	<ul style="list-style-type: none"> • Available space and manpower can be strengths
2.Pure drinking water	<ul style="list-style-type: none"> • Lack of budget, • lack of tube well, • presence of arsenic and iron 	<ul style="list-style-type: none"> • people are suffering from various diseases. 	<ul style="list-style-type: none"> • Projects of different NGOs like save the children are a positive strength.
3.Sanitation	<ul style="list-style-type: none"> • Lack of budget, • lack of consciousness. 	<ul style="list-style-type: none"> • various health and environment related problems. 	<ul style="list-style-type: none"> • Available land and work force. •
4. Communication	<ul style="list-style-type: none"> • Katcha road and allocation of insufficient budget. 	<ul style="list-style-type: none"> • deficiency of other facilities. 	<ul style="list-style-type: none"> • Available space and manpower.
5.Health service	<ul style="list-style-type: none"> • Lack doctor, nurse and • insufficient infrastructure. 	<ul style="list-style-type: none"> • People suffer from various health related problems and they are deprived of proper health care. 	<ul style="list-style-type: none"> • Available manpower.

4.4 Perceived Development Priorities for Decree Char Union.

The recommended development priorities of Decree Char Union are as follows;

Table 4.2: Development Priorities for Decree Char Union

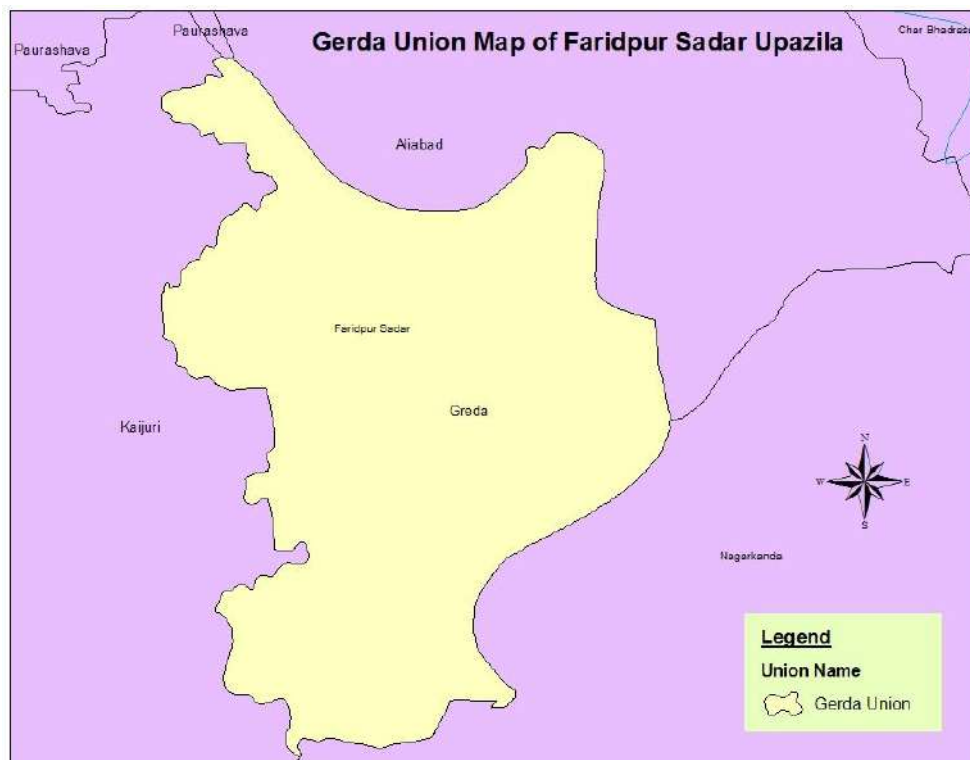
Short term	Midterm	Long term
<ul style="list-style-type: none"> • Communicational development • Electricity • Improved health service • Educational development • Employment opportunity • Pure drinking water • Village police • Empowerment of local government • Market • Agricultural development • Health service • Bank 	<ul style="list-style-type: none"> • Developed health service • Communication • Educational development 	<ul style="list-style-type: none"> • Developed health service • Communication • Educational development

Figure 4.4: PRA attendance sheet

5.0 Gerda Union

5.1 Overview

Goalkandi Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 41.94 km². Total Number of village is 27. Total number of population of this union is 39142. The boundary of the study area is stated below:

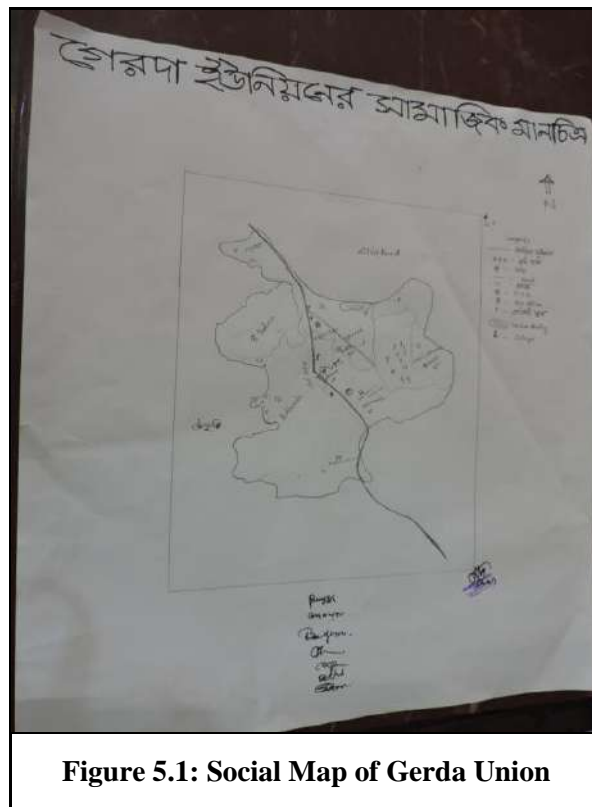


Map 5.1: Gerda Union

5.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Gerda union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).



5.3 Major Problems and Potentials

5.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

5.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Education
2. Sanitation
3. Water logging

4. Health service
5. Pure drinking water

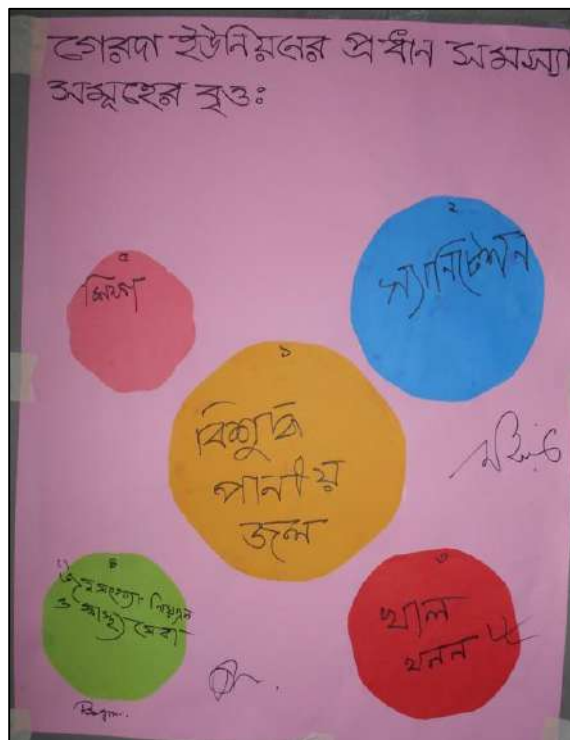


Figure 5.2: Venn diagram of Major Five Problems

5.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market
7. Man power

5.3.d Potential Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potential are as follows;

1. Agricultural land
2. Proposed EPZ
3. Cattle farm
4. Kumar river
5. Educated man power

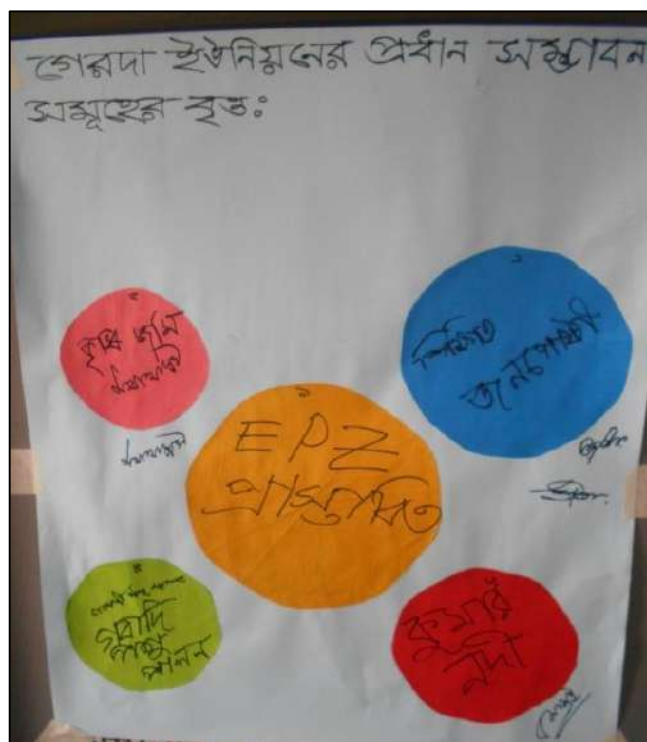


Figure 5.3: Venn diagram Major Five Potentials

5.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 5.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Education problem	<ul style="list-style-type: none"> • Lack of budget, • lack of teachers and schools • lack of infrastructure. 	<ul style="list-style-type: none"> • unemployment and less qualified man power. 	<ul style="list-style-type: none"> • Available space and manpower can be strengths
2.Pure drinking water	<ul style="list-style-type: none"> • Lack of budget, • lack of tube well, • presence of arsenic and iron 	<ul style="list-style-type: none"> • people are suffering from various diseases. 	<ul style="list-style-type: none"> • Projects of different NGOs like save the children are a positive strength.
3.Sanitation	<ul style="list-style-type: none"> • Lack of budget, • lack of consciousness. 	<ul style="list-style-type: none"> • various health and environment related problems. 	<ul style="list-style-type: none"> • Available land and work force.

Identified Problems	Causes	Impacts	Potentials/Probability
4. Communication	<ul style="list-style-type: none"> • Katcha road and allocation of insufficient budget. 	<ul style="list-style-type: none"> • deficiency of other facilities. 	<ul style="list-style-type: none"> • Available space and manpower.
5. Health service	<ul style="list-style-type: none"> • Lack doctor, nurse and • insufficient infrastructure. 	<ul style="list-style-type: none"> • People suffer from various health related problems and they are deprived of proper health care. 	<ul style="list-style-type: none"> • Available manpower.

5.4 Perceived Development Priorities for Gerda Union under.

The recommended development priorities of Gerda Union are as follows;

Table 5.2: Development Priorities for Gerda Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Communicational development • Electricity • Improved health service • Educational development • Employment opportunity • Pure drinking water • Drug eradication • Empowerment of local government • Market • Agricultural development • Health service • Irrigation 	<ul style="list-style-type: none"> • Developed health service • Electricity • Agricultural development • Drug eradication • Empowerment of local government • Pure drinking water • Educational development • Digital union • Market • Employment opportunity 	<ul style="list-style-type: none"> • Developed health service • Electricity • Agricultural development • Industrialization • Model union • Pure drinking water • Irrigation • Water supply • Employment opportunity

5.5. List of Participants

<p>পারদেব ন. বঙ্গবন্ধু সড়ক সদর উপজেলা পরিষদ প্রশাসনিক অফিস (উপসদর অফিস) PRA (সদর উপজেলা পরিষদ)</p>					
<p>উপজেলা: ২৪টি উপজেলা উপসদর: ২৪টি উপজেলা</p>			<p>তারিখ: ০৭-১২-২০২২</p>		
<p>উপসদর: ২৪টি উপজেলা</p>			<p>সদর: ২৪টি উপজেলা</p>		
ক্র.সং.	নাম	পদবী	স্বাক্ষর/স্বাক্ষর	যোগাযোগ নং	স্বাক্ষর
০১	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০২	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৩	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৪	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৫	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৬	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৭	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৮	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
০৯	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১০	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১১	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১২	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৩	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৪	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৫	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৬	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৭	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৮	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
১৯	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
২০	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
২১	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
২২	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
২৩	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	
২৪	শ্রীমতী সত্যজিৎ দেবী	সদস্য		০১৭১৬০৬৫১৭	

Figure 5.4: PRA attendance sheet

6.0 Isna Gopalpur Union

6.1 Overview

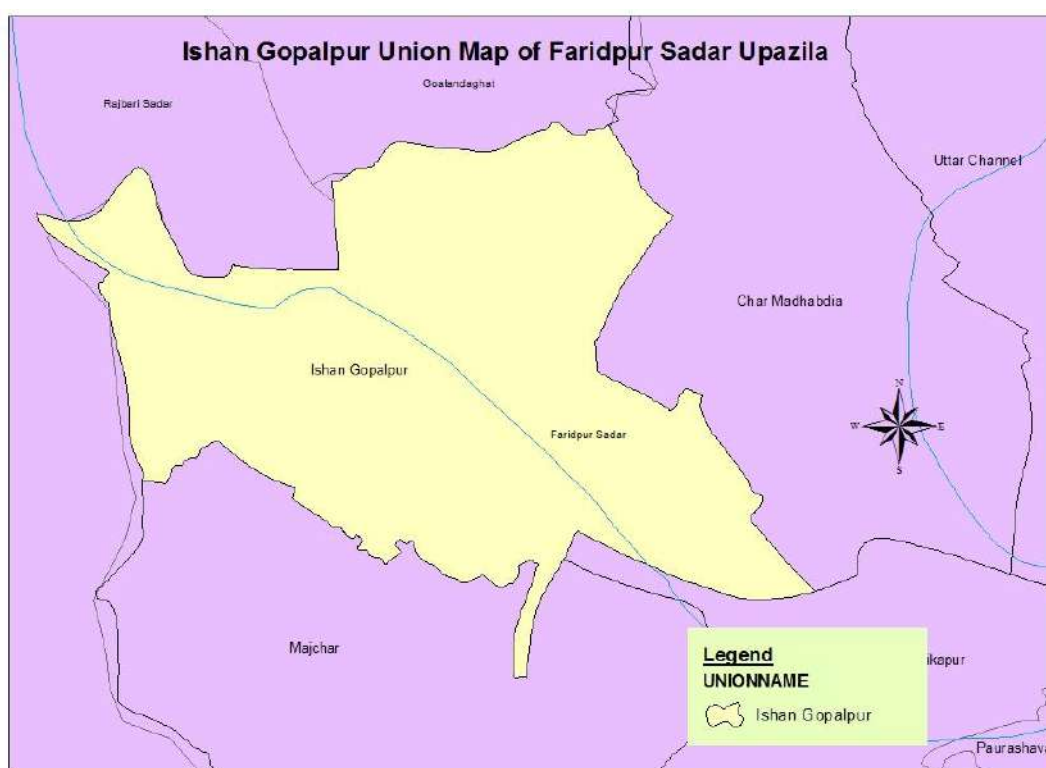
Ishan Gopalpur Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 31.14km². Total village number is 13. Total number of population of this union is 27234. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 6.1: Ishan Gopalpur Union

6.2 Spatial Aspects

Social mapping is a useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist the planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can be helpful to select interventions in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Ishan Gopalpur union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging)

area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).

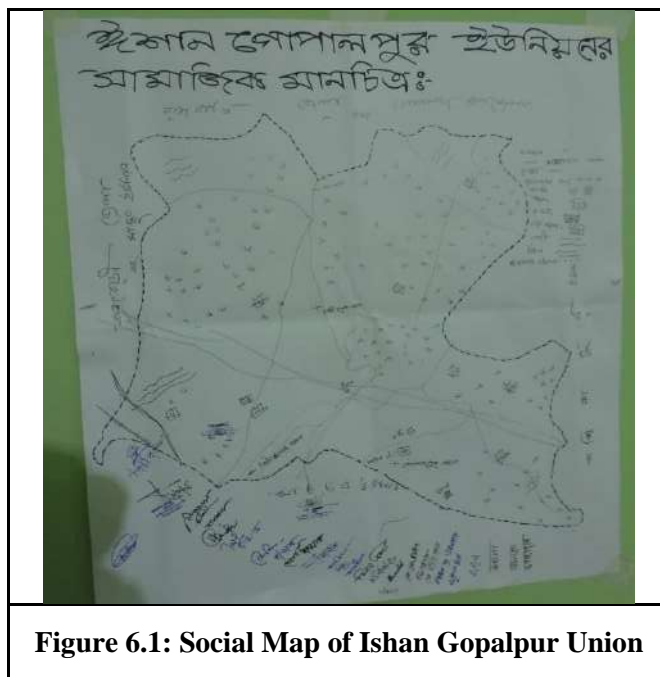


Figure 6.1: Social Map of Ishan Gopalpur Union

6.3 Major Problems and Potentials

6.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Pure drinking water
3. Drainage problem
4. Education
5. Unemployment
6. Water logging
7. Water supply
8. Irrigation
9. Infrastructure

6.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Communication problem
2. Health Facilities
3. Water logging
4. Early marriage
5. Electricity
6. Health service

7. Sanitation
8. Pure drinking water
9. Poverty
10. Educational infrastructure
11. Irrigation seed, instrument, fertilizer lacking
12. Lack of Cold Storage
13. Unemployment
14. Drug addiction
15. Unplanned market
16. Corruption in distributing relief goods
17. No animal treatment hospital
18. Lack of funding
19. Breaking social equity through political interruption
20. No social security allowance
21. River and canal erosion
22. Lack of availability of primary
23. Less medicine in local market
24. Unwillingness of public participation in development works

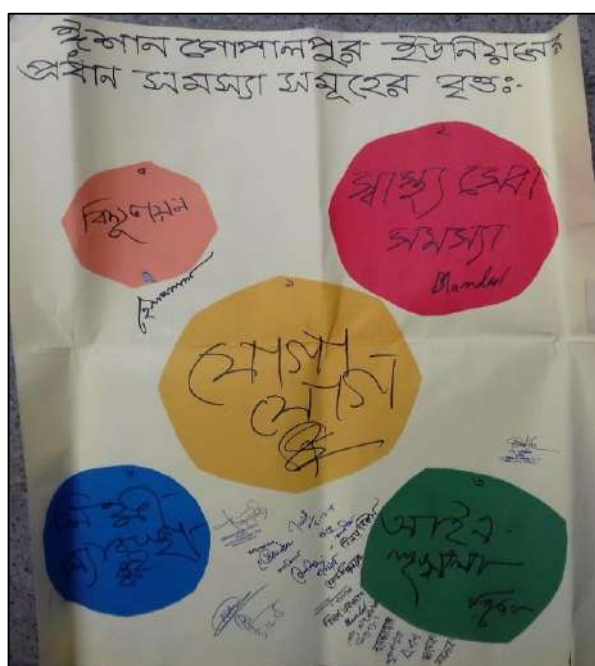


Figure 6.2: Venn diagram of Major Five Problems

6.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Communication Problem
2. Health facility problem
3. Lack of security

4. Lack of education
5. Lack of electricity

6.3.d Potentials Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land
2. Fisheries
3. Medicinal and forest tree
4. Remittance
5. Livestock

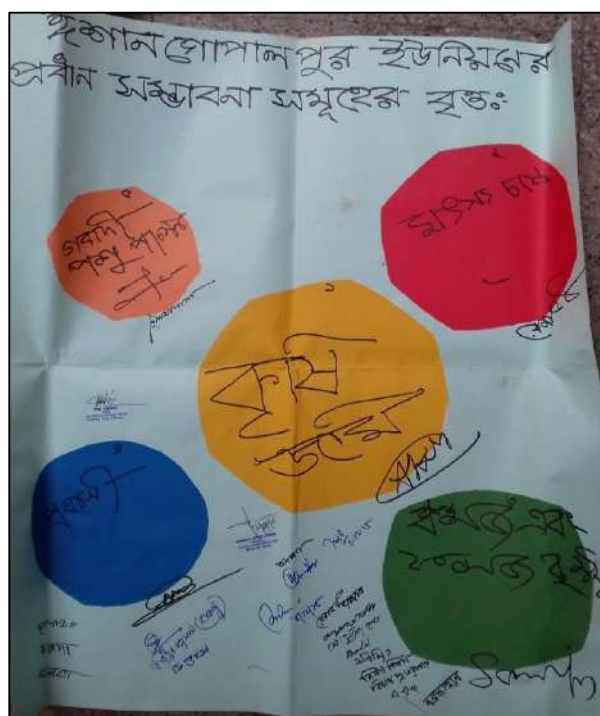


Figure 6.3: Venn diagram Major Five Potentials

6.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 6.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Lack of local Govt. empowerment	<ul style="list-style-type: none"> political influence and lack of integrated planning 	<ul style="list-style-type: none"> mismanagement of project implementation. 	<ul style="list-style-type: none"> Cooperation of Union Parishad can be strength

Identified Problems	Causes	Impacts	Potentials/Probability
2. Communication problem	<ul style="list-style-type: none"> recent flood, broken, mud road and broken bridge and lack of Govt. importance local communication. 	<ul style="list-style-type: none"> transferring agricultural goods and medical treatment lacking 	<ul style="list-style-type: none"> local manpower and materials like sand, bamboo and wood
3. Health problem	<ul style="list-style-type: none"> Lack of hospital and qualified doctor in local level, proper treatment 	<ul style="list-style-type: none"> People has to go a long way to meet their demands and its very 	<ul style="list-style-type: none"> A FWC clinic in local level can be a potential to mobilize
4. Law and regulation problem	<ul style="list-style-type: none"> no police station in this union 	<ul style="list-style-type: none"> trouble by drug addicted, robbery, theft and insecurity 	<ul style="list-style-type: none"> Local people's awareness is the positive strength.
5. Electricity problem	<ul style="list-style-type: none"> Lack of enough electricity line in local level and frequent load shedding 	<ul style="list-style-type: none"> life has been difficult for local people like studying, sleeping or regular pumping water in agricultural field. 	<ul style="list-style-type: none"> . People are willing to charge for the continuous service is the strength

6.4 Perceived Development Priorities for Gobindo para Union under Rajshahi District.

The recommended development priorities of Gobindopara Union are as follows:

Table 6.2: Development Priorities for Gobindo para Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Improved drainage Educational development Drinking Water supply Child marriage reduction Model Union Drug eradication Job opportunity Improved health service 	<ul style="list-style-type: none"> Fisheries industry Banking facility Community center Fire service station Quality education Better treatment Dairy farm development Model union Security Improved drainage electricity 	<ul style="list-style-type: none"> Better communication Employment Improved drainage Model union Sanitation electricity Gas Security Child marriage reduction Local market development Fire station

6.5. List of Participants

ব্যয়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিন্সিপ্যাল অফ ডেভেলপমেন্ট প্লান (প্যাকেজ ৩)
PRA মেম্বার উপস্থিতির তালিকা

উপজেলা: **ফরিদপুর সদর** তারিখ: **০৫.০২.২০২৫**
ইউনিয়ন: **ইকানিচাটপালপুর** সময়: **১০.০০**
স্থান: **ইকানিচাটপালপুর**

নং	নাম	পদবি	ওয়ার্ড/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
০১	শ্রীমতী সত্যমণি	মহিলা	ওয়ার্ড-০১	০১৭৩২৮৮	
০২	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০২	০১৭৪৩৩২৩৬৭	
০৩	শ্রীমতী সত্যমণি	মহিলা	ওয়ার্ড-০৩	০১৭১৭৩২৫৭৪০	
০৪	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৪	০১৭৭৫১১১৩৩৭	
০৫	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৫	০০৭২৪০২০৫৫৫	
০৬	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৬	০১৭১২-১৭১৩৬০	
০৭	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৭	০১৭১১-৭০২৪৭৬	
০৮	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৮	০১৭০৬০৬২৬৩০	
০৯	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-০৯	০১৭০৭৪৭২০৭৭	
১০	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১০	০২৭৫-৫০৫০২	
১১	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১১	০২৭৬৫০৫০২	
১২	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১২	০১৭১১-৫৪৩০২২	
১৩	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৩	০১৭১৬-৫১৭২৪৫	
১৪	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৪	০১৭১২-৩৩২৫৫২	
১৫	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৫	০১৭১৭১৩৭২৫৩	
১৬	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৬	০১৭১৩০৩৪১২৭	
১৭	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৭	০১৭১৫২৭৪৭৫২	
১৮	শ্রীমতী ইকানিচাটপালপুর	মহিলা	ওয়ার্ড-১৮		

Figure 6.4: PRA Attendance Sheet

7.0 Kaijuri Union

7.1 Overview

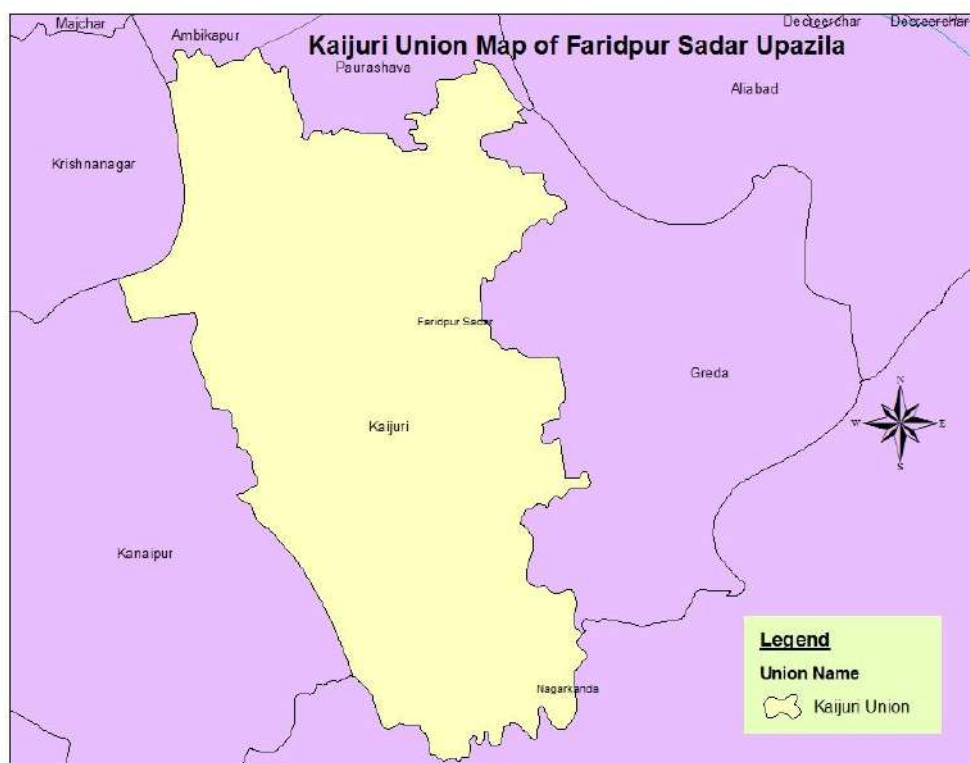
Kaijuri Union is under the administrative jurisdiction of Faridpur Sadar Upazilla in Faridpur district has an area of 41.94 km². Total number of population of this union is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 7.1: Kaijuri Union

7.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected has selected two persons who were assigned to work on social mapping of the Kaijuri union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water

logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).

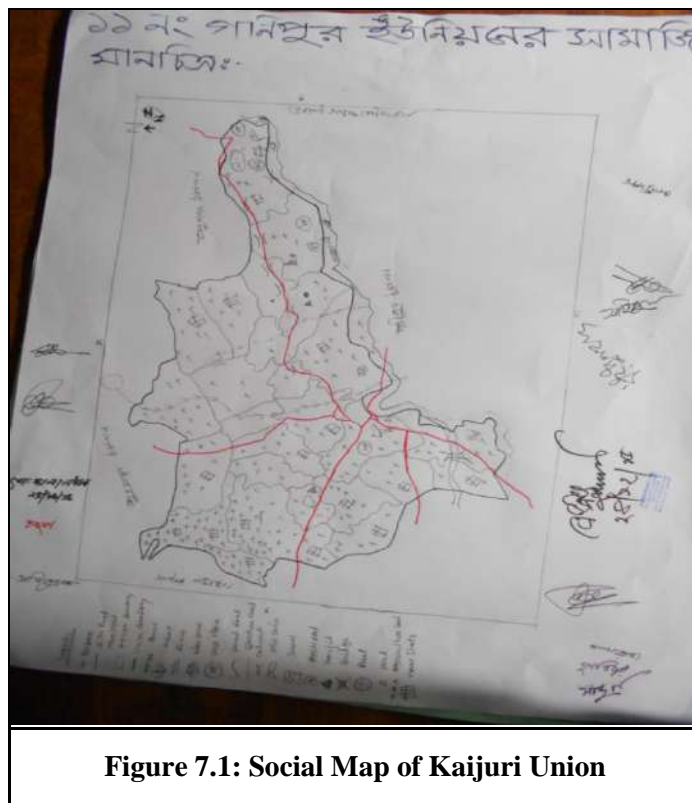


Figure 7.1: Social Map of Kaijuri Union

7.3 Major Problems and Potentials

7.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

7.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Communication

2. Sanitation
3. Unemployment
4. Agricultural equipment
5. Pure drinking water



Figure 7.2: Venn diagram of Major Five Problems

7.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market
7. Man power

7.3.d Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land
2. Market
3. Poultry farm

4. Water body
5. Active man power



Figure 7.3: Major Five Potentials

7.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 7.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Communication	<ul style="list-style-type: none"> Katcha road and allocation of insufficient budget 	<ul style="list-style-type: none"> deficiency of other facilities. 	<ul style="list-style-type: none"> Available land and work force
2.Pure drinking water	<ul style="list-style-type: none"> Lack of budget, lack of tube well, presence of arsenic and iron. 	<ul style="list-style-type: none"> people are suffering from various diseases 	<ul style="list-style-type: none"> Projects of different NGOs like save the children are a positive strength.

Identified Problems	Causes	Impacts	Potentials/Probability
3.Sanitation	<ul style="list-style-type: none"> Lack of budget, lack of consciousness 	<ul style="list-style-type: none"> various health and environment related problems.. 	<ul style="list-style-type: none"> Available land and work force
4Agricultural problem	<ul style="list-style-type: none"> Lack of technology, high cost of seeds and fertilizers, low selling price 	<ul style="list-style-type: none"> scarcity of agricultural products 	<ul style="list-style-type: none"> Available space and manpower
5.Unemployment	<ul style="list-style-type: none"> Lack of industrialization 	<ul style="list-style-type: none"> increased poverty. 	<ul style="list-style-type: none"> Availability of educated manpower is a strength

7.4 Perceived Development Priorities for Kaijuri Union under.

The recommended development priorities of KaijuriUnion are as follows;

Table 7.2: Development Priorities for Kaijuri Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Electricity Improved health service Educational development Electricity Water supply Drug eradication Empowerment of local government Market Agricultural development Health service 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Drug eradication Empowerment of local government Pure drinking water Educational develop Digital union Market Employment opportunity 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Industrialization Market Pure drinking water Educational development Water supply Employment opportunity Model union

7.5 List of Participants

<p>পূর্বানুসৃত ও বর্ণনামূলক তথ্য</p> <p>সদর উপজেলা পরিষদ</p> <p>প্রিয়দেবপুর ওক (উপজেলা পরিষদ) রাস (স্বাক্ষর) নং</p> <p>PRA (সদর উপজেলা পরিষদ)</p>					
<p>উপজেলা: <u>ফরিদপুর সদর</u></p> <p>উপজেলা: <u>ফরিদপুর সদর</u></p>		<p>তারিখ: <u>০৭.০২.২০১৫</u></p> <p>সময়: <u>১০.০০ ঘণ্টা</u></p>		<p>৩.১২.১৫</p> <p>০৭.০২.২০১৫</p>	
ক্র.সং.	নাম	পেশা	স্বাক্ষর	ফোন নং	স্বাক্ষর
১	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
২	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৩	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৪	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৫	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৬	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৭	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৮	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
৯	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
১০	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
১১	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
১২	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
১৩	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭
১৪	সদর উপজেলা পরিষদ	সদর উপজেলা পরিষদ	০৭.০২.২০১৫	০১৭৭৭৭৭৭৭৭	০১৭৭৭৭৭৭৭৭

Figure 7.4: PRA Attendance Sheet

8.0 Kanaipur Union

8.1 Overview

Kanaipur Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 41.94km². Total number of population of this union is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

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South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 8.1: Kanaipur Union

8.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Kanaipur union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked the participants to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).

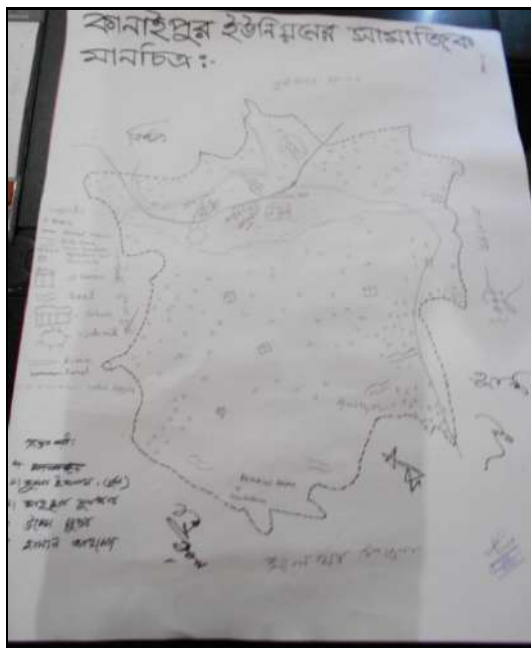


Figure 8.1: Social Map of Kanaipur Union

8.3 Major Problems and Potentials

8.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

8.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Education
2. Market
3. Health service
4. Fire service
5. Pure drinking water

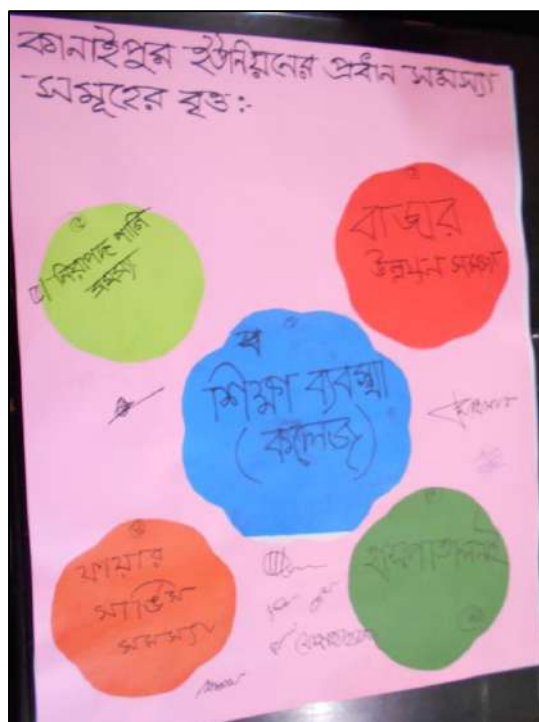


Figure 8.2: Venn diagram of Major Five Problems

8.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market
7. Man power

8.3.d Potentials Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land

2. Cattle farming
3. Industry
4. Expatriates
5. Business

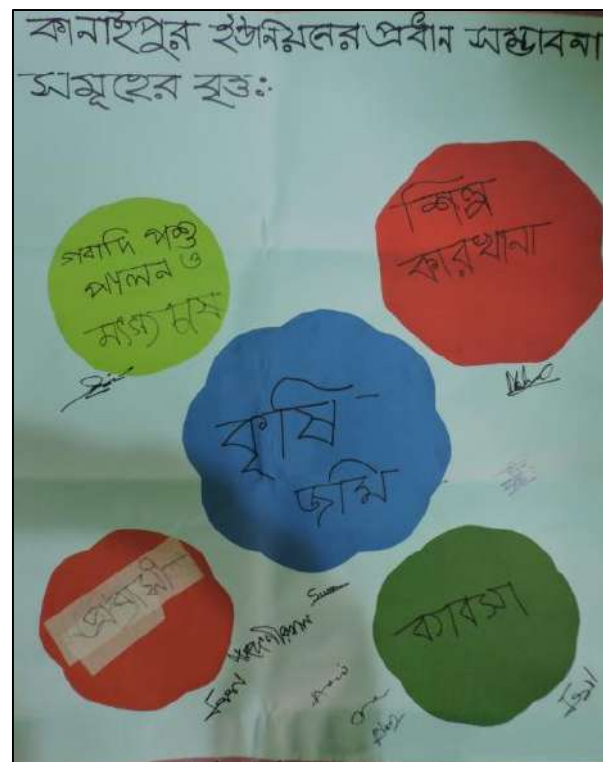


Figure 8.3: Major Five Potentials

8.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 8.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Education problem	<ul style="list-style-type: none"> Lack of budget, lack of teachers and schools lack of infrastructure 	<ul style="list-style-type: none"> unemployment and less qualified man power 	<ul style="list-style-type: none"> Available space and manpower
2. Pure drinking water	<ul style="list-style-type: none"> Lack of budget, lack of tube well, presence of arsenic and iron 	<ul style="list-style-type: none"> People are suffering from various diseases. 	<ul style="list-style-type: none"> Projects of different NGOs like save the children

Identified Problems	Causes	Impacts	Potentials/Probability
3. Market	<ul style="list-style-type: none"> Lack of budget indifference of the government. 	<ul style="list-style-type: none"> various economic problems 	<ul style="list-style-type: none"> Available land and work force
4. Health	<ul style="list-style-type: none"> Allocation of insufficient budget 	<ul style="list-style-type: none"> suffering of the local people. 	<ul style="list-style-type: none"> Available land and work force
5. Fire service	<ul style="list-style-type: none"> Indifference of the authority. 	<ul style="list-style-type: none"> vulnerability to fire hazards is increasing 	<ul style="list-style-type: none"> Available of space

8.4 Perceived Development Priorities for Kanaipur Union.

The recommended development priorities of Kanaipur Union are as follows;

Table 8.2: Development Priorities for Kanaipur Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Electricity Improved health service Educational development Employment opportunity Pure drinking water Village police Empowerment of local government Market Agricultural development Health service Bank Fire service 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Bank Empowerment of local government Pure drinking water Educational development Digital union Market Employment opportunity Fire service Market 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Industrialization Model union Pure drinking water Irrigation Bank Employment opportunity Model union Fire service Market

9.0 Krishna Nagar Union

9.1 Overview

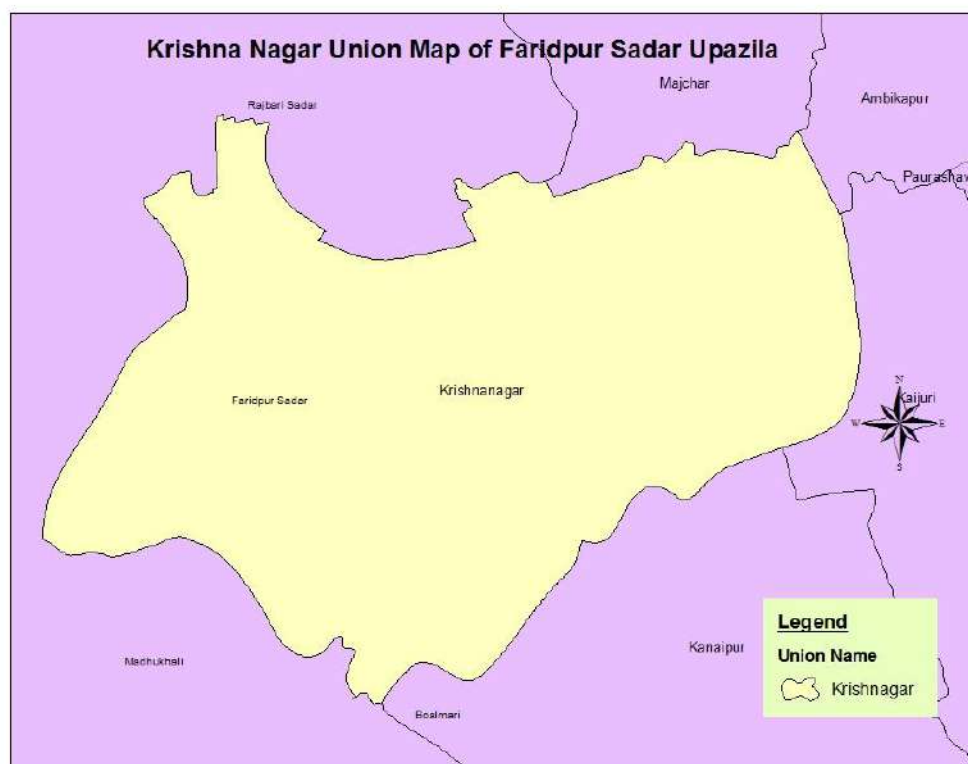
Krishna Nagar Union is under the administrative jurisdiction of Faridpur sadar Upazilla in Faridpur district has an area of 41.94 km². Total number of population of this union is 39142. Literacy rate of this union is 44.46%. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



Map 9.1: Krishna Nagar Union

9.2 Spatial Aspects

Social mapping is useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist of planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can helpful to select intervention in order to minimize or reduce the problems.

[illegible]

1. Communication
2. Water logging
3. Early marriage
4. Electricity
5. Health service
6. Sanitation
7. Pure drinking water
8. Poverty
9. Educational infrastructure
10. Irrigation

9.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Education
2. Electricity
3. Health service
4. Communication
5. Law and order

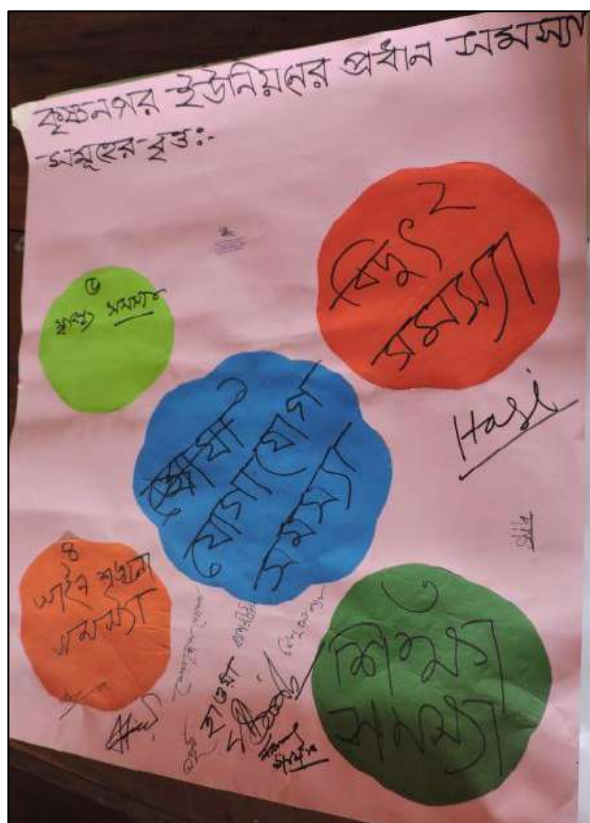


Figure 9.2: Venn diagram of Major Five Problems

9.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural land
2. Poultry
3. Cattle farming
4. Fish farming
5. Business
6. Market

7. Man power

9.3.d Potentials Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land
2. Market
3. Industry
4. River
5. Educated manpower

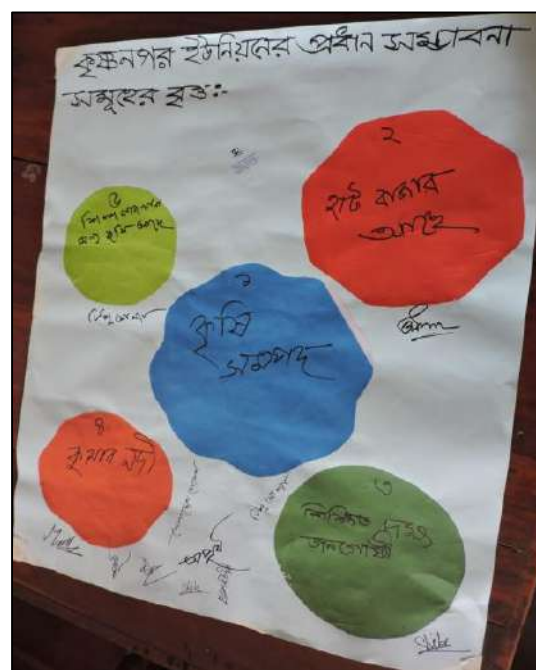


Figure 9.3: Major Five Potentials

9.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 9.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Education problem	<ul style="list-style-type: none"> Lack of budget, lack of teachers and schools 	<ul style="list-style-type: none"> unemployment and less qualified man 	<ul style="list-style-type: none"> Available space and manpower

Identified Problems	Causes	Impacts	Potentials/Probability
	<ul style="list-style-type: none"> lack of infrastructure 	power.	
2.Health	<ul style="list-style-type: none"> Allocation of insufficient budget. 	<ul style="list-style-type: none"> suffering of the local people. 	<ul style="list-style-type: none"> Available land and work force
3.Communication	<ul style="list-style-type: none"> Katcha road Allocation of insufficient budget 	<ul style="list-style-type: none"> Deficiency of other facilities. 	<ul style="list-style-type: none"> Available land and work force
4.Electricity	<ul style="list-style-type: none"> Lack of budget 	<ul style="list-style-type: none"> difficulty in irrigation and other problems. 	<ul style="list-style-type: none"> Available space and manpower
5.Law and Order	<ul style="list-style-type: none"> Lack of coordination with the local police 	<ul style="list-style-type: none"> various social problems to the people. 	<ul style="list-style-type: none"> Available manpower

9.4 Perceived Development Priorities for Krishna Nagar Union.

The recommended development priorities of Krishna Nagar Union are as follows;

Table 9.2: Development Priorities for Krishna Nagar Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Electricity Improved health service Educational development Employment opportunity Pure drinking water Village police Empowerment of local government Market Agricultural development Health service Women empowerment Reduce corruption 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Drug eradication Empowerment of local government Pure drinking water Educational development Digital union Market Employment opportunity Women empowerment Market 	<ul style="list-style-type: none"> Developed health service Electricity Agricultural development Industrialization Model union Pure drinking water Women empowerment Drug eradication Employment opportunity Model union Fire service Market

9.5 List of Participants

স্বাধীন ও গণপূর্ণ মন্ত্রণালয়
স্বাধীন উন্নয়ন অধিদপ্তর
প্রশাসনিক অর্থ ডেভেলপমেন্ট ব্রাঞ্চ (সেকশন ৩)
PRA (স্বাধীন) উপস্থিতির তালিকা

উপজেলা: **ফরিদপুর সদর**
ইউনিয়ন: **কৃষ্ণনগর ইউ.পি.**

তারিখ: **০২-০২-২০২২**
সময়: **০৯-০২-২০২২**

সং.	নাম	পদবী	ওয়ার্ড/ইউনিয়ন	মোবাইল নং.	স্বাক্ষর
১	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১নং-কৃষ্ণনগর	০১৭০০১২৬১৭	
২	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	২নং-কৃষ্ণনগর	০১৭১১২৪৫৫৩২	
৩	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৩নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৪	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৪নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৫	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৫নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৬	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৬নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৭	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৭নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৮	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৮নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
৯	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	৯নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
১০	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১০নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
১১	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১১নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
১২	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১২নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
১৩	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১৩নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	
১৪	মোঃ মিলিমা ইসলাম	সহকারী প্রোগ্রামার	১৪নং-কৃষ্ণনগর	০১৭১৩২৩৪৭২৪	

স্বাক্ষর: **মোঃ মিলিমা ইসলাম**

তারিখ: **০২-০২-২০২২**

Figure 9.4: PRA Attendance Sheet

10.0 Majh Char Union

10.1 Overview

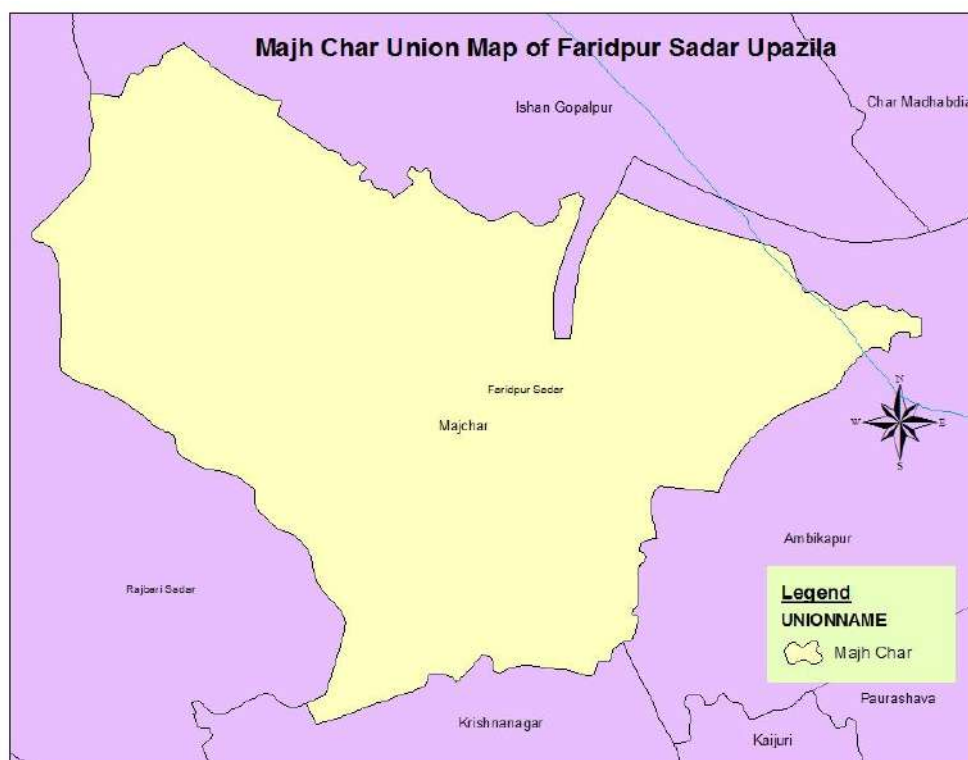
Majh Char Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 24km². Total number of population of this union is 29118. It has 14 villages. The boundary of the study area is stated below:

North: On the north side of the study area, Char Madhabdia Union is situated

West: On the west side of the study area, Krishnanagar Union is located

South: On the south side of the study area Kaijuri Union are located.

East: On the east side of the study area, Aliabad Union is located



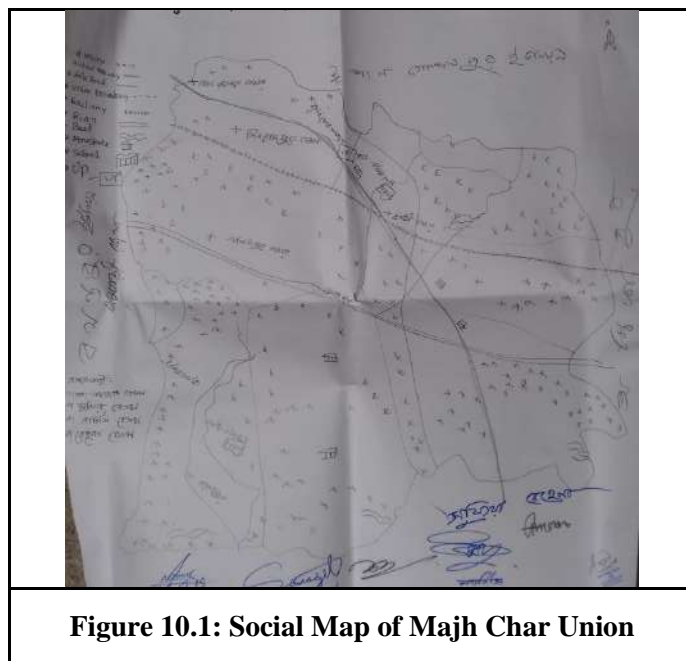
Map 10.1: Majh Char Union

10.2 Spatial Aspects

Social mapping is a useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist the planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can help to select interventions in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the Majh Char Union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked to locate

roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potentials areas (in terms agricultural land, non-agricultural land uses etc).



10.3 Major Problems and Potentials

10.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication problem
2. Health Facilities
3. Water logging
4. Educational institution lacking
5. Lack of healthy Sanitation
6. Lack of employment
7. Lack of drinking water
8. Water logging
9. Drug addiction
10. No playing field
11. No boundary for union parisad
12. No vocational training center
13. Lack of animal treatment hospital
14. No proper price of agricultural product
15. No public grave yard
16. Landless and root less people
17. No emergency shelter
18. Infrastructure

10.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Communication Problem
2. sanitation problem
3. Lack of education
4. Lack of health facility
5. Unemployment

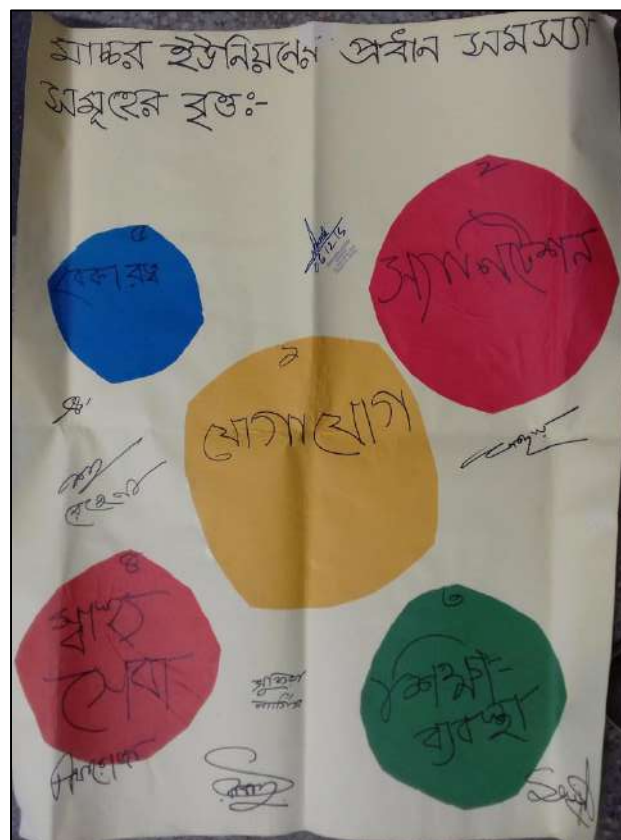


Figure 9.2: Venn diagram of Major Five Problems

10.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural Crop (onion, jute, paddy, vegetable)
2. Fruits (coconut, sugarcane, Supery)
3. Man power
4. Cottage Industry
5. Educational institute
6. Remittance
7. Fisheries pond
8. NGOs
9. Brick Industry

10. Poultry farm
11. Electricity supply centre
12. Livestock
13. Natural river
14. Local NGOs
15. Bank

10.3.d Potentials Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land
2. Fisheries
3. Industry
4. Remittance
5. Home cattle

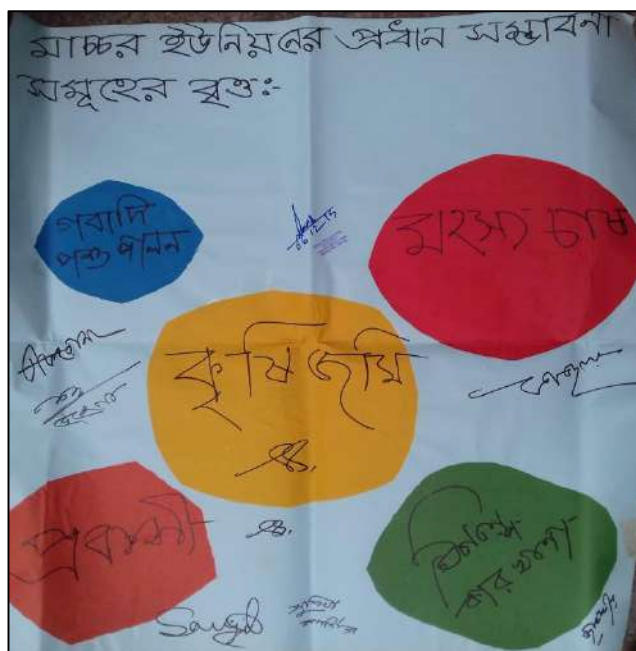


Figure 10.3: Major Five Potentials

10.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 10.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1. Lack of local Govt. empowerment	<ul style="list-style-type: none"> political influence and lack of integrated planning 	<ul style="list-style-type: none"> mismanagement of project implementation. 	<ul style="list-style-type: none"> Cooperation of Union Parishad can be strength

Identified Problems	Causes	Impacts	Potentials/Probability
2.Communication problem	<ul style="list-style-type: none"> • Due to recent flood, • broken, mud road and broken bridge • lack of Govt. importance 	<ul style="list-style-type: none"> • creation problem in transferring agricultural goods and medical treatment lacking. 	<ul style="list-style-type: none"> • local manpower and materials like sand, bamboo and wood
3.Sanitation	<ul style="list-style-type: none"> • Lack of public awareness, • govt. allocation and poverty. 	<ul style="list-style-type: none"> • different type of disease 	<ul style="list-style-type: none"> • Tax collection and local land tax
4.Lacking in education system	<ul style="list-style-type: none"> • Lack of quality education, • qualified teacher, • frequent natural disaster, • incompatibility in teacher student 	<ul style="list-style-type: none"> • education level among the students are decreasing day by day. 	<ul style="list-style-type: none"> • 17 primary schools, 2 high schools, 6 madrasas can be potential factor
5.Unemployment	<ul style="list-style-type: none"> • Lack of local industry, • agricultural land and proper education, • 	<ul style="list-style-type: none"> • local young generation are facing frustration, drug, family relationship degradation and insecurity. 	<ul style="list-style-type: none"> • Local 50 MW electricity supply center can be used for industrial attraction to create local employment.
6.Health problem	<ul style="list-style-type: none"> • Lack of hospital and qualified doctor in local level, • proper treatment 	<ul style="list-style-type: none"> • People has to go a long way to meet their demands and its very costly. 	<ul style="list-style-type: none"> • A FWC clinic in local level can be a potential to mobilize treatment practice.

10.4 Perceived Development Priorities for Majh Char Union.

The recommended development priorities of Majh Char Union are as follows;

Table 10.2: Development Priorities for Majh Char Union

Short term	Midterm	Long term
<ul style="list-style-type: none"> • Communicational development • Improved drainage • Educational development • Water supply • Electricity Model Union • Drug eradication • Empowerment of local government • Market • Agricultural development • Improved health service 	<ul style="list-style-type: none"> • Development in communication • Agricultural development • Employment • Sanitation • Quality education • Better treatment • Local govt. empowerment • Model union • Food management • Improved drainage 	<ul style="list-style-type: none"> • Better communication • Agricultural development • Improved drainage • Model union

10.5 List of Participants

প্ৰায়ম ৩ পদকৃত মন্তব্য
নগর উন্নয়ন আঁকিওঁ
প্ৰিমাৰেশ্যন অফ ডেভেলপমেন্ট প্লান (প্যাকেজ ৩)
PRA মেম্বাৰ উল্লিখিত তালিকা
উপায়ত: ফাৰিদপুৰ সদাৰ তারিখ: ০৬.১২.২০২০
ইউনিয়ন: ফাৰিদপুৰ সময়: ১০.০০ ঘণ্টা
সভা: প্ৰিমাৰেশ্যন অফ ডেভেলপমেন্ট প্লান

ক্ৰ.	নাম	পদবী	ওতা/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
০১	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
০২	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
০৩	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
০৪	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
০৫	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
০৬	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
০৭	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
০৮	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
০৯	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
১০	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
১১	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
১২	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ
১৩	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
১৪	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ

উপায়ত: ফাৰিদপুৰ সদাৰ তারিখ: ০৬.১২.২০২০
ইউনিয়ন: ফাৰিদপুৰ সময়: ১০.০০ ঘণ্টা
সভা: প্ৰিমাৰেশ্যন অফ ডেভেলপমেন্ট প্লান

ক্ৰ.	নাম	পদবী	ওতা/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
১৫	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭২৬৩১০১৭	মিঃ
১৬	মিঃ মোঃ মাহমুদ হোসেন	উপায়ত	ফাৰিদপুৰ	০১৭১৮-৭৫৭৭৭৭	মিঃ

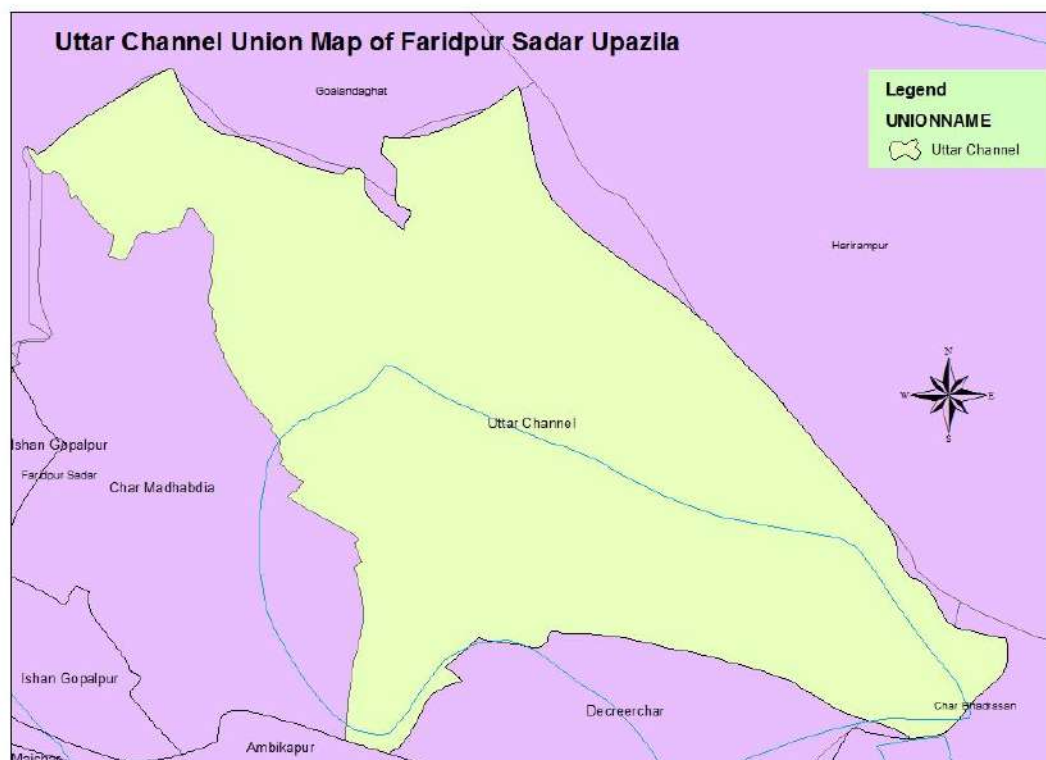
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Figure 10.4: PRA Attendance Sheet

11.0 North Channel Union

11.1 Overview

North channel Union is under the administrative jurisdiction of Faridpur Sadar Upazila in Faridpur district has an area of 14.07km². Total number of population of this union is 34814. Total village number is 75.



Map 11.1: North Channel Union

10.2 Spatial Aspects

Social mapping is a useful PRA tool which is helpful in knowing the Spatial Aspects of the target area that can assist the planning team in decision making for future planning. It is also helpful to identify different problems and resources in the area through map exercising that can help to select intervention in order to minimize or reduce the problems.

The Facilitator has selected two persons who were assigned to work on social mapping of the North channel union by one group and another group found out the causes and effects, related potentials for solving problems. Then the participants were asked to locate roads, settlements, institutions and also problem areas (in terms of flood zone, water logging area, char areas, or any other risk zone etc) and potential areas (in terms of agricultural land, non-agricultural land uses etc).

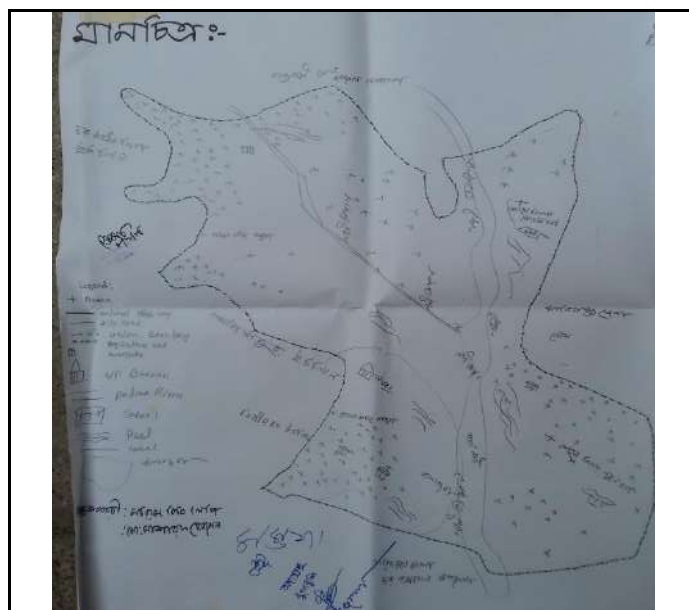


Figure 11.1: Social Map of North channel Union

11.3 Major Problems and Potentials

11.3.a Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

1. Communication problem
2. Health Facilities
3. River bank erosion
4. Educational institution lacking
5. Lack of healthy Sanitation
6. Lack of employment
7. Lack of drinking water
8. Water logging
9. Drug addiction
10. Lack of agricultural instrument
11. No boundary for union parisad
12. No vocational training center
13. No public grave yard
14. Landless and root less people
15. No cold storage
16. Low wage of local Imam
17. Allowance of local Chairman and members are very low
18. No boundary wall of union parsad
19. No soil test
20. Drought

11.3.b Problems Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major problems as priority basis. The five major problems are as follows;

1. Unemployment
2. Lack of education
3. Communication Problem
4. Lack of health facility
5. Sanitation problem

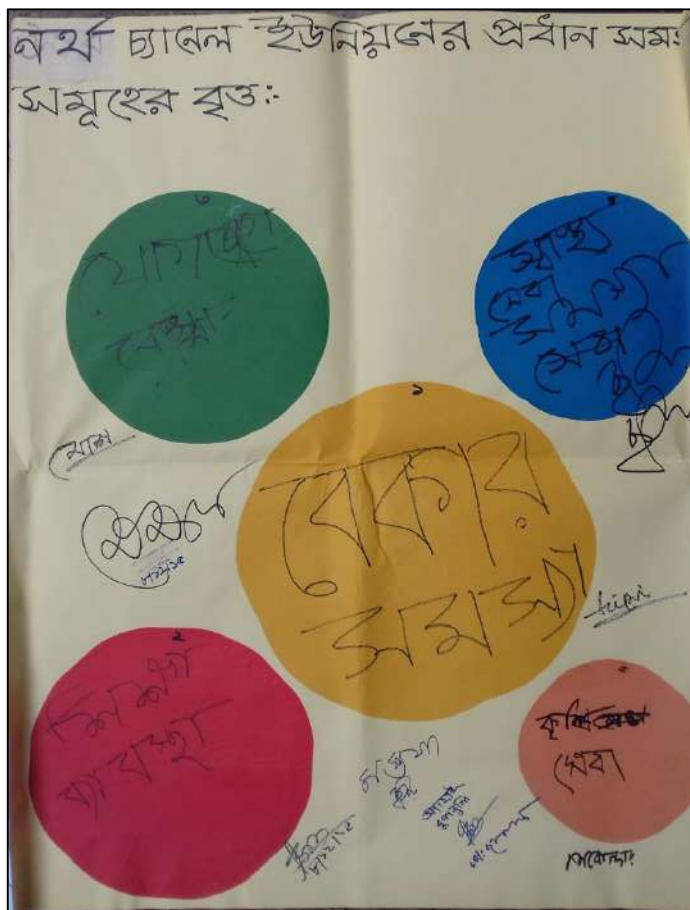


Figure 11.2: Venn diagram of Major Five Problems

11.3.c Identification of Potentials through Venn Diagram

After identification of problems with prioritization, the next step is to identify the potentials of the respective area which may be used as resources during planning. The potentials are as follows;

1. Agricultural Crop (onion, jute, paddy, vegetable)
2. Educational institute
3. Remittance
4. Home based dairy farm
5. Electricity supply center
6. Livestock
7. Natural river (pondi)
8. Local market
9. Lots of open space
10. Man power for agriculture

11.3.d Potentials Prioritization through Venn Diagram

After a long discussion, the participants have come to the consensus to identify the 5 major potentials as priority basis. The five major potentials are as follows;

1. Agricultural land
2. Sand
3. Fisheries
4. Remittance
5. Home cattle



Figure 11.3: Major Five Potentials

11.3.e Identification of Prioritized Problems, Cause, Effect/Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify the causes and effect/impact of problems and potentials in the area. The problems, causes, impact and potentials are furnished in the following table;

Table 11.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impacts	Potentials/Probability
1.Lack of local Govt. Empowerment	<ul style="list-style-type: none"> Political influence and Lack of integrated planning 	<ul style="list-style-type: none"> Mismanagement of project implementation. 	<ul style="list-style-type: none"> Cooperation of Union Parishad can be strength
2.Unemployment problem	<ul style="list-style-type: none"> Lack of vocational education system, Industrialization, economic 	<ul style="list-style-type: none"> Young generation are being motivated to drug, poverty, 	<ul style="list-style-type: none"> Local vacant agricultural land, river, ability to

	depression <ul style="list-style-type: none"> Budget distribution 	theft, and monarchy..	work and number of unemployed person
3.Communication problem	<ul style="list-style-type: none"> Due to recent flood, broken, mud road and broken bridge Lack of Govt. Importance. 	<ul style="list-style-type: none"> Transferring agricultural goods and medical treatment lacking 	<ul style="list-style-type: none"> Local manpower and materials like sand, bamboo and wood
4.Lacking in education system	<ul style="list-style-type: none"> Lack of quality education, qualified teacher, Frequent natural disaster, incompatibility in teacher student ration 	<ul style="list-style-type: none"> Education level among the students are decreasing day by day. 	<ul style="list-style-type: none"> 17 primary schools, 2 high schools, 6 madrasas can be potential factor
5.Health problem	<ul style="list-style-type: none"> Lack of hospital Qualified doctor in local level 	<ul style="list-style-type: none"> People has to go a long way to meet their demands and its very costly 	<ul style="list-style-type: none"> A FWC clinic in local level can be a potential to mobilize treatment practice.
6.Lack of agricultural service	<ul style="list-style-type: none"> Due to proper intervention in agriculture by Govt., Lack of budget Vacancy in agriculture post 	<ul style="list-style-type: none"> Farmers are hampered. 	<ul style="list-style-type: none"> There is large area in chor and lots of farmer as a potentiality

11.4 Perceived Development Priorities for North channelUnion.

The recommended development priorities of North channelUnion are as follows;

Table 9.2: Development Priorities for North channelUnion

Short term	Midterm	Long term
<ul style="list-style-type: none"> Communicational development Improved drainage Educational development Water supply Improving allowance Model Union Drug eradication Fisheries development Market River Dam development 	<ul style="list-style-type: none"> Industrial development Employment Dairy farm development Model union Electricity communication Education Health service 	<ul style="list-style-type: none"> Better communication Disaster protection Improved drainage Model union Industry

11.5 List of Participants

<p>পৃষ্ঠা নং ৩ পঞ্চম স্তরের সভাপতি</p> <p>পঞ্চম স্তরের সভাপতি</p> <p>প্রশাসনিক অর্থ ডেপুটি সেক্রেটারি (পারদেহ ৩)</p> <p>PRA (পঞ্চম স্তরের উপস্থিতি) তালিকা</p> <p>উপস্থিতি: ২০২২-২৩-২৪</p> <p>উপস্থিতি: ২০২২-২৩-২৪</p> <p>তারিখ: ০৮/১২/২০২০</p> <p>সময়: ১২:০০</p>					
ক্র.	নাম	পদবী	এলাকা/ইউনিয়ন	মোবাইল নং	স্বাক্ষর
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১৩	মোঃ মোস্তাফিজুর রহমান	মোঃ মোস্তাফিজুর রহমান	মোঃ মোস্তাফিজুর রহমান	০১৮২ ৬৪৬২২৯	মোঃ মোস্তাফিজুর রহমান
১৪	মোঃ মোস্তাফিজুর রহমান	মোঃ মোস্তাফিজুর রহমান	মোঃ মোস্তাফিজুর রহমান	০১৮২ ৬৪৬২২৯	মোঃ মোস্তাফিজুর রহমান

Figure 11.4: PRA Attendance Sheet

LIST OF ABBREVIATIONS/ACRONYMS

PRA	Participatory Rapid Appraisal
REB	Rural Electrification Board
BBS	Bangladesh Bureau of Statistics
CBOs	Community Based Organizations
CSOs	Civil Society Organizations
GoB	Government of Bangladesh
GIS	Geographic Information System
ToP	Technology of Participation
ToR	Terms of Reference
UP	Union Parishad
UDD	Urban Development Directorate

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Executive Summary

This report aims to explore the socioeconomic condition of Faridpur Sadar upazila, Faridpur. Socio-economic survey tools provide a means of improving understanding of local resource management systems, resource use and the relative importance of resources for households and villages. Faridpur Sadar, the upazila also shows high potentialities of entering in “Demographic Bonus” window soon. Like others area of Bangladesh, middle income people also lives in high percentage. These people are attracted to the urban facilities of urban portion of this upazila, which leads them to make new settlement here. Consequently, the land price is also rising in Faridpur Upazila. People of Both of rural and urban area are satisfied with the water quality, sanitation, retail market location, fire service station, and recreational facilities etc. which are some of the basic needs of living a healthy life. On the other hand, there are poor maintenance found in roads. But the alarming is about this upazila’s education quality. It is deteriorating day by day because of lack enough qualified educational institutions. Moreover, there are not enough provision for maternal and child health. So necessary steps should be taken by concerned authorities regarding these problems.

Chapter 1: Introduction

1.1 Background

This report aims to collate a full scope of societal and economic indexes in one location, and, through the report, present a wide perspective of socioeconomic conditions of Faridpur Sadar upazilas, Faridpur. The purpose of the present report is to:

1. Broaden the access to the information held in the database through publication of the most recent data gathered; and
2. Provide readers with up-to-date information on short term changes in socio-economic conditions in the occupied Faridpur Sadar upazila, Faridpur.

Socioeconomic indicators are an important ingredient for knowing an area's socio-economic conditions. Here the phenomena that lie at the convergence of the societal and economic areas of society are being examined. Moreover, while planning an area there is a need for information about the degree of socio-economic development, the population's quality of life (urban, rural, etc.), local problems, and the distinctive of people's economic behavior. The main source of such information is an intricate and comprehensive social research. Studies are aimed towards the analysis of complicated social processes in an area and examine the spectrum of problems concerning changes in societal construction and the constellation of social awareness. It includes family structure, satisfaction with living conditions, housing and communal services, assessment of educational service quality (public schools, vocational training, higher education), quality of medical services etc.

1.2 Location and Background of the Project Area

Faridpur Sadar is an Upazila of Faridpur District in the Division of Dhaka, Bangladesh. The upazila is located in between 23°29' and 23° 34' north latitudes and between 89° 43' and 89° 56' east longitudes. Faridpur Sadar Upazila (Faridpur district) with an area 412.86 sq.km is bounded on the north by Goalanda upazila of Rajbari zilla and Shibalaya and Harirampur upazilas of Manikganj zila, east by Harirampur upazila of Manikganj zila and Char Bhadrassan upazila, south by Nagarkanda, Saltha and Boalmari upazilas and west by Rajbari Sadar of Rajbari zila and Madhukhali upazila. The upazila consists of 1 paurashava, 9 wards, 41 mahallas, 11 unions, 157 populated mauzas and 342 villages (BBS, 2011).

1.3 Importance in the Regional Context

Faridpur Sadar, the largest upazila of Faridpur in respect of area and population, came into existence as a thana in 1896 and was upgraded to upazila in 1984. It is learnt that there lived a renowned pious saint named **Shah Farid** in this locality. He was buried in the present place of Faridpur town after his death. It is generally believed that the upazila might have derived its name. Faridpur from the name of that great saint **Shah Farid**.

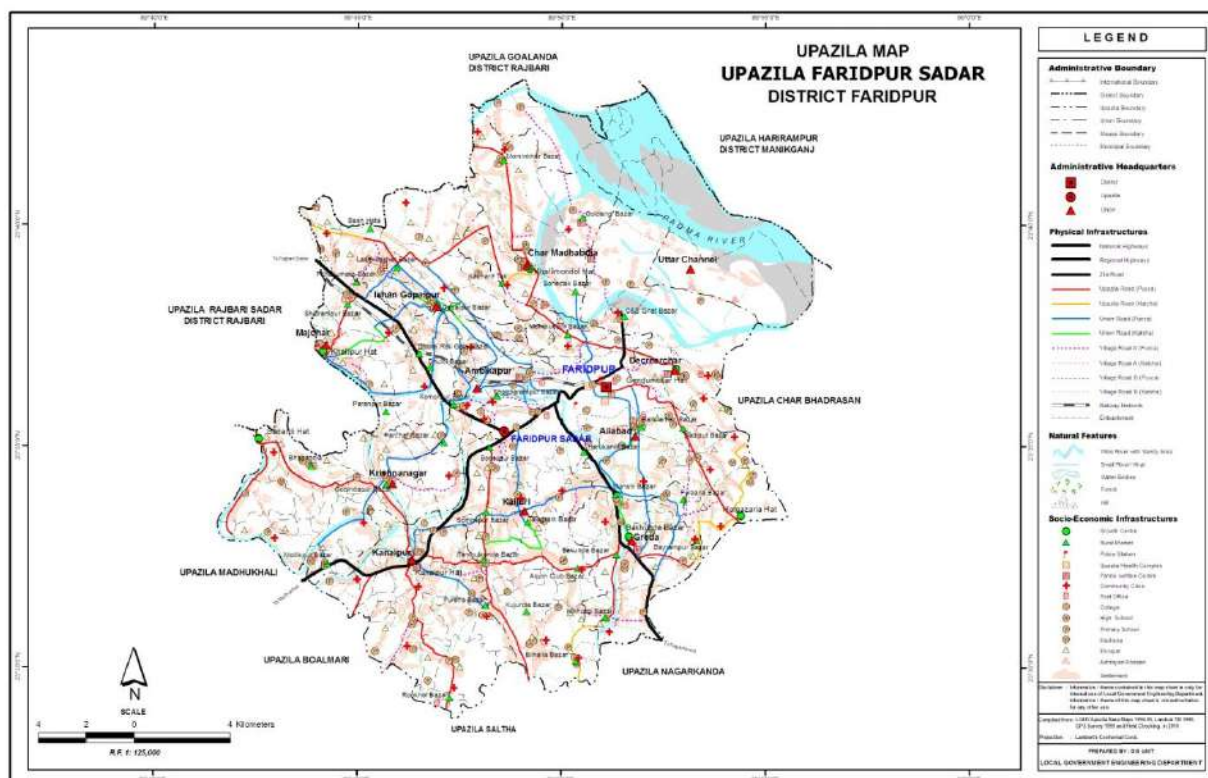


Figure 1.1 Upazila Map, Faridpur Sadar, Faridpur (Source: LGED, 2016)

1.4 Social Information

According to BBS (2011), there are total 103,535 households at this Upazila. According to this report about 342 villages of this upazila are now under rural electrification, and the number is increasing. Total number of population is 469,410 where the number of male is about 235,762 and number of female is 233,648. Density of this area is about 1137 per sq. km. It has about 503 mosque, 143 mandir and 4 Church. There are also 9 growth centre, 41 hat-bazar, 489 Poultry farm, 872 Dairy farm, 36 Brick kiln, 26 post office, 100 government primary school, 35 community primary school, 75 junior high school, 13 madrasa, and 16 colleges. About 55.8% of this upazila's total population is literate. The percentage is slightly higher among male than female. The upazila is 14 km (by road) far from District Headquarter. It also has 4106 ponds and 3 rivers flowed including Padma and Meghna. There are 15 filing station, 3 police station and no camps. The upazila has 516 bridge/culvert, 249 km of metalled road, 8129.00 km of semi metalled road and 383 km of unmetalled road etc. There are also 21 clinic are located in this upazila.

Chapter 2: Approach and Methodology

2.1 Study Objective (s) and Specific Objectives

The broad objective of this report was to map the socio-economic condition of Faridpur Sadar Upazila, Faridpur.

Specific objectives: The specific objectives of this report were:

- To assess the social services and infrastructures situation of Faridpur Sadar Upazila.
- To seek information about the livelihood sources, income ratio, expenditure, investments and savings of the inhabitants of the Upazila.
- To identify the basic needs of the area with intensive participatory practices and to suggest some concrete recommendations for development of this Upazila.

2.2 Scope of Work

1. Preparation of five tiers Development Plan such as Sub Regional Plan, Structure Plan, Urban Area Plan, Rural Area Plan and Action Area Plan.
2. Preparation of Land Use Plan, Traffic and Transportation Management Plan, Drainage and Environmental Plan, Disaster Management Plan, Urban and Rural Area Plan and Action Plans for the project area.

2.3 Sampling

Three criteria usually will need to be specified to determine the appropriate sample size: the level of precision, the level of confidence or risk, and the degree of variability. The determination of sample size for this project is concerned with the following issues under the assumption that the characteristic of the population for Urban and Rural belongs to different homogenous group.

- The definition of the population;
- The creation of sampling frame;
- The choice of Probability versus Non-probability sampling;
- The calculation of sample size.

The definition of the population: Households of the project area are considered as the statistical population. The rural populations are more homogeneous. For Faridpur Sadar Upazila total household number is 103,535. Whereas 75,961 are rural and 27574 are Urban (BBS, 2011).

The creation of sampling frame: The standard rule for sampling frame has been followed based on SRS (Simple Random Sampling).

The choice of Probability versus Non-probability sampling: Probability sampling has been followed.

The calculation of sample size: To determine the minimum sample size the following

formula has been followed: $n = \frac{z^2}{d^2} pq$

Where,

$n = \text{Sample size}$,

$z = \text{Statistical certainty chosen}$,

$p = \text{Coverage rate/estimated prevalence}$,

$q = 1 - p$ and

$d = \text{precision desired} : 0.05$

So, using 95% confidence interval and $\pm 3\%$ precision level total no of surveys are calculated. Distribution of sample for Faridpur Sadar Upazila is given below:

Sl. No	Urban	Rural	Total Sample
1	232	958	1190

Then, they used stratified sampling technique under probability sampling technique to collect questionnaire based primary data for socioeconomic analysis. The stratified sampling technique is further used for collecting samples from all the sub zones such as wards and unions of this Upazila. For each union, then random sampling technique is used to select the households for survey using Microsoft excel.

2.4 Tools Development

The Survey tool was developed following the below steps. (1) Literature Review (2) Collection of Upazila Map (3) Find out sectors, indicators and variables (4) Preliminary questionnaire develop and share with Team leader as well as Project Management Office (5) Pretesting at field level (6) Questionnaire Finalization

2.4.1 Preparation of Questionnaire

In order to conduct the survey, a compact and extensive pre-coded structured questionnaire (please see Annexure-01) has been prepared for all the packages and it has been approved by the authority of Urban Development Directorate (UDD). The questionnaire has intended to capture information (see Table 2.3) according to the provided format in the TOR. Socioeconomic survey outputs represent the overall social, religious and economic condition of the Upazila.

Table 2.1: Socioeconomic Survey Format as per TOR

Item	Illustrated
Demographic Information	Age, sex, growth rate, household size, migration etc.
Family Size	Number of households, number of family members
Age, Religious Group	Age specific group, religious status
Economic Status	Primary, secondary, higher and others
Occupational Pattern	Government, private, formal, informal and others
Income Level	Lower, medium and higher (Income Range)
Ownership Pattern	Land ownership information, transfer procedures etc.
Land Value	Low land, ditch land, built-up land, buildable land etc.
Health Facilities	Type of facilities in hospital, private clinic and dispensary etc.
Recreation Facilities	Active and passive, type of facilities (Active, Passive)

2.4.2 Pre-testing

The questionnaires were pretested in urban and rural areas with participation of survey team (Survey supervisors, Enumerators) and members of Project management team. Then the survey team discussed about the field level problem with the socio-economic expert, Team leader and Project Management team for finalization of Questionnaire format.

2.4.3 Training of Enumerators and Survey Supervisors

ECAL, Dhaka considered the experience of working in similar types of survey functions and educational qualifications for selection in the socioeconomic survey team. Considering these issues, a survey team of 28 members were selected for carrying out socioeconomic survey work at Faridpur Sadar Upazila (see Annure-02). An arrangement has also been made to provide orientation and training to the survey team by the Team Leader (TL). After orientation and training at the headquarters of ECAL, Dhaka, the survey team has been sent to the field.

2.5 Survey Team Mobilization

The survey started in 12.08.2015 and the total survey is taken about 30 days from that date.

2.6 Quality Control Measures

To ensure quality of data, a number of validation checks were conducted during data collection period:

- The survey supervisor went back to the respondent as well as talked over mobile phone number for validate or accurate the collected data by enumerator.
- After data collection, had been completed, 5% household was randomly chosen, and then the supervisors went to the field for further investigation. If any inconsistencies were found, then the supervisors discussed the issue with the enumerators.

- (c) Project Manager from Project Management Office as well as Socio-economic expert had been checked randomly for quality of collected data.

2.7 Database Preparation and Processing

After completing the survey works in the field (Annexure 2), a detail database has been prepared to follow the survey questionnaire. The database has been prepared by using SPSS 20 software. To make the data input process easier, coding system has been used in the necessary field. Few data have been stored in MS Excel software. 3 micro computers are exclusively used for data entry. SPSS 20 software is used for all data management that has been collected from the field. In this chapter, socioeconomic survey data have been presented into three forms/styles viz. tabular form, geographical and textual/report form.

2.8 Limitation of the Study

Socio-economic Questionnaire Survey is comparatively costly and time consuming. Ideally, to conduct face to face questionnaire survey, enumerators and supervisors are required. Training of enumerators and supervisors is essential. Questionnaire surveys generally cannot provide strong evidence of cause and effect. Because collected data of surveys on status and perceptions of community people of various socio economic features at the same time. It is very difficult to prove that the reputed risk factor actually causes the problem.

Other constraints to using surveys to gather data:

- The lack of time to carry out the survey format.
- While a survey provides us with quantitative and qualitative data offering insight to various socio economic features; it will not produce the kind of data needed to create a full picture of the state of socio economic profile of a certain area.
- Respondents may not feel encouraged to provide accurate, honest answers
- Respondents may not feel comfortable providing answers that present themselves in an unfavorable manner.
- Respondents may not be fully aware of their reasons for any given answer because of lack of memory on the subject.
- Surveys with closed-ended questions may have a lower validity rate than other question types.
- Data errors due to question non-responses may exist. The number of respondents who choose to respond to a survey question may be different from those who chose not to respond, thus creating bias.
- Survey question answer options could lead to unclear data because certain answer options may be interpreted differently by respondents. For example, the answer option “somewhat agree” may represent different things to different subjects, and have its own meaning to each individual respondent. ‘Yes’ or ‘no’ answer options can also be problematic. Respondents may answer “no” if the option “only once” is not available.
- Customized surveys can run the risk of containing certain types of errors

Chapter 3: Study Findings

3.1 Age Sex Structure of Household Members

In the surveys, the percentage of male and female was about the same both in rural and urban area. But in urban area female ratio was little bit higher. (please see figure 3.1)

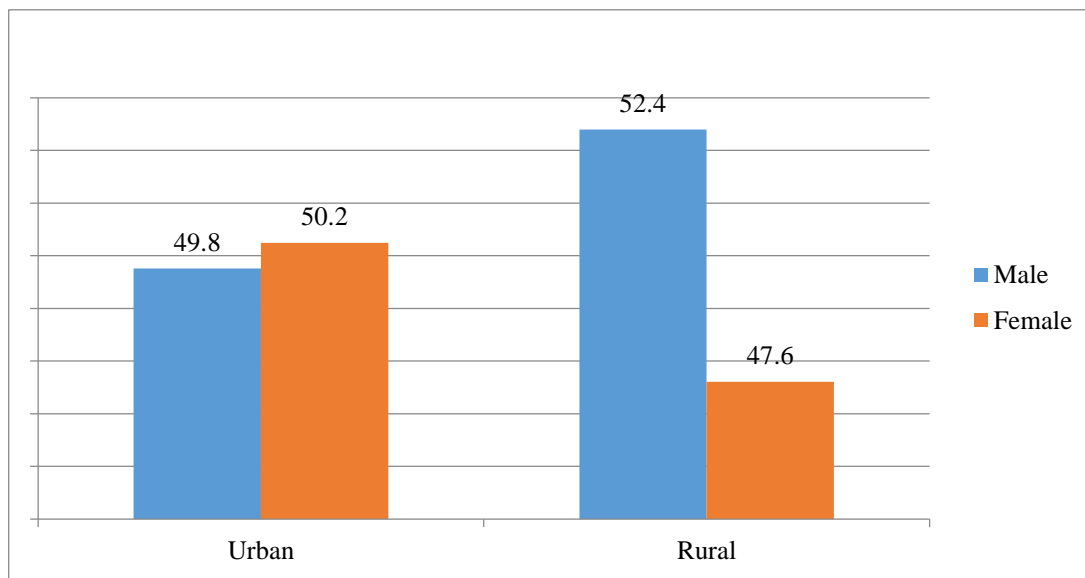


Figure 3.1: Male-Female Ratio (Source: Field Survey, 2015)

In addition, from the below age-sex pyramid, it has been seen that in urban area 97% female respondents were from 18-59 years' range, whereas about 88% of male were between 18 to 59 years (please see figure 3.2)

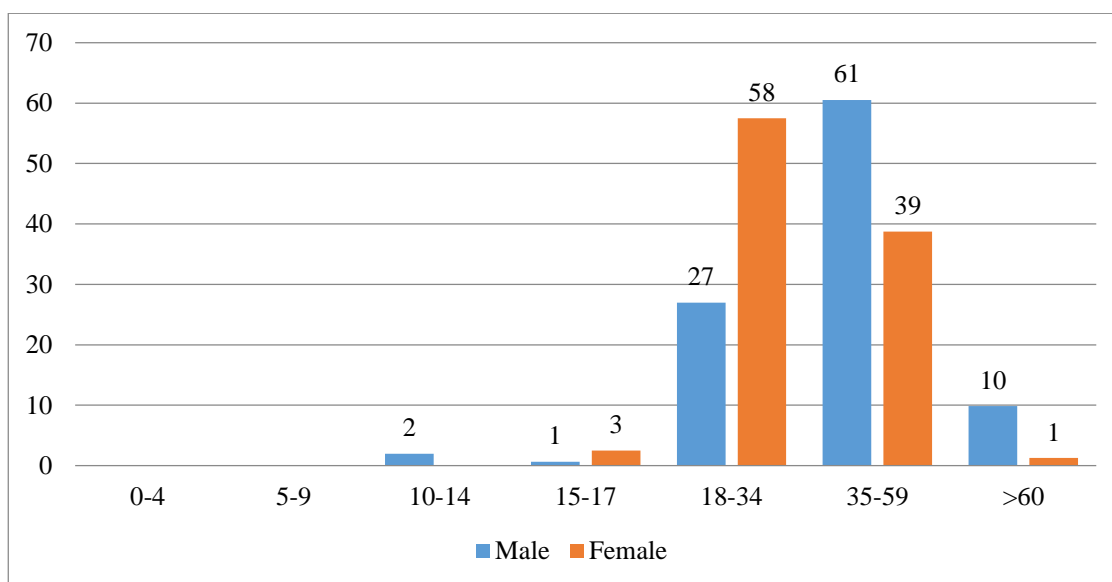


Figure 3.2: Age-sex comparison of Urban Population (Source: Field Survey, 2015)

Figure 3.3 represents the age-sex comparison of rural respondents of the upazila.

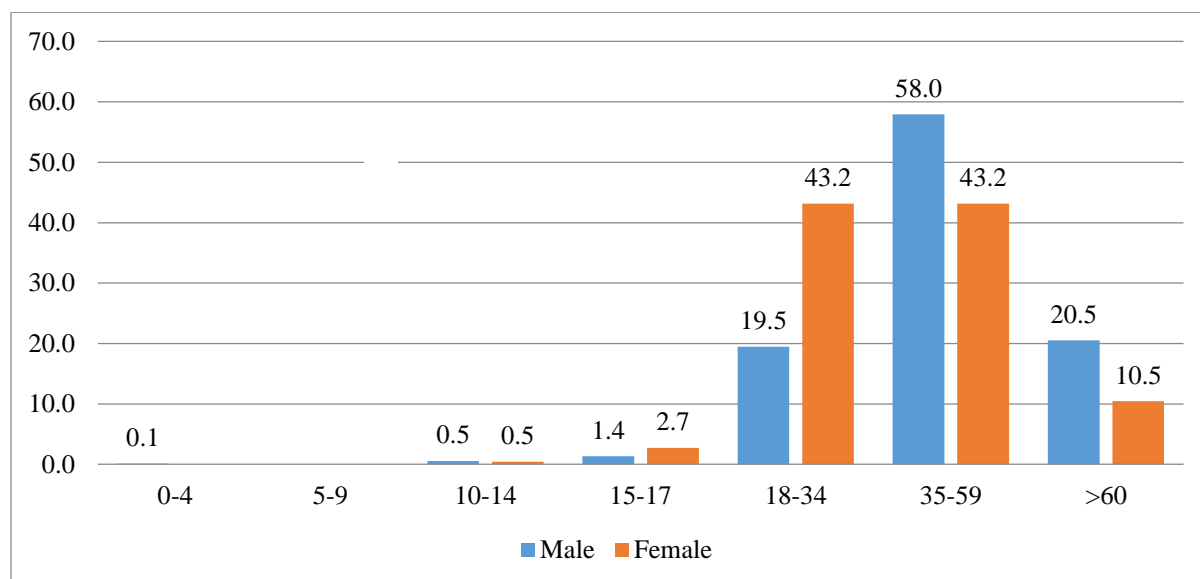


Figure 3.3: Age-sex comparison of Rural Population (Source: Field Survey, 2015)

When the respondents are categorized into different ages, it has been seen that, more than two third of total respondents are between 18-59 age group irrespective of their sex which indicates that the upazila might have been entered into the window of ‘Demographic Bonus’ in the coming years. Moreover, among senior citizen group male percentage is found higher than female. Again, the age sex pyramid of urban and rural area also represents almost the same condition. From the above figures, it could be easily anticipated that in the coming years people from age group 0-13 of both rural and urban area would be shifted into age group 14+ which would be resulted into to bring about opportunities for the upazila to enter into the window of ‘Demographic Bonus’.

3.2 Marital Status

It has been found in this upazila most of the respondents are either single or married irrespective of rural or urban area. Among them the percentage of marital status “single” is slightly lower in rural area than urban area. Apart from these about more than 90% of total respondents were married (Please see figure 3.4)

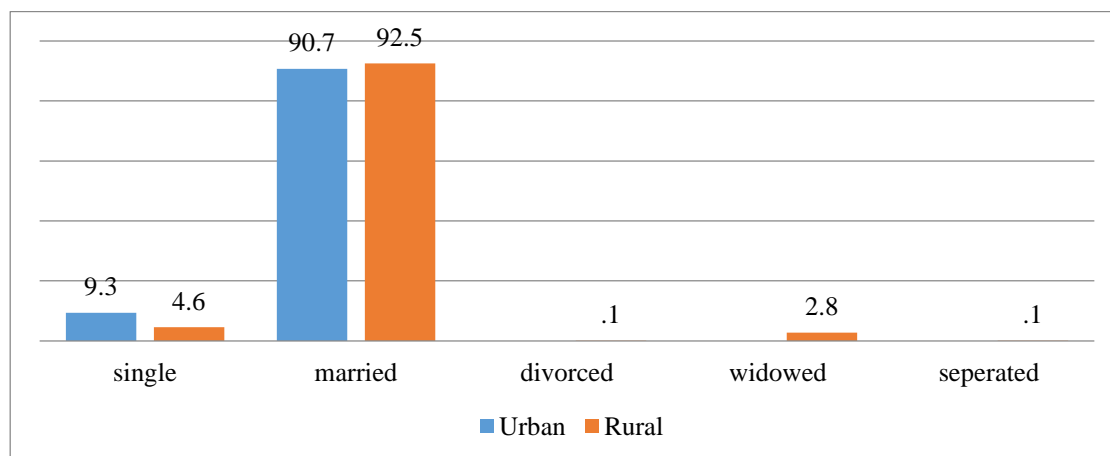


Figure 3.4: Marital Status (Source: Field Survey, 2015)

3.3 Level of Education

In this upazila it has been found that irrespective of rural or urban area about 22.5% of the respondents are below the primary level of education. In rural area, maximum respondents (about 31.5%) have completed their primary education. The percentage who completed their SSC/HSC/Degree level of education is always found as higher in urban area than rural area. So, it can be anticipated that people from urban area is more attached with higher education than in rural area. As about half of the total rural population are from below primary school level, some initiatives should be taken to increase the percentages.

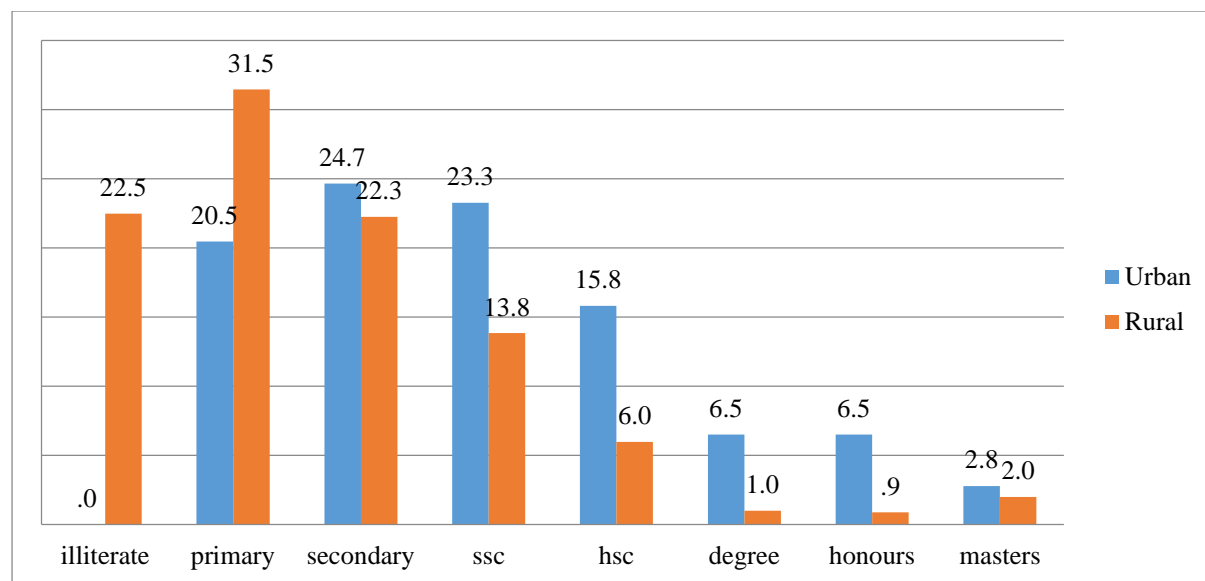


Figure 3.5: Level of Education (Source: Field Survey, 2015)

3.4 Types of Occupation

In this upazila, it has been found that both in urban and rural area, people are attached with agricultural based economy. Thus, this area is mainly agrarian based economy. Moreover, about one-third of total urban population is engaged with either daily labor or business. On the other hand, most of the respondents of rural area are engaged in non-govt jobs or business.

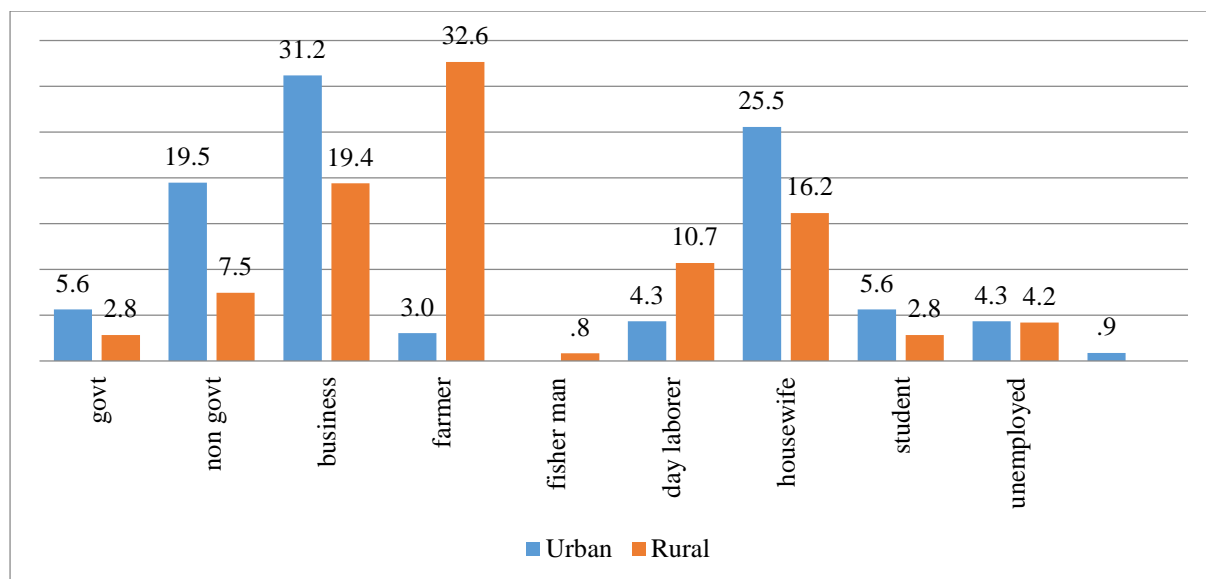


Figure 3.6: Types of Occupation in Both of Urban and Rural Area (Source: Field Survey, 2015)

The relations also have been studied between education level and occupation pattern in urban area. It has been found that people who are have completed the primary level of education mostly (about half) engaged in labor types of jobs or business of work. Respondents who started their higher school but did not complete SSC has been found as remaining in the about same types of occupations.

Table 3.1: Education and Occupation Pattern in Urban Area (In Percentage)

	Primary	Secondary	Ssc	Hsc	Degree	Honours
Govt	2	2	2	6	14	36
Non Govt	7	23	20	29	36	36
Business	36	26	34	35	29	14
Farmer	5	2	2	0	0	0
Day Laborer	11	4	2	0	0	0
Housewife	32	38	28	12	7	0
Student	0	2	6	15	14	14
Unemployed	5	4	6	0	0	0
Others	2	0	0	3	0	0
Total	100.00	100.00	100.00	100.00	100.00	100.00

(Source: Field Survey, 2015)

On the other hand, respondents who completed HSC, about half of them started to enter in Non-govt jobs or started their own business. Respondents from above HSC level started to engage in Government and Non-government jobs. They also involve in their own business too.

On the other hand, in the rural area, respondents who have masters and degree certificate most of them are engaged in expanding their business. Very few people about 1% involved in government job. Respondents who completed honors level of education about 80% of them are found as worked in their own business. Like in urban area, the percentage of engaging in Non-government jobs also increased in rural area for those who completed their education

level above honours. Respondents from below primary level of education most of them worked as farmer and fisherman. A significant number of respondents (about 45%) also remain unemployed after completing HSC and honours. The percentage of engaging in small entrepreneurship in rural is almost same as urban area.

Table 3.2: Education and Occupation Pattern in Rural Area

	Illiterate	Primary	Secondary	Ssc	Hsc	Degree	Honours	masters
Govt	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Non Govt	0.50	0.71	2.00	5.60	11.11	0.00	25.00	27.78
Business	0.99	3.89	4.50	16.00	18.52	44.44	25.00	55.56
Farmer	10.89	12.01	30.00	30.40	38.89	44.44	0.00	5.56
Fisher Man	45.05	44.88	27.00	12.00	7.41	0.00	12.50	0.00
Day Laborer	1.98	0.71	0.50	0.00	0.00	0.00	0.00	0.00
Housewife	13.37	17.31	7.50	4.00	0.00	0.00	0.00	0.00
Student	18.32	11.66	22.00	13.60	3.70	11.11	12.50	5.56
Unemployed	0.00	0.71	2.50	4.80	20.37	0.00	25.00	5.56
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100

(Source: Field Survey, 2015)

3.5 Monthly Income and Expenditure of Households

3.5.1 Income Status

Both in rural area about half of total respondents' income source is found as agriculture. In urban area about 50% respondents' income source were found as business. Therefore, in urban area about 88% respondents were either engaged with job or business. Whereas in rural area income from foreign remittance percentage is found slightly higher (5.3%) than urban area.

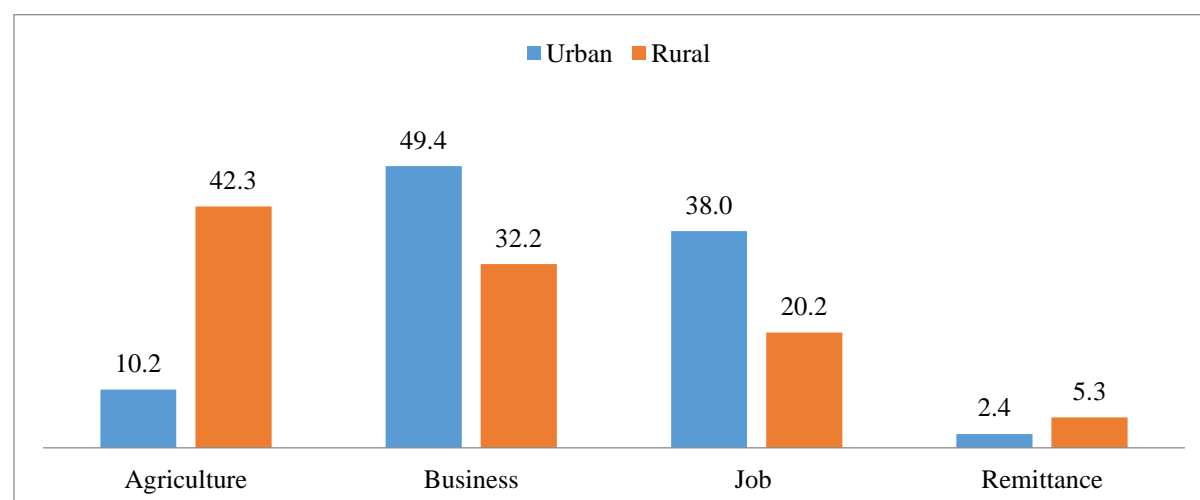


Figure 3.7: Income Source, note: Multiple Response Counted (Source: Field Survey, 2015)

Again, from the below figure it has been seen that the highest percentage of rural people's (about more than 80%) income is within BDT 20000. On the other hand, About half of urban people's income is between BDT 10000 and 20000. About 14% of total urban respondents' income range is more than BDT 30000. Even one forth of urban population earn less than BDT 10000. Thus, it has been observed that, monthly income is about same irrespective of rural or urban area.

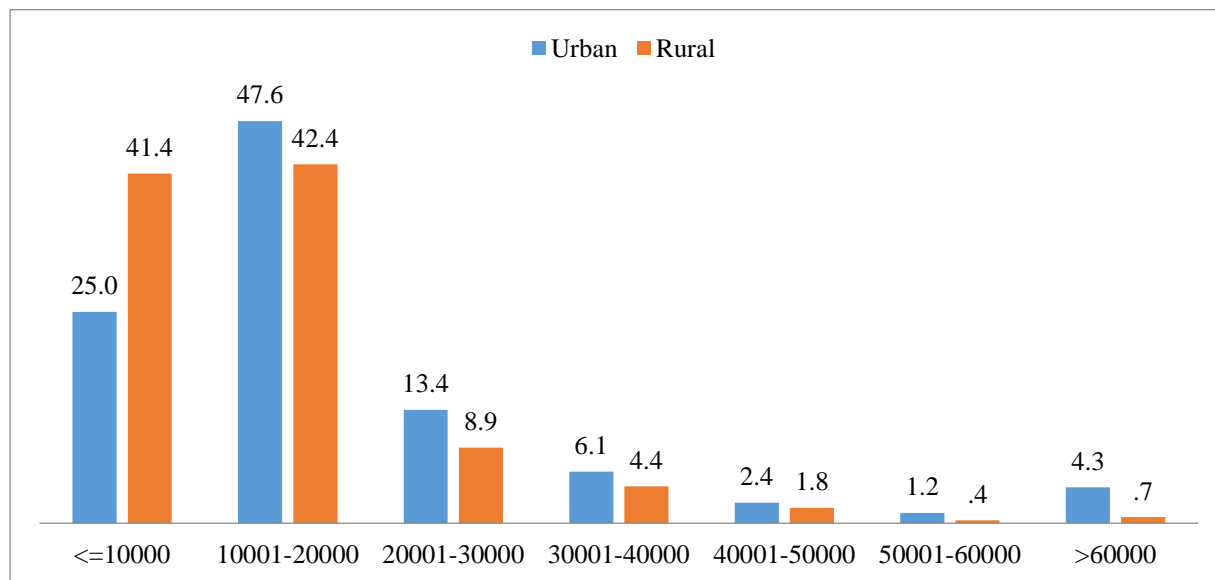


Figure 3.8: Monthly Income (Source: Field Survey, 2015)

3.5.2 Monthly Expenditure

The percentage of households who has expenditure below BDT 10000, is found higher rural area than urban area. But expenditure of urban population is higher than that of rural area within BDT 10000 and BDT 20000. About 90% of total households have the expenditure below BDT 20000. Thus, the expenditure is about the same both in urban and rural area of the upazila.

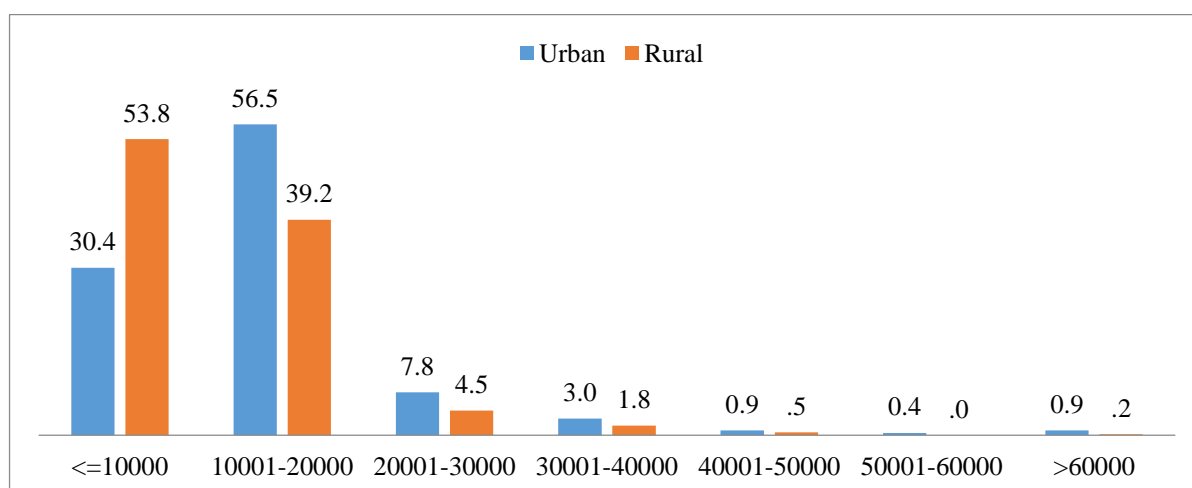


Figure 3.9: Monthly Expenditure (Source: Field Survey, 2015)

3.6 Migration

In this upazila most of the total respondents migrated from the nearby village or other zila..

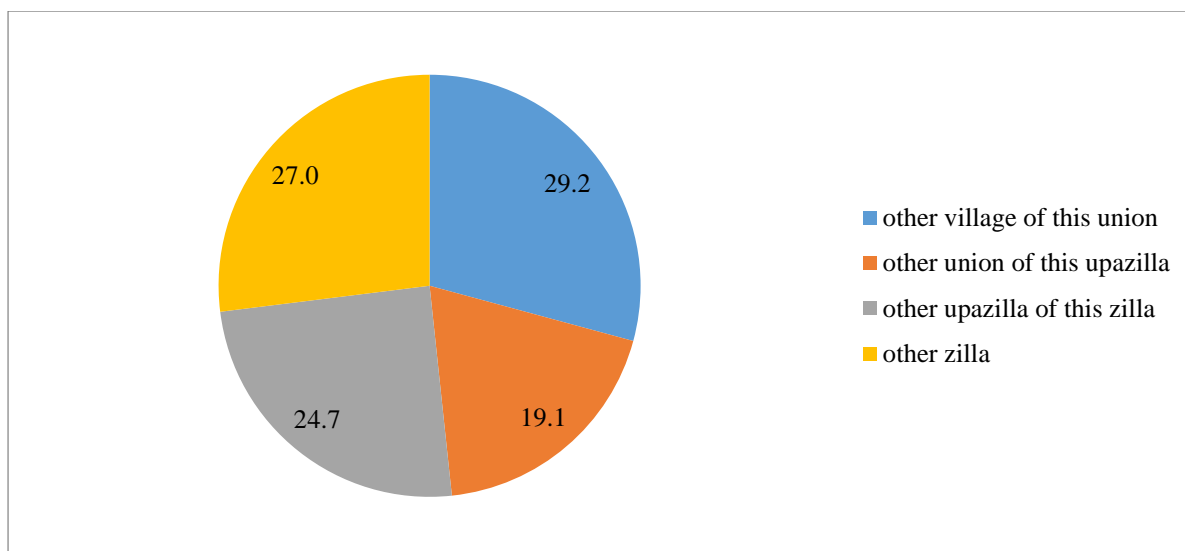


Figure 3.10: State of Migration (in percentage) Source: Field Survey, 2015

Maximum percentage (about 45%) of respondents migrated in this upazila because of their jobs or employment cause. About 19.8% of the respondents migrated here because of the disasters like river erosion. About 16.3% also migrated here because of education purpose.

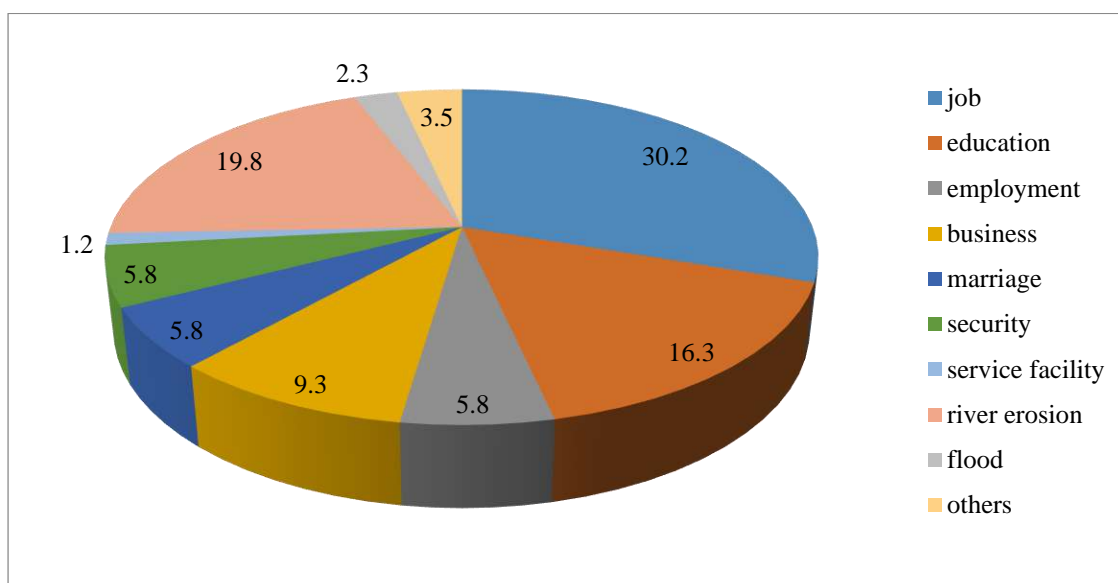


Figure 3.11: Causes of Migration (in percentage) Source: Field Survey, 2015

3.7 Housing Status

a. Pattern of Household Land Ownership

In this upazila, almost all of the households lived in their own house, and they are the owner of their household land also. The families are living at the area for long time. Thus, most of the people of this Upazila are there by their inheritance. On the other hand, some of the respondents also lived in “Joint” owned land. A small percentage both in urban and rural area also lived in the house inherited from their parents. About 15% respondents of urban area are living as tenant.

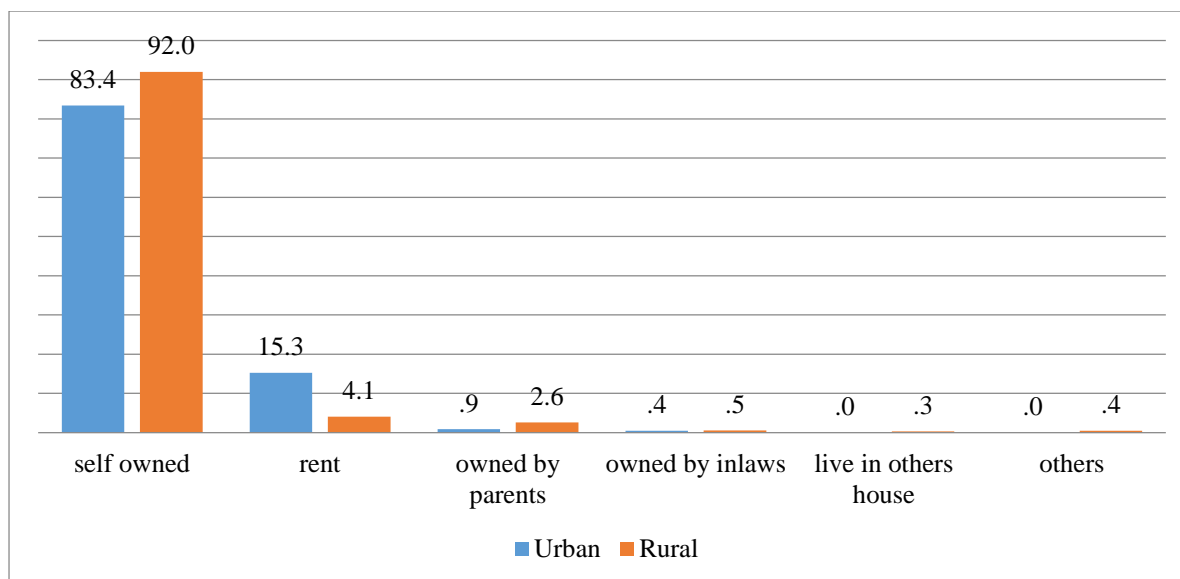


Figure 3.12: Pattern of Household Land Ownership (Source: Field Survey, 2015)

b. Types of House Structure

About half of the households of both urban and rural area those are middle income households of the upazila lived in semi-pucca house. In rural area most of the respondents (about 43.5%) are living in kutchra house. More than 92% of urban respondent live in pucca or semi-pucca house. In rural area about 1% also lived in jhupri.

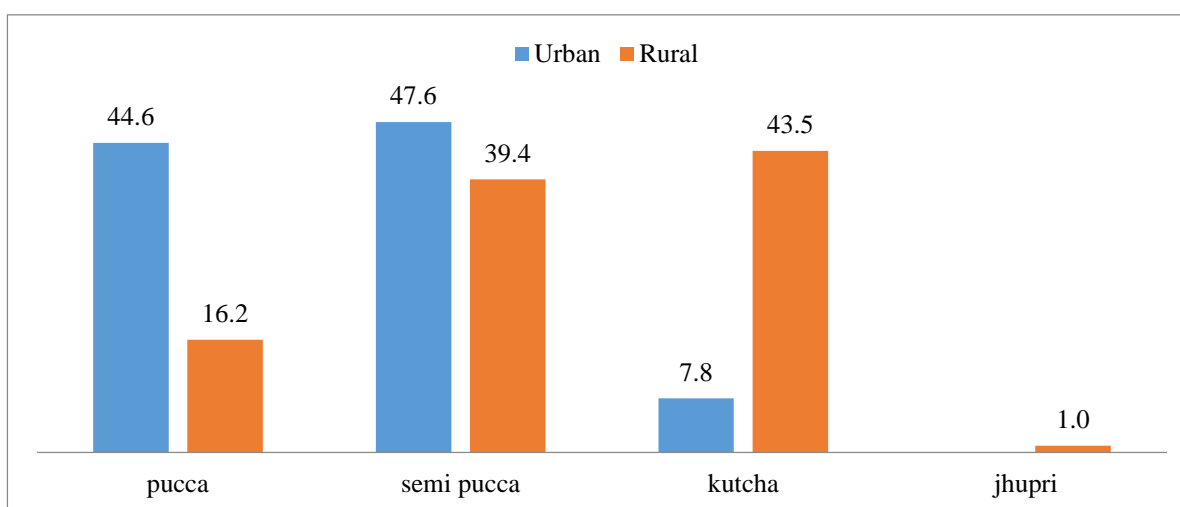


Figure 3.13: Type of Household Structure (Source: Field Survey, 2015)

3.8 Land Value

Land price highly varied with locations. It has been found that in rural area about 76.1% of land's price is below 1 lakh, where as in urban area more than half of total land's price is between 1 and 3 lakhs. About 22% lands price is more than 5 lakhs. But only 4.1% land of rural area's land are in the same price range. Thus the urban facilities have highly influence on land value.

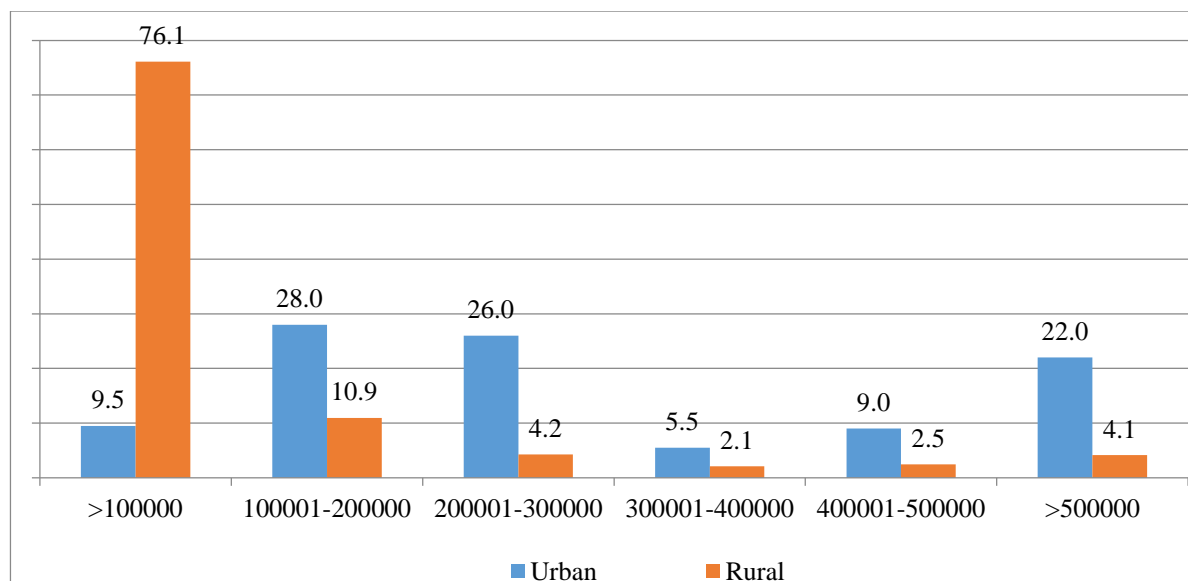


Figure 3.14: Price of Present Household Land in 2015 (Source: Field Survey, 2015)

3.9 Transport

3.9.1 Mode of Communication

It has been found in this upazila that, road distribution is enough good as about 69% of total households is within 50m from the road. Though a significant percentage (about 11%) of people also lived far from the road, most of them are from poor income range.

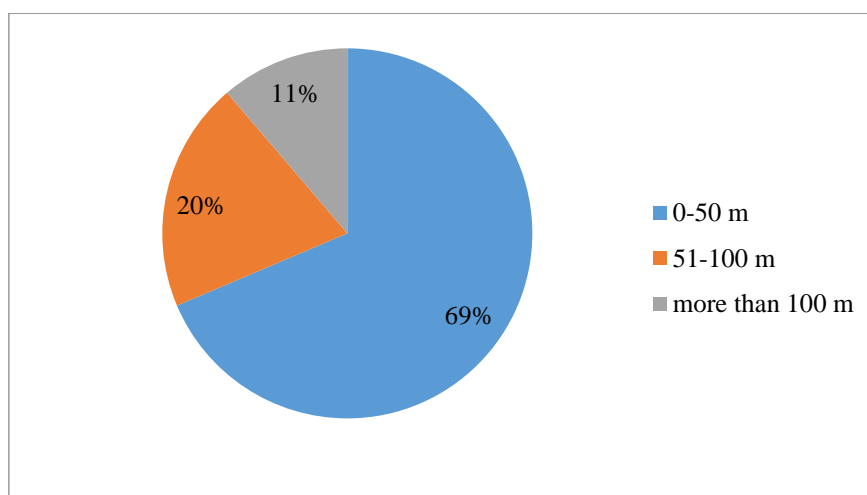


Figure 3.15: Distance from Road to House (Source: Field Survey, 2015)

It has been found in urban area that about 82% of total households anticipated that they have adequate bus stand near their household. But in rural area the availability bus stand is below 50%.

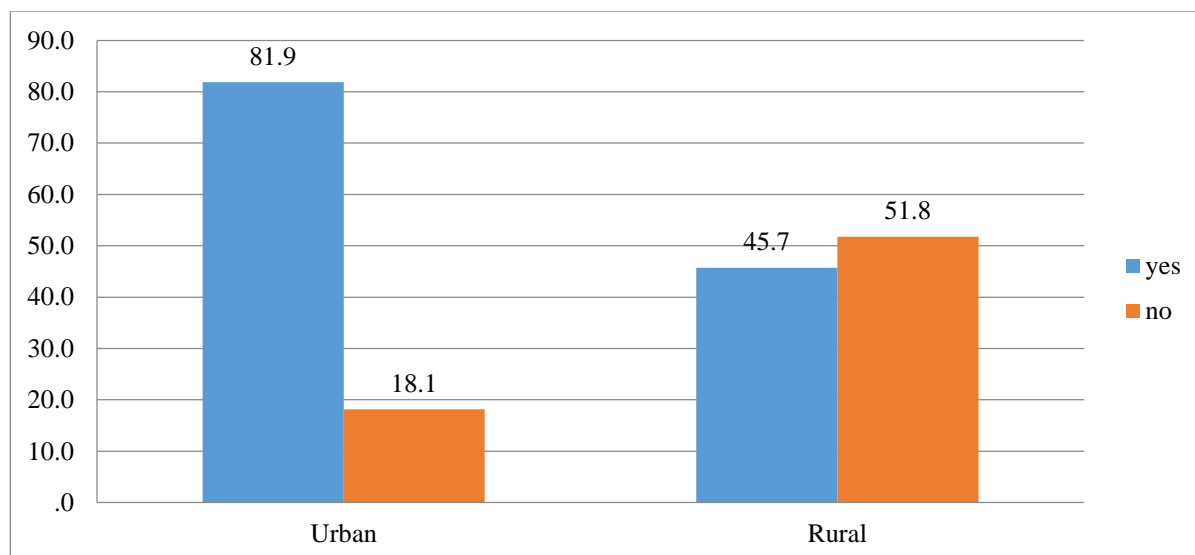


Figure 3.16: Availability of Bus Stand (Source: Field Survey, 2015)

Though about 38.1% of total households said that they have bus stand within 1km from their house. According to huge percentage (about 19.4%) of households said that, bus stand is far more than 5 km from their house. So, it became very tough for them while they moved with elder citizen.

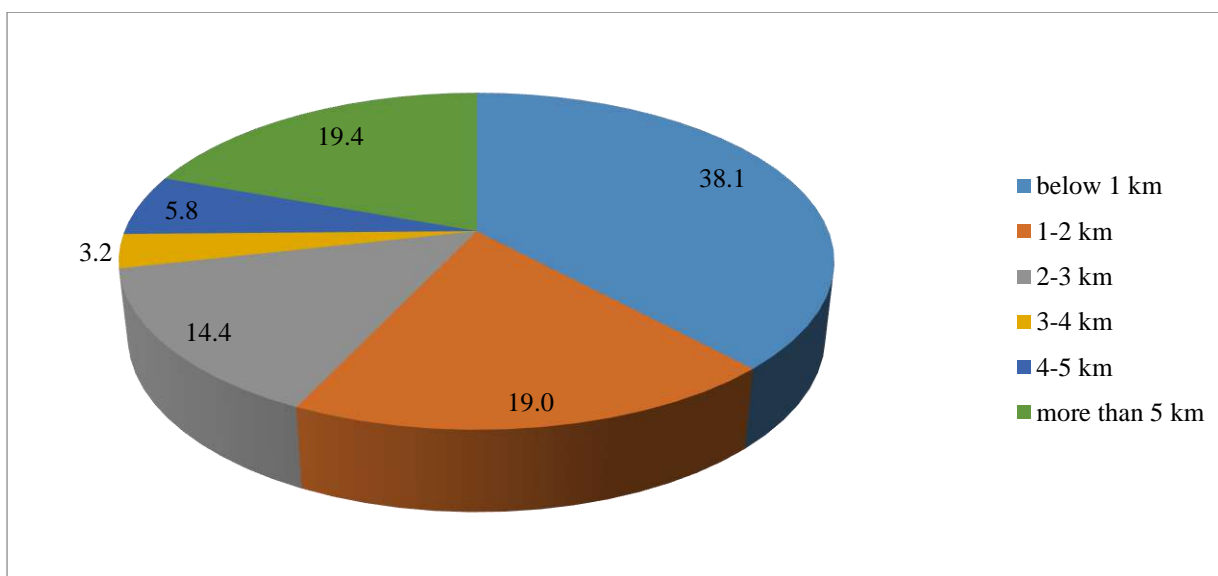


Figure 3.17: Distance to Bus Stand (Source: Field Survey, 2015)

3.9.2 Types of Road

Most of the households in urban (about 50.1%) use pitched road for their daily communication. Though an important portion (about 25.6%), which is also the second highest of all other categories, had to use kutcha road for their daily communication. Rest of them used either brick or mortar made road. Therefore, there are high need of new roads.

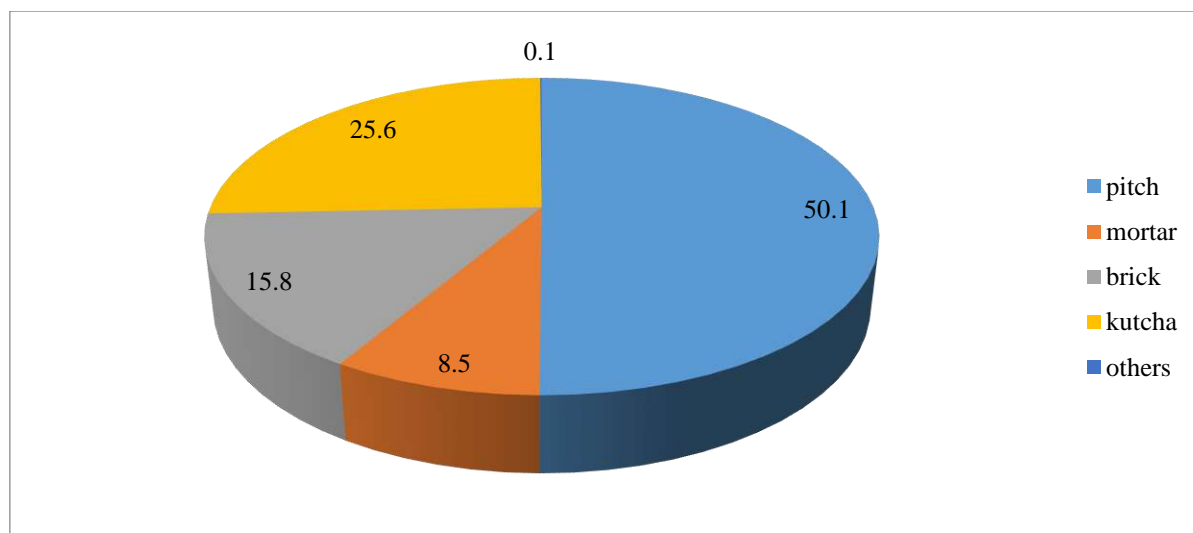


Figure 3.18: Roads Used for Daily Communication (in front of house) (Source: Field Survey, 2015)

It has been found that about two third of total households anticipated that, the condition of the road is not good enough. Some of them also said that, narrow road is the main problem of the road. Some also said, garbage and hawkers make the situation of road worse.

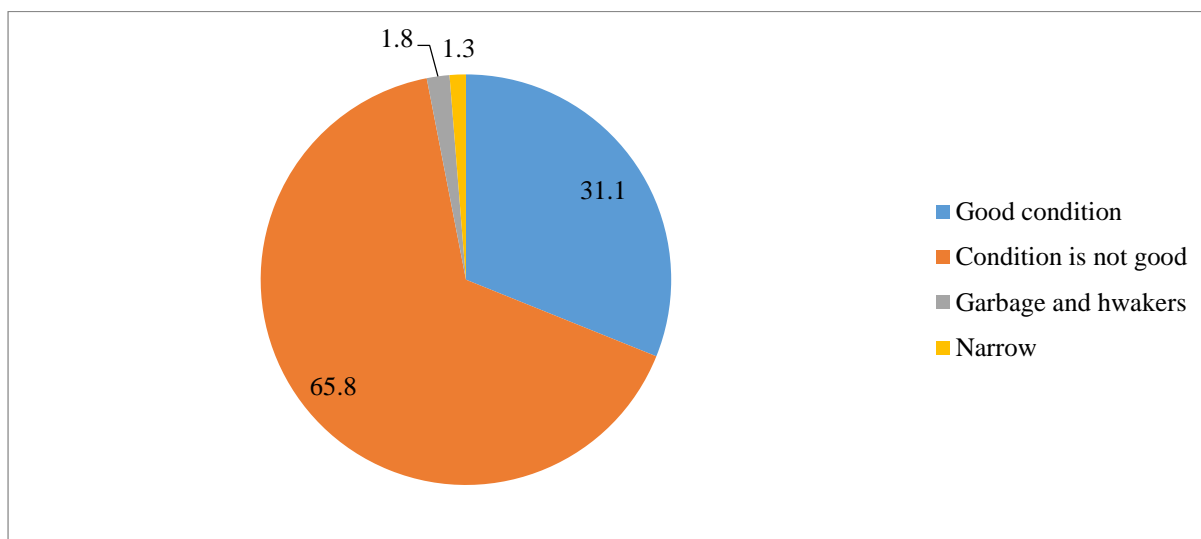


Figure 3.19: Problems of Road (Source: Field Survey, 2015)

3.10 Utility Service

3.10.1 Energy

a. Source of Fuel

In this upazila, it has been found that about 92.2% of total households use woods as their major source of fuel. About 6.7% of them also used cylinder gas or bio fuel as the major source. Thus, the area need very much need of natural gas.

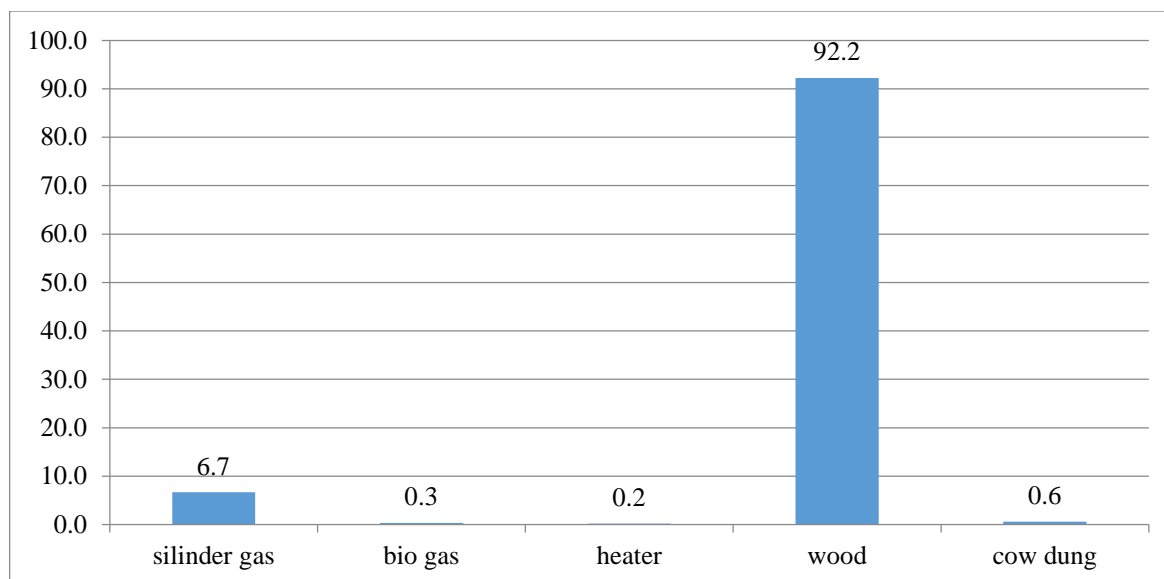


Figure 3.20: Source of Fuel (Source: Field Survey, 2015)

b. Electricity Supply Status

Because of high load shedding and high pressure in peak period with insufficient electricity supply both in urban and rural area very small percentage households has said that electricity supply has been occurred regularly. About 38.1% of total households said that load shedding is their one of the major problem related to electricity. Otherwise the highest percentage (about 60.3%) of total households said that, even they are lack of electricity connection in their houses.

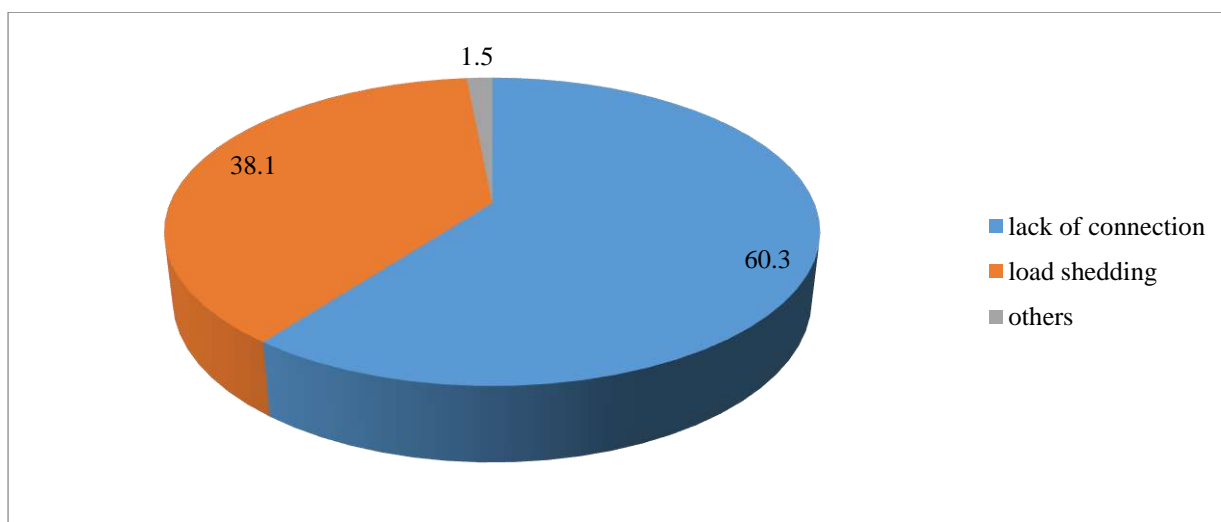


Figure 3.21: Problems of Electricity Supply (Source: Field Survey, 2015)

Thus, about 46.8% of them used rural electricity as their source of electricity, which is unable to provide them enough supply of electricity demand. 43.7% of electricity is supplied by PDB. About 9.2% of total households found, those even have no electricity or use generator as their major source of electricity.

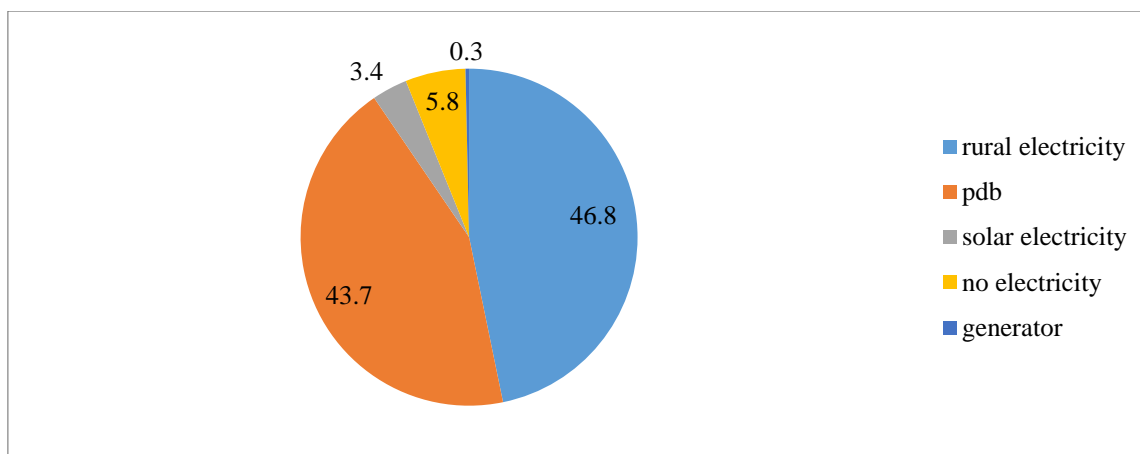


Figure 3.22: Electricity Supply Status (Source: Field Survey, 2015)

3.10.2 Sanitation

It is alarming for the upazila is that, about 60% of total households use non-sanitary sanitation system. Even 1.9% of them use open sanitation system which is very unhygienic.

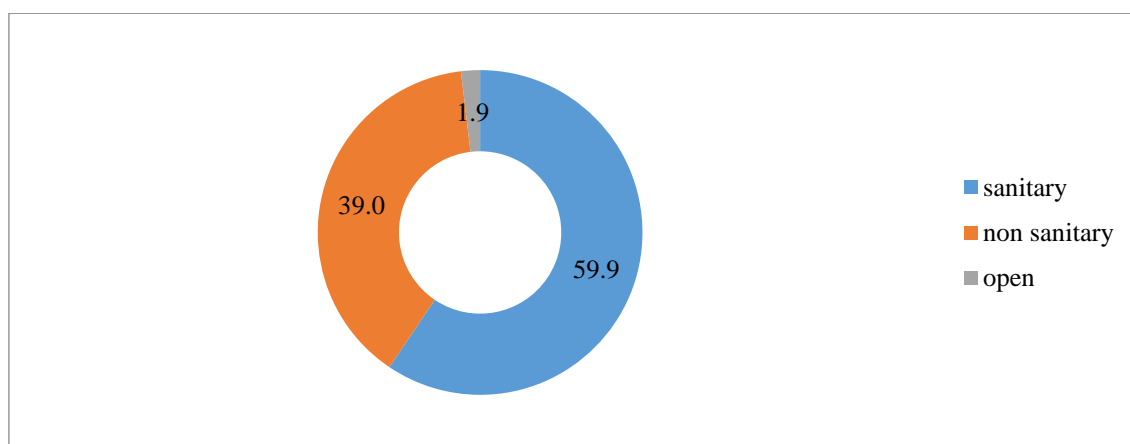


Figure 3.23: Sanitation System Source: Field Survey, 2015

3.11 Waste Management

3.11.1 Waste Management System

It has been found that, waste management system of this upazila is not satisfactory, as only 8% of them used dustbin. About, one-fourth of total households dump their waste “anywhere” without proper designation. Rest of them used, hole to manage their waste

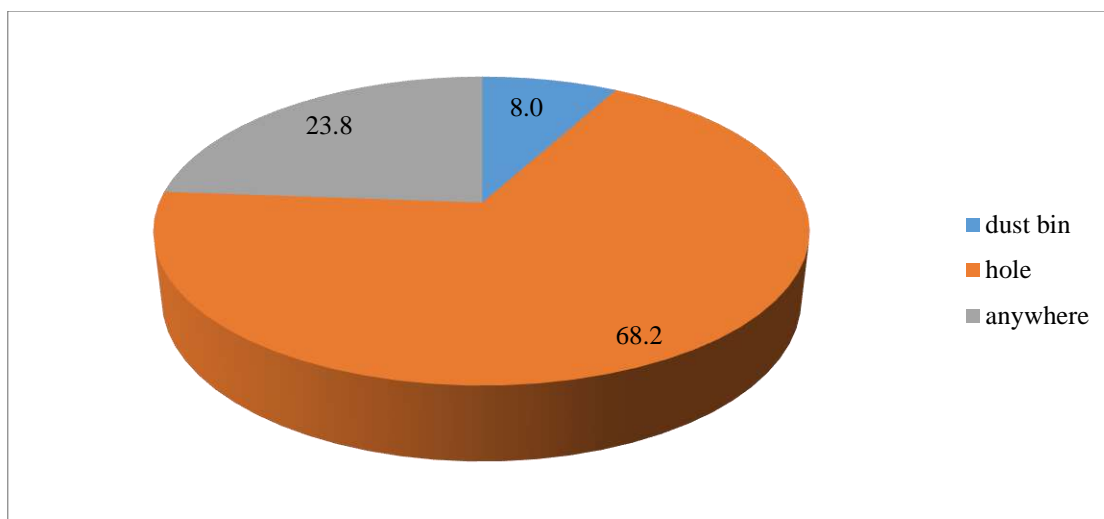


Figure 3.24: Distribution of Waste Management System (Source: Field Survey, 2015)

3.11.2 Distance to Waste Disposal Place

Most of the household dump their waste within very short distance. About 78% household dump their waste within 250m range from their households.

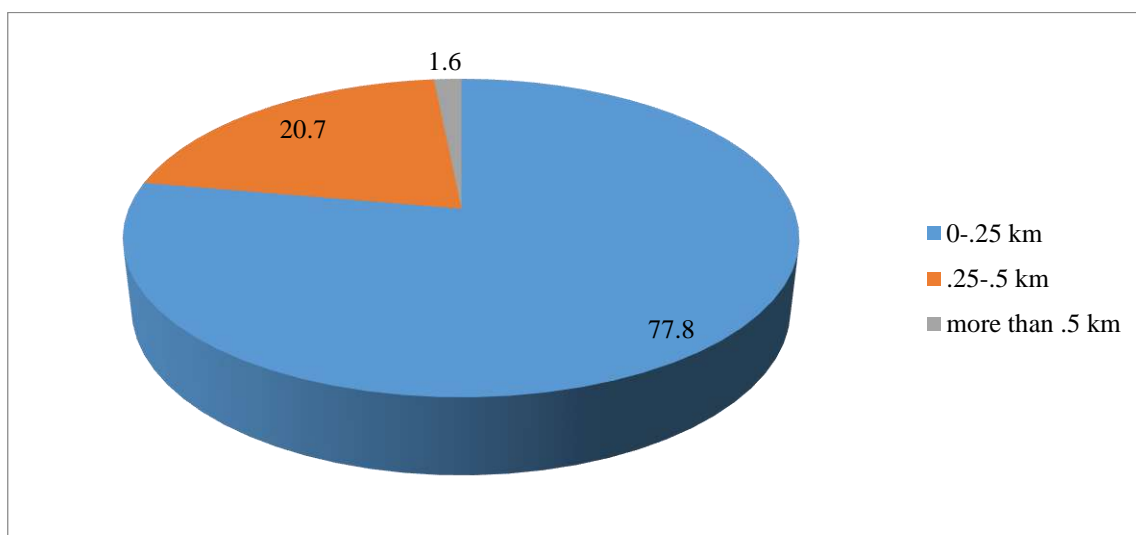


Figure 3.25: Distance to Waste Disposal Place (Source: Field Survey, 2015)

3.11.3 Problems Related to Waste Management

It has been found that maximum percentage (about 45%) of household said that, because of the lack of enough facility, they had to use inappropriate waste dumping. Moreover, the second highest percentage said that, there are lack of enough dustbin as their major problem related to waste management. Some of them also said that, they have enough facility for safe waste dumping, but most of the time they are not well managed.

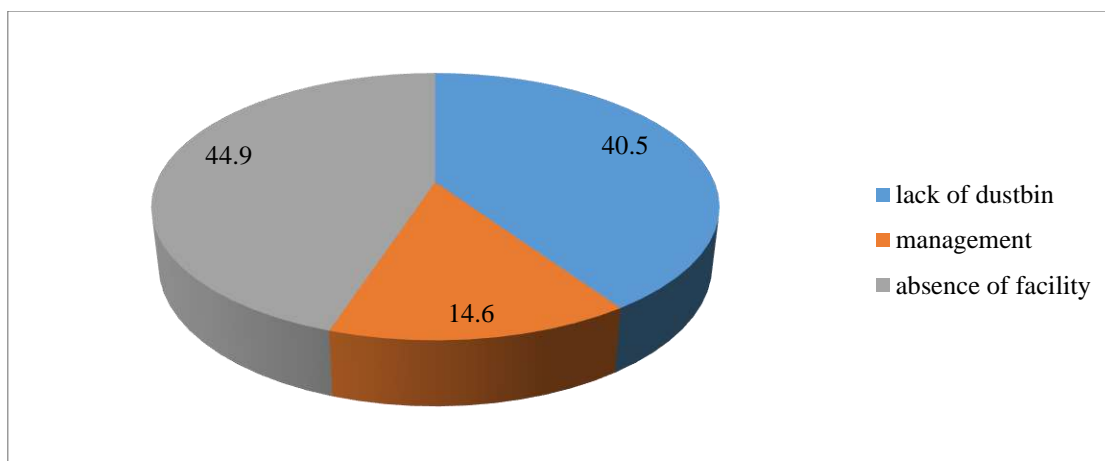


Figure 3.26: Problems Related to Waste Management (Source: Field Survey, 2015)

3.12 Medical Facility

In this upazila, maximum respondents (about 48% of total) said that medical facility is located very far (more than 5km) from them. Only 10.7% respondents enjoy the facility very easily, as the service is within 1km from their residence. Therefore, it can be said that, the location of health facilities are less enough efficient.

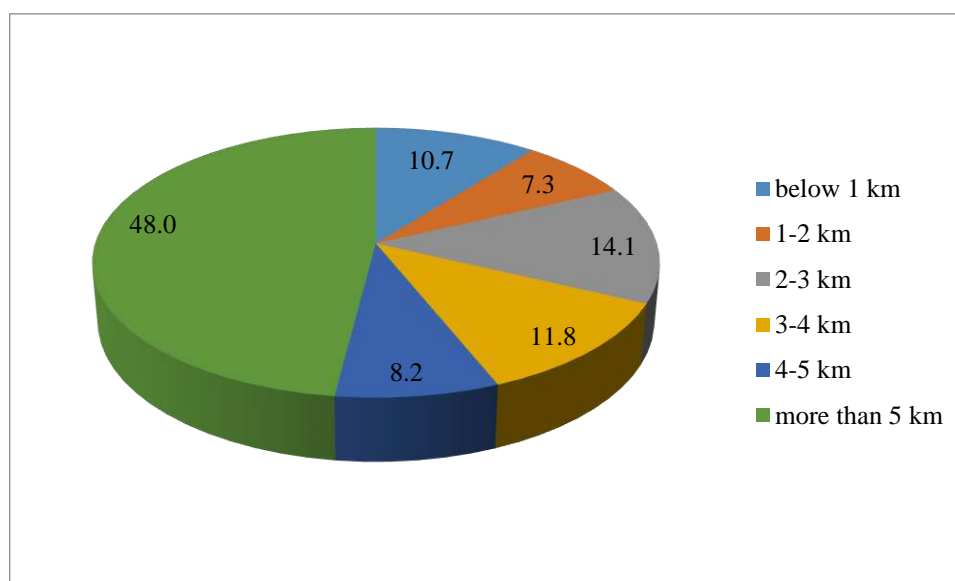


Figure 3.27: Distance from Medical (Source: Field Survey, 2015)

More than two-third of total households are quite satisfied with the services of the medicals. Only small portion of them said that, they are not satisfied with the services.

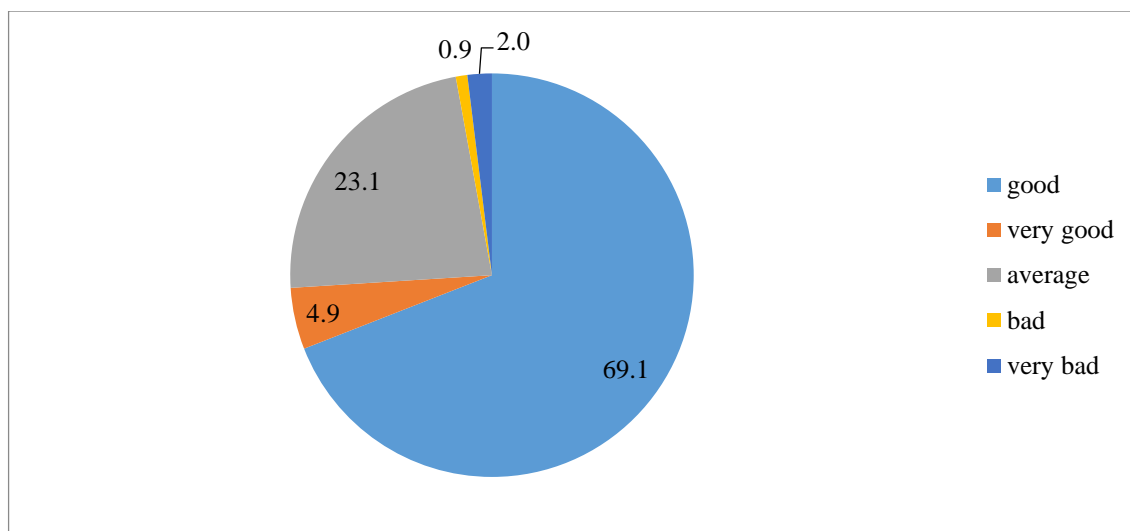


Figure 3.28: Quality of Treatment Facility (Source: Field Survey, 2015)

Apart from these positive situations of treatment facilities of the Upazila, the most important drawbacks of this upazila is lacking of community clinic in both rural and urban area. Moreover, there are also lack of enough free medical centre services. Thus steps for establishing new community clinic and government clinic should be taken by proper authorities. Moreover, there are also lack of necessary medicines, for which immediate measurements should be taken.

3.13 Educational Facility

In this upazila it has been found that, about 80% of total households enjoy the primary school facility within 2km from their residence. In urban area, about 10% of households have to enjoy primary school facility more than 5km from their households. Whereas the percentage is quite low in rural area. The causes behind this is, urban people is more conscious about their children's education, as a result they would send their children far from their households for better schools, whereas the mentality is not the same in rural area.

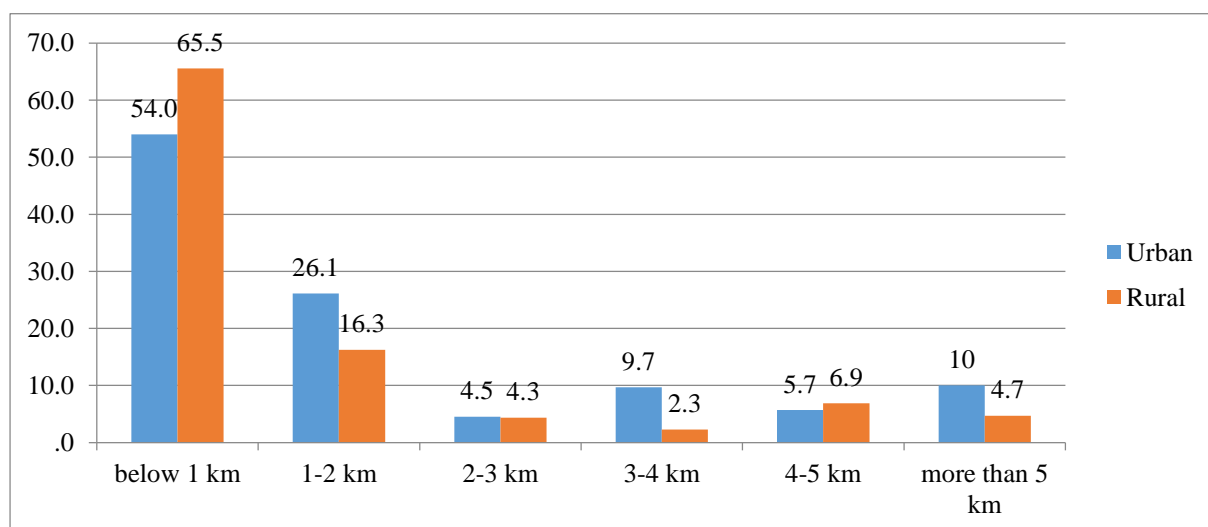


Figure 3.29: Distance to Primary School (Source: Field Survey, 2015)

Moreover, both in urban and rural area, it has been found that, most of the households are satisfied with level of education they got from the educational institution. About 14% of urban households said, the quality of educational institution is very good. Thus, the overall situation of education qualification has been found satisfactory.

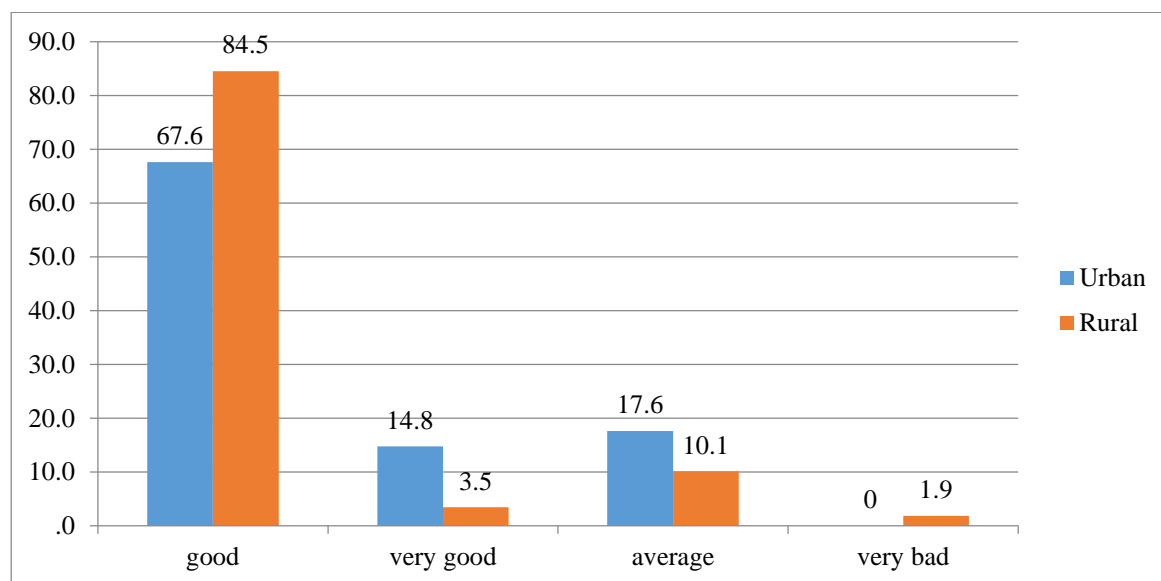


Figure 3.30: Quality of Primary School (Source: Field Survey, 2015)

3.14 Available Services in the Upazila

The consultant analyzed retail market, post office, fire service and playground condition as vital services of the upazila where the location, distance from the household and service quality has been studied.

3.14.1 Distance and Service Quality of Retail Market

It has been found that, most of retail markets are situated within 1km distance both in urban and rural area. About half of the urban retail markets are within 1-3 km distance. Significantly distances about 20% rural retail markets are more than 4 km.

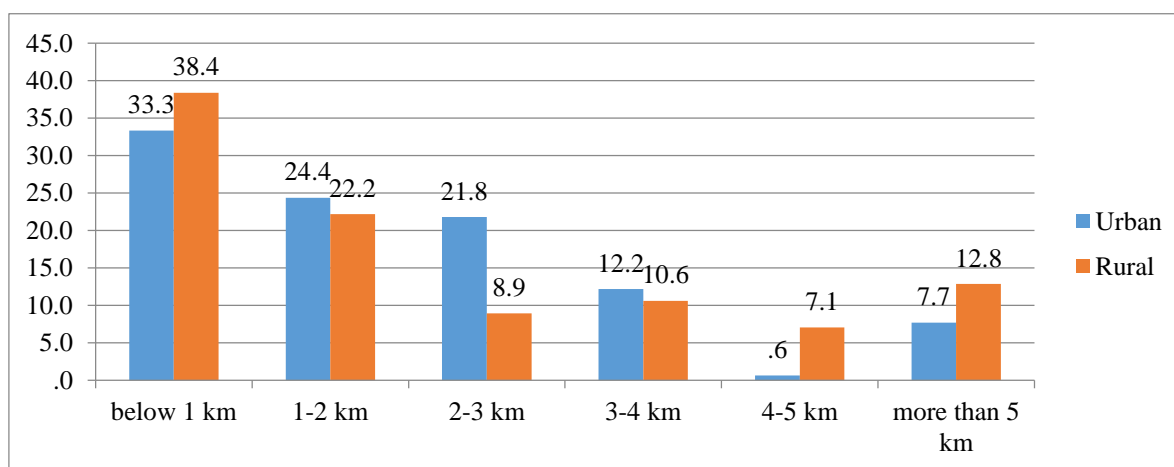


Figure 3.31: Location and Distance of Retail Market from Household (Source: Field Survey, 2015)

Both in urban and rural area, almost all of the households said that, they are quite satisfied with the services of retail markets. Whereas, in rural area very few respondents are dissatisfied with the services of retail markets.

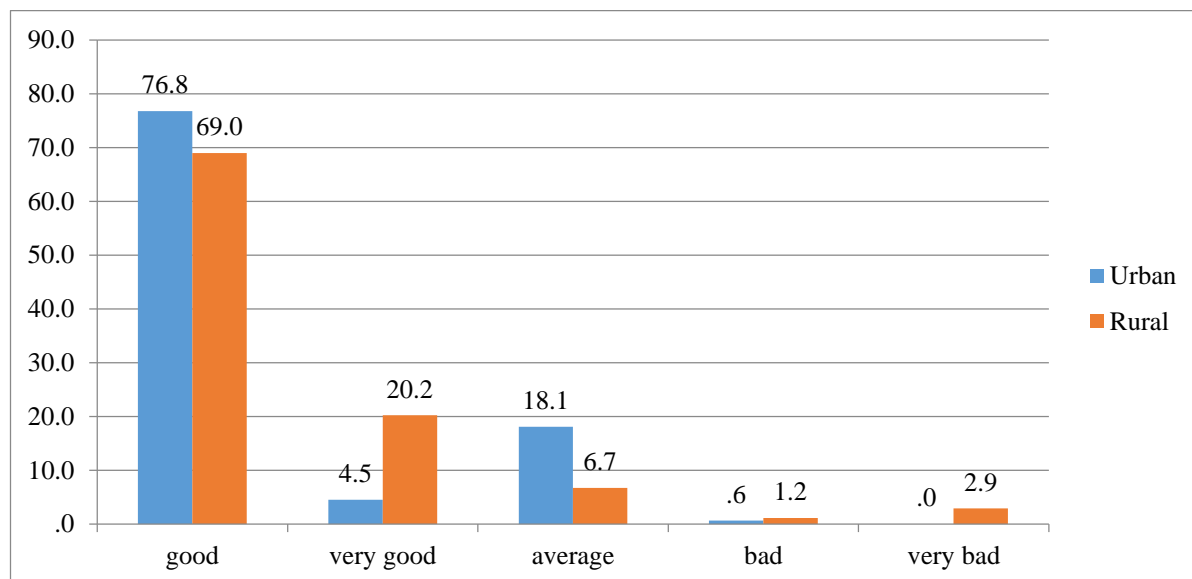


Figure 3.32: Service Quality of Retail Market (Source: Field Survey, 2015)

3.14.2 Distance and Service Quality of Post Office

Again, there are 26 post offices in the upazila. Most of them are within 3km radius for about 73% household. More than one third of total households have their post offices within 1 km. Thus, the location is convenient for most of the households.

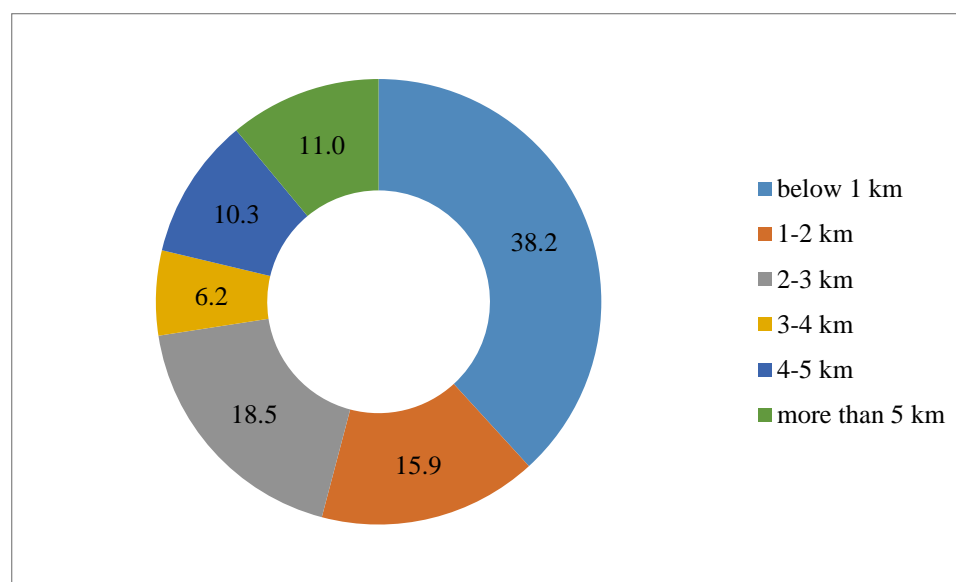


Figure 3.33: Location and Distance of Post Office from Household (Source: Field Survey, 2015)

About three-fourth of total households are quite satisfied about the service quality of post offices. Very small percentage of households said that, they are not satisfied with the services

as they anticipated as the services of post offices are either bad or very bad. Therefore, the services of post offices are satisfactory in this upazila.

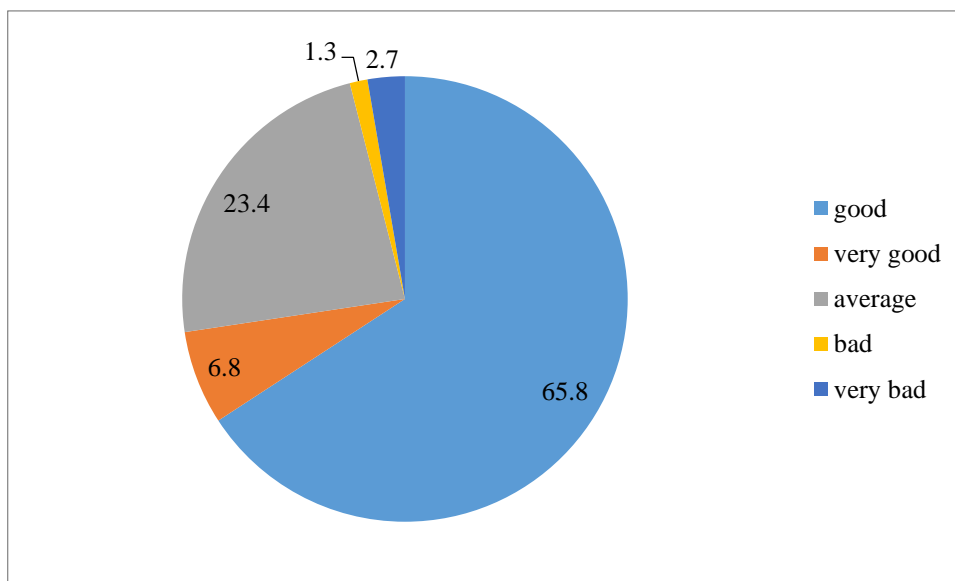


Figure 3.34: Service Quality of Post Office (Source: Field Survey, 2015)

3.14.3 Distance and Service Quality of Fire Service Station

There is only one fire service station in the upazila (BBS, 2011). About 45% of respondent's houses are within 2km radius. More than one fourth of total households have their fire service outside of 5 km radius. Thus, the location is inconvenient for most of the households.

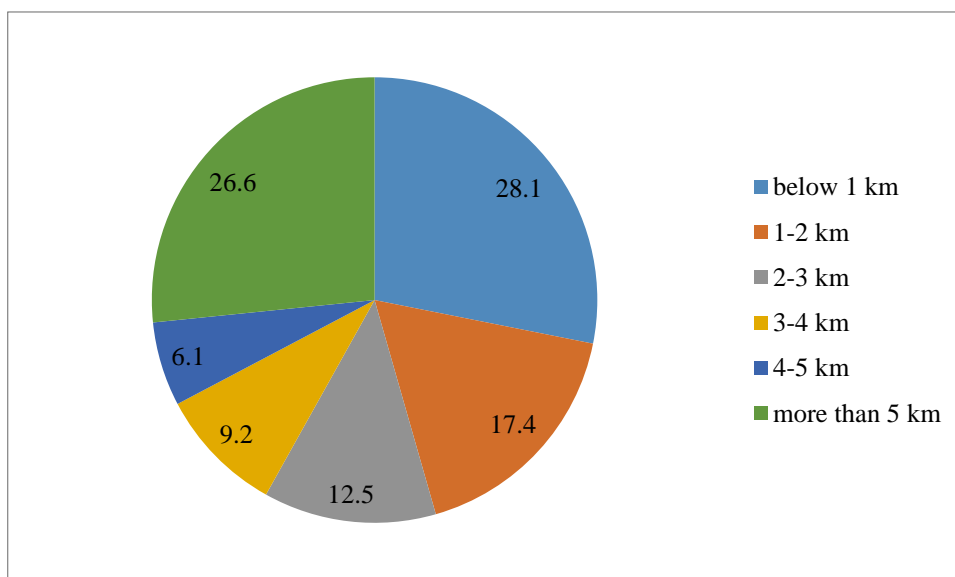


Figure 3.35: Location and Distance of Fire station from Household (Source: Field Survey, 2015)

More than three-fourth of total households are quite satisfied about the service quality of the fire station. Very small percentage of households said that, they are not satisfied with the services. Therefore, the service of fire station is satisfactory in this upazila

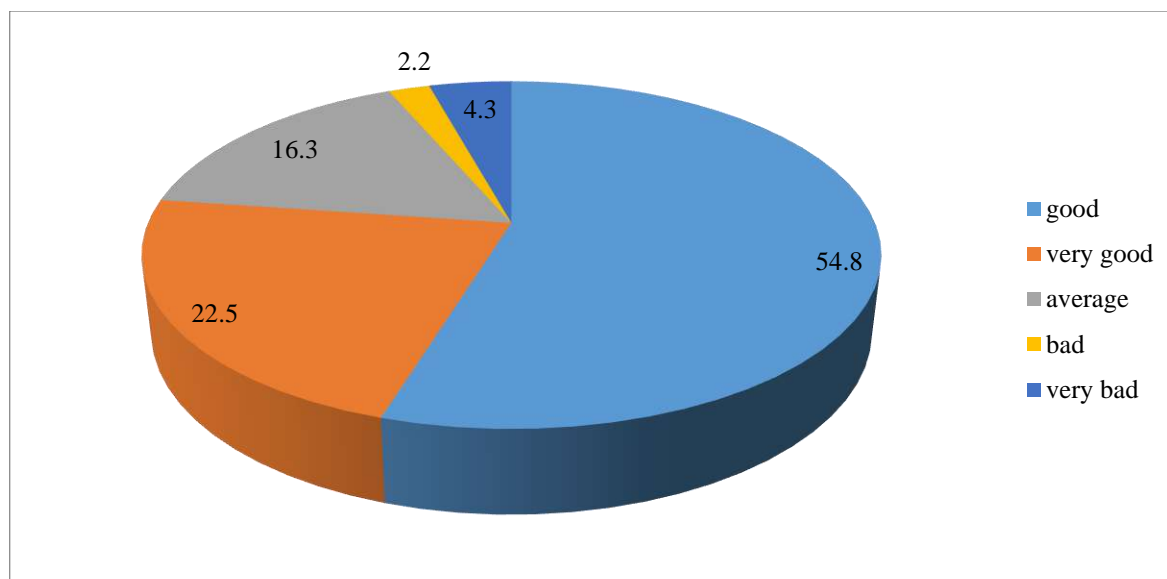


Figure 3.36: Service Quality of Fire station (Source: Field Survey, 2015)

3.14.4 Distance and Service Quality of Playground

In the upazila for most of the households (about 71.6%), playground is within 2 km of their households. Thus, most of the households' recreational facilities is playing in the fields. But 10.3% of the respondents need to go more than 5 km to reach playground.

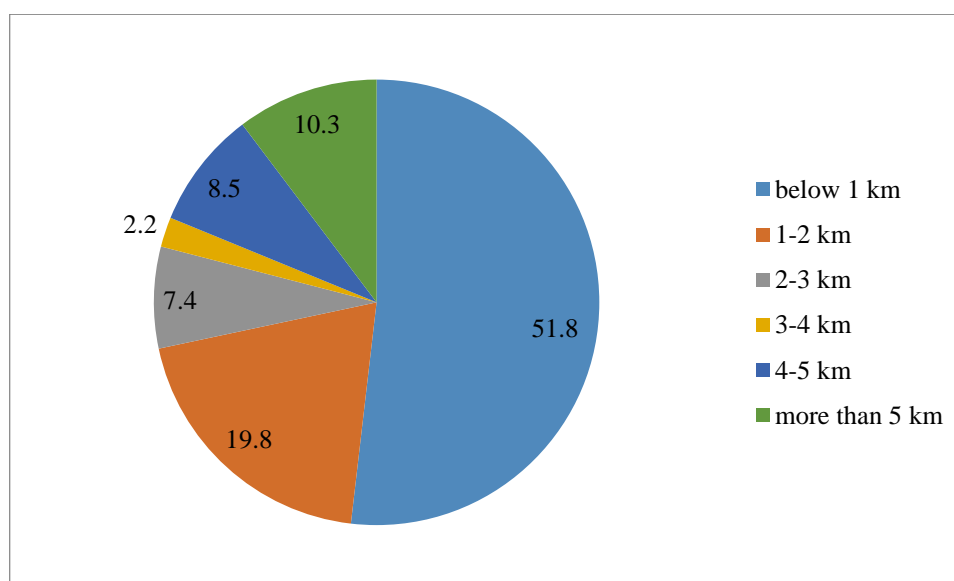


Figure 3.37: Distance from Household (Source: Field Survey, 2015)

And almost all of them are satisfied or highly satisfied with their playground as 81.3% of total households said that, the service of playground is good or very good. So, it can be said that in the upazila there are sufficient number of playgrounds for the households and they are well maintained.

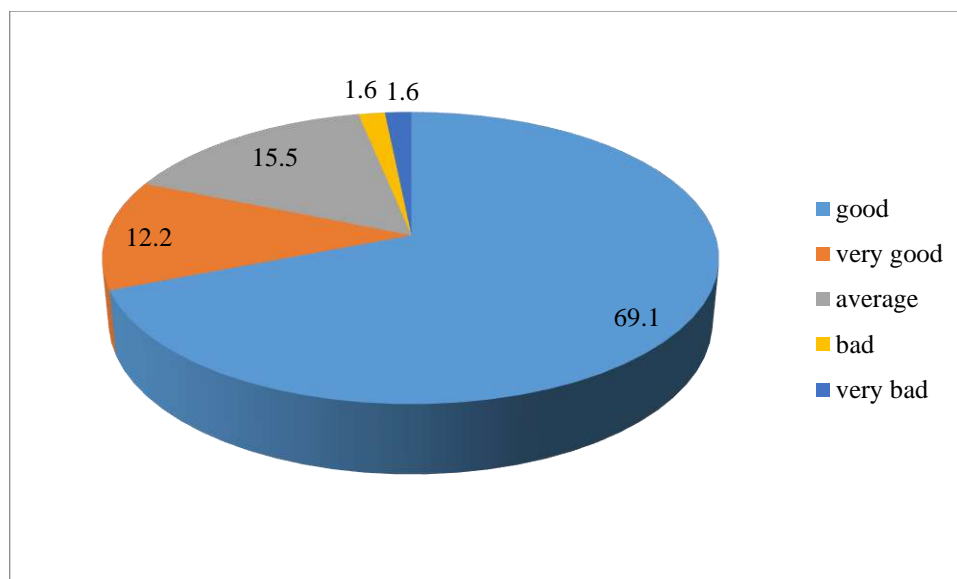


Figure 3.38: Service Quality of Play Ground (Source: Field Survey, 2015)

3.15 Problems of the Road

As discussed in the earlier section of this chapter a number of respondents have said, their problem related with the roads. Here, the details have been asked about the road. They said that, the major problem (about 44%) related to the roads are that, the road should be widened. Moreover, about one-third of total respondents also said that, appropriate management must be needed in the roads. About 20% of them also said that, they are victim of excess fare and traffic congestion in the road. Thus, necessary measurements should be taken regarding these.

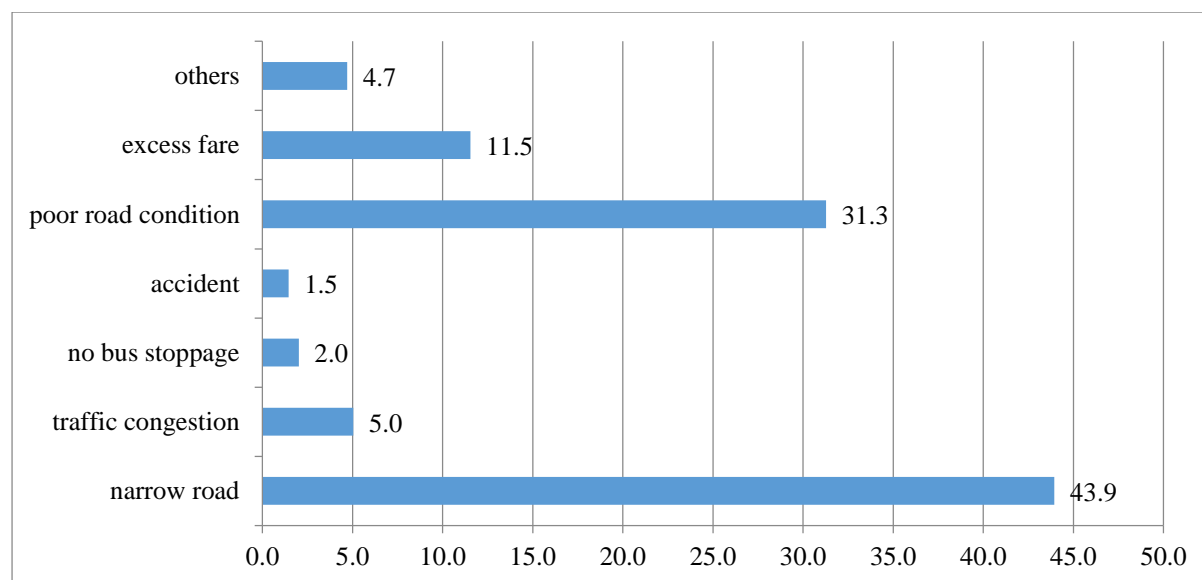


Figure 3.39: Problems of the Road (Source: Field Survey, 2015)

3.16 Hazards in the Upazila

Several options have been given to the respondents for existence of different hazards. Among them, it has been found that, the below shown hazards has mostly affected the upazila according to the respondents. Among the hazards, water logging and excessive rain hampered

them most, whereas in summer season, they said the scenario got changed totally. In summer season, they experience severe lack of water for the agricultural purpose.

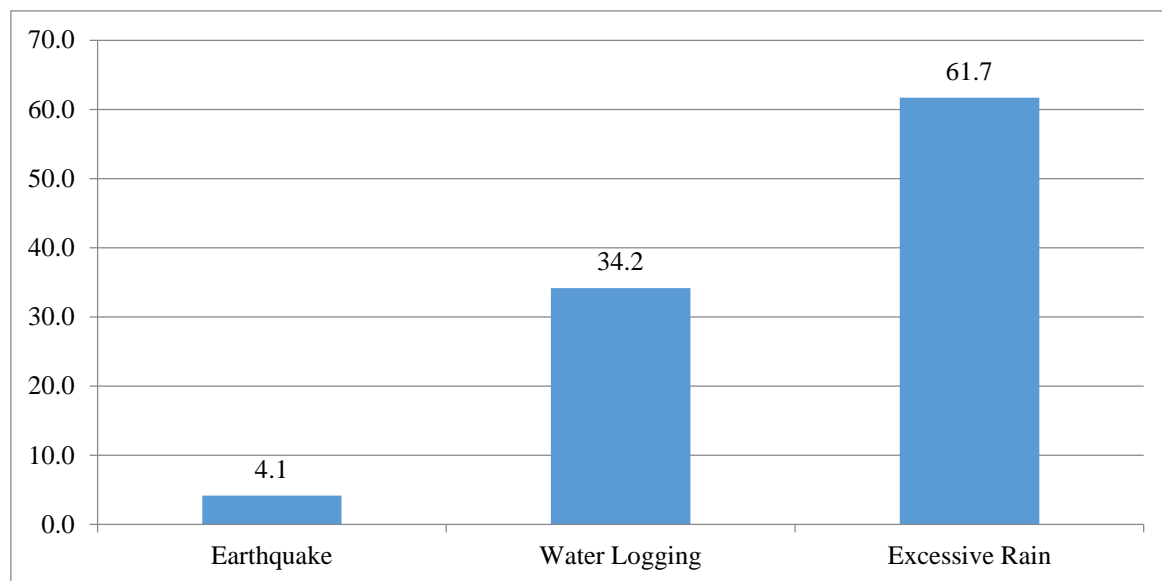


Figure 3.40: Problems Related with Hazard (Source: Field Survey, 2015)

3.17 Disaster Management

More than 80% total households said that, they need cash money after the occurrence of disaster. Moreover, about 8% of them also wished for a very effective early warning system. They said that, it would help them to reduce the damages or losses in a significant way. Moreover, it is very promising that, about 5% of them said that, helping each other also could be an efficient disaster management technique.

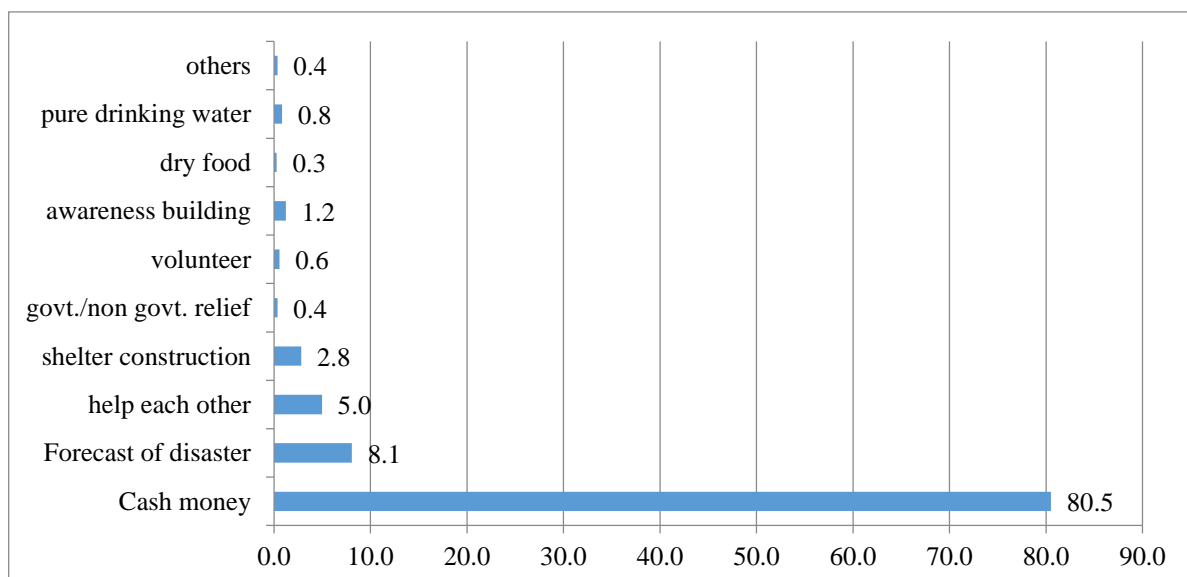


Figure 3.41: Necessary Steps for Disaster Management (Source: Field Survey, 2015)

3.18 People's Aspiration about the Development of the Upazila

The people's aspiration about the development of the area data also collected from multiple rank methods. It plays a vital role to represent the importance of different people's aspiration

about the development of both rural and urban the area. For prioritizing development work first ten development problems have been taken for both urban and rural area. In both urban and rural area respondents have given the most emphasis on road development. In urban area development of drainage system and play grounds are also the indicators of development. In rural area people indicate establishing educational institution and hospital are sign of development. Other factors of development are also shown in the graph according to priority

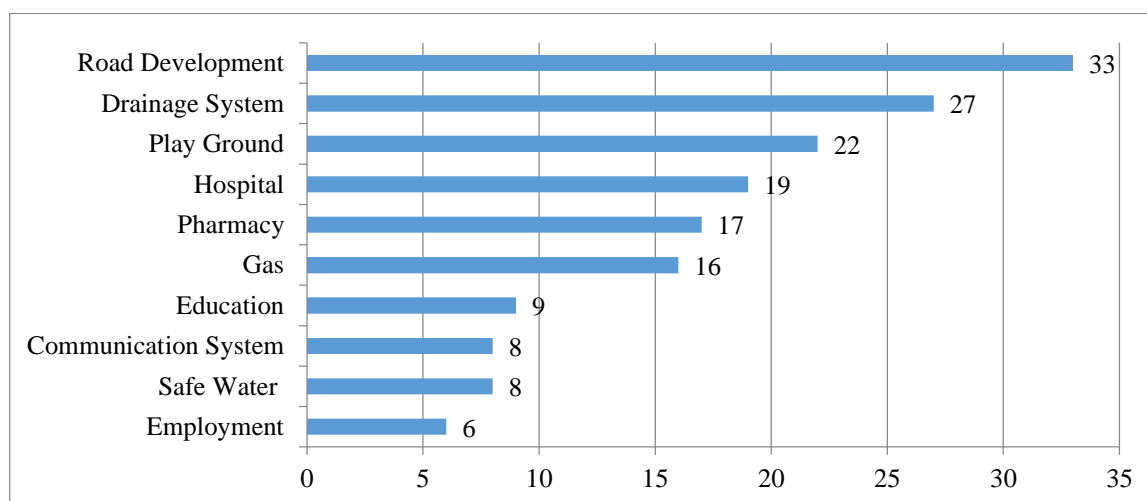


Figure 3.42: Prioritization of Development Works in urban area (Source: Field Survey, 2015)

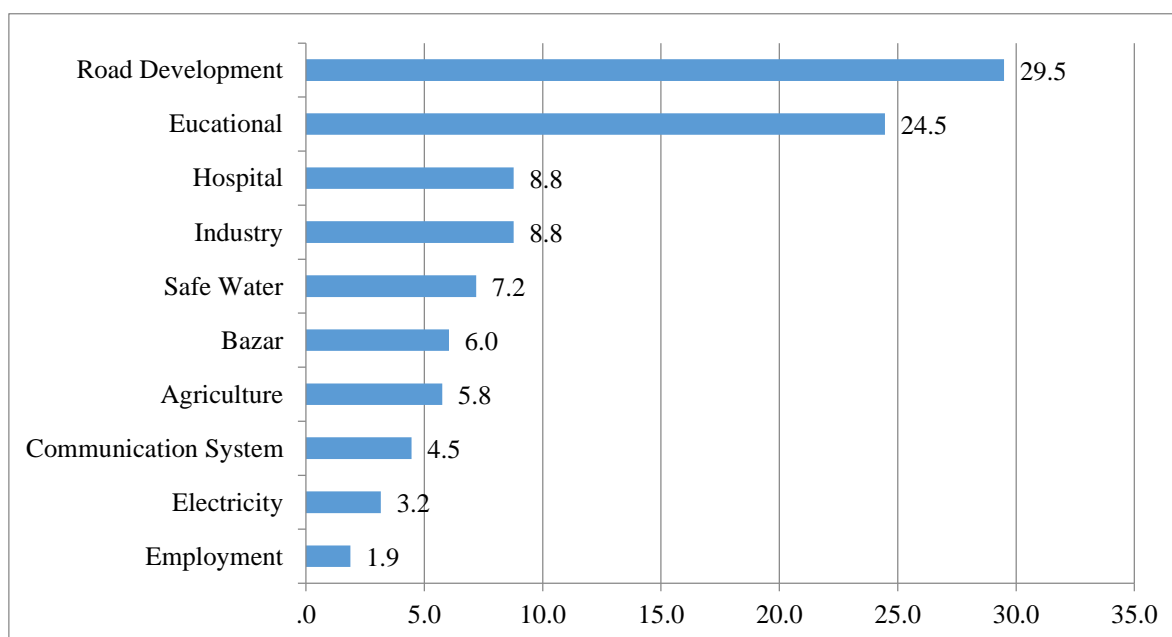


Figure 3.43: Prioritization of Development Works in rural area (Source: Field Survey, 2015)

Chapter 4: Conclusion and Policy Framework

Faridpur Sadar upazila is on the edge of entering in “Demographic Bonus” window within the coming years as the percentage of working people is high and will increase in the near future. But it has been found that the level of education of this area is not satisfactory, one of the main causes behind it is the very high teacher-student ratio and lacking of qualified teacher. So, concerned authorities should pay attention to the issues of the upazila. Moreover, the upazila’s main mode of communication is by road, and the condition of road is decent but because of lack of regular maintenance the condition is deteriorating. So, road authorities should take some necessary steps regarding it. In addition, lack educational institution in this area is one of the main problems expressed by the most of the households especially in rural area, so concerned authority should take some necessary steps. Again, concerned authority should consider taking some steps regarding improvement of maternal and child health. Apart from these, this upazila is in good condition regarding in supplying electricity, recreational facilities, sanitation, law and order situation, retail markets etc.

Annexure-I

Annexure-II

Table: List of Socioeconomic Survey Team Members

Sl	Name	Designation	Date Start	Date End
1		Supervisor	12.08.2015	11.09.2015
2		Supervisor	12.08.2015	11.09.2015
3		Supervisor	12.08.2015	11.09.2015
4		Supervisor	12.08.2015	11.09.2015
5		Surveyor	12.08.2015	11.09.2015
6		Surveyor	12.08.2015	11.09.2015
7		Surveyor	12.08.2015	11.09.2015
8		Surveyor	12.08.2015	11.09.2015
9		Surveyor	12.08.2015	11.09.2015
10		Surveyor	12.08.2015	11.09.2015
11		Surveyor	12.08.2015	11.09.2015
12		Surveyor	12.08.2015	11.09.2015
13		Surveyor	12.08.2015	11.09.2015
14		Surveyor	12.08.2015	11.09.2015
15		Surveyor	12.08.2015	11.09.2015
16		Surveyor	12.08.2015	11.09.2015
17		Surveyor	12.08.2015	11.09.2015
18		Surveyor	12.08.2015	11.09.2015
19		Surveyor	12.08.2015	11.09.2015
20		Surveyor	12.08.2015	11.09.2015
21		Surveyor	12.08.2015	11.09.2015
22		Surveyor	12.08.2015	11.09.2015
23		Surveyor	12.08.2015	11.09.2015
24		Surveyor	12.08.2015	11.09.2015
25		Surveyor	12.08.2015	11.09.2015
26		Surveyor	12.08.2015	11.09.2015
27		Surveyor	12.08.2015	11.09.2015
28		Surveyor	12.08.2015	11.09.2015

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর

প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প : প্যাকেজ নং - ৩
বাগমারা উপজেলা, রাজশাহী জেলা; গাংনি উপজেলা, মেহেরপুর জেলা এবং ফরিদপুর সদর উপজেলা, ফরিদপুর জেলা
পরামর্শক প্রতিস্থানঃ ইনজিনিয়ারিং কনসালটেন্টস এন্ড এসোসিয়েটস লিমিটেড

পারিবার জরিপ প্রশ্নমালা (আর্থ-সামাজিক)

(জরিপ প্রক্রিয়াটি উত্তরদাতার কাছে পরিষ্কারভাবে বর্ণনা করুন এবং তার অনুমতি নিয়ে আরম্ভ করুন। সকল তথ্য শুধুমাত্র সরকারী কাজে ব্যবহার করা হবে। আপনার দেয়া সকল তথ্য গোপন রাখা হবে।)

ক্রমিকঃ [শুধুমাত্র অফিসিয়াল ব্যবহারের জন্য]

তথ্য সংগ্রহকারীর নাম :.....	কোড : <input type="text"/>	তারিখ : <input type="text"/>
জেলা :.....	কোডঃ <input type="text"/>	উপজেলা : <input type="text"/>
ইউনিয়ন/পৌরসভা :.....	<input type="text"/> , গ্রাম/মহল্লা.....	<input type="text"/> , ওয়ার্ড নাম্বার :..... <input type="text"/>
ঠিকানা (বিস্তারিত) :.....	ল্যান্ডমার্ক :	
খানাটি কোন ধরনের এলাকায় অবস্থিতঃ <input type="checkbox"/> ১ = শহর, ২ = শহরতলী, ৩ = গ্রাম		

ক্রম	প্রশ্ন	কোড	কোডের বিবরণ
ক) উত্তরদাতার প্রাথমিক তথ্যঃ			
০১	উত্তরদাতার নাম :	<input type="text"/>	সদস্য নম্বর (খ নং প্রশ্ন হতে)
০২	লিঙ্গ :	<input type="text"/>	১ = পুরুষ, ২ = মহিলা
০৩	বয়স (পূর্ণ বছরে) :	<input type="text"/>	
০৪	উত্তরদাতার মোবাইল নম্বর :	<input type="text"/>	

খ) পরিবারের সদস্যদের বিবরণ

আপনার পরিবারে বর্তমানে যে সকল সদস্য বসবাস করছেন তাদের নাম বলুন। (যাচাই করুন এবং সকল সদস্যদের নাম লিপিবদ্ধ করুন।)

সদস্য নম্বর	নাম	বয়স (পূর্ণ বছরে)	মহিলা/পুরুষ ১ = পুরুষ; ২ = মহিলা	যদি বয়স ৫ বছর বা তার অধিক হয় শিক্ষা [] সর্বোচ্চ কোন ক্লাশ পাশ করেছেন?	[] পেশা	১০ বছর বা তার অধিক বয়সের জন্য [] এর বর্তমান বৈবাহিক অবস্থা
	১	২	৩	৪	৫	৬
০১		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০২		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৩		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৪		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৫		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৬		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৭		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৮		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
০৯		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
১০		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

৪. শিক্ষা :	৫ = ডিগ্রি/ফাজিল/সমমান	৫.পেশা :	৬ = দিন মজুর	৬. বৈবাহিক অবস্থা :
০ = স্কুলে যায়নি/কোন শ্রেণী পাশ নয়	৬ = স্নাতক (সম্মান)/সমমান	০১ = সরকারি চাকরি	০৭ = গৃহিনী	১ = কখনই বিয়ে করেনি/অবিবাহিত
১ = প্রাথমিক/ তার চেয়ে কম	৭ = মাস্টার্স/কামিল/সমমান	০২ = বেসরকারি চাকরি	০৮ = শিক্ষার্থী	২ = বিবাহিত (একত্রে বসবাস করছেন)
২ = মাধ্যমিক/ এসএসসির কম	৮ = শুধুমাত্র ধর্মীয় বা অন্যান্য শিক্ষা	০৩ = ব্যবসা	০৯ = বেকার	৩ = তালাকপ্রাপ্ত
৩ = এসএসসি অথবা সমমান	৯ = অন্যান্য (উল্লেখ করুন)	০৪ = কৃষক	১০=অন্যান্য (উল্লেখ করুন)	৪ = বিধবা/বিপত্নীক
৪ = এইচএসসি অথবা সমমান		০৫ = জেলে		৫ = বিচ্ছিন্ন/পরিত্যক্ত

গ) আবাসন সংক্রান্ত তথ্যঃ

ক্রমঃ	প্রশ্ন	কোড লিস্ট	কোড
০১	পরিবার যে ঘরে বসবাস করে তার ধরন কি? প্রধান ঘর কি-না : ১ = হ্যাঁ; ২ = না	ঘরের ধরন : ১=পাকা, ২= সেমি পাকা, ৩= কাঁচা, ৪=ঝুপড়ি	<input type="checkbox"/>
০২	আপনার ঘরের মালিকানার ধরণ কি? (প্রধান ঘরের মালিকানা কি না)	১=নিজে মালিক ৩= বাবা/মায়ের মালিকানা ৫=অন্যের ঘরে বিনা মূল্যে বসবাস	<input type="checkbox"/>
০৩	ভাড়া কৃত হলে, মাসিক ভাড়া কত? (বিলসহ - টাকায়)	২=ভাড়া কৃত ৪=শুশ্রূষা/শ্রমিক বাড়ি ৬=(উল্লেখ করুন)	

ঘ) জমির মালিকানা সংক্রান্ত তথ্যঃ

০১	আপনার পরিবারের কি নিজস্ব জমি	১ = হ্যাঁ ২ = না	(না হলে পরের সেকশনে যান)		
০২	জমির ধরণ	জমির পরিমাণ (শতাংশে)	জমির মূল্য (টাকা/শতাংশ)	জমির ধরণ ১ = নিচু, ২ = মাঝারি, ৩ = উচু	জমির এলাকা ১ = শহর, ২ = শহরতলী, ৩ = গ্রাম
		১	২	৩	৪
ক	বসত ভিটা	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
খ	আবাদি	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
গ	বানিজ্যিক	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ঘ	অন্যান্য (উল্লেখ করুন)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ঙ) অবকাঠামো ও অন্যান্য সুবিধাদি

১. রাস্তাঃ

বাড়ীর সম্মুখস্থ রাস্তার প্রস্থ (মিঃ)	বাড়ীর সম্মুখস্থ রাস্তার ধরণ	প্রধান রাস্তার সুবিধাদি				
		বাসা থেকে প্রধান রাস্তার দূরত্ব (মিঃ)	নর্দমা	লাইটপোস্ট	ট্রাফিক সিগন্যাল/রোড মার্কিং	রাস্তার অবস্থা/সমস্যা
১	২	৩	৪	৫	৬	৭

কোডঃ

১ঃ বাড়ী সম্মুখস্থ রাস্তার প্রস্থ

- ১= ৩ মিটার
২= ৫ মিটার
৩= ৫ মিটারের উপরে

২ঃ বাড়ী সম্মুখস্থ রাস্তার ধরণ

- ১= পিচ ঢালা
২= সুরকি বিছানো
৩= ইট বিছানো
৪= কাঁচা
৫= অন্যান্য

৩ঃ প্রধান রাস্তার দূরত্ব

- ১= ০-৫০ মিটার
২=৫১-১০০ মিটার
৩= ১০০ মিটারের উপরে

৪ঃ ড্রেন

- ১= পাকা
২= কাঁচা
৩=নাই

৫ঃ লাইটপোস্ট

- ১=হ্যাঁ
২=না

৬ঃ ট্রাফিক সিগন্যাল/রোড মার্কিং

- ১= আছে
২= নাই

৭ঃ রাস্তার অবস্থা/সমস্যা

- ১=অবস্থা ভাল ৩= বর্জ্য ও হকার দ্বারা রাস্তা দখল ৫=অগ্রশস্ত্র
২=অবস্থা ভাল নয় ৪= যানঘট ৬= অন্যান্য

২) অত্যাৱশ্যকীয় সেৱা সংক্রান্ত তথ্যঃ

প্রশ্ন নং	প্রশ্ন	কোড	কোডের বিবরণ		
০১	আপনার এই এলাকায় কি ড্রেনেজ সুবিধা আছে?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না (না হলে ৮নং প্রশ্নে যান)		
০২	আপনার পরিবার কি ড্রেনেজ সুবিধা পান?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না		
০৩	কি ধরনের ড্রেনেজ ব্যবস্থা?	<input type="checkbox"/>	১ = কনক্রিট, ২ = ইটের, ৩ = মাটির		
০৪	ড্রেনের অবস্থা কি?	<input type="checkbox"/>	১ = ভাল, ২ = মোটামুটি, ৩ = খারাপ		
০৫	ড্রেন কি উপচে পড়ে এবং পরিবেশ দূষণ করে?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না		
০৬	ড্রেন কি কোথাও বদ্ধ হয়ে যায়?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না		
০৭	আপনার এলাকায় কি জলাবদ্ধতা তৈরি হয়?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না (না হলে ৯নং প্রশ্নে যান)		
০৮	যদি হ্যাঁ হয় এর কারণ এবং সময় কাল				
ক্রমিক নং	কারণ	আছে/ঘটে? ১ = হ্যাঁ, ২ = না	কাল/সিজন (মাসের নাম) হতে পর্যন্ত	সময়	১: ঘটে/আছে-- না হলে পরের লইনে যান
		১	২ ৩	৪	৫: সময়
০১	ড্রেনেজ সুবিধা না থাকা	১ ২			১ = পুরো সিজন
০২	অধিক বৃষ্টিপাত	১ ২			২ = সপ্তাহব্যাপী
০৩	বন্যার পানি	১ ২			৩ = কয়েকদিন
০৪	সরু ড্রেন	১ ২			৪ = কয়েক ঘন্টা
০৫	বদ্ধ ড্রেন	১ ২			
০৬	নীচু জমি	১ ২			
০৭	অন্যান্য (-----)	১ ২			
০৯	আপনার এলাকায় বর্জ্য ব্যবস্থাপনা আছে কি?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না	
১০	আপনার পরিবারের বর্জ্য কোথায় ফেলেন? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/>	<input type="checkbox"/>	১ = পৌর ডাস্টবিন ২ = গর্তে ৩ = যেখানে সেখানে ৪ = অন্যান্য (উল্লেখ করুন)	
১১	বর্জ্য ফেলার স্থানের দূরত্ব	<input type="checkbox"/>		১= ০-১/৪ কি.মি., ২ = ১/৪-১/২ কি.মি. ৩= ১/২ কি.মি. -এর অধিক	
১২	আপনার পরিবারের কি নিজস্ব পায়খানা আছে?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না (না হলে ১৪নং প্রশ্নে যান)	
১৩	পায়খানা থাকলে তার ধরণ কি?	<input type="checkbox"/>		১ = সেনিটারী লেট্রিন ২ = নন-সেনিটারী লেট্রিন ৩ = খোলা জায়গা	
১৪	আপনার পরিবারের বিদ্যুতের উৎস কি?	<input type="checkbox"/>		১ = পল্লী বিদ্যুৎ ৪ = বিদ্যুৎ নেই ২ = পিডিবি ৩ = জেনারেটর ৩ = সৌর বিদ্যুৎ ৫ = অন্যান্য (-----)	
১৫	আপনার পরিবারের রান্নার জ্বালানীর উৎস কি?	<input type="checkbox"/>		১= সিলিভার গ্যাস ৪= বৈদ্যুতিক হিটার ৫= অন্যান্য (উল্লেখ করুন) ২= বায়োগ্যাস ৫= লাকড়ি/ভূষি ৩= কেরোসিন ৬= গোবর	
চ) পরিবেশ দূষণঃ					
০১	আপনার এলাকার ভূ-উপরিভাগের পানি কি দূষিত হচ্ছে?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না	
০২	যদি হ্যাঁ হয়, কি কারণে পানি দূষিত হচ্ছে? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/>	<input type="checkbox"/>	১ = শিল্পকারখানার কারণে ৩= গৃহস্থলির বর্জ্য ২ = রাসায়নিক সার/কীটনাশক ব্যবহারে; ৪= অন্যান্য (উল্লেখ করুন)	
০৩	আপনার এলাকার জমি কি দূষিত হচ্ছে?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না	
০৪	যদি হ্যাঁ হয়, কি কারণে জমি দূষিত হচ্ছে? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/>	<input type="checkbox"/>	১ = শিল্পকারখানার কারণে ৩= গৃহস্থলির বর্জ্য ২ = রাসায়নিক সার/কীটনাশক ব্যবহারে; ৪= অন্যান্য (উল্লেখ করুন)	
০৫	আপনার এলাকায় কি শব্দ দূষণ হচ্ছে?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না	
০৬	যদি হ্যাঁ হয়, কি কারণে শব্দ দূষণ হচ্ছে?	<input type="checkbox"/>	<input type="checkbox"/>	১ = শিল্পকারখানার কারণে ২ = যানবাহনের কারণে ৩= অন্যান্য (উল্লেখ করুন)	
০৭	আপনার এলাকায় কি বায়ু দূষণ হচ্ছে?	<input type="checkbox"/>		১ = হ্যাঁ ২ = না	
০৮	যদি হ্যাঁ হয়, কি কারণে বায়ু দূষণ হচ্ছে? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/>	<input type="checkbox"/>	১ = শিল্পকারখানার কারণে ২ = যানবাহনের কারণে ৩= অন্যান্য (উল্লেখ করুন)	

ছ) পরিবারের সদস্যদের অন্তঃগমন ও বহিঃগমন সংক্রান্ত তথ্য :

০১	পরিবারের কোন সঞ্চয় আছে কি?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না (না হলে ৩নং প্রশ্নে যান)
০২	পরিবারের বাৎসরিক সঞ্চয়ের পরিমাণ টাকা	
ঠ)) পরিবারের বিনিয়োগঃ			
০৩	পরিবারের কোন বিনিয়োগ আছে কি?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না (না হলে পরের সেকশনে যান)
০৪	পরিবারের বাৎসরিক বিনিয়োগের পরিমাণ টাকা	

ড) নাগরিক সেবা/সুবিধা সমূহের প্রাপ্যতা :

ক্রমিক নং	সুবিধাসমূহ	প্রাপ্যতা ১ = আছে, ২ = নাই (না থাকলে পরের লইনে যান)	আপনারা কি সেখানে যান? ১ = হ্যাঁ, ২ = না	দূরত্ব	যাতায়াত মাধ্যম	সেবার মান
		১	২	৩	৪	৫
০১	সরকারী মেডিকেল হাসপাতাল/ ক্লিনিক (উপজেলা/জেলা সদর)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০২	পরিবার কল্যাণ কেন্দ্র	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৩	কমিউনিটি ক্লিনিক	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৪	বেসরকারী হাসপাতাল/ক্লিনিক	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৫	ঔষধের দোকান	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৬	কমিউনিটি সেন্টার	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৭	মার্কেট	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৮	পুলিশবক্স	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
০৯	পার্ক	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১০	খেলার মাঠ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১১	ব্যাংক	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১২	পোস্টঅফিস	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৩	দমকল বাহিনী	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৪	প্রাথমিক বিদ্যালয়	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৫	মাধ্যমিক বিদ্যালয়	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৬	উচ্চ মাধ্যমিক/কলেজ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৭	ডিগ্রী কলেজ/অনার্স বা মাস্টার্স কলেজ / বিশ্ববিদ্যালয়	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৮	মাদ্রাসা	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৯	ব্যায়ামাগার/ক্লাব	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২০	সিনেমা হল/মিলনায়তন	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২১	কাঁচা বাজার	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২২	বাস স্ট্যান্ড	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৩	লাইব্রেরী	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৪	কবরস্থান/শ্মশান	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৫	ঈদগাহ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৬	মসজিদ/মন্দির/মঠ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৭	গণ শৌচাগার	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৮	অন্যান্য (উল্লেখ করুন)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩. দূরত্ব ১ = পায়ে হাটা দূরত্ব (১ কি: মি: -এর নীচে) ২ = ১ কি: মি: - ২ কি: মি: ৩ = ২ কি: মি: - ৩ কি: মি: ৪ = ৩ কি: মি - ৪ কি: মি: ৫ = ৪ কি.মি. - ৫ কি: মি: ৬ = ৫ কি: মি: এর বেশী		৪. যাতায়াত মাধ্যম ১ = পায়ে হেঁটে ২ = বাই-সাইকেলে ৩ = রিক্সা ৪ = টেম্পো/ অটোরিক্সা/ নসিমন ৫ = বাস ৬ = ট্রেন ৭ = নৌকা ৮ = অন্যান্য		৫. সেবার মান ১ = ভাল ২ =খুব ভাল ৩ = মোটামুটি ৪ = খারাপ ৫ = খুব খারাপ		

ঢ) এলাকার সমস্যা সমূহঃ

ক্রমঃ	প্রশ্ন	কোড	কোডের বিবরণ
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০১	আপনার এলাকায় কি যানবাহন সম্পর্কিত কোন সমস্যা আছে?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
০২	যদি হ্যাঁ হয়, কি ধরনের সমস্যা? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = অপ্রস্থ রাস্তা ২ = রাস্তা প্লাবিত হয় ৩ = রাস্তা মাঝে মাঝে নষ্ট ৪ = যানজট ৫ = বেশী ভাড়া ৬ = গন পরিবহণ অপ্রতুল ৭ = অন্যান্য (উল্লেখ করুন)
০৩	আপনার এলাকায় কি রাস্তাঘাট সম্পর্কিত কোন সমস্যা আছে?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
০৪	যদি হ্যাঁ হয়, কি ধরনের সমস্যা? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = সরু রাস্তা ২ = রাস্তা প্লাবিত হয় এবং মাঝে মাঝে নষ্ট ৩ = যানজট ৪ = গন পরিবহণ অপ্রতুল ৫ = রাস্তার অভাব ৬ = বেশির ভাগ রাস্তা কাঁচা ৭ = অন্যান্য (উল্লেখ করুন)
০৫	আপনার এলাকায় কি বর্জ্য নিষ্কাশন কোন সমস্যা?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
০৬	যদি হ্যাঁ হয়, কি ধরনের সমস্যা? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = যথেষ্ট ডাস্টবিন নেই ২ = বর্জ্য ব্যবস্থাপনা ভাল না ৩ = কোন ব্যবস্থা নেই ৪ = অন্যান্য (উল্লেখ করুন)
০৭	আপনাদের এলাকায় কি বিদ্যুতের কোন সমস্যা আছে?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
০৮	যদি হ্যাঁ হয়, কি ধরনের সমস্যা? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = সবার বিদ্যুত সংযোগ নেই ২ = লোড শেডিং অনেক বেশি ৩ = অন্যান্য (উল্লেখ করুন)
০৯	আপনার বাড়ীর দেওয়াল কখনো ফেটেছে কিনা?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
১০	যদি হ্যাঁ হয়, তার কারণ কি? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = ভূমিকম্প ২ = দুর্বল/পুরান দেওয়াল ৩ = কারণ অজ্ঞাত ৪ = অন্যান্য (উল্লেখ করুন)
১১	আপনার এলাকায় কখনো মাটি ডেবে/বসে গেছে কিনা?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
১২	যদি হ্যাঁ হয়, তার কারণ কি? (একাধিক উত্তর হতে পারে)	<input type="checkbox"/> <input type="checkbox"/>	১ = ভূমিকম্প ২ = কারণ অজ্ঞাত ৩ = অন্যান্য (উল্লেখ করুন)
১৩	অন্যান্য (উল্লেখ করুন)		

৩) প্রাকৃতিক দুর্যোগ, দুর্যোগে ক্ষতি ও মোকাবেলার জন্য গৃহীত পদক্ষেপ সমূহ

ক্রঃ নং	দুর্যোগের ধরণ	পতিত হয়েছিল? হ্যাঁ = ১; না = ২	ক্ষতির ধরণ (একাধিক হতে পারে)	ক্ষতির পরিমাণ (টাকায়)	মোকাবেলায় কি ধরনের পদক্ষেপ নিয়েছিলেন? (একাধিক হতে পারে)
		১	২	৩	৪
০১	বন্যা	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০২	খরা	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৩	সাইক্লোন	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৪	নদী ভাংগণ	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৫	অতিবৃষ্টি	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৬	জলাবদ্ধতা	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৭	ভূমিকম্প /ভূমি ধ্বস	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৮	ঝড়ো বাতাস	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
০৯	ধুলি ঝড়	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

ক্রঃ নং	দুর্যোগের ধরণ	পতিত হয়েছিল? হ্যা = ১; না= ২	ক্ষতির ধরণ (একাধিক হতে পারে)	ক্ষতির পরিমাণ (টাকায়)	মোকাবেলায় কি ধরণের পদক্ষেপ নিয়েছিলেন? (একাধিক হতে পারে)
		১	২	৩	৪
১০	অগ্নিকাণ্ড	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
১১	সড়ক দুর্ঘটনা	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
১২	নৌকা/জাহাজডুবি	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
১৩	লবনাজতা	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
১৪	অন্যান্য (উল্লেখ করুন)	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

২. প্রভাব/ক্ষতির কোড:

০ = কোন প্রভাব/ক্ষতি হয় নি
 ১ = খানা সদস্যের মৃত্যু
 ২ = কার্যদিবস নষ্ট
 ৩ = ঘরবাড়ি সম্পূর্ণভাবে নষ্ট
 ৪ = বাড়ির কিছু অংশ নষ্ট
 ৫ = গোয়াল ঘর নষ্ট

৪. কি ধরনের পদক্ষেপ নিয়েছিলেন:

০ = কোন প্রস্তুতি নেই
 ১ = ঘরের ভিটা উচু করা
 ২ = ঘরের খুঁটি মেরামত
 ৩ = ঘর মেরামত
 ৪ = শুকনো খাবার জমানো
 ৫ = টাকা জমানো

৬ = জমির ফসল নষ্ট
 ৭ = মুরগি/ গৃহপালিত পশুর ক্ষতি
 ৮ = আর্থিক ক্ষতি
 ৯ = জমি/সম্পদ নদীগর্ভে
 অন্যান্য (উল্লেখ করুন)

৬ = সেবাদানকারীদের সাথে যোগাযোগ রাখা
 ৭ = মোমবাতি/ম্যাচ রাখা
 ৮ = বালি বা পানি জমা করা
 অন্যান্য (উল্লেখ করুন)

৪) দুর্যোগ মোকাবেলায় সবচেয়ে জরুরী কোন কোন পদক্ষেপ গ্রহণ করা উচিত বলে মনে করেন?

- ১ = নগদ অর্থ হাতে রাখা
- ২ = রেডিও/টেলিভিশন/পত্রিকার মাধ্যমে আগে থেকে দুর্যোগেও খবর রাখা
- ৩ = দলগত ভাবে একে অপরের সহযোগিতা করা
- ৪ = এলাকায় আশ্রয় কেন্দ্র তৈরি করা
- ৫ = দুর্যোগ নিবারণকারী সংস্থাসমূহকে দ্রুত খবর দেওয়া
- ৬ = দুর্যোগ-আক্রান্তদের সরকারী/বেসরকারী ভাবে সহযোগিতা প্রদান
- ৭ = এলাকার অবকাঠামোগত উন্নয়ন করা
- ৮ = এলাকায় সেচ্ছাসেবক দল গঠন করা
- ৯ = সচেতনতা বাড়ানো
- ১০ = শুকনো খাবার রাখা
- ১১ = পানীয় জলের নিরাপদ ব্যবস্থা করা
- ১২ = ফায়ার সার্ভিস
- ১৩ = জরুরী চিকিৎসার ব্যবস্থা রাখা
- ১৪ = অন্যান্য (উল্লেখ করুন)

ত) পর্যটন :

১	আপনার এলাকায় পর্যটনের সম্ভাবনা আছে কি?	<input type="checkbox"/>	১ = হ্যাঁ ২ = না
২	সম্ভাবনা থাকলে কি ধরণের সম্ভাবনা আছে ১ = প্রত্নতাত্ত্বিক নিদর্শন; ২ = টুরিস্ট জোন; ৩ = সাংস্কৃতিক ঐতিহ্যমণ্ডিত স্থান; ৪ = অন্যান্য উল্লেখ করুন		
৩	আপনার এলাকায় পর্যটনের জন্য সম্ভাবনাময় স্থান (স্থানের নাম লিখুন)		

থ. খানা সদস্যদের প্রতিদিনের ভ্রমণ সংক্রান্ত তথ্য :

পরিবারের সদস্যদের ভ্রমণ সংক্রান্ত তথ্য:

ক্রমিক নং	ভ্রমণ নং	ভ্রমণের উৎস (স্থান)	ভ্রমণের গন্তব্য (স্থান)	ভ্রমণের দূরত্ব	ভ্রমণের উদ্দেশ্য	ভ্রমণের সময়		বাহন	সমস্যা
						শুরু	শেষ		
	১	২	৩	৪	৫	৬	৭	৮	৯
০১									
০২									
০৩									
০৪									
০৫									
০৬									
০৭									

কোড :

৪ঃ দূরত্ব

৫ : ভ্রমণের উদ্দেশ্য

৮ : বাহনের নাম

৯ঃ সমস্যা

১= ১ কি.মি.	১= কর্মস্থলে গমন	১= রিক্সা/ভ্যান	১= রাস্তা সংকীর্ণ
২= ১-৩ কি.মি.	২= স্কুল/কলেজ/বিশ্ববিদ্যালয়/শিক্ষা প্রতিষ্ঠান	২= সাইকেল	২= সবসময় যানজট
৩= ৩-৫ কি.মি.	৩= কেনাকাটা	৩= মোটর সাইকেল	৩= বাস স্টপেজ নেই
৪= ৫-৭ কি.মি.	৪= আনন্দ ভ্রমণ/বিনোদন/খেলাধুলা	৪= কার/জীপ/মাইক্রোবাস	৪= দূর্ঘটনা
৫= ৭ কি.মি.-এর অধিক	৫=আত্মীয় গৃহে গমন	৫= বাস	৫= মাঝে মাঝে রাস্তা ভাল নেই
	৬ = চিকিৎসা	৬= বেবীট্যাক্সী/টেম্পো	৬= ভাড়া বেশি
	৭= অন্যান্য	৭= হেঁটে	৭= অন্যান্য (উল্লেখ করুন)
		৪=. অন্যান্য (উল্লেখ করুন)	

দ) আপনার এলাকার অর্থনৈতিক কর্মকাণ্ডসমূহ কি কি ?

০১)

০২)

০৩)

ধ) আপনার মতে উন্নয়নের ক্ষেত্রে অগ্রাধিকারসমূহ উল্লেখ করুনঃ

০১ =

০২ =

০৩=

০৪=

০৫=

ন) এলাকার উন্নয়নের ক্ষেত্রে আপনার সুপারিশ/পরামর্শ সমূহ উল্লেখ করুন :

০১ =

০২ =

০৩ =

০৪ =

০৫ =

তথ্য সরবরাহকারীর স্বাক্ষর তারিখ :	তথ্য সংগ্রহকারীর নাম এবং স্বাক্ষর তারিখ :	তথ্য যাচাইকারীর নাম এবং স্বাক্ষর তারিখ :
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Abbreviation/Acronyms

BDT	Bangladesh Taka
BBS	Bangladesh Bureau of Statistics
BREB	Bangladesh Rural Electrification Board
FPC	Finite Population Correction
GoB	Government of Bangladesh
HDI	Human Development Index
HBB	Herring Bone Bond
HH	House Hold
PDB	Power Development Board
NGO	Non-Government Organization
SDG	Sustainable Development Goal
SPSS	Statistical Packages for the Social Sciences
SRS	Simple Random Sampling
ToR	Terms of Reference
TL	Team Leader
UDD	Urban Development Directorate

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গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
 গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
 নগর উন্নয়ন অধিদপ্তর
 প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
 প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
 অ-আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ স্থানঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
 (শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

.....
 সুপারভাইজারের স্বাক্ষর

১. সাক্ষাৎকার প্রদানকারীর নাম, ঠিকানা ও মোবাইল নম্বর :

২. জরিপ এলাকা (হাট/বাজার/মার্কেট/গ্রাম/মহল্লার নাম) :.....

৩. সাক্ষাৎকার প্রদানকারীর আর্থসামাজিক বৈশিষ্ট্যঃ

খানার সদস্য	বয়স (বছর)	লিঙ্গ (কোড)	বৈবাহিক অবস্থা (কোড)	শিক্ষা (কোড)	জন্মস্থান	অভিগমনের কারণ (কোড)
২						
৩						
৪						
৫						
৬						
৭						
৮						
৯						

কোড : লিঙ্গ

১. পুরুষ	২. মহিলা	৩. নপুংসক
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কোড : বৈবাহিক অবস্থা

১. অবিবাহিত	২. বিবাহিত	৩. বিধবা/বিপত্নিক	৪. তালাক প্রাপ্ত	৫. পৃথক	৬. পরিত্যক্ত	৭. অন্যান্য
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কোড : শিক্ষা

১. নিরক্ষর	২. প্রাথমিক	৩. নিম্ন-মাধ্যমিক	৪. মাধ্যমিক/দাখিল	৫. এইচ.এস.সি/আলিম
৬. ডিগ্রি/অনার্স/ফাজিল	৭. মাস্টার্স ডিগ্রি/কামিল	৮. টেকনিক্যাল সার্টিফিকেট	৯. অন্যান্য :	

কোড : অভিগমনের কারণ

১. কর্মস্থল	২. বেকারত্ব/দারিদ্রতা	৩. বৈবাহিক কারণ	৪. সামাজিক অস্থিরতা	৫. ব্যবসা
৬. নদী ভাঙ্গন	৭. অন্যান্য :			

৪. বর্তমান পেশার ধরন :

৫. পূর্বের পেশার ধরন :

৬. পূর্বের পেশা পরিবর্তনের কারণ :

৭. স্বনিয়োজিত পেশা হলে মূলধনের পরিমাণ : (টাকা)

৮. মূলধনের উৎস (কোড)ঃ

কোড ৮ : মূলধনের উৎস

১. উত্তরাধিকার সূত্রে	২. যৌতুক	৩. নিজ পরিবার/বন্ধু-বান্ধব	৪. বিনিয়োগকারী	৫. ঋণ	৬. নিজেদের সমবায়	৭. অন্যান্য :
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গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
 নগর উন্নয়ন অধিদপ্তর
 প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
 প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(শিল্প কারখানা)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
 (শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
 সুপারভাইজারের স্বাক্ষর

১. শিল্প কারখানা বৃহৎ/ ক্ষুদ্র/ মাঝারি/ কুটির

১.১ শিল্প কারখানা/প্রতিষ্ঠানের নাম :

১.২ শিল্প কারখানা/প্রতিষ্ঠানের ঠিকানা :

১.৩ মালিকানার ধরন (কোড)ঃ কোড ১.৩ : মালিকানার ধরন

১. ব্যক্তিগত মালিকানা	২. লিমিটেড কোম্পানি	৩. অংশীদারী প্রতিষ্ঠান
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১.৪ মালিক/ব্যবস্থাপনা পরিচালক/ব্যবস্থাপনা অংশীদারের নামঃ

১.৫ প্রতিষ্ঠানের ধরন (কোড)ঃ কোড ১.৫ : প্রতিষ্ঠানের ধরন

১. নির্মাণ সামগ্রী	২. মৎস্য প্রক্রিয়াজাতকরণ	৩. তামাক প্রক্রিয়াজাতকরণ	৪. কুটির শিল্প
৫. ইট ভাটা	৬. খাদ্য প্রক্রিয়াজাতকরণ	৭. কাষ্ঠজাত দ্রব্য	৮. হস্ত শিল্প
৯. দোকান	১০. বরফ কারখানা/আইসক্রিম	১১. ভোজ্য তেল কল	১২. মোটর গ্যারেজ
১৩. যন্ত্রপাতি বিপণন	১৪. পোল্ট্রি	১৫. ঔষধ শিল্প	১৬. সিগারেট কারখানা
১৭. হাট/বাজার	১৮. দুগ্ধ খামার	১৯. মেটাল প্রডাক্ট	২০. বিড়ি বানানো
২১. লব্ধি	২২. মৎস্য খামার	২৩. প্লাস্টিক শিল্প	২৪. রুটি/বিস্কুট কারখানা
২৫. রাসায়নিক দ্রব্যাদি	২৬. ছাপাখানা	২৭. করাত কল	২৮. রাইস মিল
২৯. আটা/ময়দা মিল	৩০. কোল্ড স্টোরেজ	৩১. সিমেন্ট কারখানা	৩২. সিরামিক পণ্য উৎপাদন কারখানা
৩৩. সুতা ও বস্ত্র শিল্প	৩৪. অন্যান্য		

১.৬ আয়তন : বিঘা , একর (১ একর = ৩.০৩ বিঘা)

১.৭ মূলধন সংক্রান্ত তথ্য

প্রতিষ্ঠানের মোট মূলধন : টাঃ

১.৭.১ মূলধনের উৎস (কোড) :

কোড ১.৭.১ : মূলধনের উৎস

১. ব্যক্তিগত সঞ্চয়	২. পারিবারিক উৎস	৩. ব্যক্তিগত/পারিবারিক সঞ্চয় ও ব্যাংক ঋণ
৪. আত্মীয় স্বজন থেকে প্রাপ্ত ঋণ	৫. প্রবাসী আয় থেকে প্রাপ্ত	৬. স্থানীয় মহাজন থেকে প্রাপ্ত
৬. সমবায় প্রতিষ্ঠান হিসেবে প্রতিষ্ঠিত	৭. অন্যান্য	

১.৮ কর্মকর্তা ও কর্মচারীর সংখ্যা :

১.৮.১ সর্বমোট সংখ্যা : ১.৮.২ পুরুষঃ ১.৮.৩ নারী :

১.৮.৪ প্রশাসনিক কর্মকর্তা ও কর্মচারীর সংখ্যা :

১.৮.৫ শ্রমিক ও অন্যান্য কর্মচারীর সংখ্যা :

১.৯ কাঁচামাল সংক্রান্ত তথ্যঃ

ক্রমিক নং	ব্যবহৃত কাঁচামাল	কাঁচামালের উৎস	
		স্থানীয় (%)	আমদানীকৃত (%)
১			
২			
৩			
৪			
৫			

১.১০ উৎপাদিত পণ্য :

১.১০.১ উৎপাদিত পণ্যের প্রকার (কোড) :

কোড ১.১০.১ : উৎপাদিত পণ্যের প্রকার

১. ইট	২. প্রক্রিয়াজাতকরণকৃত মাছ	৩. দুধ ও দুগ্ধজাত খাবার	৪. গৃহস্থালির পণ্যসামগ্রী
৫. ভোজ্য তেল	৬. ডিম/পোল্ট্রি	৭. প্যাকেটজাত খাবার	৮. তামাকজাত দ্রব্য
৯. কৃষিজাত পণ্য	১০. ধাতব পাত্র	১১. সুতা ও বস্ত্র	১২. ঔষধ
১৩. কাঁচ, টাইলস, রিং স্ল্যাব	১৪. কাষ্ঠজাত দ্রব্য	১৫. প্লাস্টিক পণ্য	১৬. জি আই পাইপ, পানির পাম্প
১৭. রাসায়নিক দ্রব্যাদি	১৮. হস্তশিল্প পণ্য	১৯. বরফ/আইসক্রিম	২০. কৃষি যন্ত্রপাতি
২১. আটা/ময়দা	২২. আলু সংরক্ষণ	২৩. সিমেন্ট	২৪. সিরামিকের তৈজসপত্র
২৫. অন্যান্য			

১.১০.২ উৎপাদিত পণ্য বাজারজাতকরণ :

ক্রম	বিবরণ	পরিমাণ (%)
১.১০.২.১	স্থানীয় বাজার	
১.১০.২.২	সারা দেশ	
১.১০.২.৩	রপ্তানির জন্য স্থানীয় রপ্তানিকারককে সরবরাহ	
১.১০.২.৪	সরাসরি রপ্তানি (বিদেশ) :	

১.১১ কাঁচামাল ও উৎপাদিত পণ্য বাজারজাতকরণে ব্যবহৃত পরিবহন :

১.১১.১ সড়ক পথ (কোড) :

কোড ১.১১.১ : সড়ক পথের বাহন

১. বাস	২. ট্রাক	৩. পিকআপ	৪. মাইক্রোবাস	৫. মটরসাইকেল	৬. কার	৭. ট্যাক্সি/বেবি ট্যাক্সি/ভটভটি
৮. অটো	৯. রিক্সা	১০. ভ্যান	১১. গরু/ঘোড়ার গাড়ি	১২. বাইসাইকেল	১৩. অন্যান্য	

১.১১.২ রেলপথ: ১. বাংলাদেশ রেলওয়ে

১.১২ বর্জ্য ব্যবস্থাপনা :

১.১২.১ দৈনিক বর্জ্য উৎপাদনের পরিমাণ ও ধরন : টন

১.১২.১.১ কঠিন : % ১.১২.১.২ তরল : %

১.১২.২ বর্জ্য অপসারণ: ১. পরিশোধিত ২. অপরিশোধিত

১.১২.৩ বর্জ্য অপসারণের স্থান (কোড) :

কোড ১.১২.৩ : বর্জ্য অপসারণের স্থান

১. রাস্তার পাশে	২. খোলা মাঠ	৩. খাল	৪. নদী	৫. কৃষি জমি	৬. বর্জ্য ডাম্পিং স্থান
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১.১২.৪ বর্জ্য অপসারণ স্থানের মালিকানা (কোড) :

কোড ১.১২.৪ : বর্জ্য অপসারণ স্থানের মালিকানা

১. নিজস্ব ডাম্পিং গ্রাউন্ড	২. সরকারি স্থান	৩. বেসরকারি মালিকানাধীন জায়গা
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১.১৩ বর্জ্য পরিশোধন ব্যবস্থা আছে কি না?

১. হ্যাঁ ২. না

১.১৪ প্রতিষ্ঠান থেকে সৃষ্ট পরিবেশ দূষণ রোধের ব্যবস্থার বিবরণ:

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১.১৫ ই.আই.এ (এনভায়রনমেন্টাল ইমপ্যাক্ট এসেসমেন্ট) করেছেন কি না?

১. হ্যাঁ ২. না

১.১৬ প্রতিষ্ঠানের শ্রমিক - কর্মচারীদের পেশাগত প্রশিক্ষণের ব্যবস্থা আছে কি?

১. হ্যাঁ ২. না

থাকলে প্রশিক্ষণের ধরন (কোড) :

কোড ১.১৬ : প্রশিক্ষণের ধরন

১. প্রতিষ্ঠানে শিক্ষানবিস	২. সংশ্লিষ্ট পেশার প্রশিক্ষণ কেন্দ্র	৩. কোম্পানির খরচে বৈদেশিক প্রশিক্ষণ
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১.১৭ প্রতিষ্ঠানের শ্রমিক-কর্মচারীদের স্বাস্থ্য পরীক্ষার ব্যবস্থা আছে কি?

১. হ্যাঁ ২. না

থাকলে কি ধরনের ব্যবস্থা (কোড) :

কোড ১.১৭ : শ্রমিক-কর্মচারীদের স্বাস্থ্য পরীক্ষার ব্যবস্থার ধরন

১. নিজস্ব ডাক্তার প্রতিদিন নির্দিষ্ট সময়ে প্রতিষ্ঠানে এস স্বাস্থ্য সেবা দেন	২. কোম্পানির ব্যবস্থানুযায়ী ডাক্তার নিজস্ব চেম্বারে দেখেন
৩. প্রতিষ্ঠানের ভেতর ছোট হাসপাতাল আছে	৪. স্বাস্থ্য সেবার জন্য আলাদা আর্থিক ভাতা পান

১.১৮ শিল্প কারখানার পরিবেশ বিষয়ক ছাড়পত্র আছে কিনা (বিবরণসহ) :

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১.১৯ কর্মকর্তা/কর্মচারীদের বাসস্থান সম্পর্কিত তথ্য (কোড) :

কোড ১.১৯ : বাসস্থান

১. শিল্প প্রতিষ্ঠানের নিজস্ব আবাসন	২. কর্মকর্তা/কর্মচারীদের নিজস্ব বাড়ি	৩. ভাড়া বাসা	৪. অন্যান্য
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১.২০ এই প্রতিষ্ঠানের খাবার পানি সরবরাহ (কোড) :

কোড ১.২০ : খাবার পানি সরবরাহ

১. নিজস্ব টিউবওয়েল	২. সিটি কর্পোরেশনের পাইপ লাইন	৪. সরবরাহ নাই
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১.২১ খাবার পানির মান (কোড) : ☐ ভাল ☐ ভাল নয়

১.২২ এই মার্কেট/হাট/বাজার এর গণশৌচাগার ব্যবস্থা (কোড) :

কোড ১.২২ : গণশৌচাগার ব্যবস্থা

১. স্যানিটারী টয়লেট	২. পিট ল্যাট্রিন	৩. ব্যবস্থা নাই
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১.২৩ গণশৌচাগারের মান (কোড) : ☐ ভাল ☐ ভাল নয়

১.২৪ এই কারখানার উৎপাদন কাজের জন্য পানির উৎস (কোড) :

কোড ১.২৪ : পানির উৎস

১. ডিপ টিউবওয়েল	২. পুকুর	৩. খাল	৪. নদী	৫. পানির প্রয়োজন নাই
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১.২৫ এই কারখানার বিদ্যুৎ সরবরাহ ব্যবস্থা (কোড) :

কোড ১.২৫ : বিদ্যুৎ সরবরাহ ব্যবস্থা

১. পি.ডি.বি	২. আর.ই.বি সরবরাহ	৩. আর.ই.বি সরবরাহ বন্ধ থাকলে নিজস্ব জেনারেটর
৪. আর.ই.বি সরবরাহ বন্ধ থাকলে উৎপাদন বন্ধ হয়ে যায়	৫. সৌর বিদ্যুৎ	৬. অন্যান্য

১.২৬ এই কারখানার বিদ্যুৎ সরবরাহের অবস্থা (কোড) :

কোড ১.২৬ : বিদ্যুৎ সরবরাহ অবস্থা

১. নিয়মিত ও অসুবিধা নাই	২. অনিয়মিত	৩. নিয়মিত কিন্তু লো-ভোল্টেজ	৪. অনিয়মিত ও লো-ভোল্টেজ
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১.২৭ প্রতিষ্ঠানে উৎপাদিত পণ্যের পরিমাণ (বাৎসরিক) :

..... পিস টন গজ/মিটার

১.২৮ উৎপাদিত পণ্যের মূল্য (বাৎসরিক) : টাকা

১.২৯ শিল্প কারখানার সমস্যা (কোড) :

কোড ১.২৯ : কারখানার সমস্যা

১. অবকাঠামোগত সমস্যা	২. অপ্রভুল যোগাযোগ ব্যবস্থা	৩. জ্বালানি সংকট
৪. বর্জ্য অপসারণ সমস্যা	৫. চাঁদাবাজি	৬. শ্রমিক অসন্তোষ
৭. আমলাতান্ত্রিক জটিলতা	৮. আমদানী পণ্যের সাথে অসম প্রতিযোগিতা	৯. দক্ষ শ্রমিকের অভাব
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১.৩০ উল্লিখিত সমস্যা সমাধানের পরামর্শ থাকলে তার বিবরণ :

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তথ্য প্রদানকারীর নাম :

পদবী :

মোবাইল নম্বর :

তথ্য প্রদানের জন্য ধন্যবাদ

Executive Summary

Economy of an area is one the major notions of the upazila's development condition. It also reveals, which sectors of economy has been flourished here, and which sectors of economy is favorable for this area. Thus, the report aims to explore the existing economic condition of this upazila by categorizing the economic sectors into broad categories named Formal and Informal. Faridpur Sadar Upazila is a dominantly industrial area, and is home to Jute of the country. Beside this Paddy, wheat, oilseed, pulse, onion, garlic and sugarcane is the main crop of this Upazila and Extinct or nearly extinct crops Indigo, arahar, aus paddy, mustard seed, khesari. Except the Agri-based economic activities there are a good industrial economy exist in the upazila such as Brick Field, Handicrafts, Jute Mills, Ice cream factory, Rice mill, Workshop, Yarn and Fabrics industry, Cottage and Handicrafts, Flour mill, Fertilizer Industry etc. On the other hand, here it has been found that the upazila needs skilled labor but female is totally segregated from both of formal and informal sectors of economy. Thus government could take necessary steps to build the young people of this area into working skilled labor by establishing new training centers and also encouraging women to enter into the economy by taking some appropriate steps. In addition, infrastructure development (road) along with provision of loan in low interest also were preferred by most of the industries. Moreover, one of the major economic success of this area is the local markets are capable of meeting the need for most of the economic units of this area. And, the products are going beyond the upazila boundary which is favorable for flourishing economy of a region. Thus the government could take necessary steps by shifting the informal sectors into formal sectors, and thus the informal sectors could be one of the major sources of government's revenue. In addition, the management committee of the economic units both of formal and informal area enough conscious about their laborer's health security, though there are small consciousness among them about waste management and their surrounding environment. Thus awareness building programs could be taken regarding this problem.

Abbreviation/Acronyms

ECAL-----	Engineering Consultants and Associates Limited
BDT-----	Bangladesh Taka
BBS-----	Bangladesh Bureau of Statistics
BEZA-----	Bangladesh Economic Zone Authority
BDT-----	Bangladeshi Taka
CBOs -----	Community Based Organizations
EIA-----	Environmental Impact Assessment
FY -----	Fiscal Year
GDP-----	Gross Domestic Product
GoB-----	Government of Bangladesh
JV -----	Joint Venture
LGED -----	Local Government Engineering Department
MDGs -----	Millennium Development Goals
NGO -----	Non-Government Organization
NSSS -----	National Social Security Strategy
PRSP -----	Poverty Reduction Strategy Paper
SDG-----	Sustainable Development Goal
SPSS-----	Statistical Packages for the Social Sciences
SRS -----	Simple Random Sampling
SME -----	Small and Medium Enterprises
SFYP -----	Seventh Five Year Plan
TIN-----	Tax Identification Number
ToR -----	Terms of Reference
TL -----	Team Leader
UDD -----	Urban Development Directorate

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Chapter One: Introduction

1.1 Background

Economy of an area is one the major notions of the upazila's development condition. It also reveals, which sectors of economy has been flourished here, and which sectors of economy is favorable for this area. It also notifies the level of development that the area needs and required. Thus formal-informal economic survey plays a vital role in development planning and others level of development. Basis on the previous discussion, this report aims to explore the existing economic condition of this upazila by categorizing the economic sectors into broad categories named Formal and Informal.

In the context of Bangladesh, formal-informal sectors constitute the dominant economic activities in Bangladesh and its contribution to GDP and employment is unending fact. Empirical Studies indicate around 80% of labor force in Bangladesh works in the informal economy and that the contribution of the informal sector of the GDP is around 64%. The major informal sector in Bangladesh is agriculture, and a large number of Small and Medium Enterprises (SMEs) and Micro-enterprises fall into the category of informal sector. The major driving forces behind the growth in informal sector, is the rise of Household demand for informal sector goods and services as well as the rise in demand for intermediate inputs. In fact, informal sector covers a significant part of the economy and plays an important role in employment creation and Production. Therefore, informal sector is very important for the Bangladesh Economy, as its various channels have major impacts on both the formal economy as well as the overall economy of the country.

1.2 Understanding Formal-Informal Economic Survey

In this context the components of formal economies are, the economic units which have government approval, as they are registered, possess Taxpayer Identification Number (TIN) and give tax to the government. Industries, bank, insurance, NGO, CBOs etc. are the example of formal economic units. On the other hand, informal economies include agricultural day laborers, small traders, urban foot path vendors, paid domestic workers and home produced cloths, handicrafts, household based agriculture, vendors, hawkers, and small scale service providers like cobblers, tailors etc. are the major components of informal economy. Informal jobs mainly fall outside the domain of the Governments labor market regulation. Moreover, informal workers do not function with the types of legal protection connecting the number of working hours, health and safety or within the types mandated benefits that would be normally feature of formal employment opportunities in large ongoing private sector firms or in public sector.

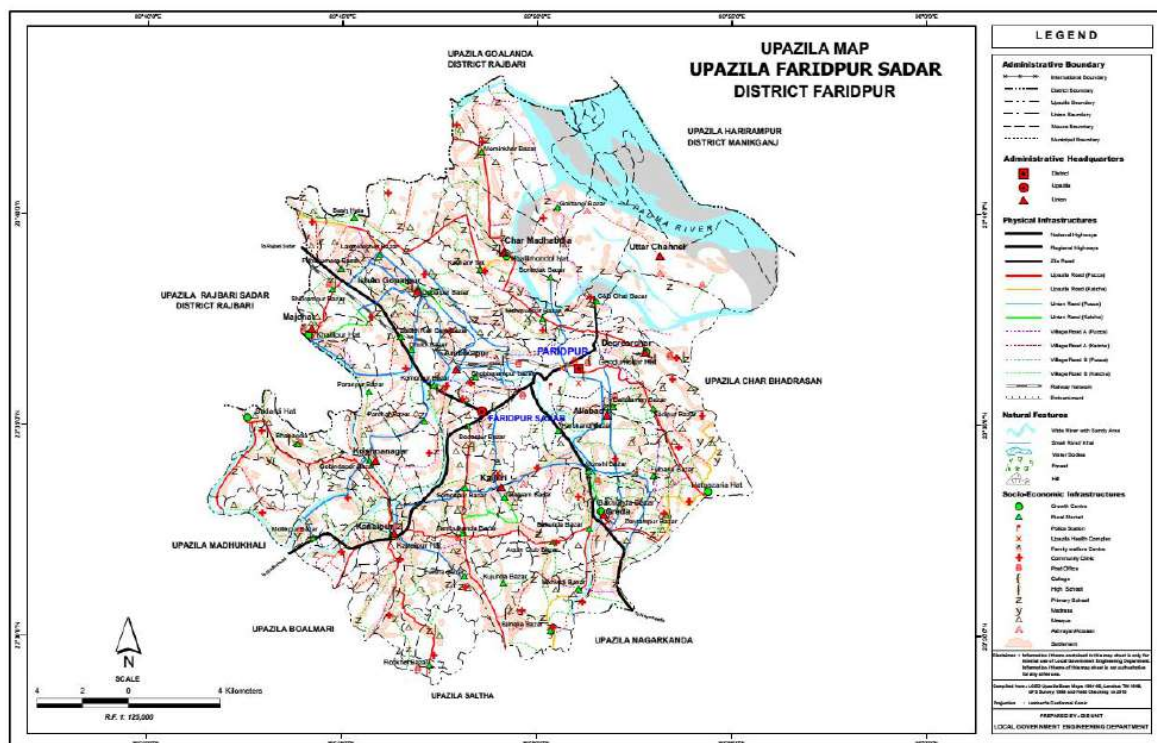
1.3 Upazila Profile

Faridpur Sadar Upazila (FARIDPUR DISTRICT) area 407.02 sq km, located in between 23°29' and 23°34' north latitudes and in between 89°43' and 89°56' east longitudes. It is bounded by Goa landa and Harirampur upazilas on the north, Saltha upazila on the south, Char Bhadrasan and Harirampur upazilas on the east, Boalmari, Madhukhali and Rajbari Sadar upazilas on the west. Upazila town is situated on the bank of Kumar river. Total Household 103535; Population total 469410; male 235762, female 233648; Per square km density 1137. muslim 420103, hindu 48260, buddhist 20; Christian 843 and others 184. the main rivers of Faridpur Sadar are Padma, Kumar, Old Kumar, Bhubaneshwar; Chapa Beel, Hari Beel, Shakuner Beel, Dhol Samudra, Kole (a strip of shallow water) of Beel Mamunpur and Tepa Kholar Lake (excavated) are notable. Aridpur Sadar Thana was formed in 1896 and it was turned into an upazila in 1983.

Faridpur Sadar is dominantly agricultural area, Here the main sources of income are Agriculture 39.72%, non-agricultural labourer 4.03%, industry 1.65%, commerce 17.49%, transport and communication 9.19%, service 14.23%, construction 3.68%, religious service 0.15%, rent and

remittance 1.41% and' others 8.45%. Archaeological heritage and relics Mosque at Gerda (1013 AH), Dargah of Sheikh Farid, Shiva Mandir at Chawkbazar, Jagabandhu Ashram (Sree Angan), Mazar of Bismillah Shah, Court Mosque, Faridpur Christian Mission, Gaur Gopal Angina (courtyard), house of Shah Saheb at Goalchamat, Math of Mahim Babu is the main historical and heritage site of the upazila.

Map-1.1: Upazila Map, Faridpur Sadar, Faridpur Source: LGED, 2016



Faridpur Sadar upazila of Faridpur District is generally functioning as a large agro-economic zone where many people are engaged with agriculture based economic activities. It also contains large employment centre at urban areas, thus the people got attracted from different parts of rural areas. The location and linkages of the city of Faridpur Sadar with the regional growth centers makes it one of the most important cities in this region. According to BBS (2011), the upazila has 5 growth centres, 31 hat/bazars, 133 rice mills, 11 jute mills, 11 Mills, 327 hand loom, 133 husking craft mill, 62 goor processing, 85 Cane industry, 430 wooden furniture, 68 saw mill, 17 rice mill, 24 Oil mill, 16 potteries, 21 Printing Press, 118 flour mill, 405 tailoring shop.

Paddy, jute, wheat, oilseed, pulse, onion, garlic and sugarcane is the main crop of this Upazila. Extinct or nearly extinct crops Indigo, arahar, aus paddy, mustard seed, khesari.

Chapter Two: Approach and Methodology

2.1 Introduction

First of all, the consultants reviewed different national policies and plans. Then, they developed a general survey methodology for conducting formal informal economic survey. Then appropriate personnel of formal and informal economic units were being interviewed with the approved questionnaire (Please see Annexure-I). The following reports are the general elaboration of the followed methodology of the survey. The consultants used convenient survey technique under non-probability sampling technique to collect questionnaire based primary data for formal informal economic analysis.

2.2 Sample Selection

Three criteria usually will need to be specified to determine the appropriate sample size: the level of precision, the level of confidence or risk, and the degree of variability. The determination of sample size for this project is concerned with the following issues under the assumption that the characteristic of the population to different homogenous group.

- The definition of the population;
- The creation of sampling frame;
- The choice of Probability versus Non-probability sampling;
- The calculation of sample size.

The definition of the population: Different types of formal and informal economic units are being considered as the population for this formal-informal economic survey (BBS, 2011).

The creation of sampling frame: The standard rule for sampling frame has been followed based on SRS (Simple Random Sampling).

The choice of Probability versus Non-probability sampling: Probability sampling has been followed.

The calculation of sample size: To determine the minimum sample size the following formula has been followed: $n = \frac{z^2}{d^2} pq$

Where,

n = Sample size ,

z = Statistical certainty chosen ,

p = Coverage rate/estimated prevalence ,

$q = 1 - p$ and

d = precision desired : 0.05

Then, they used stratified sampling technique under probability sampling technique to collect questionnaire based primary data for formal-informal economy analysis. The stratified sampling technique is further used for collecting samples from all the sub zones such as industries, hawkers etc. of this Upazila. For each types then random sampling technique is used to select the industries for survey using Microsoft excel.

2.3 Tools Development

The Survey tool was developed following the below steps. (1) Review of National Policies and Plans (2) Collection of Upazila Map (3) Find out sectors, indicators and variables (4) Preliminary

questionnaire develop and share with Team leader as well as Project Management Office (5) Pretesting at field level (6) Questionnaire Finalization.

2.3.1 Preparation of Questionnaire

In order to conduct the survey, a compact and extensive pre-coded structured questionnaire (please see Annexure-01) has been prepared for all the packages and it has been approved by the authority of Urban Development Directorate (UDD). The questionnaire has intended to capture information according to the provided format in the TOR.

2.3.2 Pre-testing

The questionnaires were pretested with formal and informal economic units with participation of survey team (Survey supervisors, Enumerators) and members of Project management team. Then the survey team discussed about the field level problem with the economic expert, Team leader and Project Management team for finalization of Questionnaire format.

2.3.3 Training of Enumerators and Survey Supervisors

ECAL considered the experience of working in similar types of survey functions and educational qualifications for selection in the formal-informal economic survey team. Considering these issues, a survey team of 27 members were selected for carrying out the survey work at Faridpur Sadar Upazila (see Annexure-II). An arrangement has also been made to provide orientation and training to the survey team by the Team Leader (TL). After orientation and training at the headquarters of ECAL, the survey team has been sent to the field.

2.3.4 Survey Team Mobilization

The survey started in 22.01.2016 and the total survey is taken about 30 days from that date.

2.4 Quality Control Measures

To ensure quality of data, a number of validation checks were conducted during data collection period:

- (a) The survey supervisor went back to the respondent as well as talked over mobile phone number for validate or accurate the collected data by enumerator.
- (b) After data collection had been completed, some economic units were randomly chosen, and then the supervisors went to the field for further investigation. If any inconsistencies were found, then the supervisors discussed the issue with the enumerators.
- (c) Project Manager from Project Management Office as well as formal-informal economic expert had been checked randomly for quality of collected data.

2.5 Database Preparation and Processing

After completing the survey works in the field (Annexure-II), a detail database has been prepared to follow the survey questionnaire. The database has prepared by using SPSS 20 software. To make the data input process easier, coding system has been used in the necessary field. Few data have been stored in MS Excel software. 3 micro computers are exclusively used for data entry. SPSS 20 software is used for all data management that has been collected from the field. In this chapter socioeconomic survey data have been presented into three forms/styles viz. tabular form, geographical and textual/report form.

Chapter Three: Review of Plan and Policies

3.1 Introduction

Bangladesh's planning model is dominated by a central planning system where the central governments set out relevant plans and policies and implement the goal and objectives of those on sectoral basis. Either a central government body or a local institution of a particular sector under a central ministry initiates the planning process with directives from that higher authority. It can be mentioned here that both the orientation and the process of development planning have been entirely top-down approach. However, this type of plan decision making system is to be followed in undertaking even any planning initiatives at the smaller urban centre levels.

In recent times there appears to be some understanding at the national levels about the importance of physical planning which has been voiced in various national plans and policies viz. Plans - the Five Year Plans, later Poverty Reduction Strategy Paper (PRSP), Vision 2021; Vision 2021-2041; and Policies – land use policy, agriculture policy, water policy, environmental policy, industrial policy, health policy, education policy, disaster policy, transport policy, etc. These documents would be of paramount importance in the process of preparing development plans for Faridpur Sadar Upazila. It is vitally needed to consider the spatial aspects of these national plans' and policies' goal and objectives so that these are harmonized as well as reflected in the Strategy Plans, the Structure Plans, the Urban Area Plans and the Detailed Area Plans of the above mentioned Upazilas in the context of respective local circumstances.

In this section, penitent national plans and policies have been critically reviewed to provide guidance to prepare an appropriate and sustainable economic development plan for the Upazila in line with the TOR of the consultancy services.

3.2 Sustainable Development Goals (SDGs)

Sustainable Development Goals are accompanied by targets and will be further elaborated through indicators focused on measurable outcomes. They are action oriented, global in nature and universally applicable. They take into account different national realities, capacities and levels of development and respect national policies and priorities. They build on the foundation laid by the MDGs, seek to complete the unfinished business of the MDGs, and respond to new challenges. These goals constitute an integrated, indivisible set of global priorities for sustainable development. Targets are defined as aspirational global targets, with each government setting its own national targets guided by the global level of ambition but taking into account national circumstances. The goals and targets integrate economic, social and environmental aspects and recognize their inter linkages in achieving sustainable development in all its dimensions. Principal goals of SDG include the following:

1. End poverty in all its forms every where
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3. Ensure healthy lives and promote well-being for all at all ages
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. Achieve gender equity and empower all women and girls
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to all affordable, reliable, sustainable and modern energy for all
8. Promote sustainable, inclusive and sustainable economic growth, full and decent work for all;
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

10. Reduce inequality within and among countries;
11. Make cities and human settlements inclusive, safe, resilient and sustainable;
12. Ensure sustainable consumption and production pattern;
13. Take urgent action to combat climate change and its impacts
14. Conserve and sustainably use the oceans, sea and marine resources for sustainable development;
15. Protect, restore and promote, sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss;
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development;

In illustration of these goals, some targets have proposed to meet the goals of SDG. Some relevant targets to meet up the goals related to the formal informal economic sector are mentioned below:

Goal 1: Poverty Elevation

Target 1.3: Ensure all men and women in poor and vulnerable, have equal rights to economic resource and access to basic services, ownership and control over land and other forms of property, inheritance, natural resource appropriate new technology and financial services including microfinance.

Target 1.5: Build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

Goal 5: Gender Equality

Target 5.1: End all forms of discrimination against all women and girls everywhere.

Target 5.3: Eliminate all forms of violations against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.

Goal 9: Sustainable Infrastructure and Industrialization

Target 9.2: Promote inclusive and sustainable industrialization by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

Target 9.4: Upgrade infrastructure and retrofit industries to make them sustainable, with increase resource-use efficiency and greater adaptation to clean and environmentally sound technologies and industrial processes.

Goal 12: Sustainable Consumption and Production Patterns

Target 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices to integrate sustainable information at reporting cycle.

Issues like environmental sustainability, eradication of poverty and hunger, quality education, sustainable industrialization and health related matters are directly related to plan preparation process. In the preparation of Faridpur Sadar Upazila development plan land use zoning will endeavor to protect the environmentally sensitive areas through conservation, promote education through allocation of appropriate quantity of land for setting up of academics, industry and health facilities. The plan will be directed to reduce urban and rural deprivation through appropriate proposal for strengthening urban and rural economy and adequate provision of utility services.

3.3 Development Goals of Bangladesh: Vision 2021 and 2041

Vision 2021 was the political manifesto of the Bangladesh Awami League party before winning the National Elections of 2008. It stands as a political vision of Bangladesh for the year 2021, the golden jubilee of the nation. The policy has been criticized as a policy emblematic of technological optimism in the context of Bangladesh and the state repression of media, low internet penetration, inadequate electricity generation. The Vision 2021 is an articulation of where this nation needs to be in 2021 – the year which marks the 50th anniversary of Bangladesh’s independence.

The main goal is for Bangladesh to become a middle income country where poverty will be completely eradicated. Economic development & initiatives identified are:

- a. Meeting basic needs
- b. Population and labor force
- c. Alleviation of poverty
- d. Food & nutrition
- e. Health care center
- f. Education
- g. Industry
- h. Energy security
- i. Infrastructural development
- j. Housing
- k. Environment
- l. Water resources

3.4 Perspective Plan (2010 – 2021)

A nation without vision is a nation gone astray. Such is not the case for Bangladesh whose independence in 1971 was the culmination of a people’s struggle, as much for political freedom as it was for their economic emancipation. In keeping with those aspirations, the Government’s Vision 2021 is an articulation of where this nation needs to be in 2021 – the year which marks the 50th anniversary of Bangladesh’s independence. That milestone, ten years away from 2011, will be a high point in Bangladesh’s war against chronic poverty and the struggle to attain middle income country status, from its beginning as a low income country. This “Perspective Plan of Bangladesh (2010-2021): Making Vision 2021 a Reality” is a strategic articulation of the development vision, mission, and goals of the Government in achieving a prosperous Bangladesh grounded in political and economic freedoms a reality in 2021.

Vision 2021 stipulates middle income status for Bangladesh by 2021, reaching annual GDP growth rate of 10% by that year and averaging 9.2% for the period 2011-21. Fulfillment of this vision requires superior double digit performance for manufacturing taking its share in GDP to 27 percent by 2021, and that of industry to 37 percent. Accelerated pace of industrialization will be necessary to address the increasingly diminishing capacity of agriculture to absorb the incremental labour force, strengthen backward and forward linkages with agriculture and services sectors, cater to the growing domestic demand for industrial goods, and take advantage of emerging opportunities in the global market.

3.5 Seventh Five Year Plan (SFYP)

The Government’s Vision 2021 defines several economic and social outcomes for Bangladesh to achieve by 2021. To convert this Vision into long-term development targets, a Perspective Plan 2010-2021 was prepared. The targets of Vision 2021 and the associated Perspective Plan 2010-2021 were to be achieved through the implementation of two five-year plans, the Sixth Five Year Plan (2011-15) and the Seventh Five Year Plan (2016-2020). The 6th FYP made solid progress in increasing per

capita income and reducing poverty through a strategy of pro-poor economic growth. The Seventh Five Year Plan has targets for economic growth, employment, poverty reduction, human resources development, gender balance and environmental protection. If the targets are achieved, the socio-economic environment of the country will transform it from a low-income economy to the first stages of middle-income country. Goals and Targets of 7th FYP are:

A. Income and poverty

- Attaining average real GDP growth of 7.4% per year over the Plan period.
- Reduction in the head-count poverty ratio by 6.2 percentage point.
- Reduction in extreme poverty by about 4.0 percentage point.
- Creating good jobs for the large pool of under-employed and new labor force entrants by increasing the share of employment in the manufacturing sector from 15 percent to 20 percent.

B. Sector Development

- Increase the contribution of the manufacturing sector to 21% of GDP by FY20.
- Substantial improvement of export to \$54.1 billion by FY20. Achieving a Trade & GDP ratio of 50% by FY20.

C. Urban Development

- Access to improved water source will be ensured for all urban dwellers.
- Coverage of drainage system to be expanded to 80%
- Ensure sustainable urban development that supports increased productivity, investment and employment.

3.6 National Social Security Strategy (NSSS) of Bangladesh

The Government's Social Security Strategy is a part of policies and programs that comprises the Social Development Framework. This forms a wider umbrella incorporating the Government's poverty reduction strategy and strategies on education, health, nutrition, population, sanitation and water supply, financial inclusion, women and gender empowerment, social inclusion of ethnic and religious minorities, environmental protection, climate change management, disaster management and social security. The aim of this framework is to have a comprehensive and consistent set of policies that can help Bangladesh achieve better equity and social justice in the context of its development effort.

3.7 Other National Policies

The following national policies have also been studied:

- National Agriculture Policy, 2004
- National Land Use Policy, 2001
- National Fisheries Policy, 1998
- Forestry Policy, 1994
- National Water Policy, 1999
- National Environment Policy, 1992
- Health Policy, 2000
- Population Policy, 2004
- Housing Policy, 2004
- Industrial Policy, 2005
- National Tourism Policy, 1992
- National Policy for Safe Water Supply & Sanitation, 1998
- Urban Management Policy Statement, 1999
- Proposed National Urban Sector Policy
- National Plan for Disaster Management 2008-2015
- Disaster Management Act 2012 and Disaster Management Policy 2015

3.8 Private Sector Developments

During the reconnaissance & economic survey period, it has been noticed that a number of structures and establishments have been recently constructed haphazardly along the road sides through the private sector initiatives in various places of Faridpur Sadar Upazila. And these are used as weaving factories, dyeing industries, markets and hats, schools, colleges, fish firms, poultry firms, electric sub-stations, and so on. The overall implications of such developments have also been studied.

3.9 Linkage of Policies, Plans and Acts/Rules Related to Economic Development of Faridpur Sadar

The above mentioned vision, plan, policies and strategies will be prepared considered for preparation of development plan Faridpur Sadar upazila. The sectoral policies will also be reflected in the final plan preparation

Chapter Four: Formal Economic Survey

4.1 Introduction

The major formal types of economic activities in Faridpur Sadar are: 1) Brick Field 2) Handicrafts 3) Jute Mills 4) Ice cream factory 4) Rice mill 5) Workshop 6) Yarn and Fabrics industry 7) Building materials 8) Cottage 9) Cottage and Handicrafts and 10) Flour mill. 11) Fertilizer Industry. The locations of interviewed economic unit's personnel are given below:

Table-4.1 Type of Industries with Location

	Brick Field	Handicrafts	Ice cream factory	Rice mill	Jute Mills	Yarn and Fabrics	Building materials	Cottage and Handicrafts	Flour mill/Rice Mill	Food processing	Fertilizer Industry
Faridpur Paurashava	2	1	1	1	2	2	2	2	1	1	1
Ambikapur	1	1	0	1	0	1	0	2	0	0	0
Aliabad	0	0	0	2	2	0	1	0	1	2	0
Ishan Gopalpur	2	0	0	0	0	2	0	1	0	0	1
Uttar Channel	0	0	1	1	1	0	0	0	1	0	0
Kanaipur	1	0	0	0	0	0	2	0	1	1	0
Krishnanagar	0	1	0	1	0	1	0	1	0	0	1
Kaijuri	0	0	0	0	0	0	1		1	1	0
Greda	0	0	0	0	0	0	1	1	0	0	0
Char Madhabdia	1	1	0	0	0	0	0	1	0	0	0
Decreerchar	1	1	1	0	1	2	0	0	0	1	1
Majchar	0	1	0	1	0	0	1	0	1	1	0

Source: Field survey 2016

At least one sample of the all type of formal economic activities of the paurashava area has been surveyed. The main Economic unit of the Upazila is based on Jute. Mainly Jute mills and Jute Store are producing more economic activities, production, employment opportunity and export money. There are 6 brick fields in this Upazila and 7 rice mills has been surveyed. Beside this three Ice Cream Factory and 4 Fertilizer industry of different Union has been surveyed to collect the details data. Some yarn factories and hand loom industry of Paurashav, Krishnanagar, Ambikapur is surveyed. 6 flour and rice mills are interviewed from 5 unions. It has been seen that there are various types of industries such as cottage industry and handicrafts are located varying from brickfields to small workshops in Faridpur Sadar upazila.

4.2 Ownership Pattern

Most of the formal economic units (about 85%) ownership pattern is private. Rest of them is owned by limited companies. Thus, most of the employments of this upazila are from private sectors. Moreover, it has also been seen that, there are no government owned company except bank is working here (Please see figure 4.1).

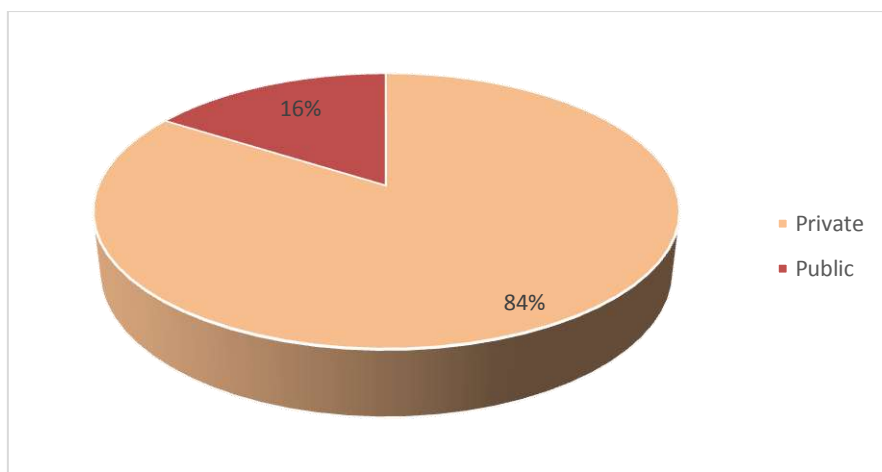


Figure 4.1: Ownership patterns of formal economic units (Source: Field Survey, 2016)

4.3 Area Occupied

It has been found that about 52% of total formal economic units needs area less than 0.1 acre. About 18% of total also need more than 0.1 but less than 1 acres. In addition, the brick fields and Large Scale Garments Industry, Jute Mills mainly need more land (more than 10 acre) than others (Please see figure 4.2).

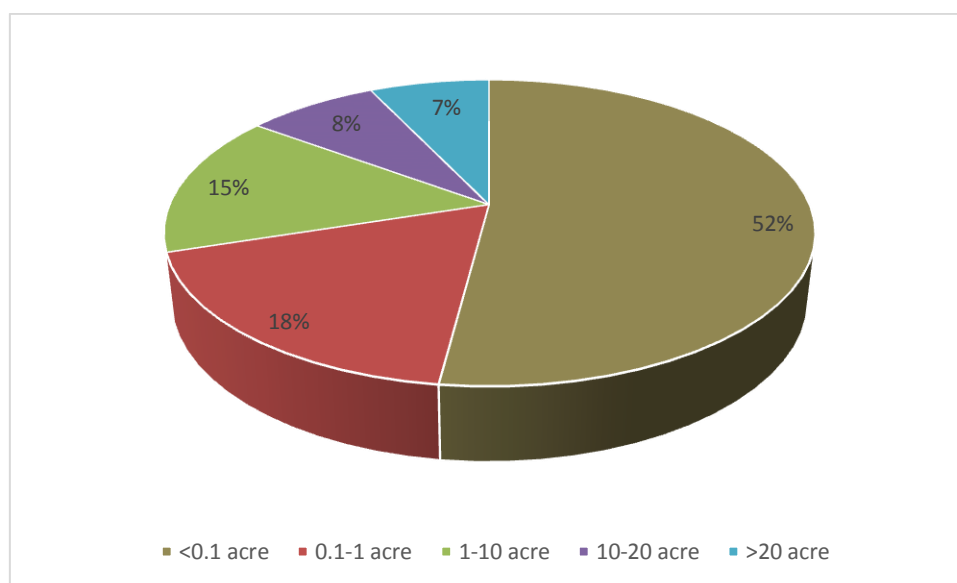


Figure-4.2: Area occupied by formal economic units in acre (Source: Field Survey, 2016)

4.4 Number of Employees

Jute mills and jute store is the main industrial sectors what is generated main employment opportunity in Faridpur Sadar Upazila. About 50% of the total jute industry has the employee more than 100 and 25% of them has the employee more than 150. Two third of total brick fields need more than 100 people. Rest of them need less than 100 but more than 10 people. Beside this, some of the garments need more 30-40 people. On the other hand, almost all of the handicrafts, workshops and cottage industries need less than 10 people. About two third of total rice mills and almost all of the yarn & fabrics industries need more than 10 and less than 150 people. Thus, in this upazila comparatively Jute Mills and brick fields employ more people than others.

Table-4.2: Distribution of no. of employees (in percentage) by types of industries

	<10	10-100	100-150	>150
Jute Mills		50.0	25.0	25.0
Brick Field		35.0	50.0	15.0
Jute Store	22.0	35.00	15.0	18.0
Yarn and Fabrics industry		30.0	55.0	15.0
Cottage and Handicrafts	50.0	50.0		
Handicrafts	100.0			
Fertilizer Industry	100.0			
Flour mill	100.0			
Rice mill	33.3	66.7		
Workshop	100.0			
Cottage	100.0			
Food processing	100.0			

Source: Field Survey, 2016

4.5 Male-Female Ratio in Different Types of Industries

It has been found that, most of the industries have little or no participation of female in their industries. In cottage & handicraft industries highest number of female participation has observed. As there is a noticeable number of loom house is established in Faridpur Sadar Upazila and female are working in this sector. So in that particular types of industries about 29% of total employees are female. Rice mills and dairy farm employed the second highest (about one third) female employees. In Jute Mills about 22% and in brick fields also about 18% of total employees are found female. Beside this, in workshop and building materials sector no woman are working in Faridpur Sadar Upazila.

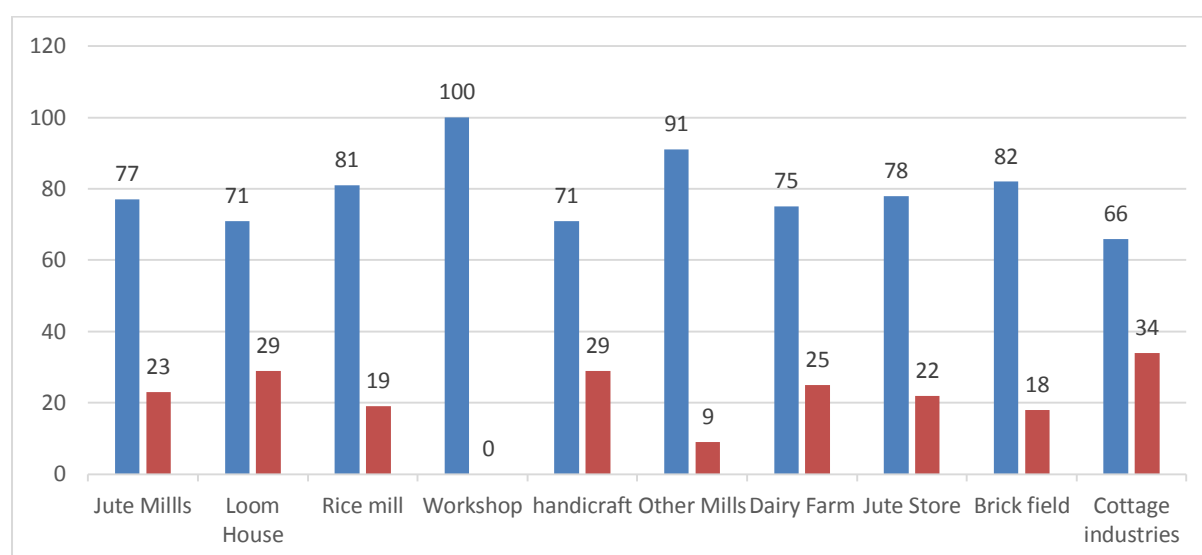


Figure-4.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2016)

4.6 Raw Materials

4.6.1 Major Raw Materials

Major raw materials vary by different types of industries. For instance, major raw material for Jute mills are jute; for brick field is soil, whereas bamboo is the major raw material of cottage industries and handicraft industries. Again sugar is mentioned as one of the major raw materials for ice cream factories. Iron and rod are the major raw materials for workshop. Moreover, flour is the major raw materials for food processing industries, whereas paddy is for rice and turmeric is for flour mill. Though major raw materials vary from industries to industries, except yarn and fabrics industries, almost all of the industries' major raw materials' sources are local market. Thus, the upazila is self-sufficient in the perspective of supply of major raw materials for most of the industries.

Table-4.3: Major raw materials (in percentage)

Industries	Major raw materials
Jute Mills	Jute
Brick Field	Soil
Handicrafts	Bamboo
Ice cream factory	Sugar
Rice mill	Paddy
Workshop	Iron (66.67), Rod (33.33)
Handloom	Yarn
Yarn and Fabrics industry	Yarn
Building materials	Brick or broken bricks (66.67), Iron (33.33)
Cottage	Bamboo
Cottage and Handicrafts	Bamboo
Flour mill	Turmeric

Source: Field Survey, 2016

4.6.2 Minor Raw Materials

Apart from the major raw materials, the industries also used some minor raw materials. For example, brick fields also used coal, sand and diesel in their industries. And almost all of the coal's source is other regions. Apart from these, most of the industries' (except yarn and fabrics) minor raw materials' source is local market. Moreover, food processing industries used sugar, and ice cream factories used flour as their minor raw materials. Again flour mills used chilly in their industries. Workshops also used Plain Sheet as their minor raw materials.

Table-4.4: Minor raw materials (in percentage)

Industries	Minor raw materials
Jute Mills	Burlap, hessian
Brick Field	Sand, Coal, Diesel (33.33% each)
Handicrafts	Guna
Workshop	Plain sheet
Yarn and Fabrics industry	Parts (66.67), Diesel (33.33)
Building materials	Sand (66.67), Sheet (33.33)
Cottage	Plastic
Cottage and Handicrafts	Cloths
Flour mill	Chilly

Source: Field Survey, 2016

4.6.3 Other Raw Materials

Building Materials industries also mentioned as cement, rod and GP sheets are the other raw materials they used. Whereas, food grade color is another raw material used in food processing. Ice cream factory also used milk as their raw materials in their industries. As most of the workshop works have been done by electricity, the industries also mentioned it along with steel and color sheet as their raw materials. In addition, almost all of the raw materials have been collected from local markets. Thus, the economy of this upazila is strong enough to support its own production.

Table-4.5: Other raw materials

Industries	Other raw materials
Workshop	Color sheet (50), Steel (50)
Yarn and Fabrics industry	Needle
Building materials	Cement, Rod, GP sheet (33.33% each)
Cottage and Handicrafts	Yarn
Flour mill	Chilly

Source: Field Survey, 2016

4.7 Products and Their Market

As The Upazila is the Jute source of the country so the jute products from the jute mills and jute store go to the whole country from this Upazila. Almost 75% of the Jute product is exported to different district from here. It has been seen that brick fields, yarn and fabrics industries along with cottage and handicrafts industries exported their products in other markets. Whereas cottage and handicrafts industries export a good amount of their products (about 55%). Another important product industry Fertilizer industry export about 35% of the products. Apart from these, most of the industries' product only supports the local needs.

Table-4.6: Products and Their Market

Industries	Product	Export (%)
Jute Mills	25	75
Brick Field	70	30
Handloom	60	40
Handicrafts	100	0
Rice mill	100	0
Workshop	100	0
Yarn and Fabrics industry	55	45
Building materials	100	0
Cottage and Handicrafts	45	55
Flour mill	100	0
Fertilizer Industry	65	35

Source: Field Survey, 2016

4.8 Production Amount and Their Yearly Price

It can be seen in Table 4.8 that production of different products in this upazila and their yearly price has been given. Here, brick fields produced average 4712500 pcs of brick per year which yearly price is highest (about BDT 3,56,75,000) among other products. Rice mills positioned in second (BDT 1,16,00,000) in the perspective of yearly price of production. On the other hand, food processing

industries produce about 87.6 tons' products yearly which yearly production price is the next highest (BDT 87,60,000).

Table-4.7: Production amount and their yearly price

Industries	Amount of Production	Unit	Avg. Price in BDT
Jute Mills & Stores	1,05,000	tons per year	13,16,00,000
Brick Field	25,12,500	pcs in year	1,96,65,000
Ice cream factory	41,000	pcs in year	4,41,000
Workshop	152	pcs in year	5,30,000
Building materials	6130	pcs in year	36,90,000
Cottage	6025	pcs in year	42,500
Cottage and Handicrafts	27500	pcs in year	2,87,500
Rice mill	1230	tons per year	2,26,00,000
Workshop	13	tons per year	8,30,000
Yarn and Fabrics industry	2.3	tons per year	6,36,000
Flour mill	21.95	tons per year	4,03,000
Goor processing	107	tons per year	65,60,000
Handicrafts	750	gauge/meter per year	45,000
Yarn and Fabrics industry	32,250	gauge/meter per year	6,88,000

Source: Field Survey, 2016

4.9 Transportation Mode of Raw Materials

About one-third total industries use Van/Rickshaw as their primary mode of transportation for raw materials. Almost 27% industry used the non-motorized Van for transporting the raw materials. This is because, as discussed earlier the major source of raw materials and products produced are the local markets. Moreover, about more than one-fourth of total industries also used tempo/nosimon as their primary mode of transportation. In addition, about more than one third (31%) of total industries also used truck and pickup as their primary mode of communication.

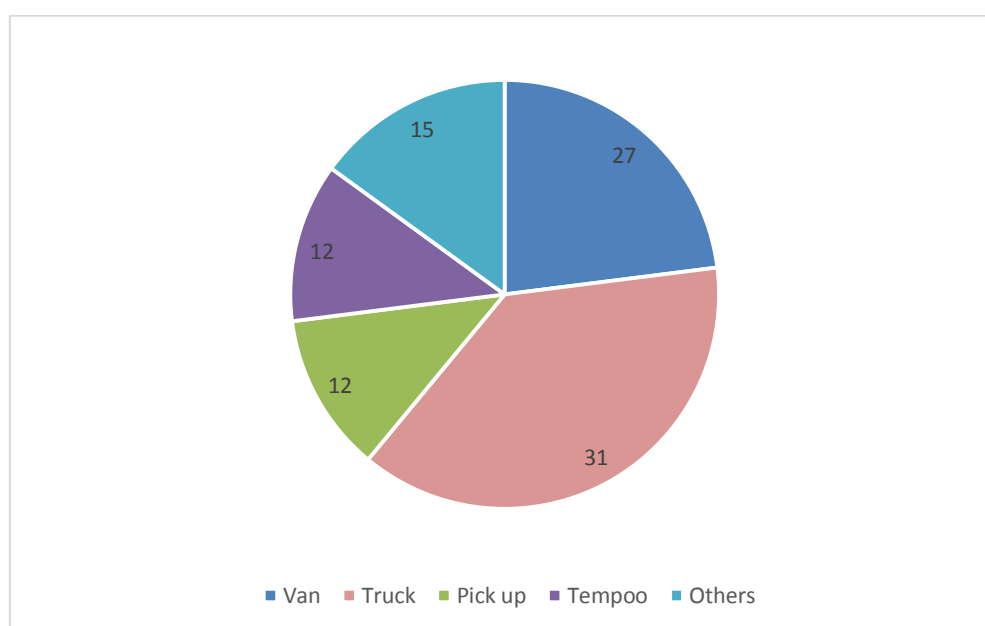


Figure-4.4: Mode of transportation of raw materials (Source: Field Survey, 2016)

4.10 Solid Waste, Management and Environment

a. Waste disposal site

Maximum industry disposes the waste in dumping zone where others dispose in open field, agriculture land and canals. Though maximum waste goes to disposal zone but a huge amount waste dispose in agriculture land and canal what is very alarming. It hampers the main flow of water in canals and creating navigation problem and on other side it destroys the soil quality of the agriculture land. From the survey it has been found that brick fields make highest amount (1.3 tons) of solid waste whereas cottage handicraft industries and handloom make about 1.3 tons of solid waste. And rest of the types of industries produce less than one tons of solid waste. Whereas, about 34% of total waste is non-refined.

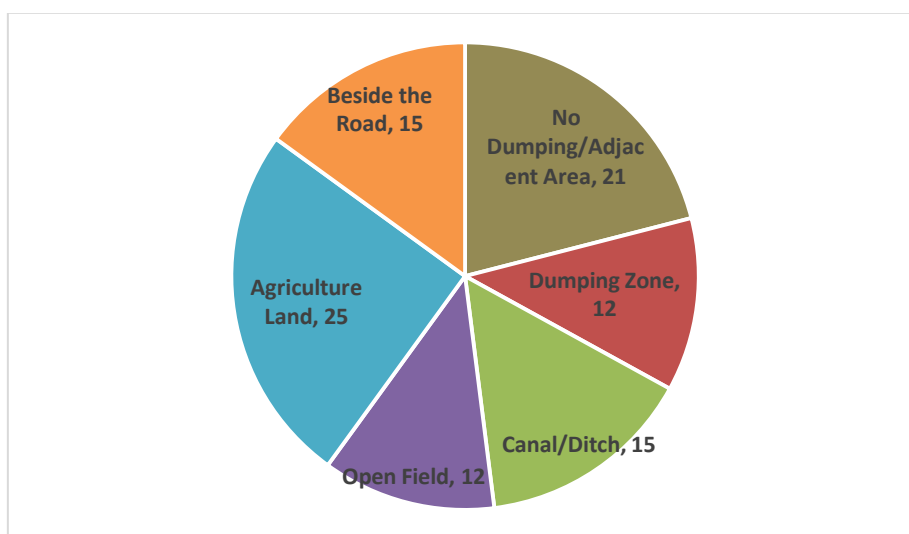


Figure-4.5: Waste disposal site (Source: Field Survey, 2016)

b. Availability of waste treatment system

Moreover, approximately more than 78% of total industries said they do not have any waste treatment system (please see figure 4.6). Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Only 22% of the industries have the partial or full treatment system but most of the cases these are not working properly. Necessary steps should be taken regarding these.

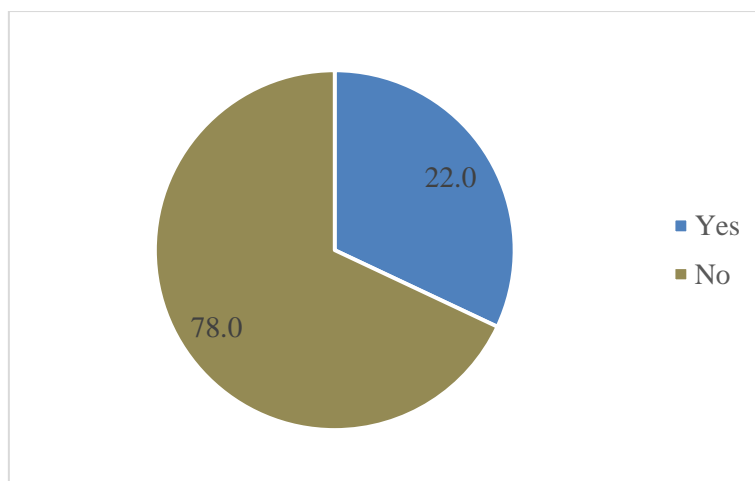


Figure-4.6: Availability of waste treatment system (Source: Field Survey, 2016)

c. Measures taken against pollution

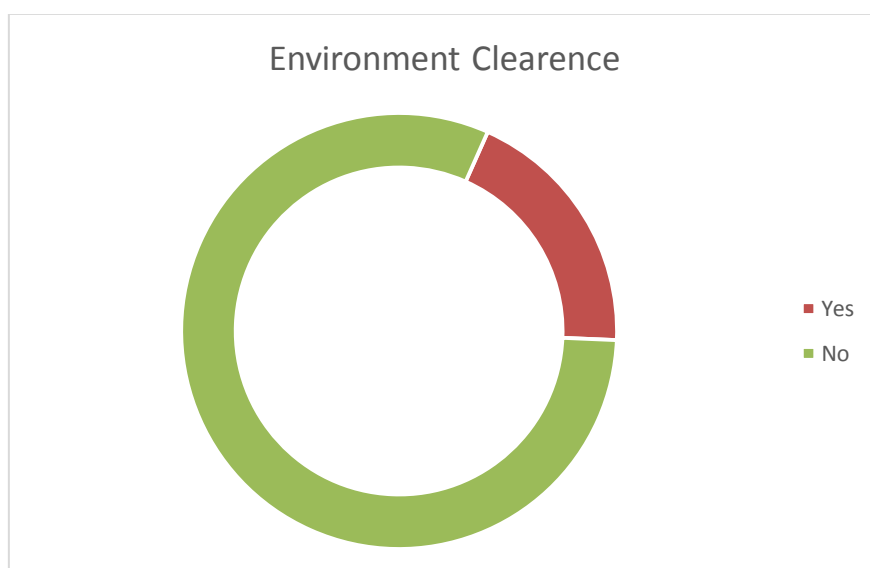


Figure-4.7: Availability of environmental clearance (Source: Field Survey, 2016)

In addition, alarming is that, about more than 94% of total industries mentioned that they do not take any measurements regarding against pollution (please see figure 4.8). In addition, only five industries completed their Environmental Impact Assessment (EIA) report but about two third of total industries mentioned that they have environmental clearance of the industry. Only Brick kiln are using chimney but most of the case they are not following actual standard to set up a chimney. (please see figure 4.7).

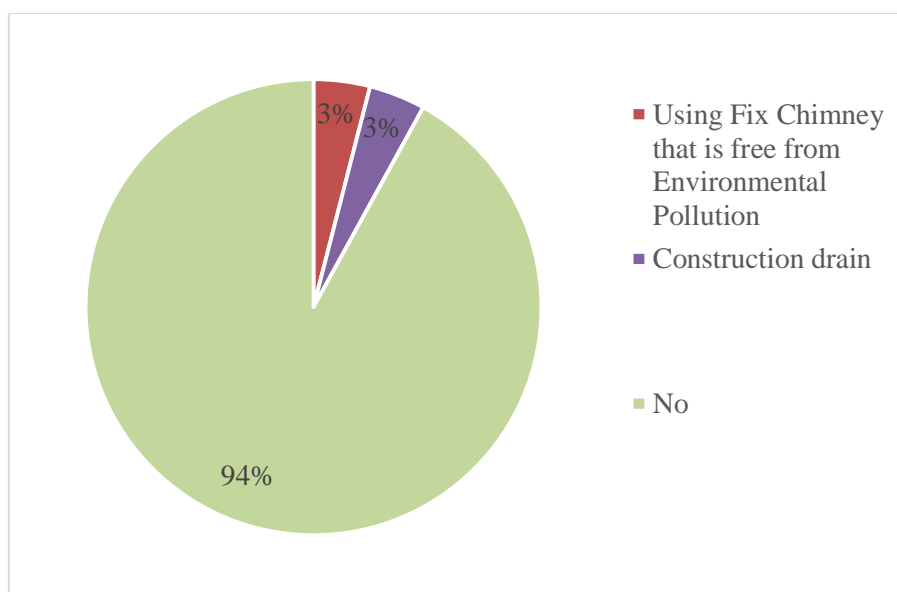


Figure-4.8: Measures taken against pollution (Source: Field Survey, 2016)

4.11 Health Security of the Worker

In approximately 33% of total industries, workers have no health security. In some cases, Owners and labor jointly faces the health security cost. But most of the workers of industries (about 52%) opinioned that owner pays on health security of the workers. Thus, in this case, workers get their rights of treatment in most of the time. Sometimes,

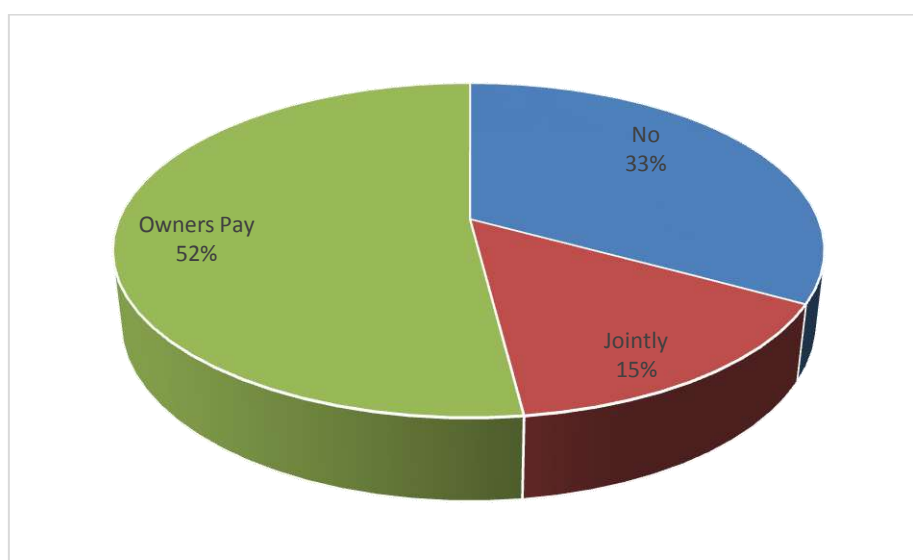


Figure-4.9: Health security of the worker (Source: Field Survey, 2016)

4.12 Problems in the Industries

About 20% of total industries complained that Unskilled labor and backdated technology is their major problems. And infrastructure problem is another major problem for the industrial development. Almost 19% respondents think infrastructure problem is a major barrier. Moreover, about 23% of total industries mentioned that their next major problem is lack of energy (electricity etc.). About 11% of total industries response lack of loan facility and high amount of interest rate is the major problem. about 7% of the respondents think bad communication system is a big problem and others indicate to the corruption, financial problem etc. Thus lack of enough infrastructure in this upazila which is mentioned strongly by the industries.

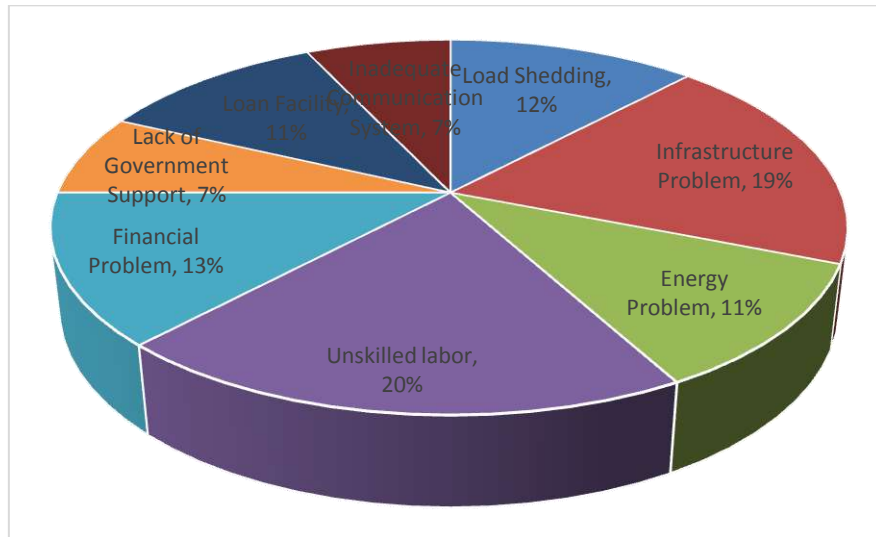


Figure-4.10: Problems in the industry (Source: Field Survey, 2016)

4.13 Suggestions to Solve the Industrial Problems

Most of the respondents think better infrastructure build up is a best possible solution to meet the industrial need. About 28% of total industry need better infrastructures. 22% of the respondents think availability and easy transport of the raw materials is essential for the industrial development. About 18% industry said only road construction can be a possible solution to meet up the problem. Beside this, Skilled laborer is a major solution is a think of 17% respondents. Moreover, stop corruption and non-stop energy and electricity supply is mandatory for the industrial development. (Please see figure 4.11).

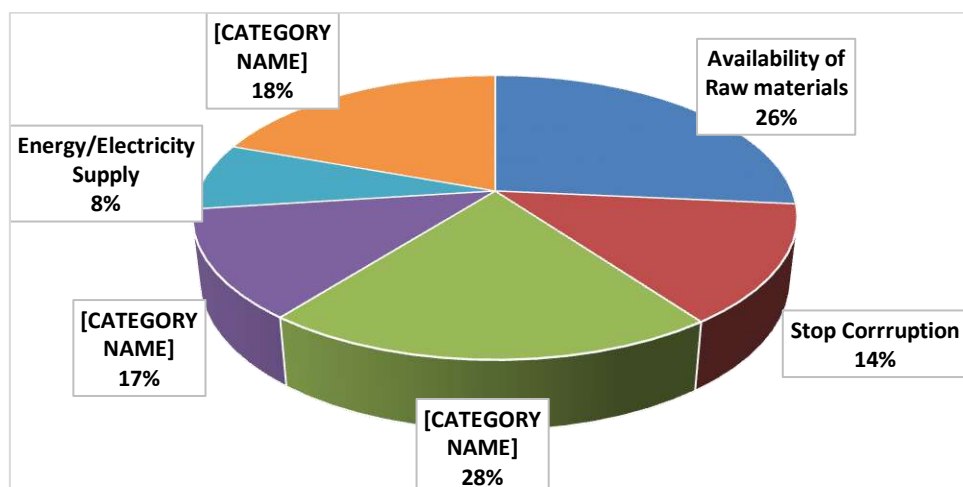


Figure-4.11: Suggestions to solve industrial problems (Source: Field Survey, 2016)

Chapter Five: Informal Economic Survey

5.1 Introduction

The major informal types of economic activities in Faridpur Sadar are: (1) Poultry; (2) Saw mills; (3) Dairy farms; (4) Nursury ;(5) Furniture making (6) Jute Store. The locations of interviewed informal economic units are given below:

Table-5.1 Type of Industries with Location

	Poultry	Saw mill	Dairy farm	Nursury	Furniture making	Jute Store
Faridpur Paurashava	2	2	1	3	3	2
Ambikapur	2	0	0	2	3	3
Aliabad	1	2	1	1	0	2
Ishan Gopalpur	0	1	0	4	2	1
Uttar Channel	0	2	0	0	1	5
Kanaipur	3	1	1	3	0	0
Krishnanagar	5	0	0	2	0	2
Kaijuri	0	2	3	1	1	1
Greda	2	0	2	3	0	1
Char Madhabdia	3	0	1	0	2	0
Decreerchar	1	1	0	2	0	2
Majchar	2	0	2	3	3	2

Source: Field survey 2016

Every category of the informal economic activities in paurashava area was in survey sample. Beside this, among 21 Nursury, 4 are in Islam Gopalpur, 3 in Greda and the rest 16 in the remaining upazila are surveyed. 3 furniture making of Ambikapur and Majchar, 2 from Ishan Gopalpur and Char Madhabdia was surveyed. 7 saw mills of different Unions are surveyed. Those play vital role to develop wood based household and other infrastructure development in Faridpur Sadar. The data about different poultry farms was collected from 14 poultry farm of 7 Unions. These plays vital role to meet the meat supply and egg demand at the area. Apart from these many dairy farm is located at Kaijuri, Greda, Majchar union. Beside this, the main economic activity Jute stores was surveyed to collect the detailed data from different Unions through the whole Upazila.

5.2 Ownership Pattern

Most of the informal economic units (about 92%) ownership pattern is private. Rest of them are owned by shareholders. Thus, most of the employments of this upazila are from private sectors. (Please see figure 5.1).

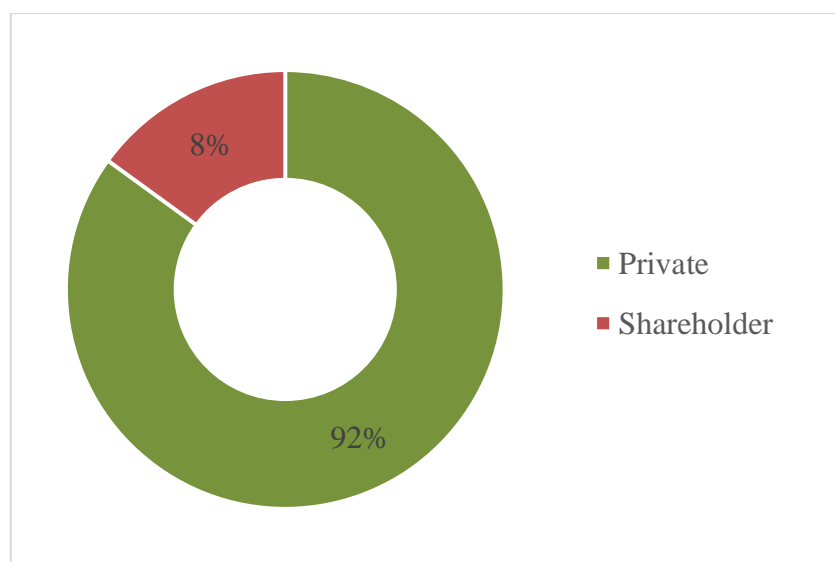


Figure-5.1: Ownership patterns of formal economic units (Source: Field Survey, 2016)

5.3 Area Occupied

Most of the informal industries occupied in an area less than 0.1 acre. It has been found that about 26% of total informal economic units needs area more than 0.1 acre but less than 10 acres. This types of economic units are mainly the poultry, dairy and saw mills. Among them, the jute stores and some of saw mills mainly need more land (more than 1 acre) than others. About 53% of them needs less than 0.1 acres of land. (Please see figure 5.2)

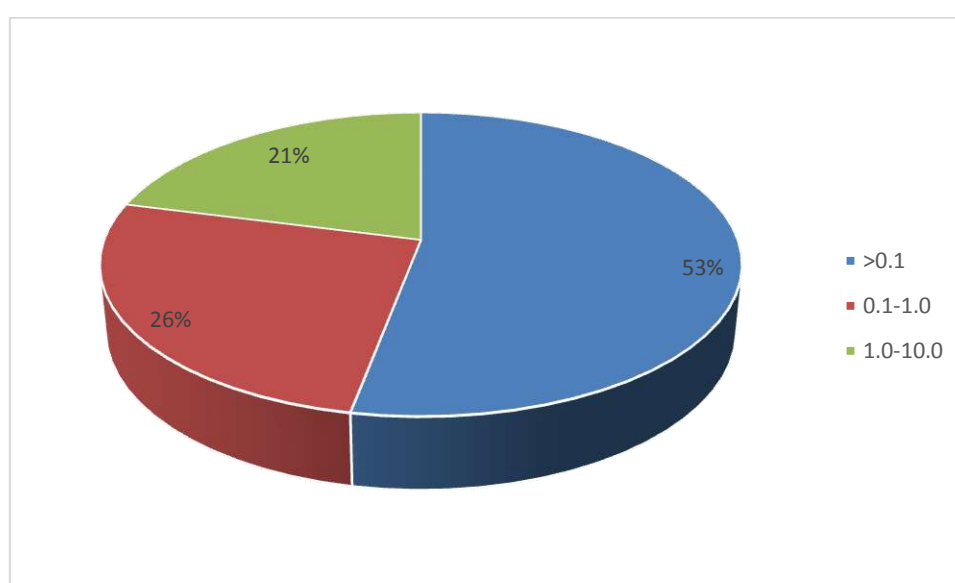


Figure-5.2: Area occupied by formal economic units in acre (Source: Field Survey, 2016)

5.4 Number of Employees

It has been found that except furniture making economic units, almost all of the informal economic units can manage their business with less than 10 people. The main informal activities in this upazila such as Nursery, decorator, poultry, dairy farm all need less than 10 people. Beside this, Some Jute store, furniture making and some ceramic industry need more than 10 people.

Table-5.2: Distribution of no. of employees (in percentage) by types of industries

	<10 persons	10-100 persons
Nursury	100.0	
Decorator	100.0	
Poultry	100.0	
Jute Store	75.0	25.0
Saw mill	100.0	
Handicraft	100.0	
Dairy farm	100.0	
Furniture making	85.0	15.0
Ceramic	65.0	35.0

Source: Field Survey, 2016

5.5 Male-Female Ratio in Different Types of Industries

It has been found that, in informal economy also there are significantly low or no participation of women. In poultry and dairy farm, only about one fourth female employees have been found. Except Cottage industry and hand loom sector no significant number of woman is found in this sector. In rest of the informal economic types, inconsiderable percentage of women is present. Thus awareness program or other appropriate steps should be taken regarding these.

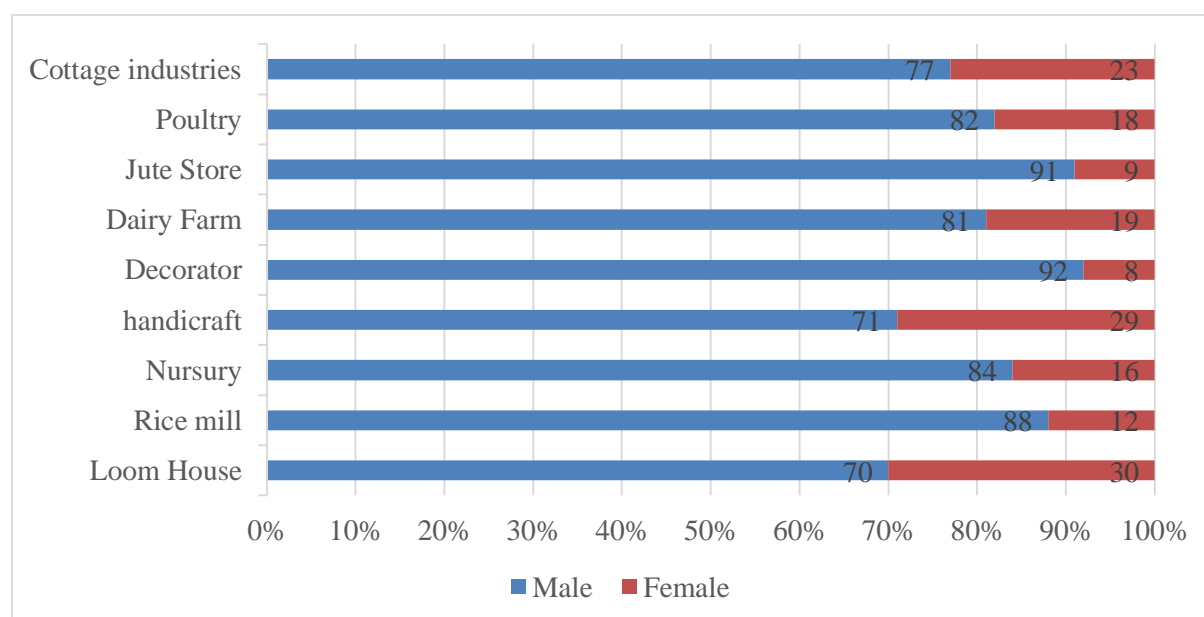


Figure-5.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2016)

5.6 Raw Materials

5.6.1 Major Raw Materials

Major raw materials vary by different types of informal industries. For instance, major raw materials for saw mills is tree, wood and wood powder, whereas Tush, Maize, Soya bean, Kura, Jhinuk, Protein, Medicine and salt, Poultry feed, Maize are the major raw materials for poultry. Again cow is one of

the major raw materials for dairy farm. And except saw mills, source of all kinds of raw materials are local market. Thus local markets are sufficient enough to supply the demands for these informal economies. Saw mills about half of their raw materials import from other regions.

Table-5.3: Major raw materials

	Major raw materials
Poultry	<i>Tush</i> , Maize, Soya bean, Kura, <i>Jhinuk</i> , Protein, Medicine and salt, Poultry feed, Maize
Handicraft	Bamboo, Guna
Nursury	<i>Seed</i> , <i>Soil</i>
Saw mill	Wood, Tree, Tree Powder
Dairy farm	Cow
Furniture making	Wood, Tree, Tree Powder

Source: Field Survey, 2016

5.6.2 Minor Raw Materials

Apart from the major raw materials, poultry farms need some minor raw materials. They need Pituitary Gland Medicine for their farms. In addition, they also mentioned that *tush* another important raw material. Dairy farms said *bhushi* as their minor raw materials. Moreover, Maize, Soyabean, Oilcake and Bhusi as their minor raw materials. Furniture making informal industries mentioned burnish colors and road as their minor raw materials.

5.6.3 Other Raw Materials

Some of the dairy farms mentioned straw and some of the furniture making economic units mentioned board as their less important raw materials needed for their business.

5.7 Products and Their Market

Products of some Poultry farms are going outside the upazila area to sell their products after meeting demands of the area. Poultry farms exported about 13% of their products outside the upazila. Apart from these, saw mills, dairy farms, fisheries and furniture making economic units' product only support the local needs.

Table-5.4: Products and Their Market

Industries	Local	Others
Nursury	100	
Poultry	80	20
Saw mill	100	0
Dairy farm	85	15
Handicrafts	85.4	14.6
Furniture making	100	0

Source: Field Survey, 2016

In below table production of different informal economic units in this upazila and their yearly price has been given. Here, Nursury produced about 5 lakh new sapling per year which yearly price is

highest (about BDT 15,13,24,000) among other products. Home appliances by furniture makers positioned in second (BDT 44,20,000) in the perspective of yearly price of production. Dairy farms produced about 16.2 tons of their product yearly, which yearly production price is the lowest (10,57,000).

Table-5.5: Average production amount and their yearly price

	Production	Units	Yearly price of products in BDT
Nursury	5,35,800.0	Pcs per year	15,13,2400
Poultry	95,200.0	Pcs per year	13,12,000
Saw mill	17,350.0	gauge/meter per year	21,23,000
Dairy farm	16.2	tons per year	10,57,000
Furniture making	213.0	Pcs per year	44,20,000

Source: Field Survey, 2016

5.8 Mode of Transportation of Raw Materials

About half of total informal economic units use Van/Rickshaw as their primary mode of transportation for raw materials. This is because, as discussed earlier the major source of raw materials are the local markets. Moreover, about one-fourth of total informal economic units also used tempo/nosimon as their primary mode of transportation. In addition, about 29% of informal economic units also used truck or pick up as their primary mode of communication.

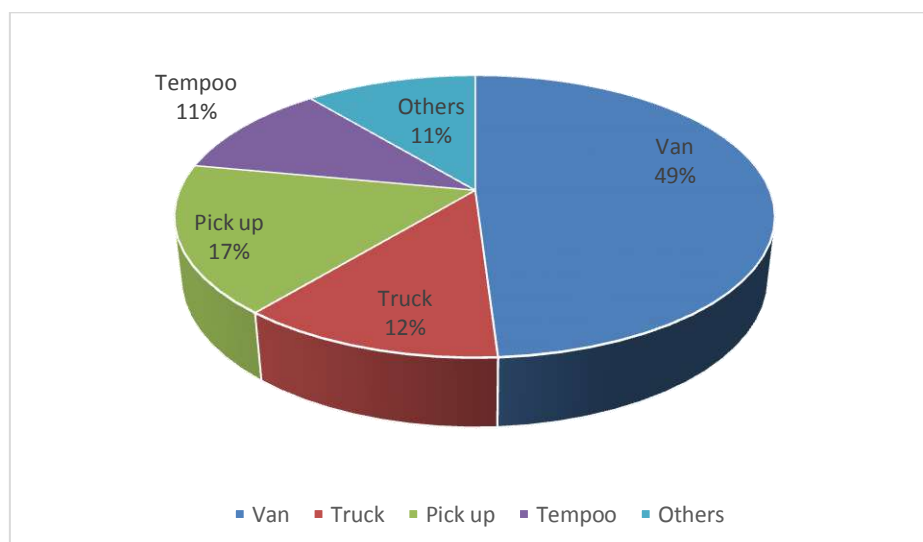


Figure-5.4: Mode of transportation of raw materials (Source: Field Survey, 2016)

5.9 Solid Waste, Management and Environment

From the survey it has been found that Saw mill industry make highest amount (2.5) of solid waste. Beside this, Garments or hand loom industry and poultry farms make more than 1 tons of solid waste yearly. And rest of the types of industries produce less than one tons of waste. Only dairy farm's half of total waste is liquid waste. For rest of the types the whole waste is solid waste. About 31% of total informal economic units dispose the waste into roadside. But the alarming is that about 69% of them also use agricultural land as waste disposal site (please see figure 5.5). Moreover, the waste contained both of refined (280%) and non-refined (72%) waste.

Table-5.6: Average waste produced

	Waste Produced (tons per year)
Poultry	1.51
Saw mill	2.5
Handicrafts	0.9
Dairy farm	0.8
Garments/Loom	1.2

Source: Field Survey, 2016

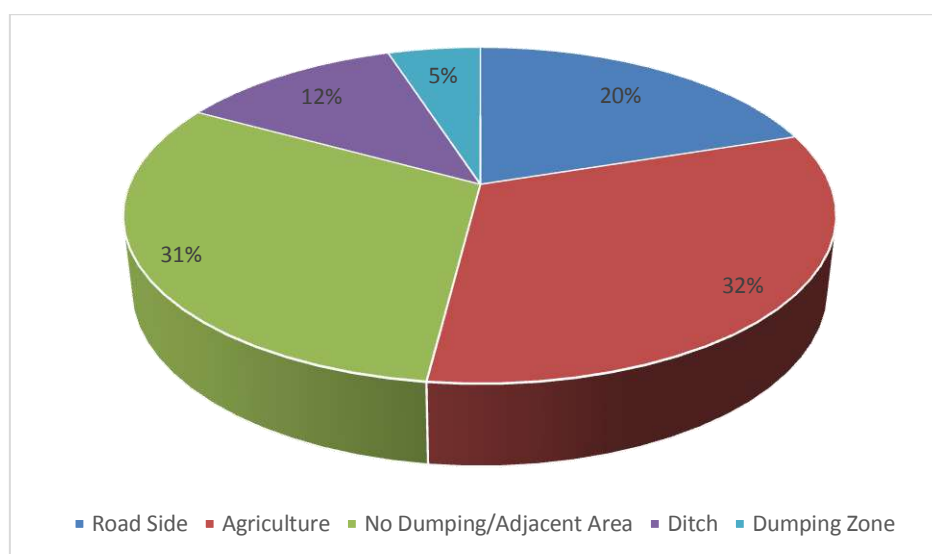


Figure 5.5: Waste disposal site (Source: Field Survey, 2016)

Moreover, approximately more than three fourth of total informal economic units said they do not have any waste treatment system (please see figure 5.6). Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Necessary steps should be taken regarding these.

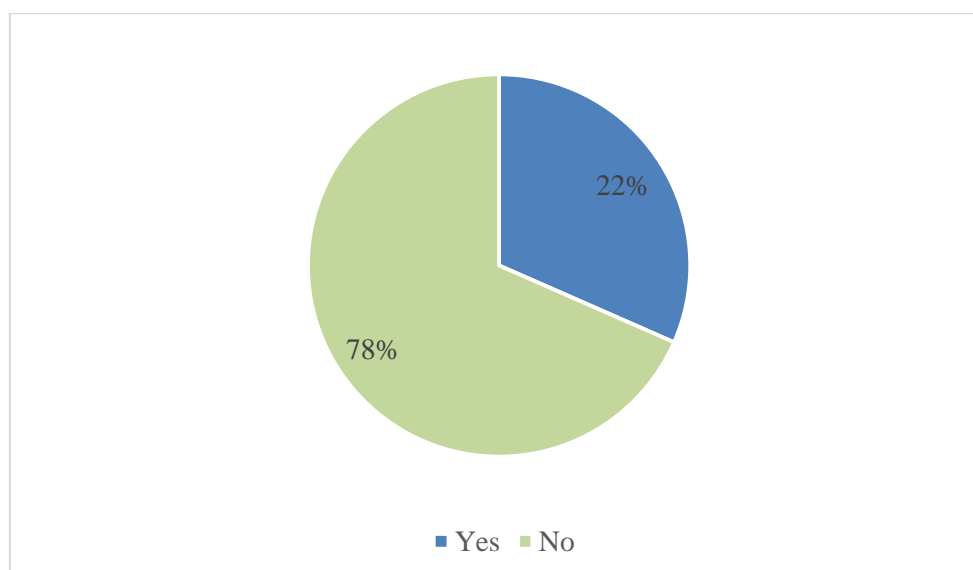


Figure-5.6: Availability of waste treatment system (Source: Field Survey, 2016)

Regarding measures taken against pollution generated by the organization about 41% of informal economic units (poultry farms, fisheries) mentioned that they dumped the waste under the soil, thus it could produce the fertilizer.

But alarming is that, about half of total industries mentioned that they do not take any measurements regarding against pollution (please see figure 5.7). In addition, not a single economic units completed their Environmental Impact Assessment (EIA) report and do not have any environmental clearance (please see figure 5.7)

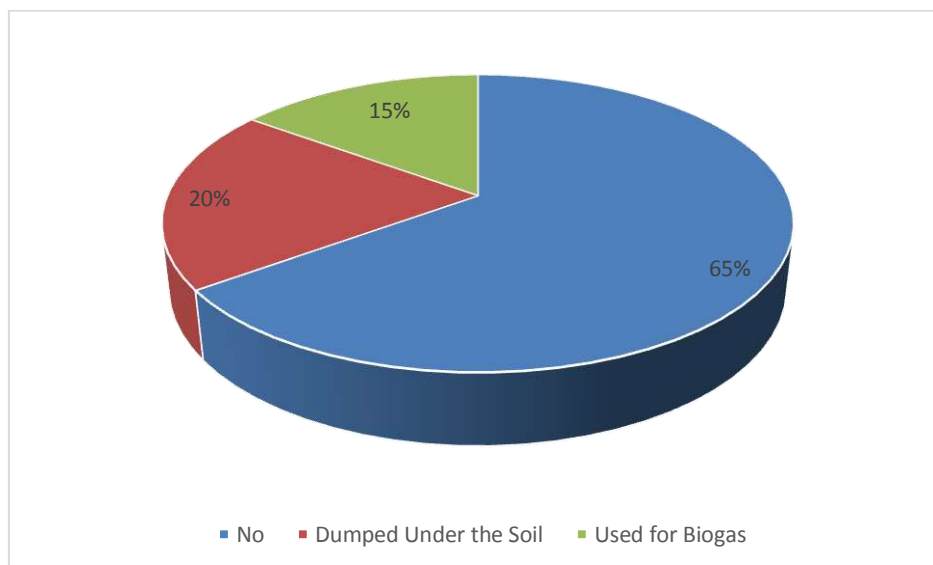


Figure-5.7: Measures taken against pollution (Source: Field Survey, 2016)

5.10 Health Security of the Worker

Most of the workers of industries (about 35% of total) owner pays on health security of the workers. And for the 12% cases the organization pay the health expenditures if it happens on working time. Thus, in this upazila, workers get their rights of treatment in most of the time. Beside This, about 32% of the employee do not get any health security from the industry.

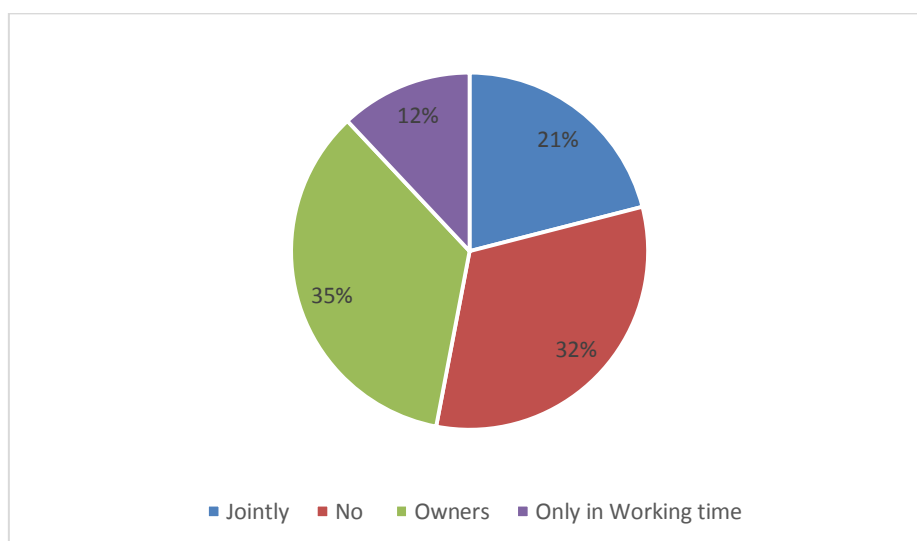


Figure-5.8: Health security of the worker (Source: Field Survey, 2016)

5.11 Problems in the Industries

About more than 18% of total informal economic units said that lack of skilled labor is there major problem. Another major problem is the infrastructure problem what was mentioned as 28%. About 15% of them also mentioned that their next major problems are Loan facility and financial problem. Thus there are lack of skilled labor in this upazila which is mentioned strongly by the industries. The least priority for the major problems towards them is electricity problem.

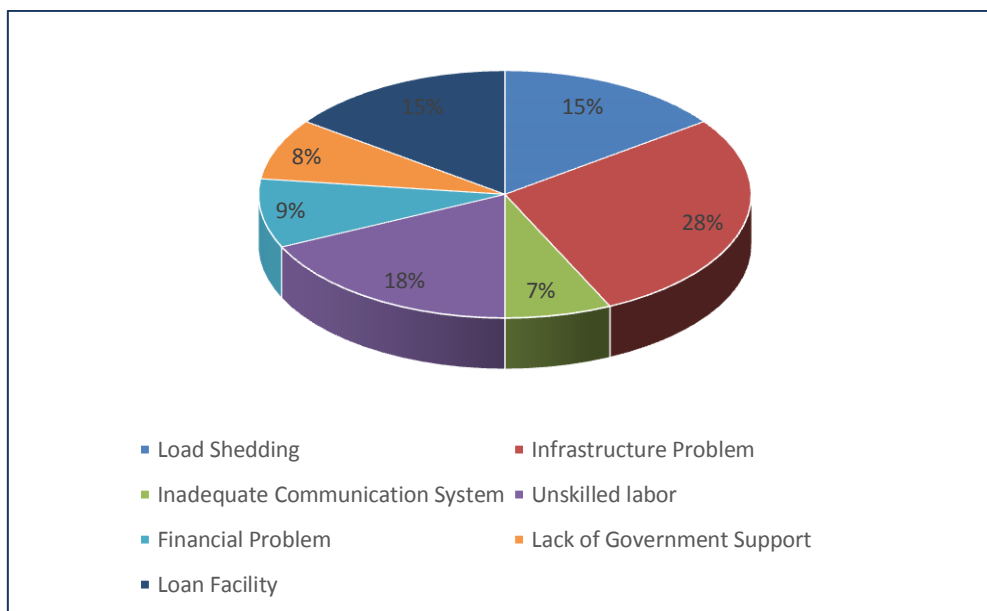


Figure-5.9: Problems in the industry (Source: Field Survey, 2016)

5.12 Suggestions to Solve the Problems

About 18% of the total economic units notifies that the solution of above mentioned problem could be governments helps towards them by providing loan on easy terms. About one fourth of them (23%) mentioned Infrastructure Development is needed to solve the industrial problems. Availability of low cost and good quality medicine, Health facility also help them a lot. About 12% of them also thinks Communication development or road construction is a primary solution of the problem. About 13% of them also wants training for the worker, thus they can get the skilled labors for their economy. Beside this, 8% of the respondents think financial help is essential to solve the problem.

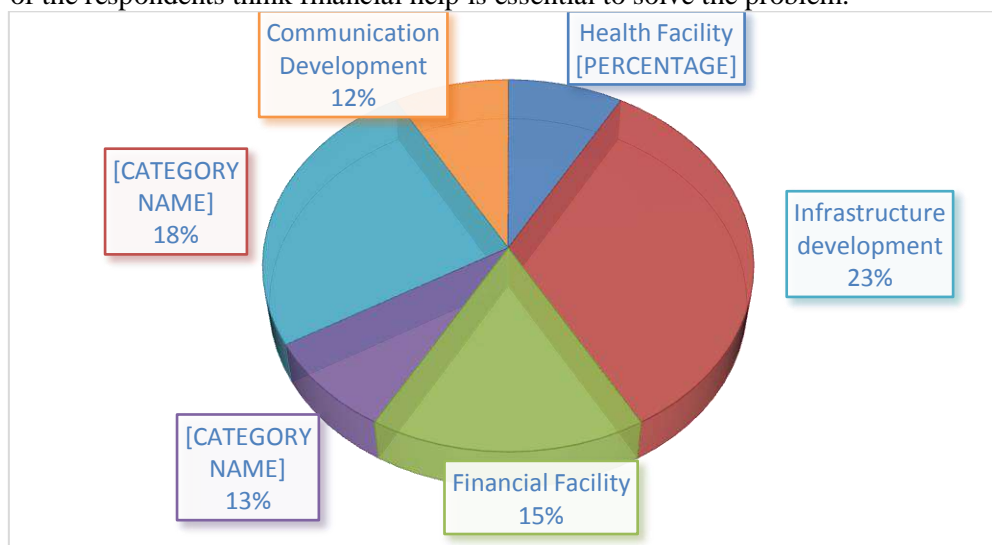


Figure-5.10: Suggestions to solve industrial problems (Source: Field Survey, 2016)

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গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(ব্যাংক ও বীমা)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে ☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১.১ প্রতিষ্ঠানের ধরন : ☐ ব্যাংক ☐ বীমা

১.২ প্রতিষ্ঠানের নাম ও ঠিকানা :
.....

২. ব্যাংক

২.১ সেবা প্রদানের খাত (কোড) : কোড ১.২ : সেবার খাত

১. সাধারণ ব্যাংকিং	২. বৈদেশিক বাণিজ্য	৩. এস.এম.ই ব্যাংকিং	৪. মোবাইল ব্যাংকিং	৫. ই-ব্যাংকিং
৬. চলতি মূলধন ঋণ	৭. শিল্প ঋণ	৮. কৃষি ঋণ	৯. প্রকল্প ঋণ	১০. অন্যান্য

২.২ সেবা প্রদানের ক্ষেত্রঃ

যে সব এলাকা এই সেবার আওতাধীন :

২.৩ মোট গ্রাহক :

১. সাধারণ ব্যাংকিং:	২. বৈদেশিক বাণিজ্য:	৩. এস.এম.ই ব্যাংকিং:
৪. মোবাইল ব্যাংকিং:	৫. ই-ব্যাংকিং:	৬. চলতি মূলধন ঋণ:
৭. শিল্প ঋণ:	৮. কৃষি ঋণ:	৯. প্রকল্প ঋণ:
১০. অন্যান্য:		

২.৪ মোট প্রদত্ত ঋণের পরিমাণ : টা..... ২.৪.১ মোট অনাদায়ী ঋণের পরিমাণ টা.....

২.৪.২ কৃষি -ঋণের পরিমাণ : টা.....

২.৫ মোট ঋণ খেলাপি : ২.৫.১ কৃষি ঋণ খেলাপি : ২.৫.২ অকৃষি ঋণ খেলাপি :

২.৫.৩ অন্যান্য :

৩. বীমা

৩.১ সেবা প্রদানের খাত (কোড) : কোড ১.২ : সেবার খাত

১. সাধারণ বীমা	২. জীবন বীমা	৩. যানবাহন বীমা	৪. স্বাস্থ্য বীমা	৫. গৃহ বীমা
৬. শস্যঝুঁকি বীমা	৭. অগ্নি বীমা	৮. গবাদি পশু বীমা	৯. দুর্ঘটনা বীমা	১০. নৌ-বীমা
১১. শ্রম বীমা	১২. শিক্ষা বীমা	১৩. ঝুঁকি বীমা	১৪. অন্যান্য:.....	

৩.২ সেবা প্রদানের ক্ষেত্রঃ

যে সব এলাকা এই সেবার আওতাধীন :

৩.৩ মোট গ্রাহক :

১. সাধারণ বীমা:	২. জীবন বীমা:	৩. যানবাহন বীমা:
৪. স্বাস্থ্য বীমা:	৫. গৃহ বীমা:	৬. শস্যঝুঁকি বীমা:
৭. অগ্নি বীমা:	৮. গবাদি পশু বীমা:	৯. দৃঘর্টনা বীমা:
১০. নৌ -বীমা:	১১. শ্রম বীমা	১২. শিক্ষা বীমা
১৩. ঝুঁকি বীমা	১৪. অন্যান্য:	

৩.৪ নিয়মিত প্রিমিয়াম প্রদানকারী গ্রাহকের সংখ্যা.....

৩.৫ সংগ্রহকৃত মোট প্রিমিয়ামের পরিমাণ:টাকা/মাসিক

৩.৬ বকেয়া প্রিমিয়াম প্রদানকারী গ্রাহকের সংখ্যা.....

৩.৭ বকেয়া প্রিমিয়ামের পরিমাণ:টাকা/মাসিক

৪.১ ব্যাংকিং/বীমা কার্যক্রম পরিচালনায় যে সব সমস্যার মোকাবিলা করতে হয়ঃ

.....
.....

৪.২ সমস্যাগুলোর সমাধানে পরামর্শ :

.....
.....

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
আনুষ্ঠানিক অর্থনৈতিক কর্মকান্ড জরিপ প্রশ্নমালা
(এন.জি.ও.)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. এন.জি.ও. (নন গভমেন্ট অর্গানাইজেশন)

১.১ এন.জি.ও-র নাম :

১.২ এন.জি.ও-র ঠিকানা :

১.৩ প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি (কোড) :

কোড ১.৩ : প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি

১. সারাদেশ	২. সিটি কর্পোরেশন এলাকা	৩. ওয়ার্ড ভিত্তিক
৪. গ্রাম ভিত্তিক	৫. স্বল্প আয় শ্রেণির জন্য	৬. বিভাগ ভিত্তিক
৭. জেলা ভিত্তিক	৮. অন্যান্য	

১.৪ সেবার ধরন (কোড) :

কোড ১.৪ : সেবার ধরন

১. বিভিন্ন ট্রেডে প্রশিক্ষণ	২. উন্নত বীজ সরবরাহ	৩. সামাজিক বনায়নে উদ্বুদ্ধকরণ
৪. তামাক প্রক্রিয়াজাতকরণ	৫. পানির আর্সেনিক দূরীকরণ বা সতর্কীকরণ	৬. চারাগাছ বিতরণ
৭. ঋণ প্রদান	৮. ভূমির উর্বরতা হ্রাস ও প্রতিকার বিষয়ে প্রশিক্ষণ	৯. বিভিন্ন জনগুরুত্বপূর্ণ বিষয়ে জনসচেতনতা সৃষ্টি
১০. অন্যান্য :		

১.৫ কর্মকান্ডের সুবিধাভোগী শ্রেণি

কোড ১.৫ : সুবিধাভোগী শ্রেণি

১. নিম্ন আয়ের জনসাধারণ	২. পেশা ভিত্তিক জনগোষ্ঠী	৩. ইস্যুভিত্তিক সুবিধাভোগী
৪. বিশেষ বৈশিষ্ট্য এলাকাভিত্তিক সুবিধাভোগী	৫. অন্যান্য	

১.৬ সমিতির মোট সদস্য সংখ্যা : জন

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
আনুষ্ঠানিক অর্থনৈতিক কর্মকান্ড জরিপ প্রশ্নমালা
(সি. বি. ও)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. সি. বি. ও (কমিউনিটি বেইজড অর্গানাইজেশন)

১.১ সি.বি.ও.-র নাম :

১.২ সি.বি.ও.-র ঠিকানা :

১.৩ প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি (কোড) :

কোড ১.৩ : প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি

১. সারাদেশ	২. সিটি কর্পোরেশন এলাকা	৩. ওয়ার্ড ভিত্তিক
৪. গ্রাম ভিত্তিক	৫. স্বল্প আয় শ্রেণির জন্য	৬. বিভাগ ভিত্তিক
৭. জেলা ভিত্তিক	৮. অন্যান্য	

১.৪ সেবার ধরন (কোড) :

কোড ১.৪ : সেবার ধরন

১. বিভিন্ন ট্রেডে প্রশিক্ষণ	২. উন্নত বীজ সরবরাহ	৩. সামাজিক বনায়নে উদ্বুদ্ধকরণ
৪. তামাক প্রক্রিয়াজাতকরণ	৫. পানির আর্সেনিক দূরীকরণ বা সতর্কীকরণ	৬. চারাগাছ বিতরণ
৭. ঋণ প্রদান	৮. ভূমির উর্বরতা হ্রাস ও প্রতিকার বিষয়ে প্রশিক্ষণ	৯. বিভিন্ন জনগুরুত্বপূর্ণ বিষয়ে জনসচেতনতা সৃষ্টি
১০. অন্যান্য :		

১.৫ কর্মকান্ডের সুবিধাভোগী শ্রেণি

কোড ১.৫ : সুবিধাভোগী শ্রেণি

১. নিম্ন আয়ের জনসাধারণ	২. পেশা ভিত্তিক জনগোষ্ঠী	৩. ইস্যুভিত্তিক সুবিধাভোগী
৪. বিশেষ বৈশিষ্ট্য এলাকাভিত্তিক সুবিধাভোগী	৫. অন্যান্য	

১.৬ সমিতির মোট সদস্য সংখ্যা : জন

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৩ (ফরিদপুর সদর উপজেলা, বাগমারা ও গাংনী উপজেলা)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(মার্কেট/কাঁচাবাজার/হাট)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ.....

সাক্ষাৎকার গ্রহণকারীর নাম ও মোবাইল নম্বর : সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. মার্কেট/কাঁচাবাজার/হাট

১.১ মার্কেট/হাট/বাজারের নামঃ

১.২ এই মার্কেট/হাট/বাজার কোন সংস্থার কর্তৃত্বাধীন (কোড) :

কোড ১.২ : মালিকানা

১. ব্যক্তি মালিকানাধীন	২. উপজেলা পরিষদ	৩. স্থানীয় সরকার প্রকৌশল বিভাগ	৪. সিটি কর্পোরেশন
৫. সমবায় সমিতি	৬. জেলা পরিষদ	৭. অন্য কোন সরকারি প্রতিষ্ঠান	৮. অন্যান্য

১.৩ এই মার্কেট/হাট/বাজার কিভাবে পরিচালিত হয়? (কোড) :

কোড ১.৩ : পরিচালনার ধরন

১. সমিতির মাধ্যমে	২. উপজেলা পরিষদ কর্তৃক সরাসরি	৩. ইজারাদার কর্তৃক
৪. মালিক কর্তৃক	৫. সিটি কর্পোরেশন কর্তৃক সরাসরি	৬. অন্যান্য

১.৪ ইজারাদার দ্বারা পরিচালিত হলে বর্তমান অর্থ বছরে ইজারার পরিমাণ : টাঃ

১.৫ মার্কেট/হাট/বাজারের আয়তন : একর/বিঘা

১.৬ মার্কেট/হাট/বাজারে কত সংখ্যক দোকান আছে?

১.৭ কত ধরনের ব্যবসা হয় এই মার্কেট/বাজার বা হাটে? (সম্ভব হলে পাশে দোকানের সংখ্যা লিখুন)

মুদি দোকান	ত্রোকারি সামগ্রী	মাংস বিক্রির দোকান
স্টেশনারি দোকান	হাঁড়ি-পাতিলের দোকান	গরু/ছাগলের হাট
কনফেকসনারি দোকান	সেলুন	প্লাস্টিক আসবাব ও সামগ্রী
মোবাইল বিক্রয় ও মেরামত	সজির বাজার	মাইক ভাড়া
মোবাইল কার্ড ও ফ্লেক্সিলোড	মাহের বাজার	সি আই সিট
ঘড়ি ও ইলেক্ট্রনিক্স সামগ্রী	চাপকল ও এর যন্ত্রাংশ	কামারের দোকান
জুতার দোকান	স্যালাইন ইঞ্জিন মেরামত	রেস্তুরা
তৈরি পোষাকের দোকান	হার্ডওয়্যার সামগ্রী	পাইপের দোকান
কাপড়ের দোকান	স্যানিটারি সামগ্রী	নির্মাণ সামগ্রী
দর্জি দোকান	মটর সাইকেল মেরামত	স্বর্ণের দোকান
সিমেন্ট	রড	অন্যান্য

১.৭ (ক) হাট বসার ধরন (কোড) :

কোড ১.৭(ক) : হাট বসার ধরন

১. দৈনিক	২. সাপ্তাহিক	৩. সপ্তাহে দুই/তিন দিন
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১.৭ (খ) বাজার বসার ধরন (কোড) :

কোড ১.৭(খ) : বাজার বসার ধরন

১. দৈনিক	২. সকাল	৩. সন্ধ্যা
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১.৭ (গ) এই মার্কেট/হাট/বাজার এর বিদ্যুৎ সরবরাহঃ ☐ আছে ☐ নাই

১.৭ (ঘ) এই মার্কেট/হাট/বাজার এর খাবার পানি সরবরাহ (কোড) :

কোড ১.৭(ঘ) : খাবার পানি সরবরাহ

১. টিউবওয়েল	২. পুকুর	৩. সিটি কর্পোরেশনের পাইপ লাইন	৪. সরবরাহ নাই
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১.৭ (ঙ) এই মার্কেট/হাট/বাজার এর গণ শৌচাগার ব্যবস্থা (কোড) :

কোড ১.৭(ঙ) : গণ শৌচাগার ব্যবস্থা

১. স্যানিটারী টয়লেট	২. পিট ল্যাট্রিন	৩. ব্যবস্থা নাই
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১.৮ এই মার্কেটে মাসিক লেন-দেনের পরিমাণ?

১.৯ মাসে কি পরিমাণ ভাড়া বা টোল আদায় হয়?

১.১০ বর্জ্য অপসারণের দায়িত্ব কার? (কোড) :

কোড ১.১০ : বর্জ্য অপসারণকারী

১. ইজারাদার	২. দোকানদার মালিক সমিতি	৩. সিটি কর্পোরেশন	৪. মার্কেট/হাট/ বাজার কমিটি
৫. দোকানের মালিক	৬. বেসরকারি সাহায্যসংস্থা	৭. জেলা পরিষদ	৮. অন্যান্য :

১.১১ কিভাবে বর্জ্য অপসারিত হয় (কোড) :

কোড ১.১১ : বর্জ্য অপসারণের মাধ্যম

১. নিজস্ব লোক দ্বারা	২. নিজস্ব ভ্যানে করে	৩. কমিউনিটি ভ্যানে করে
৪. বেসরকারি সংস্থার ভ্যানে করে	৫. বেসরকারি সংস্থার ট্রাকে করে	৬. সিটি কর্পোরেশনের গাড়িতে
৭. বর্জ্য অপসারণের ব্যবস্থা নেই	৮. অন্যান্য :	

১.১২ কোথায় বর্জ্য ফেলা হয় (কোড) :

কোড ১.১২ : বর্জ্য ফেলার স্থান

১. নিকটস্থ ডাষ্টবিনে	২. বর্জ্য ফেলার নির্দিষ্ট স্থানে	৩. রাস্তার পার্শ্বে	৪. নিচু/পতিত জমিতে
৫. নদীতে বা খালে	৬. অন্যান্য :		

১.১৩ মার্কেট/হাট বাজারে/যাতায়াতের ব্যবস্থা (কোড) :

কোড ১.১৩ : যাতায়াত ব্যবস্থা

১. রাস্তা	২. নৌ পথ	৩. রাস্তা নেই	৪. অন্যান্য :
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১.১৪ আপনার প্রতিষ্ঠানের নিম্নবর্ণিত প্রতিবেদন থাকলে সরবরাহ করার অনুরোধ করা হলো :

- বাৎসরিক প্রতিবেদন
- মার্কেটের লে আউটপ্ল্যান
- পরিবেশ সংক্রান্ত প্রতিবেদন
- প্রতিষ্ঠান পরিচালনার বাজেট
- প্রতিষ্ঠানের উন্নয়ন, ট্রেনিং বা কর্মকর্তা কর্মচারীদের গুণগত মান উন্নয়নের জন্য নীতিমালা
- ভূমি উন্নয়ন, পানি নিষ্কাশন, পয়নিষ্কাশন, পরিবহন সংক্রান্ত প্রতিবেদন

১.১৫ পরিচালনা কমিটি/সমিতির বক্তব্য

১.১৫.১ মার্কেট/হাট-বাজার ব্যস্থাপনায় কোন সমস্যা থাকলে উল্লেখ করুন :

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১.১৫.২ সমস্যা উত্তরণের সম্ভাব্য সমাধান বা দিক নির্দেশনামূলক কিছু বলুন :

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তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

Annexure-II: List of Surveyors

Sl.	Name	Designation	Date Start	Date End
1	Md. Nur Islam	Supervisor	04-12-2015	21-02-2016
2	Md. Manzarul Islam	Supervisor	04-12-2015	21-02-2016
3	Md. Shahin Rana	Serveyor	04-12-2015	21-02-2016
4	Md. Mahabubul Rahman	Serveyor	04-12-2015	21-02-2016
5	Md. Mohammad Ali	Serveyor	04-12-2015	21-02-2016
6	Protap Halder	Serveyor	04-12-2015	21-02-2016
7	Sajal Kumar Das	Serveyor	04-12-2015	21-02-2016
8	Naznin Akterya	Serveyor	04-12-2015	21-02-2016
9	Al Mamun Babu	Serveyor	04-12-2015	21-02-2016
10	Sumon Biswas	Serveyor	04-12-2015	21-02-2016
11	Ujjal Halder	Serveyor	04-12-2015	21-02-2016
12	Bivuti Vhodro	Serveyor	04-12-2015	21-02-2016
13	Kakoli Akhter	Serveyor	04-12-2015	21-02-2016
14	Md. Shofiqul Islam	Serveyor	04-12-2015	21-02-2016
15	Md. Anwarul Huque	Serveyor	04-12-2015	21-02-2016
16	Md. Anisur Rahman	Serveyor	25-11-2016	30-11-2016
17	Imran Hossain	Serveyor	25-11-2016	30-11-2016
18	Suvash Roy	Serveyor	25-11-2016	30-11-2016
19	Biplob Mondol	Serveyor	25-11-2016	30-11-2016
20	Faisal Mia	Serveyor	25-11-2016	30-11-2016
21	Kartik Ghosh	Serveyor	25-11-2016	30-11-2016
22	Muzahidur Rashid	Serveyor	25-11-2016	30-11-2016
23	Salma Akhter (Nijhum)	Serveyor	25-11-2016	30-11-2016

Annexure-III: List of Photographs



Plate-1: Data collection at Faridpur Sadar Upazila



Plate-2 : Data collection at Faridpur Sadar Upazila

Annex-I

৯. বিক্রিত পণ্যের ধরন :

১০. ভোক্তা শ্রেণি (কোড) :

কোড ১০ : ভোক্তা শ্রেণি

১. উচ্চ বিভাগ	২. মধ্যবিভাগ	৩. নিম্ন বিভাগ	৪. নির্দিষ্ট গোষ্ঠী/শ্রেণি/পেশার মানুষ
৫. সুনির্দিষ্ট নয়	৬. অন্যান্য.....		

১১. কর্মকান্ডের কাল : ☐ ১. মৌসুমী ☐ ২. সারা বৎসর

১১.১ যদি মৌসুমী হলে, কোন মৌসুম :

১১.২ কর্ম-মৌসুমের ব্যাপ্তিকাল :

১২. আপনার অর্থনৈতিক কর্মকান্ড পরিচালনার স্থান :

১৩. আপনার অর্থনৈতিক কর্মকান্ডের অবস্থানের ধরন (কোড) :

কোড ১৩ : অবস্থানের ধরন

১. স্থায়ী	২. অস্থায়ী	৩. অযান্ত্রিক বাহনে ড্রাম্যমাণ	৪. মাথায় করে ড্রাম্যমাণ
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১৪. দোকানের মালিকানা : ☐ ১. নিজস্ব ☐ ২. ভাড়া

১৫. আপনার কি কোন ঋণ আছে : ☐ ১. হ্যাঁ ☐ ২. না

১৫.১ যদি 'হ্যাঁ' হয়,

উৎস	টাকার পরিমাণ	সুদের হার	উদ্দেশ্য (কোড)
সরকারি ব্যাংক			
বেসরকারি ব্যাংক			
সমবায় সমিতি			
মহাজন			
আত্মীয়/বন্ধু-বান্ধব			
এন.জি.ও - ১			
এন.জি.ও - ২			
এন.জি.ও - ৩			
অন্যান্য			

কোড : উদ্দেশ্য

১. ব্যবসা	২. আসবাবপত্র ক্রয়	৩. ঘরবাড়ি মেরামত	৪. বিবাহ
৫. গবাদি পশু-পাখি ক্রয়	৬. চিকিৎসা	৭. জমি ক্রয়	৮. অন্যান্য

১৬. মোট মাসিক আয় (টাকা) : ১৬.১ প্রধান পেশা : ১৬.২ সহায়ক পেশা :

১৭. মাসিক ব্যয়ঃ

খাত	খাদ্যসামগ্রী	বাসা ভাড়া	যাতায়াত	শিক্ষা	চিকিৎসা	পোষাক-পরিচ্ছদ	বিনোদন	অন্যান্য	মোট
মাসিক ব্যয় (টাকা)									

১৮. বাসস্থানের মালিকানা : ☐ ১. নিজস্ব ☐ ২. ভাড়াটে ১৮.১ ভাড়াটে হলে মাসিক ভাড়া (টাকা)ঃ

১৯. কর্মক্ষেত্রে আপনি কি ধরনের সমস্যার সম্মুখীন হন (কোড) :

কোড ১৯ : সমস্যা

১. বিরূপ আবহাওয়া	২. উচ্ছেদ আতঙ্ক	৩. চাঁদাবাজি	৪. পুলিশের হয়রানি	৫. ব্যবসায়িক মন্দা	৬. অবকাঠামোগত সমস্যা
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২০. সমস্যা সমাধানের জন্য কি করা যেতে পারে বলে আপনি মনে করেন?

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২১. আপনার আর্থ-সামাজিক উন্নয়নের জন্য কি সাহায্য সহযোগিতা প্রয়োজন?

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২২. ভবিষ্যৎ পরিকল্পনা :

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তথ্য প্রদানের জন্য আপনাকে আন্তরিক ধন্যবাদ

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 02): UDD

Bus/ Boat or Launch/ Train Passenger Interview Survey Questionnaire

Name of Upazila :

Date :

Time of Interview :

Location of Interview point :

A. Present Address of the respondent

B. Sex: (a) Male (b) Female

C. Age: 1. Below 15 years 2. 16-20 Years 3. 21-30 Years 4. 31-40 Years 5. 41-50 Years 6. Above 51 Years

D. Where did your trip begin?

E. Where did your trip end point?

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. No. of trips in a week?

H. How many times you changed modes to complete this trip?

1	2	3
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I. What are types of modes you used to complete the trip?

1. Bus 2. Motor cycle 3. Rickshaw 4. Van 5. Rail 6. Boat/Launch 5. On foot 6. Others (specify)

J. Total travel time of the trip?(In min/hour)

K. Total costs of the trip? (In Taka)

L. Total distances of the trip? (In k.m.)

M. Any comments on transportation?

Name of Enumerator:

Name of Supervisor:

Signature of Enumerator:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE-02):UDD

Traffic and Transportation Survey
Traffic Volume Count Tally Sheet

(24 Hours long) Weather condition

Name of Upazila:

Date:

Route Name:

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

Intersection Name:

Type of traffic	Number of Traffic	Total
Bus/Minibus		
Heavy Truck/ Light Truck		
Car/Micro-bus/Jeep		
Auto Rickshaw/Tempo/Nosimon		
Motorcycle		
Rickshaw/Van		
Bicycle		
Animal cart/Push cart		
Pedestrian		
Others (specify)		

Name of Enumerator

Signature of Enumerator

Name of Supervisor

Signature of Supervisor

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(Package: 02): UDD

Roadside Interview Survey (O-D Survey) Questionnaire

Time: Every half an Hour Interval (24 hours clock)

Name of Upazila:

Date:

Route Name:

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

A. Vehicle Type:

1. Truck 2. Bus 3. Car/Pickup/Jeep/Motorbus 4. Auto Rickshaw/Tempo 5. Motorcycle 6. Rickshaw/Van 7. Bicycle

B. Where did your trip begin?

City/Town.....

C. What type of place is your trip start point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

D. Where did your trip end?

City/Town.....

E. What type of place is your trip end point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. How many people were in the vehicle including the driver?

No. of people.....

H. Any comments on Transportation?

Name of Enumerator:

Signature of Enumerator:

Name of Supervisor:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 02): UDD

Questionnaire on Regional Transportation Network System

Name of Upazila :

Date of survey :

A. Information of trip going out from study area to other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip destination point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):

B. Information of trip coming into study area from other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip origin point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):
- 6) Stoppage area inside the upazila area

ORIGIN AND DESTINATION SURVEY

Table B-1: Types of Mode

Types of Vehicle	Frequency	Percent
Truck	7	5.4
Bus	16	12.4
Car/Pickup/Jeep/Motorbus	4	3.1
Auto Rickshaw/Tempo	44	34.1
Motorcycle	20	15.5
Rickshaw/Van	32	24.8
Bicycle	6	4.7
Total	129	100

Table B-2: Trip Purpose

Trip Purpose	Frequency	Percent
Work/Commute	16	12.4
Business Related	26	20.2
Shopping	58	45
Education	15	11.6
Social	5	3.9
Recreation	9	7
Total	129	100

Table B-3: Frequency of Passengers Occupancy

No. of people in vehicle	Frequency	Percent
Below 5 persons	77	62.1
6 to 10 persons	34	27.4
11 to 20 persons	4	3.2
21 to 30 persons	2	1.6
31 to 40 persons	2	1.6
Above 40 persons	5	4
Total	124	100

APPENDIX-B

Table B-4: Origin and Destination Pattern

<div> <div>Destination</div> <div>Origin</div> </div>		Residence	Workplace	Shopping	School/College/ University	Social	Recreational	Total
Residence	Frequency	0	16	21	9	9	5	60
	Percentage	0.00%	26.70%	35.00%	15.00%	15.00%	8.30%	100.00%
	Percentage	0.00%	84.20%	87.50%	100.00%	75.00%	83.30%	46.50%
Workplace	Frequency	17	2	3	0	1	1	24
	Percentage	70.80%	8.30%	12.50%	0.00%	4.20%	4.20%	100.00%
	Percentage	28.80%	10.50%	12.50%	0.00%	8.30%	16.70%	18.60%
Shopping	Frequency	32	0	0	0	1	0	33
	Percentage	97.00%	0.00%	0.00%	0.00%	3.00%	0.00%	100.00%
	Percentage	54.20%	0.00%	0.00%	0.00%	8.30%	0.00%	25.60%
School/College/University	Frequency	8	1	0	0	0	0	9
	Percentage	88.90%	11.10%	0.00%	0.00%	0.00%	0.00%	100.00%
	Percentage	13.60%	5.30%	0.00%	0.00%	0.00%	0.00%	7.00%
Social	Frequency	0	0	0	0	1	0	1
	Percentage	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	100.00%
	Percentage	0.00%	0.00%	0.00%	0.00%	8.30%	0.00%	0.80%
Recreational	Frequency	2	0	0	0	0	0	2
	Percentage	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
	Percentage	3.40%	0.00%	0.00%	0.00%	0.00%	0.00%	1.60%
Total	Frequency	59	19	24	9	12	6	129
	Percentage	45.70%	14.70%	18.60%	7.00%	9.30%	4.70%	100.00%
	Percentage	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

APPENDIX-B

Table B-5: Origin and Destination Matrix

Destination Origin	Bodor pur	CMB Ghat	Faridpu r	Kanaipu r	Munshibaz ar	Shibrampu r	Somespur bazar	Tepakhol a	Chandpu r	Gopalgan j	Hajigan j	Tambulkha na	Total
Bodorpur	0	0	0	1	0	0	0	0	0	0	0	0	1
CMB Ghat	0	0	1	0	0	0	0	2	0	0	0	0	3
Faridpur	1	0	0	0	2	0	0	0	0	1	0	1	5
Kanaipur	0	1	3	0	0	1	0	0	3	0	0	1	9
Munshibazar	0	0	4	0	0	0	0	0	0	0	0	0	4
Shibrampur	0	0	1	0	0	0	0	0	0	0	0	0	1
Somespur bazar	0	0	0	0	0	0	0	0	0	0	0	3	3
Tepakhola	0	5	7	0	0	0	1	0	0	0	2	0	15
Chandpur	0	0	0	1	0	0	0	0	0	0	0	0	1
Gopalganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Hajiganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Tambulkhana	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	6	16	2	2	1	1	2	3	1	2	5	42

PASSENGERS INTERVIEW SURVEY

Table B-6: Types of Vehicle

Type of Vehicle	Frequency	Percentage
Bus	97	83.6
Boat/Launch	10	8.6
Train	9	7.8
Total	116	100

Table B-7: Gender of Respondents according to the Mode

Sex of the Respondent	Gender		Types of Mode			
			Bus	Boat/Launch	Train	Total
	Male	Frequency	71	6	7	84
		Percentage	84.50%	7.10%	8.30%	100.00%
	Female	Frequency	26	2	2	30
		Percentage	86.70%	6.70%	6.70%	100.00%
	Total	Frequency	97	8	9	114
		Percentage	85.10%	7.00%	7.90%	100.00%

Table B-8: Gender of Respondents according to Travel Distance

Distance Gender		0.6-1km	1.1-2.0 km	2.1-3 km	3.1-5.0 km	5.1-10.0 km	10.1-20.0 km	20.1-30.0 km	Above 30.0 km	Total
Male	Frequency	1	3	1	2	12	13	15	35	82
	Percentage	1.20%	3.70%	1.20%	2.40%	14.60%	15.90%	18.30%	42.70%	100.00%
Female	Frequency	1	0	1	2	9	3	6	7	29
	Percentage	3.40%	0.00%	3.40%	6.90%	31.00%	10.30%	20.70%	24.10%	100.00%
Total	Frequency	2	3	2	4	21	16	21	42	111
	Percentage	1.80%	2.70%	1.80%	3.60%	18.90%	14.40%	18.90%	37.80%	100.00%

Table B-9: Age variations according to the Trip Purpose

Purpose Age		Work/Commute	Business Related	Shopping	Education	Recreation	Total
Below 15 years	Frequency	0	0	0	1	1	2
	Percentage	0.00%	0.00%	0.00%	50.00%	50.00%	100.00%
16-20 years	Frequency	1	0	2	5	2	10
	Percentage	10.00%	0.00%	20.00%	50.00%	20.00%	100.00%
21-30 years	Frequency	5	1	8	14	5	33
	Percentage	15.20%	3.00%	24.20%	42.40%	15.20%	100.00%

APPENDIX-B

Age \ Purpose		Work/Commute	Business Related	Shopping	Education	Recreation	Total
31-40 years	Frequency	11	12	6	1	8	38
	Percentage	28.90%	31.60%	15.80%	2.60%	21.10%	100.00%
41-50 years	Frequency	3	1	1	0	6	11
	Percentage	27.30%	9.10%	9.10%	0.00%	54.50%	100.00%
Above 51 years	Frequency	0	2	0	0	2	4
	Percentage	0.00%	50.00%	0.00%	0.00%	50.00%	100.00%
Total	Frequency	20	16	17	21	24	98
	Percentage	20.40%	16.30%	17.30%	21.40%	24.50%	100.00%

Table B-10: Trip Purpose

Trip Purpose	Frequency	Percent
Work/Commute	20	18.2
Business Related	21	19.1
Shopping	22	20
Education	21	19.1
Recreation	26	23.6
Total	110	100

Table B-11: Number of Trips according to Gender

Sex of the Respondent		No. of trips in a week							
		1	2	3	4	5	6	7	Total
Male	Frequency	42	15	7	2	8	9	1	84
	Percentage	50.00 %	17.90 %	8.30 %	2.40%	9.50%	10.70 %	1.20 %	100.00 %
Female	Frequency	15	3	1	0	3	8	0	30
	Percentage	50.00 %	10.00 %	3.30 %	0.00%	10.00 %	26.70 %	0.00 %	100.00 %
Total	Frequency	57	18	8	2	11	17	1	114
	Percentage	50.00 %	15.80 %	7.00 %	1.80%	9.60%	14.90 %	0.90 %	100.00 %

Table B-12: Number of Trips according to Trip Purpose

		No. of trips in a week							
		1	2	3	4	5	6	7	Total
(Frequency and Percentage)	Work/	10	0	1	0	3	5	1	20
	Commute	50.00 %	0.00 %	5.00 %	0.00%	15.00 %	25.00 %	5.00 %	100.00%
	Business	6	7	5	1	2	0	0	21
	Related	28.60 %	33.30 %	23.80 %	4.80%	9.50%	0.00%	0.00 %	100.00%

APPENDIX-B

	No. of trips in a week							
	1	2	3	4	5	6	7	Total
Shopping	12	8	1	0	1	0	0	22
	54.50 %	36.40 %	4.50 %	0.00%	4.50%	0.00%	0.00 %	100.00%
Education	4	0	0	1	4	12	0	21
	19.00 %	0.00 %	0.00 %	4.80%	19.00 %	57.10 %	0.00 %	100.00%
Recreation	22	2	1	0	1	0	0	26
	84.60 %	7.70 %	3.80 %	0.00%	3.80%	0.00%	0.00 %	100.00%
Total	54	17	8	2	11	17	1	110
	49.10 %	15.50 %	7.30 %	1.80%	10.00 %	15.50 %	0.90 %	100.00%

Table B-13: Modes used by Bus Passengers

Types of Mode	Frequency	Percent
Bus	93	41.15
Rail	9	3.98
Boat/Launch	10	4.42
Rickshaw	30	13.27
Van	21	9.29
On foot	63	27.88
Total	226	100.00

Table B-14: Travel Time for Bus Passengers

Total travel time of the trip in min/hour	Percentage	Frequency
Within 30 Minutes	31	36
30-60 Minutes	38.8	45

APPENDIX-B

Within 1-2 Hours	16.4	19
Within 2-3 Hours	6	7
Within 3-4 Hours	5.2	6
Within 4-5 Hours	1.7	2
Above 5 Hours	0.9	1
Total	100	116

Table B-15: Trip Cost according to the Distance

Distance \ Cost	Within 50 Taka	51-100 Taka	101-200 Taka	201-400 Taka	401-600 Taka	Total
0.6-1km	2	0	0	0	0	2
1.1-2.0 km	3	0	0	0	0	3
2.1-3 km	2	0	0	0	0	2
3.1-5.0 km	4	0	0	0	0	4
5.1- 10.0 km	20	1	0	0	0	21
10.1- 20.00 km	16	0	0	0	0	16
20.1-30.00 km	17	2	0	2	0	21
Above 30.00 km	13	21	6	3	1	44
Total	77	24	6	5	1	113

EXECUTIVE SUMMARY

Faridpur Sadar Upazila is well connected with all types of road network and communication. This area is historically important where several National and Zila Road has been gone through this Upazila. It has 11 Unions and 1 Pourashava. The National Highway N7 around 252 km has gone through it which has been served several Upazilas.

There are four types of roads namely Upazila, Union, Village-A and Village-B served by LGED. All roads are categorized into Pucca, Semi pucca and Katcha Road. There are few areas which are important but traffic congestions are occurred lack of maintenance or infrastructural problems.

For exploring the traffic scenario, seven intersections have been surveyed for traffic volume count. Origin and Destination survey has been done in prominent areas. Passenger Interview Survey has been done for Bus, Train and Truck where different glimpses are explored. Regional survey has served for Bus and Truck Terminal from the study can find out the regional linkage of its surrounding Upazilas.

Trip purpose, Types of Mode, Origin and Destination Pattern, Problems, Trip Frequency, Passenger Occupancy etc. scenarios have been drawn out from this survey.

This is a submission of the traffic and transportation survey report as a part of Survey Report as per TOR of the project and mainly describes the traffic and transportation survey activities performed as per TOR.

ABBREVIATION AND ACRONYMS

LGED	- Local Government Engineering Department
MV	- Motorized Vehicle
NMV	- Non Motorized Vehicle
OD	- Origin and Destination
PCE	- Passenger Car Equivalent
PCU	- Passenger Car Unit
PRA	- Participatory Rural Appraisal
RHD	- Roads and Highway Department
TOR	- Terms of Reference
UDD	- Urban Development Directorate

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CHAPTER 1: INTRODUCTION

1.1 Background of the Study

In the present world countries, the roads within an upazila are important and fundamental issues for communications and transactions. Thus the roads need to be well efficient and organized to serve the demand. Faridpur is a district in the south central Bangladesh and Faridpur Sadar Upazila under Faridpur District has great importance for its medieval and colonial architecture. Bangladesh has higher transportation demand and the demand of transports in Faridpur Sadar Upazila is increasing day by day. Traffic scenario and demand forecasting is essential for the design of transportation facilities and services, and also for planning, investment, and policy development. To determine the future traffic demand, existing traffic exploration is essential. Traffic study has been taken for Preparation of Development Plan for Faridpur Sadar Upazila. It is critical that this study produces an accurate value as these values form the basis for the subsequent steps and the errors in this step can propagate in the entire estimation process.

1.2 Extent and Nature of Traffic and Transportation Study

An inventory of road, railway, water way and airway network, regional transport network system and its linkage with Upazila area, information on pedestrian facilities, bus/ rail/ water way routes and parking facilities has been conducted and the base map will be upgraded with this information for providing traffic and transportation policy. A survey has provided to gather current traffic information not readily available from other sources and other relevant data have been collected from LGED, RHD and Upazila Parishad. Several traffic and transportation surveys have been done for analyzing the existing traffic behavior of Faridpur Sadar Upazila which will form the basis of traffic forecasting.

1.3 Study Area Profile

Faridpur Sadar Upazila is under Faridpur District which is located near the banks of Padma River. Faridpur Sadar came into existence as a Thana in 1894. It is learnt that, there lived a renowned religious leader and pious saint named **Shah Farid** in this locality. He was buried in the present place of Faridpur town after his death. It is generally believed that the upazila might have derived its name Faridpur Sadar from the name of that great saint Shah Farid. Administration Faridpur Sadar Thana was formed in 1896 and it was turned into an upazila in 1983. It has 11 unions and 1 pourashava.

1.4 Regional Connectivity

The upazila occupies an area of 412.86 sq.km. It is located between 23° 29' and 23° 34' north latitudes and between 89° 43' and 89° 56' east longitudes. The upazila is bounded on the north by Goalanda upazila of Rajbari zila and Shibalaya along with Harirampur upazilas of Manikganj zila, on the east

by Char Bhadrassan upazila, on the south by Nagarkanda and Boalmari upazilas and on the west by Madhukhali upazila and Rajbari Sadar upazila of Rajbari Zila. (Please see Map 1.1 & Map 1.2)

Table 1.1: Faridpur Regional Road Network

Division	Length (Km)
Rajbari	18.65
Faridpur	47.11
Magura	25.08
Jhenaidah	43.84
Jessore	50.37
Khulna	34.07
Bagerhat	30.55

Source: RHD, Road Database.

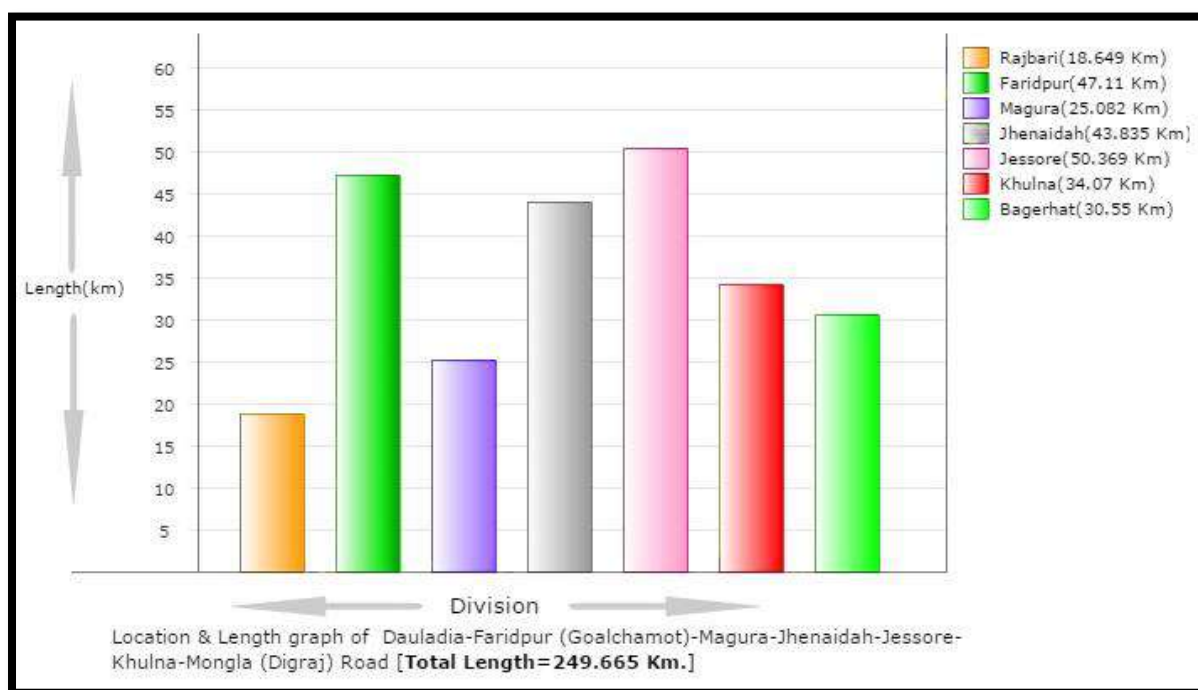
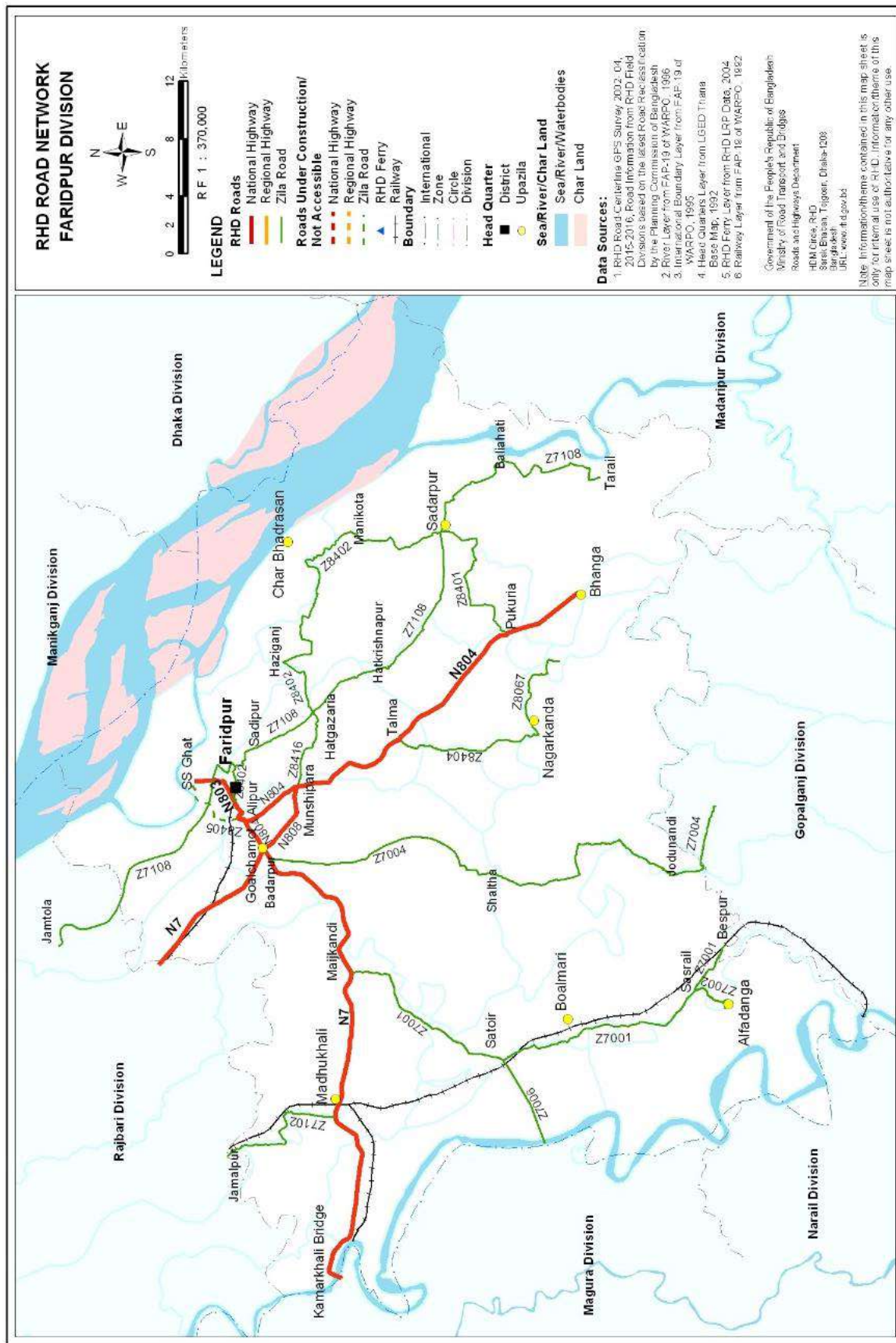
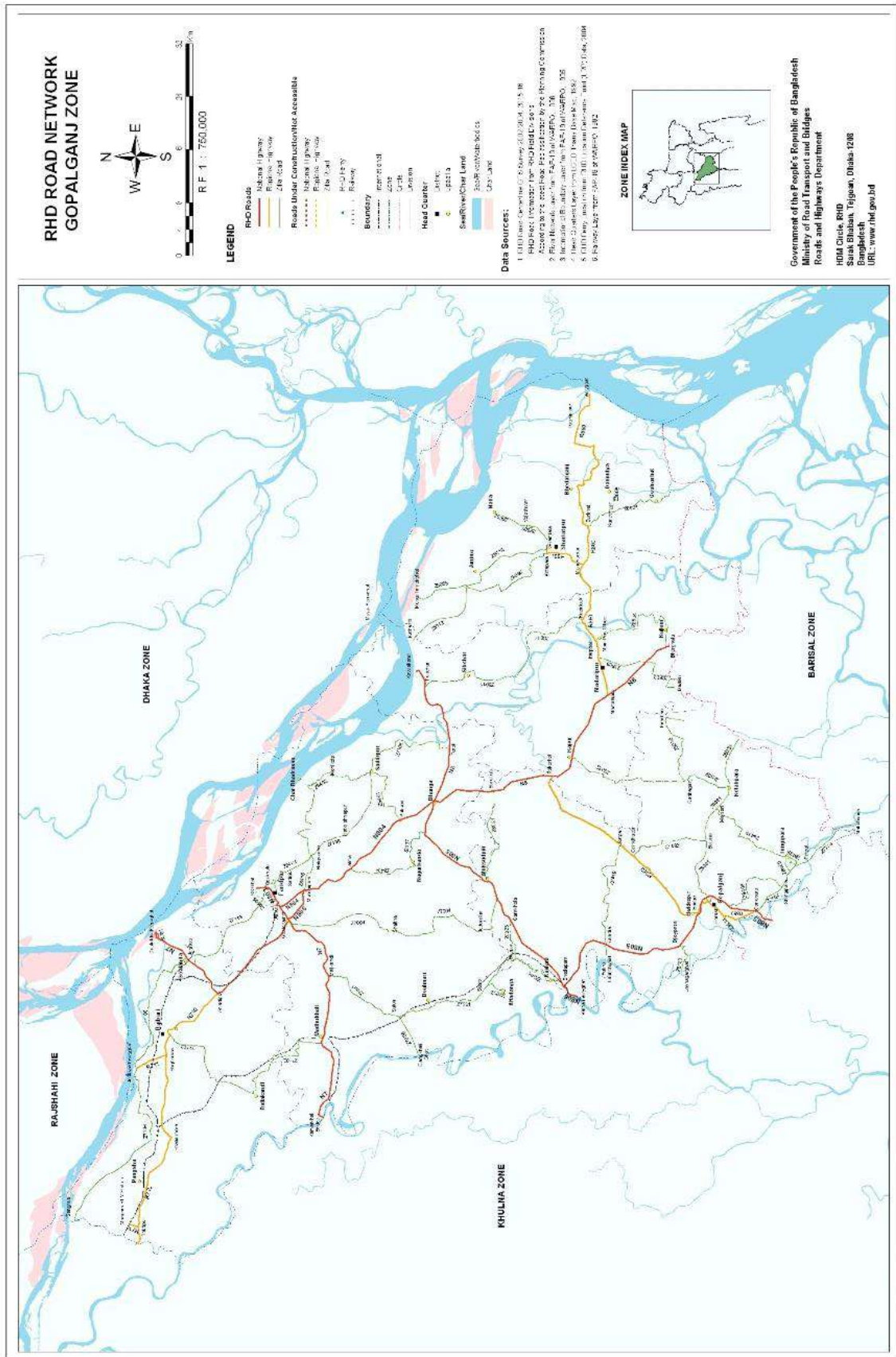


Figure 1.1: Regional Road Length of Faridpur Sadar Upazila

Source: RHD, Road Database.



Map 1.1: Regional Connectivity of Faridpur Sadar Upazila



Map 1.2: Regional Connectivity of Greater Faridpur Region

1.5 Road Network

1.5.1 Existing Road Network

Faridpur Sadar Upazila is viable in the context of road network. According to Banglapedia, 2017; Pucca road 223 km, Semi-pucca road 120 km, Katcha road 408 km; railway 25 km; waterway 40.50 nautical miles. (Please see **Map 1.3**) Road network data and other road infrastructure will be updated through physical feature survey.

Table 1.2: Existing Road Infrastructure of Faridpur Sadar Upazila

Road Type	Earthen Road (km)	Pavement Road (km)	Total Length (km)
Upazila Road	11.27	121.72	132.98
Union Road	30.33	118.16	148.48
Village Road-A	169.96	168.84	338.79
Village Road-B	275.93	100.73	376.66

Source: LGED, 2016

1.5.2 Major Road Inventory of Faridpur Sadar Upazila

The Regional Highway and several Zila Road has been passed through Faridpur Sadar Upazila. The major roads of Faridpur Sadar Upazila has shown in Table 1.2.

Table 1.3: Major Roads of Faridpur Sadar Upazila

Road ID	Name of the Road	Length of Road (km)
N7	Daulatdia Ferryghat - Goalchamot (N803) - Magura (N704) - Arappur (N704) - Jhenaidah - Hamdah (N703) - Palbari (N707, N708) - Chanchra (N706) - Murail (N707) - Phultala (N709) - Khulna - (ferry) - Kudir Battala (N709) - Digraj	252
N803	Goalchamot (N7) - Alipur (N804) - Faridpur	7
N804	Alipur (N803) - Bhanga (N8, N805)	32
Z8402	Faridpur-Hatgazaria-Char Bhadrason-Sadarpur Road	49
Z8405	Faridpur (Goalchamat)-Alipur (Ambikapur)- S.S.Ghat Road	10

Source: RHD, Road Database.

Table 1.4: Detail Road Database of N7

<u>Division</u> ▲	<u>Start location</u>			<u>End location</u>			<u>Length</u> ▲
	<u>LRP</u> ▲	<u>Offset</u> ▲	<u>Chainage</u> ▲	<u>LRP</u> ▲	<u>Offset</u> ▲	<u>Chainage</u> ▲	(Km)
Rajbari	LRPS	0	0	LRP018	629	18.649	18.649
Faridpur	LRP018	629	18.649	LRP064	1412	65.759	47.110
Magura	LRP064	1412	65.759	LRP089	1300	90.841	25.082
Jhenaidah	LRP089	1300	90.841	LRP134	1	134.676	43.835
Jessore	LRP134	1	134.676	LRP149	650	150.3	15.624
Jessore	LRP149	650	150.3	LRP184	546	185.045	34.745
Khulna	LRP184	546	185.045	LRP210	3330	213.345	28.300
Khulna	LRP210	3330	213.345	LRP219	624	219.115	5.770
Bagerhat	LRP219	624	219.115	LRPE	0	249.665	30.550

LRP – Location Referencing Points

Source: RHD, Road Database.

Table 1.5: Traffic and Transportation Inventory

Traffic (AADT)	9325 (Motorized: 7404, Non-Motorized: 1921) Show details
Average width	7.50 (m) Width Detail
No. of bridges	68
No. of ferry ghats	0

Source: RHD, Road Database.

1.6 Waterway Network

There is a great option for waterway for the inhabitants of Faridpur Sadar Upazila. Waterway is 40.50 nautical miles for Faridpur but most of the waterway is underutilized. Observation during different surveys in Faridpur it is clear that water ways are mostly used for carrying goods and as a regular transportation people don't use water way network.

1.7 Railway Network

There is no regular Rail connection with Dhaka the capital city of Bangladesh. But, there are one main rail stations at Ward No. 8, Station Bazar, Mujib Sarak in Faridpur. In Railway master plan, Faridpur would be linked with the regional Rail Network. After completing the Padma Bridge, rail line will be linked with Faridpur City. At present, only train linked with Faridpur is Rajbari in the Morning. It reached from Rajbari at 9.00 am. All the rail lines are broad gauge system.

1.8 Airways

There is no direct Air connection to Faridpur District. In Jessore, there is an Airport from where passenger can come to Faridpur and it will take less than two and half hours. Another closest Airport is at Barisal it takes about 2.5 hours. The capital city Dhaka where the main International Airport located and it takes 3.5 hours to travel to Faridpur.

1.9 Formulation and Mobilization of Survey Team

1.9.1 Orientation & Meeting

In order to carry out various surveys related with traffic and transportation, at first an orientation program was held at Faridpur Sadar Upazila Office (27th November, 2016) for giving a clear concept about the objectives of the project and different type of surveys. The Consultant team with expert had attended the orientation program and Mr. Shaheen Ahmed (Project Director and Senior Planner, UDD) was present in field during Survey on the behalf of UDD.

1.9.2 Guidance to the Survey Members

After giving orientation, the consultants have provided guidelines to the survey members who are representatives of the Consultancy firm. The survey members have been guided by proper understanding of Questionnaire formats of different types of Survey, time schedule of conducting Survey, location of conducting Survey etc. Junior Urban Planner, Jahidul Ashik, Mehedi Hasan and Afnan Mohammad were always with the enumerator at a later stage to monitor the Transport survey.

1.9.3 Selection of Survey Locations

Considering the intensity, linkage and movement of traffic different survey locations have been selected to conduct different types of survey including Volume Count, O-D Survey, Passenger Survey and Regional Transport Survey which refers as a reconnaissance survey. Major intersections, Major Roads, Bus Terminal have been identified for conducting different types of Survey. Details of survey location have been given in corresponding type of survey. Railway Station is not widely used in Faridpur, though there is a huge scope of using rail transport from Faridpur to the different parts of the country. Only a train comes from Rajbari to Faridpur in the Mohrning by 9am and it returns to Rajbari again at 9.30am. This is the only rail moves from Faridpur.

1.9.4 Formation of Survey Team

The transport surveys have been carried out according to the consent of Transport Expert. The

surveyors were deployed sufficiently according to the need of each survey locations, the consultant team have considered the previous working experience of similar types of survey activities and educational qualifications. The following table represents the team formations for traffic and transportation survey at Faridpur Sadar Upazila:

Table 1.6: List of members in Traffic and Transportation Survey

Sl. No.	Name	No.	Activities
1	Transportation Expert Md. Abul Kashem	1	Planning, preparation of questionnaire and overall supervision of the survey activities and subsequent report preparation.
2	Planner Jahidul Ashik, Mehedi Hasan and Afnan Mohammad	3	Training, Monitoring and supervision of field level data collection and survey activities.
3	Mustaq Ahmed & Md. Halim	2	Data base format preparation and supervision of data entry activities according to the guidance of Team Leader
4	Survey Supervisor Md. Anisur Rahman	2	Inspection at every spots of Field Survey.
5	Enumerators	8	Field Survey at different locations in Faridpur
6	Data Entry Operators	10	Data Entry in Excel, Analysis and presentation in tabular format.
7	Planner Hasnat Arnab and Afnan Mohammad	2	Data checking and reviewing

Source: Traffic and Transportation Survey, 2016-2017



CHAPTER 2: METHODOLOGY

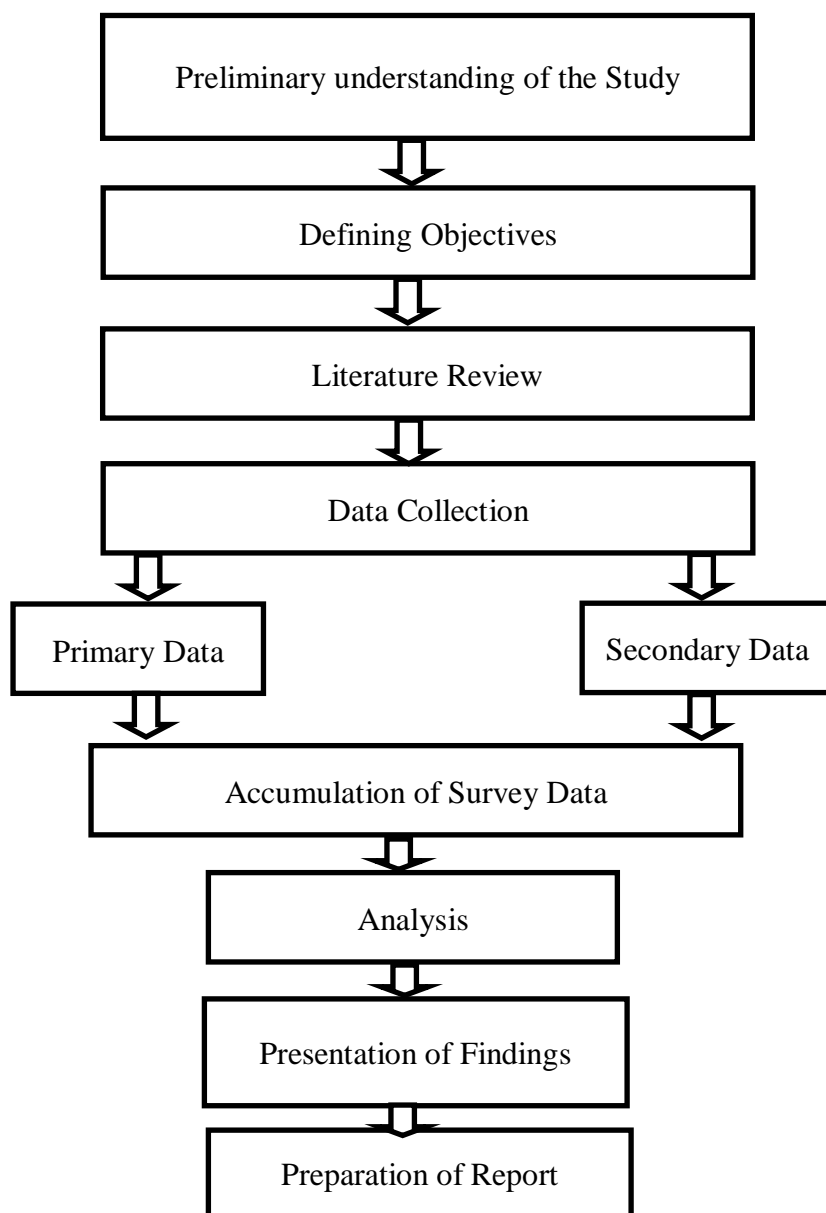


Figure 2.1: Working Methodology in Flow Chart

2.1 Introduction

Traffic and Transportation system is the backbone or mirror of an Upazila. It describes about the prospects of an Upazila. For preparation of a Development Plan, Transport is the prime issue for resolving different problems. For knowing different issues and problems, several surveys have been

selected for depicting the perfect scenario of the Upazila. To know the different scenario the consultants have conducted a number of surveys on traffic and transportation which are as follows:

- Traffic Volume Count Survey
- Origin & Destination (O D) Survey
- Passenger Interview Survey and
- Regional Transportation Survey

2.2 Reconnaissance Survey

A reconnaissance survey has been carried out to identify where the above mentioned surveys will be done for having different impact of certain locations. According to the judgment, local knowledge and stakeholder consultation survey locations points has been selected for the above selected surveys. For this study, survey has been done on the basis of Hat Day/On Day and Non Hat Day/Off Day.

2.3 Sample Size Determination

The initial sample size was determined by the following formula

$$n = \frac{z^2 pq}{d^2} \quad \text{Where,}$$

z is the normal variation and which has 1.96 for 95% confidence interval

p is the target proportion. In this case, we have assumed p= 0.5

p+q=1, therefore q=0.5

And d is the desired error which is 0.1.

The initial sample size is therefore:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.1)}$$

$$= 96.04$$

These sample size was adjusted by using the following formula:

$$n = \frac{n_0}{1 + \frac{n_0}{N}}$$

Where n is requiring sample size and N is no. of Population of Upazila.

Here, Faridpur Sadar Upazila has the population of 4, 69,410. After applying the above formula, it is found that minimum 96 samples will be surveyed for each category of survey. Considering the formula, the sample size of traffic and transportation surveys has been determined.

2.4 Conducted Traffic and Transportation Survey

2.4.1 Traffic Volume Count Survey

Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data can help to identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. For this study, Manual counting method has been applied for acquiring the required data. Manual counts are typically used to gather data for determination of vehicle classification, turning movements, direction of travel, pedestrian movements, or vehicle occupancy. The selection of study method should be determined using the count period. The count period should be representative of the time of day, day of month, and month of year for the study area. The count period should avoid special event or compromising weather conditions (Sharma 1994). Count periods may range from 5 minutes to 1 year. Typical count periods are 15 minutes or 2 hours for peak periods, 4 hours for Morning and afternoon peaks, 6 hours for Morning, midday, and afternoon peaks, and 12 hours for daytime periods (Robertson, 1994). For this survey, seven major intersections have been identified. The intersections are: Rajbari Raster Mohr, Raffle in Mohr, Janata Mohr, Bhangar Rastar Mohr, Munshi Bazar, Tambulkhana and Kanaipur. (Please see **Map 2.1**) Hat Day and Non Hat Day has been taken into consideration for each intersection. Peak hour and off peak hour have been varied in each intersection depending on its impact on the Upazila. The volume of traffic using the road in a given interval of time is one of the elemental measures of road traffic that is also termed as flow and expressed in vehicles per hour or vehicles per day. But the roads normally comprise different types of vehicles offering different degrees of interference to other traffic. However, it is obligatory to bring all types of vehicles to a common unit. The normal practice to convert the flow into common unit is Passenger Car Equivalence (PCE) or Passenger Car Unit (PCU) by using certain equivalency factors. The flow is then expressed as PCE /PCU per hour or PCE /PCU per day. The Table 2.1 represents the PCE value for the traffic volume calculation.

Table 2.1: List of PCU value for various Vehicles

Sl. No.	Vehicle Categories	PCE
1	Passenger Car	1.00
2	Light Goods Vehicle	1.00
3	Truck	3.00

Sl. No.	Vehicle Categories	PCE
4	Bus	3 .00
5	Auto-Rickshaw	0.75
6	Motor-cycle, moped, scooter	0.75
7	Paddle Cycle	0.50

Source: Ministry of Communications, 2000 (Cited in Roads & Highways, 1994)

2.4.2 Origin and Destination (O-D) Survey

Origin Destination (O-D) survey provides a detailed picture of the trip patterns and travel choices of a study area. The survey data related to households, individuals and trips allows stakeholders to understand travel patterns and characteristics; measure trends; provide input to travel demand model development, forecasting, and planning for area-wide transportation infrastructure needs and services; and, monitor progress in implementing transportation policies. The O D Survey has been taken in pertinent locations (Please see **Map 2.2**). The survey has carried out through random questionnaire according to the sample size.

2.4.3 Passenger Interview Survey

Passenger Interview Survey has done to know about the travel behavior of the passengers. In order to ensure the findings of the survey were representative, random sampling method was applied on this on-board face-to-face interview survey. Target respondents were picked by a random process. Passenger Interview Survey has been carried out in Bus Terminal, Bus stoppages etc. (Please see **Map 2.3**)

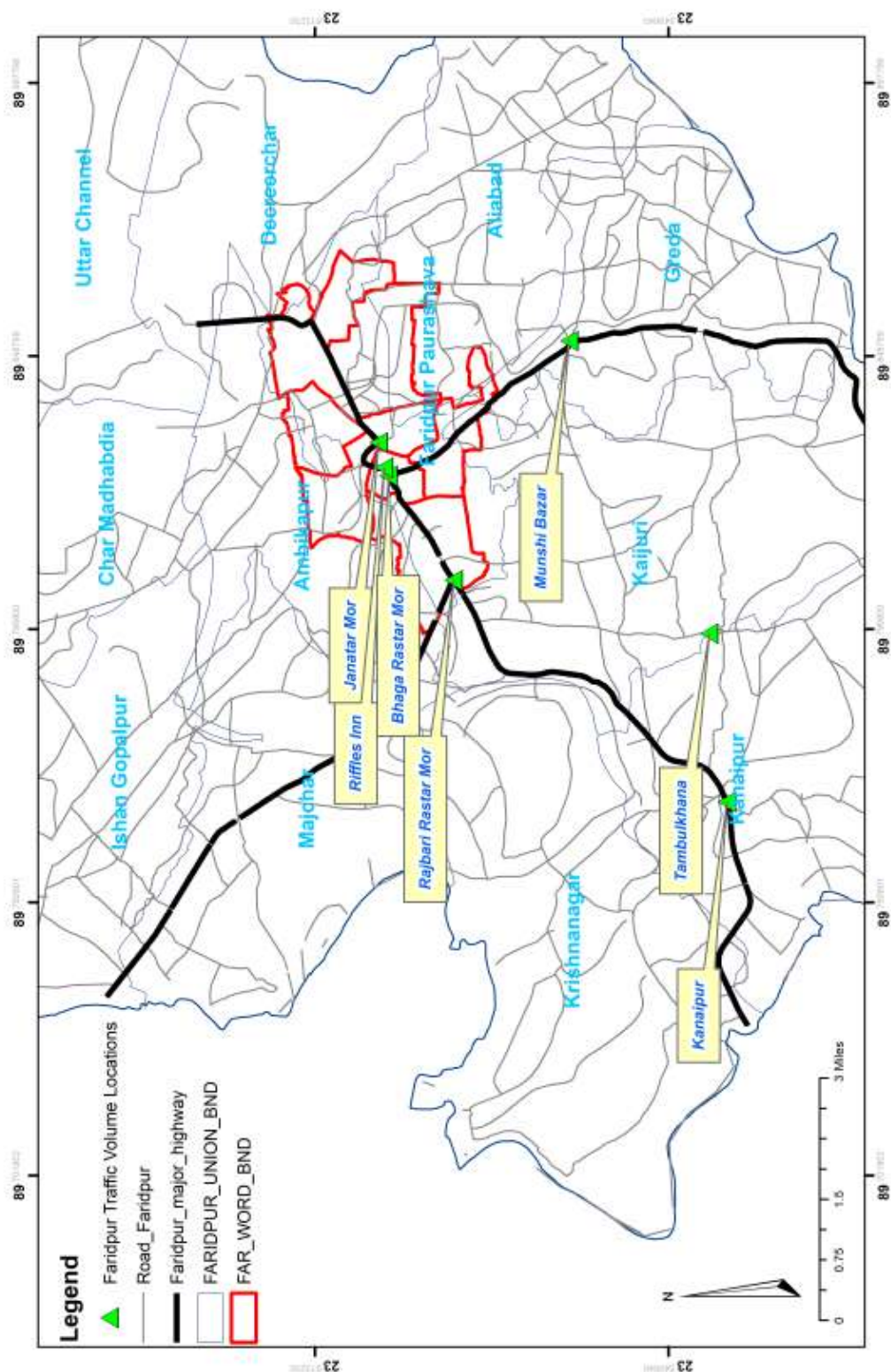
2.4.4 Regional Transportation Survey

Regional Transport is an enabler for growth but it can also be a catalyst for urban sprawl. It has implications not only for mobility and quality of life but also for the economic prosperity of cities. Regional Transport survey has been done to better understand the transport and mobility challenges and priorities for planning, infrastructure and service requirements over the short and longer term. For this survey, few locations have been considered where it will be easy to know the regional impact and regional transport network. The selected survey locations are shown in Map. (Please see **Map 2.4**)

Table 2.2: Output and methodology of the conducted survey

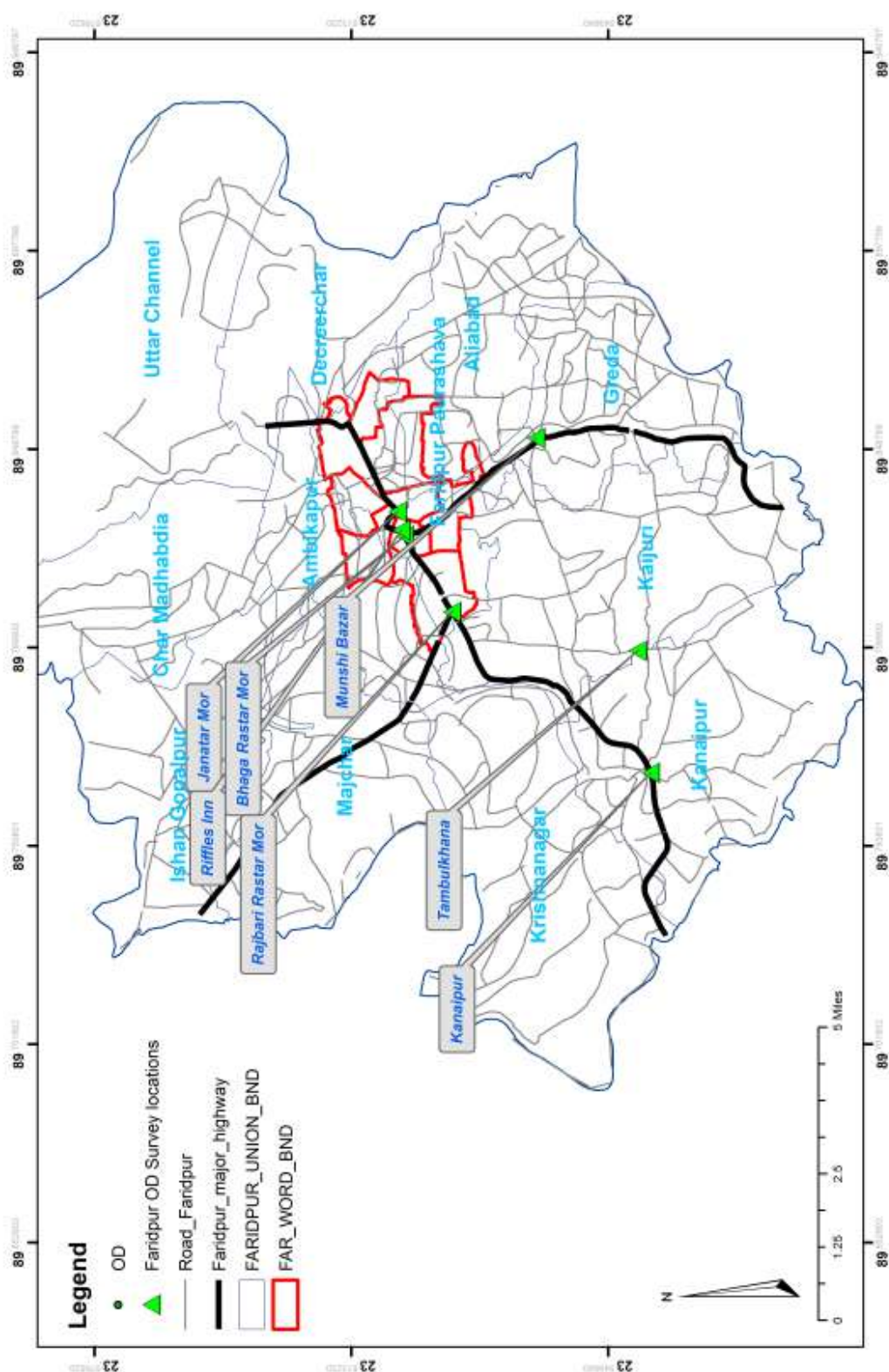
Survey	Data	Methodology
Traffic Volume Count	Details of vehicle classification, fluctuation of flow, specific vehicular movements, road features, no. of vehicle per hour.	<ul style="list-style-type: none"> • Manual counting method • Hat/On Day and Non Hat/Off Day • Peak Hour and Off Peak Hour
O D survey	Origin zones, destination zones, internal and external origin and destinations.	<ul style="list-style-type: none"> • Simple Random Survey after determining the sample size. • Before conducting the interview, the questionnaire prepared for interviewing the travelers which is approved by UDD.
Passenger Interview Survey	Trip destination, trip purpose, mode of transport, cost, distance etc.	<ul style="list-style-type: none"> • Simple Random Survey • At first, the questionnaire has been prepared to cover all information required for the survey according to the TOR. • The questionnaire has been approved by UDD and finally a sample of passengers has been selected for collecting data through approved questionnaire.
Regional Transport Network Survey	Urban growth, accessibility with nearer areas, communication and infrastructure facilities, potentiality of the area etc.	<ul style="list-style-type: none"> • Simple Random Survey after determining sample size through approved questionnaire. (Please see Appendix-C for approved Questionnaire Format of all transport Surveys)

Location of Traffic Volume Count Survey of Faridpur Sadar Upazilla

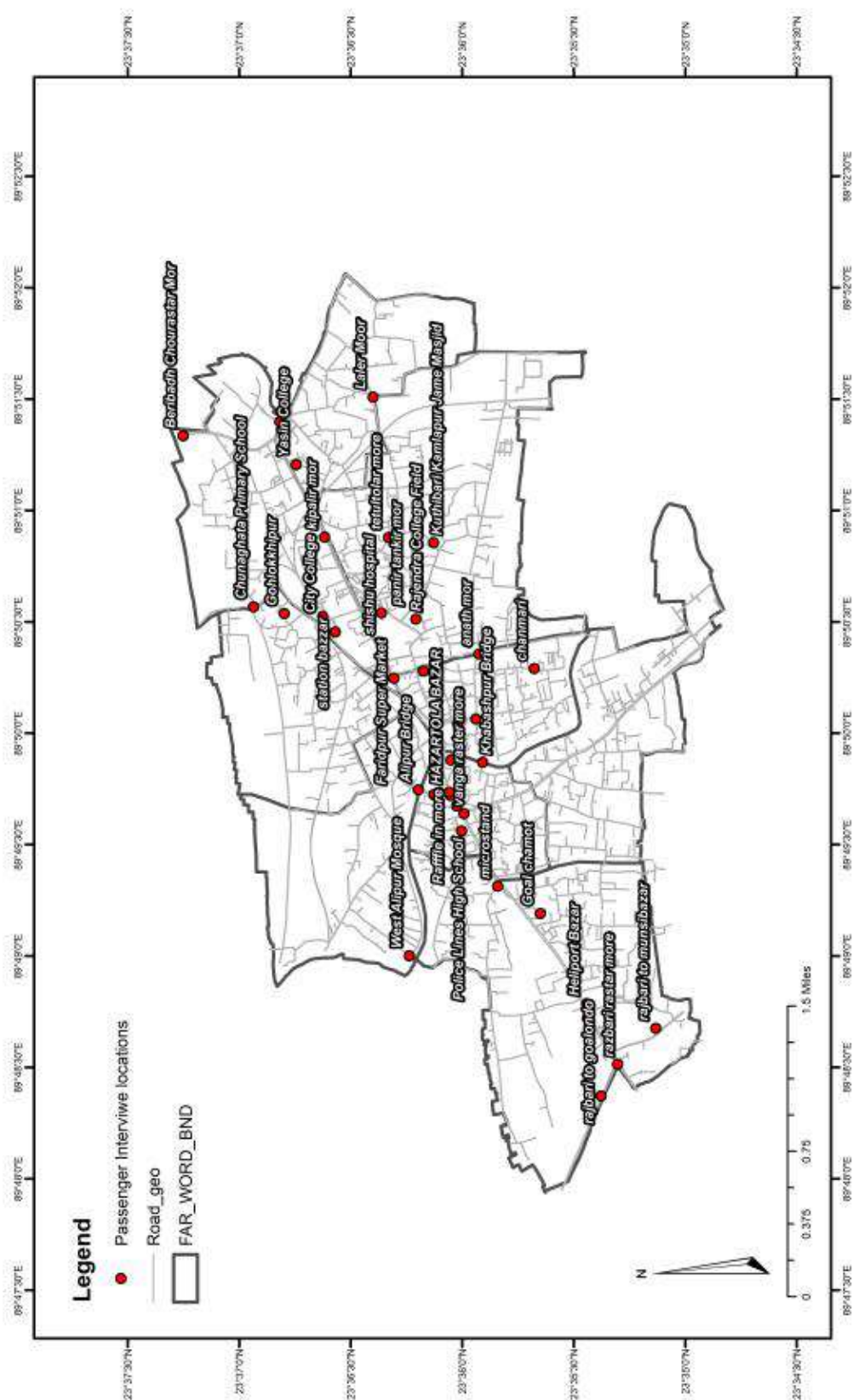


Map 2.1: Location of Traffic Volume Count at Faridpur Sadar Upazila

Location of OD Survey of Faridpur Sadar Upazilla



Map 2.2: Location of O D Survey at Faridpur Sadar Upazila



Map 2.3: Location of Passenger Interview Survey at Faridpur Sadar Upazila

CHAPTER 3: SURVEY FINDINGS AND ANALYSIS

3.1 Traffic Volume Count Survey

Traffic volume count survey has been done in seven important intersections. Peak time and off peak time vary according to the importance of the certain locations. In study area, On Day and Off day has been taken into consideration for depicting the exact scenario of traffic in Faridpur Sadar Upazila. The surveyed locations are given below:

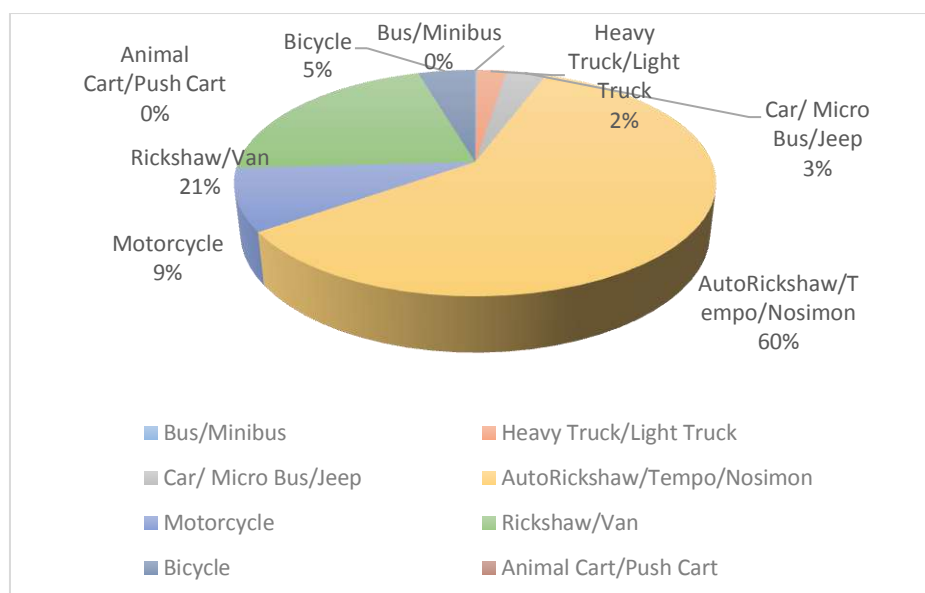
Table 3.1: Surveyed Traffic Volume Count Locations

Intersection	Date	Remarks
<ul style="list-style-type: none"> Rajbari Raster Mohr Vanga to raffle in Janata Mohr 	7-Mar-16	On Day
	4-Mar-16	Off Day
<ul style="list-style-type: none"> Bhanga Rastar Mohr Munshi Bazar Tambulkhana 	10-Mar-16	On Day
	7-Mar-16	Off Day
<ul style="list-style-type: none"> Kanaipur 	10-Mar-16	On Day
	11-Mar-16	Off Day

Source: Traffic and Transportation Survey, 2016

3.1.1 Traffic flow at Janata Mohr

In Janata Mohr, there are three links which flow to D.C. office, Riffles Inn and Masrangar Shop Mohr. From the survey, it has been seen that traffic flows are busier in Riffles Inn link. The following vehicle flows represents the total average vehicle per hour in peak time during On Day.



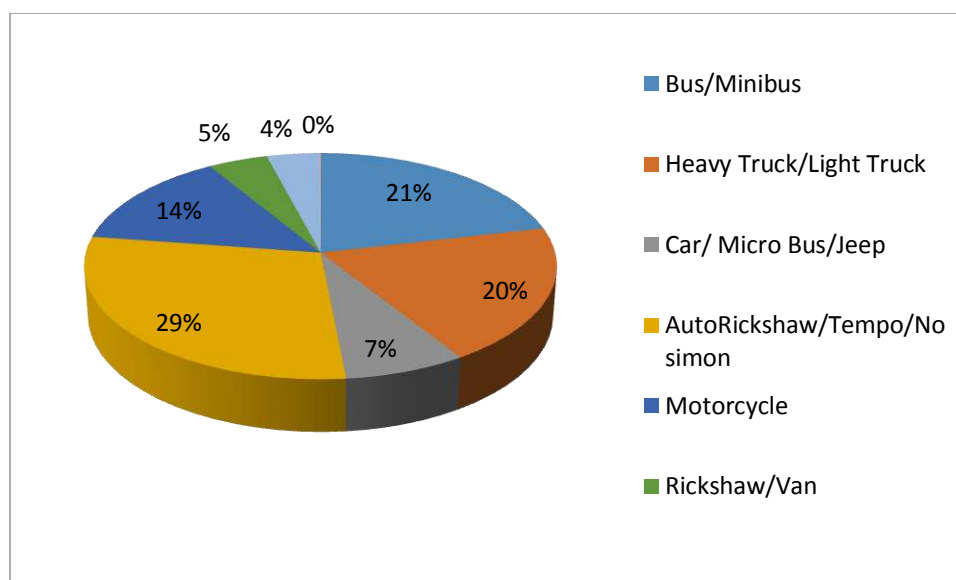
Source: Traffic and Transportation Survey, 2016

Figure 3.1: Types of Mode at Janata Mohr

From the data of above chart it is visible that in peak time per hour during on day 60% vehicles are Auto Rickshaw/Tempo/Nosimon. That means during On day passengers choose these vehicles most to reach their destinations. 21% rickshaw/van are noticed in peak time per hour. Other vehicles are motorcycle, bicycle, heavy/light truck and car/micro/jeep which percentages are 9%, 5%, 2% and 3% respectively.

3.1.2 Traffic flow at Rajbari Raster Mohr

In Rajbari Raster Mohr, there are four links which flow to Munshi Bazar, Goalanda, Jessore and Bhanga Rastar Mohr. From the survey, it has been seen that traffic flows are busier in Goalanda link. The following vehicle flows represents the total average vehicle per hour in peak time during On Day.

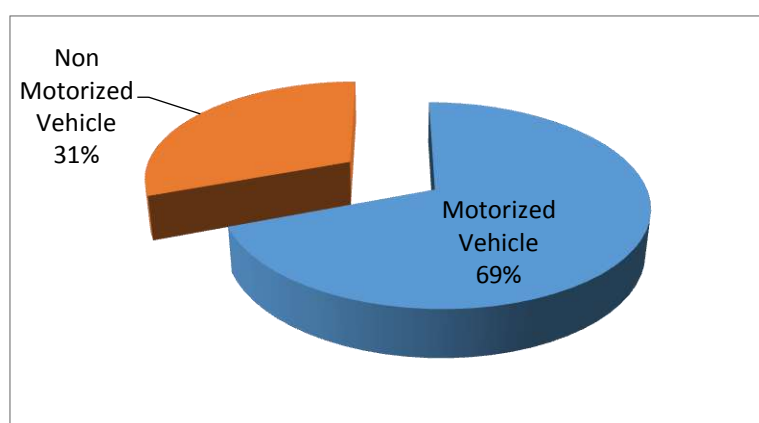


Source: Traffic and Transportation Survey, 2016

Figure 3.2: Types of Mode at Rajbari Raster Mohr

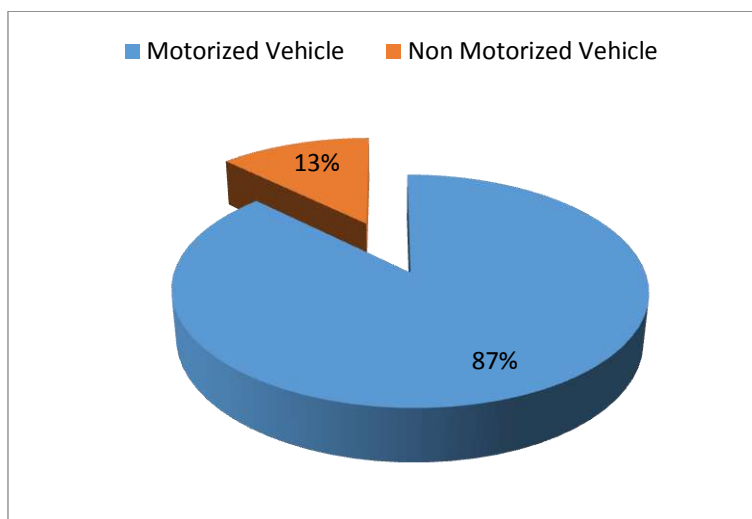
The data of above chart depicts the traffic flow Rajbari Raster Mohr. From the data of above chart it is visible that in peak time per hour during on day 29% vehicles are Auto Rickshaw/Tempo/Nosimon. That means during on day passengers choose these vehicles most to reach their destinations. 21% buses are noticed in peak time per hour. Other vehicles are motorcycle, heavy/light truck and car/micro/jeep which percentages are 14%, 20% and 7% respectively. The percentage of Rickshaw/van is only 5%.

3.1.3 Motorized Vehicle (MV) and Non-Motorized Vehicle (NMV)



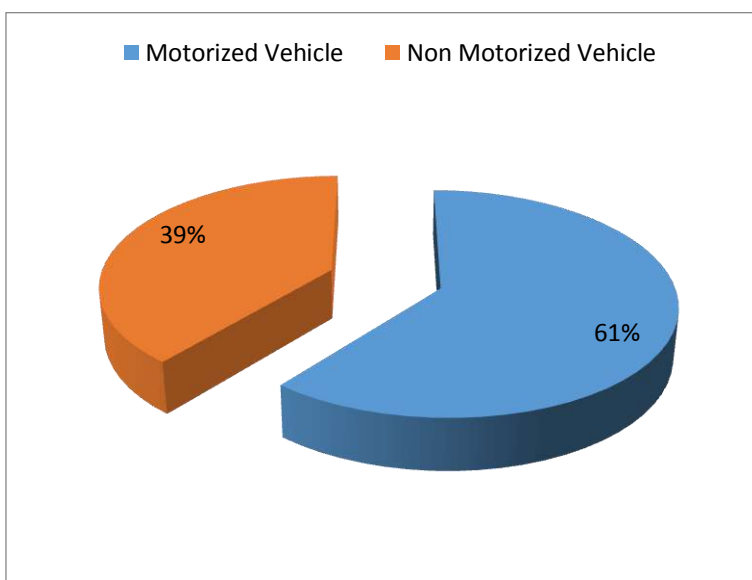
Source: Traffic and Transportation Survey, 2016

Figure 3.3: MV and NMV at Bhanga Rastar Mohr



Source: Traffic and Transportation Survey, 2016

Figure 3.4: MV and NMV at Munshi Bazar



Source: Traffic and Transportation Survey, 2016

Figure 3.5: MV and NMV at Kanaipur

The above pie charts show the percentages of motorized and non-motorized vehicles at three different points which are Bhanga Raster Mohr, Munshi Bazar and Kanaipur. The percentages of non-motorized vehicles are high at Munshi Bazar which is 87%. There is a slight difference between the percentages of Bhanga Raster Mohr and Kanaipur. Their percentages are 69% and 61%. In case of motorized vehicle Kanaipur is high which is 39%.

3.1.4 Traffic flows at Intersections

Traffic flows are occurred in different ways at every intersection. Traffic flows are varied from time to time. Sometimes traffic flows are higher at Off Day for having Regional Impact. The significant intersections are summarized in **Appendix-A**. The Average PCU and Vehicle have been shown in below table at a gist.

Table 3.2: PCU and Traffic Volume at Intersections

Intersection	Link	Average Vehicle/Hour		Average PCU/Hour	
		On Day	Off Day	On Day	Off Day
Rajbari Raster Mohr	Rajbari Rastar Mohr-Munshi Bazar	304	314	550	577.25
	Goalanda-Faridpur	1112	1017	2177	2000
	Jessore-Rajbari Rastar Mohr	767	926	1141.5	1520.5
	Sariatullah Bazar-Hazratola Mohr	1087	1062	1598.5	1236.5
Vanga to Raffle in	Raffles INN Mohr-Bhanga Rastar Mohr				2588.2
		2971	3441	2465.5	5
	Raffles-New Market	1575	1542	1197	1198
	Sariatullah Bazar-Hazratola Mohr	1252	1273	820.25	826
Janata Mohr	Janata Bank Mohr-D.C Office	2411	1925	1936.7	5
				5	1476
	Janata Bank Mohr-Riffles Inn	2816	1666	2020.2	1257.7
				5	5
	Janata Bank Mohr-Masrangar Shop Mohr	1759	1057	1282.7	5
				5	765
Bhanga Rastar Mohr	Bhanga Rastar Mohr-Goalchamot	1546	1398	1543.2	1350.7
				5	5
	Bhanga Rastar Mohr-Bhanga	3072	3171	2324.7	5
				5	2337
	Bhanga Rastar Mohr-Raffles INN Mohr	3819	3681	2904.5	2820.5
Munshi Bazar	Munshi Bazar-Bhanga Rastar Mohr	992	1320	833.25	1108.2
				5	5
	Munshi Bazar-Rajbari Rastar Mohr	543	304	1179.2	5
				5	550
	Munshi Bazar-Bhanga	727	664	1025.5	946.25
Tambulkhana	Tambulkhana-Bakunda	206		250.25	

	Tambulkhana-Kanaipur	499		568.5	
	Tambulkhana-Shalta	223		256	
	Tambulkhana-Badarpur	227		270.25	
Kanaipur	Kanaipur-Faridpur	1105	1200	1096.5	1229.2 5
	Kanaipur-Magura	1046	790	1259.5	1006.2 5
	Kanaipur-Krishna Nagar	451	374	288.25	239.75

Source: Traffic and Transportation Survey, 2016

Traffic flows are occurred in different ways at every intersection. The survey has conducted at different intersections. The data are represented in the above table in respect of each intersection. From the survey it has been depicted that Janata Mohr intersection is very significant. For example the data of this intersection is represented in the below table.

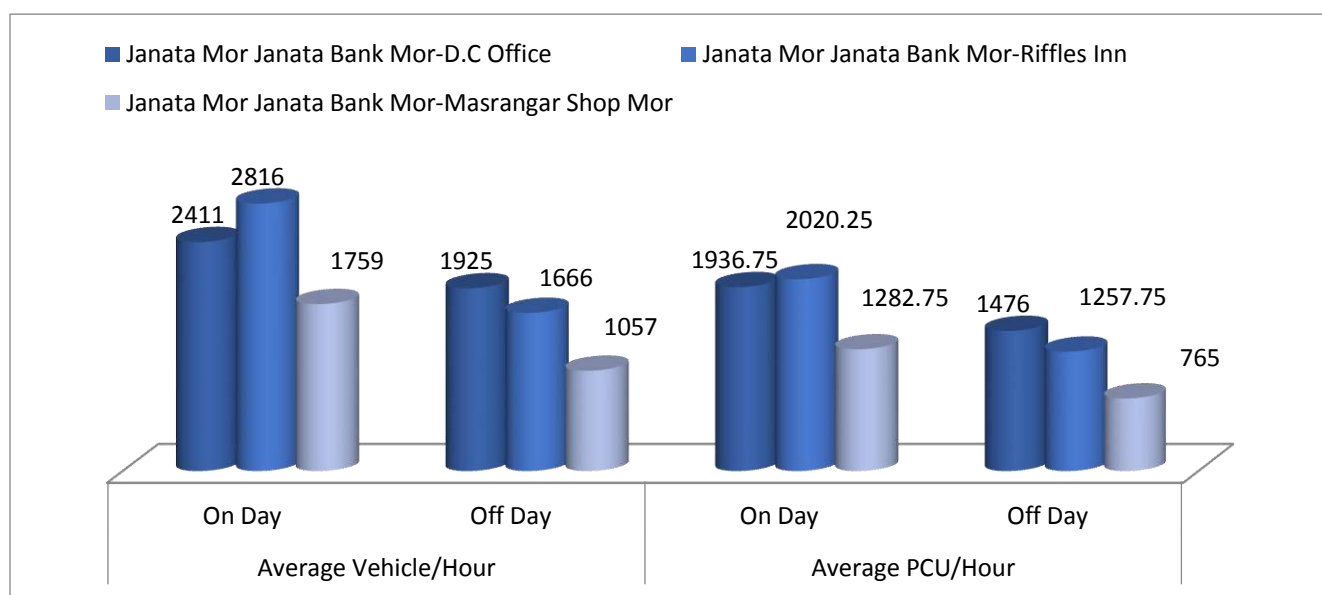


Figure 3.6: Average PCU and Vehicle per Hour at Janata Mohr

Source: Traffic and Transportation Survey, 2016

The first part of the chart shows the information of average vehicle per hour at Janata Bank Mohr-D.C Office, Janata Bank Mohr-Riffles Inn and Janata Bank Mohr-Masrangar Shop Mohr. During on day the average vehicles per hour are the highest at Janata Bank Mohr-Riffles Inn which is 2816. On the contrary during off day the pressure of vehicles is most at Janata Bank Mohr-Masrangar Shop Mohr. The adjacent part of the chart depicts the average PCU/hour of the same points. During on day the average PCU of two points is almost same the points are Janata Bank Mohr-D.C Office and Janata

Bank Mohr-Riffles Inn. The figure is 1936.75, 2020.25 respectively. During off day also these two points are mostly significant.

3.2 Origin and Destination Survey

Origin Destination Survey reflects the issues about travel behaviors and problems of passengers which has been summarized in below analysis.

3.2.1 Trip Distribution Pattern

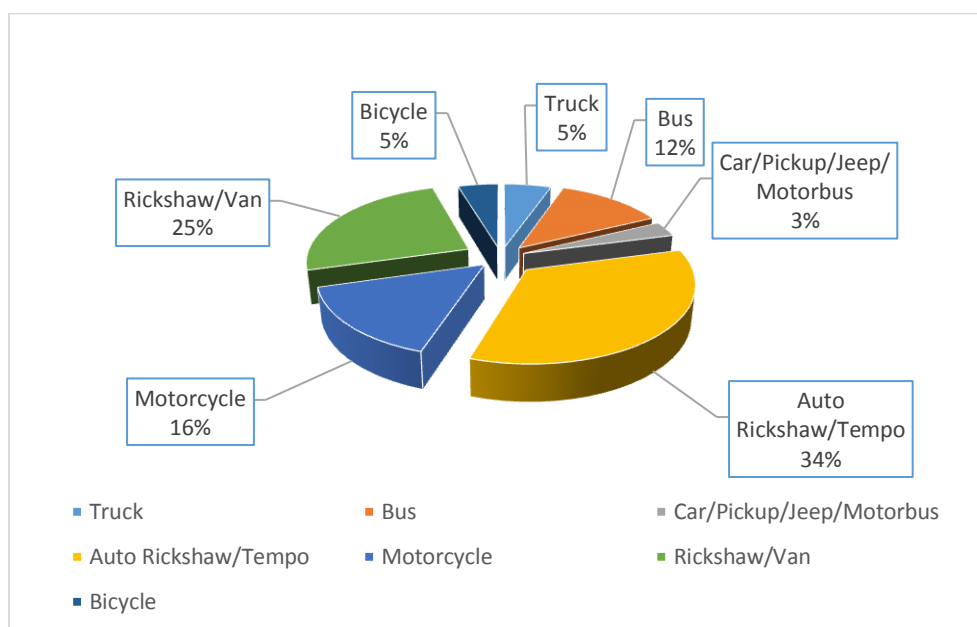
The number of O D survey has been carried out 129 where trip distribution pattern can easily determine. From the survey, it has been seen that people lean to travel internally within Unions and also travel other Upazilas and Districts. The following table represents the major trip distribution pattern of Faridpur Sadar Upazila.

Table 3.3: Origin Destination Matrix

Destination Origin	Bodorpur	CM B Ghat	Faridpur	Kanaipura	Munshibazar	Shibrampur	Somespur bazar	Tepakhol a	Chandpur	Gopalganj	Hajiganj	Tambulkhana	Total
Bodorpur	0	0	0	1	0	0	0	0	0	0	0	0	1
CMB Ghat	0	0	1	0	0	0	0	2	0	0	0	0	3
Faridpur	1	0	0	0	2	0	0	0	0	1	0	1	5
Kanaipura	0	1	3	0	0	1	0	0	3	0	0	1	9
Munshibazar	0	0	4	0	0	0	0	0	0	0	0	0	4
Shibrampur	0	0	1	0	0	0	0	0	0	0	0	0	1
Somespur bazar	0	0	0	0	0	0	0	0	0	0	0	3	3
Tepakhol a	0	5	7	0	0	0	1	0	0	0	2	0	15
Chandpur	0	0	0	1	0	0	0	0	0	0	0	0	1
Gopalganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Hajiganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Tambulkhana	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	6	16	2	2	1	1	2	3	1	2	5	42

Source: Traffic and Transportation Survey, 2016

3.2.2 Mode Choice



Source: Traffic and Transportation Survey, 2016

Figure 3.7: Types of Mode

The pie chart shows that the available modes which are roaming in this upazila and their percentages of usages. There are 7 types of mode of transport in this area. People use them according to their convenience. 34% people choose auto/rickshaw/tempo to reach to their destinations and it is the highest demanding mode in this area. The second one is rickshaw/van which is 25%. They use it to travel to nearby areas. 16% use motorcycle, 5% bicycle and truck, 12% bus and only 3% car/pickup/jeep/motorbus. These modes are used depending on need of the passengers such as they can be used for shopping purpose, education purpose, business purpose, etc.

3.2.3 Purpose of Trip

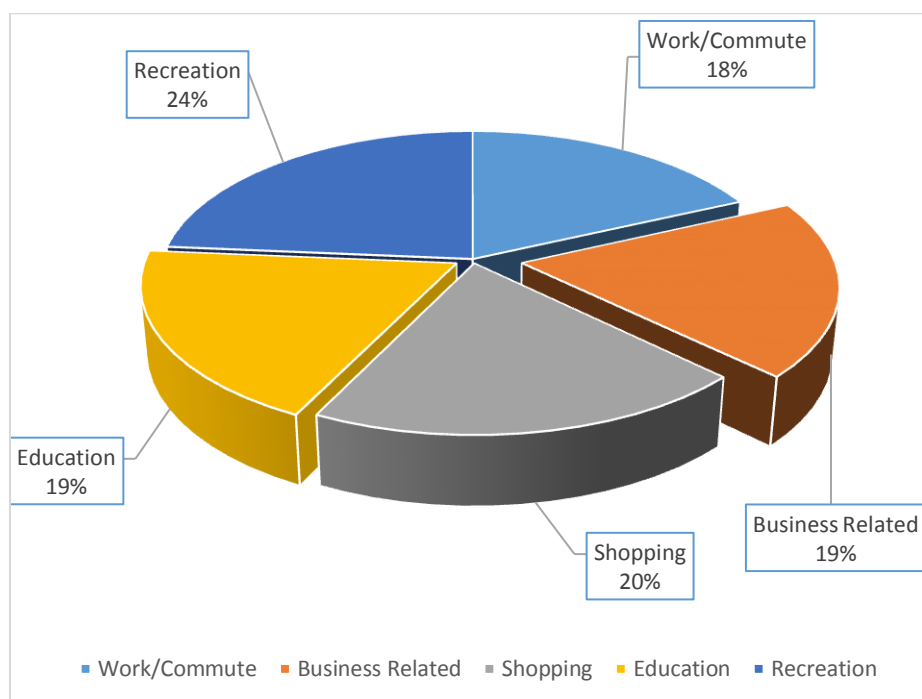


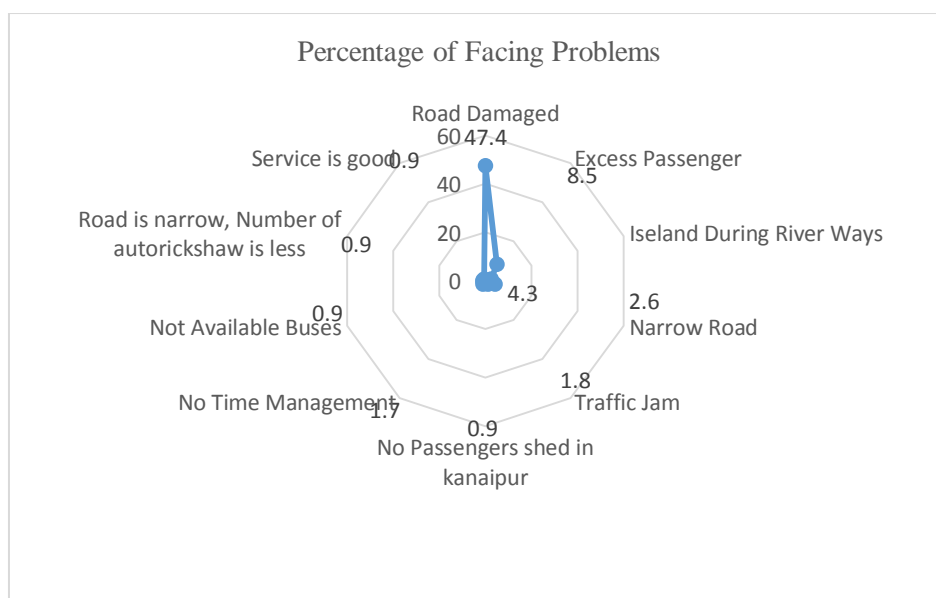
Figure 3.8: Purpose of Trip

Source: Traffic and Transportation Survey, 2016

From the information shown in this pie chart the large dark blue area resembles those whose purpose of travel is mainly recreational and which percentage is 24%. The dark ash area shows the percentage of those people who travel due to shopping and which percentage is 20%. The light blue area of the pie chart shows the percentage of those people who travel due to work and the percentage is 18%. The orange and yellow areas of the pie chart represent the percentages of those who travel because of business and education. The percentages are same in both of the cases which is 19%.

3.2.4 Major Prioritized Problems

From the survey, different problems have been drawn and the main problems which are facing most are categorized in below Figure 3.9.



Source: Traffic and Transportation Survey, 2016

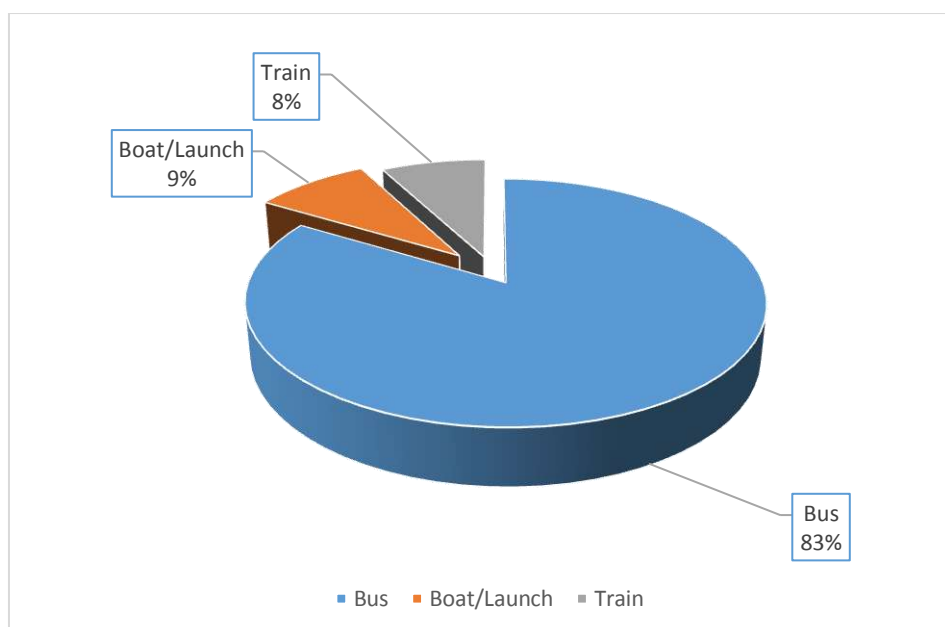
Figure 3.9: Facing problems in Transportation

The above figure represents the major problems faced by passengers. Most of them around 50% has responded that most the roads are damaged and it is required repairing or maintenance works.

3.3 Passenger Interview Survey

3.3.1 Types of Mode

It's clear from the information given in this pie chart that shows the type of vehicle which are mostly available in the Faridpur Upazila. From the survey data it is visible that there are mostly three types vehicle which are bus, train, boat/launch. From the data it is Mohre understandable that in this upazila buses are mostly preferable and the percentage is 83%. On the other hand the percentages of train and boat/launch respectively are 8% and 9%. From this survey one thing is clear that people mostly use buses for their day to day journeys. For long distance journeys they prefer train or boat.



Source: Traffic and Transportation Survey, 2016

Figure 3.10: Types of Mode

3.3.2 Respondents Distribution

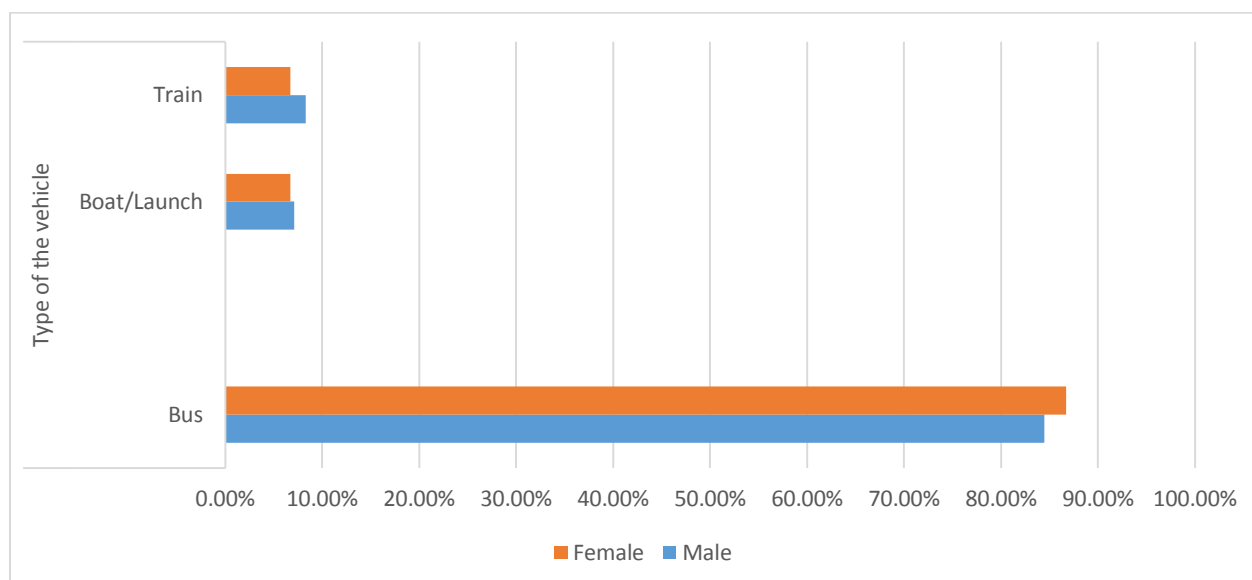
The respondents of the survey were both male and female. It is generalized that male and female prefer different types of vehicles due to some safety reasons. The table below shows a relation between sex of the respondents and types of vehicles used by them. It shows both the frequencies and percentages.

Table 3.4: Gender of Respondents according to the Mode

Sex of the Respondent	Gender		Types of Mode			
			Bus	Boat/Launch	Train	Total
	Male	Frequency	71	6	7	84
		Percentage	84.50%	7.10%	8.30%	100.00%
	Female	Frequency	26	2	2	30
		Percentage	86.70%	6.70%	6.70%	100.00%
	Total	Frequency	97	8	9	114
		Percentage	85.10%	7.00%	7.90%	100.00%

Source: Traffic and Transportation Survey, 2016

To visualize the relation Mohre effectively a bar chart has shown below:

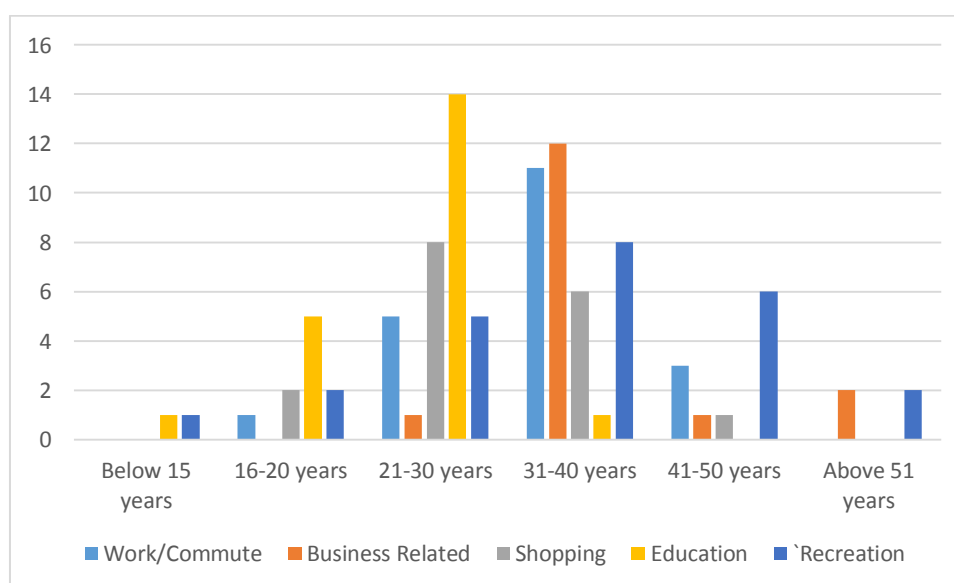


Source: Traffic and Transportation Survey, 2016

Figure 3.11: Respondents variation according to the Mode

The bar chart illustrates the percentages of male and female using different types of vehicle. In a comparison it can be seen that female use bus Mohre than male. If we see the data it will be Mohre representative. Almost 85% males use bus while nearby 90% females use bus. On the contrary the other two types of vehicles are mostly used by the males. The data also shows that. The percentages of train user are males nearly 10%, females less than 7%. The percentages of boat users are males Mohre than 6% and females Mohre than 4%.

3.3.3 Purpose of Trips according to the Age Pattern



Source: Traffic and Transportation Survey, 2016

Figure 3.12 Purpose of Trip according to the Age Pattern

The bar chart illustrates a relation between age of the respondents and the purpose of the trip. As with the age the need of people changes here the data also represents the fact. From the information it is visible that people below 15 years old travel due to education and recreation. The age group of 16-20 years old travel for work, shopping, education and recreation. In this age group most people's purpose of trip is education. The age group of 21-30 years old travel because of all purposes along with business. From the data it is also clear that this age group highly travel due to education. The second purpose is shopping and gradually their purposes are work, recreation and business. The inhabitants of this upazila mainly do businesses. That is why the age group of 31-40 travels mostly due to business and also for work. 41-50 years old age group's purpose of trip mostly is recreation, along with work, business and shopping purposes.

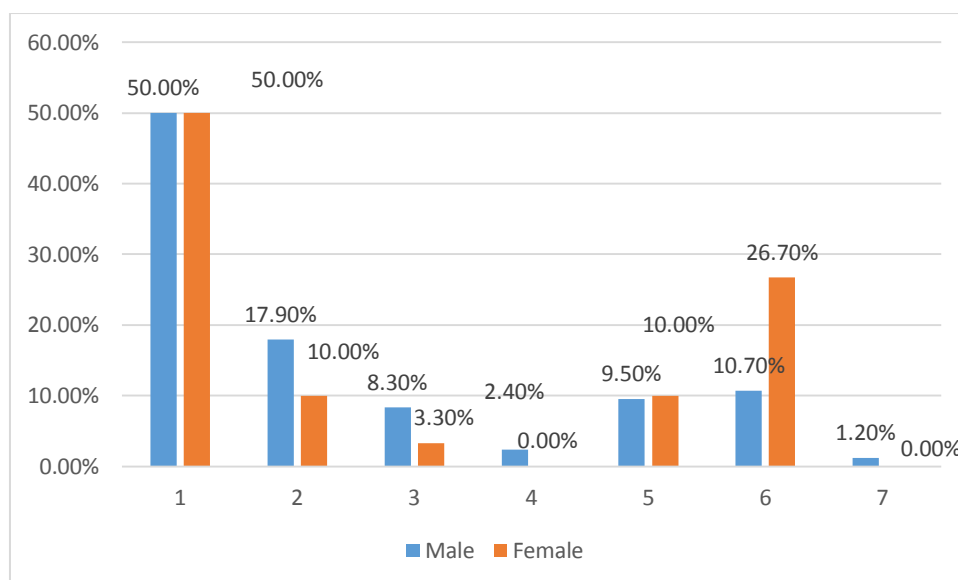
3.3.4 Number of Trips according to Gender

Table 3.5: Number of Trips according to Gender

Sex of the Respondent		No. of trips in a week							Total
		1	2	3	4	5	6	7	
Male	Frequency	42	15	7	2	8	9	1	84
	Percentage	50.00	17.90	8.30	2.40	9.50	10.70	1.20	100.00
Female	Frequency	15	3	1	0	3	8	0	30
	Percentage	50.00	10.00	3.30	0.00	10.00	26.70	0.00	100.00
Total	Frequency	57	18	8	2	11	17	1	114
	Percentage	50.00	15.80	7.00	1.80	9.60	14.90	0.90	100.00

Source: Traffic and Transportation Survey, 2016

The table shows the frequencies and percentages of the respondents according to their sex in respect of number of trip in a week. If the percentages are shown in a bar chart it will be more visible.



Source: Traffic and Transportation Survey, 2016

Figure 3.13: Number of Trips according to Gender

3.3.5 Number of Trips according to Trip Purpose

Table 3.6: Number of Trips according to Trip Purpose

		No. of trips in a week						
		1	2	3	4	5	6	7
Purpose of Trip (Frequency and Percentage)	Work/Commute	10	0	1	0	3	5	1
		50.00%	0.00%	5.00%	0.00%	15.00%	25.00%	5.00%
	Business Related	6	7	5	1	2	0	0
		28.60%	33.30%	23.80%	4.80%	9.50%	0.00%	0.00%
	Shopping	12	8	1	0	1	0	0
		54.50%	36.40%	4.50%	0.00%	4.50%	0.00%	0.00%
	Education	4	0	0	1	4	12	0
		19.00%	0.00%	0.00%	4.80%	19.00%	57.10%	0.00%
	Recreation	22	2	1	0	1	0	0
		84.60%	7.70%	3.80%	0.00%	3.80%	0.00%	0.00%
Total		54	17	8	2	11	17	1
		49.10%	15.50%	7.30%	1.80%	10.00%	15.50%	0.90%

Source: Traffic and Transportation Survey, 2016

The table shows the relationship between the purpose of trip and number of trip in a week. There are different types of purposes mentioned in the table which are: work, business related, shopping, education and recreation. From the above information it is visible that people mostly travel once in a

week for different purposes. Especially for work, shopping and recreation they travel once in a week which percentages are respectively 50%, 54.50% and 84.60%. For education purpose they mostly travel 6 days in a week which percentage is 57.10%.

3.3.6 Travel Time of the Trip

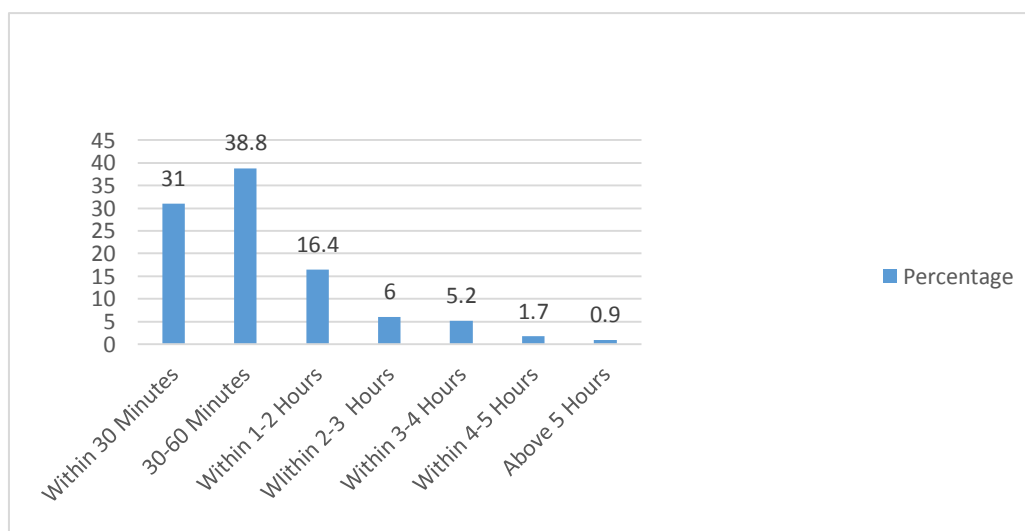


Figure 3.14: Travel Time of the Trip

Source: Traffic and Transportation Survey, 2016

From the information it can be seen that almost 38.8% people travel within 30-60 minute which means the distance to their workplace or school, college within 30-60 min. 31% people travel within 30 minutes. 16.4% travel within 1-2 hours. Rests of the 13.8% are for long distances which are 2 hours to above 5 hours.

3.3.7 Passengers Density

The below chart represents the passenger density in different vehicles.

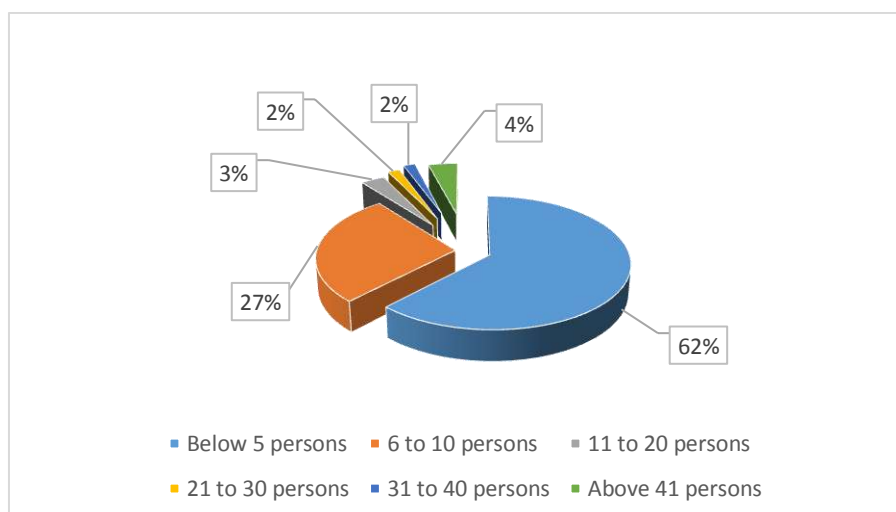


Figure 3.15: Travel Time of the Trip

Source: Traffic and Transportation Survey, 2016

The highest passenger density is above 41 persons. Then 31 to 40 gradually the densities are 21 to 30 persons, 11 to 20, 6 to 10 and below 5 persons.

3.3.8 Number of Trips

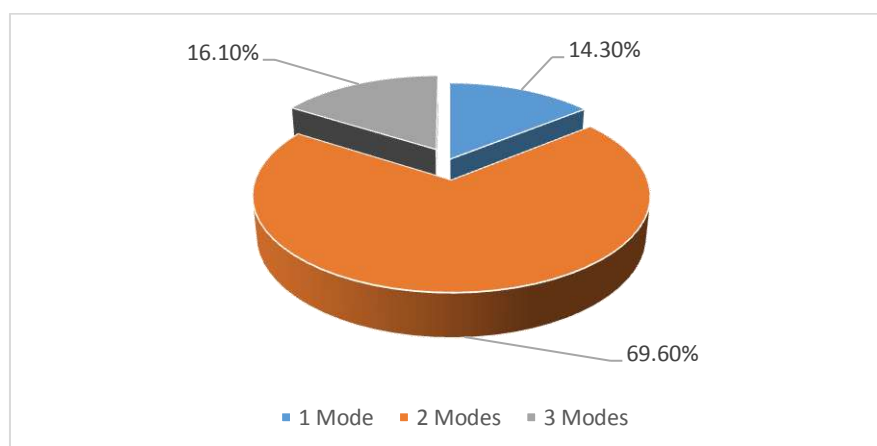


Figure 3.16: Number of Trips per Day

Source: Traffic and Transportation Survey, 2016

The above pie chart depicts the usage of multiple modes to complete a trip. The people of this upazila at least use two modes to complete their trip. From the data it is visible that 69.60% people use 2 modes to complete their trip whereas 14.30% use 3 modes to complete a trip. It can be by bus, then by rickshaw, by on foot or by other means of transportation. Only 16.10% people use 1 type of mode to complete their trip.

3.3.9 Travel Cost according to the Distance

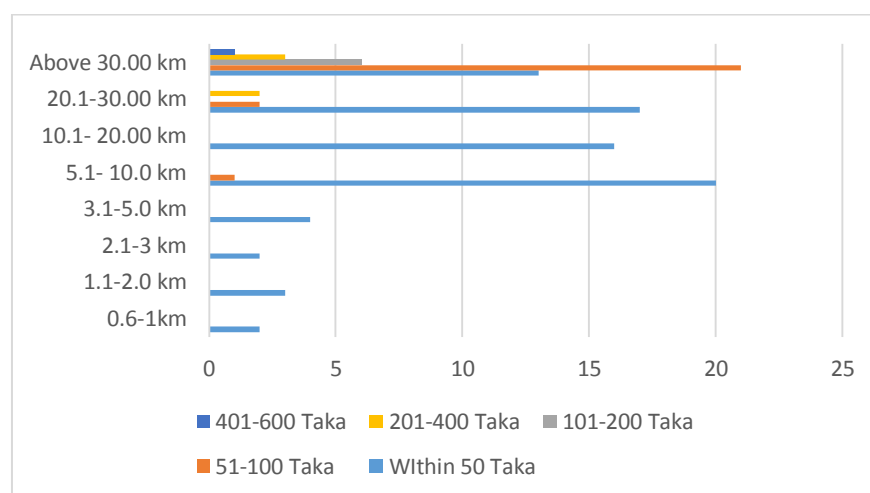


Figure 3.17: Travel Cost according to the Distance

Source: Traffic and Transportation Survey, 2016

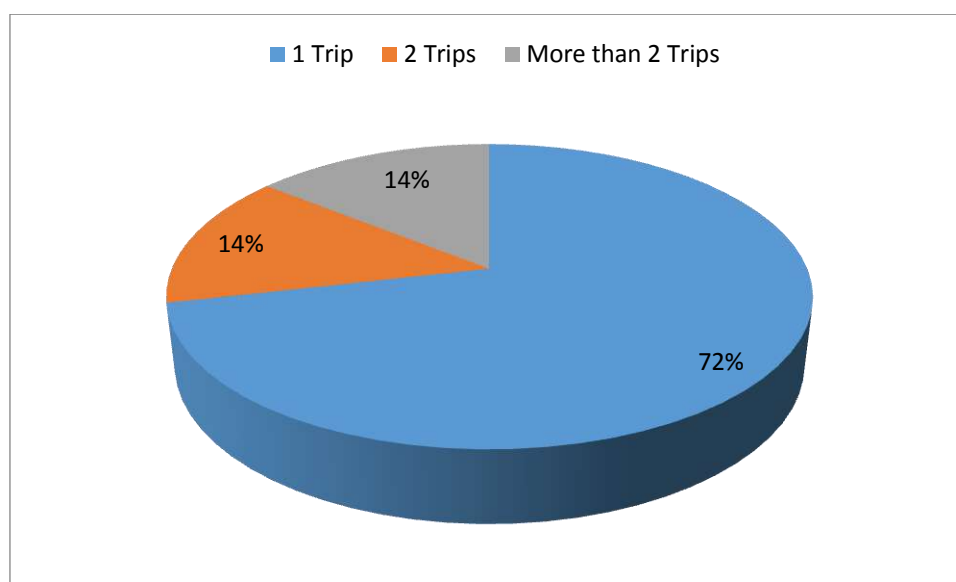
The above chart illustrates the distance and cost relationship of this upazila. The data shows that the travel distance of the people of this upazila is above 30 km. But it is remarkable that to travel to this distance they pay different fare. Most people pay 51-100 taka, the second highest is within 50 taka. Then gradually 101-200 taka, 401-600 taka and the last one is 201-400 taka. This variation to cover one distance is because of the choosing of modes by different people. The information clearly represents that people mainly pay within 50 taka to cover the distance of 1 km to 30 km.

3.4 Regional Transport Survey

Regional transport network survey has been done for Buses and Trucks which are coming into study area and going out form study area. From the survey, we can know the carrying capacity of the buses, types of goods carrying by trucks, connectivity pattern with other Upazilas and Districts.

3.4.1 Trip Frequency of Regional Buses

The below pic chart depicts the percentages of regional buses depending upon their trip frequency. Some buses prefer 1 trip, some other 2 trips and also Mohre than 2 trips.

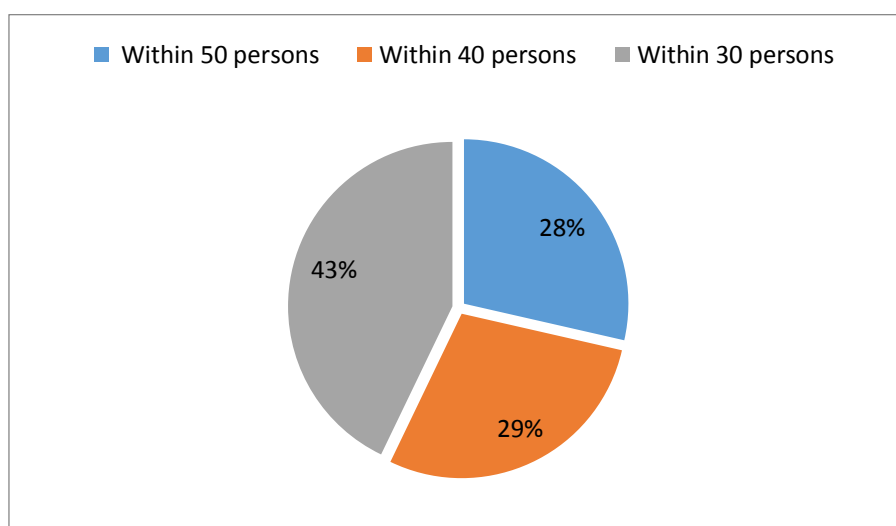


Source: Traffic and Transportation Survey, 2016

Figure 3.18: Travel Time of the Trip

From the information it is visible that 72% of regional buses require 1 trip per day. The percentages of other two types of frequencies are same which is 14%.

3.4.2 Passenger carrying capacity



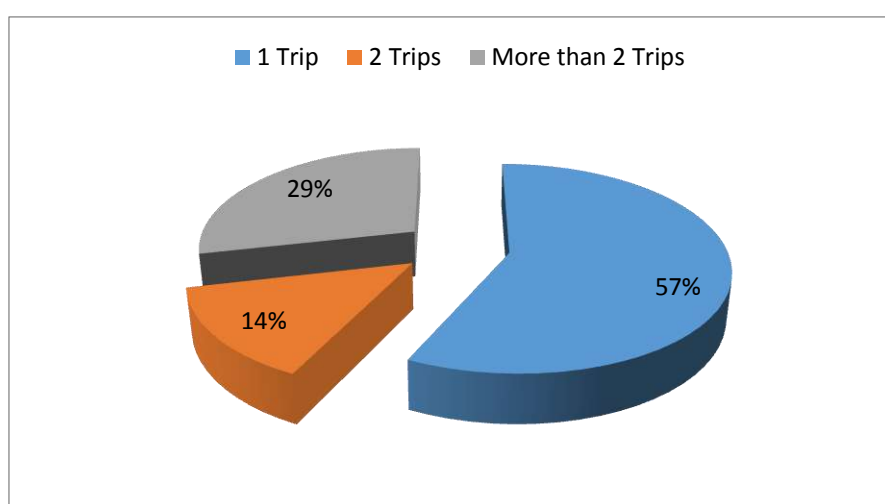
Source: Traffic and Transportation Survey, 2016

Figure 3.19: Travel Time of the Trip

Different buses have different capacity. From the survey data three types of buses are identified. Which are buses with the capacity of 50 persons, 40 persons and 30 persons. Buses with the capacity of 30 persons are mostly used by the passengers which percentage is 43%. Others are 28% and 29%.

3.4.3 Travel pattern of Trucks

Trucks are coming into study area or going out form study area for goods carrying purposes such as construction materials, agricultural products like paddy, departmental products etc.



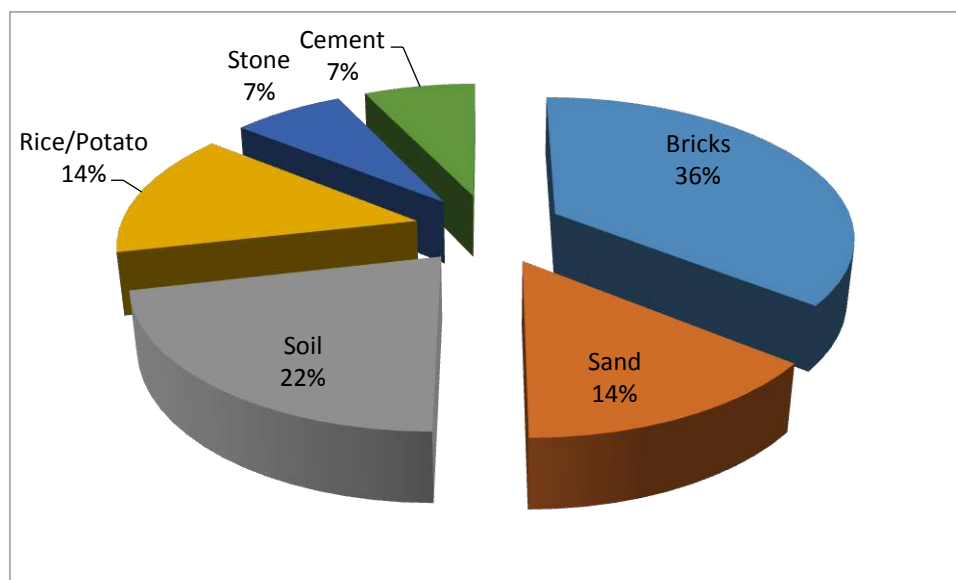
Source: Traffic and Transportation Survey, 2016

Figure 3.20: Travel Time of the Trip

If the frequencies of their trips is noticed it will be visible that most trucks prefer only 1 trip in a day which percentage is 57%. 29% make 2 trips and only 14% make more than 2 trips in a day.

3.4.4 Types of Goods carried by Trucks

The trucks carry different types of goods which are bricks, sand, soil, rice/potato, stone and cement.



Source: Traffic and Transportation Survey, 2016

Figure 3.21: Travel Time of the Trip

From the survey the percentages of buses carrying different types of goods are identified. Most trucks carry bricks which percentage is 36. 22% carry soil, rice/potato and sand 14%. So it is noticeable that the trucks mostly carry construction materials.

CHAPTER 4: CONCLUSION

Faridpur Sadar Upazila has great potentiality because of having regional connectivity with other regions and train connectivity with several important regions. The growth of a region depends mostly on transportation. In the preparation of Development Plan for Faridpur Sadar Upazila, this transportation survey has inevitable impacts. This survey attempts to describe existing conditions of this upazila from different aspects. The survey data represents the present transport facilities of this upazila, the conditions of the vehicles, and the traffic flows of vehicles at different intersections depending on peak hour. People's perception and demand on road network and facilities identified through PRA and Socio-economic survey will be justified during preparation of draft plan for the concerned upazila. The total study on the transportation of this upazila will help to prepare a comprehensive development plan for this upazila which will be a sustainable one.

TRAFFIC VOLUME CALCULATION

A) Rajbari Raster Mor

Table A-1: Hourly Traffic Volume according to the Vehicle Types for Rajbari Rastar Mor-Munshi Bazar link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Rajbari Rastar Mor to Munshibazar	Munshi Bazar to Rajbari Rastar Mor			
MV	Bus/Minibus	3	35	27	62	186	20.39
	Heavy Truck/Light Truck	3	32	50	82	246	26.97
	Car/ Micro Bus/Jeep	1	9	9	18	18	5.92
	Auto Rickshaw/Tempo/Nosimon	0.75	42	27	69	51.75	22.70
	Motorcycle	0.75	30	17	47	35.25	15.46
NMV	Rickshaw/Van	0.5	0	20	20	10	6.58
	Bicycle	0.5	0	6	6	3	1.97
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					278	537	91.45
Total NMV					26	13	8.55
Grand Total					304	550	100.00

Table A-2: Hourly Traffic Volume according to the Vehicle Types for Rajbari Rastar Mor-Munshi Bazar link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Rajbari Rastar Mor to Munshibazar	Munshi Bazar to Rajbari Rastar Mor			
MV	Bus/Minibus	3	47	27	74	222	23.57
	Heavy Truck/Light Truck	3	37	39	76	228	24.20
	Car/ Micro Bus/Jeep	1	14	17	31	31	9.87
	Auto Rickshaw/Tempo/Nosimon	0.75	35	34	69	51.75	21.97
	Motorcycle	0.75	29	21	50	37.5	15.92
NMV	Rickshaw/Van	0.5	3	7	10	5	3.18
	Bicycle	0.5	1	3	4	2	1.27
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					300	570.25	95.54
Total NMV					14	7	4.46
Grand Total					314	577.25	100.00

Table A-3: Hourly Traffic Volume according to the Vehicle Types for Goalanda-Faridpur link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Goalanda to Faridpur	Faridpur to Goalanda			
MV	Bus/Minibus	3	144	158	302	906	27.16
	Heavy Truck/Light Truck	3	136	148	284	852	25.54
	Car/ Micro Bus/Jeep	1	48	39	87	87	7.82
	Auto Rickshaw/Tempo/Nosimon	0.75	125	166	291	218.25	26.17
	Motorcycle	0.75	66	63	129	96.75	11.60
NMV	Rickshaw/Van	0.5	4	4	8	4	0.72
	Bicycle	0.5	8	0	8	4	0.72
	Animal Cart/Push Cart	3	0	3	3	9	0.27
Total MV					1093	2160	98.29
Total NMV					19	17	1.71
Grand Total					1112	2177	100.00

Table A-4: Hourly Traffic Volume according to the Vehicle Types for Goalanda-Faridpur link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Goalanda to Faridpur	Faridpur to Goalanda			
MV	Bus/Minibus	3	124	141	265	795	26.06
	Heavy Truck/Light Truck	3	123	150	273	819	26.84
	Car/ Micro Bus/Jeep	1	54	41	95	95	9.34
	Auto Rickshaw/Tempo/Nosimon	0.75	106	140	246	184.5	24.19
	Motorcycle	0.75	61	59	120	90	11.80
	Rickshaw/Van	0.5	5	2	7	3.5	0.69

APPENDIX-A

NMV	Bicycle	0.5	3	5	8	4	0.79
	Animal Cart/Push Cart	3	0	3	3	9	0.29
Total MV					999	1983.5	98.23
Total NMV					18	16.5	1.77
Grand Total					1017	2000	100.00

Table A-5: Hourly Traffic Volume according to the Vehicle Types for Jessore-Rajbari Rastar Mor link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Jessore to Rajbari Rastar Mor	Rajbari Rastar Mor to Jessore			
MV	Bus/Minibus	3	44	92	136	408	17.73
	Heavy Truck/Light Truck	3	40	79	119	357	15.51
	Car/ Micro Bus/Jeep	1	36	45	81	81	10.56
	Auto Rickshaw/Tempo/Nosimon	0.75	119	68	187	140.25	24.38
	Motorcycle	0.75	103	30	133	99.75	17.34
NMV	Rickshaw/Van	0.5	31	46	77	38.5	10.04
	Bicycle	0.5	18	16	34	17	4.43
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					656	1086	85.53
Total NMV					111	55.5	14.47
Grand Total					767	1141.5	100.00

Table A-6: Hourly Traffic Volume according to the Vehicle Types for Jessore-Rajbari Rastar Mor link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Jessore to Rajbari Rastar Mor	Rajbari Rastar Mor to Jessore			
MV	Bus/Minibus	3	120	66	186	558	20.09
	Heavy Truck/Light Truck	3	107	69	176	528	19.01
	Car/ Micro Bus/Jeep	1	69	36	105	105	11.34
	Auto Rickshaw/Tempo/Nosimon	0.75	59	155	214	160.5	23.11
	Motorcycle	0.75	50	66	116	87	12.53
NMV	Rickshaw/Van	0.5	44	29	73	36.5	7.88
	Bicycle	0.5	27	22	49	24.5	5.29
	Animal Cart/Push Cart	3	7	0	7	21	0.76
Total MV					797	1438.5	86.07
Total NMV					129	82	13.93
Grand Total					926	1520.5	100.00

Table A-7: Hourly Traffic Volume according to the Vehicle Types for Bhanga Rastar Mor-Rajbari Rastar Mor link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bhanga Rastar Mor to Rajbari Rastar Mor	Rajbari Rastar Mor to Bhanga Rastar Mor			
MV	Bus/Minibus	3	97	103	200	600	18.40
	Heavy Truck/Light Truck	3	93	63	156	468	14.35
	Car/ Micro Bus/Jeep	1	32	26	58	58	5.34
	Auto Rickshaw/Tempo/Nosimon	0.75	248	148	396	297	36.43
	Motorcycle	0.75	91	57	148	111	13.62
NMV	Rickshaw/Van	0.5	36	9	45	22.5	4.14
	Bicycle	0.5	55	29	84	42	7.73
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					958	1534	88.13
Total NMV					129	64.5	11.87
Grand Total					1087	1598.5	100.00

Table A-8: Hourly Traffic Volume according to the Vehicle Types for Bhanga Rastar Mor-Rajbari Rastar Mor link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bhanga Rastar Mor to Rajbari Rastar Mor	Rajbari Rastar Mor to Bhanga Rastar Mor			
MV	Bus/Minibus	3	45	72	117	351	11.02
	Heavy Truck/Light Truck	3	39	48	87	261	8.19
	Car/ Micro Bus/Jeep	1	37	28	65	65	6.12
	Auto Rickshaw/Tempo/Nosimon	0.75	303	198	501	375.75	47.18
	Motorcycle	0.75	98	53	151	113.25	14.22
NMV	Rickshaw/Van	0.5	78	18	96	48	9.04
	Bicycle	0.5	25	20	45	22.5	4.24
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					921	1166	86.72
Total NMV					141	70.5	13.28
Grand Total					1062	1236.5	100.00

B) Vanga to Raffle Inn

Table B-1: Hourly Traffic Volume according to the Vehicle Types for Raffles INN Mor-Bhanga Rastar Mor link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raffles INN Mor to Bhanga Rastar Mor	Bhanga Rastar Mor to Raffles INN Mor			
MV	Bus/Minibus	3	1	0	1	3	0.03
	Heavy Truck/Light Truck	3	66	50	116	348	3.90
	Car/ Micro Bus/Jeep	1	39	54	93	93	3.13
	Auto Rickshaw/Tempo/Nosimon	0.75	1240	982	2222	1666.5	74.79
	Motorcycle	0.75	168	164	332	249	11.17
NMV	Rickshaw/Van	0.5	53	37	90	45	3.03
	Bicycle	0.5	83	33	116	58	3.90
	Animal Cart/Push Cart	3	0	1	1	3	0.03
Total MV					2764	2359.5	93.03
Total NMV					207	106	6.97
Grand Total					2971	2465.5	100

Table B-2: Hourly Traffic Volume according to the Vehicle Types for Raffles INN Mor-Bhanga Rastar Mor link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raffles INN Mor to Bhanga Rastar Mor	Bhanga Rastar Mor to Raffles INN Mor			
MV	Bus/Minibus	3	1	1	2	6	0.06
	Heavy Truck/Light Truck	3	37	60	97	291	2.82
	Car/ Micro Bus/Jeep	1	57	84	141	141	4.10
	Auto Rickshaw/Tempo/Nosimon	0.75	968	826	1794	1345.5	52.14
	Motorcycle	0.75	193	202	395	296.25	11.48
NMV	Rickshaw/Van	0.5	463	349	812	406	23.60
	Bicycle	0.5	72	127	199	99.5	5.78
	Animal Cart/Push Cart	3	1	0	1	3	0.03
Total MV					2429	2079.75	70.59
Total NMV					1012	508.5	29.41
Grand Total					3441	2588.25	100

Table B-3: Hourly Traffic Volume according to the Vehicle Types for Raffles-New Market link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raffles to New Market	New Market to Raffles			
MV	Bus/Minibus	3	0	1	1	3	0.06
	Heavy Truck/Light Truck	3	29	21	50	150	3.17
	Car/ Micro Bus/Jeep	1	19	46	65	65	4.13
	Auto Rickshaw/Tempo/Nosimon	0.75	327	470	797	597.75	50.60
	Motorcycle	0.75	65	136	201	150.75	12.76
NMV	Rickshaw/Van	0.5	158	156	314	157	19.94
	Bicycle	0.5	50	97	147	73.5	9.33
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					1114	966.5	70.73
Total NMV					461	230.5	29.27
Grand Total					1575	1197	100.00

Table B-4: Hourly Traffic Volume according to the Vehicle Types for Raffles-New Market link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raffles to New Market	New Market to Raffles			
MV	Bus/Minibus	3	3	2	5	15	0.32
	Heavy Truck/Light Truck	3	24	34	58	174	3.76
	Car/ Micro Bus/Jeep	1	25	53	78	78	5.06
	Auto Rickshaw/Tempo/Nosimon	0.75	281	439	720	540	46.69
	Motorcycle	0.75	65	137	202	151.5	13.10
	Rickshaw/Van	0.5	154	213	367	183.5	23.80

APPENDIX-A

NMV	Bicycle	0.5	31	81	112	56	7.26
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					1063	958.5	68.94
Total NMV					479	239.5	31.06
Grand Total					1542	1198	100.00

Table B-5: Hourly Traffic Volume according to the Vehicle Types for Sariatullah Bazar-Hazratola Mor link during On Day, 7th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Sariatullah Bazar to Hazratola Mor	Hazratola Mor to Sariatullah Bazar			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	4	2	6	18	0.48
	Car/ Micro Bus/Jeep	1	7	2	9	9	0.72
	Auto Rickshaw/Tempo/Nosimon	0.75	285	331	616	462	49.20
	Motorcycle	0.75	43	40	83	62.25	6.63
NMV	Rickshaw/Van	0.5	266	178	444	222	35.46
	Bicycle	0.5	46	48	94	47	7.51
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					714	551.25	57.03
Total NMV					538	269	42.97
Grand Total					1252	820.25	100.00

Table B-6: Hourly Traffic Volume according to the Vehicle Types for Sariatullah Bazar-Hazratola Mor link during Off Day, 4th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Sariatullah Bazar to Hazratola Mor	Hazratola Mor to Sariatullah Bazar			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	3	4	12	0.31
	Car/ Micro Bus/Jeep	1	3	1	4	4	0.31
	Auto Rickshaw/Tempo/Nosimon	0.75	313	306	619	464.25	48.63
	Motorcycle	0.75	39	52	91	68.25	7.15
NMV	Rickshaw/Van	0.5	248	198	446	223	35.04
	Bicycle	0.5	56	53	109	54.5	8.56
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					718	548.5	56.40
Total NMV					555	277.5	43.60
Grand Total					1273	826	100.00



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for
Fourteen Upazilas
Package 03

Draft Survey Report

Geological Survey

of

Faridpur Upazila

September 2016

Submitted By

ইঞ্জিনিয়ারিং কনসালটেন্টস এন্ড এসোসিয়েটস লিমিটেড
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LETTER OF TRANSMITTAL

EXECUTIVE SUMMARY

Development plan of Faridpur Upazila, District Dhaka has been taken under package-3 and the project titled 'Preparation of Development Plan for Fourteen Upazilas' a initiative of Urban Development Directorate (UDD). In this development plan, subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment. This is basically done to determine the state of the soil below the surface of the project area and natural, such as earthquakes, landslides and soil erosion as a result of the design of the infrastructure development such as geological and hydro-meteorological hazards are evaluated.

To know the subsurface environment of the study area, surveys has been carried out up to 30 meter below the earth surface in the field. Investigations and surveys are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting Down-hole seismic test; conducting Down-hole seismic test and conducting Multi-Channel Analysis of Surface Wave (MASW). Laboratory testing of soil samples such as Grain Size analysis, Natural moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. To meet the above geological, geotechnical and geophysical task, 37 boreholes with SPT program, six MASW and seven Down-hole seismic survey programs have been conducted into the field at Faridpur Upazila.

From geotechnical and geological data base would give a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. On the other hand, if the infrastructures are built according to this risk informed physical land-use plan, the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards.

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ABBREVIATIONS

ASTM	: American Society for Testing and Materials
AVS30	: Average Shear Wave velocity of 30 meter depth
BH	: Borehole
MASW	: Multi-Channel Analysis of Surface Wave
N value	: Soil resistance or compactness
PGA	: Peak Ground Acceleration
PGV	: Peak Ground Velocity
PS logging	: Primary and Shear wave logging (Down-hole seismic test)
SA	: Spectral Acceleration
SPAC	: Spatial Autocorrelation
SPT	: Standard Penetration Tests
UDD	: Urban Development Directorate
EGL	Existing Ground Level
GWL	Ground Water Level

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CHAPTER-01: INTRODUCTION

1.1. BACKGROUND:

Horizontal expansion of urban area is rapidly increasing in Bangladesh with respect to their rapid population growth and increasing life expectancy of the peoples. But present trend of planning practice is mostly oriented towards planning of major cities and towns, not in all other towns or growth centers because huge amount of financial allocation/grants involvement. Recent policy of government, the upazila has been recognized as the most significant tier of administration. So that these areas are need to be planned and developed to accommodate all social, economic, administrative, infrastructure services and service facilities. The government's intention is to reflect the national policy of bringing development administrative and service facilities to the door step of rural masses and to ensure better delivery of government services to the people. Realizing the fact and importance of formulating development plans for upazilas, Urban Development Directorate has come up with a great initiative to plan those areas. At the first phase of this initiative UDD has decided to prepare development plan for 14 Upazilas all over Bangladesh into five different packages. For each package separate consultancy team has been appointed to carry out that job more fruitfully. Desh Upodesh Ltd. in Association with AAIMA International BD Ltd. and Tech-SUS Ltd has been selected for package-3 (covering Faridpur Upazila, Dist: Meherpur; Faridpur Sadar Upazila, Dist: Faridpur; and Baghmara Upazila, Dist: Rajshahi) by project evaluation committee of UDD.

Subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment. Primarily this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meteorological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

Regarding this study, following investigations and surveys has been carried out in the field which are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard

guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting Down-hole seismic test; conducting Down-hole seismic test and conducting Multi-Channel Analysis of Surface Wave (MASW). Geologically and structurally the area is not much complex, that's why geotechnical and geophysical investigations are covered whole floodplain area except low or marshy land up to 30 meter depth from ground level and almost everywhere soil sediments are fluvial type of deposit which are much soft and thicker.

Following laboratory testing of soil samples such as Grain size analysis, Natural moisture content, Atterberg limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. These field and laboratory test data will be analyzed and integrated into a module to produce risk sensitive micro-zonation maps.

1.2. SCOPE OF WORK:

The aim of this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meteorological hazards such as earthquake, liquefaction, ground failure and integrate the consequence into the design of the infrastructure. The main objective will be achieved through accomplishment of the following sub-objectives:

- a) Preparation of Geological map of the study area.
- b) Preparation of sub-surface lithological 3D model of different layers through geotechnical investigation
- c) Preparation of engineering geological mapping based on AVS30
- d) Determination of soil type in the project area
- e) Foundation layer identification
- f) Preparation of Seismic Hazard Map
- g) Finally intensity map is prepared for high rise and low rise building

CHAPTER-02: METHODOLOGY

The methods and materials used to carry out of these activities have been described below-

2.1. TEST DETAILS AND PROCEDURE OF DOWN-HOLE SEISMIC TEST (PS LOGGING)

Main objectives of downhole seismic test to measure the travelling time of elastic wave from the ground surface to some arbitrary depths beneath the ground. The seismic wave was generated by striking a wooden plank by a sledge hammer. The plank was placed on the ground surface at around 1 m in horizontal direction from the top of borehole. The plank was hit separately on both ends to generate shear wave energy in opposite directions and is polarized in the direction parallel to the plank.

The shear wave emanated from the plank is detected by a tri-axial geophone. The geophone was lowered to 1 m below ground surface and attached to the borehole wall by inflating an air bladder. Then, the measurements were taken at every 1 m interval until the geophone was lowered to 30 m below ground surface. For each elevation, 3 records were taken and then used to calculate the shear wave velocity.



Plate 1: Downhole Seismic Test data logger

2.2.1. Procedure of Field Work and Analysis

- a) A wooden plank with an approximate dimension of 2 ft x 1 ft x 2 ft is fixed to the ground. The wooden plank is placed about 1m from the borehole as shown in Plate 2.



Plate 2: Wooden Plank as the Vibration Source

- b) Cables are wired from the geophone Plate 3 and the trigger to the data acquisition unit Plate 4. Signals in the vertical, radial and transverse directions are recorded by the data acquisition unit.



Plate 3: Geophone



Plate 4: Data Acquisition Unit

- c) The geophone is lowered into the borehole as shown in Plate 5 Then, air is pumped into the air bag to fix the geophone to the casing (PVC pipe) at 1 m interval in depth basically.



Plate 5: Geophone Lowering In the Borehole

- d) Excitations are generated by hitting the wooden plank in three directions by the hammer.



Plate 6: Direction of Excitations

- e) Data is recorded in the data acquisition unit. Figure 1 illustrates a typical dataset in obtaining the arrival time of S-wave. Hitting the wooden plank in opposite directions generates signals as shown in the figure. The time that two curves begin to separate is the arrival time of shear wave. By doing the same analysis for every depth, S-wave profiles are obtained throughout the depth of the borehole.

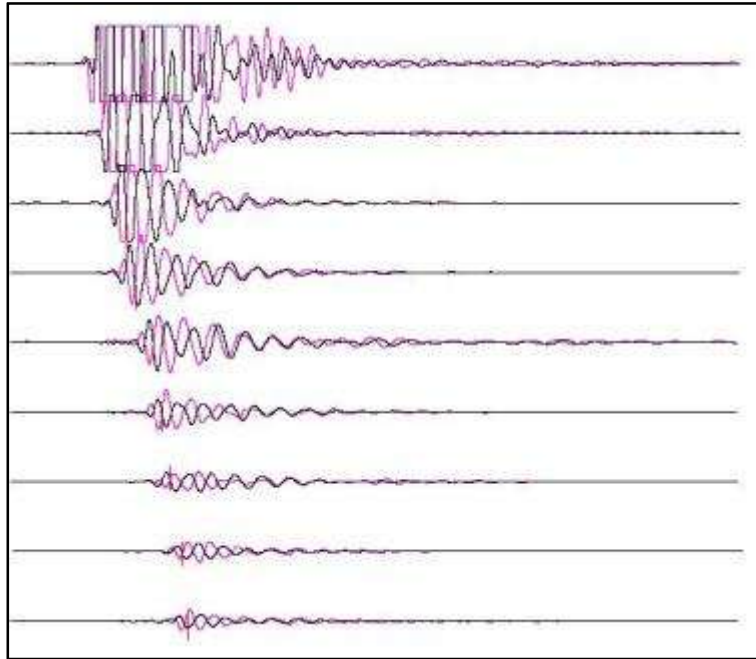
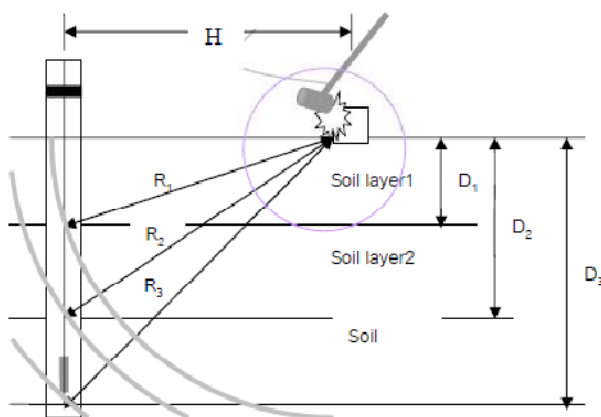


Figure 1: Determination of the Arrival Time of S-Wave

- f) Using the raw data of the test depth (D), the shortest pass (R) and the recorded arrival time of S-wave (t) in the inclined path is calculated to the travel time, t_c , in the vertical path as shown in Figure 2.



$$t_c = D \frac{t}{R}$$

Where

t_c is the corrected travel time

D is the testing depth from ground surface,

t is the first arrival time from test

R is the distance between the source and receiver

[Auld 1977]

Figure 2: Calculation of the Travel Time

- g) By plotting the corrected travel time versus depth, the velocity of every 1 m interval is calculated from (Auld 1977)

$$V_d = \frac{\Delta D}{\Delta t_c} [\text{Auld 1977}]$$

Where, ΔD is depth interval showing similar slope and Δt_c is the corrected travel time difference of ΔD .

2.2. TEST DETAILS AND PROCEDURE OF MULTI-CHANNEL ANALYSIS OF SURFACE WAVE (MASW)

Multichannel Analysis of Surface Wave (MASW) is recent and very popular method for computation of shear wave velocity. This method is widely used for seismic microzonation. A MASW is a seismic surface method, widely used for subsurface characterization and is increasingly being applied for seismic microzonation and site response studies (Anbazhagan and Sitharam, 2008). It is also used for the geotechnical characterization of near surface materials (Park and Miller, 1999; Xia et al., 1999; Miller et al., 1999; Anbazhagan and Sitharam, 2008). MASW is used to identify the subsurface material boundaries, spatial and depth variations of weathered and engineering rocks (Anbazhagan and Sitharam, 2009). We have used the MASW system consisting of 12 channels Geode seismograph with 12 vertical geophones of 10 Hz capacity.

The measuring procedure in this project is shown as follows:

- I. To decide the measuring line
- II. To set receivers along the line at the ground surface. The intervals of each geophone are 3m.
- III. To set an acrylic board at a half interval outside the line
- IV. To shoot it vertically. Then generated elastic waves are recorded by receivers.
- V. To shift the acrylic board between second receiver and the third receiver, and shoot it vertically. Then generated elastic waves are recorded at receivers.
- VI. To iterate this procedure up to setting the acrylic boards at a half interval outside the other side of the line.

The data acquisition parameters are given in table 1.

Table 1: MASW Data Acquisition Parameters

Seismic refraction	
Number of channels	12
Geophone spacing	3m
Array length	33m
Sampling rate	1ms
Record length	2 sec
Natural frequency of Geophone	10 Hz
Source	8 kg hammer
Shot number	13 points, 11 between geophones and 2 outside of measuring line

Source: Park and Miller, 1999; Xia et al. 1999; Miller et al. 1999; Anbazhagan and Sitharam, 2008

2.2.1. Analysis of MASW

Data processing consists of two main steps: (i) Obtaining the dispersion curves of Rayleigh wave phase velocity from the records; (ii) Determining the V s profiles from which the Vs30 values are calculated (see figure 3). In the phase velocity analysis, SPAC (Spatial Autocorrelation) method (Okada, 2003) is employed. Okada (2003) shows Spatial Autocorrelation function $\rho(\omega, r)$ is expressed by Bessel function.

$$\rho(\omega, r) = J_0(\omega r / c(\omega)) \quad [\text{Okada, 2003}]$$

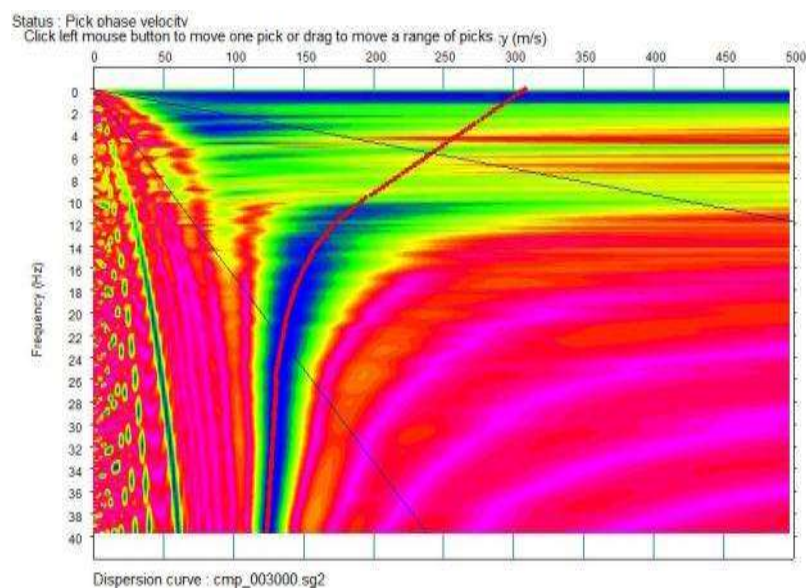
Where, r is the distance between receivers, ω is the angular frequency, c (ω) is phase velocity of waves, J_0 is the first kind of Bessel function. The phase velocity was obtained at each frequency using equation (2). A one dimensional inversion using a non-linear least square method has been applied to the phase velocity curves. In the inversion, the following relationship between P-wave velocity (Vp) and Vs (Kitsunezaki et. al., 1990):

$$Vp = 1.29 + 1.11Vs \quad [\text{Kitsunezaki et. al., 1990}]$$

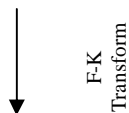
Where, V_s is S-wave velocity (km/s), V_p is P-wave velocity (km/s). In order to assume density ρ (g/cm³) from S-wave velocity, the relationship of Ludwig et al. (1970) is used.

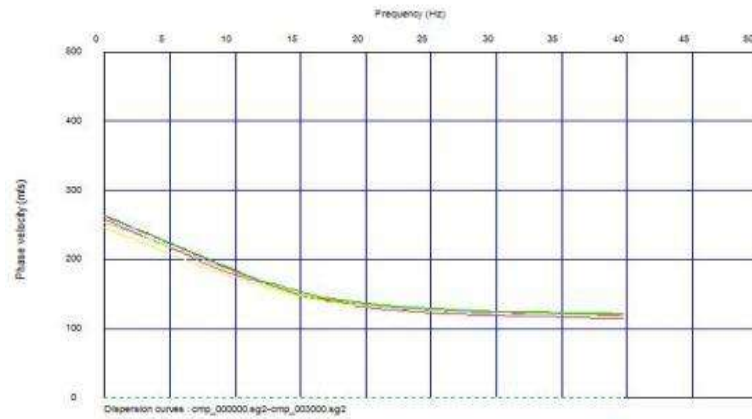
$$\rho = 1.2475 + 0.399V_p - 0.026V_p^2 \quad [\text{Ludwig et al. (1970)}]$$

These calculations are carried out along the measuring line, and the S-wave velocity distribution section was analyzed.



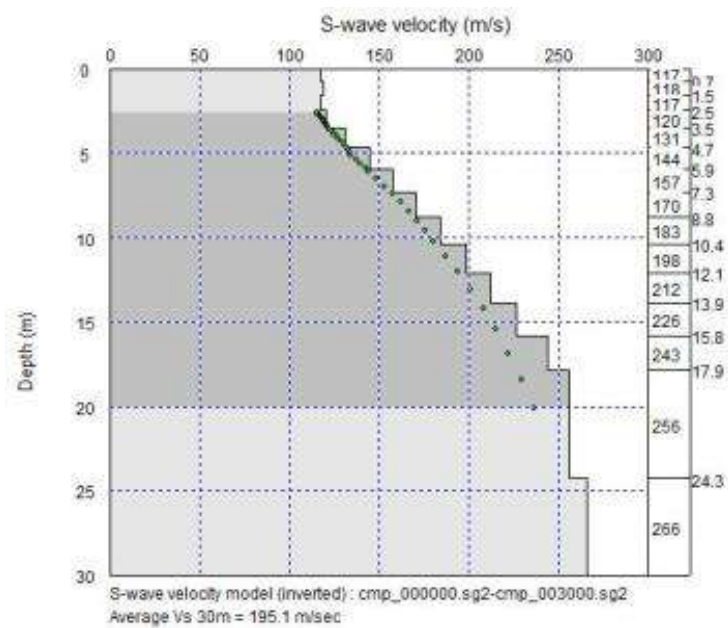
MASW Raw field data





Dipersion for Rayleigh wave

↓
Inversion



Shear wave velocity profile

Figure 3: Main Step of the MASW Processing Technique

2.3. TEST DETAILS AND PROCEDURE OF STANDARD PENETRATION TEST

The geotechnical boreholes have been constructed using wash boring method. In this investigation, 37 numbers of boreholes have been prepared at Faridpur Upazila. The borehole logs are enclosed in the Appendix A. The boring method has been described in the following section.

2.3.1. Drilling

The bore holes are being drilled through mechanical percussion wash boring method at the locations previously decided. As 30 m boring is so complicated and time consuming moreover it has done continuously to the end to prevent the possibility of caving of the boring wall, it will be decided to send two sets of worker who will work in 8 hrs until desired depths will be achieved. In this manner the estimated time for boring execution will 13- shifts and 12- shifts are considered for mobilization, assemble and disassemble of the equipment, site cleanup and backfill the bore holes to their pre-existing condition.

2.3.2. Data Collection

The field data are being collected according to the respective standard methods. First of all the location, areal coverage, topography, geomorphology of the test site are note down. The soil sample collection procedure is mentioned in the section 2.3.4. While SPT soil samples are collected. At the same time, the ground water table is note down.

2.3.3. SPT Execution

As it mentioned earlier, the geotechnical boreholes will be constructed using mechanical boring method. The depth of those boreholes is to 30m. In this method N values (standard Penetration Test) is counted and soil sample also be taken in every 1.5m depth interval. The subsequent procedure which has been followed during the field work is furnished as follows:

- I. Drill a 100-200 mm (2.5-8 in) diameter exploratory boring to the depth of the first test.
- II. Insert the SPT sampler (also known as a Split-spoon Sampler) into the boring. The shape and dimensions of this sampler are shown in Figure 4. It is connected via steel rods to a 63.5 kg (140 lb) hammer, as shown in Figure 5.
- III. An automatic tripping mechanism (in case of rotary drilling used this technique in this investigation), raise the hammer a distance of 760 mm (30 in) and allow it to fall. This energy drives the sampler into the bottom of the boring. Repeat this process until the sampler has penetrated a distance of 450 mm (18 in), recording the number of hammer blows required for each 150 mm (6 in) interval.
- IV. Compute the N-value by summing the blow counts for the last 300 mm (12 in) of penetration. The blow count for the first 150 mm (6 in) is retained for reference purposes, but not used to compute N because the bottom of the boring is likely to be disturbed by the drilling process and may be covered with loose soil that fell from the sides of the boring.
- V. Extract the SPT sampler, then remove and save the soil sample (disturbed sample).
- VI. Drill the boring to the depth of the next test and repeat steps 2 through 6 as required.

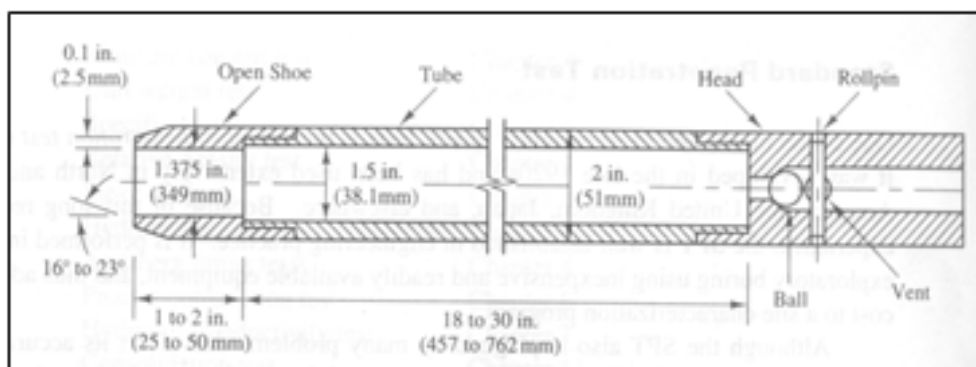


Figure 4: Split-spoon sampler.

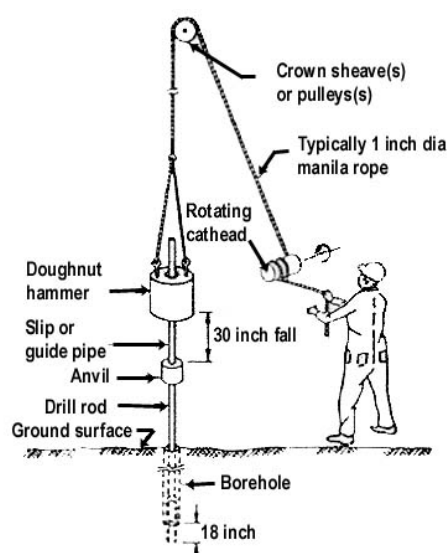


Figure 5: The SPT sampler in place in the boring with hammer

2.3.4. SOIL SAMPLING

Two main categories of soil samples are collected, undisturbed and disturbed. Undisturbed samples, which are required mainly for shear strength and consolidation tests, are obtained by techniques which aim at preserving the in-situ structure and water content of the soil. In boreholes, undisturbed samples can be obtained by withdrawing the boring tools (except when hollow-stem continuous-flight augers are used) and driving or pushing a sample tube into the soil at the bottom of the hole. The sampler is normally attached to a length of boring rod which can be lowered and raised by the cable of the percussion rig. When the tube is brought to the surface, some soil is removed from each end and molten wax is applied, in thin layers, to form a seal approximately 25mm thick: the ends of the tube are then covered by protective caps. Undisturbed block samples can be cut by hand from the bottom or sides of a trial pit. During cutting, the samples must be protected from water, wind and sun to avoid any change in water content: the samples should be covered with molten wax immediately they have been brought to the surface. It is impossible to obtain a sample that is completely undisturbed, no matter how elaborate or careful the ground investigation and sampling technique might be. In the case of clays, for example,

swelling will take place adjacent to the bottom of a borehole due to the reduction in total stresses when soil is removed and structural disturbance may be caused by the action of the boring tools; subsequently, when a sample is removed from the ground the total stresses are reduced to zero.

Soft clays are extremely sensitive to sampling disturbance, the effects being more pronounced in clays of low plasticity than in those of high plasticity. The central core of a soft clay sample will be relatively less disturbed than the outer zone adjacent to the sampling tube. Immediately after sampling, the pore water pressure in the relatively undisturbed core will be negative due to the release of the in-situ total stresses. Swelling of the relatively undisturbed core will gradually take place due to water being drawn from the more disturbed outer zone and resulting in the dissipation of the negative excess pore water pressure: the outer zone of soil will consolidate due to the redistribution of water within the sample. The dissipation of the negative excess pore water pressure is accompanied by a corresponding reduction in effective stresses. The soil structure of the sample will thus offer less resistance to shear and will be less rigid than the in-situ soil.

A disturbed sample is one having the same particle size distribution as the in-situ soil but in which the soil structure has been significantly damaged or completely destroyed; in addition, the water content may be different from that of the in-situ soil. Disturbed samples, which are used mainly for soil classification tests, visual classification and compaction tests, can be excavated from trial pits or obtained from the tools used to advance boreholes (e.g. from augers and the clay cutter). The soil recovered from the shell in percussion boring will be deficient in fines and will be unsuitable for use as a disturbed sample. Samples in which the natural water content has been preserved should be placed in airtight, non-corrosive containers: all containers should be completely filled so that there is negligible air space above the sample.

All samples should be clearly labeled to show the project name, date, location, borehole number, depth and method of sampling; in addition, each sample should be given a serial number. Special care is required in the handling, transportation and storage of samples (particularly undisturbed samples) prior to testing. The types of tube samplers used in this study are described below.

Thin-walled Sampler

Thin-walled samplers (Figure 6) have been used to collect undisturbed samples from boreholes. These samplers are used in soils which are sensitive to disturbance such as soft to firm clays and plastic silts. The sampler does not employ a separate cutting shoe, the lower end of the tube itself being machined to form a cutting edge. The internal diameter may range from 35 to 100 mm. The area ratio is approximately 10% and samples of first-class quality can be obtained provided the soil has not been disturbed in advancing the borehole. In trial pits and shallow boreholes the tube can often be driven manually

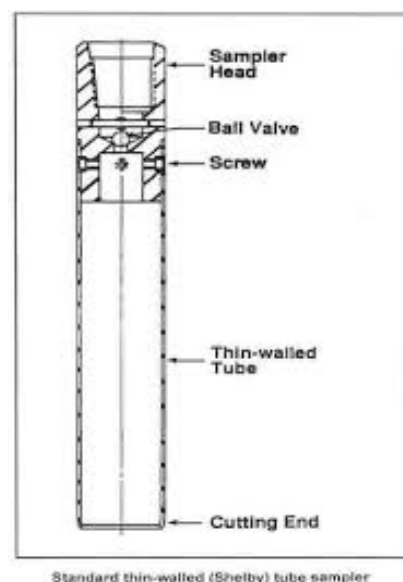


Figure 6: Thin-Walled (Shelby Tube) Sampler

Split-spoon sampler

Split-spoon samplers (Figure 7) have been to collect disturb samples. It consists of a tube which is split longitudinally into two halves: a shoe and a sampler head incorporating air-release holes are screwed onto the ends. The two halves of the tube can be separated when the shoe and head are detached to allow the sample to be removed. The internal and external diameters are 35 and 50 mm, respectively, the area ratio being approximately 100%, with the result that there is considerable disturbance of the sample. This sampler is used mainly in sands, being the tool specified in the standard penetration test (SPT).

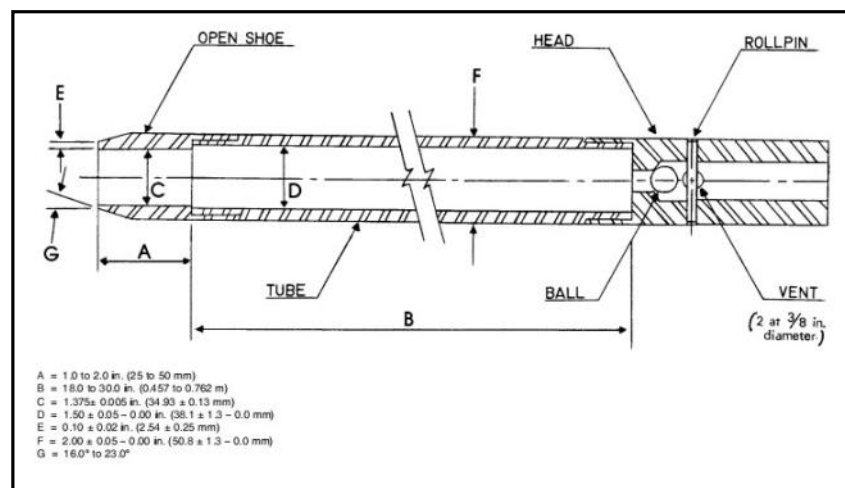


Figure 7: Undisturbed (Split-Spoon) Sampler

2.3.5. CARRYING OUT DIFFERENT ENGINEERING TESTS ON SOIL SAMPLE

A wide variety of laboratory tests is performing on soils to measure number of soil parameters. Some soil properties are intrinsic to the composition of the soil matrix and are not affected by sample disturbance, while other properties depend on the structure of the soil as well as its composition, and can only be effectively tested on relatively undisturbed samples. Some soil tests measure the direct properties of the soil, while others measure "index properties" which provide useful information about the soil without directly measuring the property desired.

The test types and standard which have been following given in the following section. Before explaining each of the engineering tests, the standard followed in each test is mentioned here:

- Grain size analysis
 - Sieve Analysis
 - Hydrometer Analysis
- Natural Moisture Content Tests
- Attarbage Limit Test
- Unconfined Compressional Test
- Traxial Test

All laboratory test result are given in Appendix D.

CHAPTER-03: SURVEY RESULT AT FARIDPUR UPAZILA

3.1. GEOPHYSICAL INVESTIGATIONS

The main objectives of these investigation to estimate local site effects against earthquakes and the task has been segregated by three-fold: 1) To determine shear wave velocity profile at various sites, 2) To classify soil conditions according to seismic design specifications and 3) To analyze soil amplifications in the area. Field measurements of shear wave velocities were conducted in Faridpur Upazila and described in below.

Shear wave velocity profile (V_s profile) in the field were carried out by two geophysical exploration methods namely 1) seismic downhole test and 2) Multichannel Analysis of Surface Wave (MASW).

Seismic downhole test is a direct measurement method for obtaining the shear wave velocity profile of soil stratum. However, the test requires borehole which is not time and cost effective for the project. Multichannel analysis of surface waves (MASW) is a non-invasive technique which can be used to determine the V_s profile at sites. In this project, the seismic downhole and MASW tests were performed at 6 and 5 locations respectively. Locations of seismic downhole test and MASW tests are shown in Map 2. The GPS coordinate of the test locations are showing in Table 2.

Table 2: Down-hole Seismic Test (PS logging) and MASW test locations

Survey Type	Survey ID	Location	Lat	Long	Union
Downhole Seismic Test (PS Logging)	PS-1 (BH-04)	Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Madhabdia Union	23.652707	89.816911	Char Madhabdia Union
	PS-2 (BH-11)	5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Union	23.61113	89.86364	Decreerchar Union
	PS-3 (BH-13)	Faridpur Zilla School field, Faridpur Sadar	23.60888	89.84447	Faridpur Sadar
	PS-4 (BH-20)	Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri Union	23.58205	89.83917	Kaijuri Union
	PS-5 (BH-22)	Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar	23.5869	89.81373	Faridpur Sadar
	PS-6 (BH-27)	Bakhunda College Field, Bakhunda, Greda Union	23.54565	89.85487	Greda Union
	PS-7 (BH-30)	Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar Union	23.53895	89.73418	Krishnanagar Union
Multi-channel Analysis of Surface Wave (MASW)	MASW-1	Mohim School Field, Faridpur Sadar	23.59924	89.82378	Faridpur Sadar
	MASW-2	Rajandro College field	23.6025	89.84211	Faridpur Sadar
	MASW-3	26 nos Gothadhar Dangi Govt. Primary School, Aliabad union	23.58216	89.88592	Aliabad union
	MASW-4	Miregi Govt. Primary School, BASIC Industrial area, Kanaipur Union	23.55254	89.77844	Kanaipur Union
	MASW-5	Kamorpur Aziz Institute and Primary School, Ambikapur Union	23.59735	89.78988	Ambikapur Union
	MASW-6	Shibrampur R. D. Academy School Field, Majchar Union	23.64024	89.74545	Majchar Union

Source: Field Survey, 2016

3.1.1. Down-Hole Seismic (PS Logging) Test Results

As a fundamental parameter, shear wave velocity is required to define the dynamic properties of soils. If the soil velocity is less than 180m/s, it can be said as loose or soft soil. Estimation of shear wave velocity (V_s) / average shear wave velocity (AVS) and mapping is a way to characterize varying site conditions, and it can also be used to model earthquake-related ground shaking. Estimation of AVS aims to generate a map of estimated shear wave velocities for the upper 30m of the subsurface. Further this map can be used for seismic site response analysis i.e., to determine peak ground acceleration (PGA) and spectral acceleration (SA) values of both bedrock and ground surface. In this context, Downhole seismic test data acquisition has been completed at Faridpur Upazilla in Seven different locations on date 5th to 8th January, 2016.

The average shear wave velocity (AVS) of each PS logging test are tabulated in Table 3. Work plan of the test depth was 30m, however, in some locations did not reach the geophone to the 30 m in depth due to adverse conditions of PVC.

The shear wave velocities at every 1m interval of each site are given in Appendix A at tabular and also graphical format.

3.1.2. MASW Survey Result

To predict subsurface shear-wave interval velocities, multi-spectral analyses of surface waves (MASW) are popularly used. Shear wave velocities can also extract additional velocity-related information such as mechanical properties of soils and rocks. In general, MASW data compare favorably to other geophysical methods for predicting interval velocities. Furthermore, comparisons to vertical seismic profiles correlate well with MASW predicted shear wave interval velocities. In this perspective, MASW test has been completed at Six different locations at Faridpur Upazilla by 27th to 28th November, 2016 and field raw data has been processed and also interpreted.

The results of the MASW test are enclosed in Appendix B at tabular and also graphical format.

3.2. GEOTECHNICAL INVESTIGATIONS

To ensure safety of human beings and materials, geotechnical investigations have become an essential component of every construction, it includes a detailed investigation of soil strength, composition, water content, and other important soil characteristics. Investigation borings with standard penetration test were conducted in order to know vertical geological conditions. The borings with SPT were carried out at 37 points at Faridpur Upazila.

3.2.1. Standard Penetration Test (SPT) Log Analysis and Interpretation

SPT is a common in-situ testing method used to determine the geotechnical engineering properties of subsurface soils. It was developed in the late 1920s and has been used extremely in North and South America, the United Kingdom, Japan, and elsewhere. Because of this long record of experience, the SPT is well-established in engineering practice. It is performed inside exploratory boring using inexpensive and readily available equipment, and thus adds little cost to a site characterization program. Although the SPT also is plagued by many problems that affect its accuracy and reproducibility, it probably will continue to be used for the foreseeable future, primarily because of its low cost. However, it is partially being replaced by other test methods, especially on larger and more critical projects.

All the borings has to be conducted and preparation of field bore log by visual classification has to be done in the presence of the experienced technical personnel. The borehole records have to be taken that include soil type, nature of sample, soil moisture content and consistency, SPT blow counts (N Value), ground water observation and apparent origin (fill, alluvium, recent sediments, etc.) and daily field logs have been prepared. The bore locations are given in following table 5 and the geotechnical borehole log are enclosed in the below section.

Table 3: Bore Hole Information Summary at Faridpur Upazila

BH-01	MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia Union	23.6842	89.80732	Char Madhabdia Union
BH-02	SOUTH DIGRIRCHAR MADHOBIDIA GOVT. PRI. SCHOOL, Madhubdia Union	23.66698	89.83742	Uttar Channel Union
BH-03	Chardurgapur Govt. Primary School field, Ishan Gopalpur	23.67174	89.78958	Ishan Gopalpur
BH-04	Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Madhabdia Union	23.65271	89.81691	Char Madhabdia Union
BH-05	Shibrampur R. D. Academy School Field, Majchar Union	23.64033	89.74549	Majchar Union
BH-06	Pallikobi Jasimuddin Saranshala, Ambikapur	23.61221	89.82033	Ambikapur Union
BH-07	Near Madhankali Swich gate, Ambikapur Union	23.62228	89.85255	Ambikapur Union
BH-08	Adampur Bazar, Goualonda Road, Ambikapur Union	23.62173	89.83853	Ambikapur Union
BH-9	Dhuldi Railgate, Dhuldi Bazar, Majchar Union	23.61963	89.77007	Majchar Union
BH-10	Khalilpur Bazar, Majchar Union	23.61627	89.73603	Majchar Union
BH-11	5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Union	23.61113	89.86364	Decreerchar Union
BH-12	Yasin College, Faridpur Sadar	23.61196	89.85338	Faridpur Sadar
BH-13	Faridpur Zilla School field, Faridpur Sadar	23.60888	89.84447	Faridpur Sadar
BH-14	Vajon Dangga Govt. Primary School, Faridpur Sadar	23.60272	89.86537	Faridpur Sadar
BH-15	Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar	23.59823	89.84946	Faridpur Sadar
BH-16	94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar	23.60121	89.83946	Faridpur Sadar
BH-17	Mohim School Field, Faridpur Sadar	23.5986	89.82333	Faridpur Sadar
BH-18	Raghu Nandanpur Madrasha, Ambikapur Union	23.59732	89.81214	Ambikapur Union
BH-19	Porunpur Govt. Primary School, Porunpur Bazar, Majchar Union	23.60005	89.75507	Majchar Union
BH-20	Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri Union	23.58205	89.83917	Kaijuri Union

BH-21	Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar	23.58869	89.82675	Faridpur Sadar
BH-22	Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar	23.5869	89.81373	Faridpur Sadar
BH-23	Choyata, Aliabad Union	23.57358	89.88176	Aliabad Union
BH-24	Near Payarpur Godaoun, Kaijuri Union	23.56865	89.83886	Kaijuri Union
BH-25	opposite side of Krish poshikhan Institute gate, Gunggabodi, Krishnanagar Union	23.57589	89.79154	Krishnanagar Union
BH-26	Gobinddapur Hat, Krishnanagar Union	23.57146	89.74718	Krishnanagar Union
BH-27	Bakhunda College Field, Bakhunda, Greda Union	23.54565	89.85487	Greda Union
BH-28	Chacia fokirbari Road, Kaijuri Union	23.54129	89.81203	Kaijuri Union
BH-29	Kanaipur Akhak Centre, Kanaipur Union	23.54651	89.77526	Kanaipur Union
BH-30	Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar Union	23.53895	89.73418	Krishnanagar Union
BH-31	Vhatpara Govt. Primary School, Kaijuri Union	23.53291	89.83473	Kaijuri Union
BH-32	Fursha Govt. Primary School, Kanaipur Union	23.5202	89.80351	Kanaipur Union
BH-33	Dokin Char Kamolpur	23.58859	89.84049	
BH-34	Tonthoniar Hat, End of Kanaipur Union	23.4989	89.78552	Kanaipur Union
BH-35	Nasirar Bazar, Dorghapur, Ishan Gopalpur	23.66123	89.76324	Ishan Gopalpur
BH-36	Near Health Coplex, Ishan Gopalpur	23.63583	89.77994	Ishan Gopalpur
BH-37	Doiarampur Govt. Primary School, Doiarampur, Majchar Union	23.61706	89.79298	Majchar Union

Source: Field data, 2015

While boring and SPT testing, soil samples are being visually classified in the following way:

Sieve	Soils	Designations
+No 4 (4.76mm)	Gravel	
No.4 to No 10(2.00mm)	Coarse	Sand
No. 10 to No 40 (0.42mm)	Medium	Sand
No. 40 to No 200 (0.07mm)	Fine	Sand
No.200	Silt or Clay	

Some soil has one dominant lithology with minuscule amount of other soil type. In such cases, minor soil sample are written in the following manner with along with dominant soil type.

- | | |
|-----------|-----------|
| 1. Trace | 1 to 10% |
| 2. Little | 10 to 25% |
| 3. With | 25 to 35% |

SPT- N value is also note down while SPT Testing. Then the collected soil samples are being cross checked with SPT-N values to ensure quality data collection.

Based on N-values, other very useful soil parameters may be obtained from the co-relation charts given by different research workers. Two such useful co-relations for cohesive and non-cohesive soils after K. Terzaghi are given below:

Table 4: Values of Relative Density (Dr.), Friction Angle and Unit Weight of Non-cohesive soil based on N-values

N-values	Condition	Relative Density	Angle of Internal friction (Degree)	Moist Unit Weight (Pcf)
0-4	Very Loose	0-15%	28 ⁰	70-100
4-10	Loose	15-35%	28 ⁰ -30 ⁰	95-125
10-30	Medium dense	35-65%	30 ⁰ -36 ⁰	110-130
30-50	Dense	65-85%	36 ⁰ -41 ⁰	110-140
Over 50	Very dense	85-100%	Over 41 ⁰	> 130

Table 5: Values of Unconfined Compressive Strength based on N-values for Cohesive Soil (Approximate):

N-values	Condition	Unconfined Compressive Strength (Tsf)
Below 2	Very soft	Below 0.25
2-4	Soft	0.25-0.50
4-8	Medium stiff	0.50-1.00
8-16	Stiff	1.00-2.00
16-32	very stiff	2.00-4.00
Over 32	Hard	over 4.00

In the above table the shear strength of cohesive soil is equal to $\frac{1}{2}$ of unconfined compressive strength and the angle of shearing resistance is equal to zero. It should be remembered that the co-relation for cohesive soil is not always much reliable.

The litholog are already written down in a standard format and has been attached in the appendix C.

CHAPTER-04: CONCLUSION

Faridpur Upazila and its adjoining areas is mostly comprises by monotonous flood plain area except few depression. Soil quality of the project area is varying as morphological difference, that's why geological, geotechnical and geophysical investigations has been carried out such a pattern to cover all morphological unit. In this consequences, 37 boreholes with SPT, 7 downhole seismic tests and 6 MASW program has been completed in the field as a part of this survey investigation. During this survey, soil samples (disturbed and undisturbed) are also collected for further laboratory test which will give idea about the soil engineering properties. This investigation data will be analyzed and integrated in a module from which it can possible to generate geomorphologic map, sub-surface litho-logical 3D model of different layers, engineering geological mapping based on AVS30, Seismic Hazard Assessment Map, soil type map, seismic intensity map, Peak Ground Acceleration (PGA) and recommended building height maps for both high rise building and low rise building etc

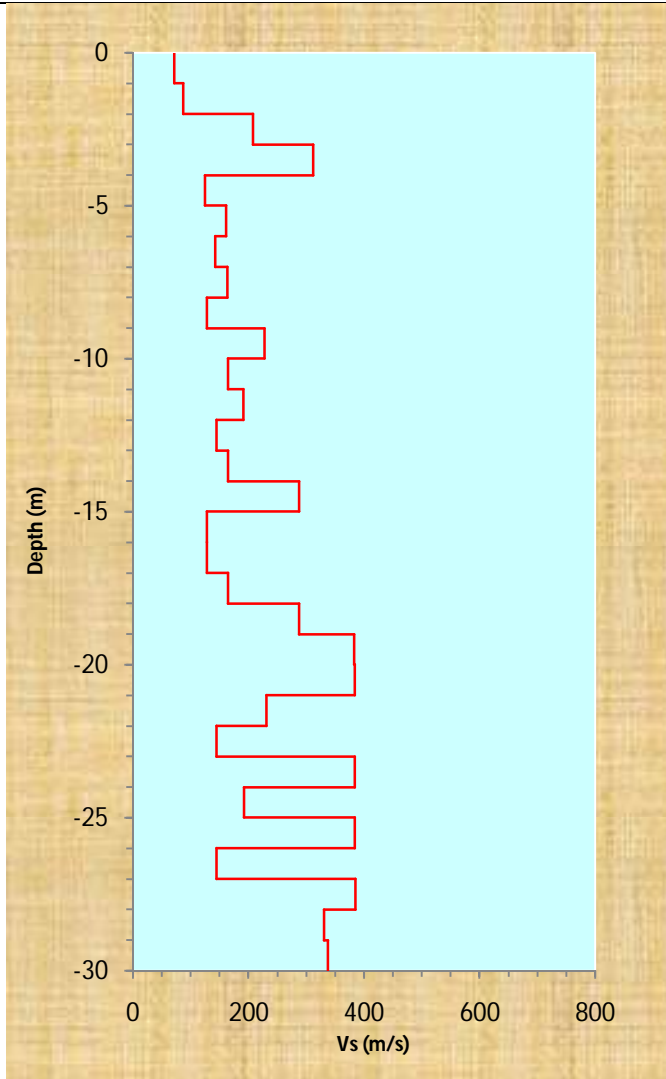
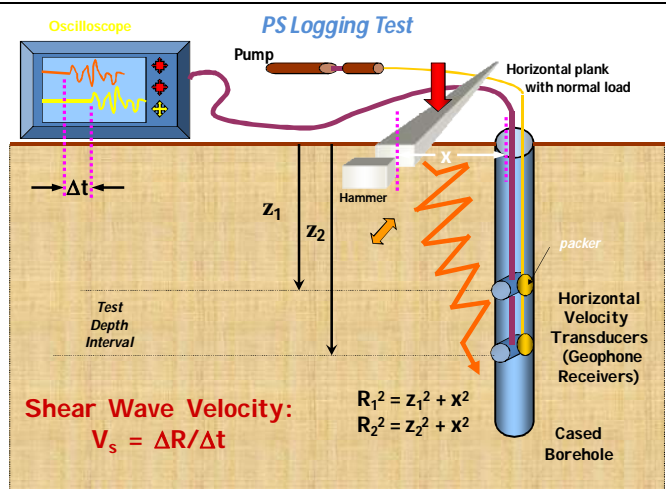

Above investigation and outcomes would give a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. It is to be mentioned that the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards if the infrastructures are built following the risk informed physical land-use plan.

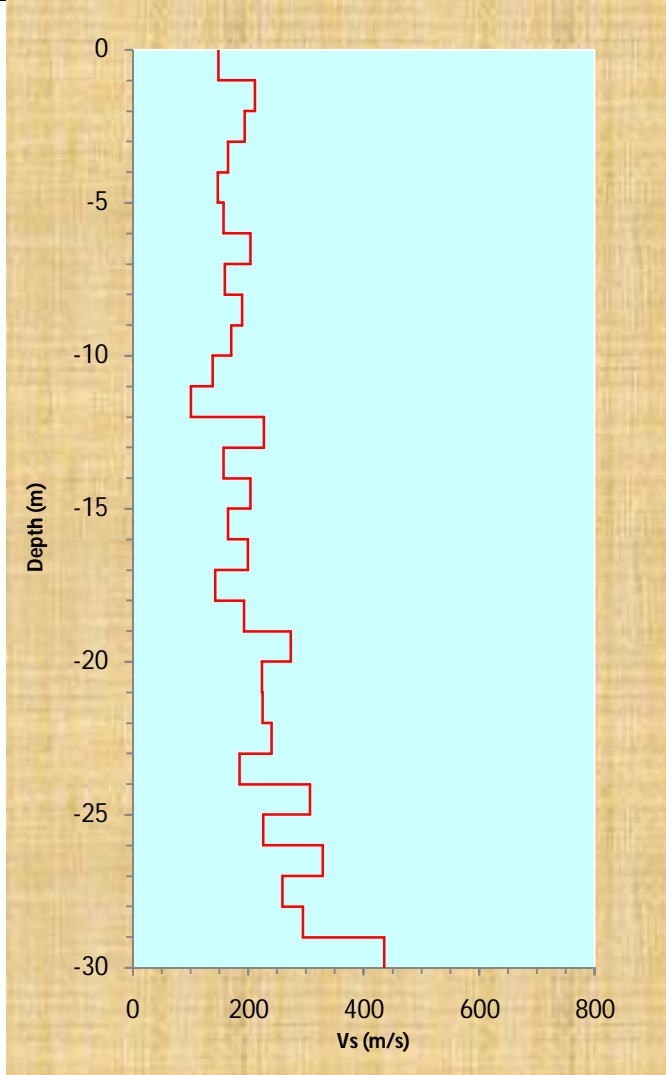
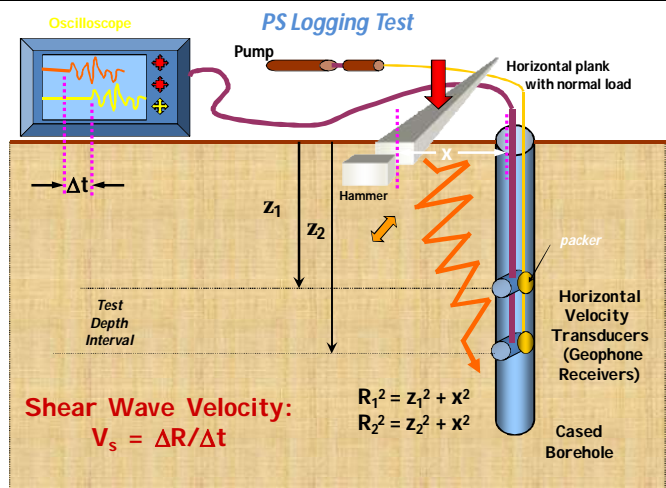

CHAPTER 5: REFERENCES

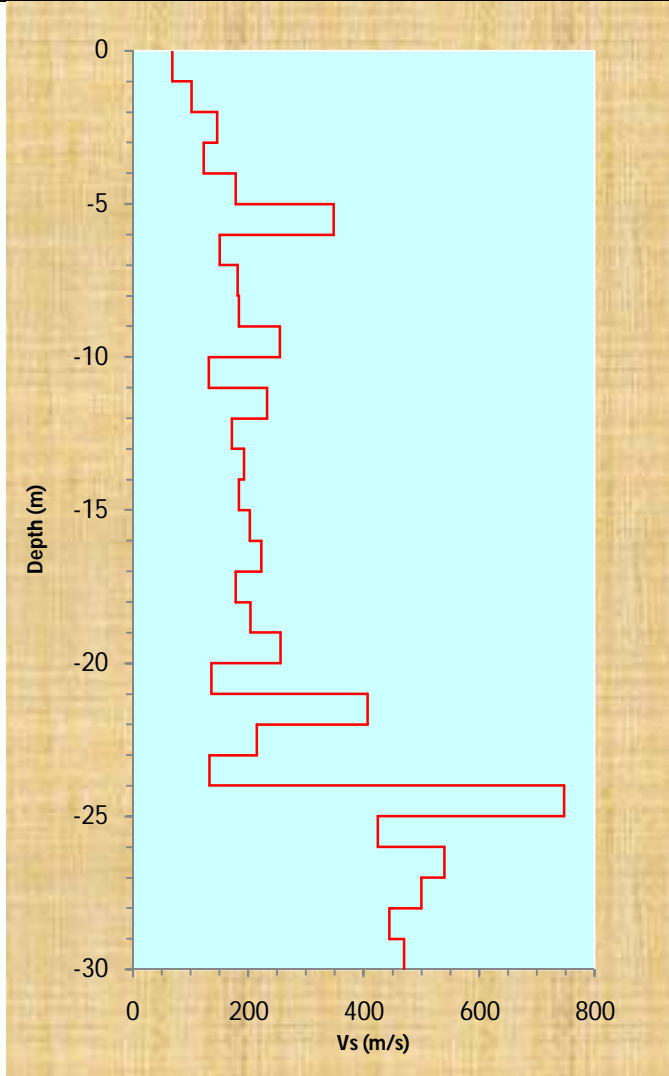
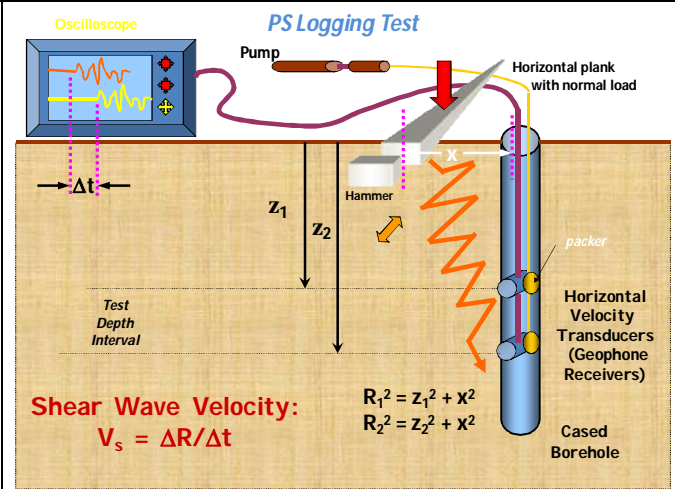

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- ix. Park CB, Miller RD, Xia J. Multi-channel analysis of surface waves. *Geophysics* 1999; 64(3):800–8.

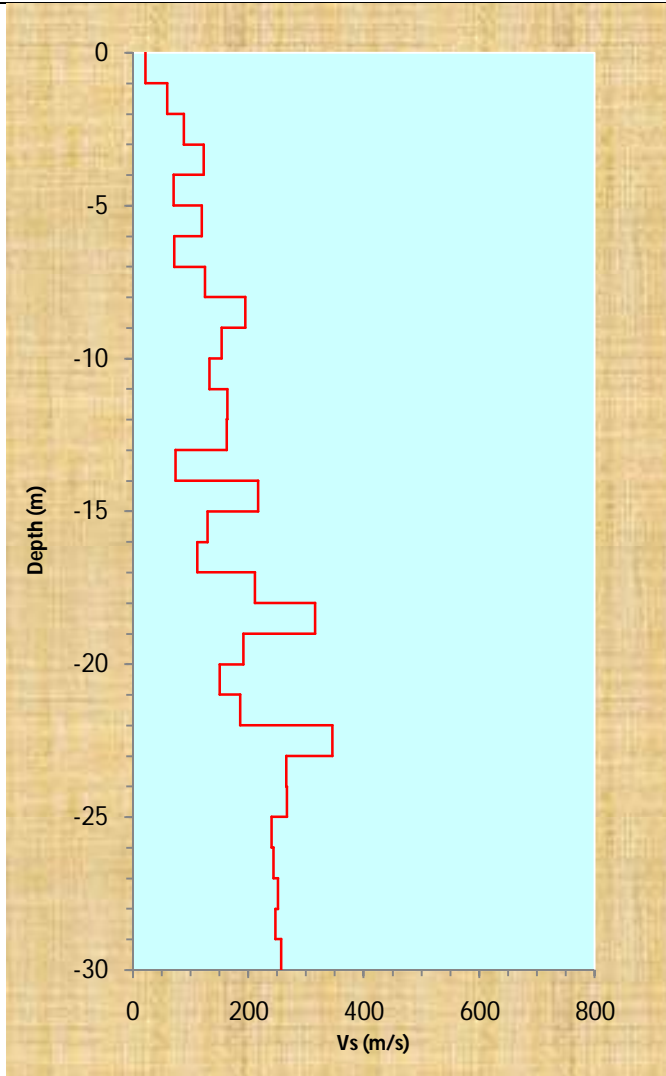
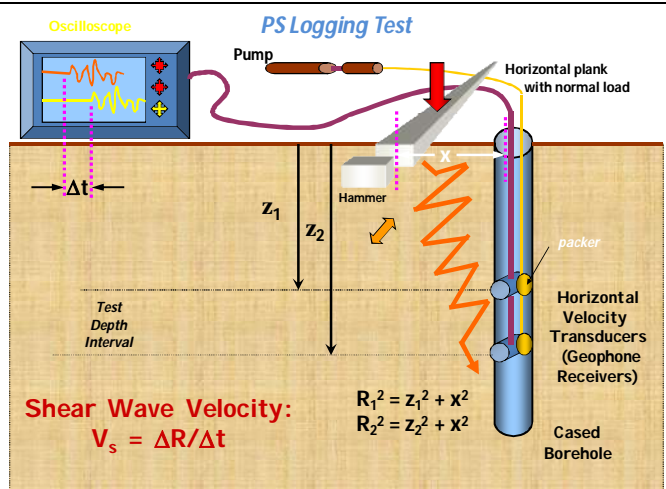

Appendix A

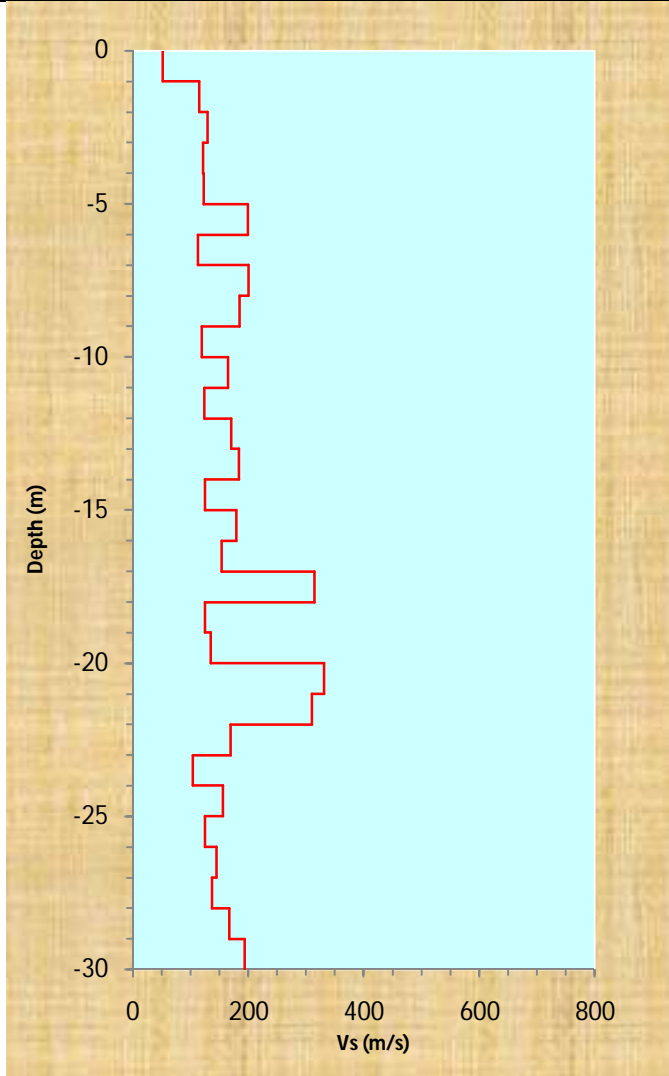
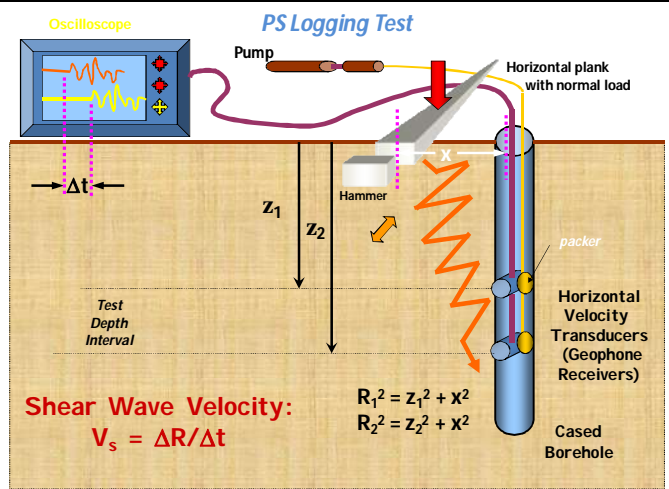

Downhole Seismic Test (PS Logging) Results and Graphs

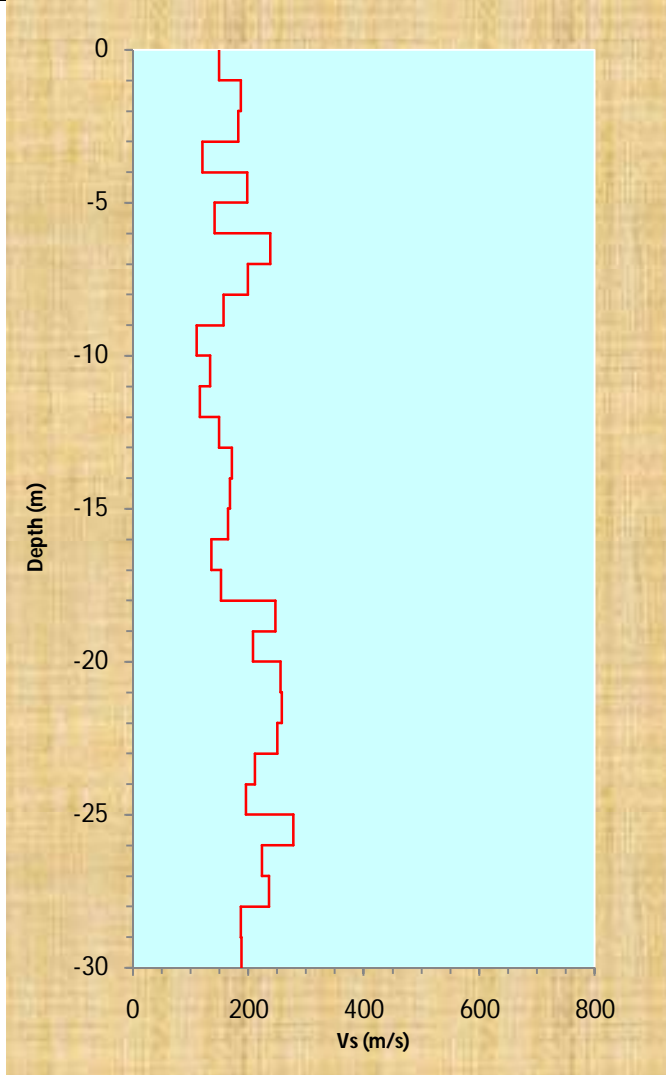
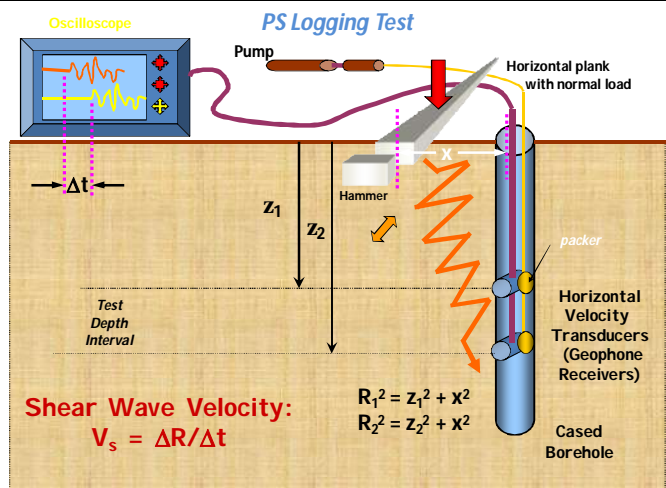

Tested Date : 7 January 2016 Location : Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia Union Test Id : PS-1 (BH-04) Coordinate : Latitude 23.652707 Longitude 89.816911 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity		Data Acquisition Procedure
-1	71			
-2	87			
-3	207			
-4	312			
-5	125			
-6	161			
-7	142			
-8	163			
-9	128			
-10	228			
-11	164			
-12	191			
-13	144			
-14	165			
-15	287			
-16	128			
-17	128			
-18	165			
-19	288			
-20	383			
-21	384			
-22	231			
-23	144			
-24	384			
-25	192			
-26	384			
-27	144			
-28	384			
-29	331			
-30	337			
Average Vs 30m = 178m/sec				 <p>Downhole Seismic Test Data Acquisition</p>

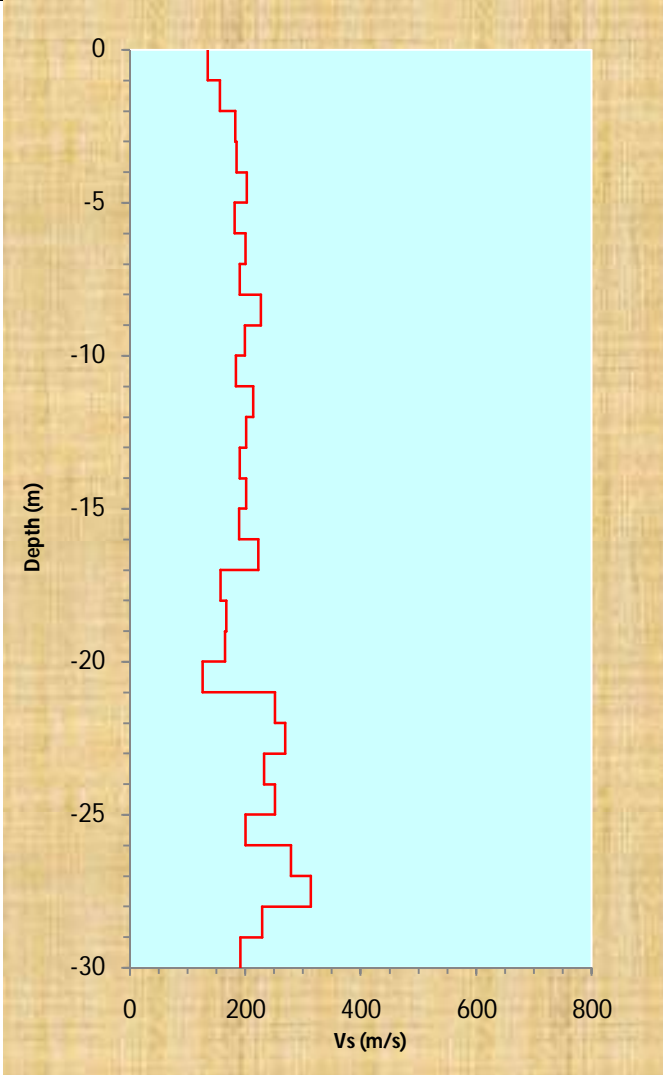
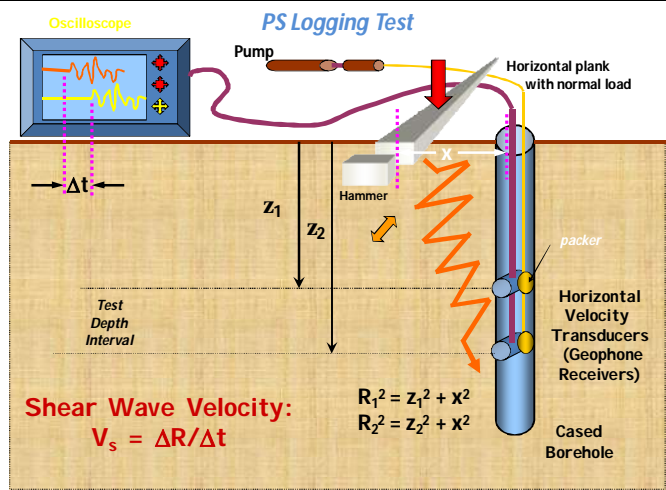

Tested Date : 7 January 2016 Location : 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Union Test Id : PS-2 (BH-11) Coordinate : Latitude 23.61113 Longitude 89.86364 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity		Data Acquisition Procedure
-1	148			
-2	211			
-3	193			
-4	165			
-5	147			
-6	157			
-7	203			
-8	159			
-9	189			
-10	170			
-11	138			
-12	100			
-13	227			
-14	156			
-15	204			
-16	165			
-17	199			
-18	142			
-19	193			
-20	273			
-21	224			
-22	224			
-23	240			
-24	184			
-25	306			
-26	226			
-27	329			
-28	259			
-29	295			
-30	435			
Average Vs 30m = 191 m/sec				 <p>Downhole Seismic Test Data Acquisition</p>

Tested Date : 6 January 2016 Location : Faridpur Zilla School field, Faridpur Sadar Test Id : PS-3 (BH-13) Coordinate : Latitude 23.60888 Longitude 89.84447 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity		Data Acquisition Procedure
-1	68			 <p>Shear Wave Velocity: $V_s = \Delta R / \Delta t$</p> <p> $R_1^2 = z_1^2 + x^2$ $R_2^2 = z_2^2 + x^2$ </p>
-2	102			 <p>Downhole Seismic Test Data Acquisition</p>
-3	146			
-4	123			
-5	178			
-6	348			
-7	150			
-8	181			
-9	184			
-10	255			
-11	131			
-12	232			
-13	171			
-14	192			
-15	184			
-16	203			
-17	222			
-18	178			
-19	203			
-20	256			
-21	136			
-22	406			
-23	215			
-24	133			
-25	746			
-26	424			
-27	539			
-28	500			
-29	445			
-30	469			
Average Vs 30m = 193m/sec				

Tested Date : 5 January 2016 Location : Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri Union Test Id : PS-4 (BH-20) Coordinate : Latitude 23.58205 Longitude 89.83917 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity		Data Acquisition Procedure
-1	22			 <p>PS Logging Test</p> <p>Oscilloscope</p> <p>Pump</p> <p>Horizontal plank with normal load</p> <p>Hammer</p> <p>Horizontal Velocity Transducers (Geophone Receivers)</p> <p>Cased Borehole</p> <p>Test Depth Interval</p> <p>Shear Wave Velocity: $V_s = \Delta R / \Delta t$</p> <p>$R_1^2 = z_1^2 + x^2$ $R_2^2 = z_2^2 + x^2$</p>
-2	59			
-3	88			
-4	122			
-5	70			
-6	119			
-7	71			
-8	124			
-9	195			
-10	154			
-11	132			
-12	164			
-13	163			
-14	74			
-15	217			
-16	129			
-17	111			
-18	211			
-19	315			
-20	191			
-21	151			
-22	186			
-23	345			
-24	265			
-25	267			
-26	240			
-27	244			
-28	252			
-29	247			
-30	257			
Average Vs 30m = 120m/sec				 <p>Downhole Seismic Test Data Acquisition</p>

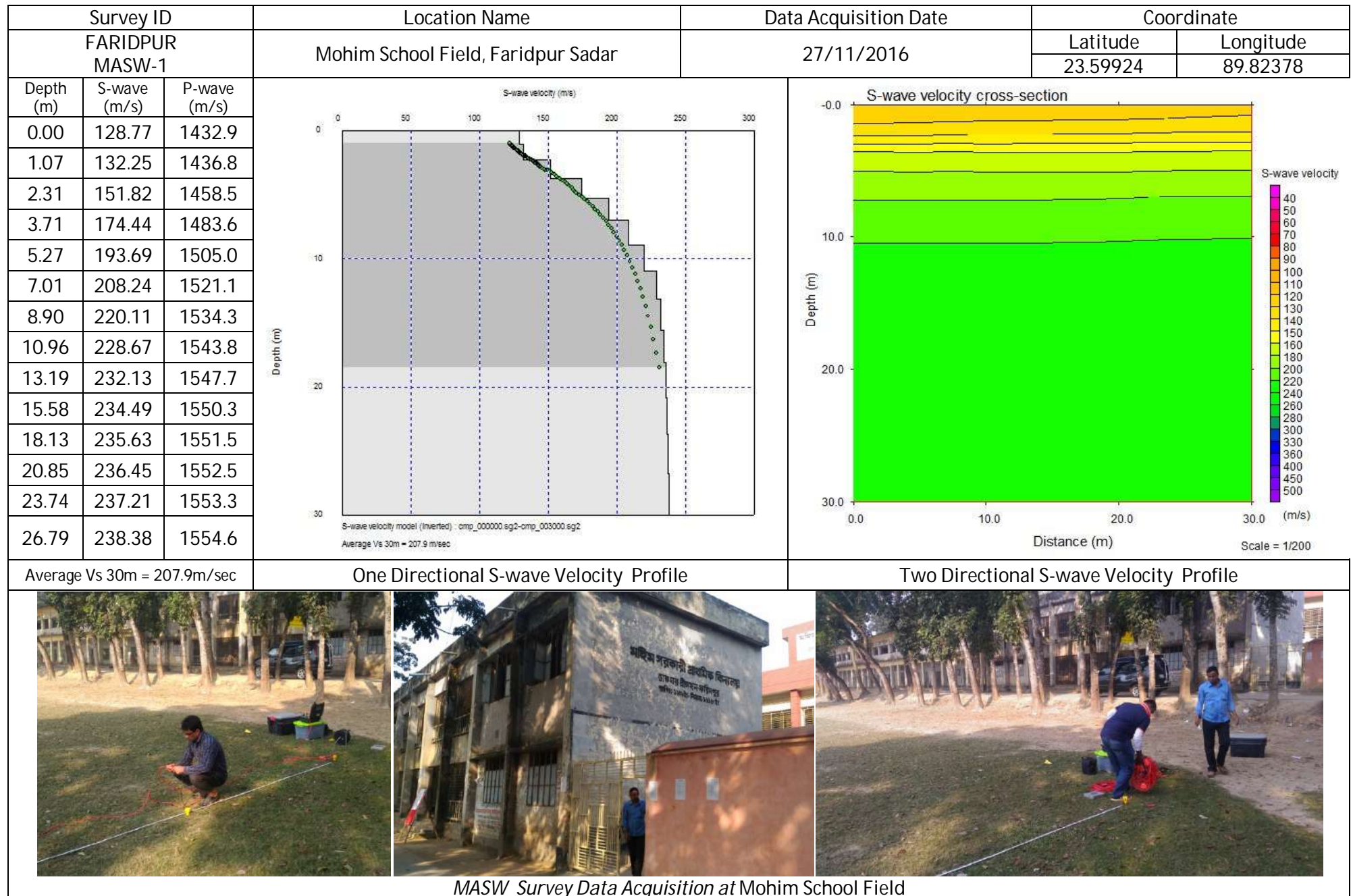
Tested Date : 7 January 2016 Location : Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar Test Id : PS-5 (BH-22) Coordinate : Latitude 23.5869 Longitude 89.81373 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure	
-1	51			
-2	115		 <p>Downhole Seismic Test Data Acquisition</p>	
-3	129			
-4	121			
-5	122			
-6	199			
-7	112			
-8	200			
-9	185			
-10	119			
-11	165			
-12	124			
-13	171			
-14	184			
-15	125			
-16	179			
-17	154			
-18	314			
-19	124			
-20	135			
-21	331			
-22	310			
-23	170			
-24	104			
-25	156			
-26	124			
-27	145			
-28	137			
-29	167			
-30	193			
Average Vs 30m = 142m/sec				

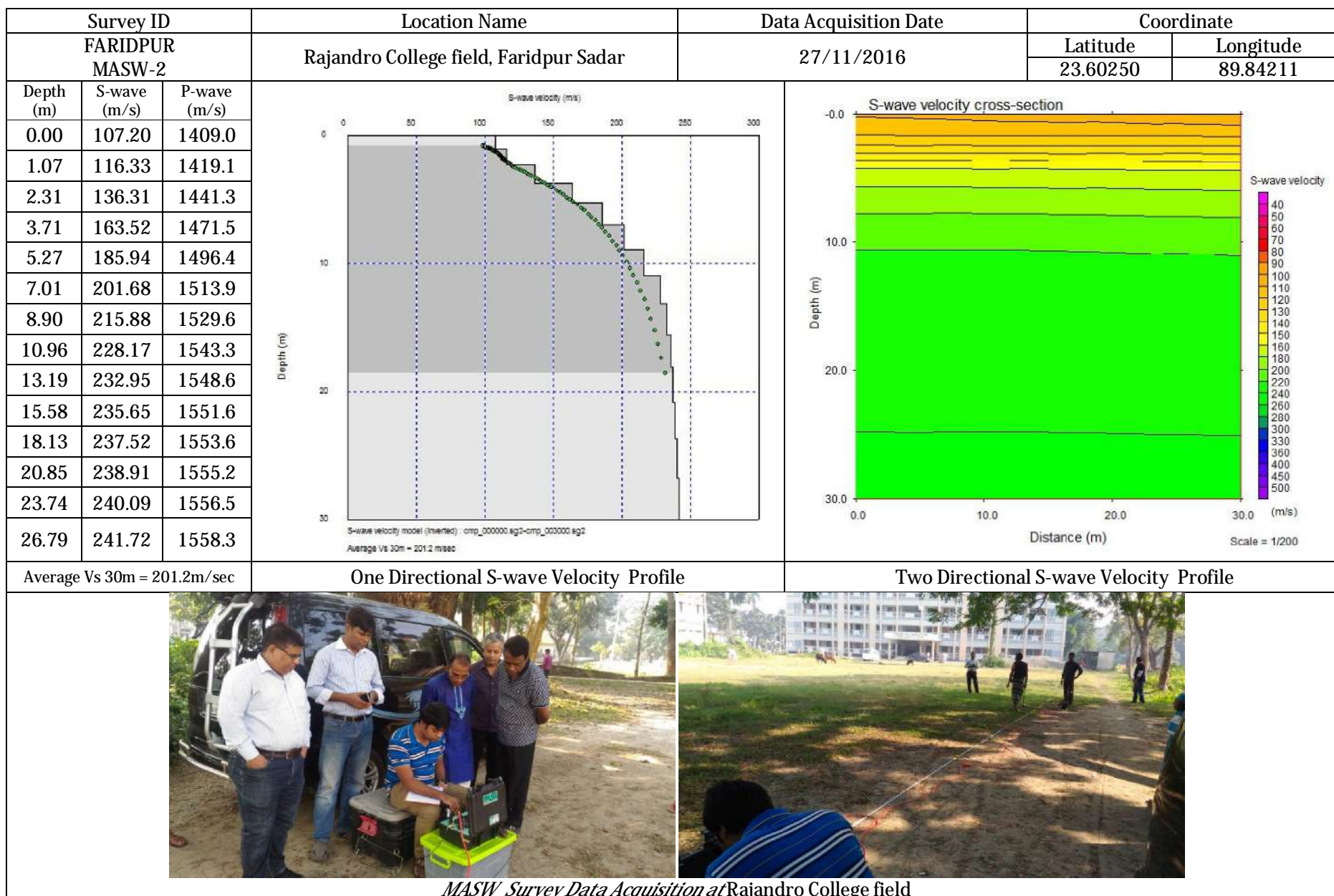
Tested Date : 7 January 2016 Location : Bakhunda College Field, Bakhunda, Greda Union Test Id : PS-6 (BH-27) Coordinate : Latitude 23.54565 Longitude 89.85487 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure	
-1	149			
-2	187		 <p>Downhole Seismic Test Data Acquisition</p>	
-3	183			
-4	121			
-5	197			
-6	141			
-7	238			
-8	199			
-9	157			
-10	110			
-11	134			
-12	116			
-13	150			
-14	171			
-15	168			
-16	164			
-17	135			
-18	152			
-19	247			
-20	208			
-21	256			
-22	258			
-23	250			
-24	211			
-25	196			
-26	278			
-27	224			
-28	235			
-29	187			
-30	188			
Average Vs 30m = 175.7 m/sec				

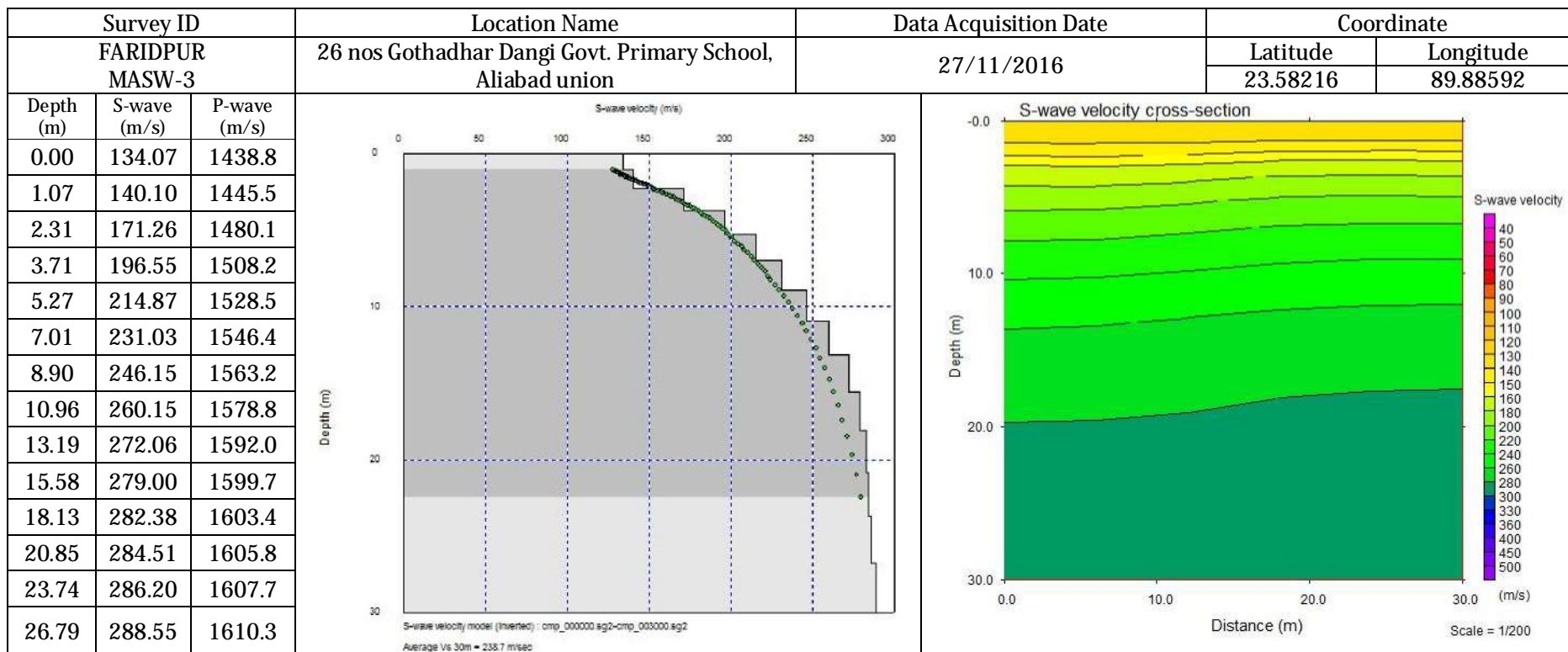
Tested Date : 6 January 2016 Location : Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar Union Test Id : PS-7 (BH-30) Coordinate : Latitude 23.53895 Longitude 89.73418 Operator : The Olson Instruments Downhole Seismic system			Source : 7kg Sledge Hammer Downhole Receiver : Tri-axial Geophone Recording Equipment : Freedom Data PC Borehole Information : Grouted Cased Casing Diameter : 75mm PVC Casing	
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity		Data Acquisition Procedure
-1	135			
-2	155			
-3	183			
-4	185			
-5	202			
-6	181			
-7	201			
-8	190			
-9	227			
-10	200			
-11	184			
-12	213			
-13	202			
-14	190			
-15	201			
-16	189			
-17	223			
-18	157			
-19	167			
-20	164			
-21	126			
-22	251			
-23	269			
-24	232			
-25	251			
-26	200			
-27	279			
-28	314			
-29	229			
-30	191			
Average Vs 30m = 195.2 m/sec				 <p>Downhole Seismic Test Data Acquisition</p>

Appendix B

Multi-channel Analysis of Surface Wave (MASW) Results and Graphs







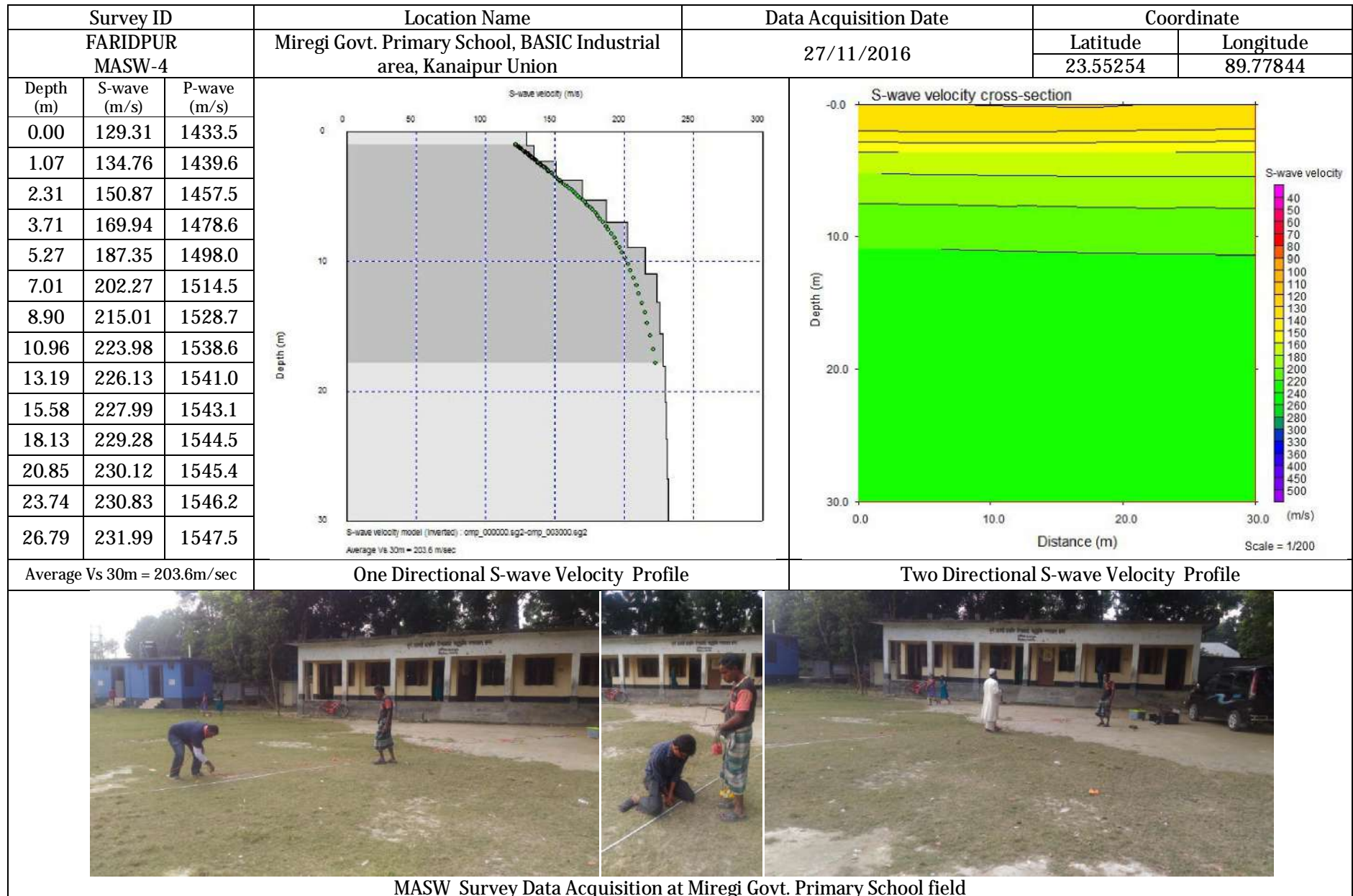
Average Vs 30m = 238.7m/sec

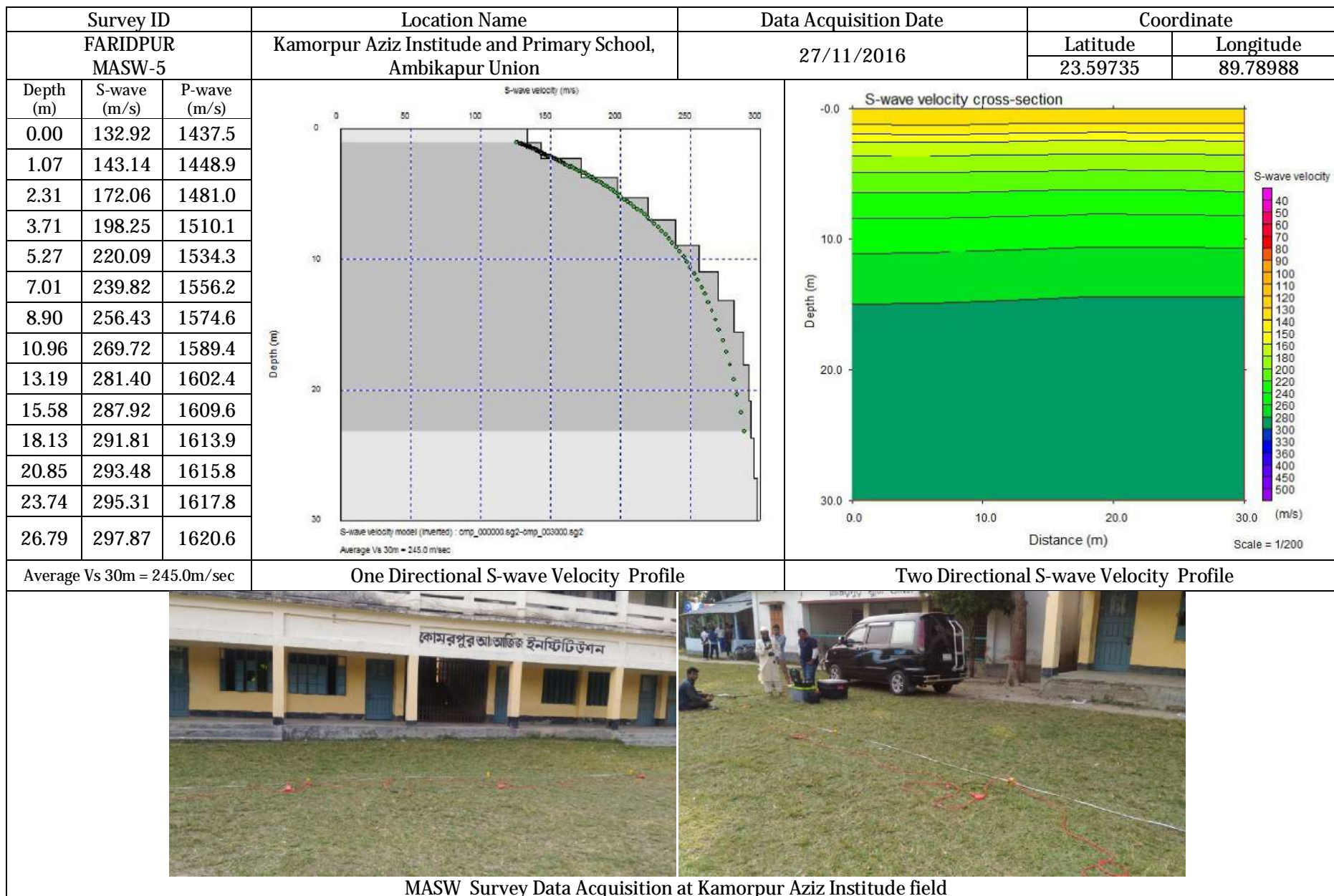
One Directional S-wave Velocity Profile

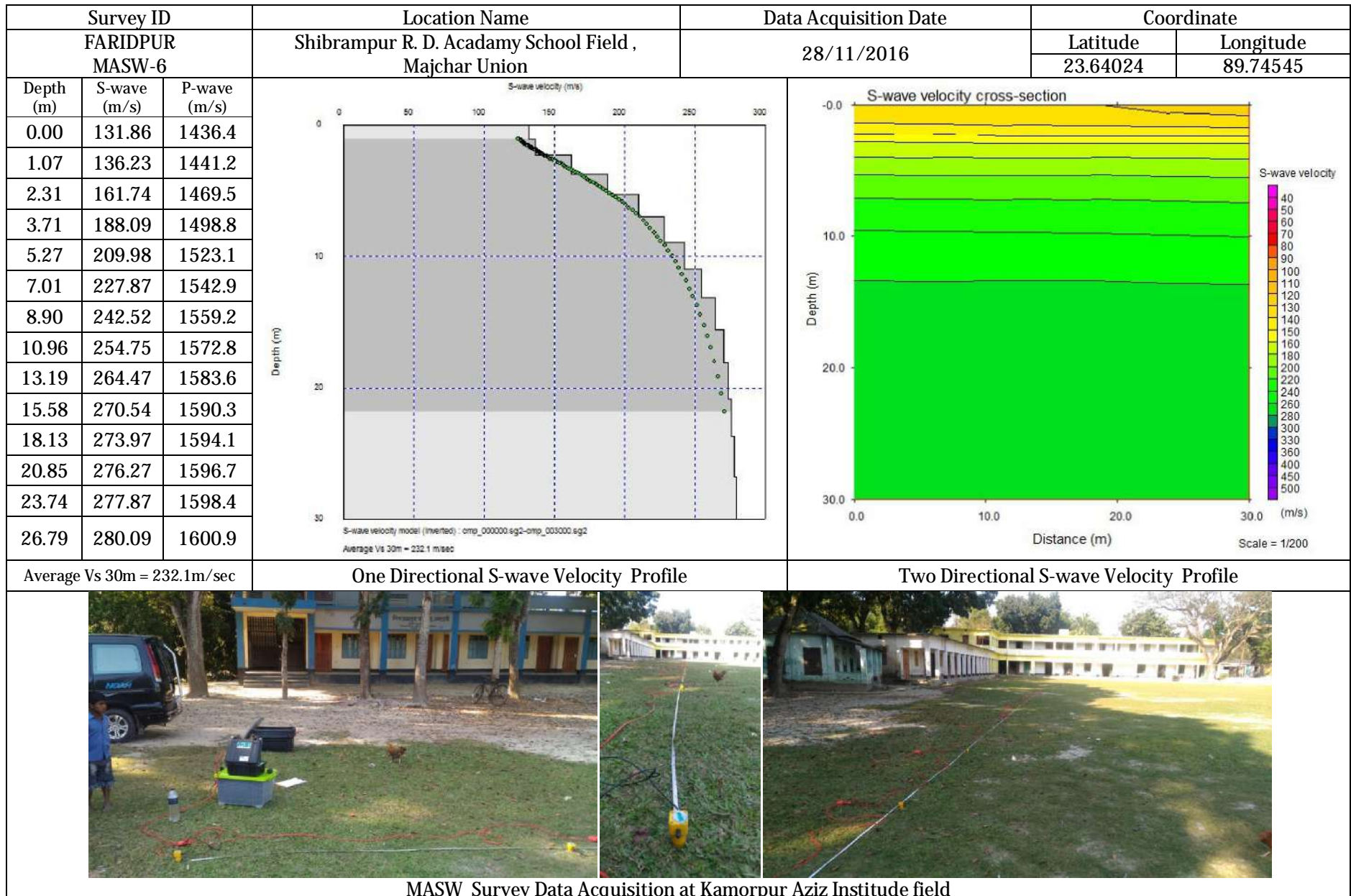
Two Directional S-wave Velocity Profile



MASW Survey Data Acquisition at Aliabad union

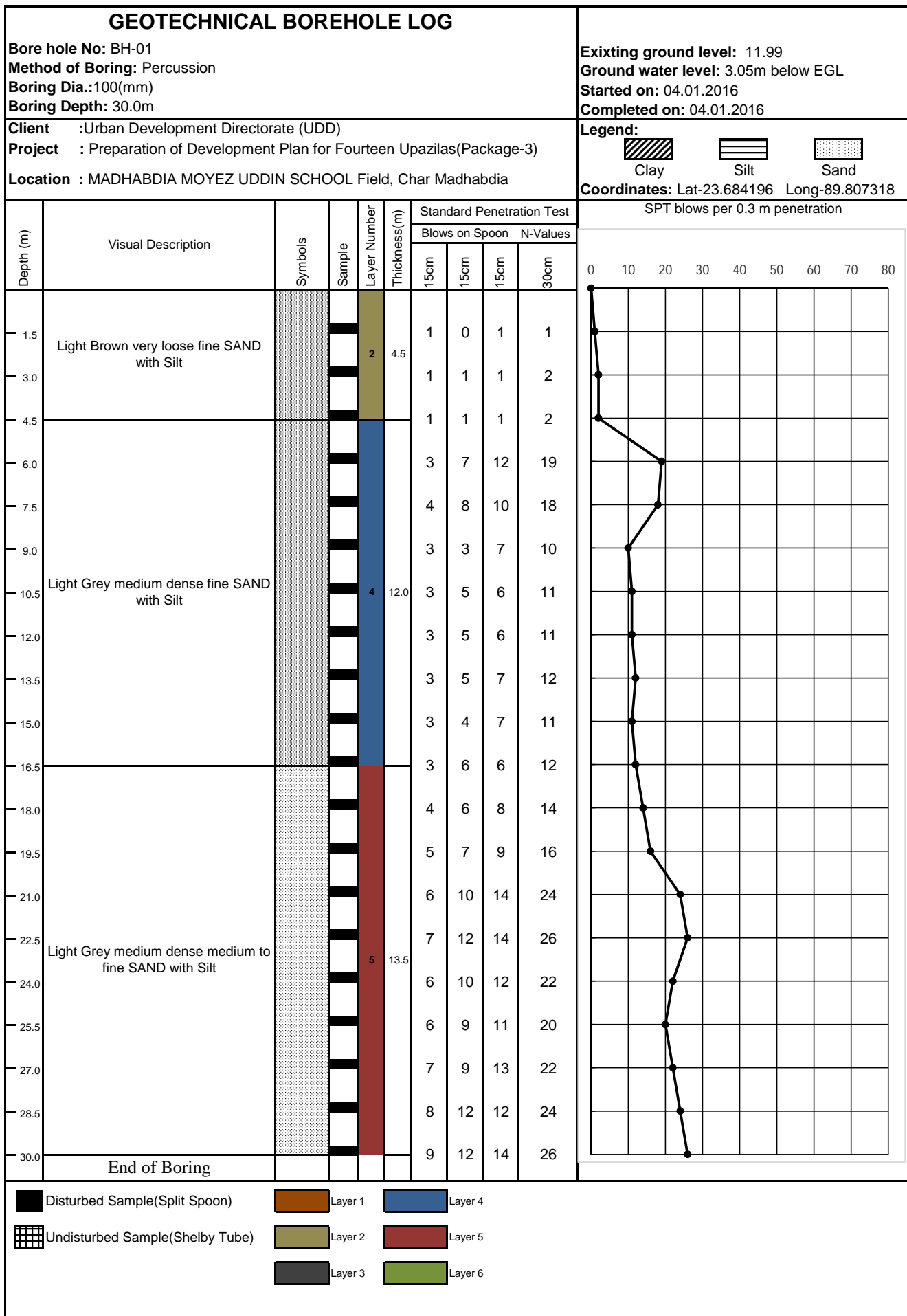


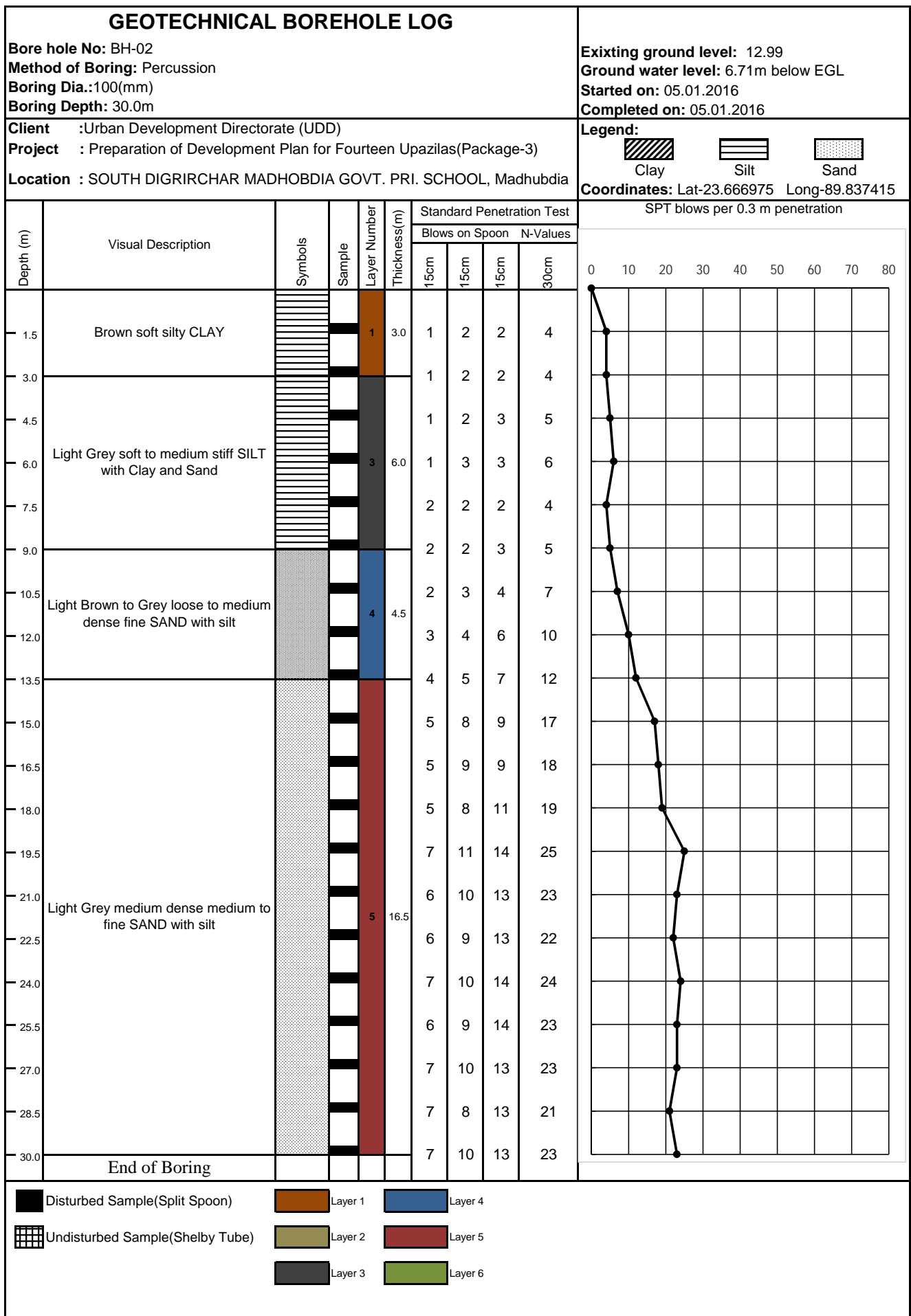


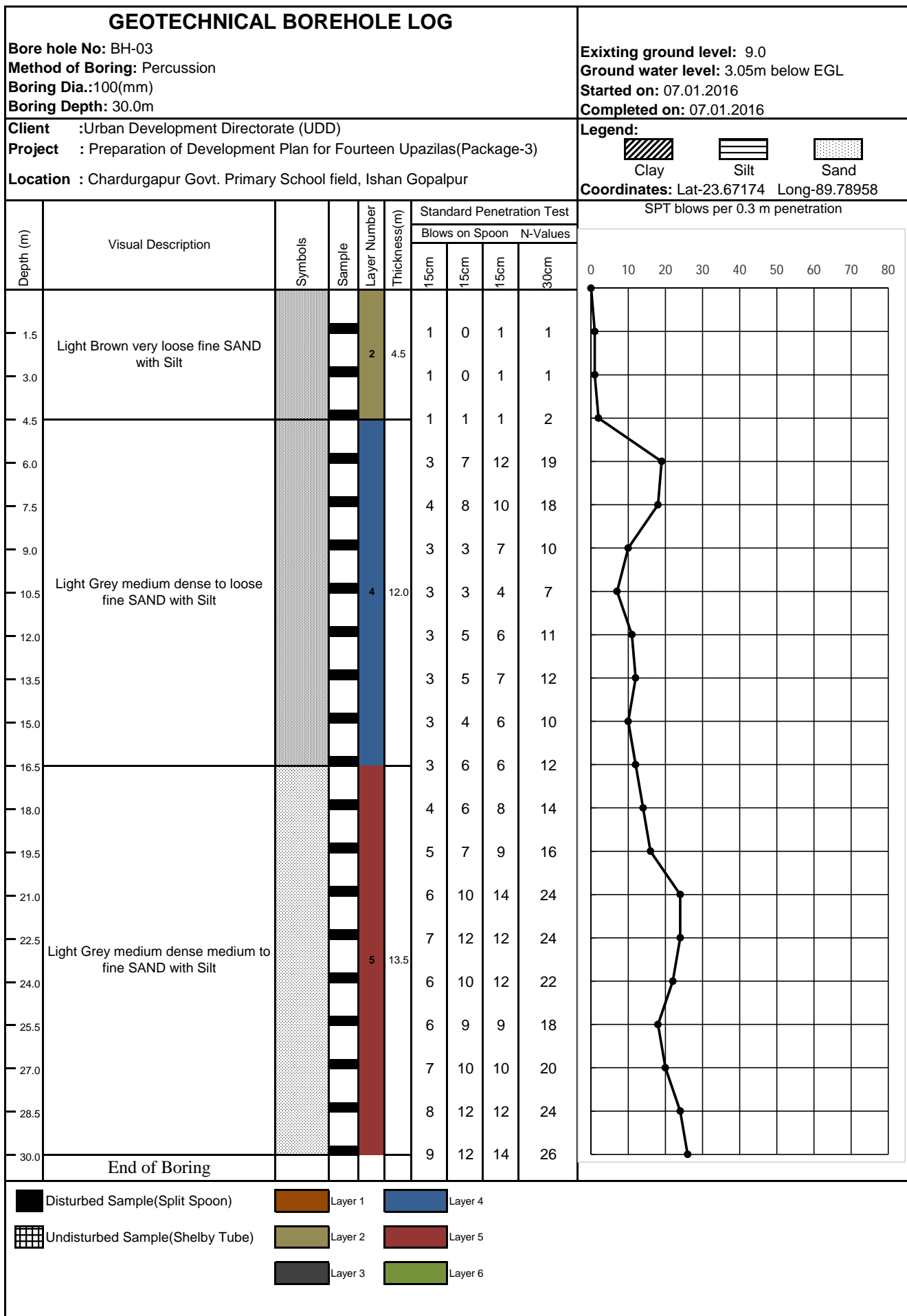


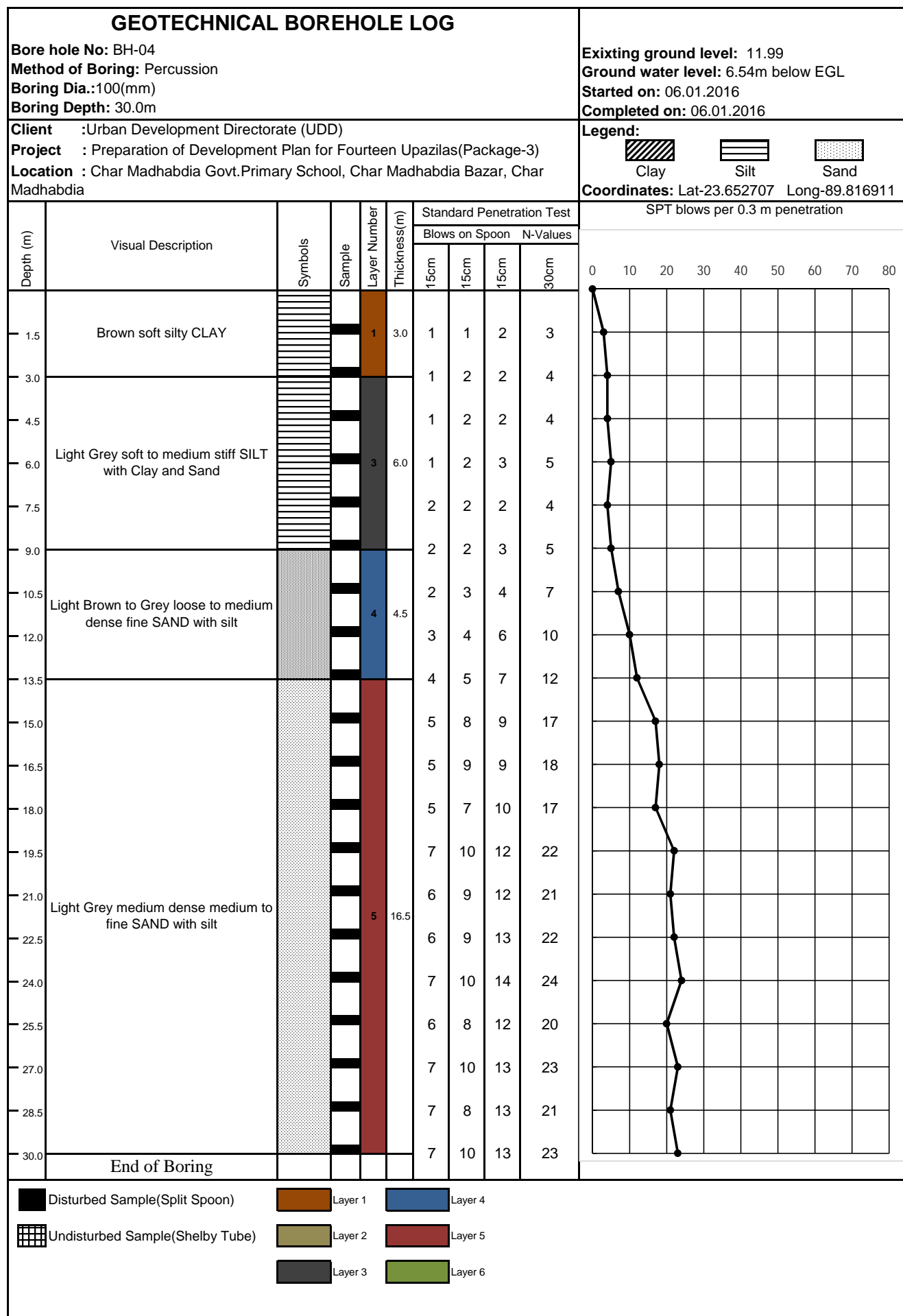
Appendix C

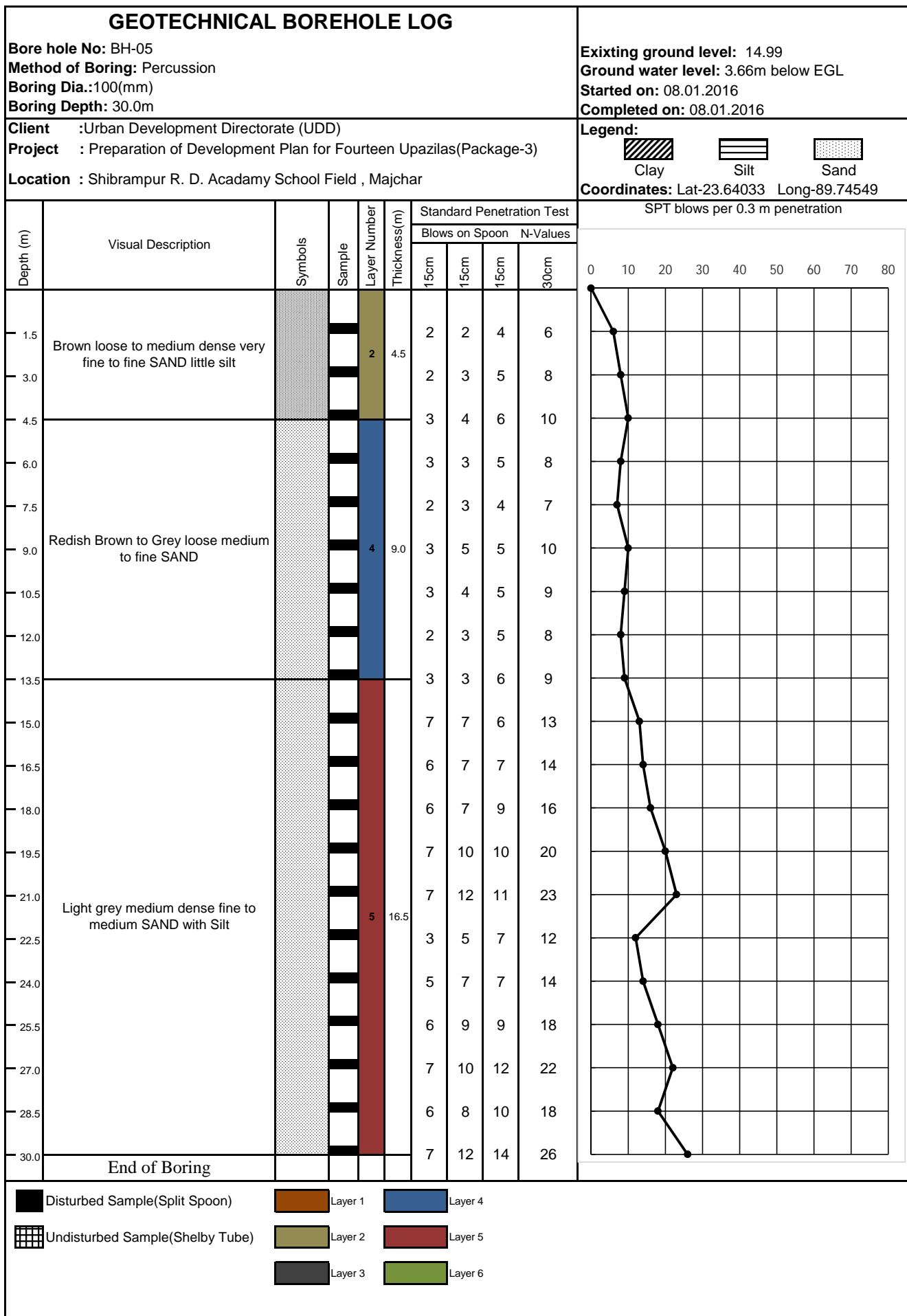
Geotechnical Borehole Logs and Graphs

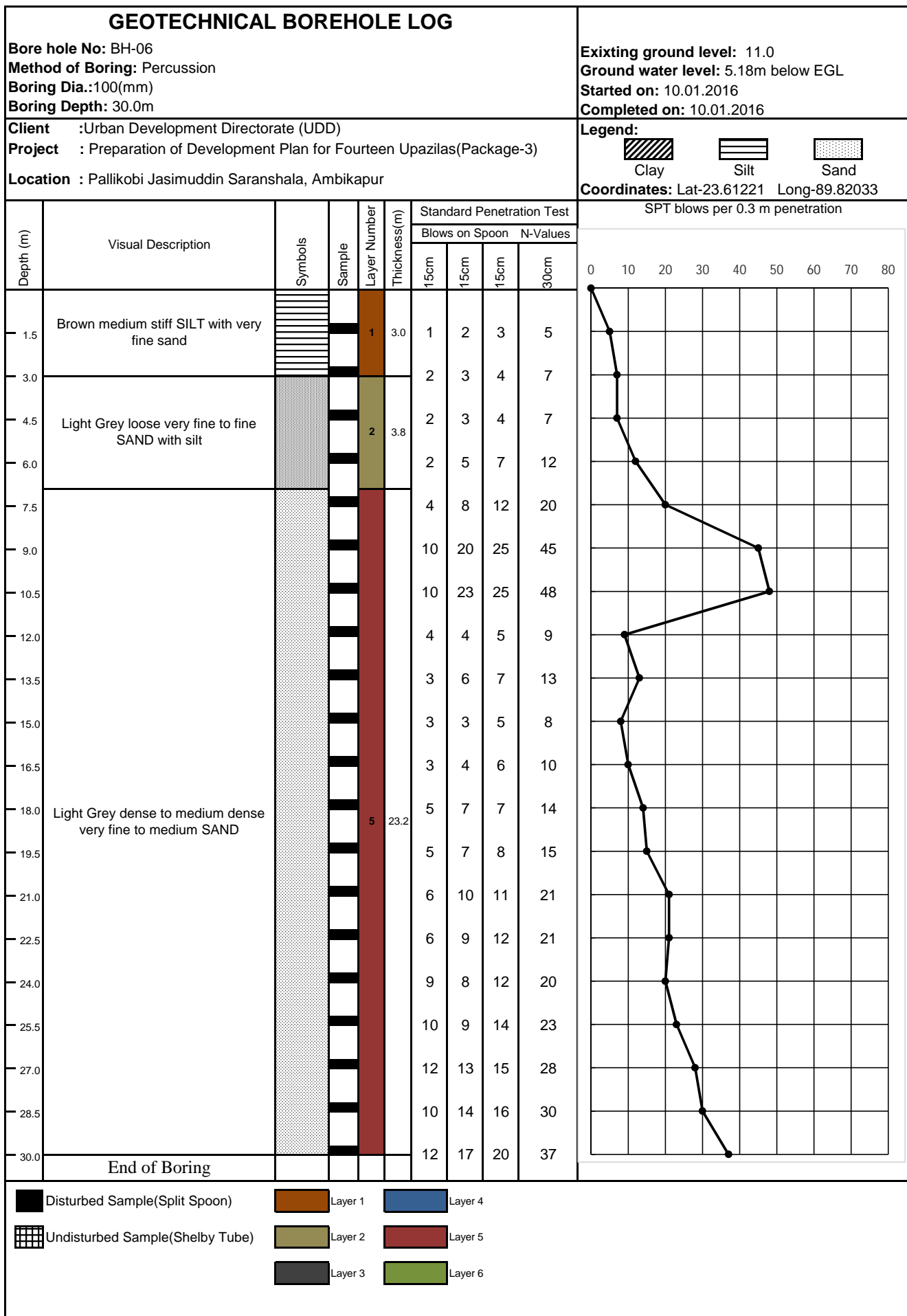


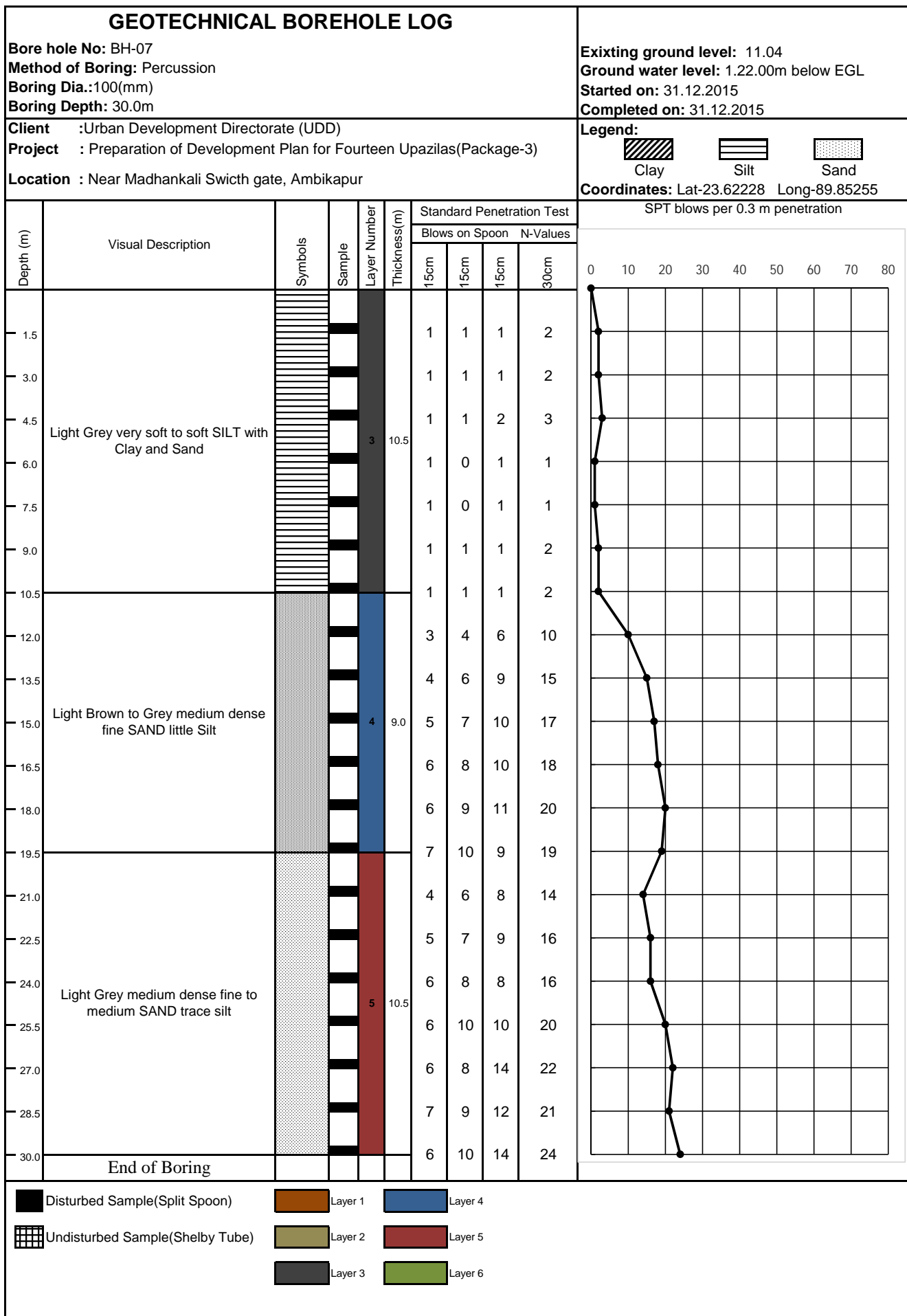


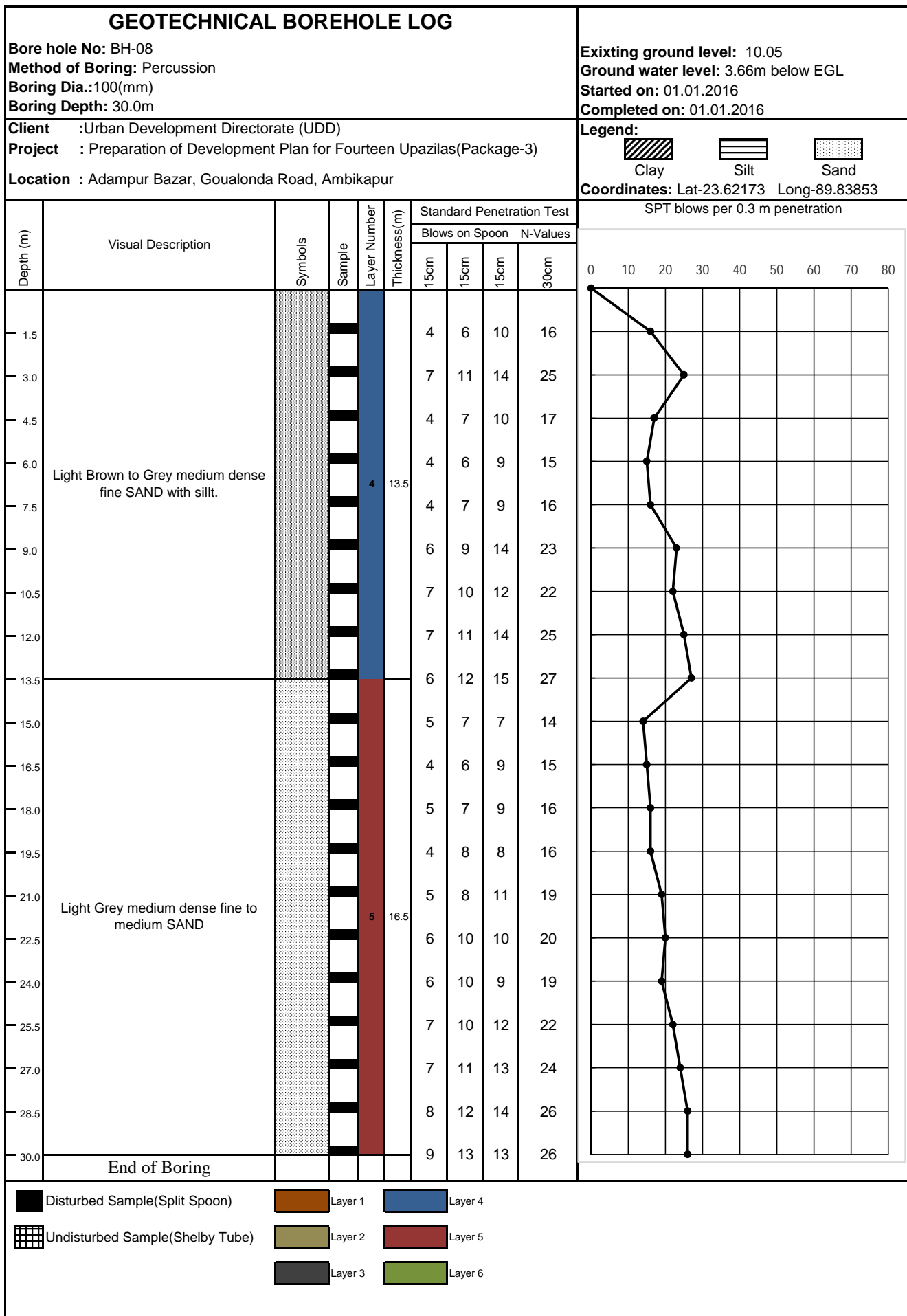


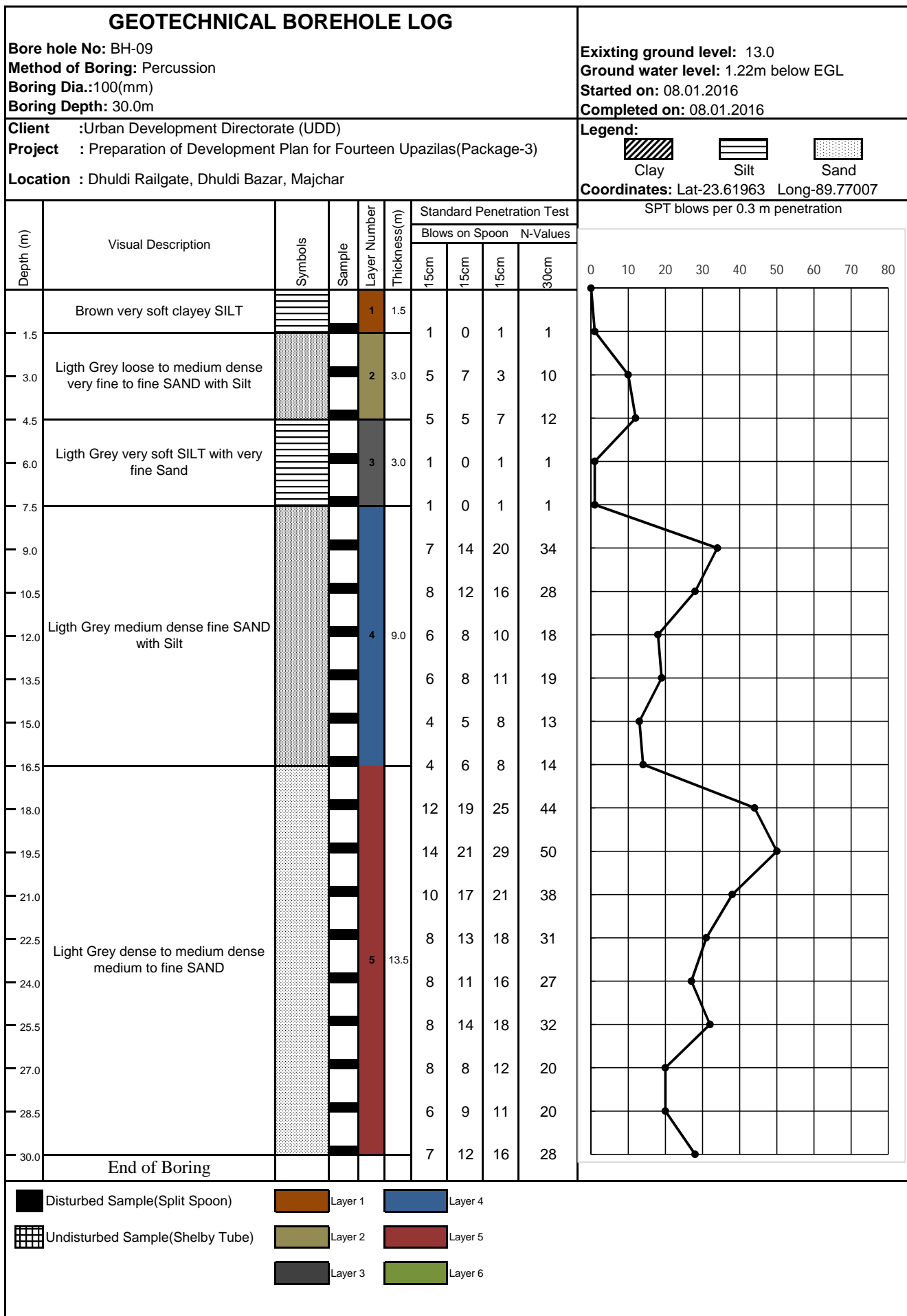


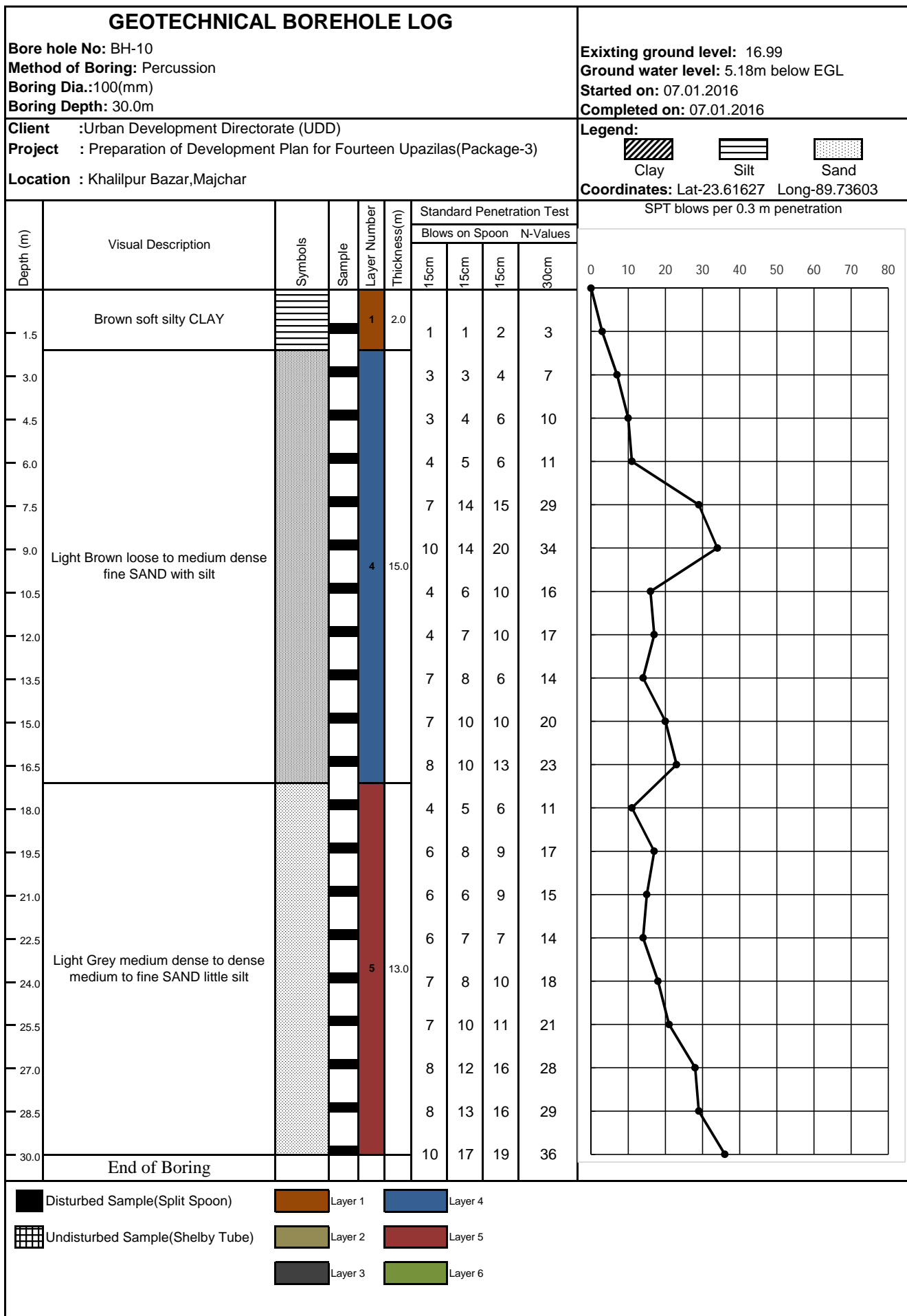


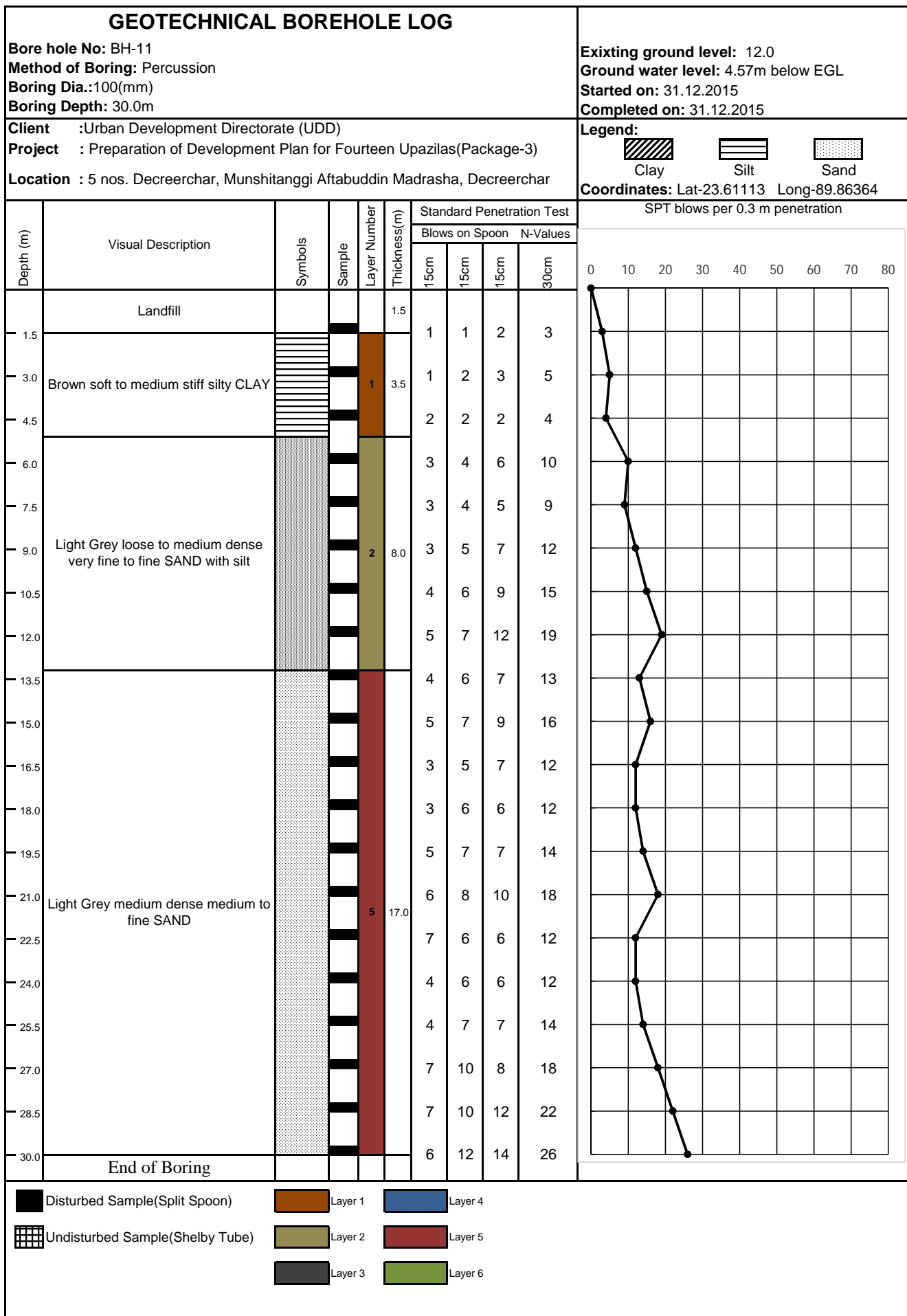


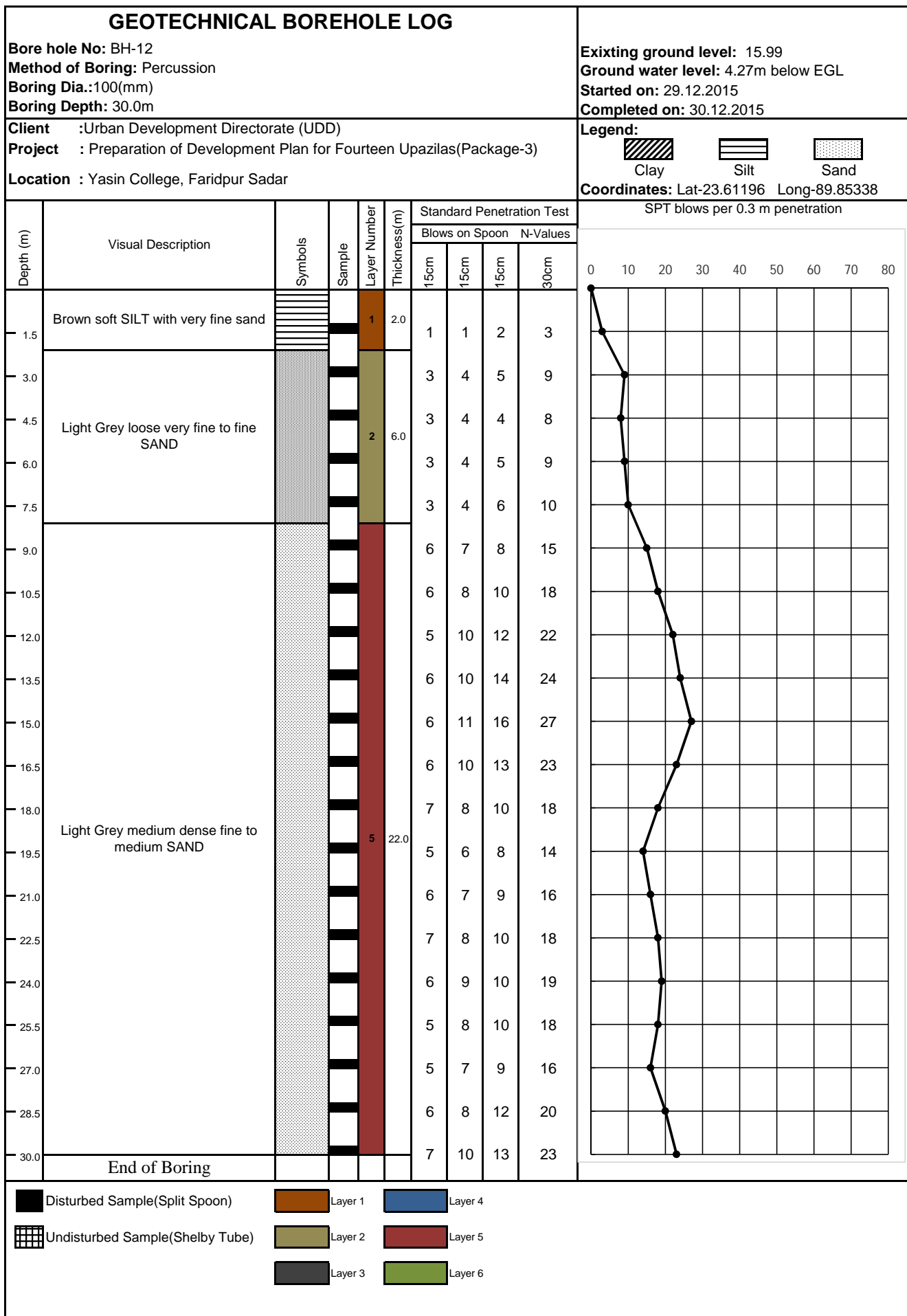


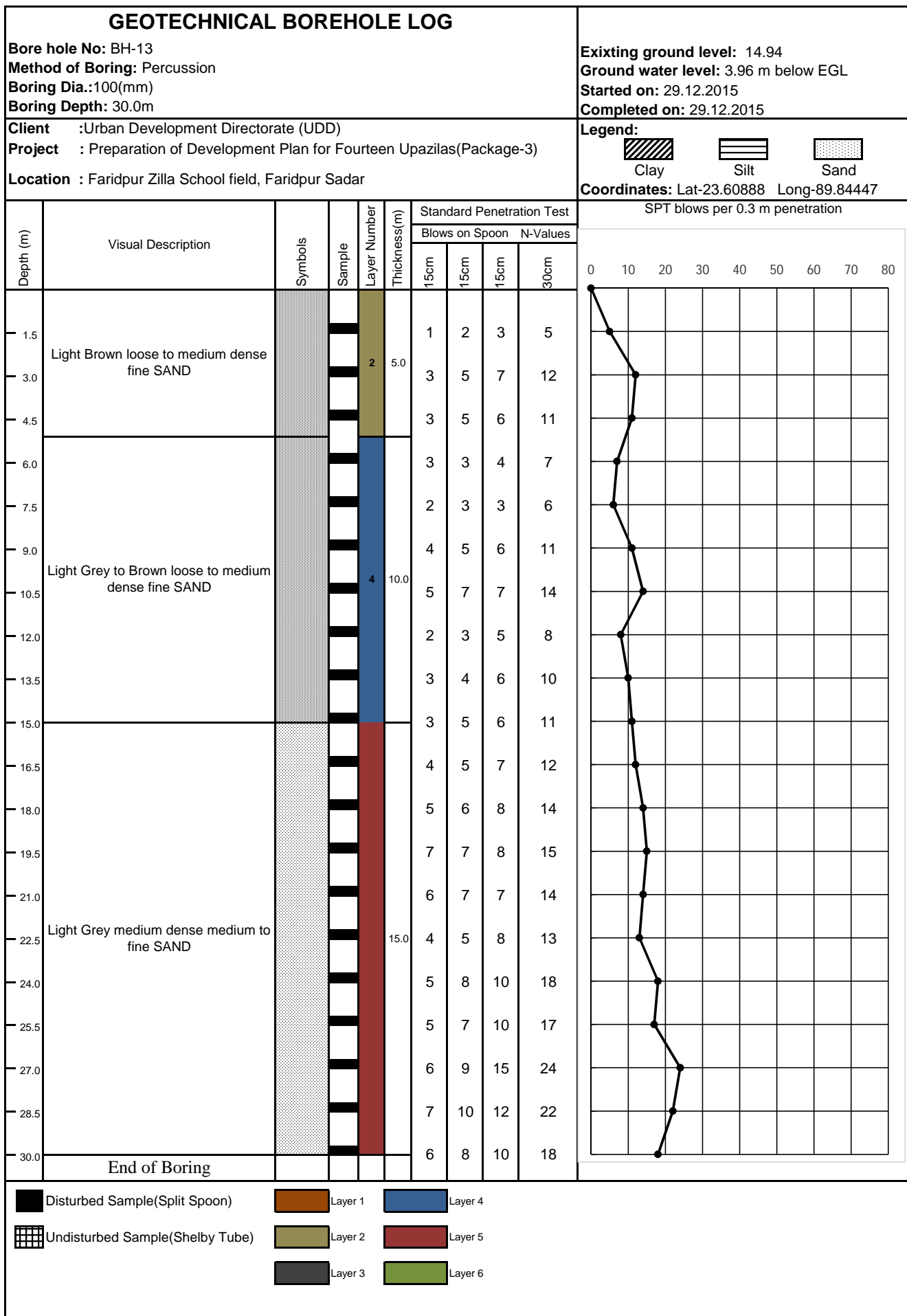


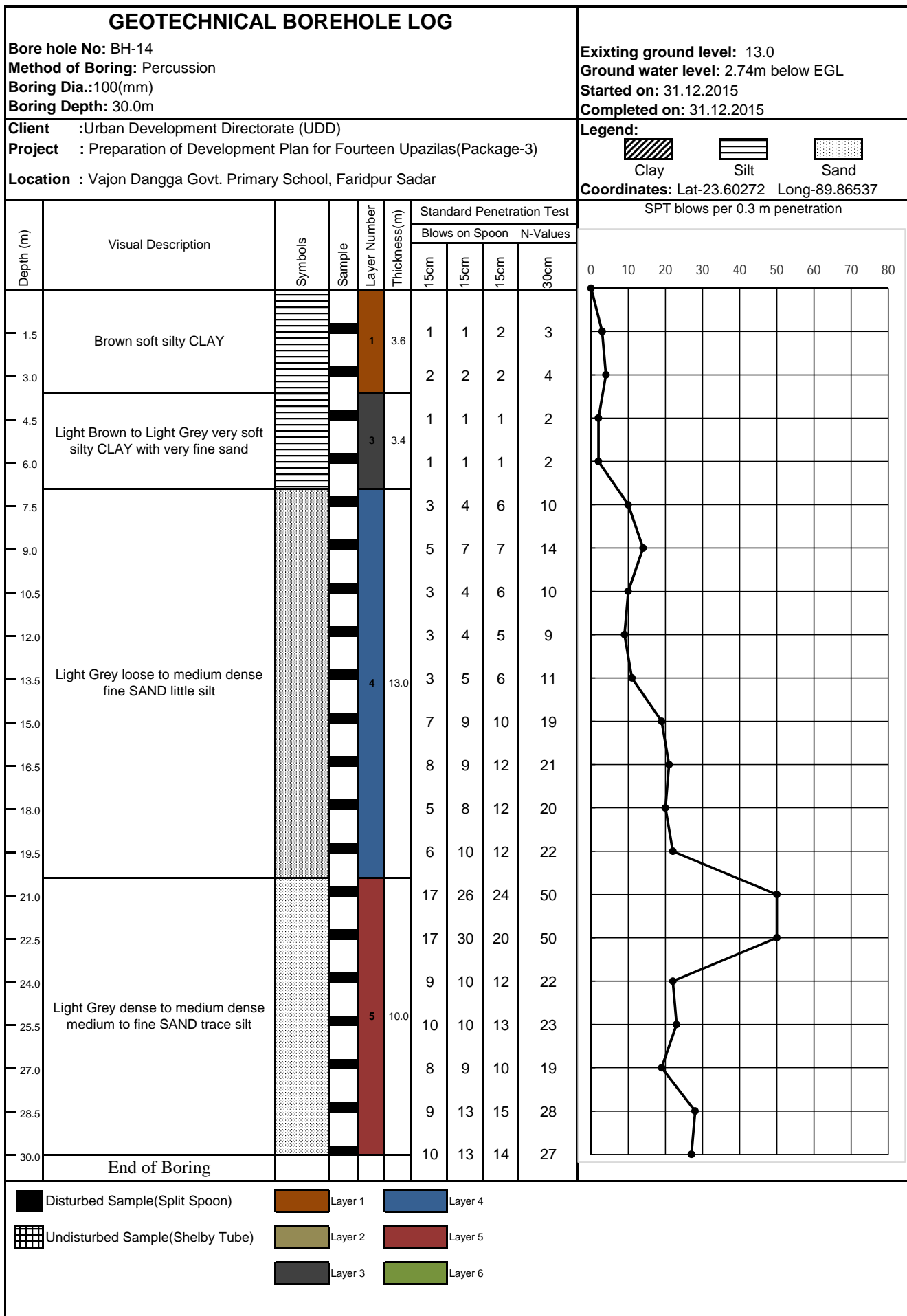


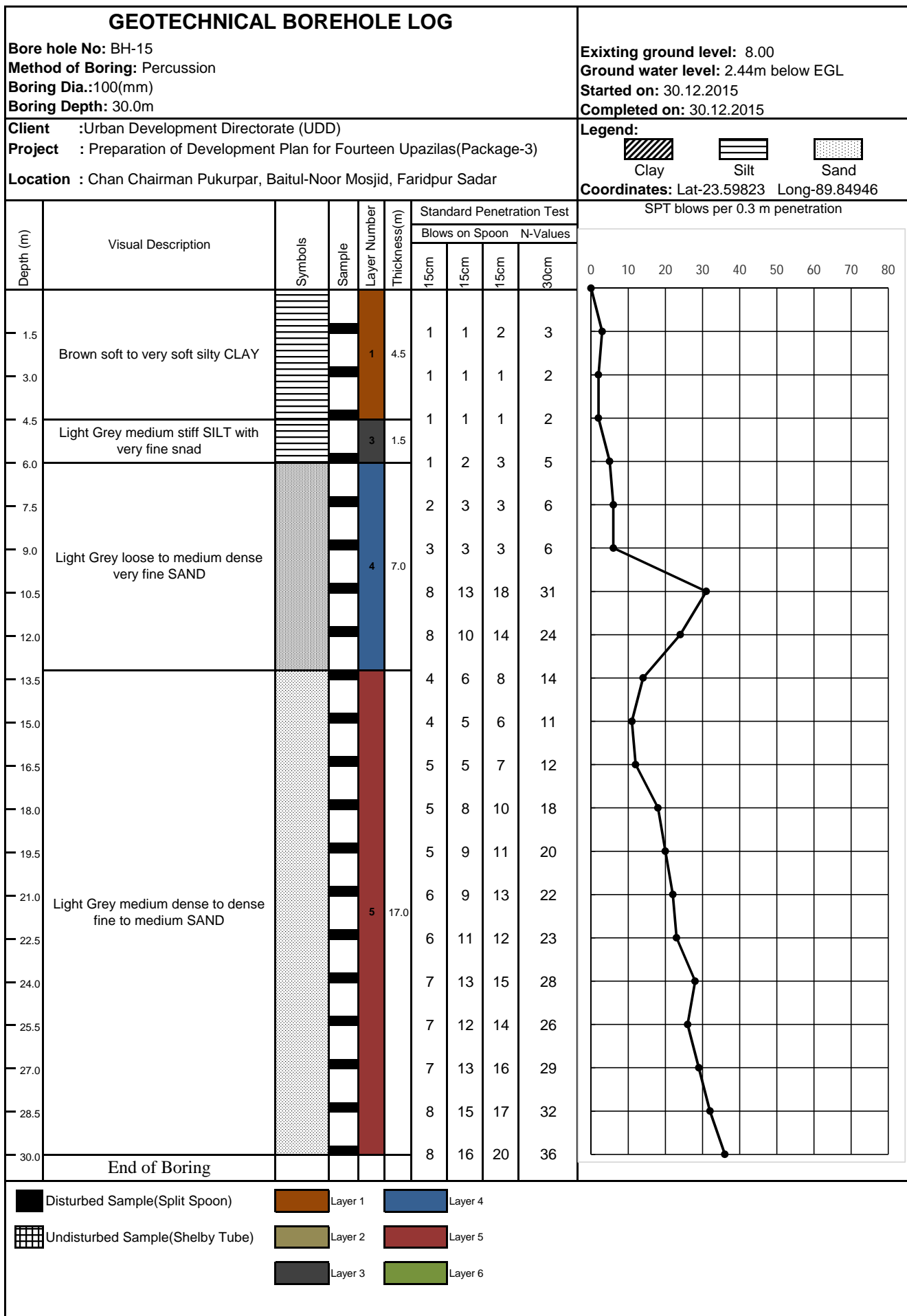


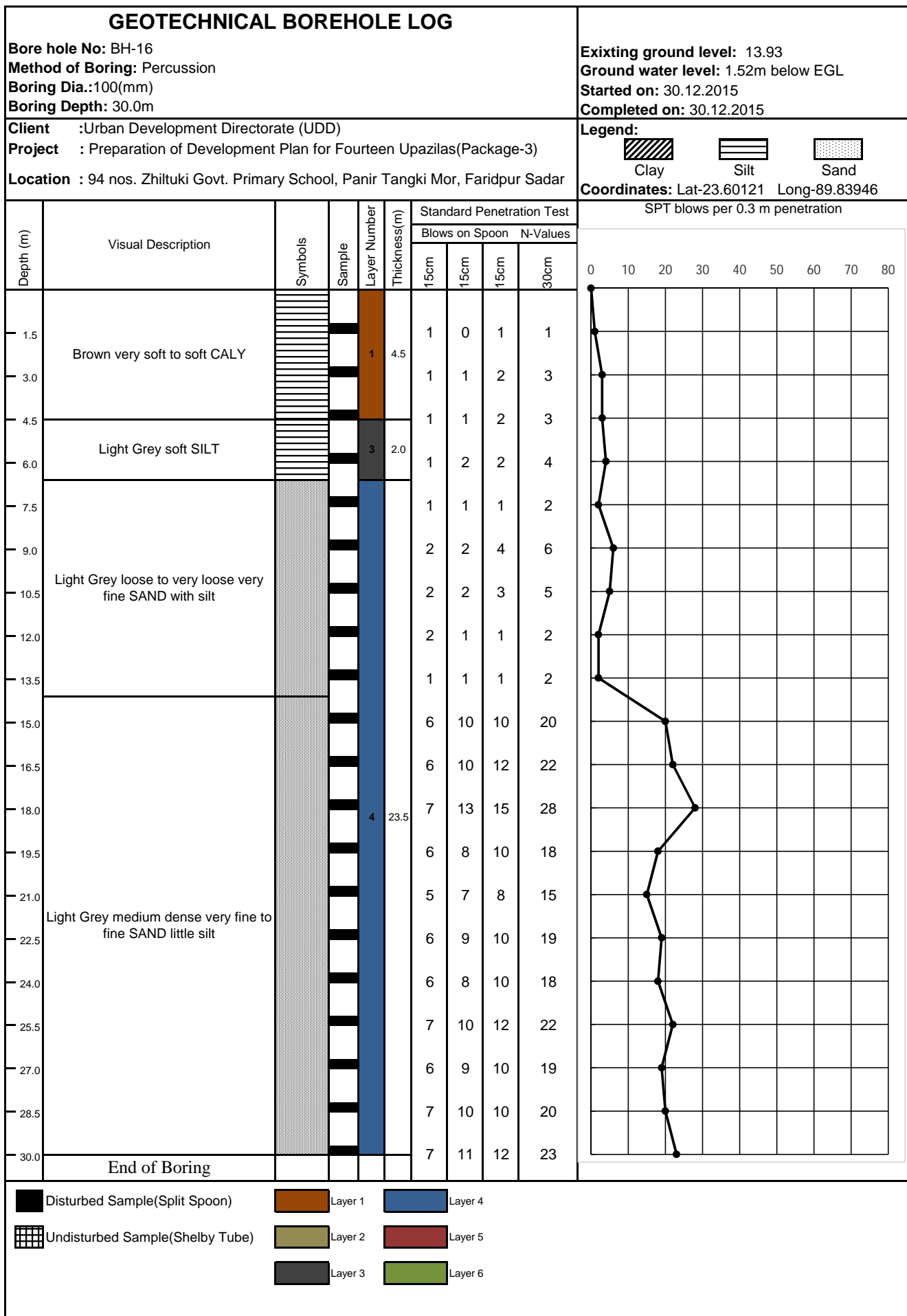


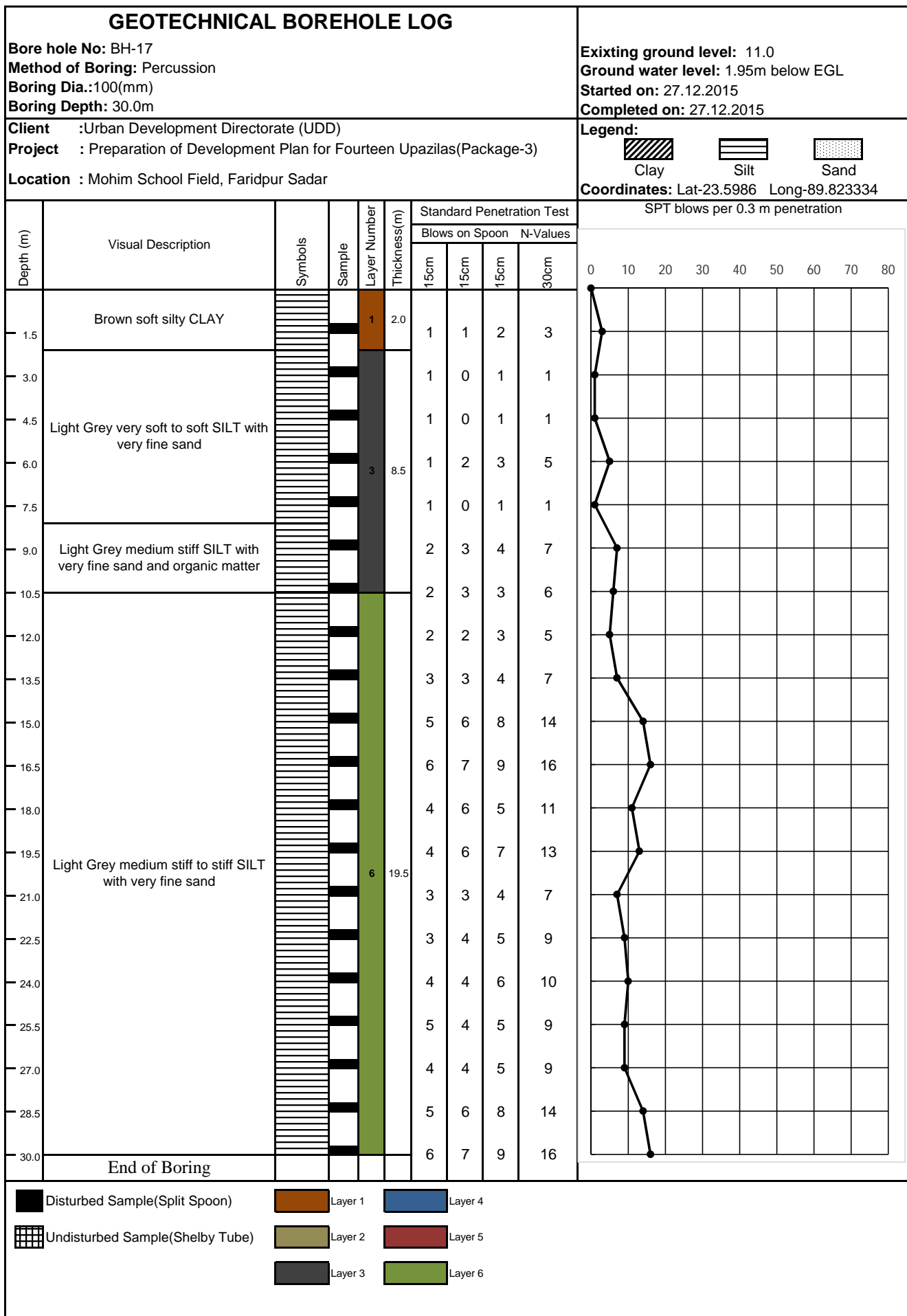


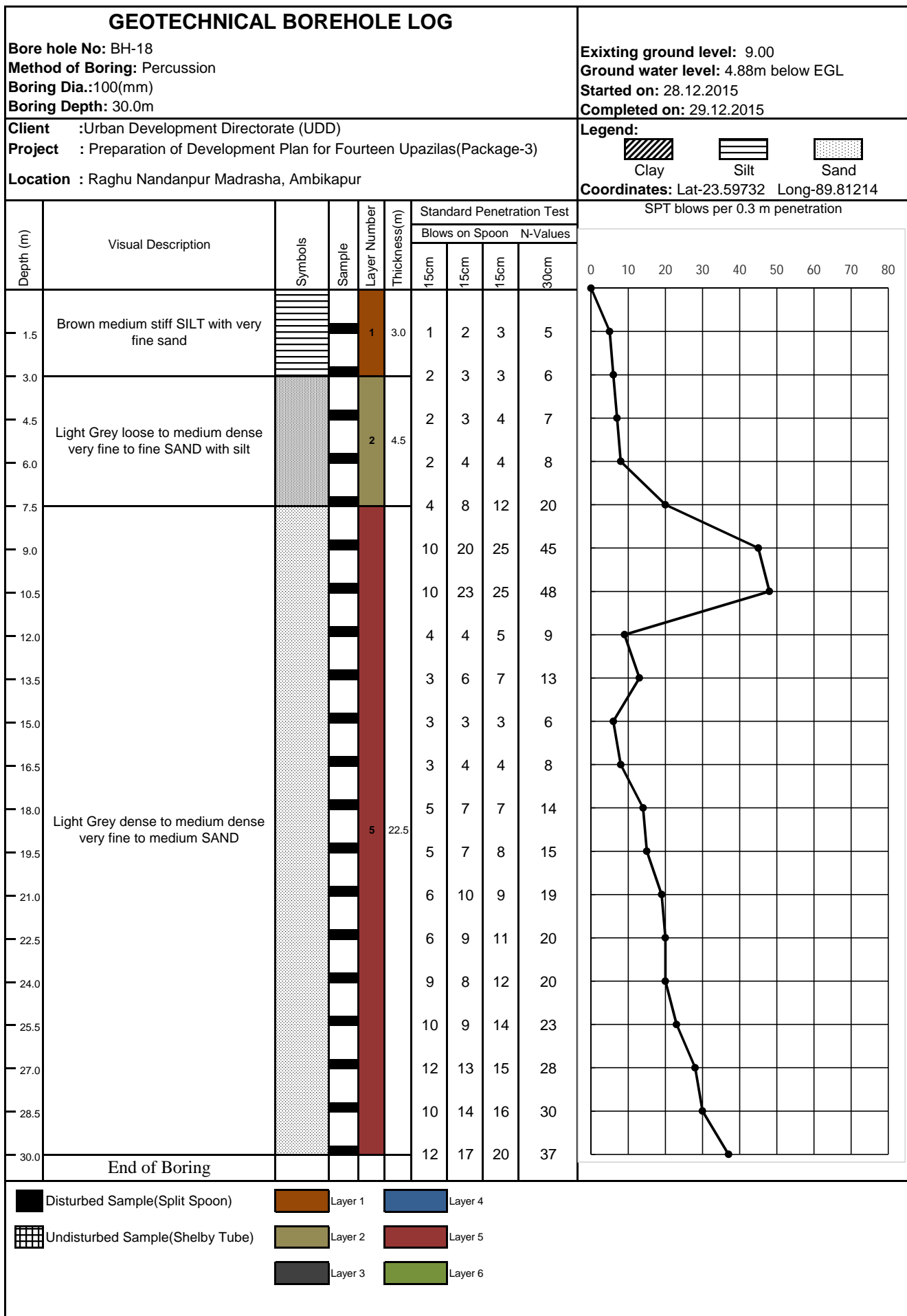


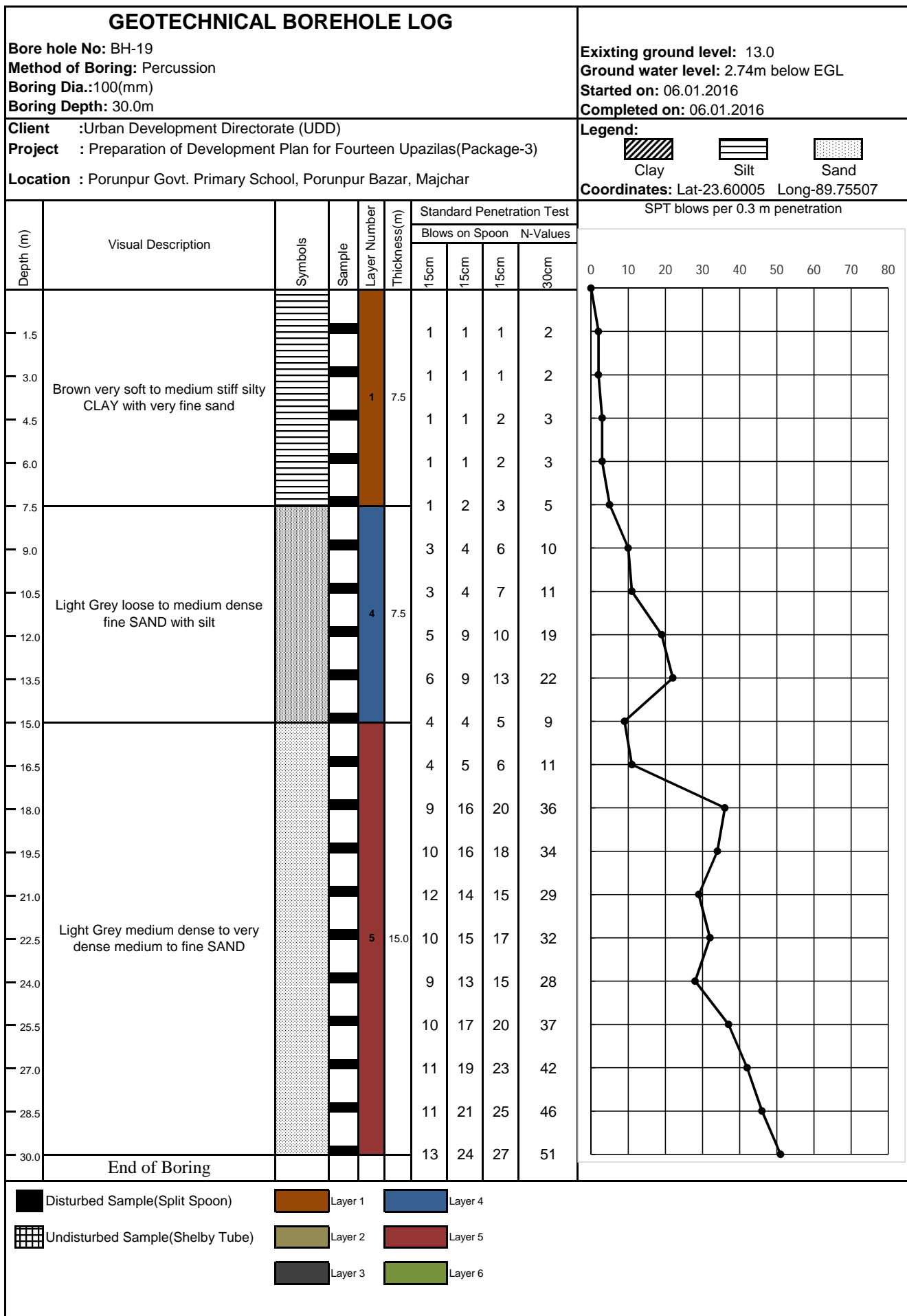


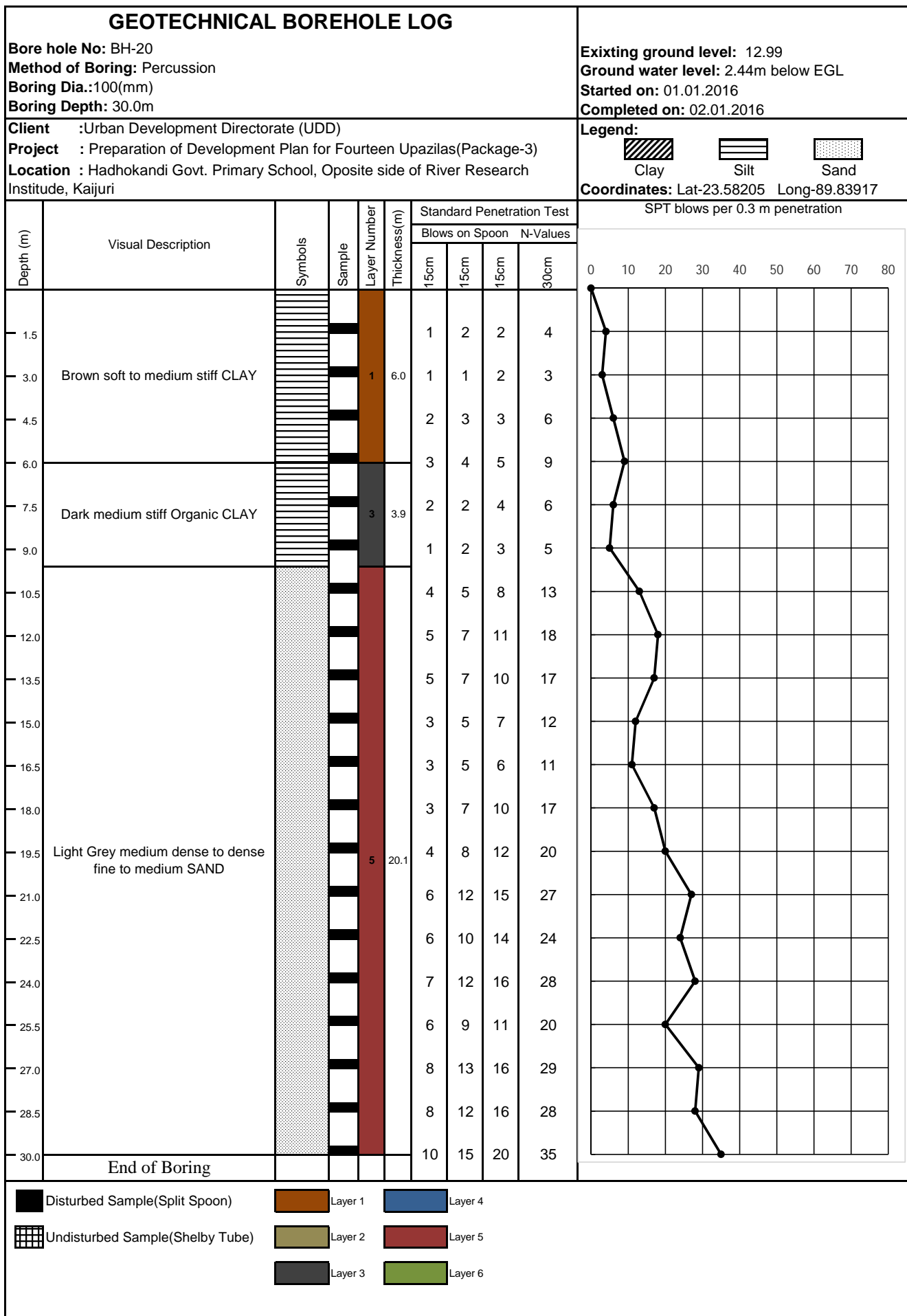


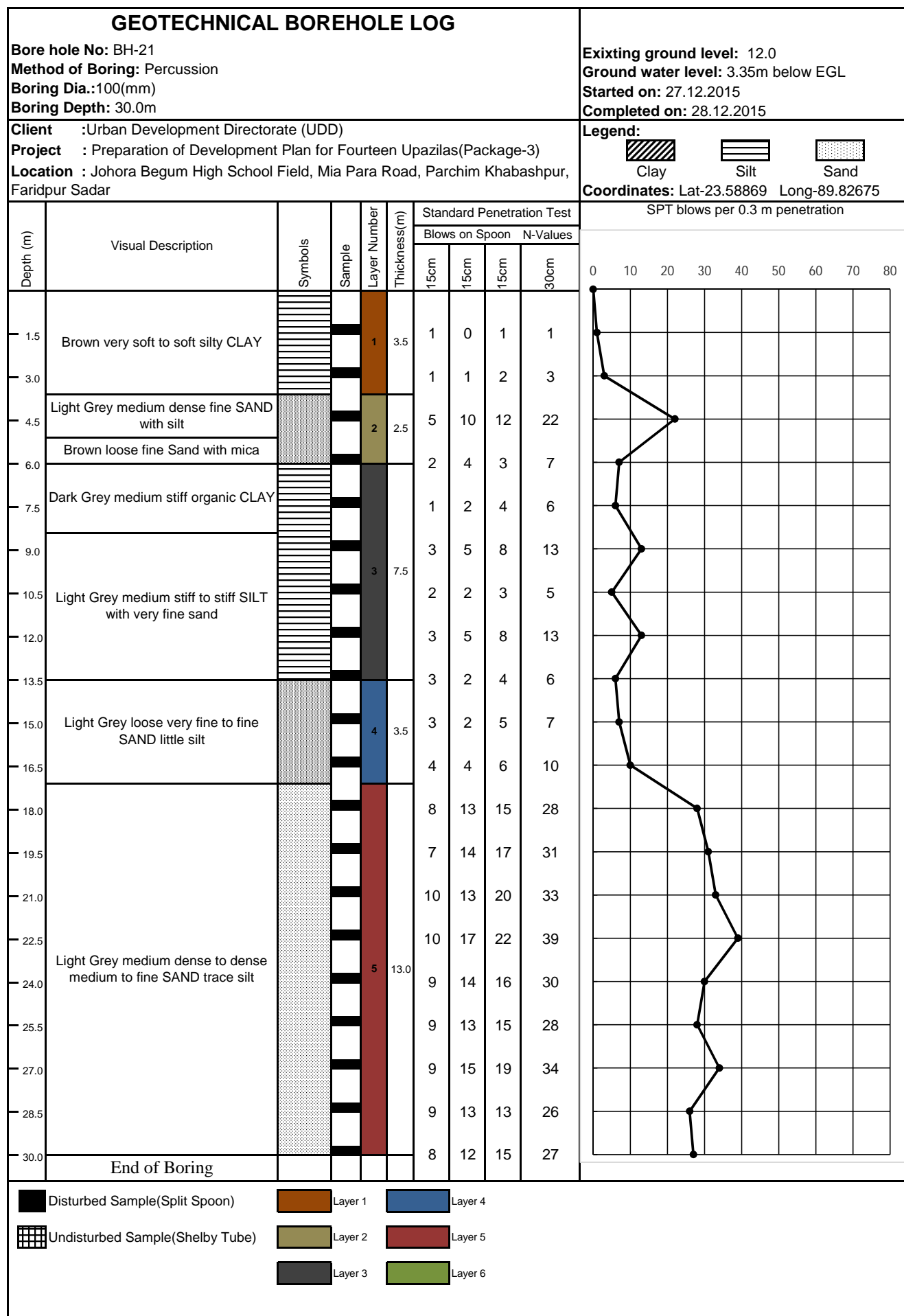


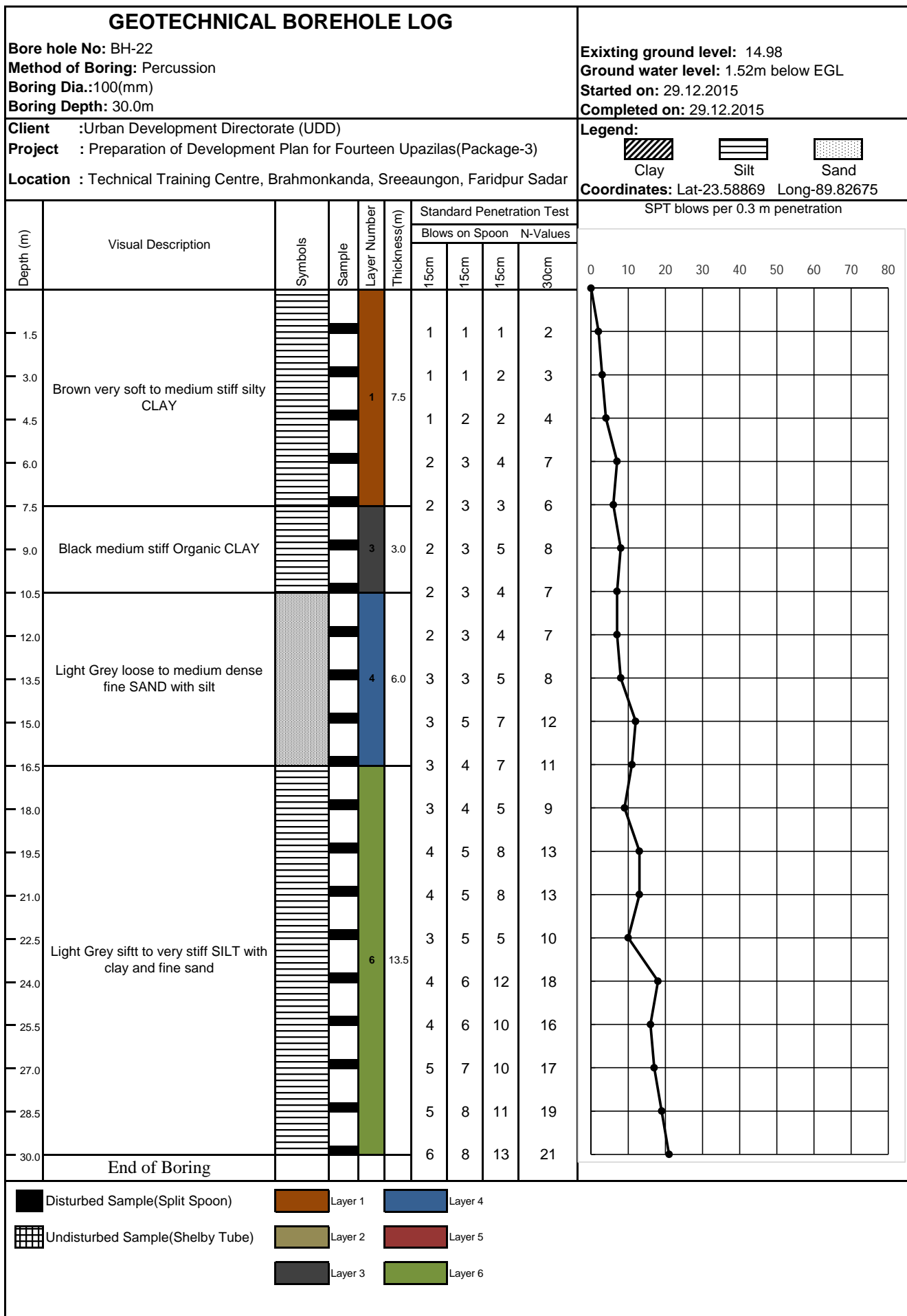


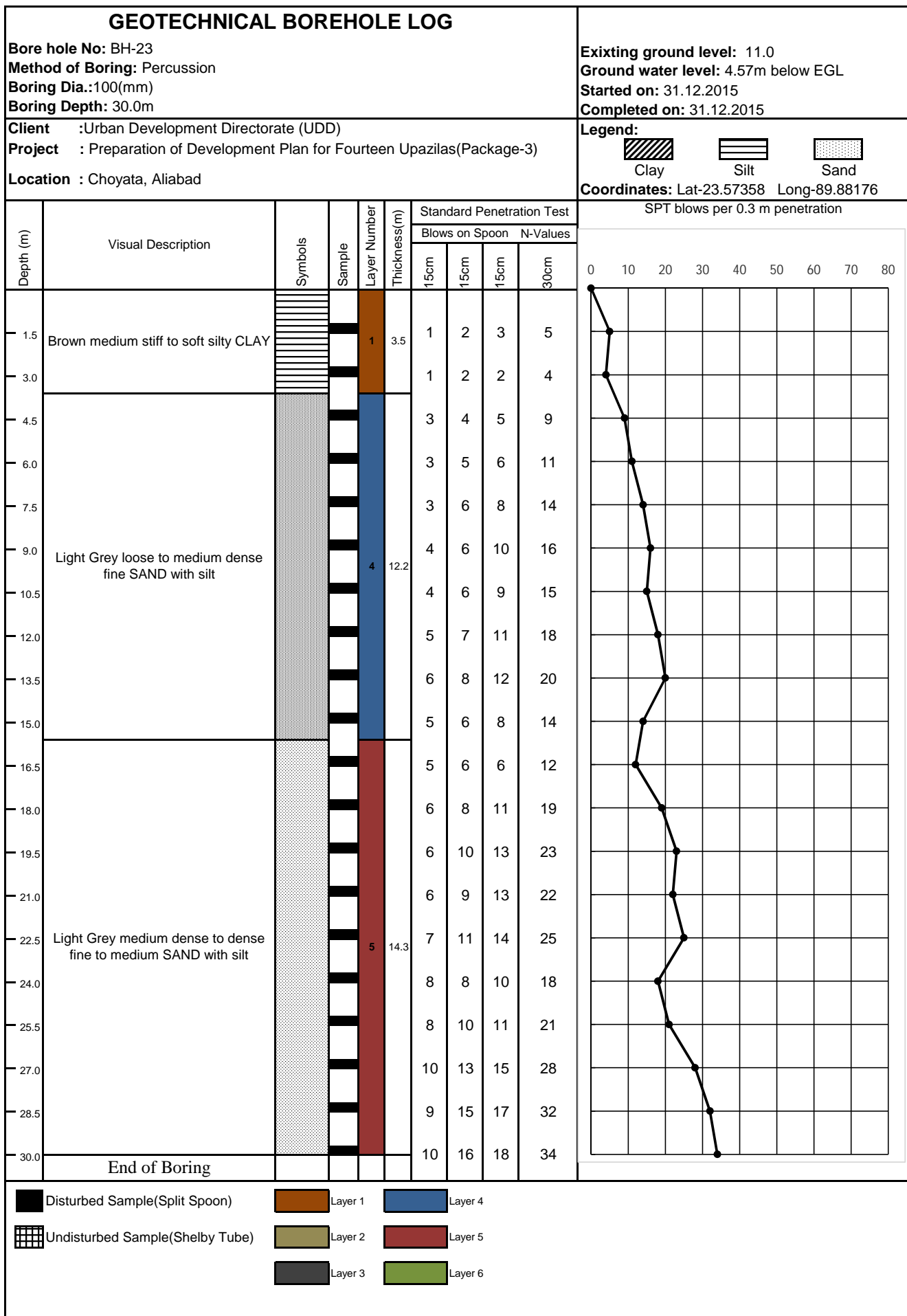


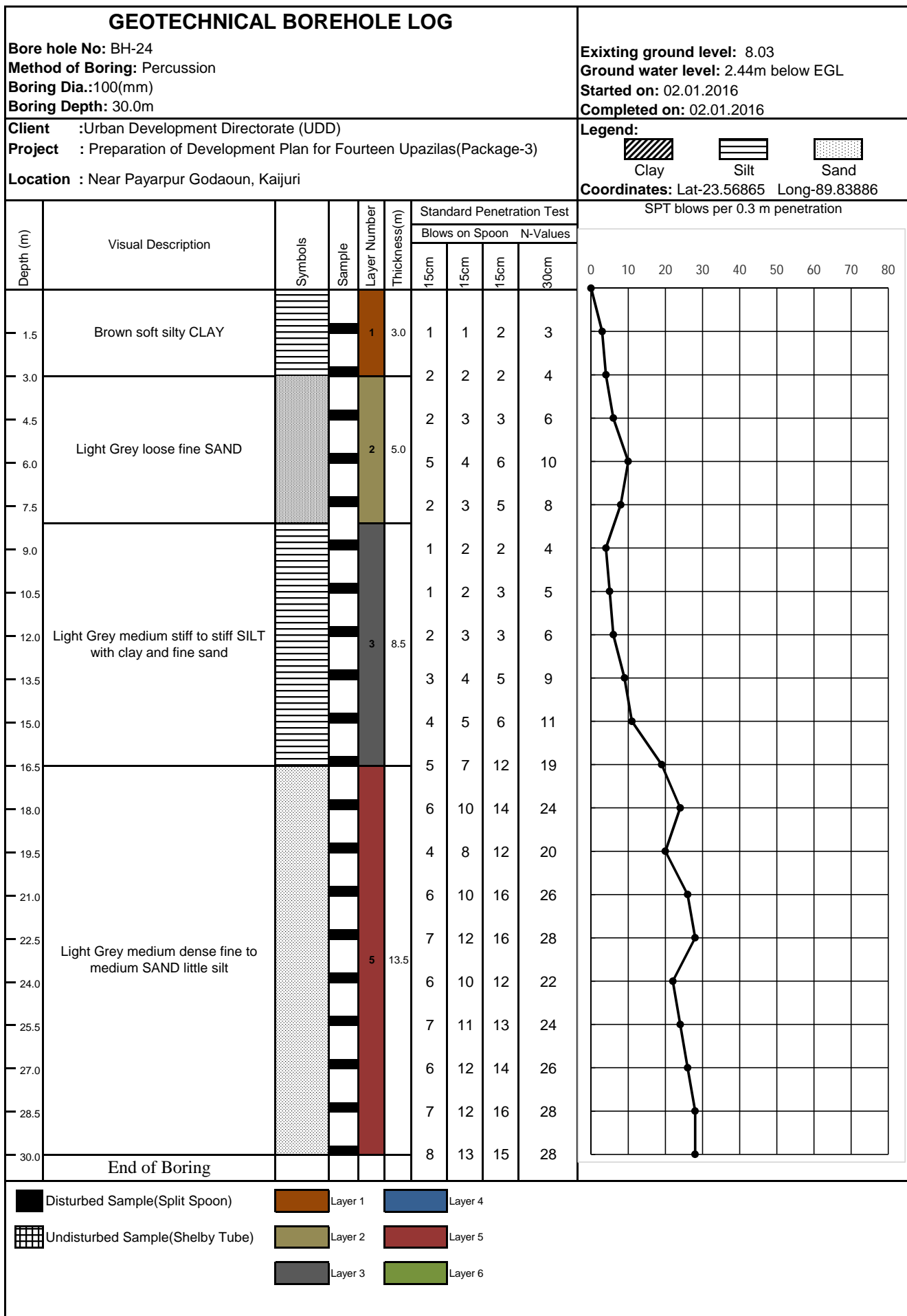


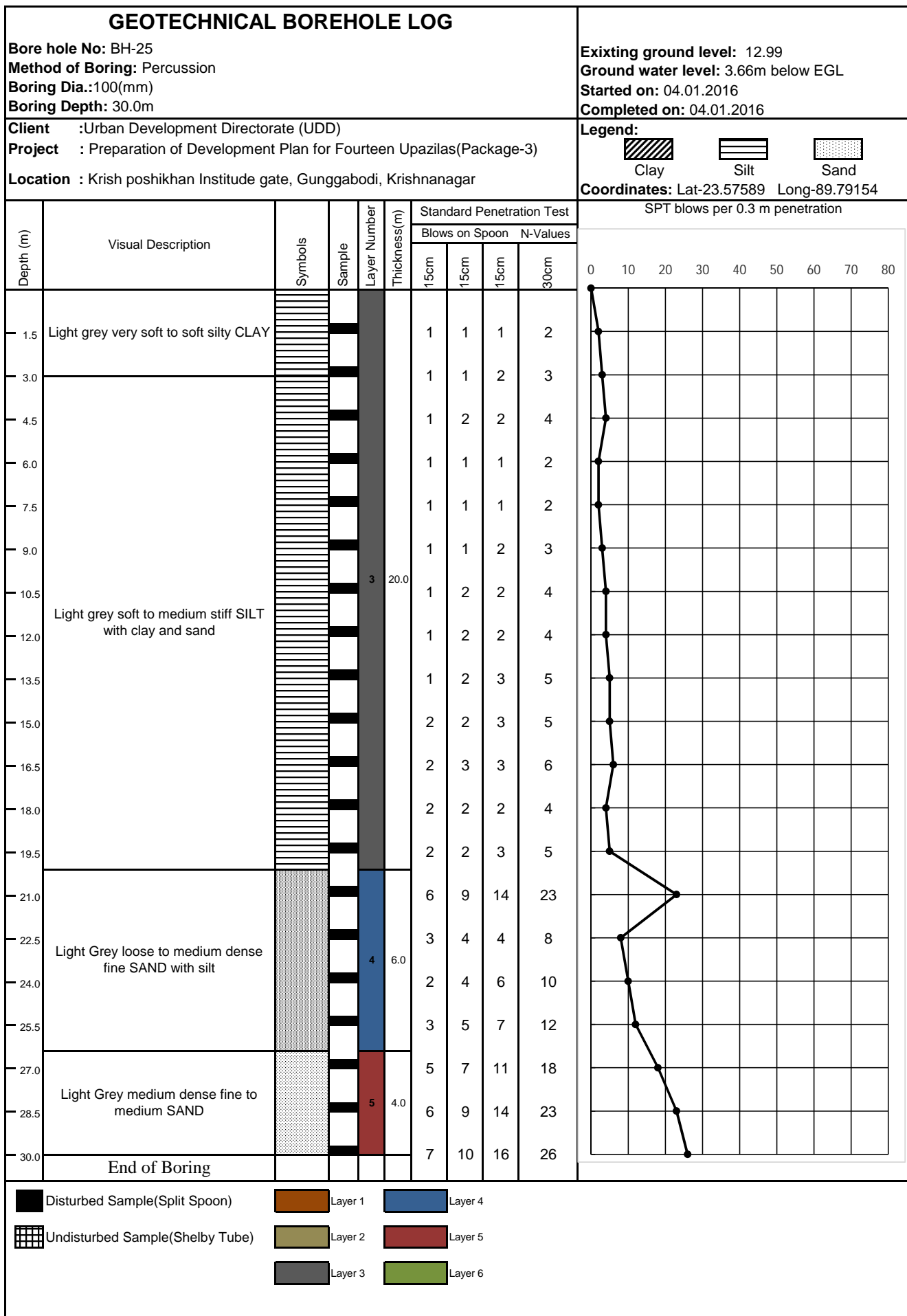


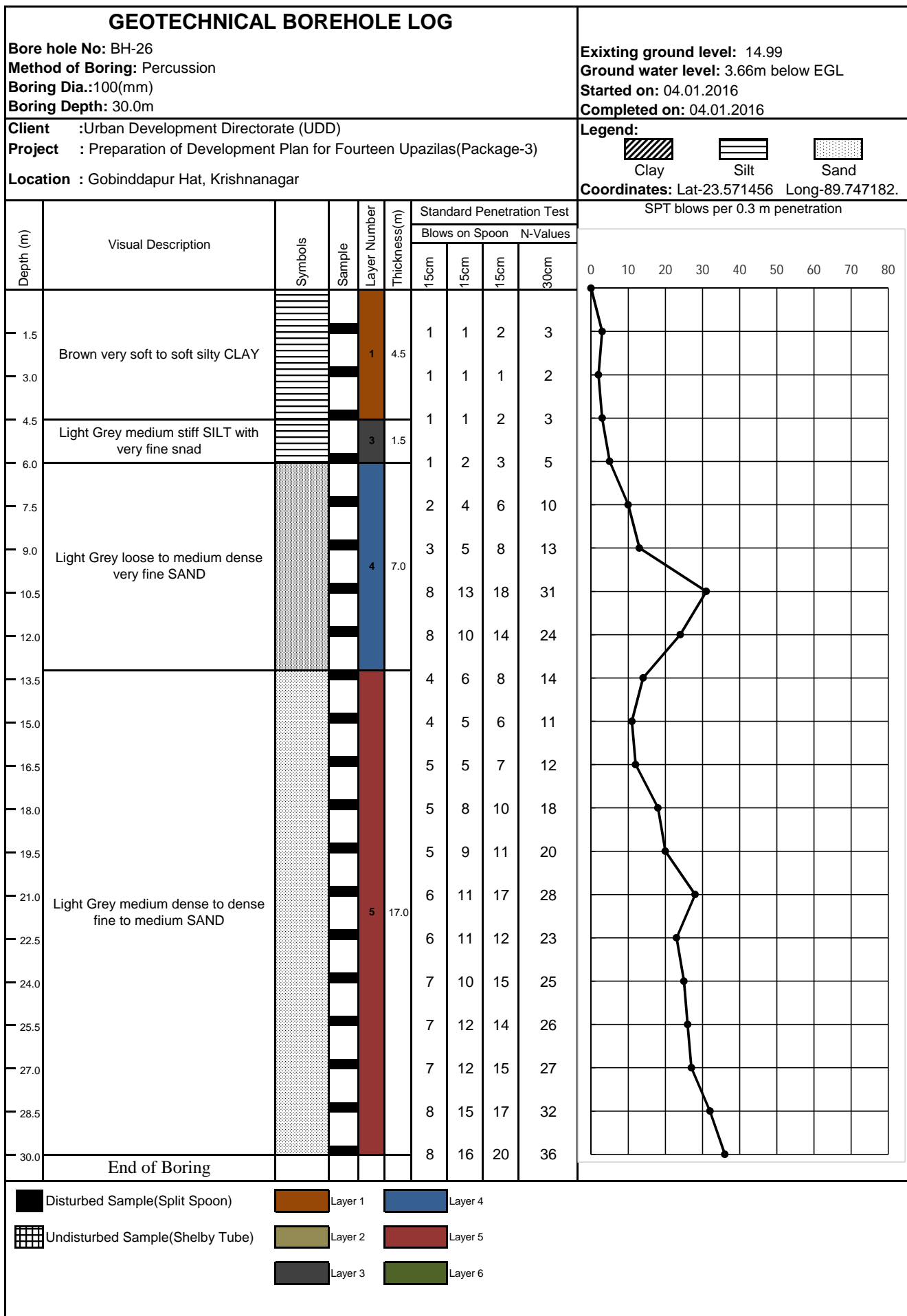


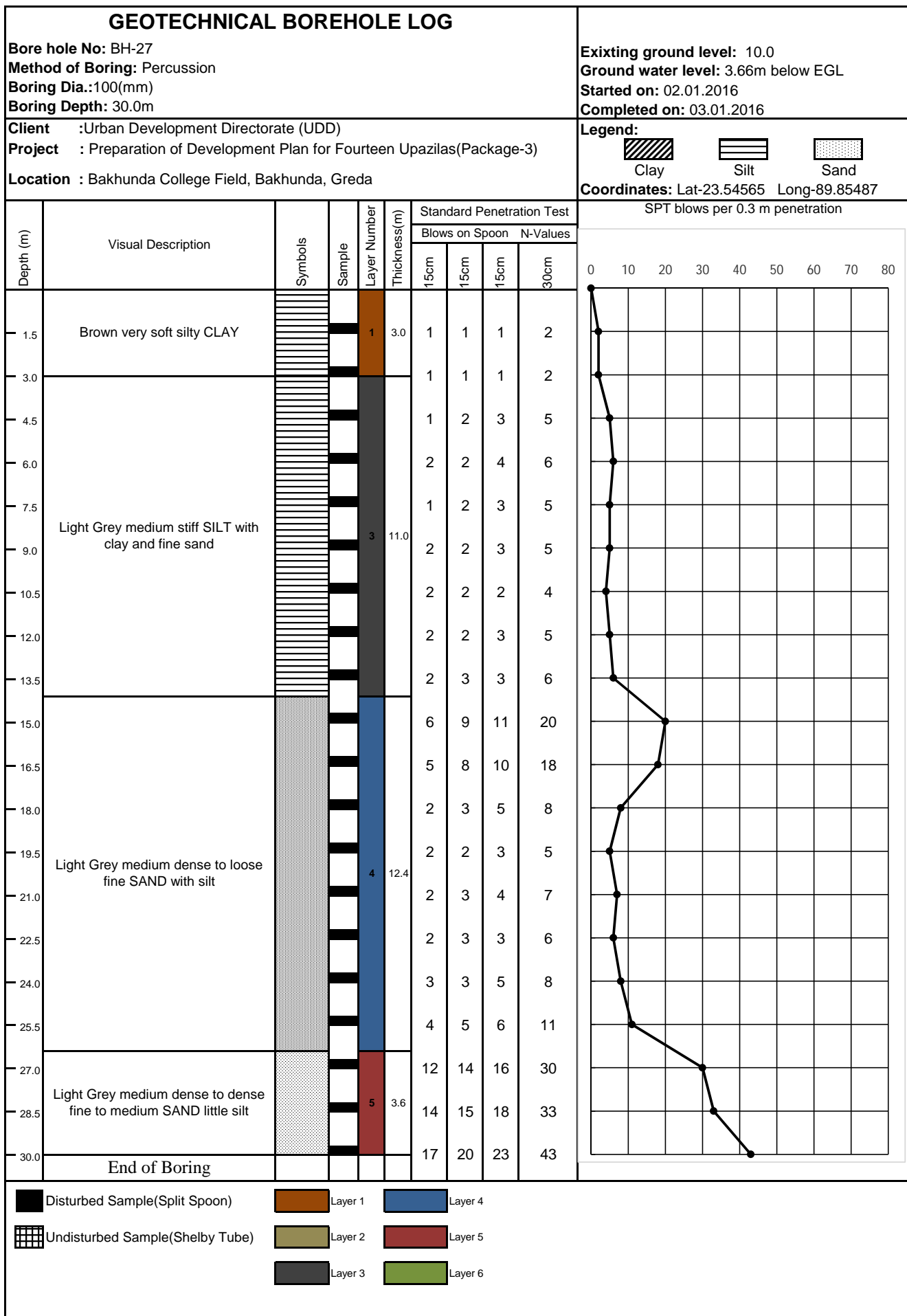


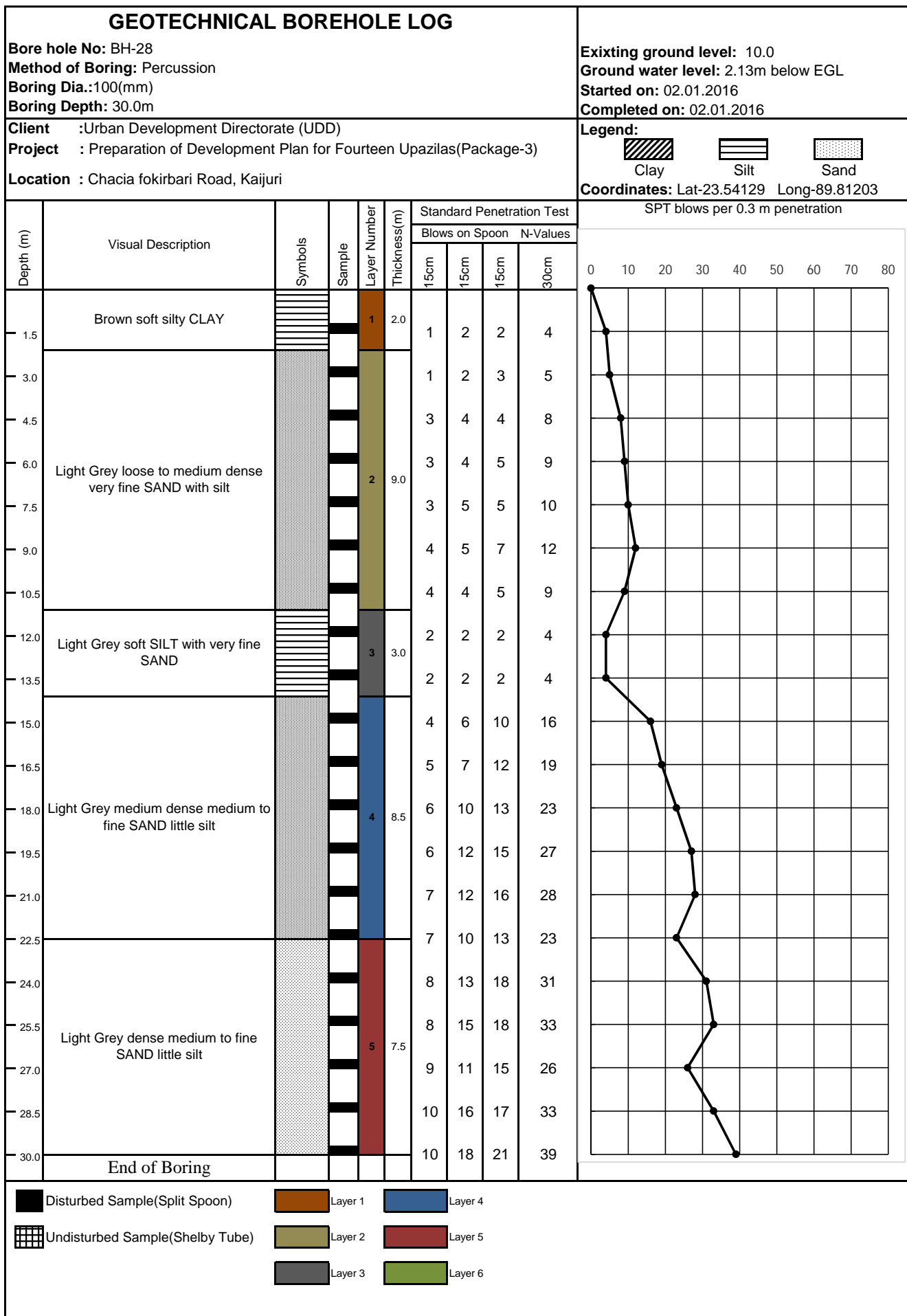


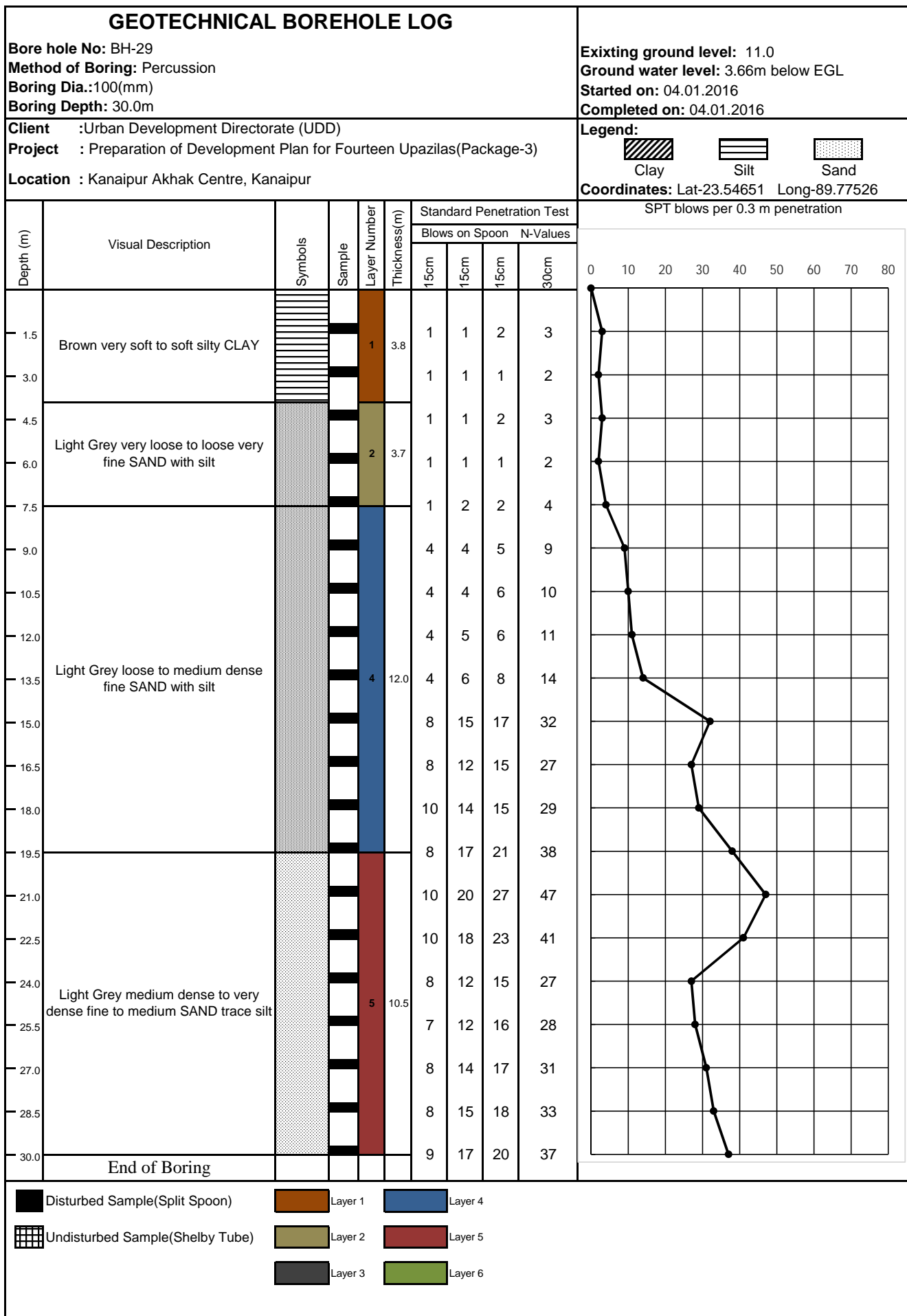


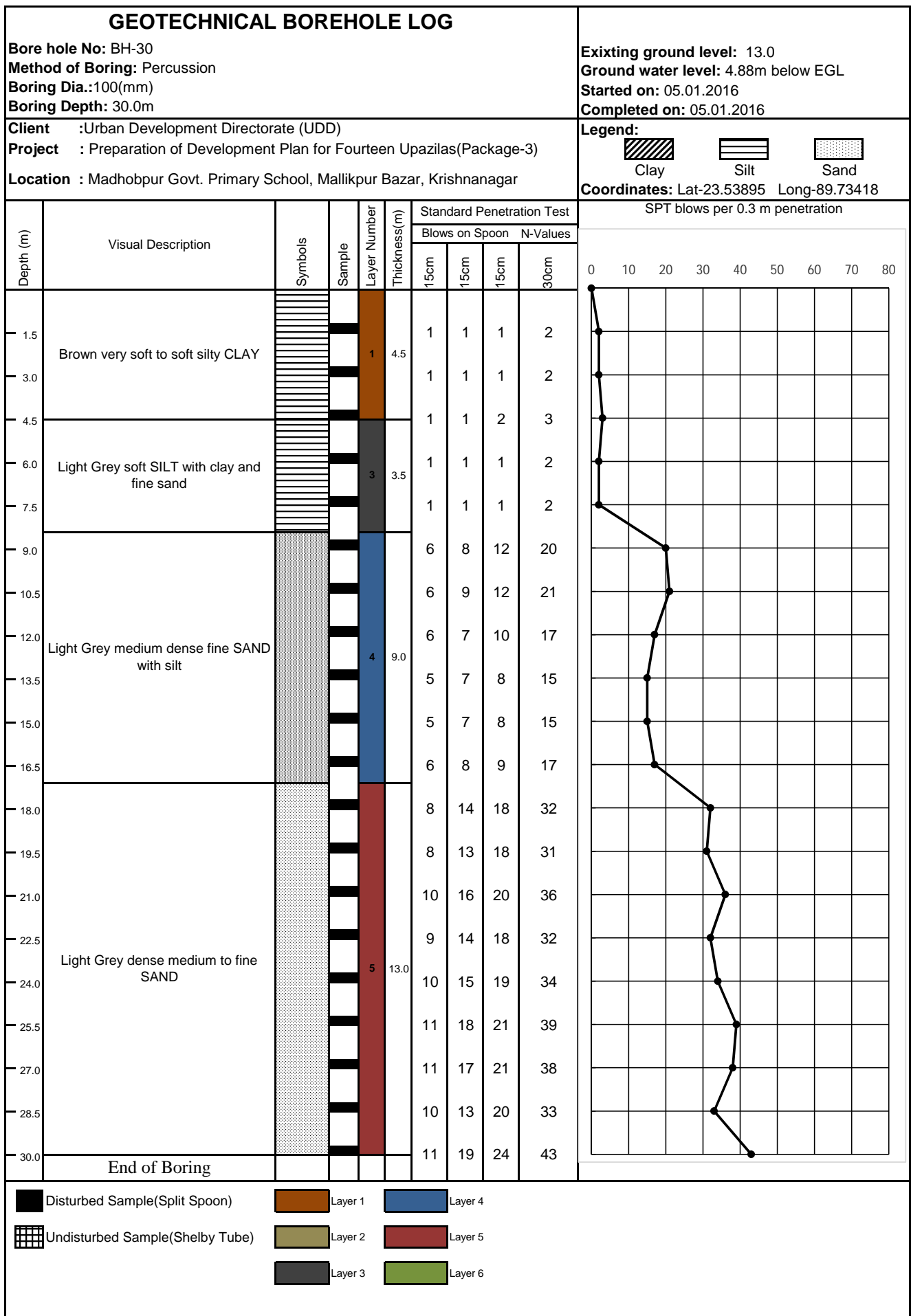


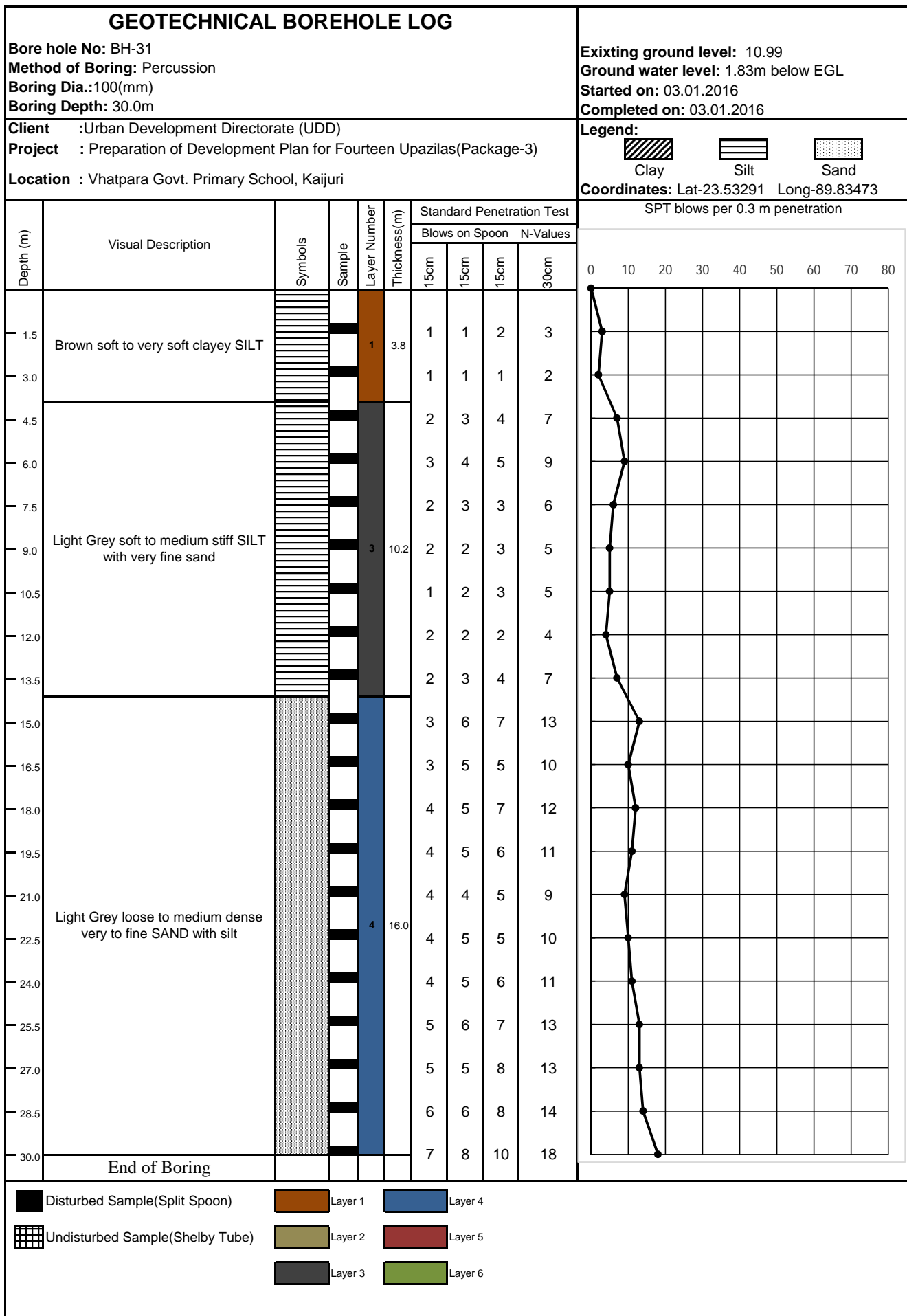


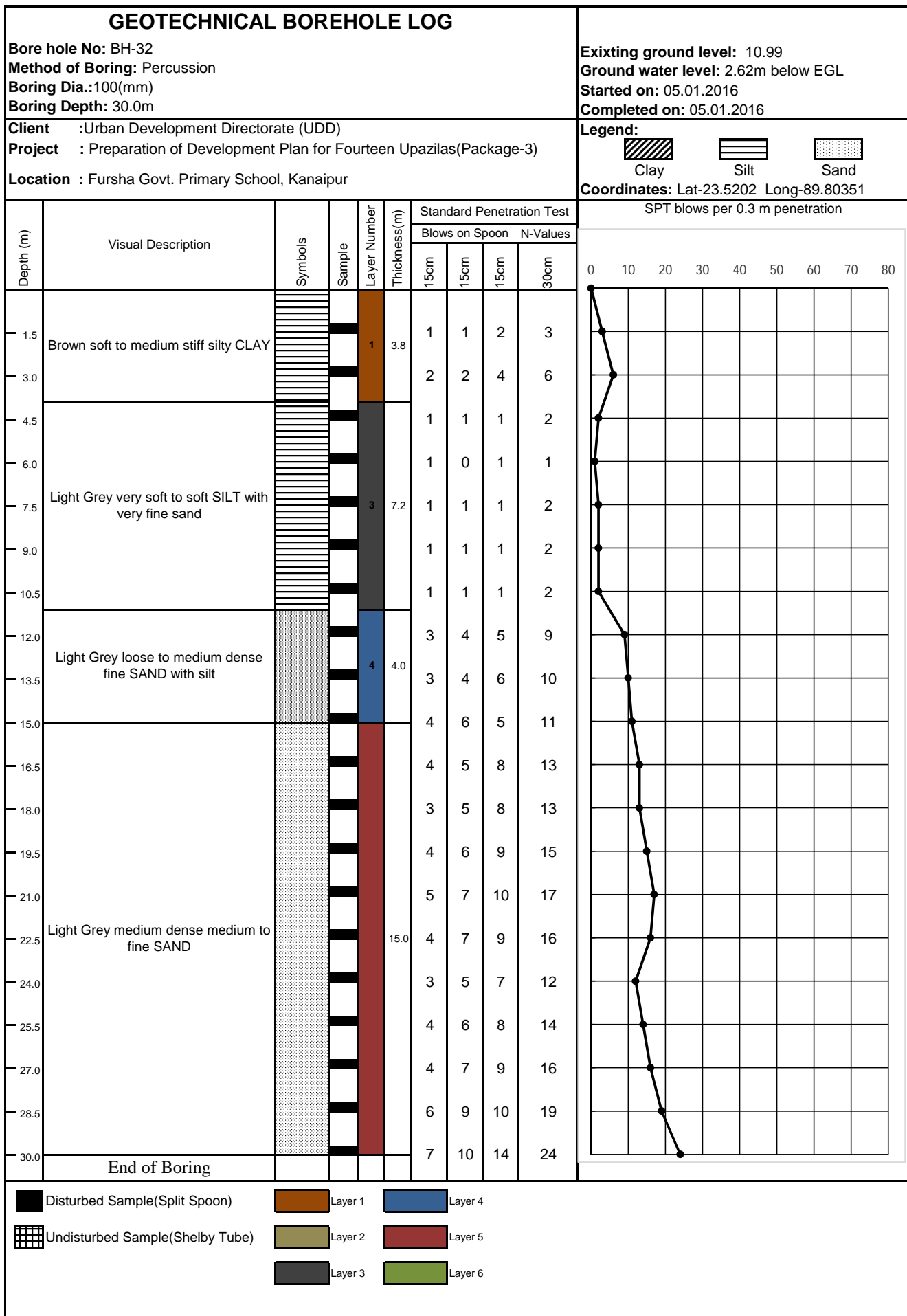


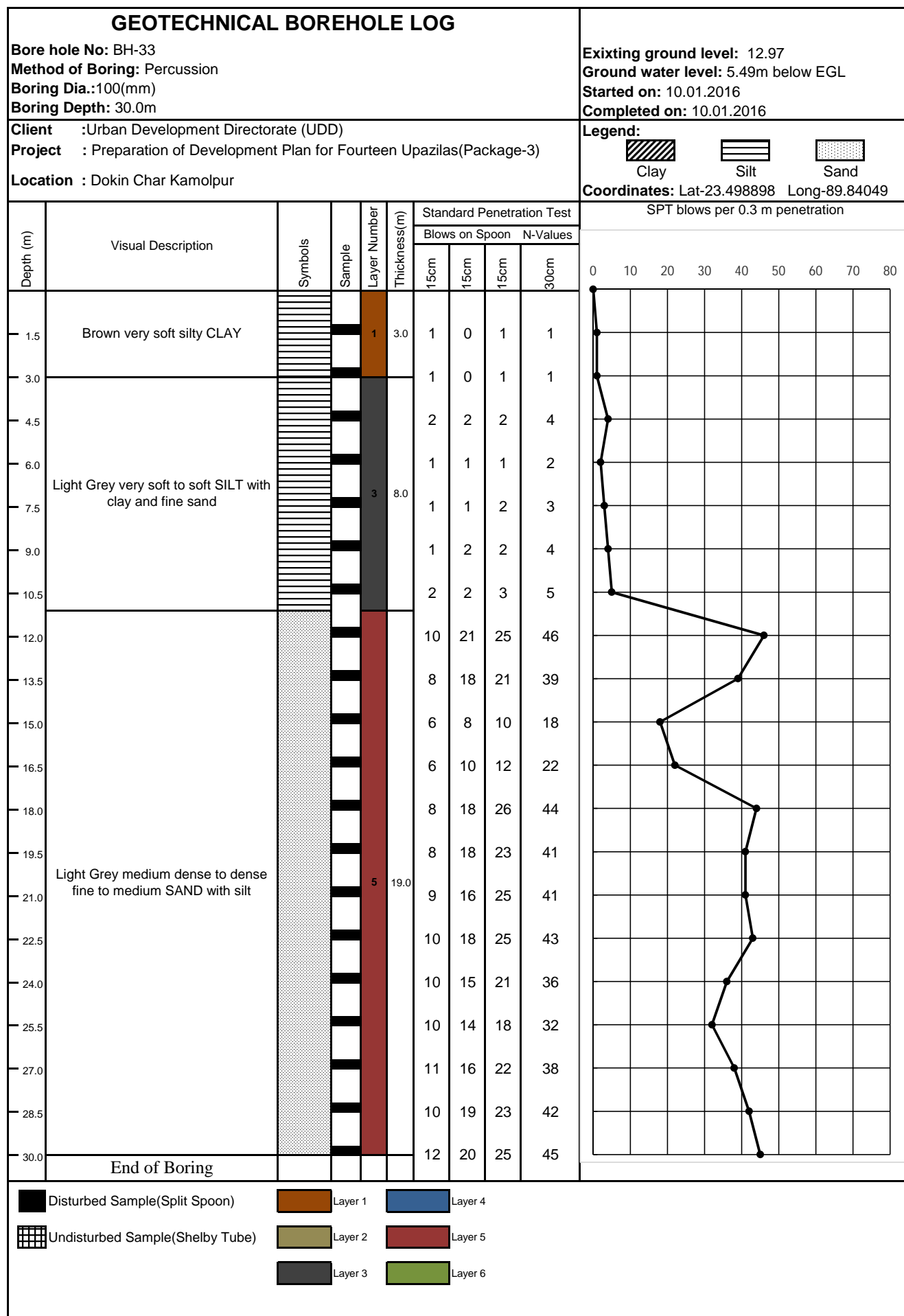


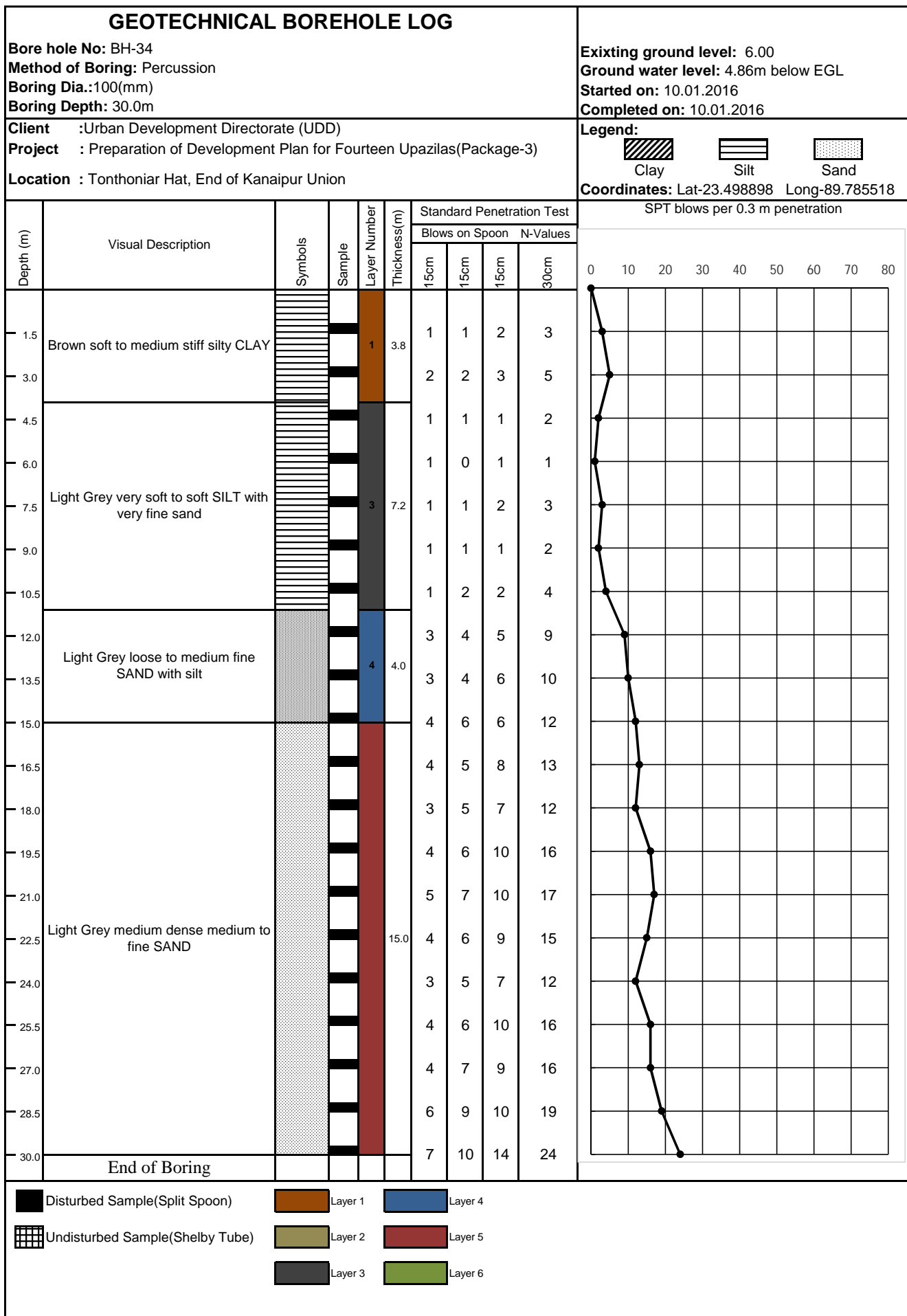


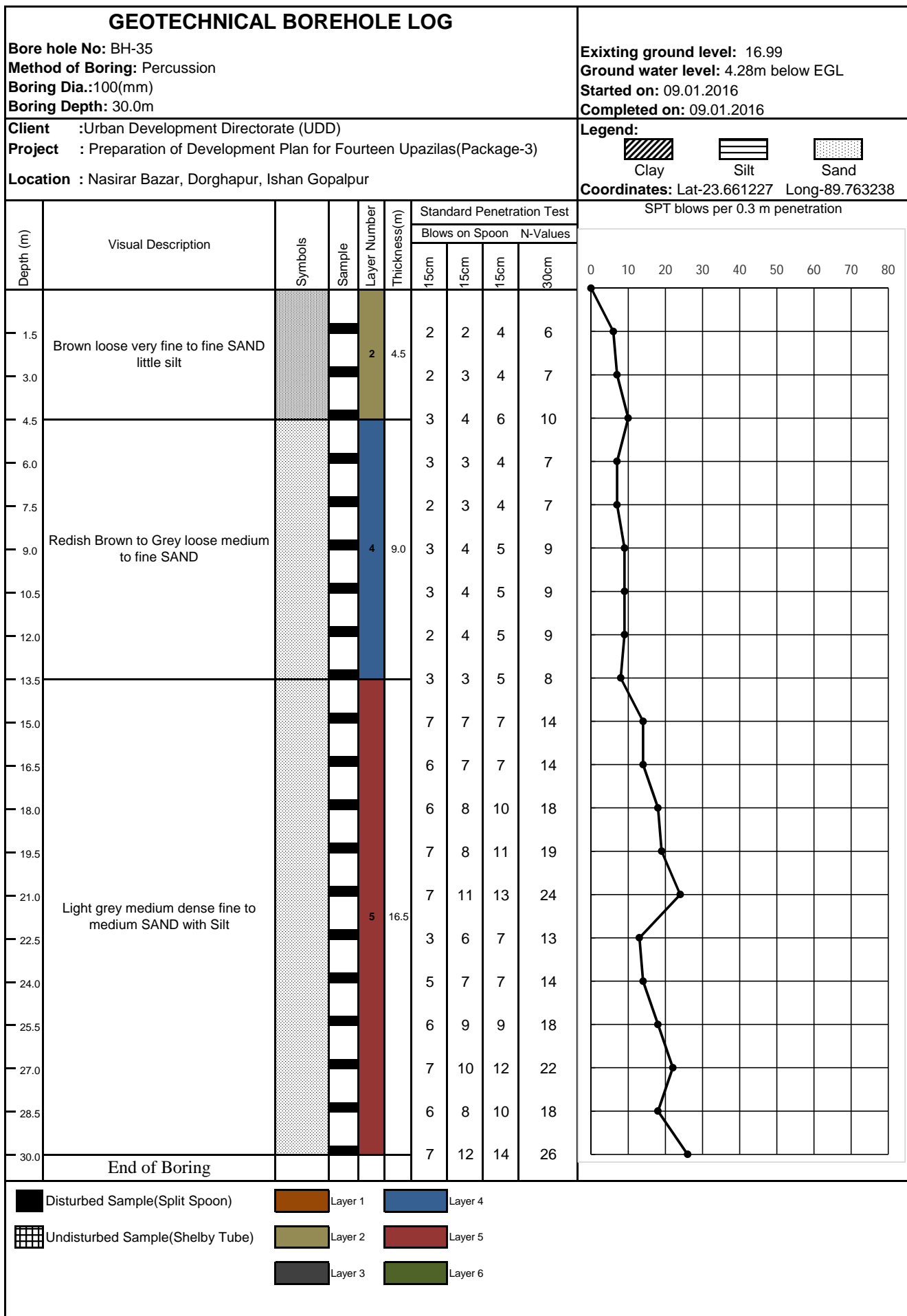


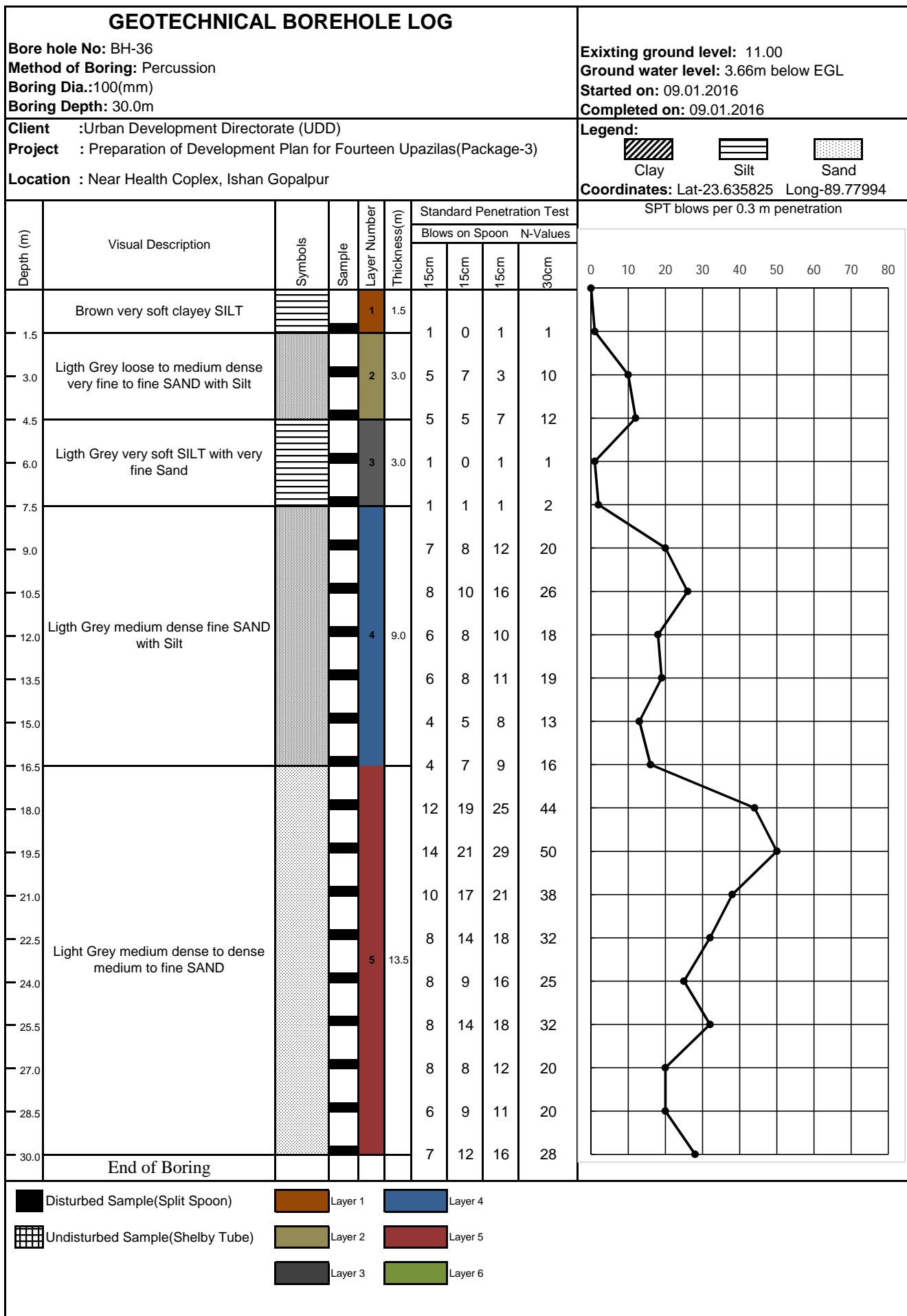


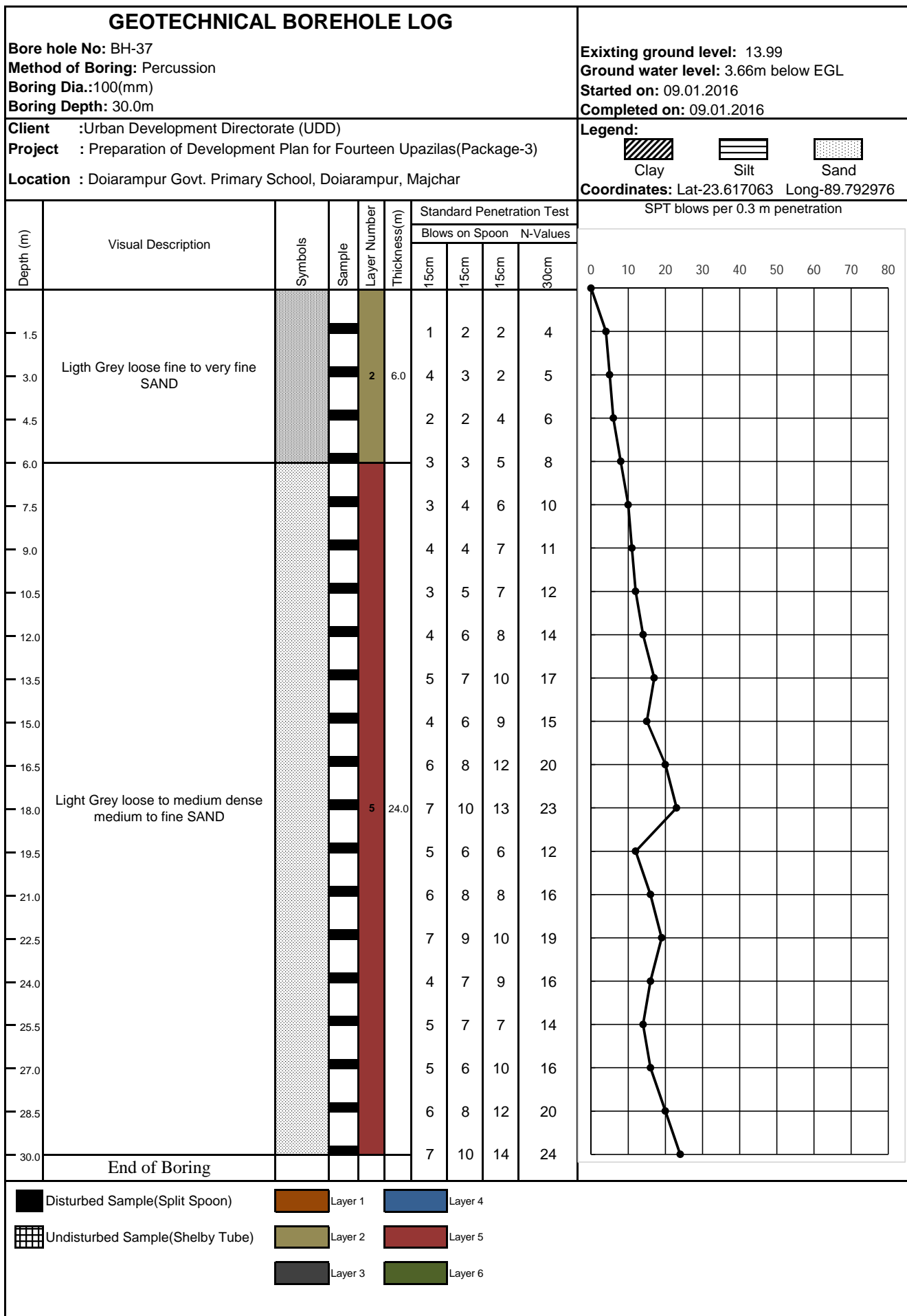












Appendix D

Geotechnical Laboratory Test Results and Graphs

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia

Bore Hole No: BH-F01

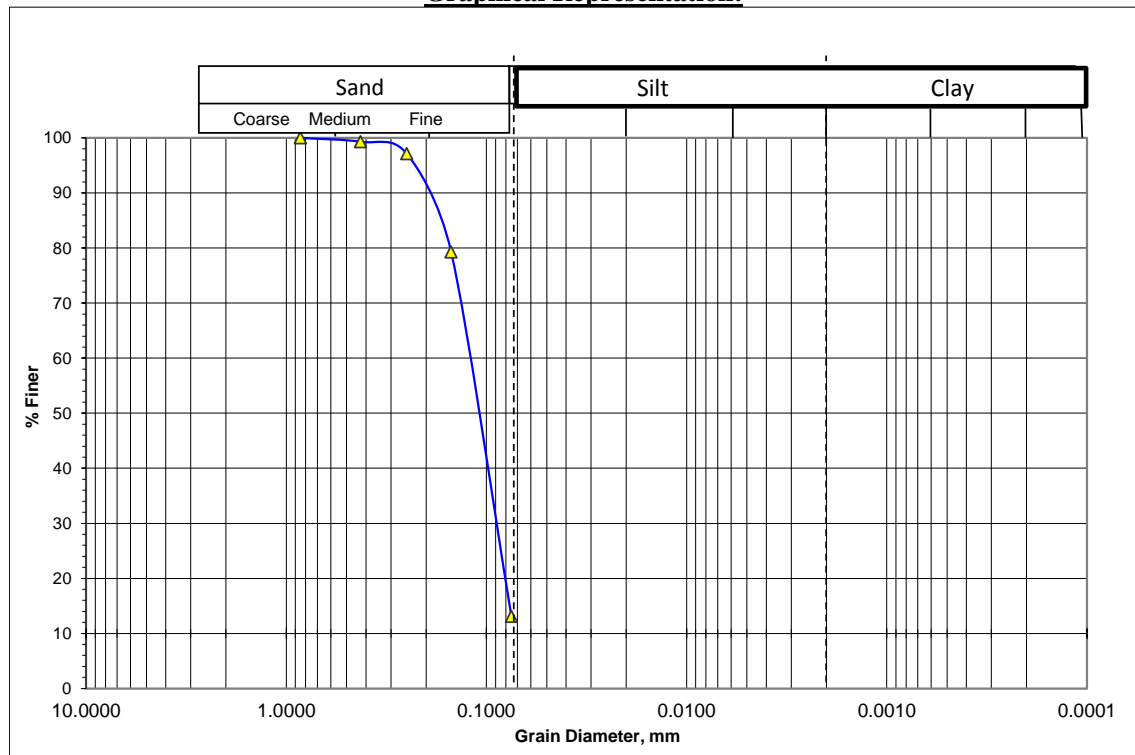
Sampled Date: 04/01/2016

Sample No : D-06

Test Date : 05/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia

Bore Hole No: BH-F01

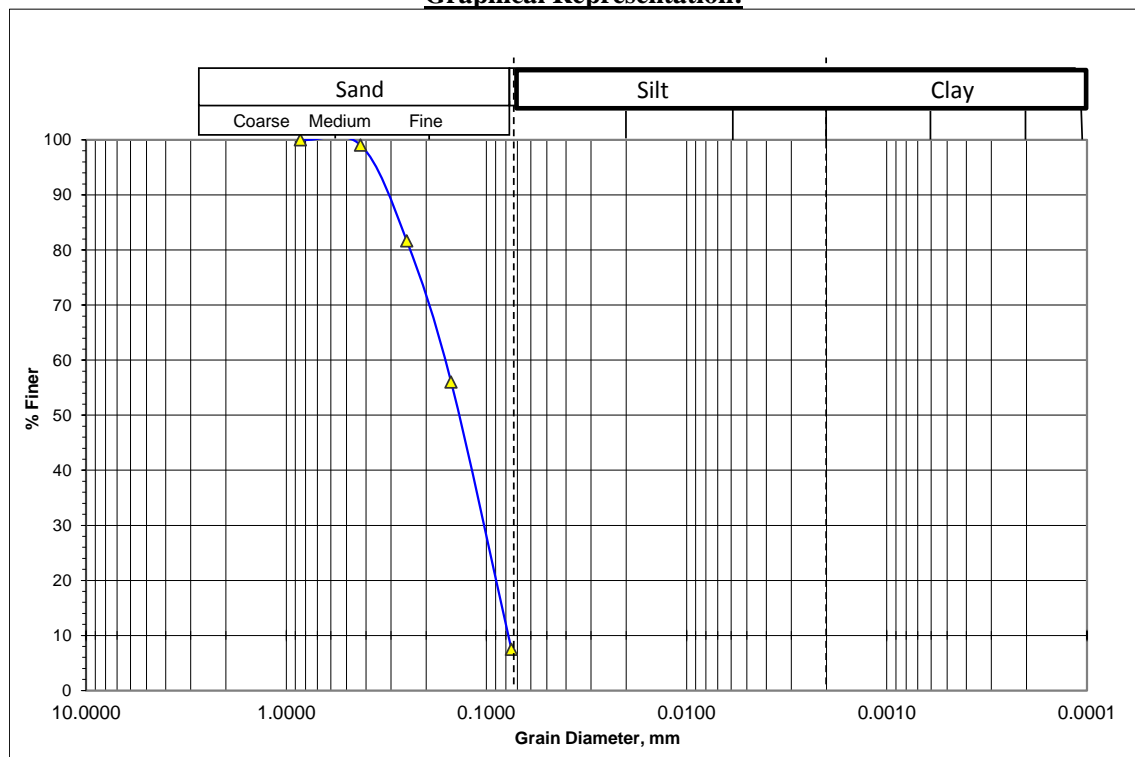
Sampled Date: 04/01/2016

Sample No : D-14

Test Date : 05/02/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, D_{50} = 0.14 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.66

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : SOUTH DIGRIRCHAR MADHOBDA GOVT. PRI. SCHOOL, Madhubdia

Bore Hole No: BH-F02

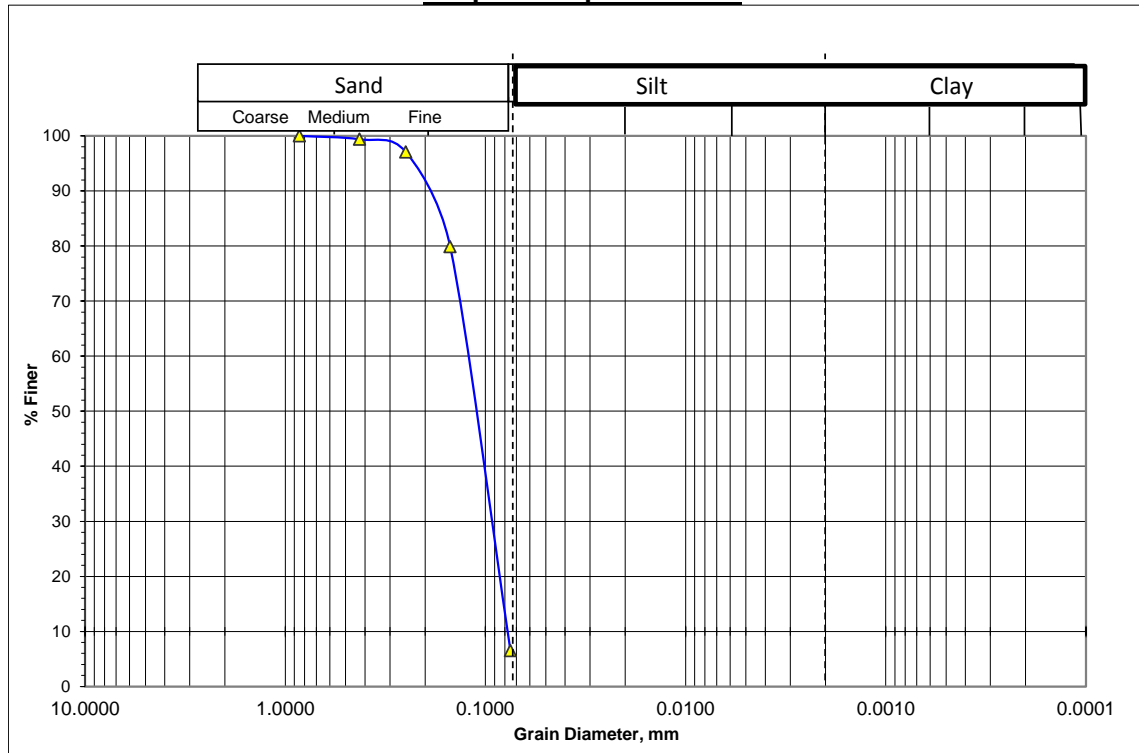
Sample Date: 05/01/2016

Sample No : D-07

Test Date : 05/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 6

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 94

(0.005mm size) & (0.001mm size) = 6

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : SOUTH DIGRIRCHAR MADHOBDA GOVT. PRI. SCHOOL, Madhubdia

Bore Hole No: BH-F02

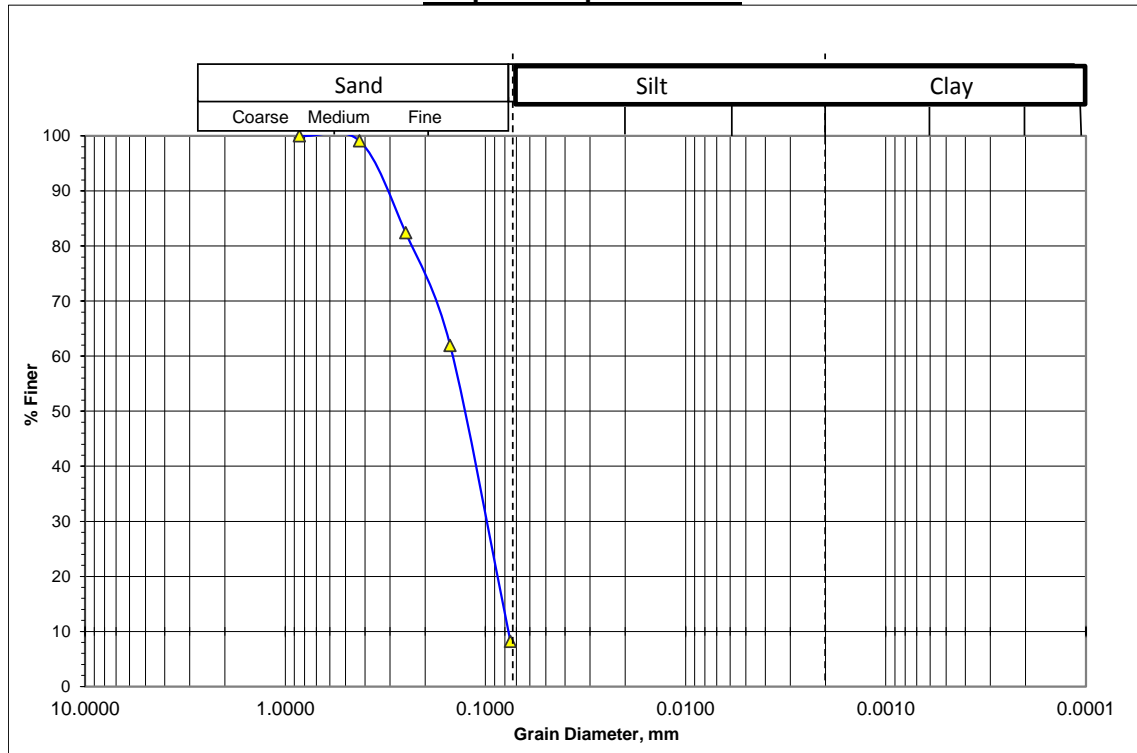
Sampled Date: 05/01/2016

Sample No : D-11

Test Date : 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03

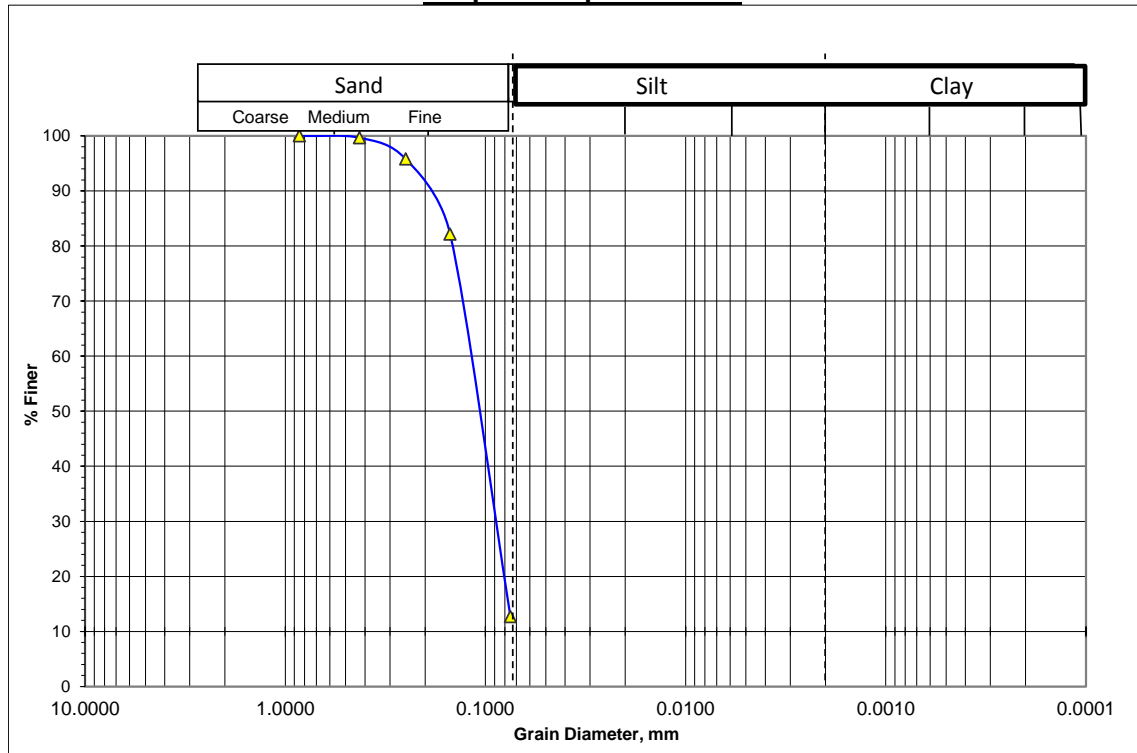
Sampled Date: 07/01/2016

Sample No : D-02

Test Date : 05/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03

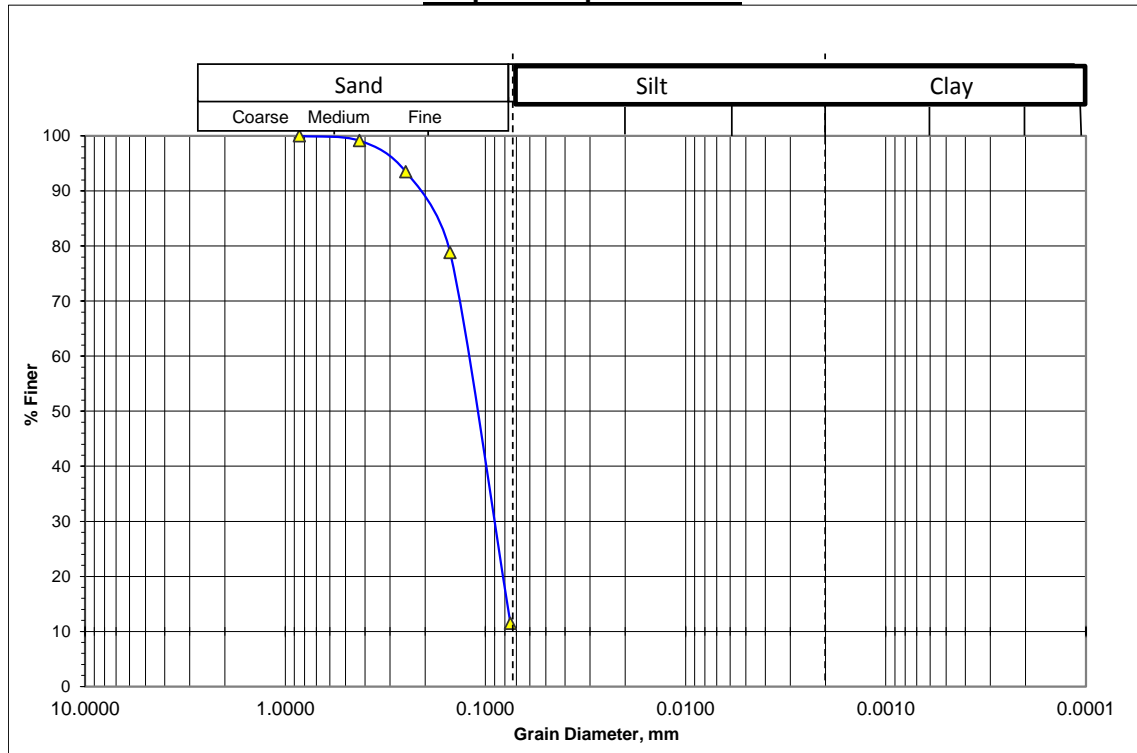
Sampled Date: 07/01/2016

Sample No : D-05

Test Date : 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 89

(0.005mm size) & (0.001mm size) = 11

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03

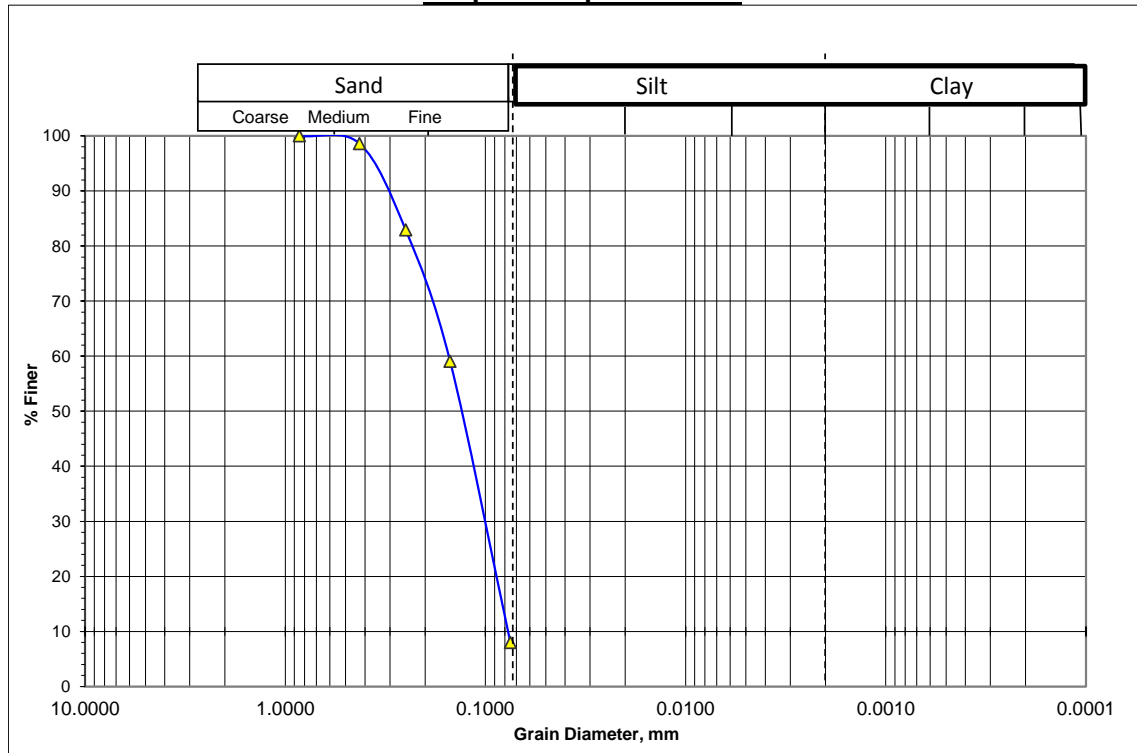
Sampled Date: 07/01/2016

Sample No : D-14

Test Date : 05/02/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.65$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No: BH-F04

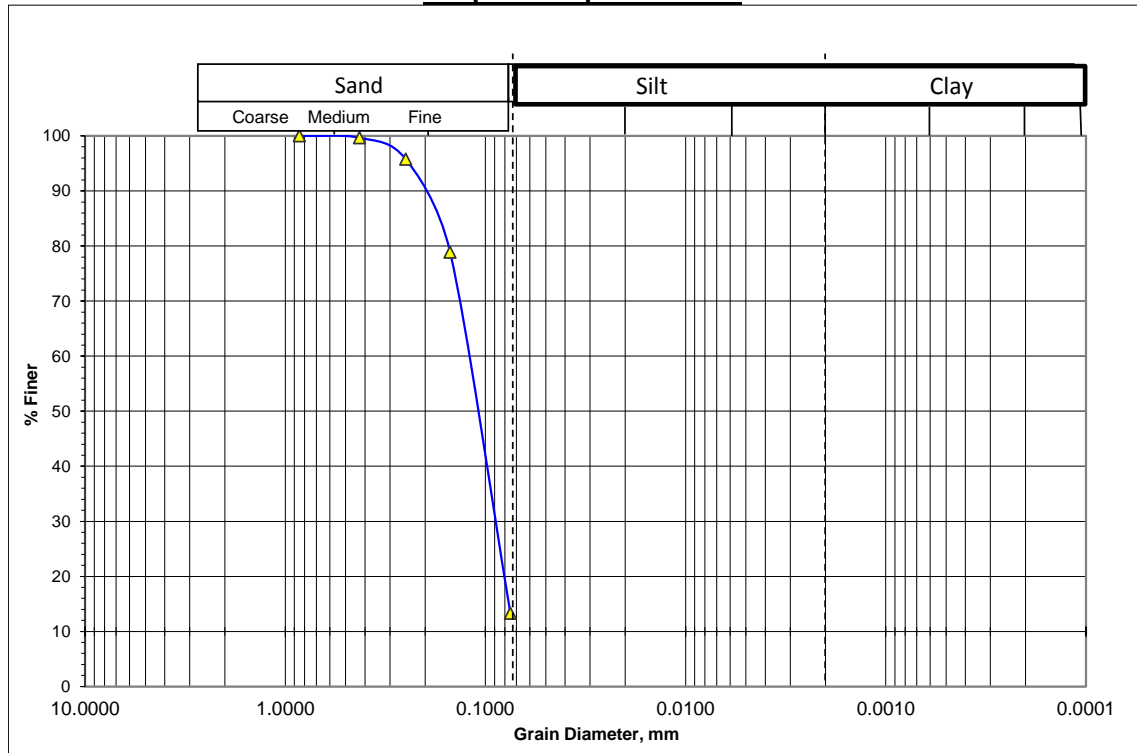
Sampled Date: 06/01/2016

Sample No : D-08

Test Date : 05/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No: BH-F04

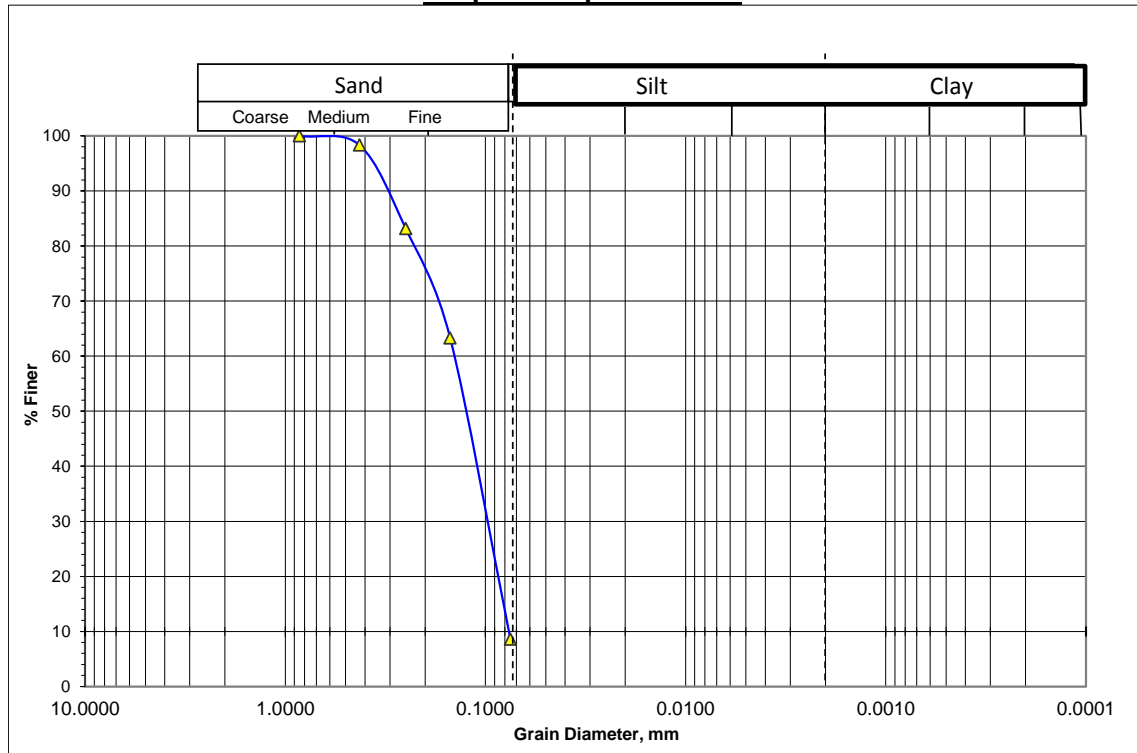
Sampled Date: 06/01/2016

Sample No : D-11

Test Date : 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Shibrampur R. D. Academy School Field , Majchar

Bore Hole No: BH-F05

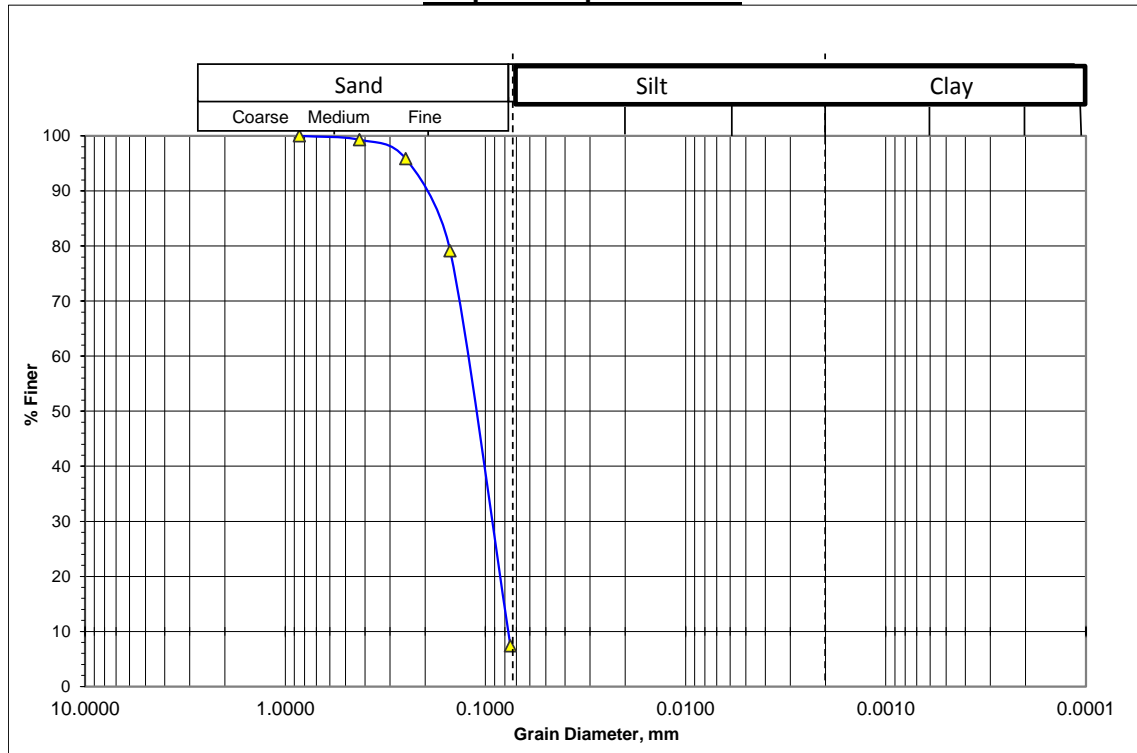
Sampled Date: 08/01/2016

Sample No : D-02

Test Date : 05/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, D_{50} = 0.11 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Shibrampur R. D. Academy School Field , Majchar

Bore Hole No: BH-F05

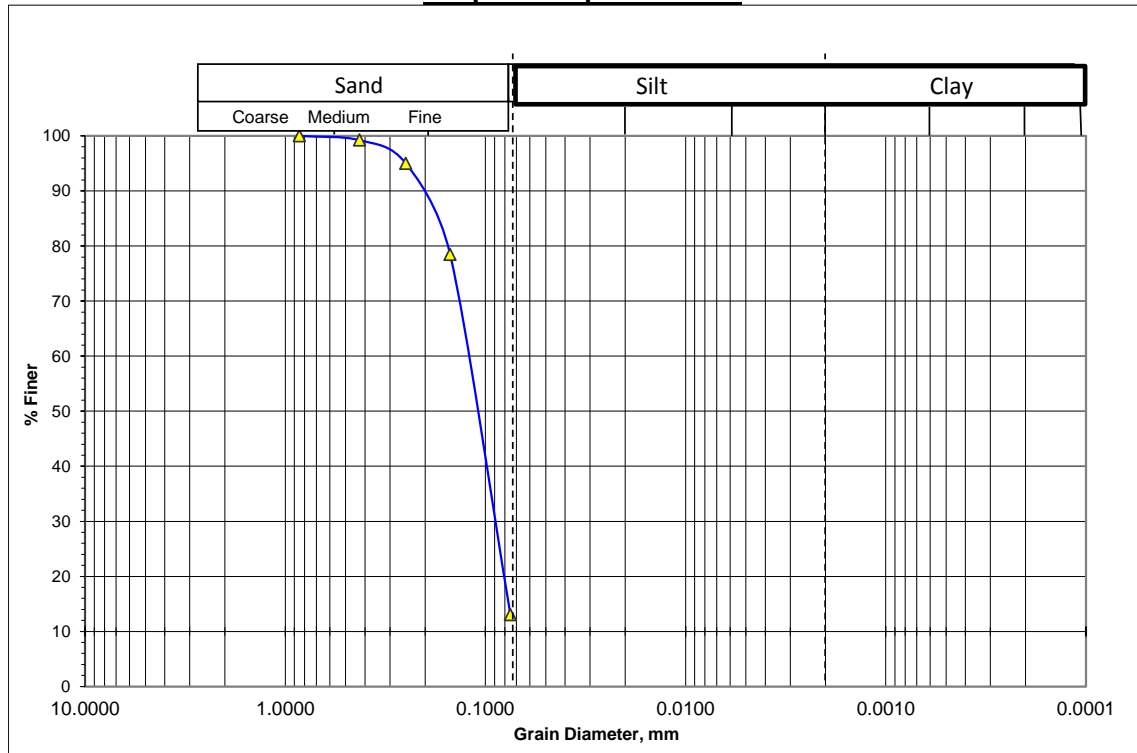
Sampled Date: 08/01/2016

Sample No : D-05

Test Date : 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, D_{50} = 0.11 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.58

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03

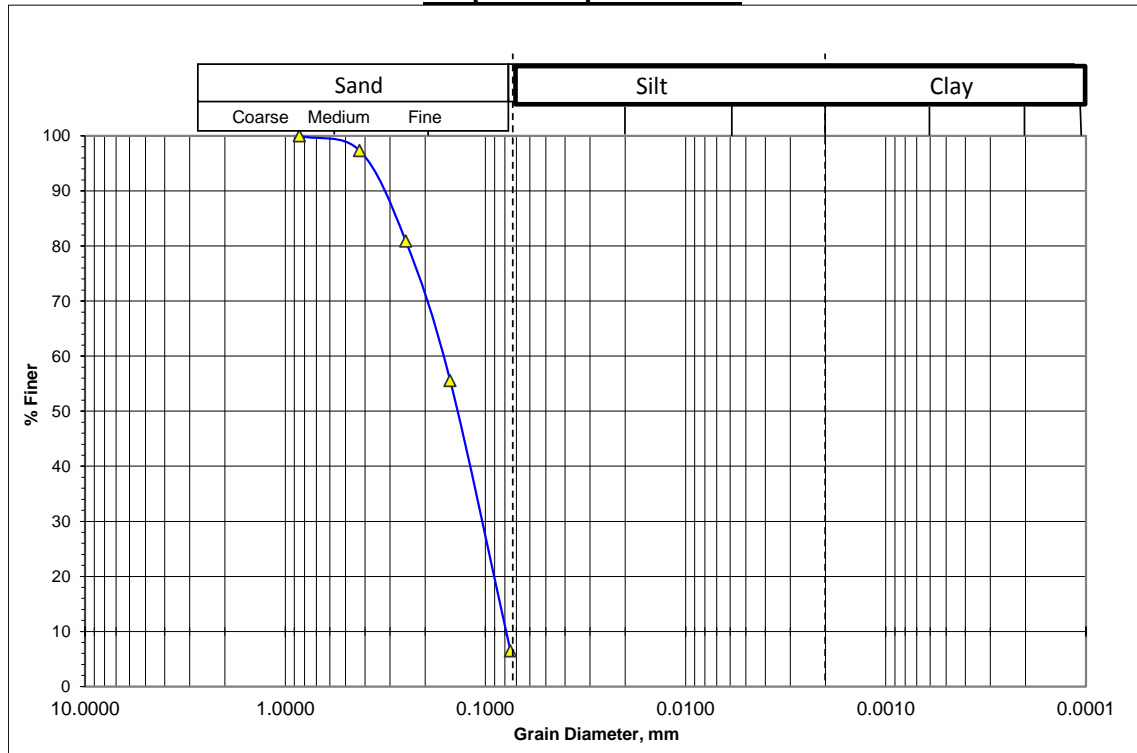
Sampled Date: 07/01/2016

Sample No : D-11

Test Date : 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 6

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 94

(0.005mm size) & (0.001mm size) = 6

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Pallikobi Jasimuddin Saranshala, Ambikapur

Bore Hole No: BH-F05

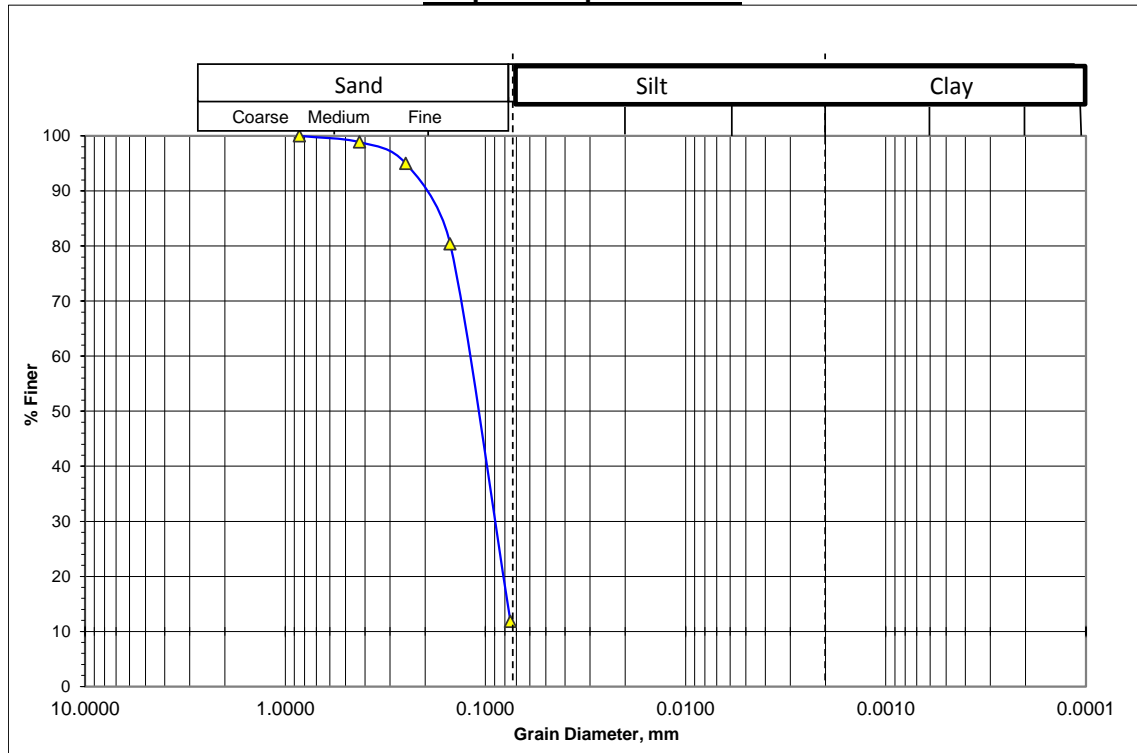
Sample Date: 10/01/2016

Sample No : D-05

Test Date : 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Pallikobi Jasimuddin Saranshala, Ambikapur

Bore Hole No: BH-F05

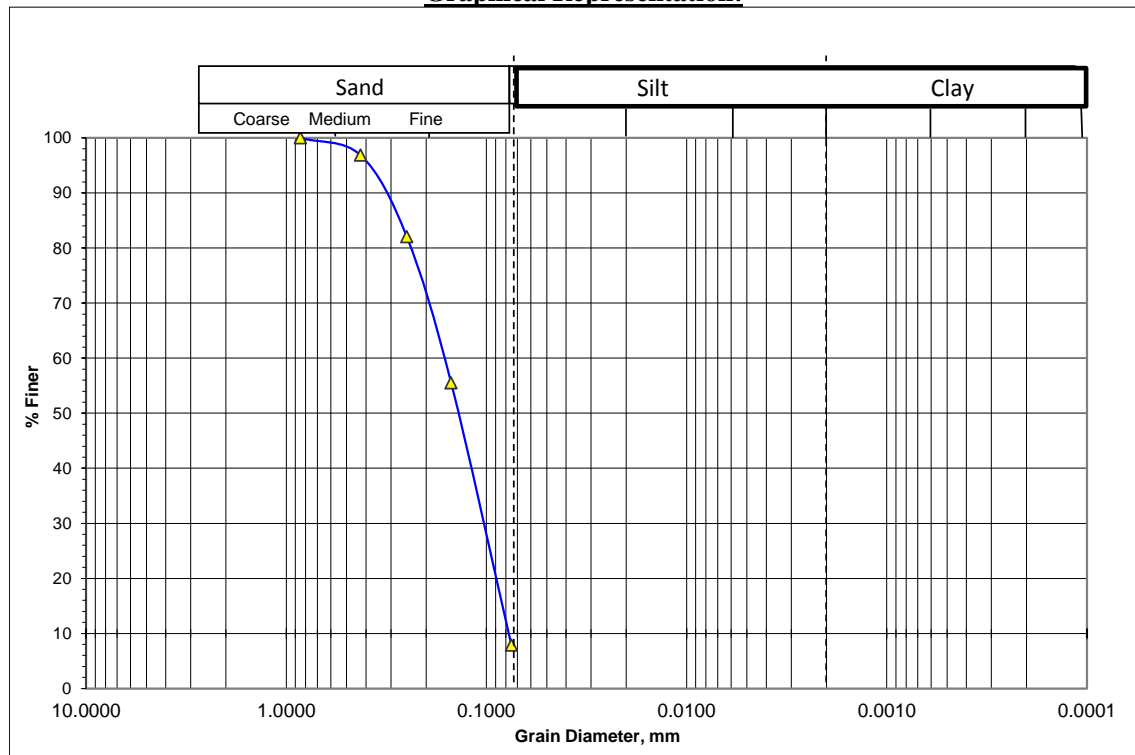
Sampled Date: 10/01/2016

Sample No : D-11

Test Date : 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.68$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Madhankali Swith gate, Ambikapur

Bore Hole No: BH-F07

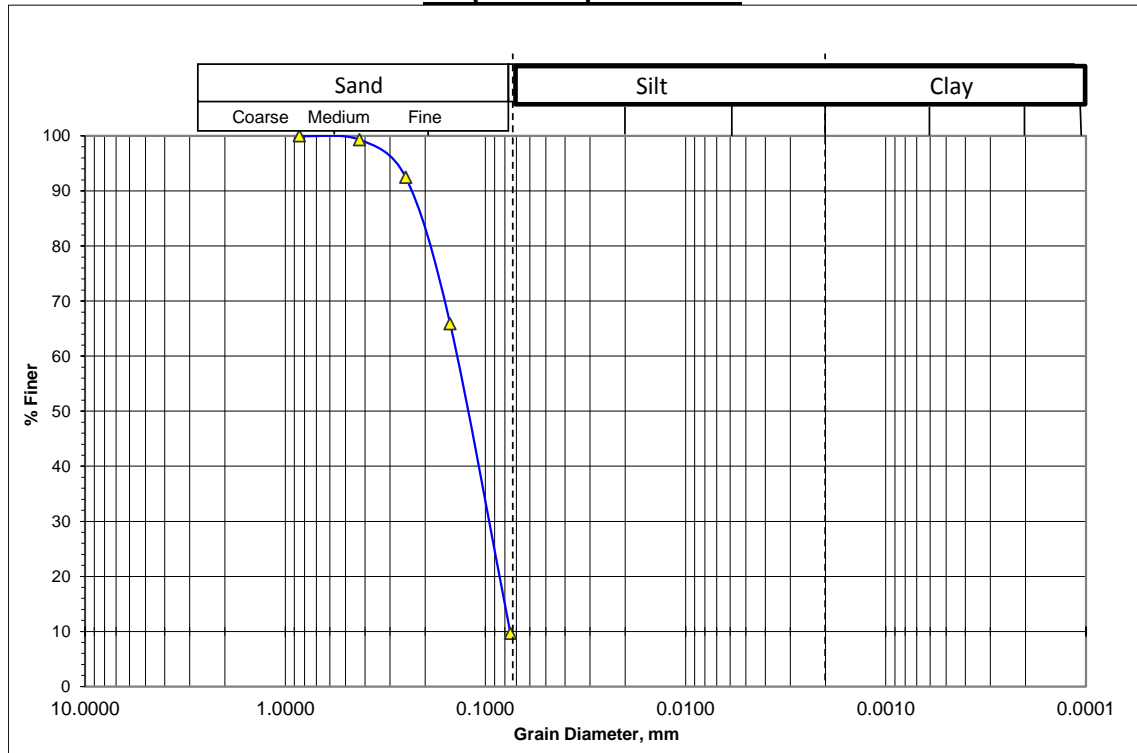
Sample Date: 31/12/2015

Sample No : D-09

Test Date : 05/02/2016

Depth (m) : 13.5

Graphical Representation:



Fines or % of silt and clay = 10

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 90

(0.005mm size) & (0.001mm size) = 10

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Madhankali Swith gate, Ambikapur

Bore Hole No: BH-F07

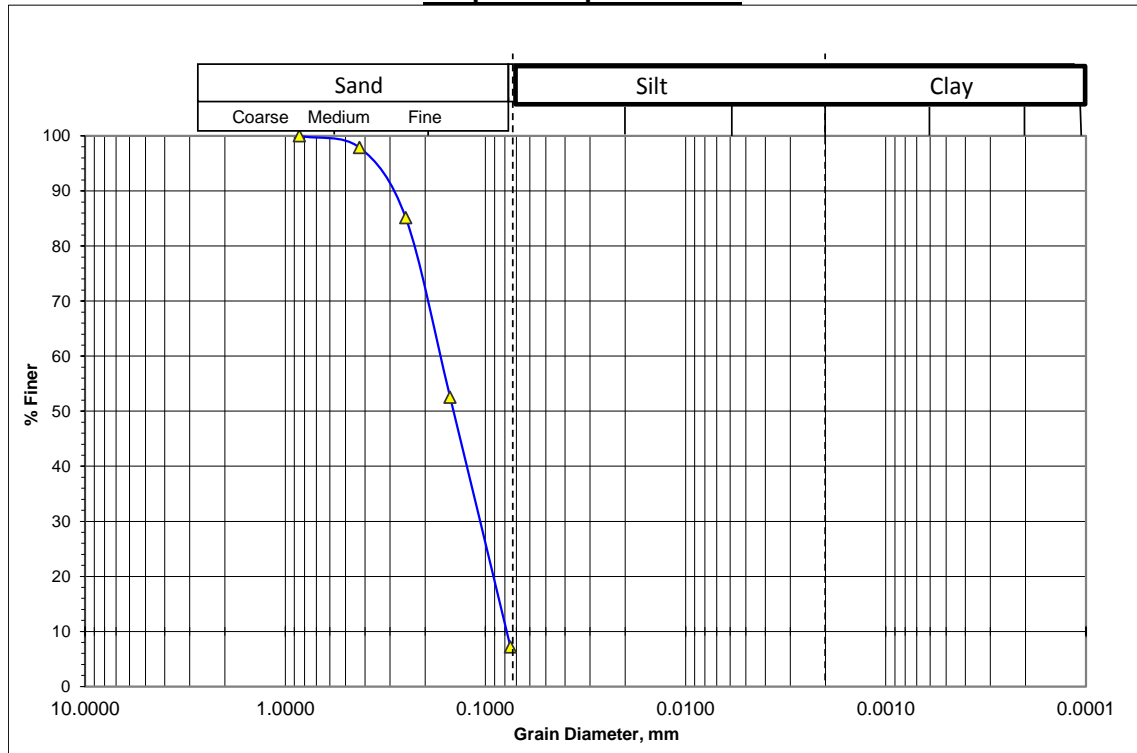
Sample Date: 31/12/2015

Sample No : D-15

Test Date : 05/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.68$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Adampur Bazar, Goulonda Road, Ambikapur

Bore Hole No: BH-F08

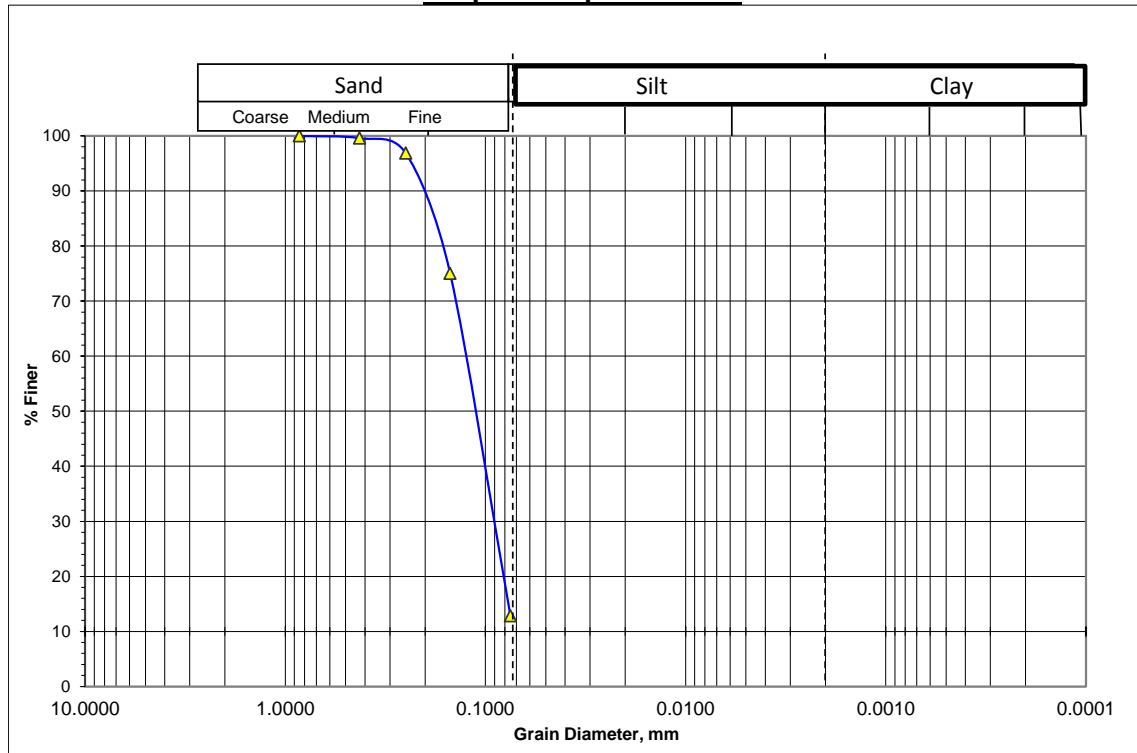
Sampled Date: 01/01/2016

Sample No : D-02

Test Date : 05/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Adampur Bazar, Goualonda Road, Ambikapur

Bore Hole No: BH-F08

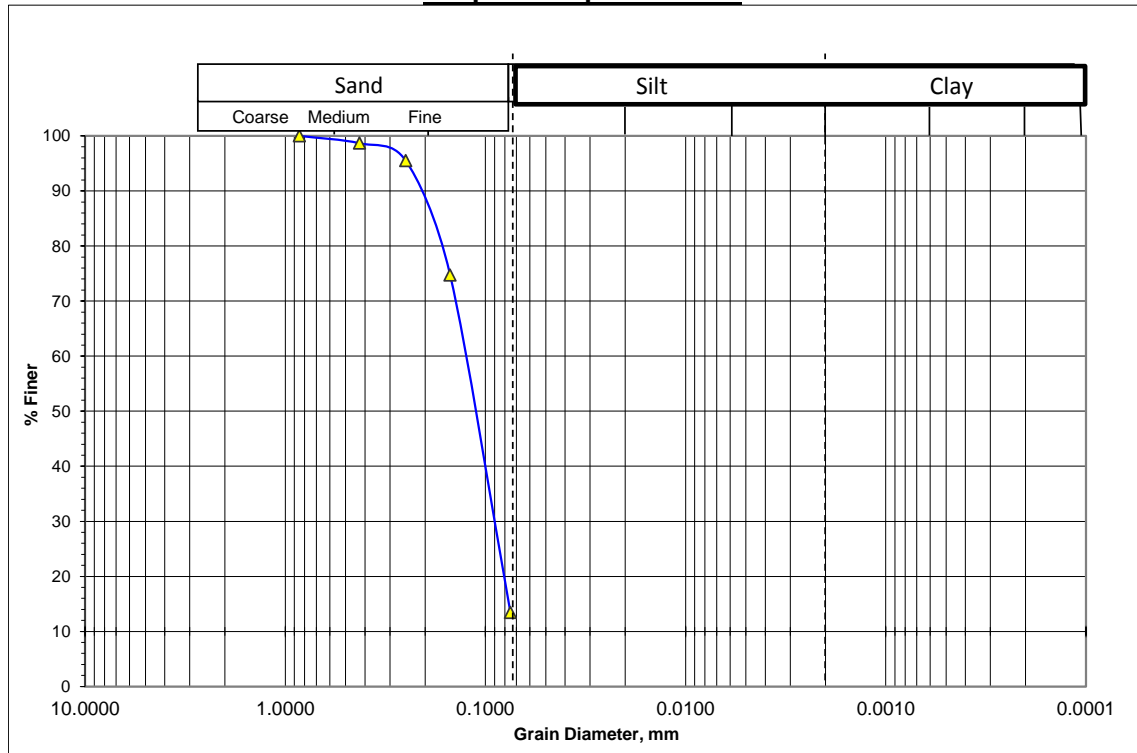
Sampled Date: 01/01/2016

Sample No : D-10

Test Date : 05/02/2016

Depth (m) : 15.0

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Adampur Bazar, Goualonda Road, Ambikapur

Bore Hole No: BH-F08

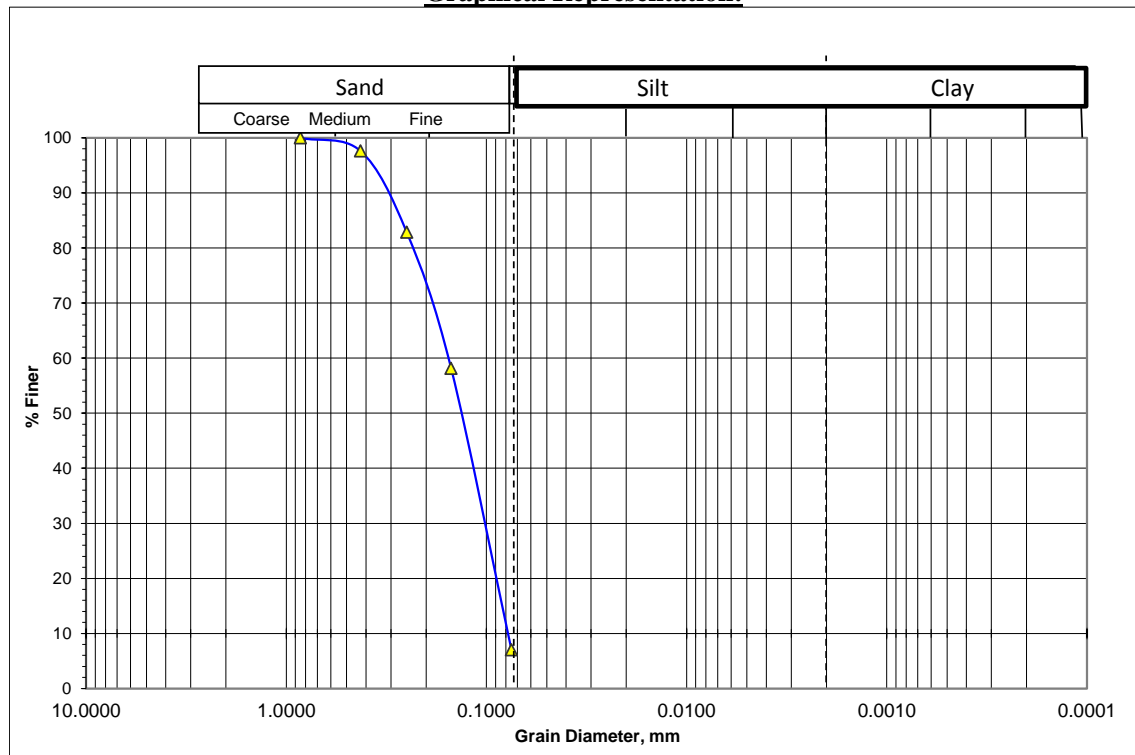
Sampled Date: 01/01/2016

Sample No : D-17

Test Date : 05/02/2016

Depth (m) : 25.5

Graphical Representation:



Fines or % of silt and clay = 6

Mean Diameter, $D_{50} = 0.14$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.66$

% Particles (from the grain -size analysis graph

(0.075mm size) = 94

(0.005mm size) & (0.001mm size) = 6

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dhuldi Railgate, Dhuldi Bazar, Majchar

Bore Hole No: BH-F09

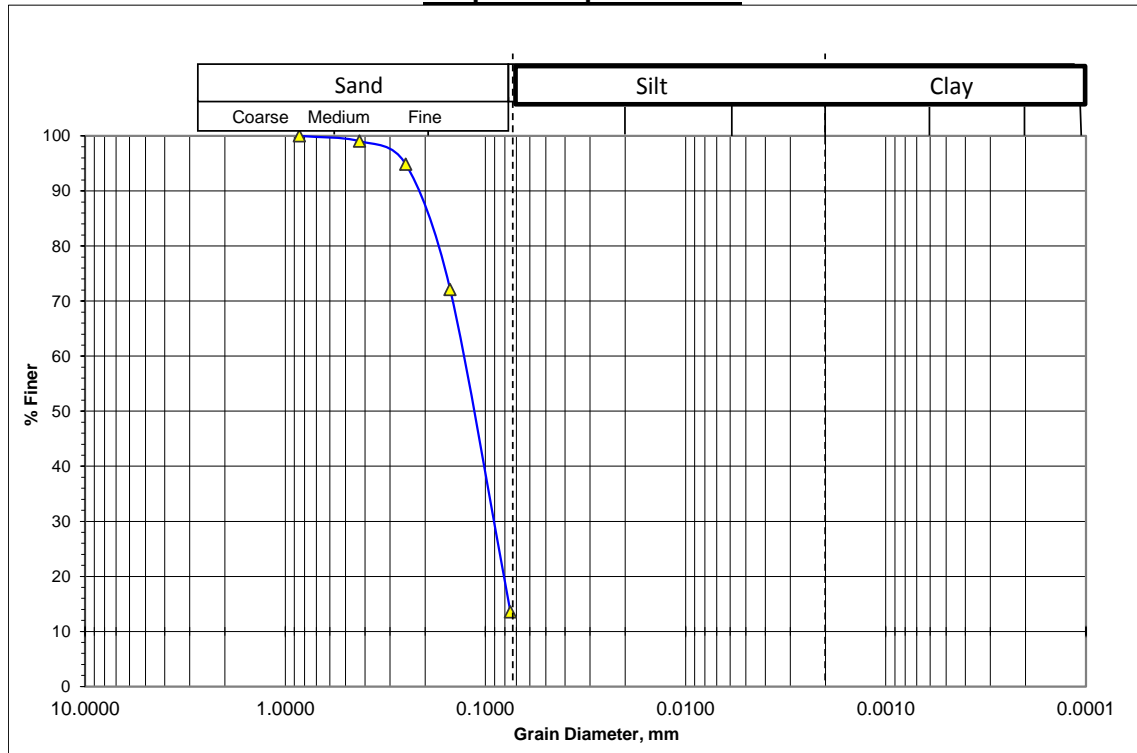
Sampled Date: 08/01/2016

Sample No : D-07

Test Date : 05/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dhuldi Railgate, Dhuldi Bazar, Majchar

Bore Hole No: BH-F09

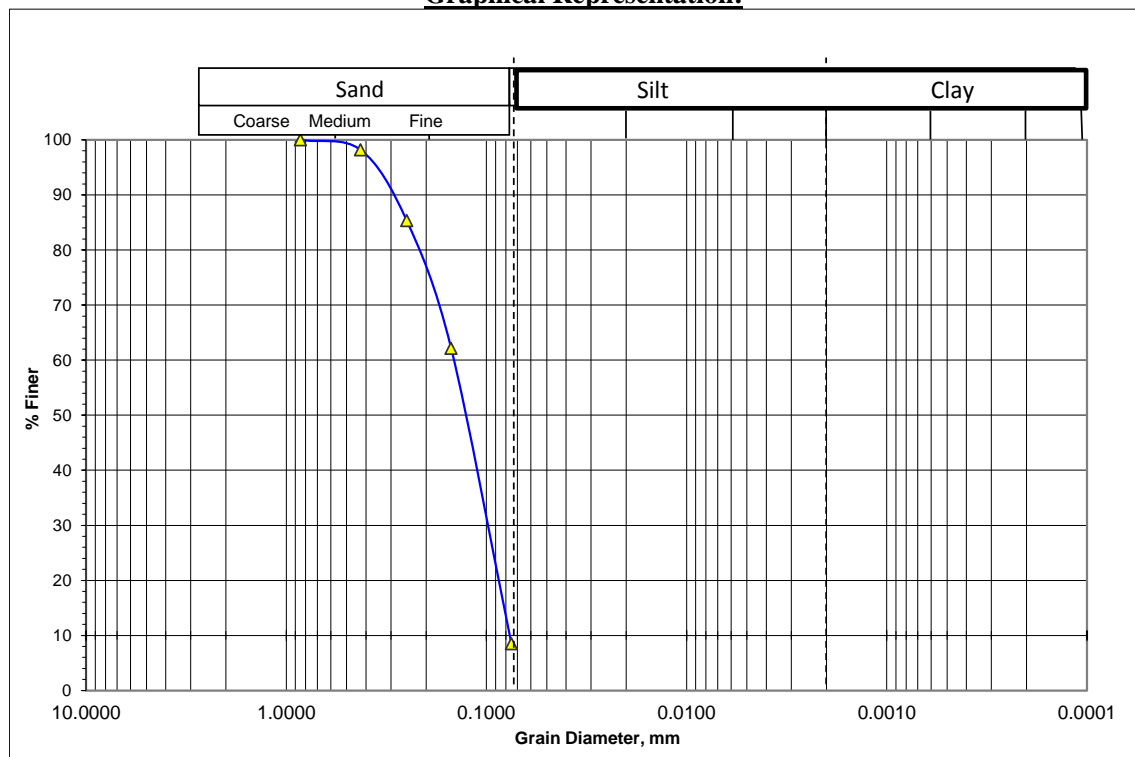
Sampled Date: 08/01/2016

Sample No : D-13

Test Date : 05/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.65$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Khalilpur Bazar,Majchar

Bore Hole No: BH-F10

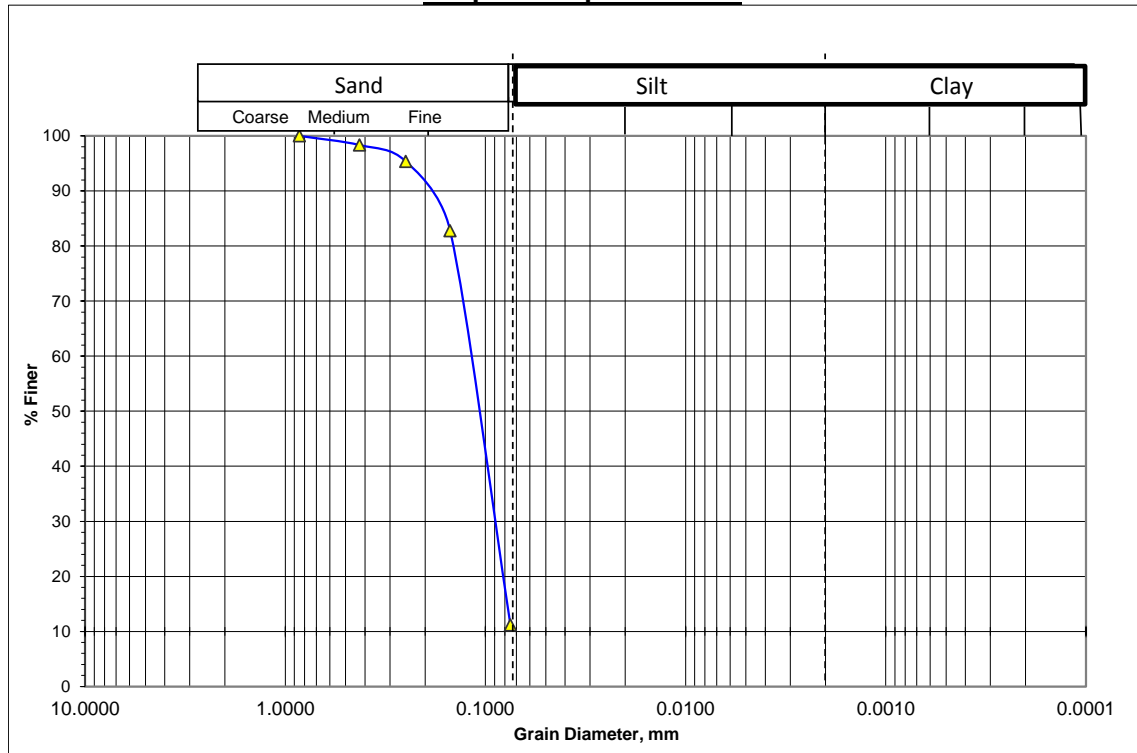
Sampled Date: 07/01/2016

Sample No : D-03

Test Date : 07/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 89

(0.005mm size) & (0.001mm size) = 11

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Khalilpur Bazar,Majchar

Bore Hole No: BH-F10

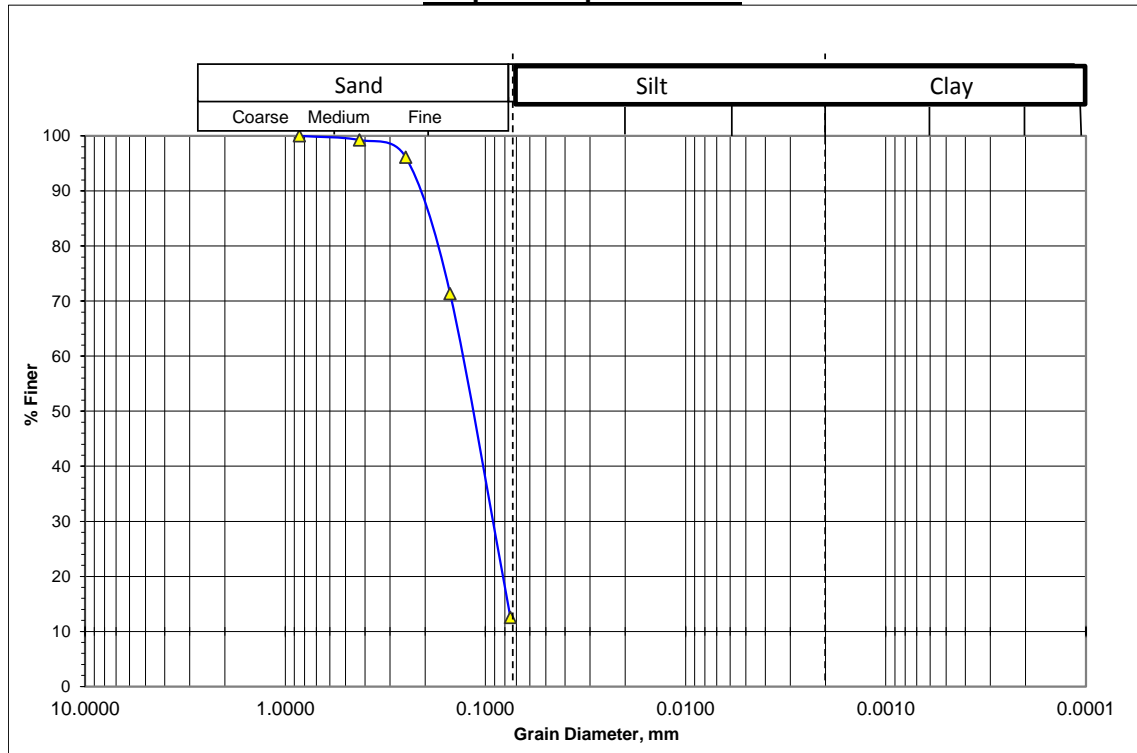
Sampled Date: 07/01/2016

Sample No : D-09

Test Date : 07/02/2016

Depth (m) : 13.5

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Khalilpur Bazar,Majchar

Bore Hole No: BH-F10

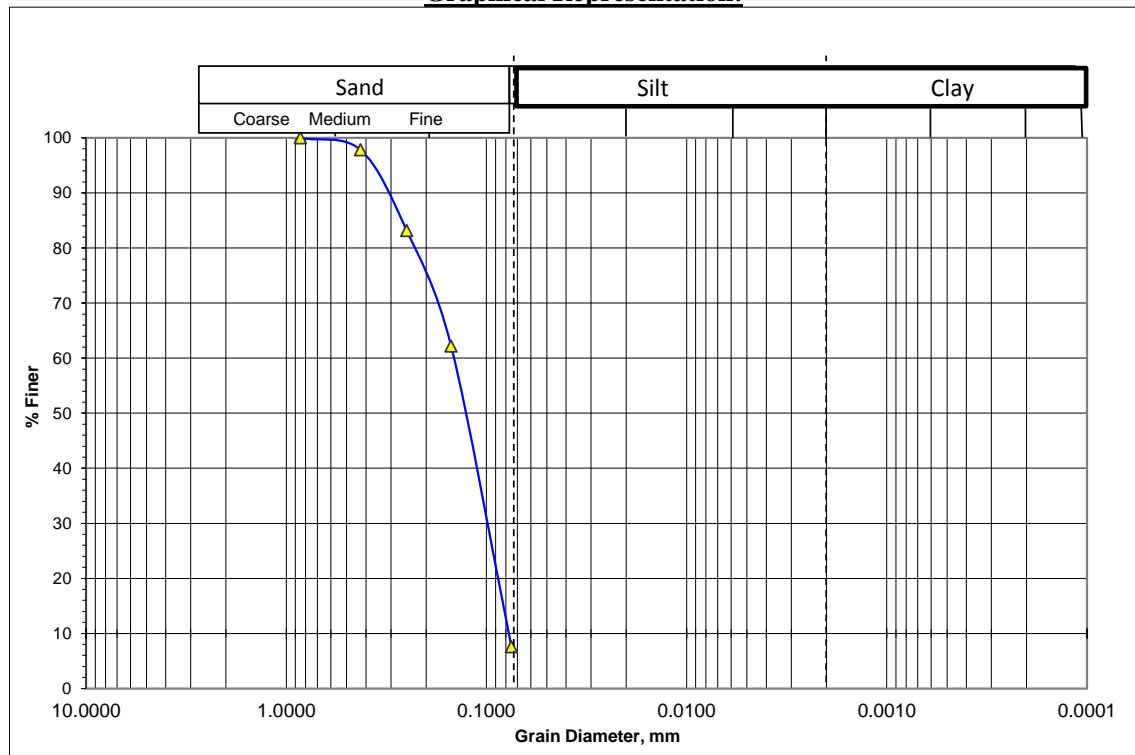
Sampled Date: 07/01/2016

Sample No : D-15

Test Date : 07/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar

Bore Hole No: BH-F11

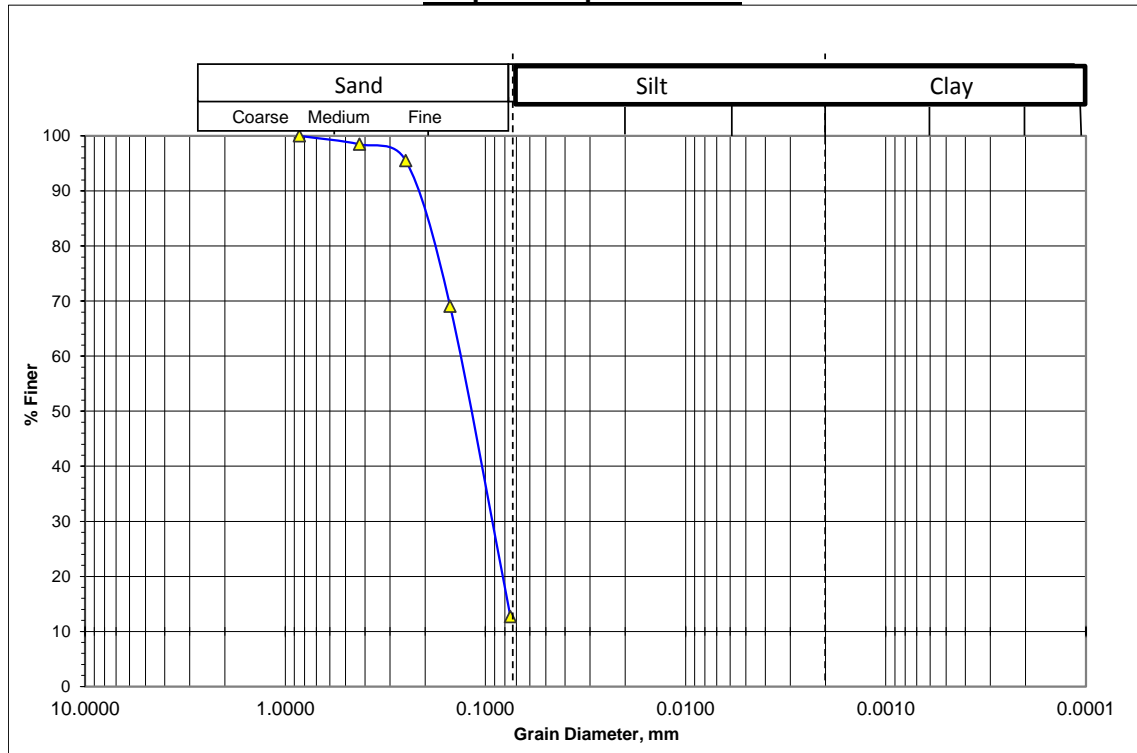
Sampled Date: 31/12/2015

Sample No : D-06

Test Date : 05/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.125$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.62$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 5 nos. Decreechar, Munshitanggi Aftabuddin Madrasha, Decreechar

Bore Hole No: BH-F11

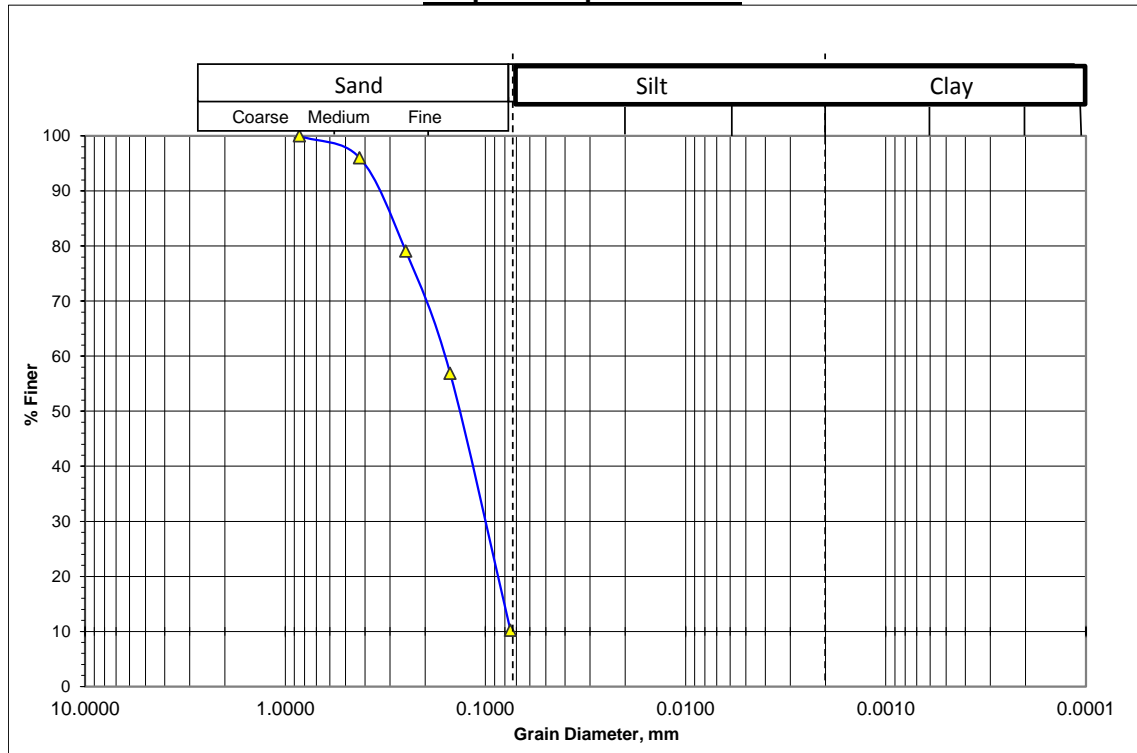
Sampled Date: 31/12/2015

Sample No : D-12

Test Date : 05/02/2016

Depth (m) : 18.0

Graphical Representation:



GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Yasin College, Faridpur Sadar

Bore Hole No: BH-F12

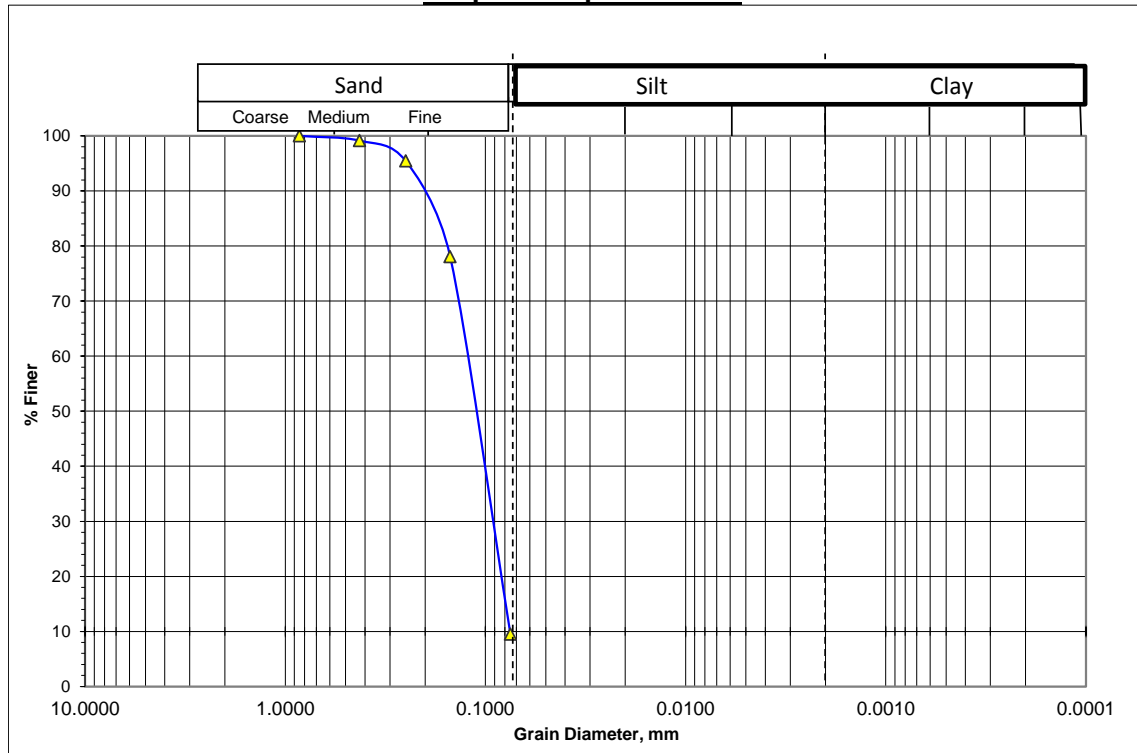
Sampled Date: 29/12/2015

Sample No : D-04

Test Date : 06/02/2016

Depth (m) : 6.0

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 91

(0.005mm size) & (0.001mm size) = 9

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Yasin College, Faridpur Sadar

Bore Hole No: BH-F12

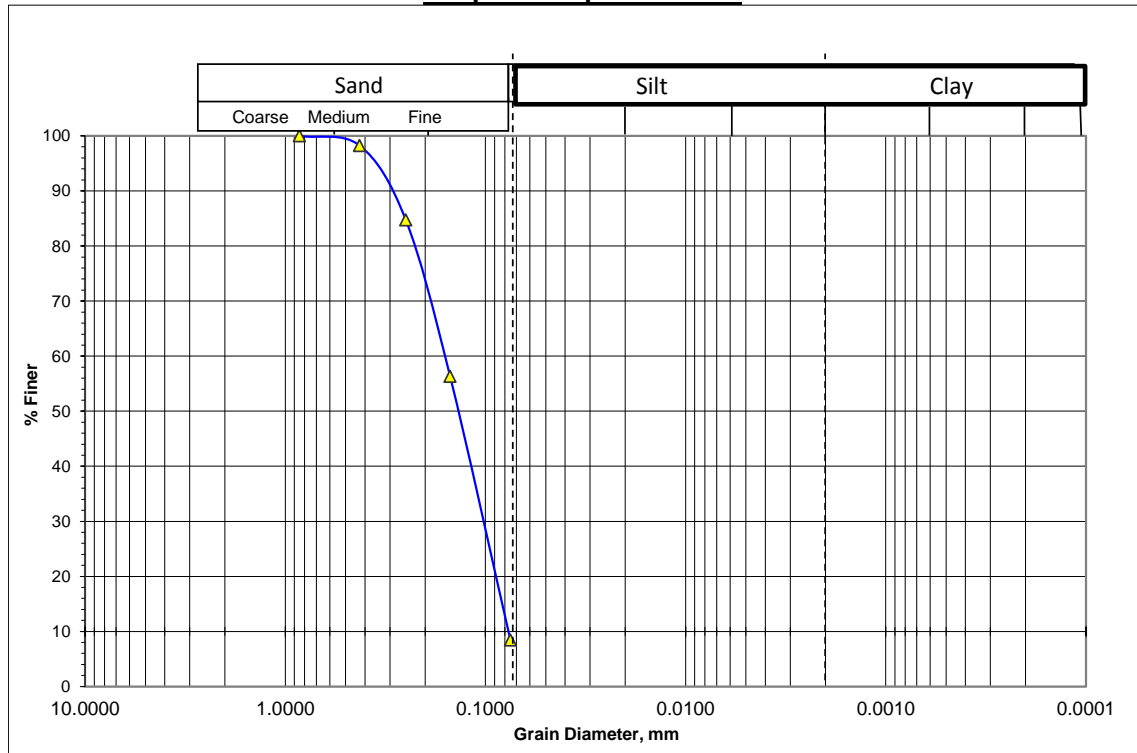
Sampled Date: 29/12/2015

Sample No : D-13

Test Date : 06/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Faridpur Zilla School field, Faridpur Sadar

Bore Hole No: BH-F13

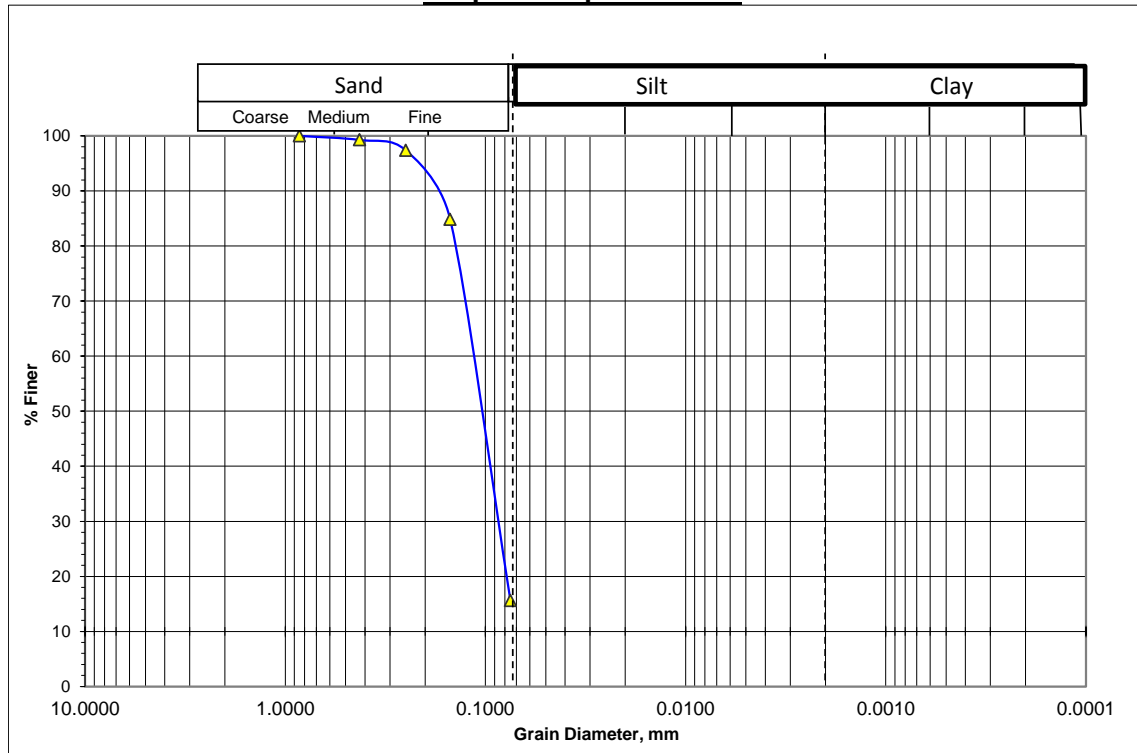
Sampled Date: 29/12/2015

Sample No : D-02

Test Date : 06/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.56$

% Particles (from the grain -size analysis graph

(0.075mm size) = 85

(0.005mm size) & (0.001mm size) = 15

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Faridpur Zilla School field, Faridpur Sadar

Bore Hole No: BH-F13

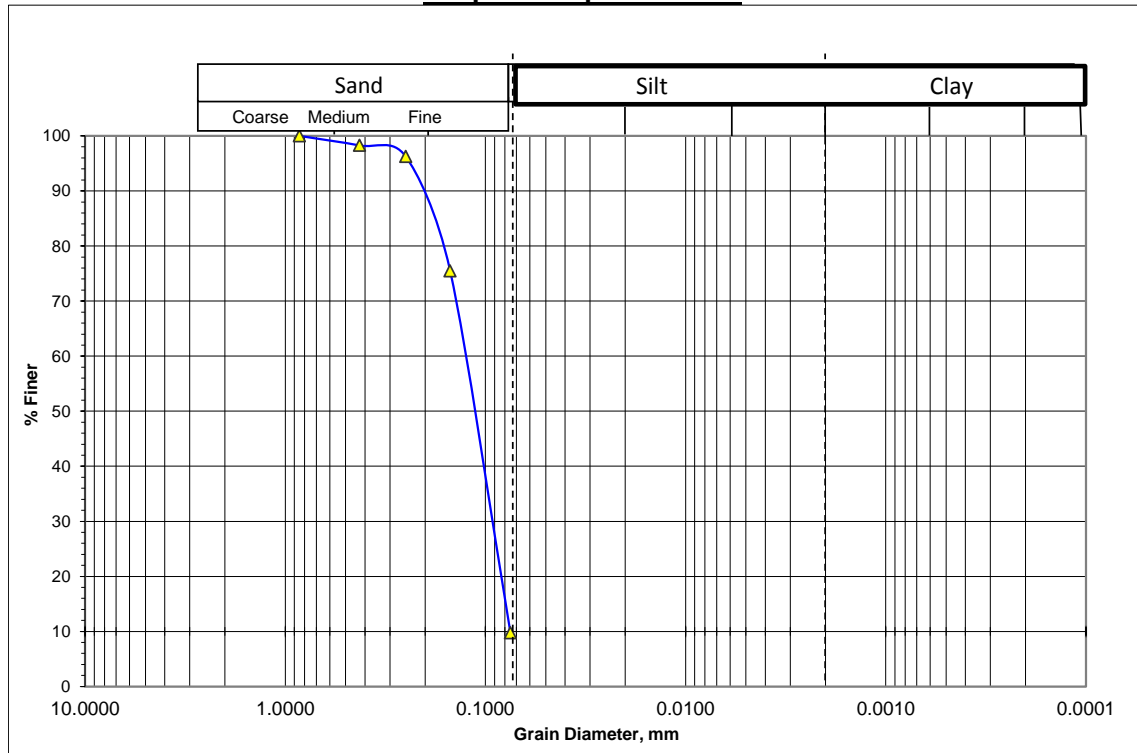
Sampled Date: 29/12/2015

Sample No : D-07

Test Date : 06/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 91

(0.005mm size) & (0.001mm size) = 9

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Faridpur Zilla School field, Faridpur Sadar

Bore Hole No: BH-F13

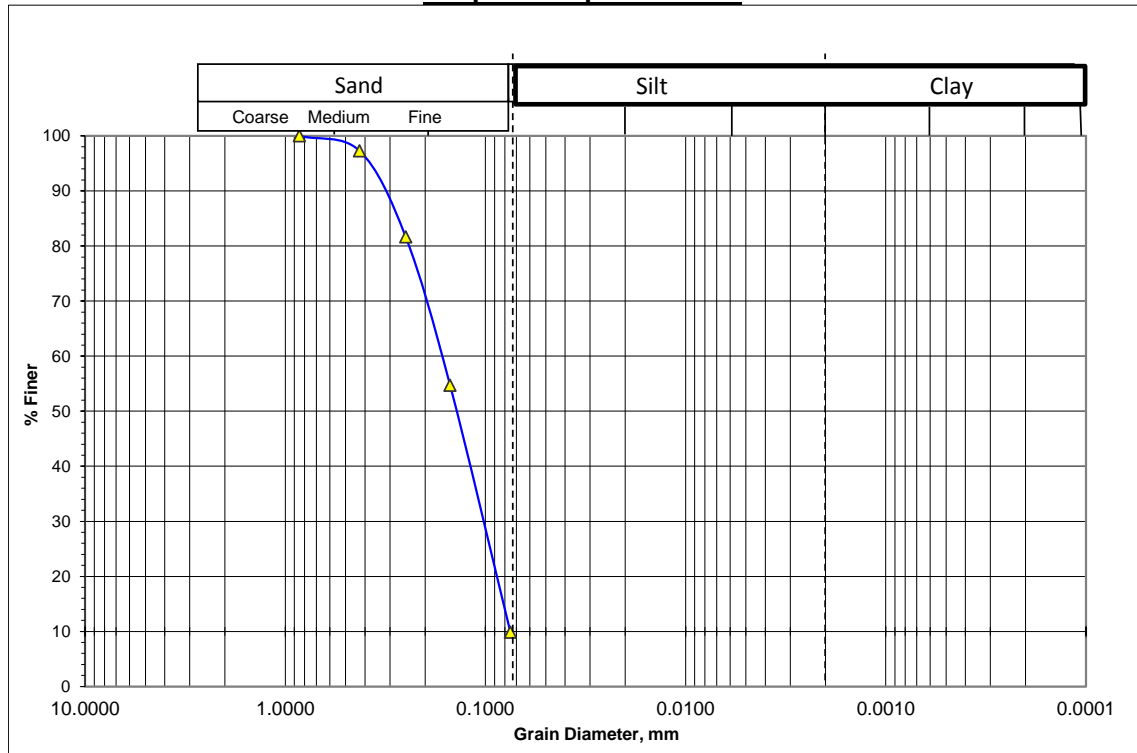
Sampled Date: 29/12/2015

Sample No : D-14

Test Date : 06/02/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.68$

% Particles (from the grain -size analysis graph

(0.075mm size) = 91

(0.005mm size) & (0.001mm size) = 9

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vajon Dangga Govt. Primary School, Faridpur Sadar

Bore Hole No: BH-F14

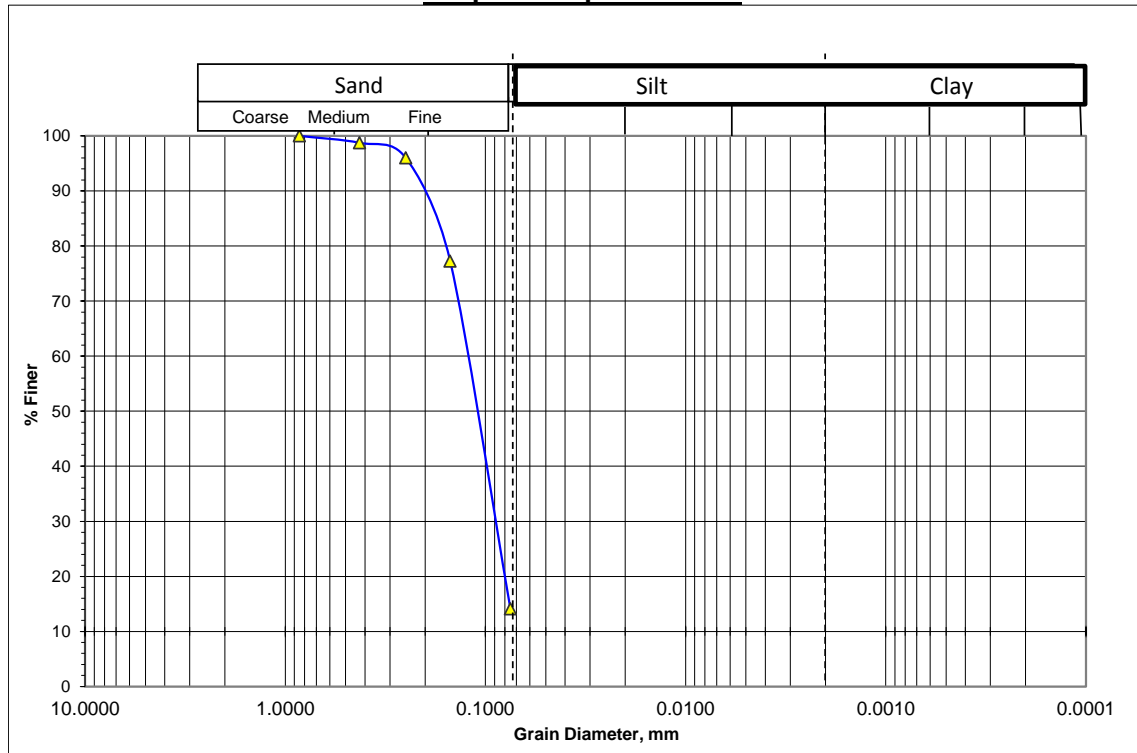
Sampled Date: 31/12/2015

Sample No : D-08

Test Date : 06/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 14

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 86

(0.005mm size) & (0.001mm size) = 14

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vajon Dangga Govt. Primary School, Faridpur Sadar

Bore Hole No: BH-F14

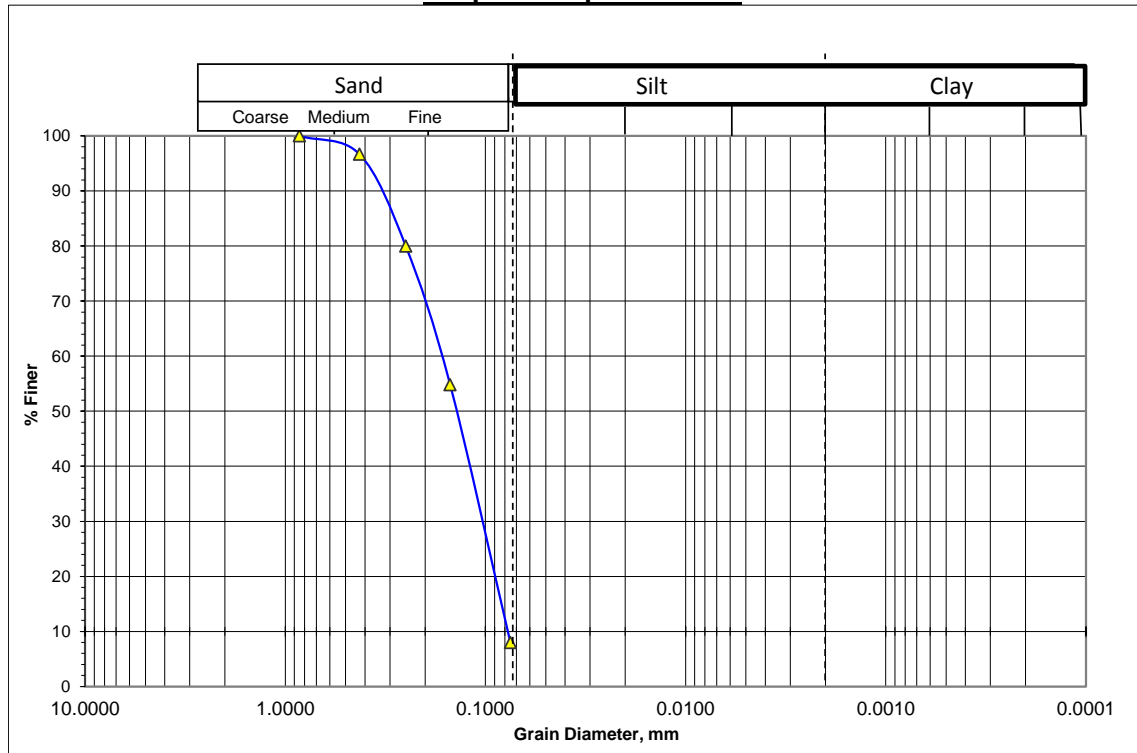
Sampled Date: 31/12/2015

Sample No : D-16

Test Date : 06/02/2016

Depth (m) : 24.0

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.68$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Bore Hole No: BH-F15

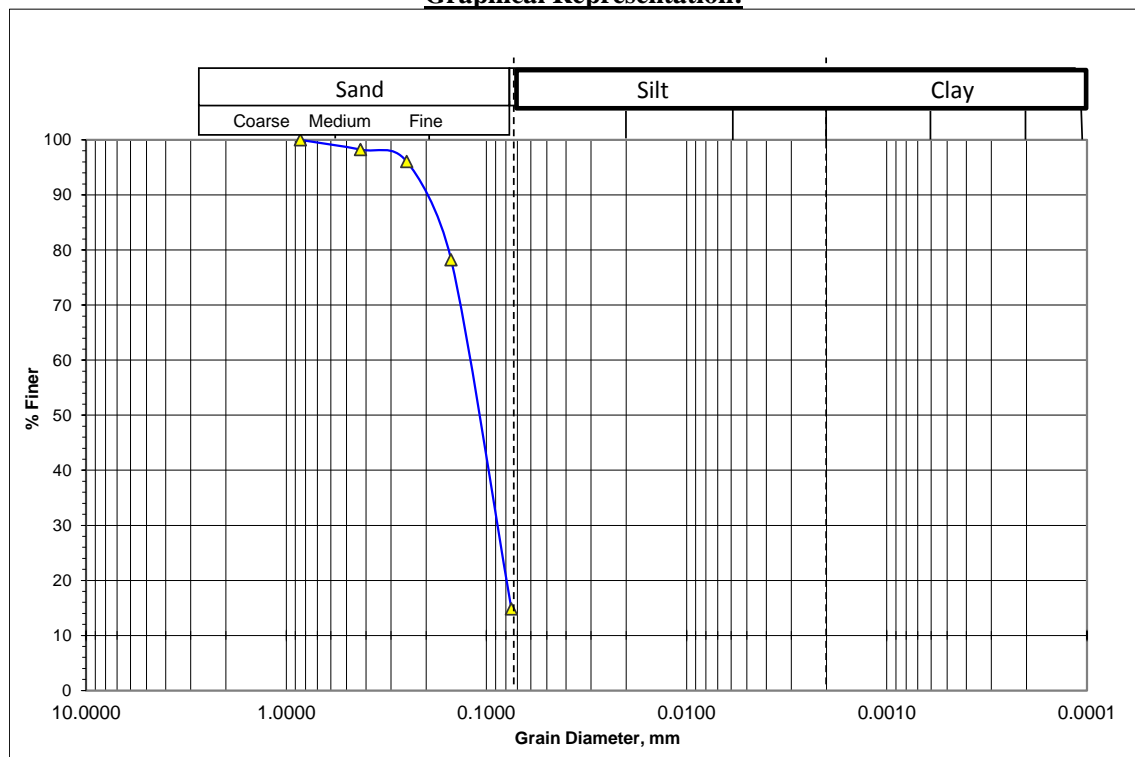
Sampled Date: 30/12/2015

Sample No : D-06

Test Date : 06/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 14

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 86

(0.005mm size) & (0.001mm size) = 14

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Bore Hole No: BH-F15

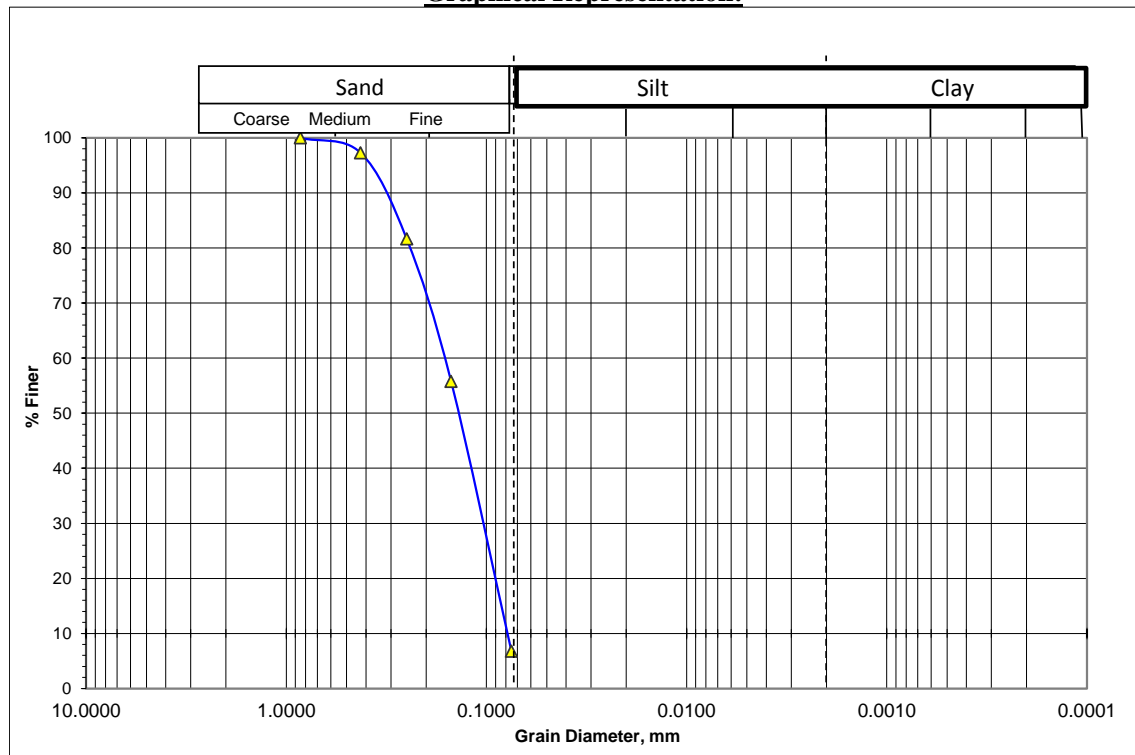
Sampled Date: 30/12/2015

Sample No : D-12

Test Date : 06/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Bore Hole No: BH-F16

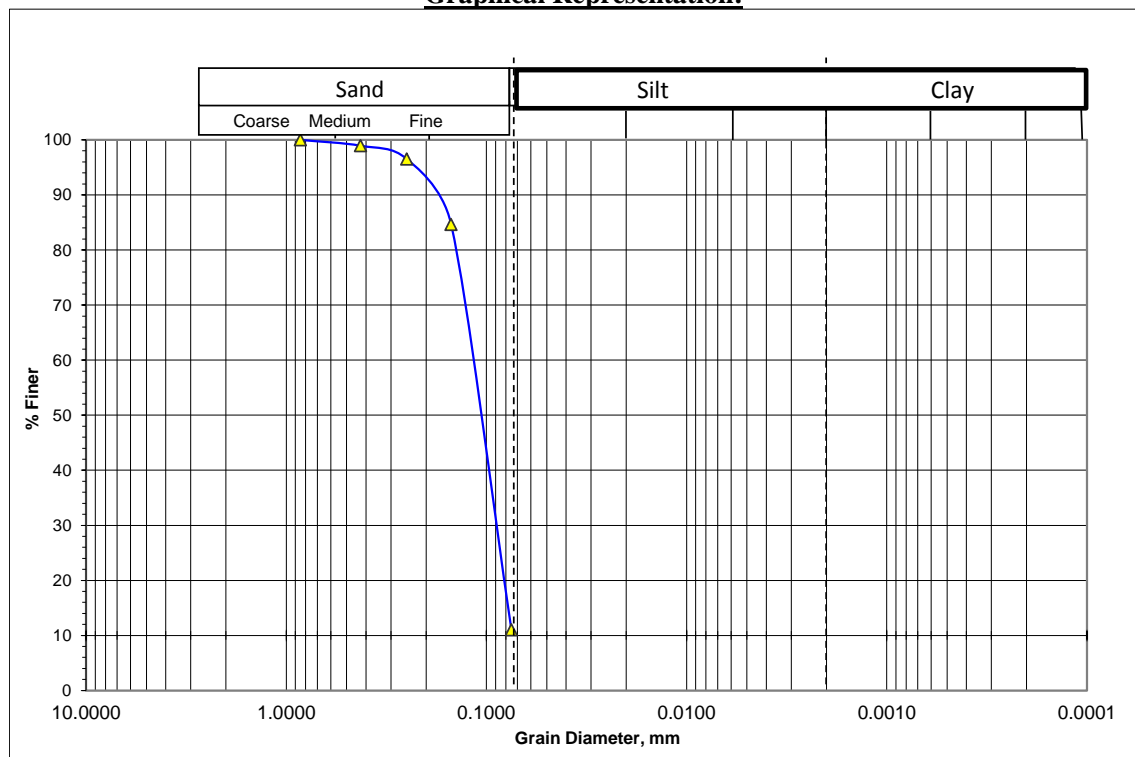
Sampled Date: 30/12/2015

Sample No : D-06

Test Date : 07/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 89

(0.005mm size) & (0.001mm size) = 11

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Bore Hole No: BH-F16

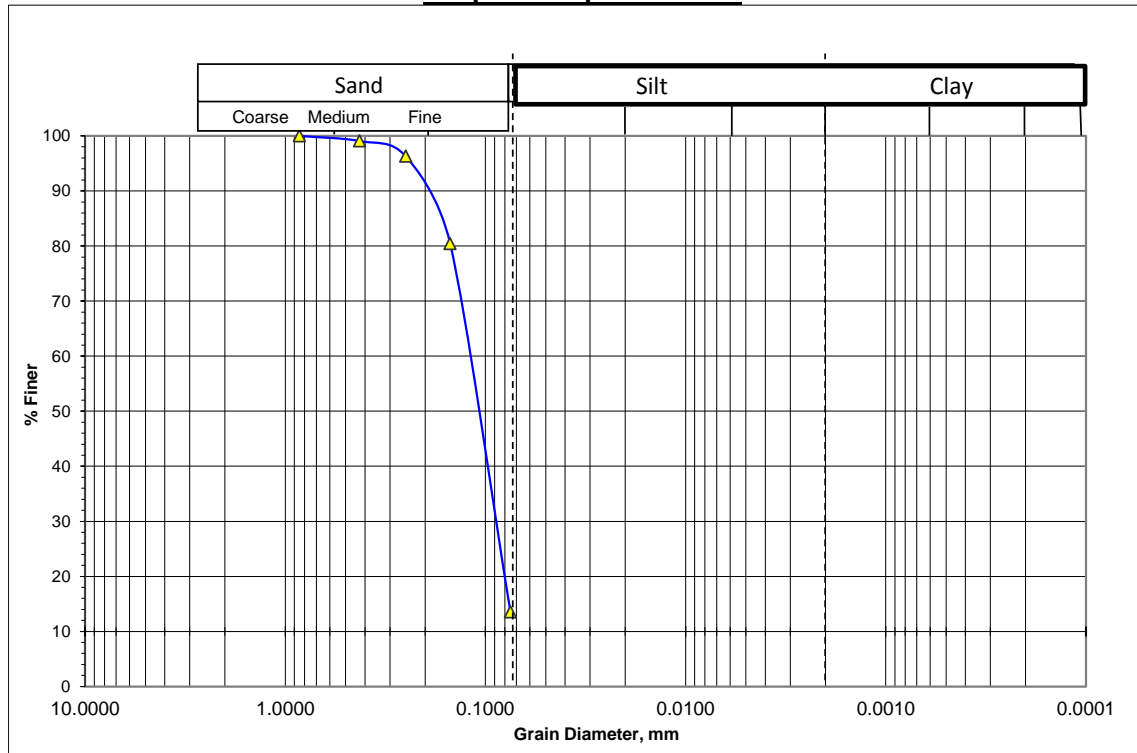
Sample Date: 30/12/2015

Sample No : D-15

Test Date : 07/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Raghu Nandanpur Madrasha, Ambikapur

Bore Hole No: BH-F18

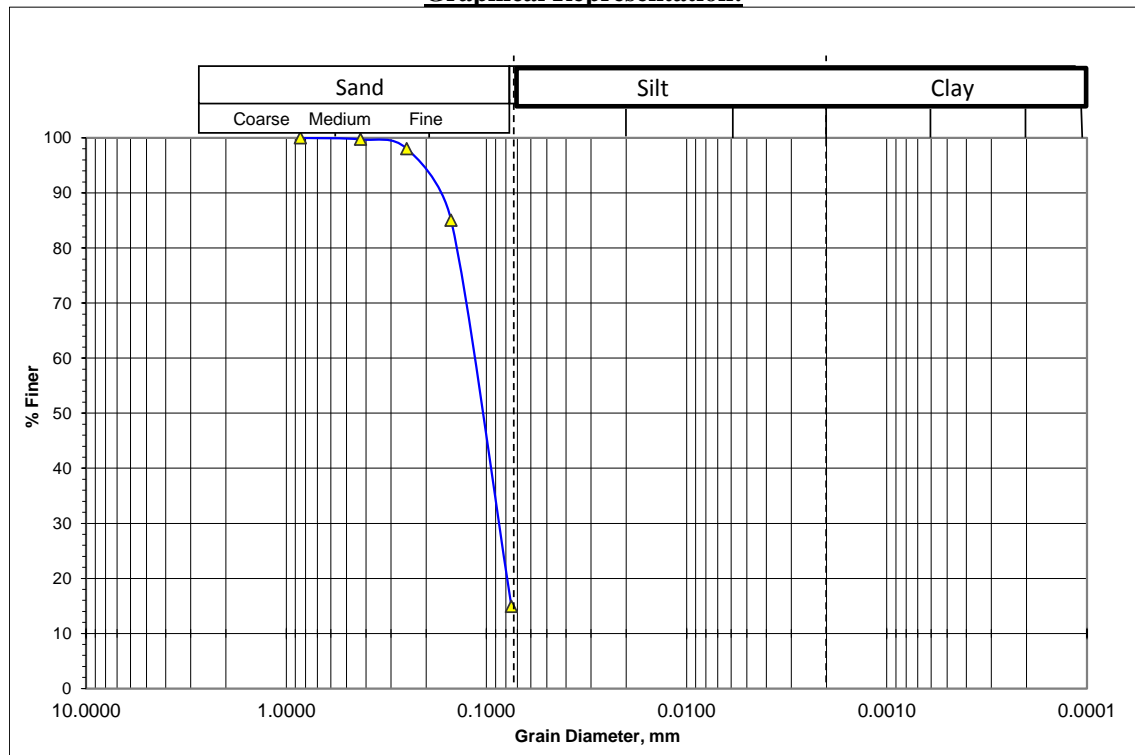
Sampled Date: 28/12/2015

Sample No : D-04

Test Date : 07/02/2016

Depth (m) : 6.0

Graphical Representation:



Fines or % of silt and clay = 14

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 86

(0.005mm size) & (0.001mm size) = 14

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Raghu Nandanpur Madrasha, Ambikapur

Bore Hole No: BH-F18

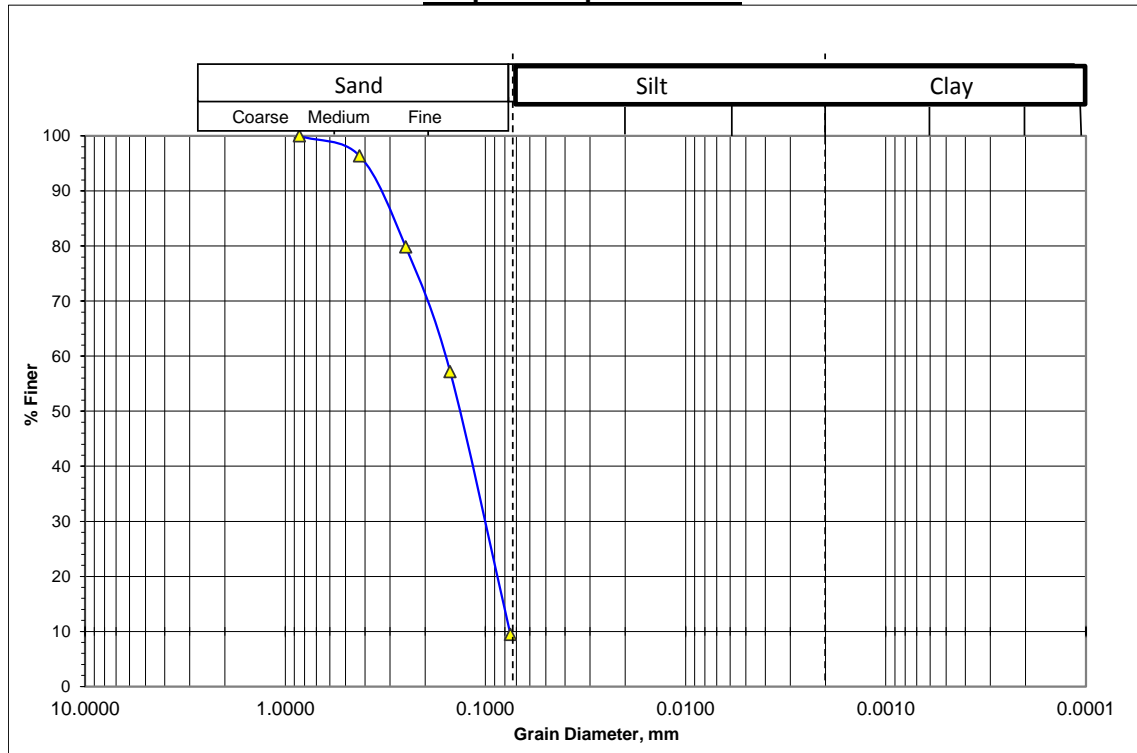
Sampled Date: 28/12/2015

Sample No : D-13

Test Date : 07/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 91

(0.005mm size) & (0.001mm size) = 9

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Porunpur Govt. Primary School, Porunpur Bazar, Majchar

Bore Hole No: BH-F19

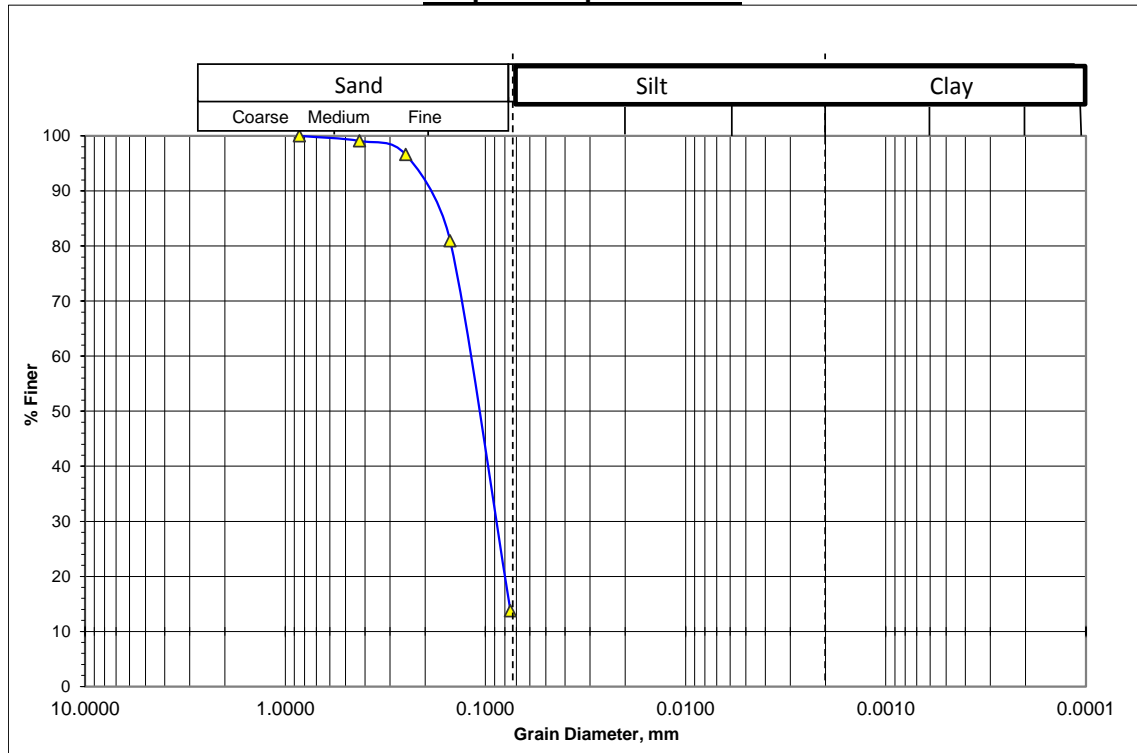
Sampled Date: 06/01/2016

Sample No : D-07

Test Date : 07/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Porunpur Govt. Primary School, Porunpur Bazar, Majchar

Bore Hole No: BH-F19

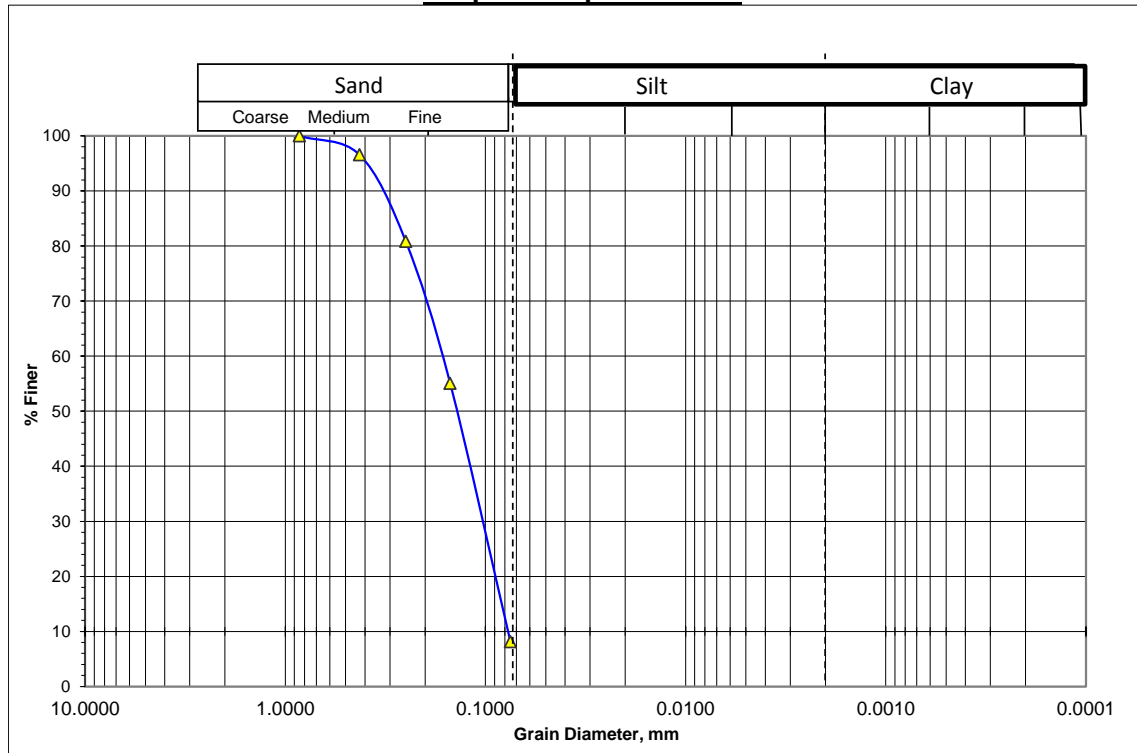
Sampled Date: 06/01/2016

Sample No : D-14

Test Date : 07/02/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, D_{50} = 0.15 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.68

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hadhokandi Govt. Primary School, River Research Institute, Kaijuri

Bore Hole No: BH-F20

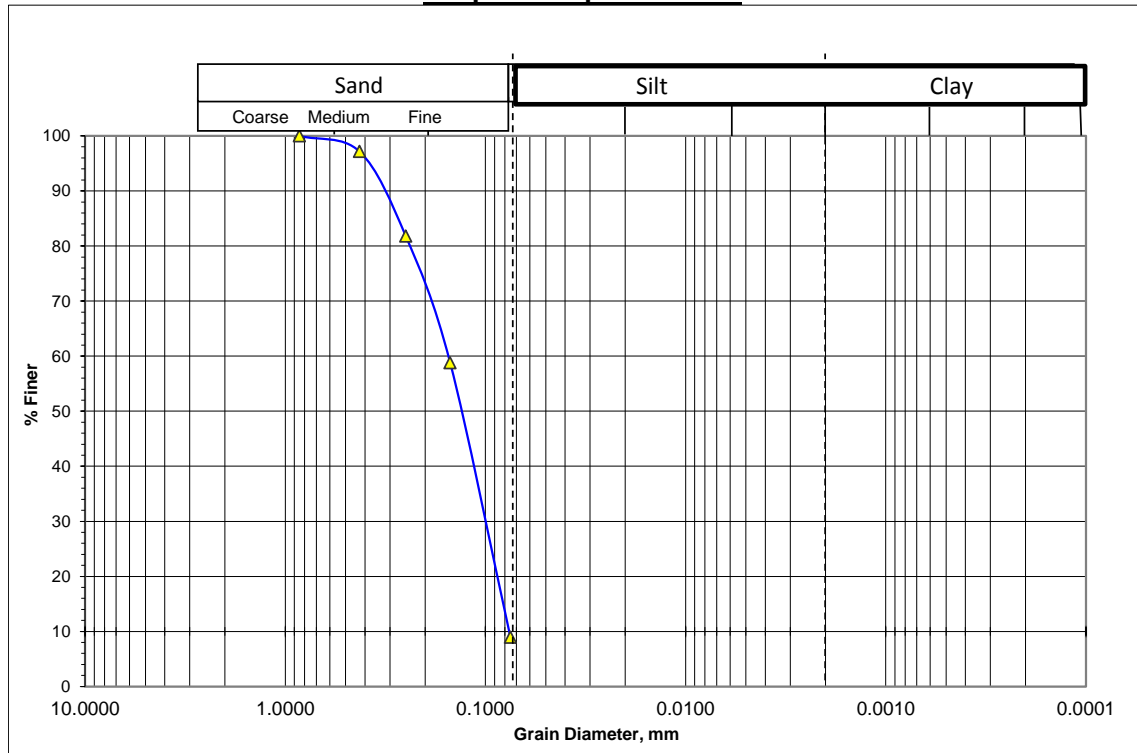
Sampled Date: 01/01/2016

Sample No : D-11

Test Date : 07/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.65$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Johora Begum High School Field, Parchim Khabashpur, Faridpur Sadar

Bore Hole No: BH-F21

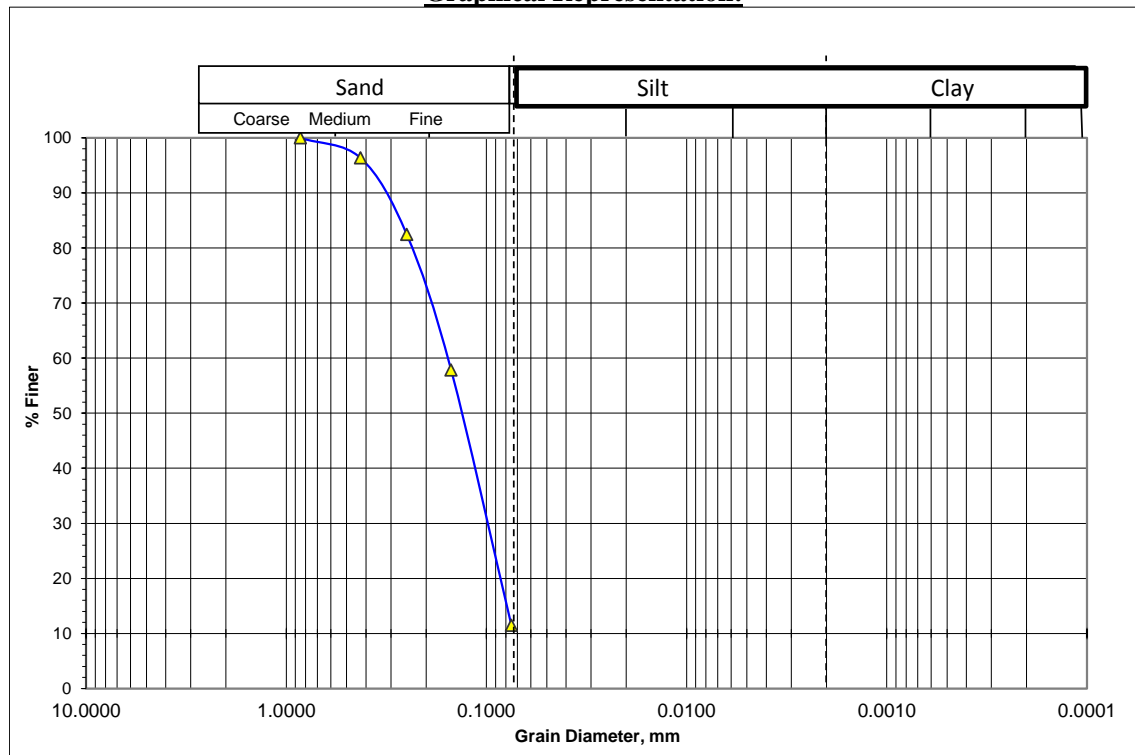
Sampled Date: 27/12/2015

Sample No : D-13

Test Date : 07/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 89

(0.005mm size) & (0.001mm size) = 11

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar

Bore Hole No: BH-F22

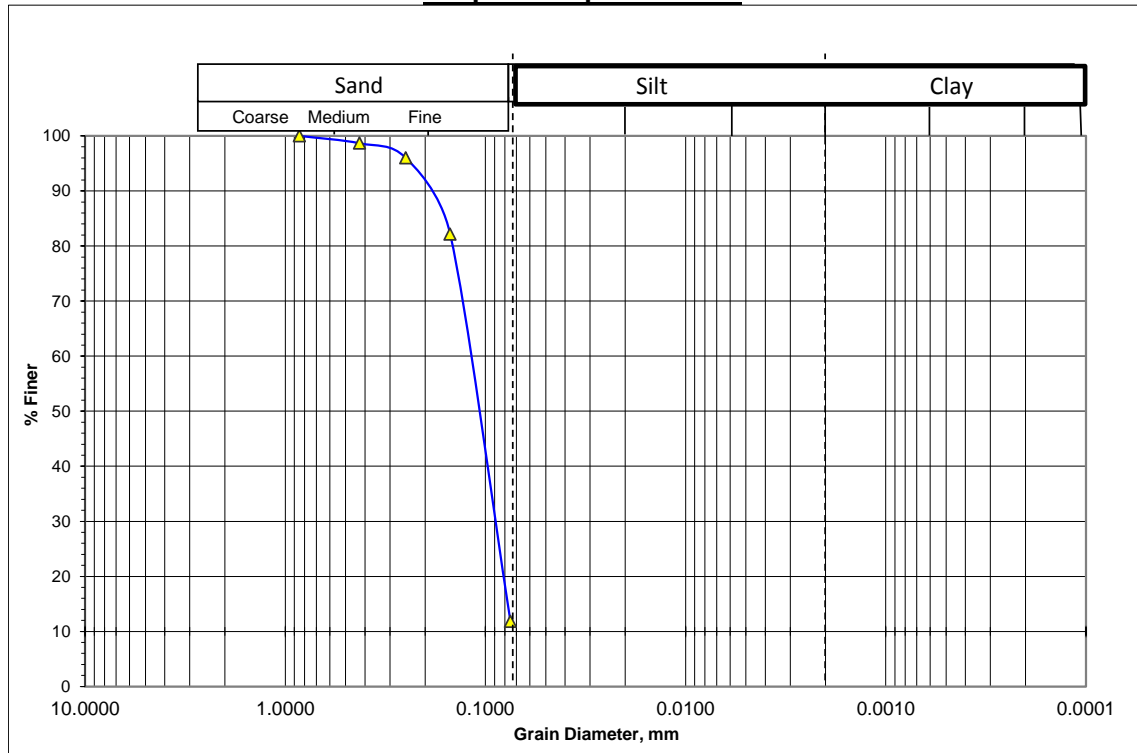
Sample Date: 29/12/2015

Sample No : D-08

Test Date : 07/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Choyata, Aliabad

Bore Hole No: BH-F23

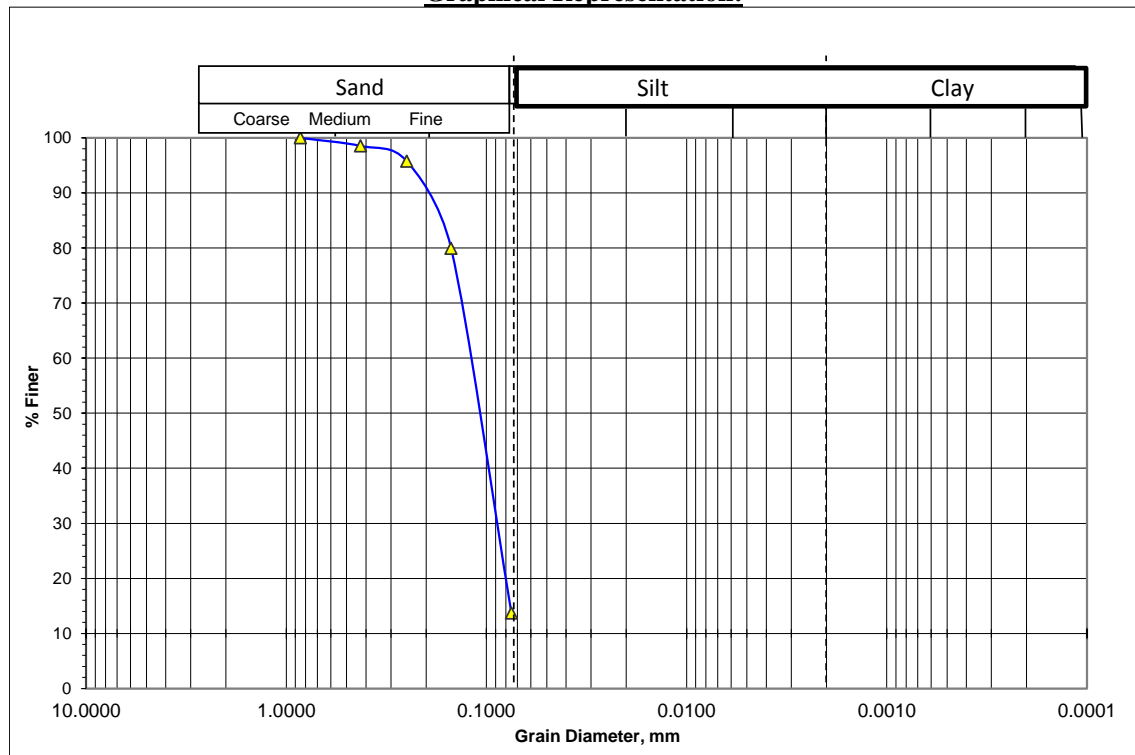
Sampled Date: 31/12/2015

Sample No : D-05

Test Date : 09/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Choyata, Aliabad

Bore Hole No: BH-F23

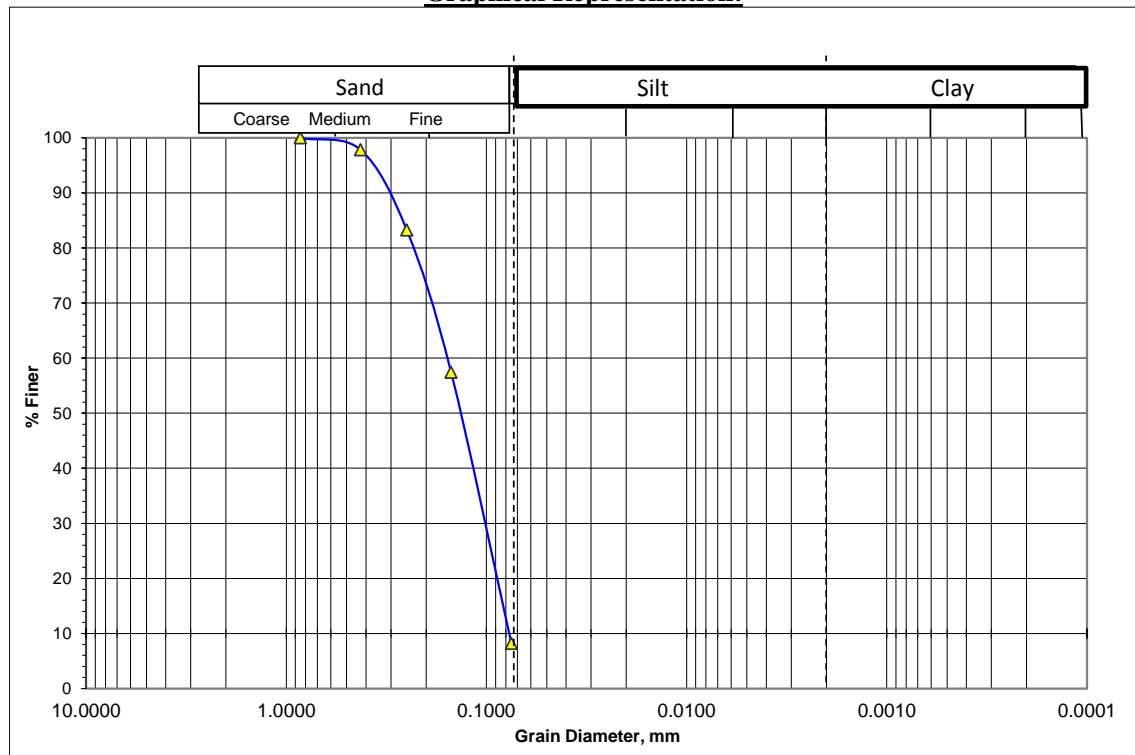
Sampled Date: 31/12/2015

Sample No : D-13

Test Date : 09/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 8

Mean Diameter, $D_{50} = 0.14$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.66$

% Particles (from the grain -size analysis graph

(0.075mm size) = 92

(0.005mm size) & (0.001mm size) = 8

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Payarpur Godaoun, Kaijuri

Bore Hole No: BH-F24

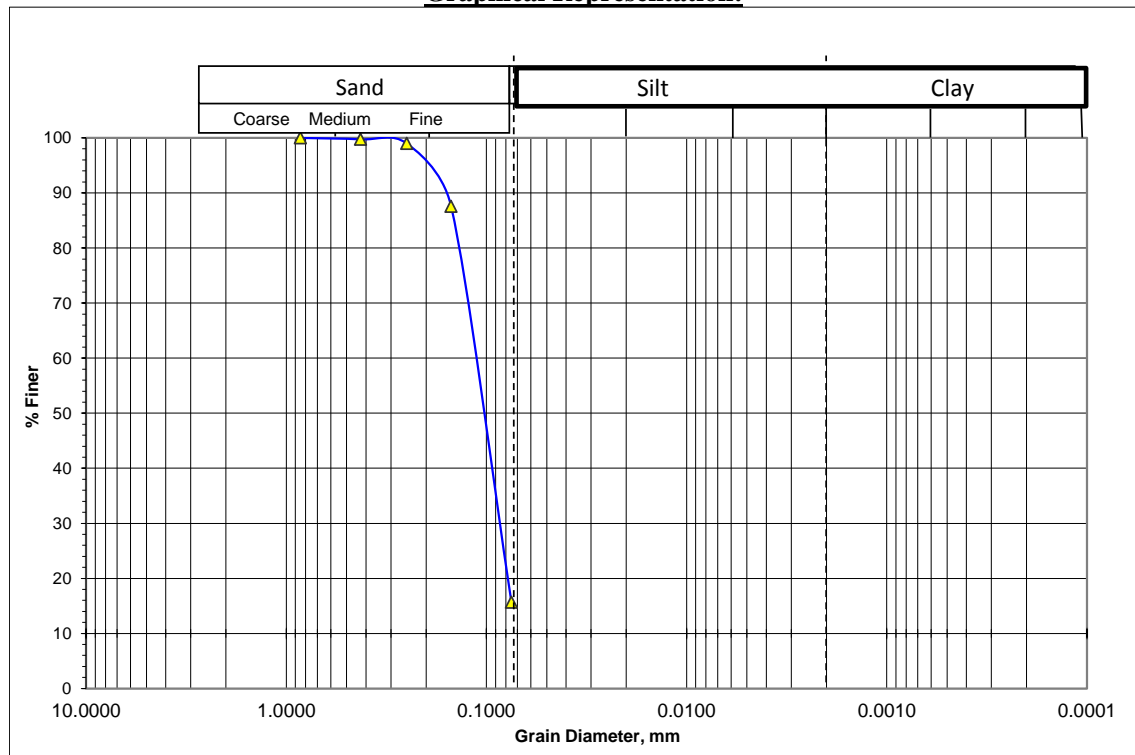
Sampled Date: 02/01/2016

Sample No : D-03

Test Date : 08/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 16

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.56$

% Particles (from the grain -size analysis graph

(0.075mm size) = 84

(0.005mm size) & (0.001mm size) = 16

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Payarpur Godaoun, Kaijuri

Bore Hole No: BH-F24

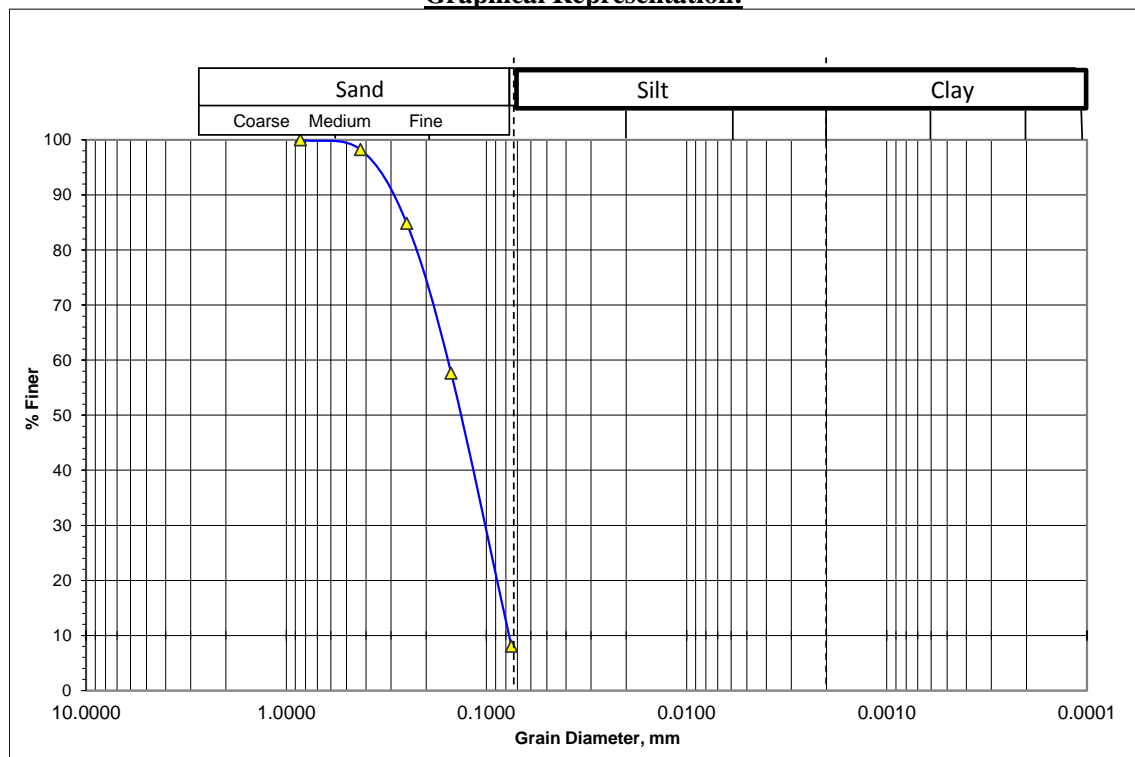
Sampled Date: 02/01/2016

Sample No : D-15

Test Date : 08/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.65$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

Bore Hole No: BH-F25

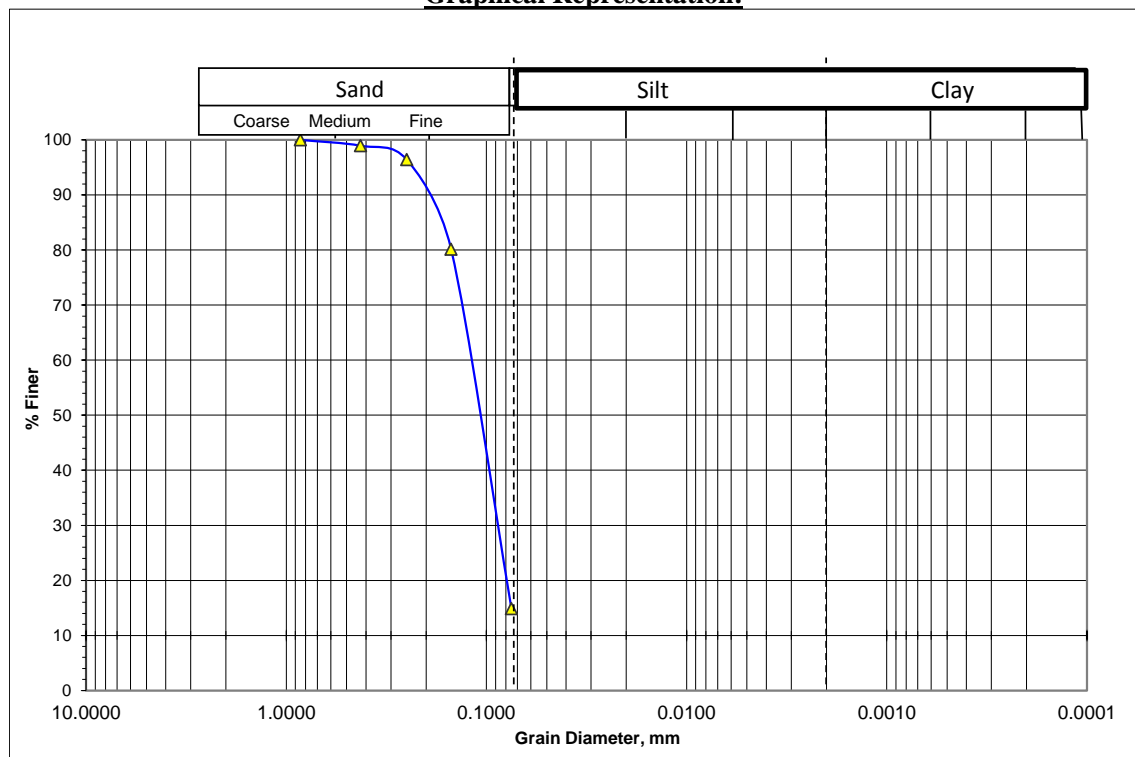
Sampled Date: 04/01/2016

Sample No : D-16

Test Date : 08/02/2016

Depth (m) : 24.0

Graphical Representation:



Fines or % of silt and clay = 14

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 86

(0.005mm size) & (0.001mm size) = 14

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gobinddapur Hat, Krishnanagar

Bore Hole No: BH-F26

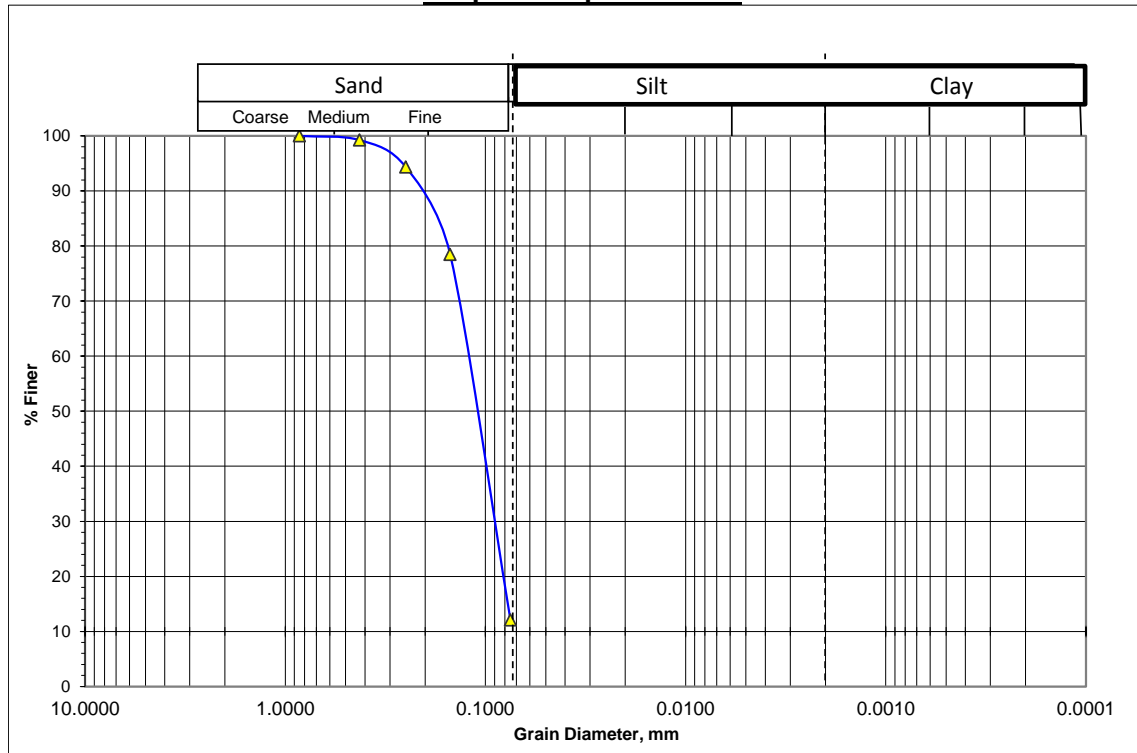
Sampled Date: 04/01/2016

Sample No : D-06

Test Date : 09/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gobinddapur Hat, Krishnanagar

Bore Hole No: BH-F26

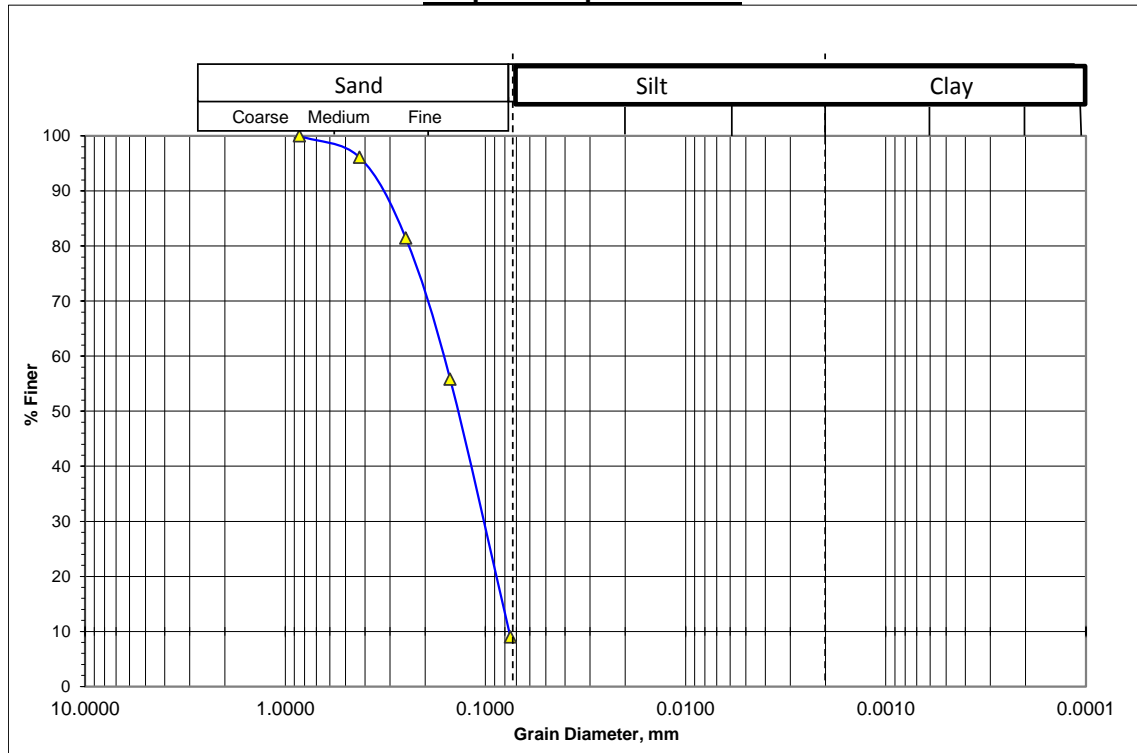
Sampled Date: 04/01/2016

Sample No : D-12

Test Date : 09/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 91

(0.005mm size) & (0.001mm size) = 9

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Bakhunda College Field, Bakhunda, Greda

Bore Hole No: BH-F27

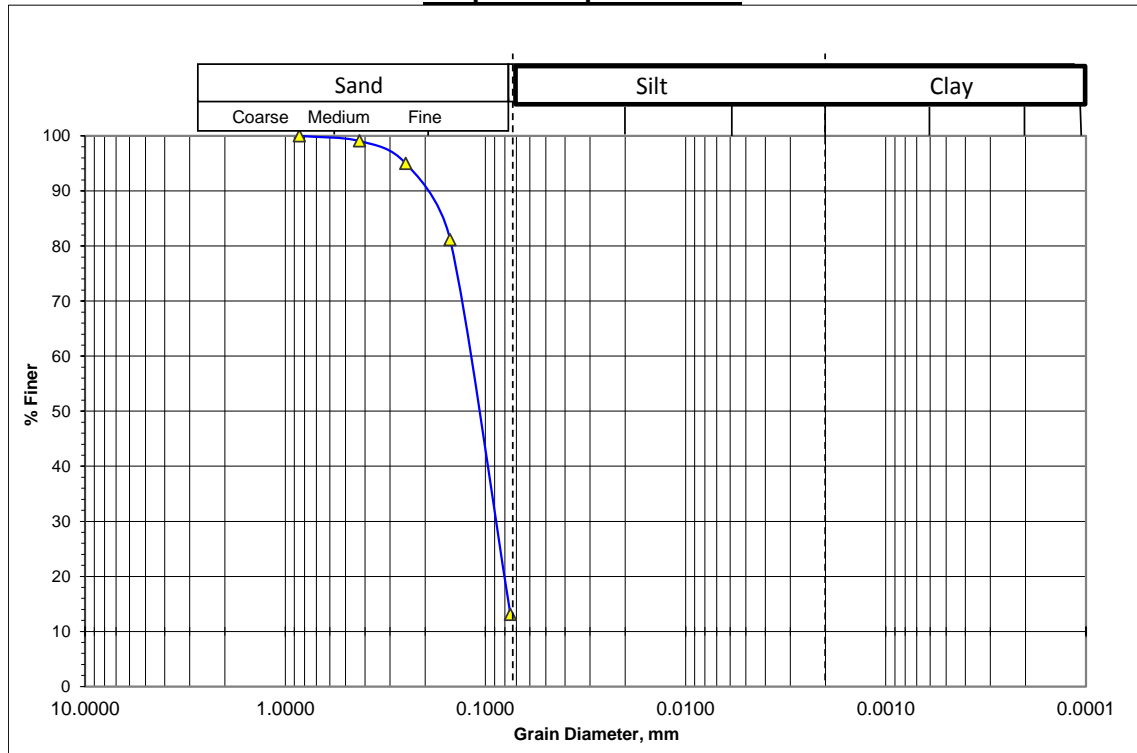
Sampled Date: 02/01/2016

Sample No : D-12

Test Date : 08/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Bakhunda College Field, Bakhunda, Greda

Bore Hole No: BH-F27

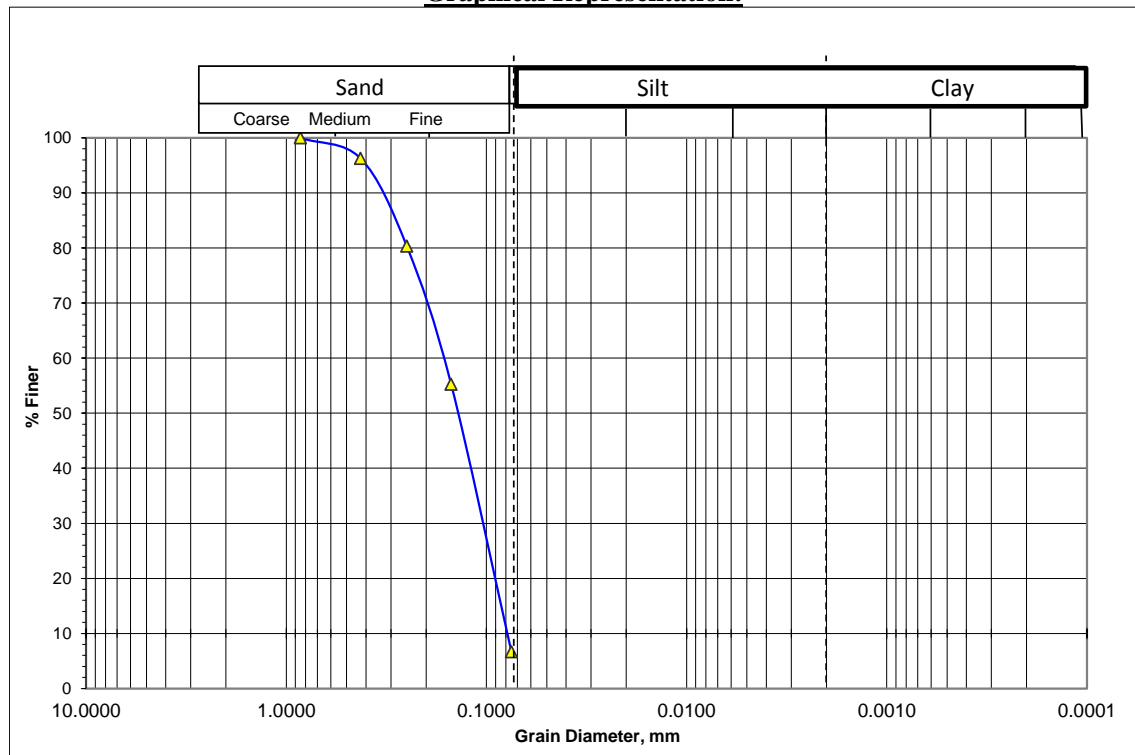
Sampled Date: 02/01/2016

Sample No : D-19

Test Date : 08/02/2016

Depth (m) : 28.5

Graphical Representation:



Fines or % of silt and clay = 6

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.68$

% Particles (from the grain -size analysis graph

(0.075mm size) = 94

(0.005mm size) & (0.001mm size) = 6

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chacia fokirbari Road, Kaijuri

Bore Hole No: BH-F28

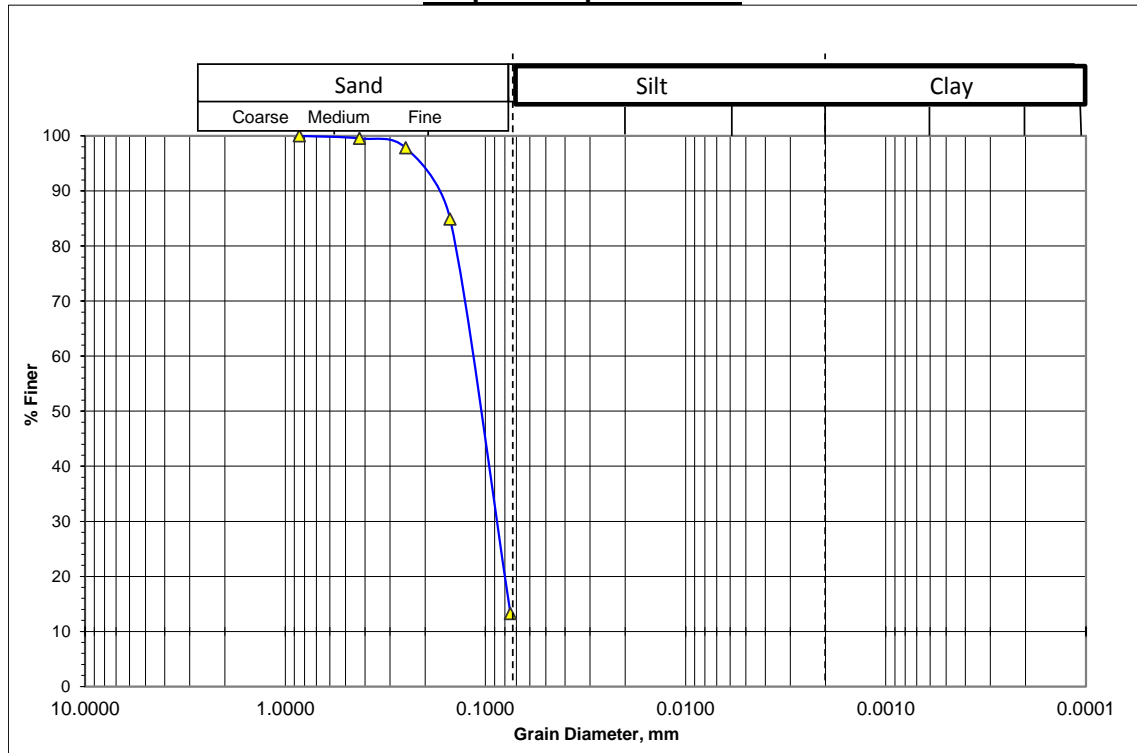
Sampled Date: 02/01/2016

Sample No : D-03

Test Date : 09/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chacia fokirbari Road, Kaijuri

Bore Hole No: BH-F28

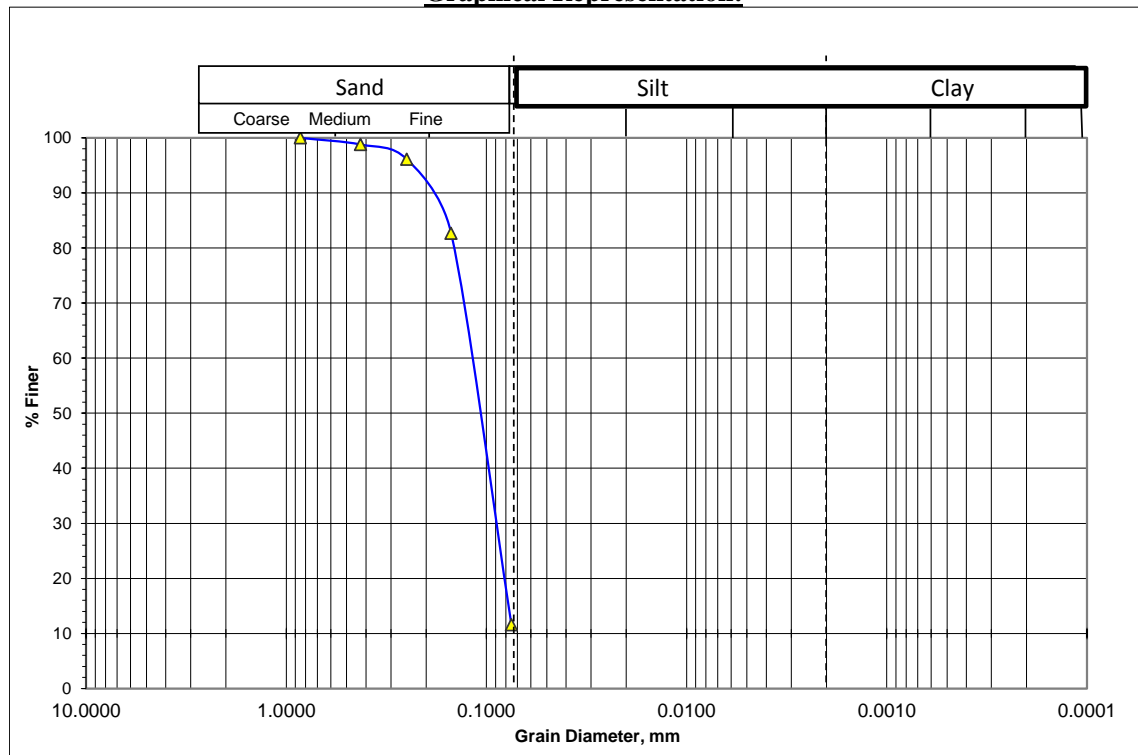
Sampled Date: 02/01/2016

Sample No : D-11

Test Date : 09/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 89

(0.005mm size) & (0.001mm size) = 11

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chacia fokirbari Road, Kaijuri

Bore Hole No: BH-F28

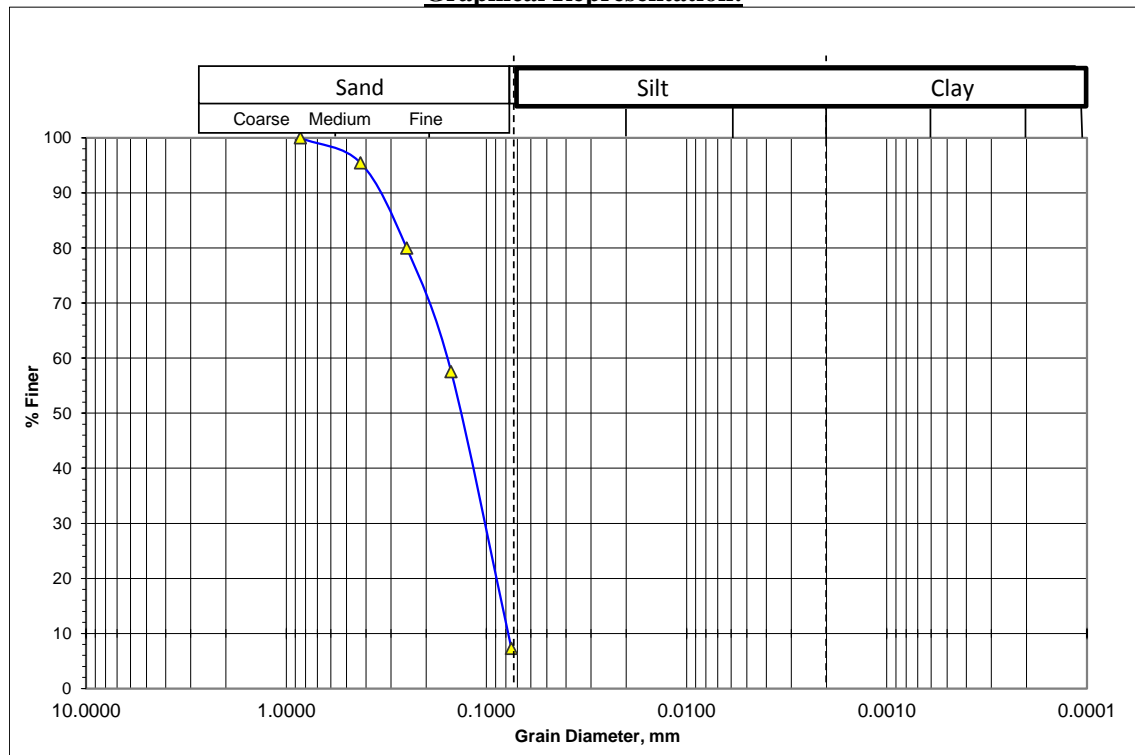
Sampled Date: 02/01/2016

Sample No : D-16

Test Date : 09/02/2016

Depth (m) : 24.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 93

(0.005mm size) & (0.001mm size) = 7

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Kanaipur Akhak Centre, Kanaipur

Bore Hole No: BH-F29

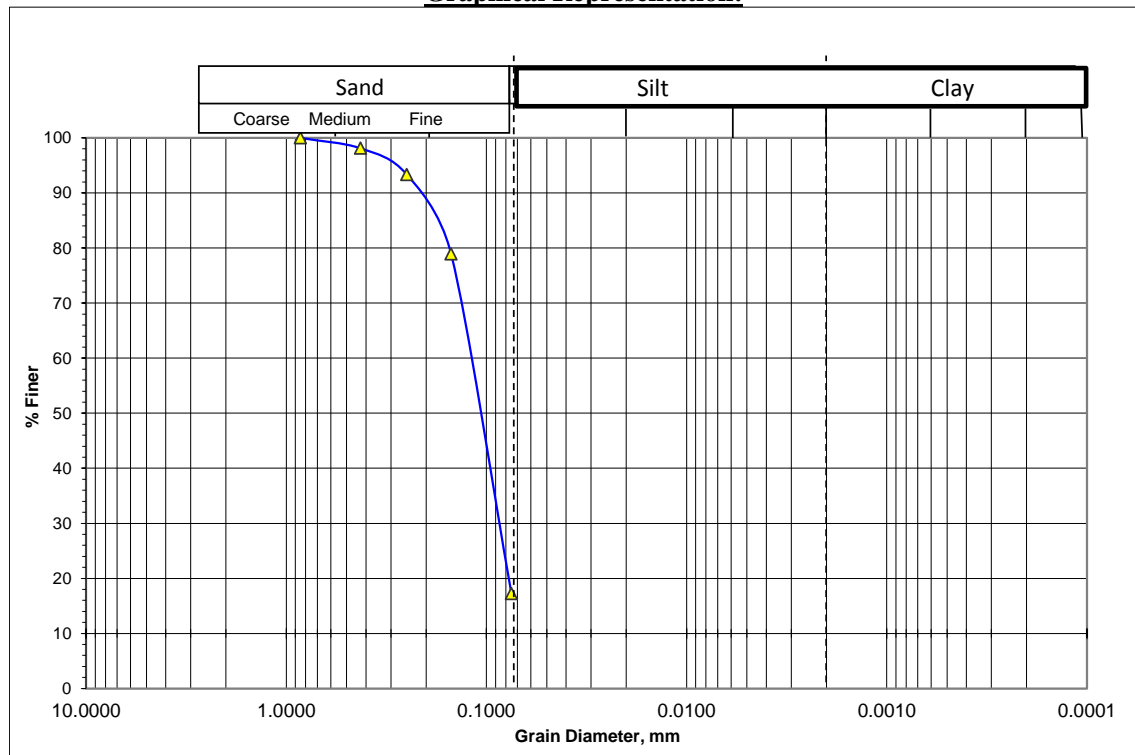
Sampled Date: 04/01/2016

Sample No : D-07

Test Date : 09/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 17

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.57$

% Particles (from the grain -size analysis graph

(0.075mm size) = 83

(0.005mm size) & (0.001mm size) = 17

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Kanaipur Akhak Centre, Kanaipur

Bore Hole No: BH-F29

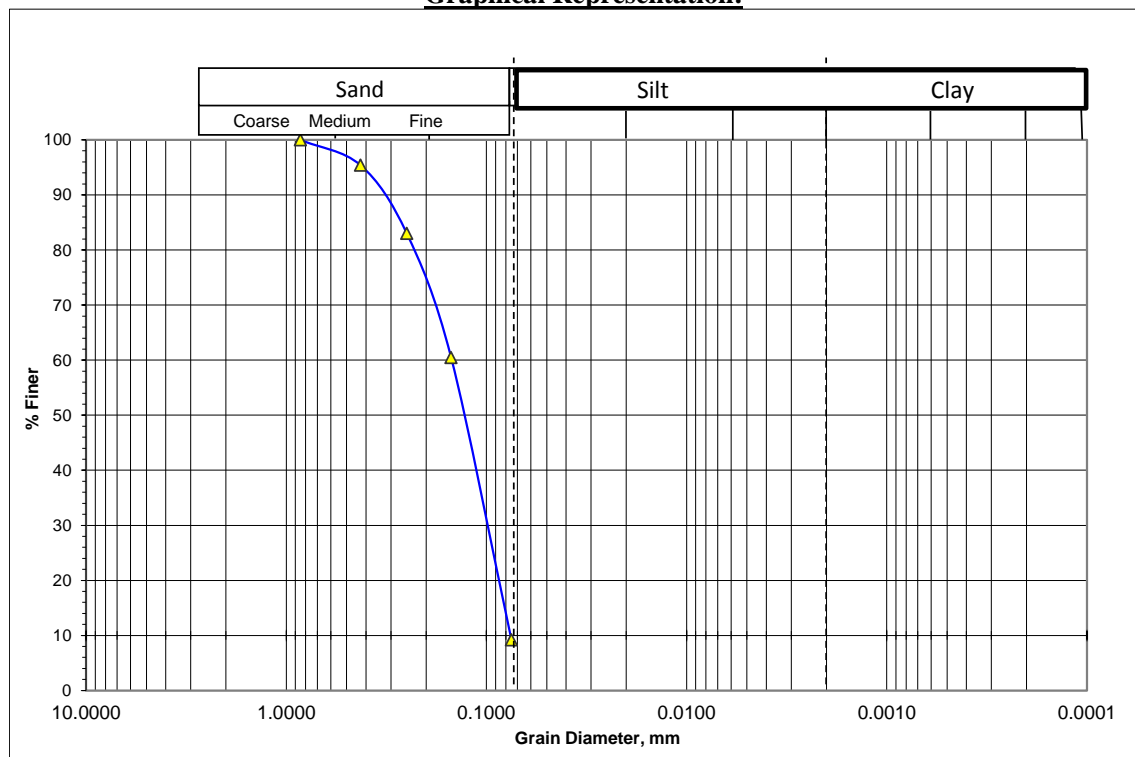
Sampled Date: 04/01/2016

Sample No : D-15

Test Date : 09/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 10

Mean Diameter, D_{50} = 0.14 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.66

% Particles (from the grain -size analysis graph

(0.075mm size) = 90

(0.005mm size) & (0.001mm size) = 10

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Bore Hole No: BH-F30

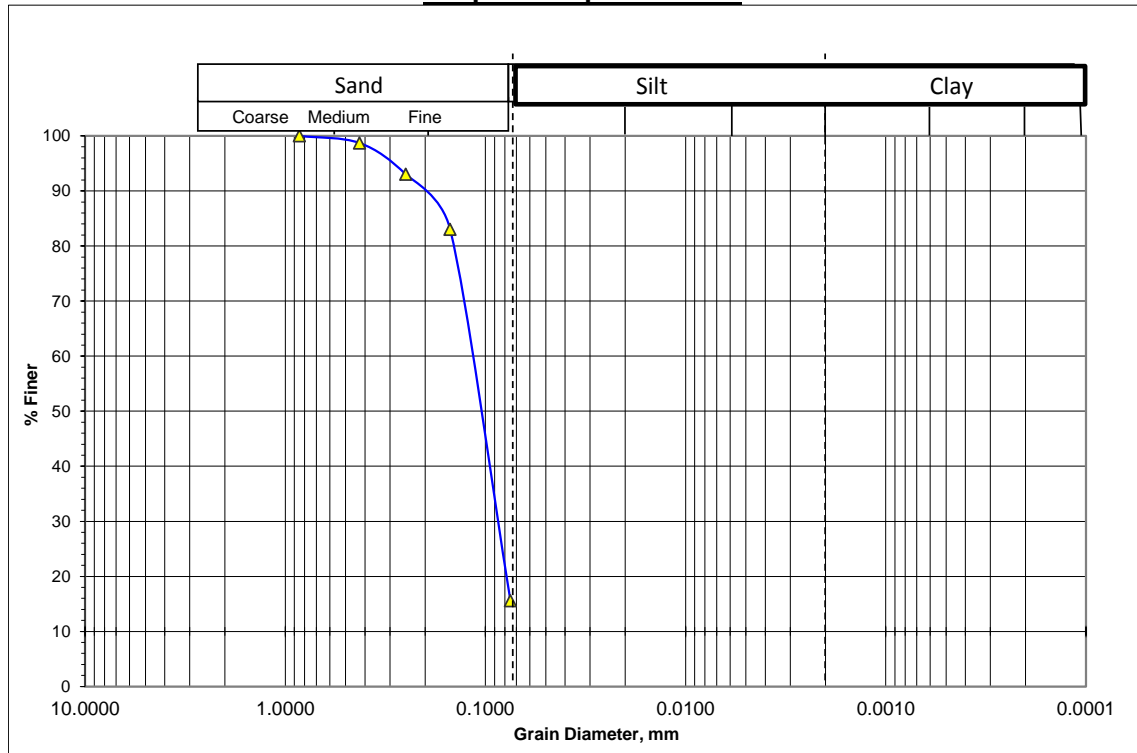
Sample Date: 05/01/2016

Sample No : D-08

Test Date : 09/01/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.56$

% Particles (from the grain -size analysis graph

(0.075mm size) = 85

(0.005mm size) & (0.001mm size) = 15

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Bore Hole No: BH-F30

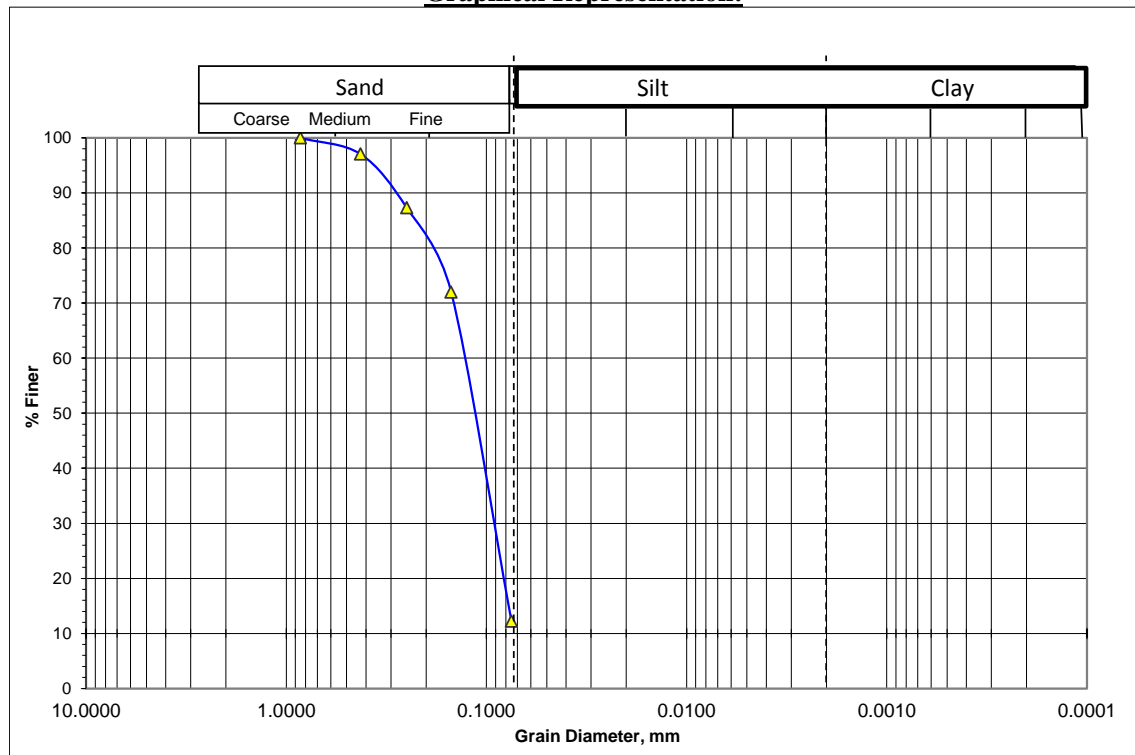
Sampled Date: 05/01/2016

Sample No : D-14

Test Date : 09/01/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 88

(0.005mm size) & (0.001mm size) = 12

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vhatpara Govt. Primary School, Kaijuri

Bore Hole No: BH-F31

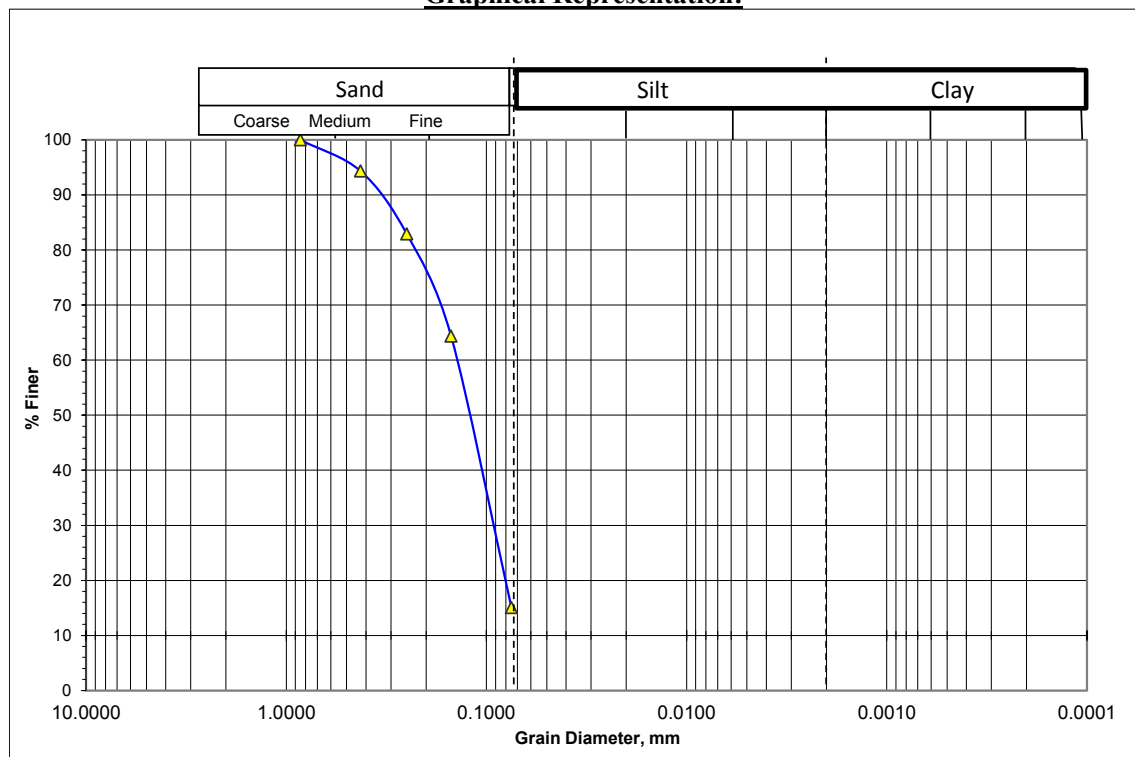
Sampled Date: 03/01/2016

Sample No : D-12

Test Date : 09/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, $D_{50} = 0.125$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.62$

% Particles (from the grain -size analysis graph

(0.075mm size) = 85

(0.005mm size) & (0.001mm size) = 15

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vhatpara Govt. Primary School, Kaijuri

Bore Hole No: BH-F31

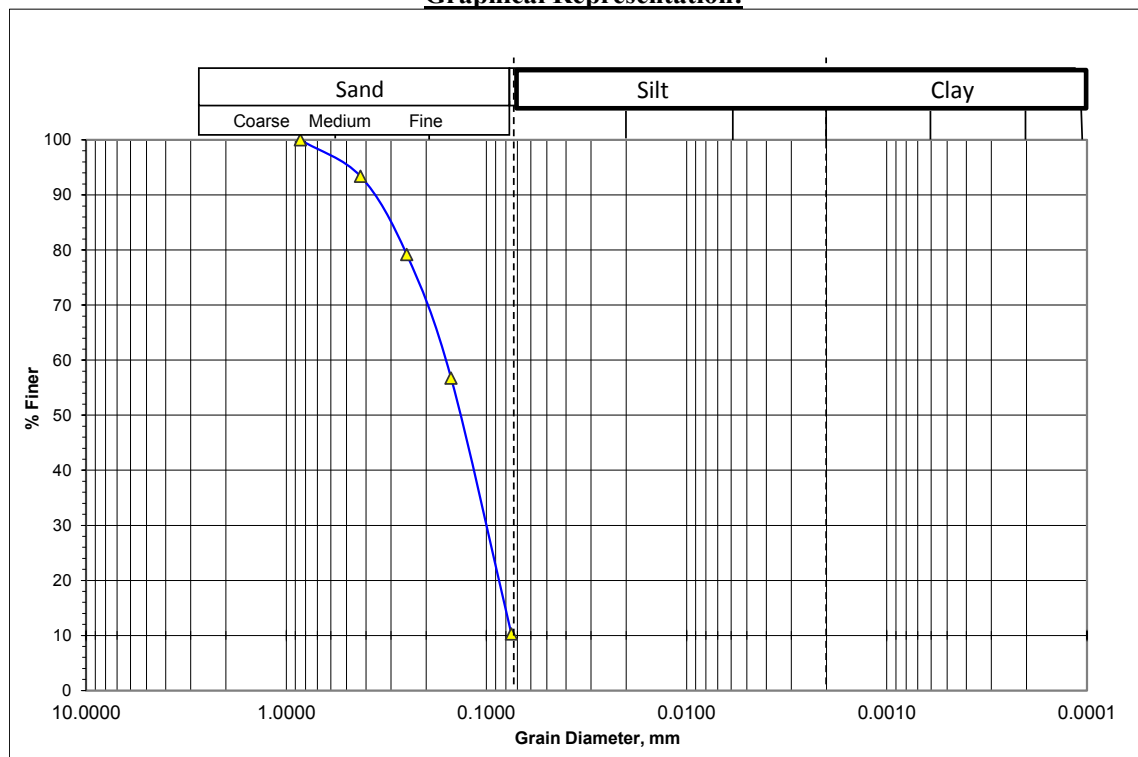
Sampled Date: 03/01/2016

Sample No : D-17

Test Date : 09/02/2016

Depth (m) : 25.5

Graphical Representation:



Fines or % of silt and clay = 10

Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.67$

% Particles (from the grain -size analysis graph

(0.075mm size) = 90

(0.005mm size) & (0.001mm size) = 10

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Fursha Govt. Primary School, Kanaipur

Bore Hole No: BH-F32

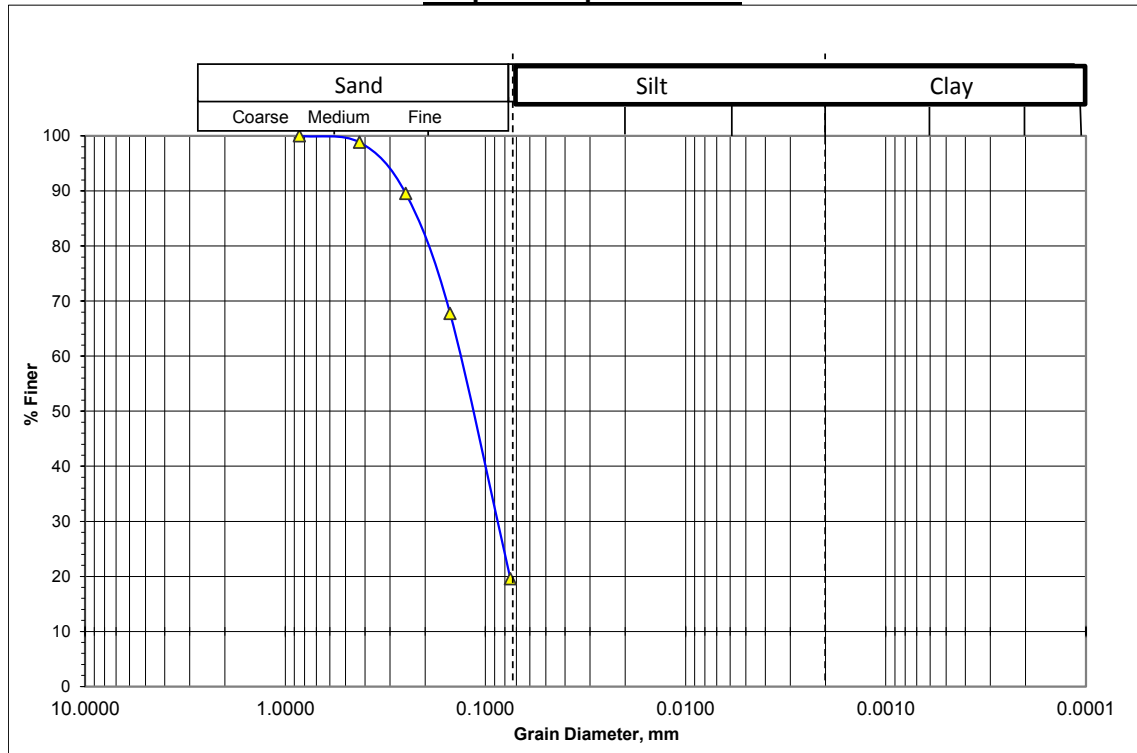
Sampled Date: 05/01/2016

Sample No : D-09

Test Date : 08/02/2016

Depth (m) : 13.5

Graphical Representation:



Fines or % of silt and clay = 20

Mean Diameter, D_{50} = 0.12 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.61$

% Particles (from the grain -size analysis graph

(0.075mm size) = 80

(0.005mm size) & (0.001mm size) = 20

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Fursha Govt. Primary School, Kanaipur

Bore Hole No: BH-F32

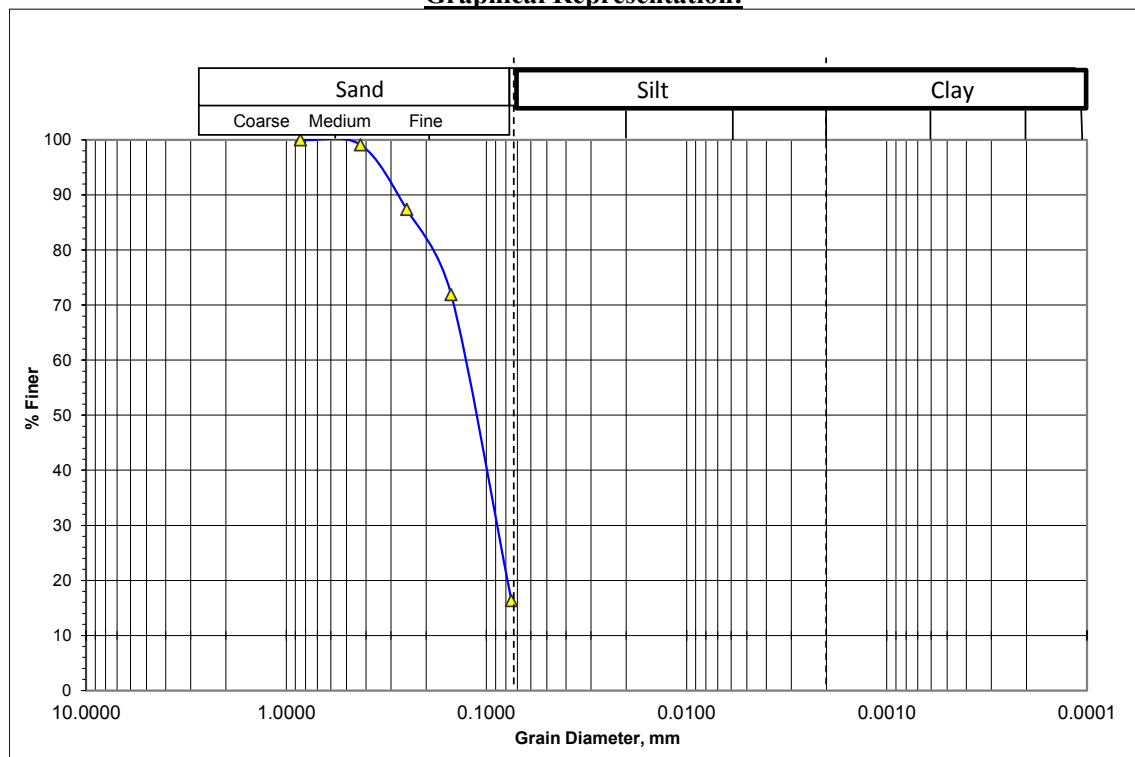
Sampled Date: 05/01/2016

Sample No : D-13

Test Date : 08/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 85

(0.005mm size) & (0.001mm size) = 15

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dokin Char Kamolpur

Bore Hole No: BH-F33

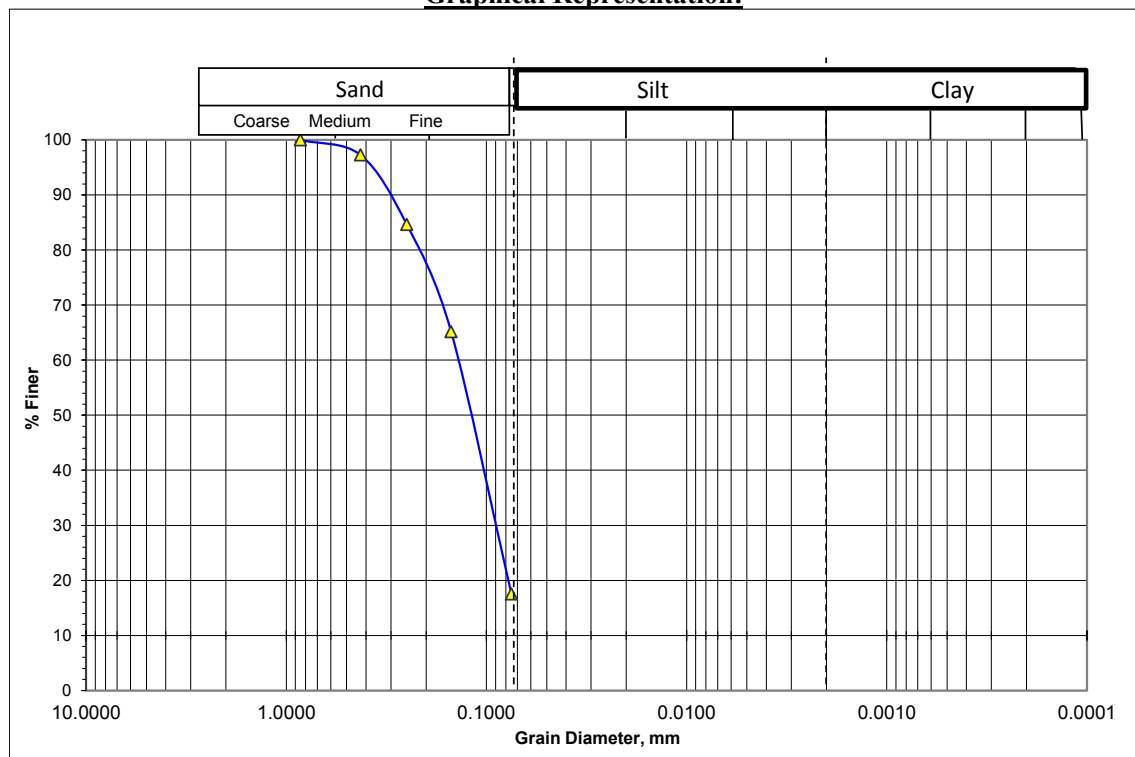
Sampled Date: 10/01/2016

Sample No : D-09

Test Date : 08/02/2016

Depth (m) : 13.5

Graphical Representation:



Fines or % of silt and clay = 17

Mean Diameter, $D_{50} = 0.125$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.62$

% Particles (from the grain -size analysis graph

(0.075mm size) = 83

(0.005mm size) & (0.001mm size) = 17

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dokin Char Kamolpur

Bore Hole No: BH-F33

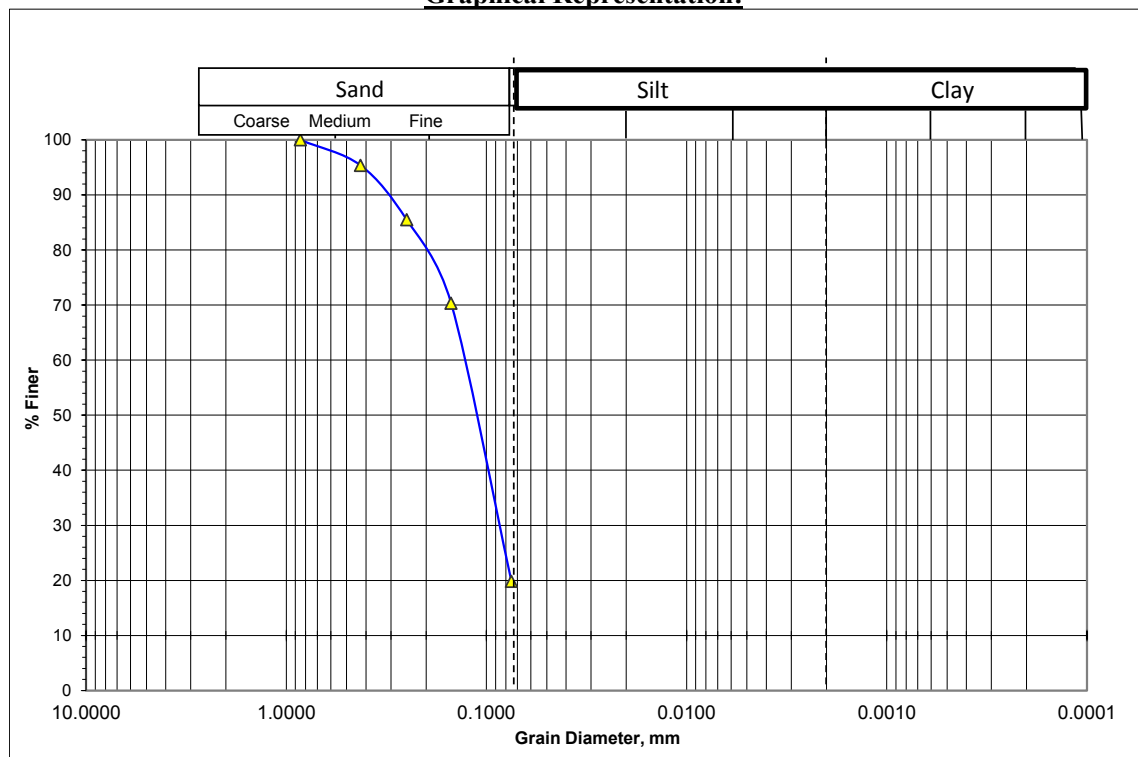
Sampled Date: 10/01/2016

Sample No : D-15

Test Date : 08/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 20

Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.60$

% Particles (from the grain -size analysis graph

(0.075mm size) = 80

(0.005mm size) & (0.001mm size) = 20

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Tonthoniar Hat, End of Kanaipur Union

Bore Hole No: BH-F34

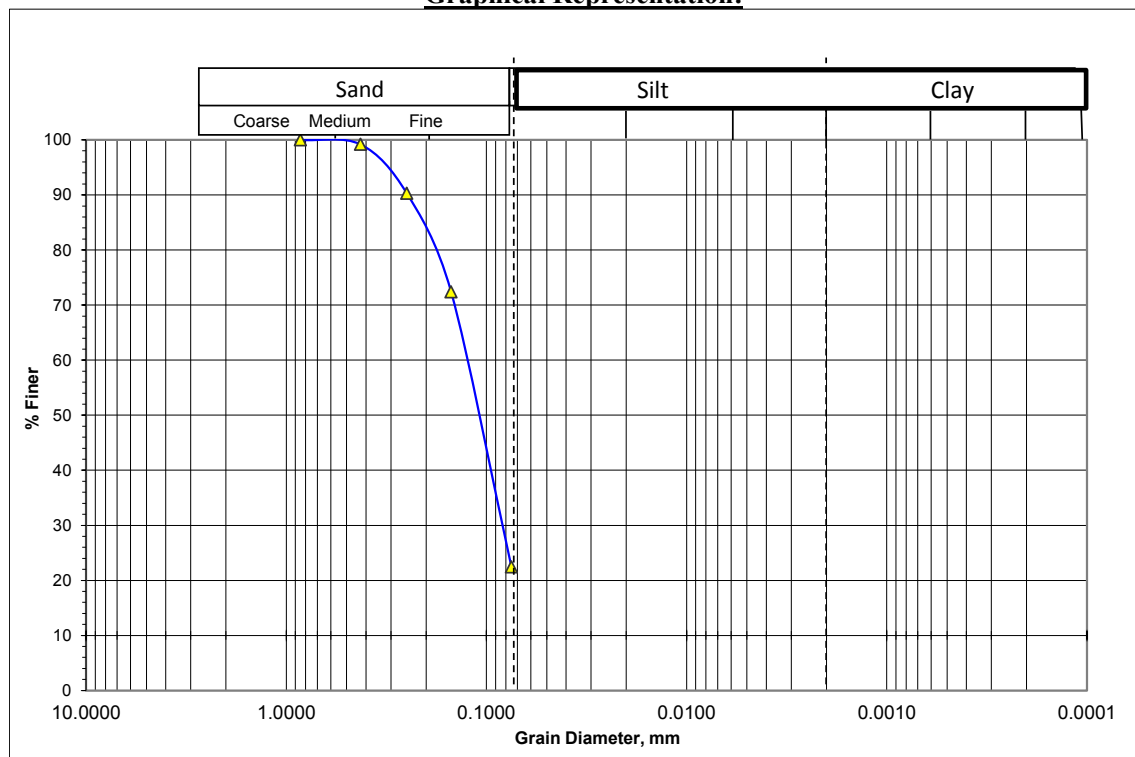
Sample Date: 10/01/2016

Sample No : D-8

Test Date : 08/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 22

Mean Diameter, D_{50} = 0.11 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.58$

% Particles (from the grain -size analysis graph

(0.075mm size) = 78

(0.005mm size) & (0.001mm size) = 22

Tested by : Md. Ashadullah

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Tonthoniar Hat, End of Kanaipur Union

Bore Hole No: BH-F34

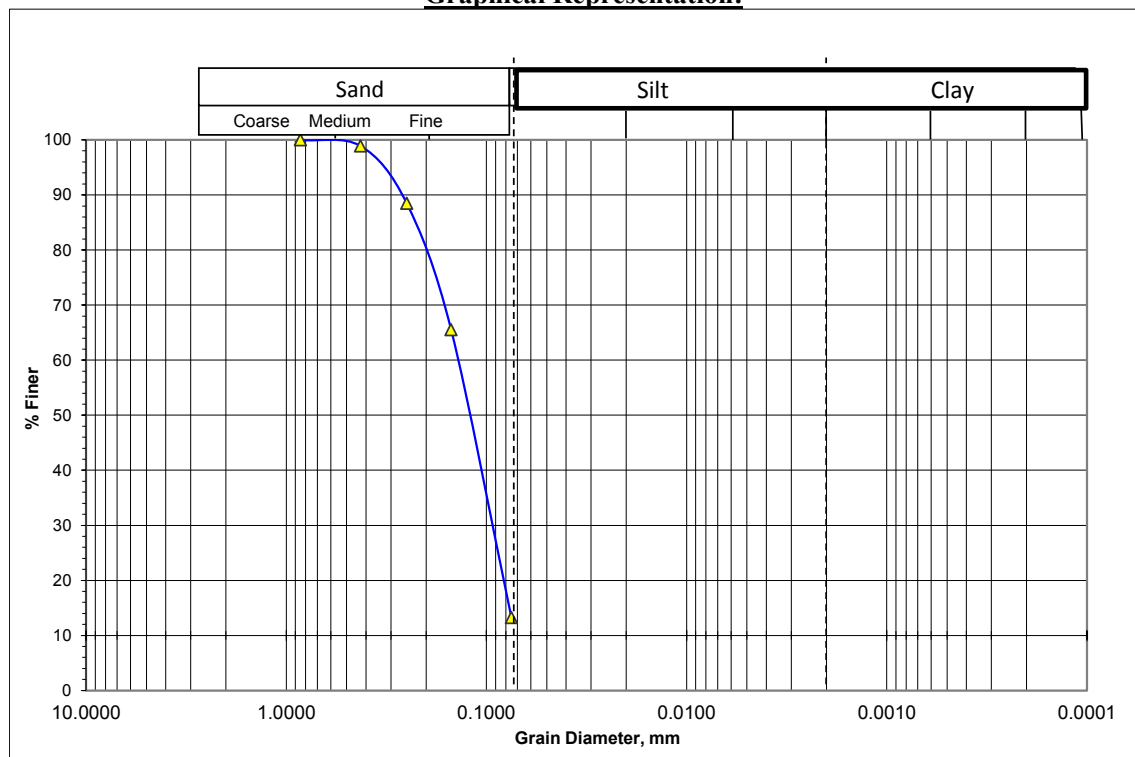
Sampled Date: 10/01/2016

Sample No : D-14

Test Date : 08/02/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.63$

% Particles (from the grain -size analysis graph

(0.075mm size) = 87

(0.005mm size) & (0.001mm size) = 13

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Nasirar Bazar, Dorghapur, Ishan Gopalpur

Bore Hole No: BH-F35

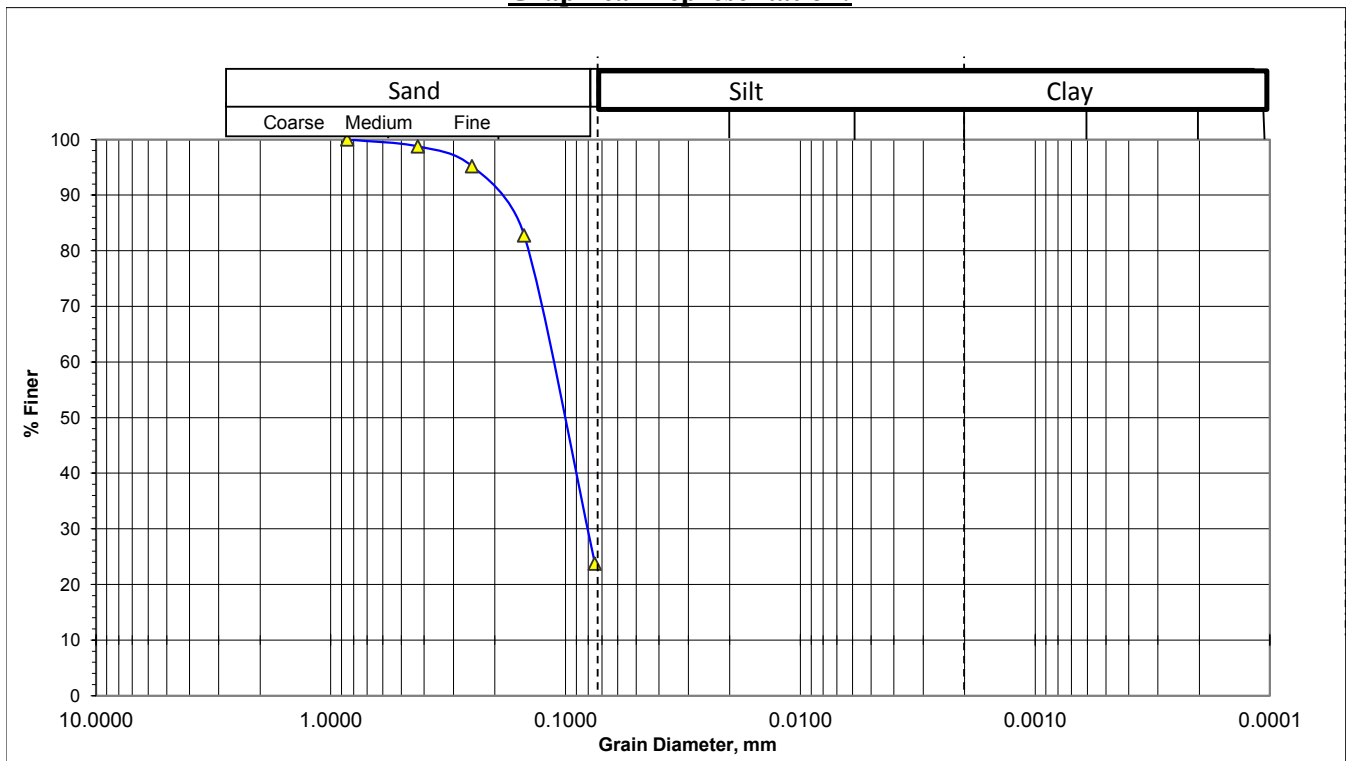
Sampled Date: 09/01/2016

Sample No : D-02

Test Date : 08/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 24

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.56

% Particles (from the grain -size analysis graph).

(0.075mm size) = 76

(0.005mm size) & (0.001mm size) = 24

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Health Coplex, Ishan Gopalpur

Bore Hole No: BH-F36

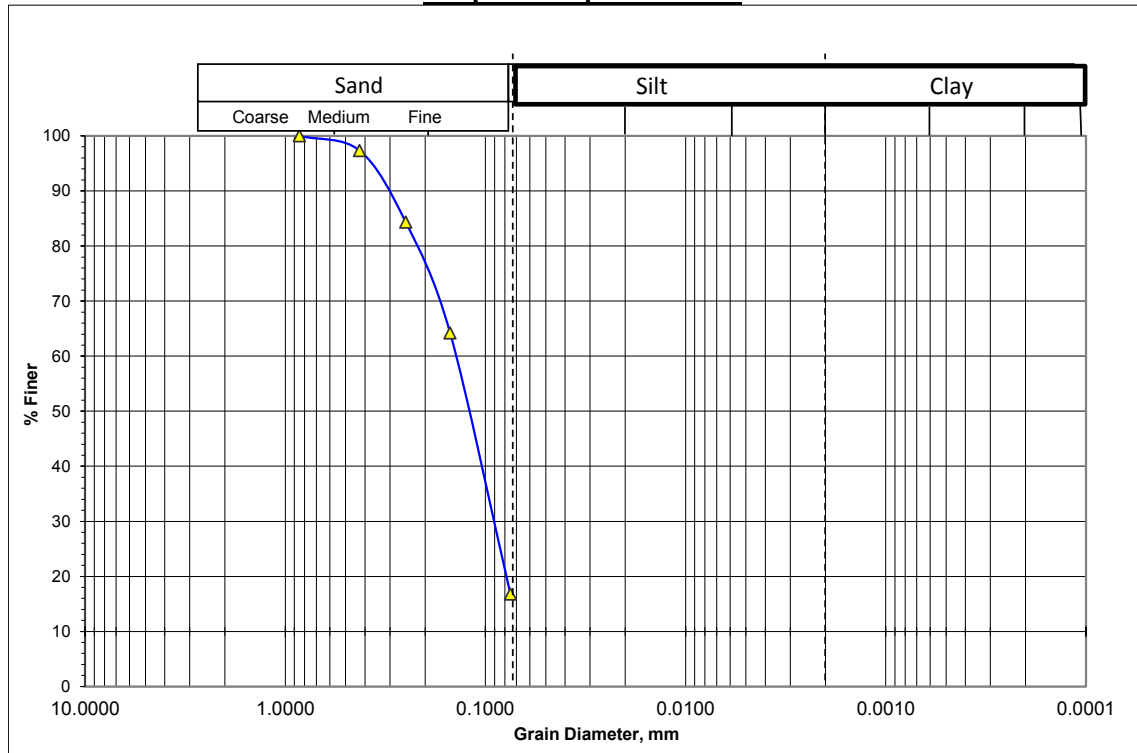
Sampled Date: 09/01/2016

Sample No : D-7

Test Date : 08/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 17

Mean Diameter, $D_{50} = 0.125$ mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.62$

% Particles (from the grain -size analysis graph

(0.075mm size) = 83

(0.005mm size) & (0.001mm size) = 17

Tested by : Md. Ashadullah

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Health Coplex, Ishan Gopalpur

Bore Hole No: BH-F36

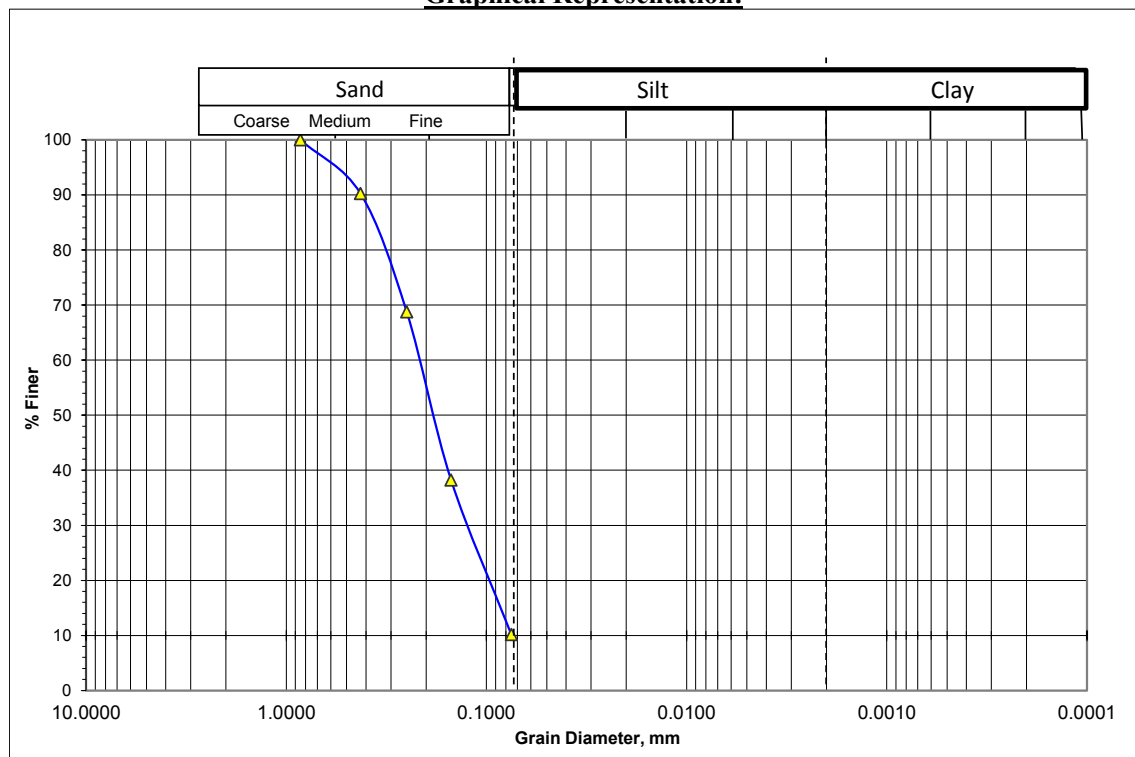
Sampled Date: 09/01/2016

Sample No : D-13

Test Date : 08/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 10

Mean Diameter, D_{50} = 0.18 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.75$

% Particles (from the grain -size analysis graph

(0.075mm size) = 90

(0.005mm size) & (0.001mm size) = 10

Tested by : Md. Ashadullah

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37

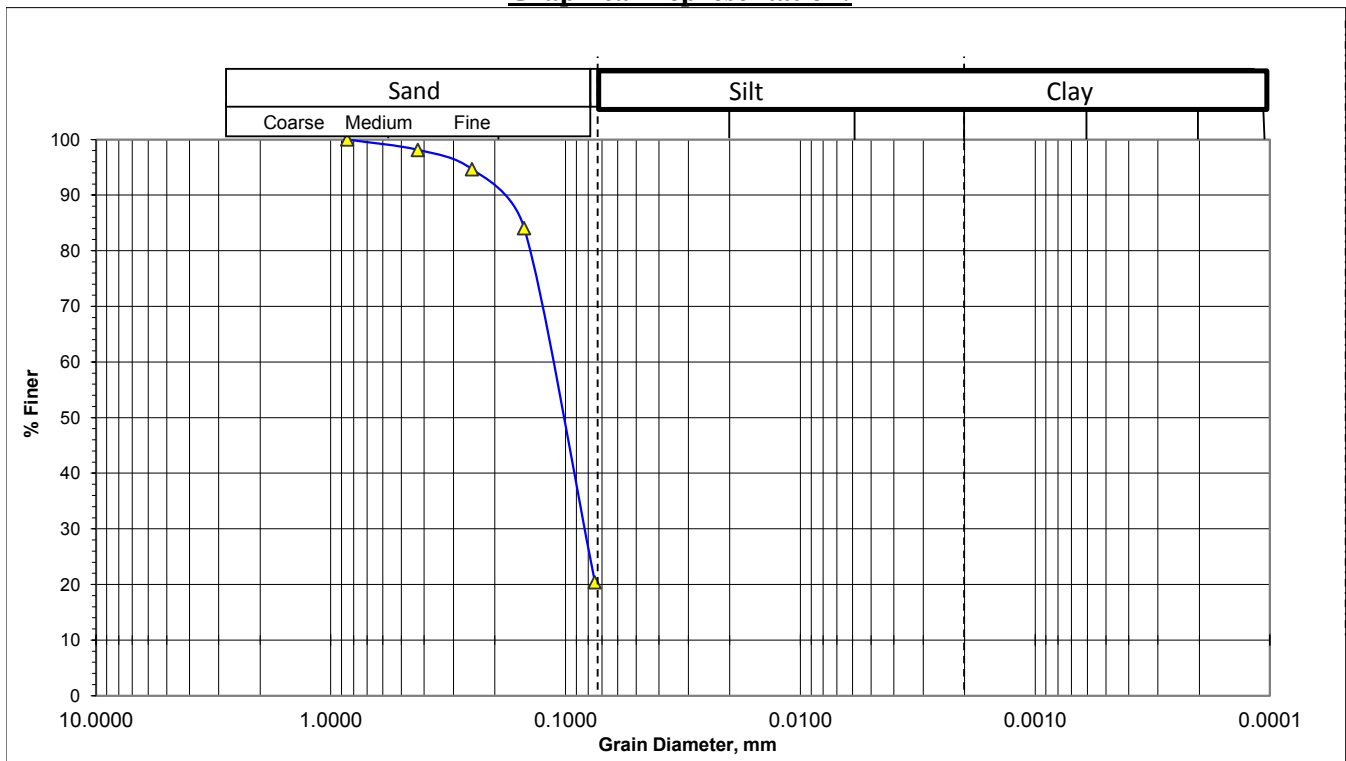
Sampled Date: 09/01/2016

Sample No : D-02

Test Date : 08/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 20

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.56

% Particles (from the grain -size analysis graph).

(0.075mm size) = 80

(0.005mm size) & (0.001mm size) = 20

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37

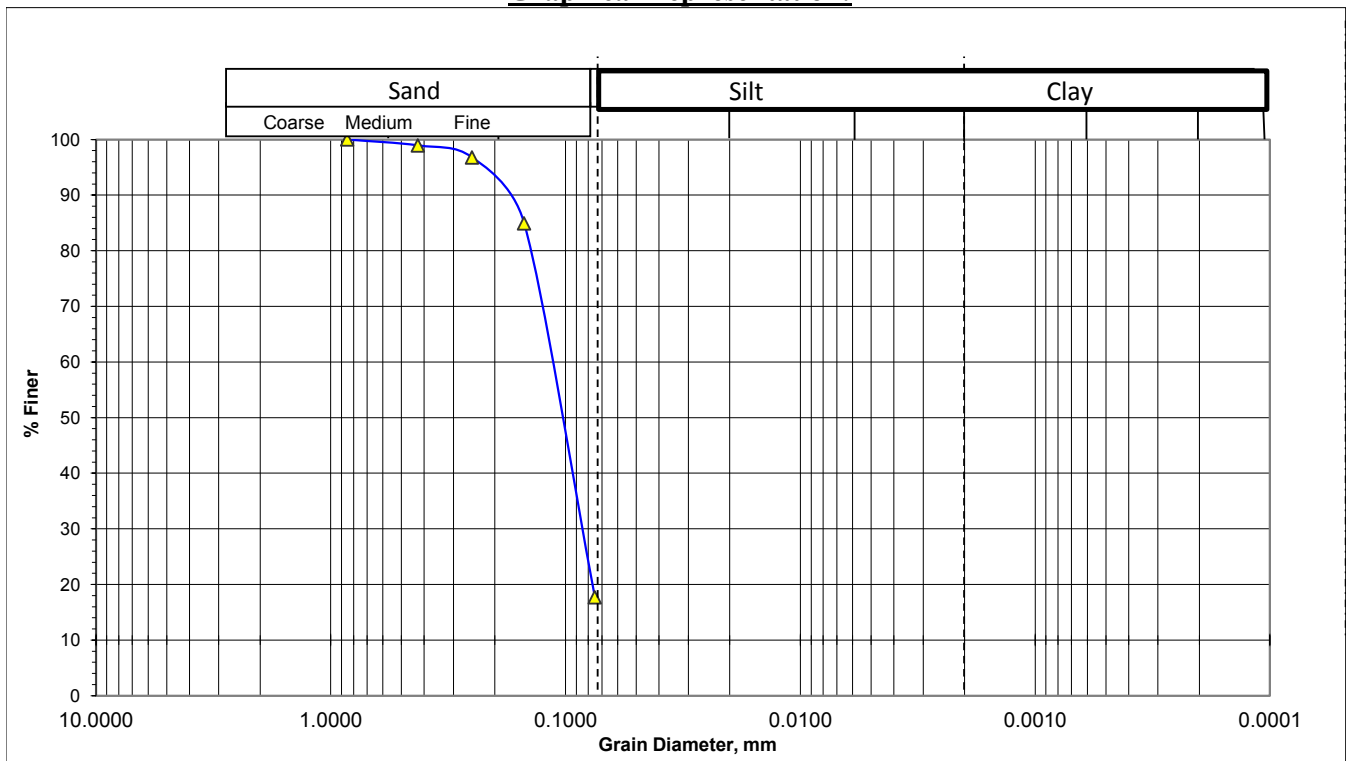
Sampled Date: 09/01/2016

Sample No : D-06

Test Date : 08/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 17

Mean Diameter, D_{50} = 0.1 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}} = 0.56$

% Particles (from the grain -size analysis graph).

(0.075mm size) = 83

(0.005mm size) & (0.001mm size) = 17

GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37

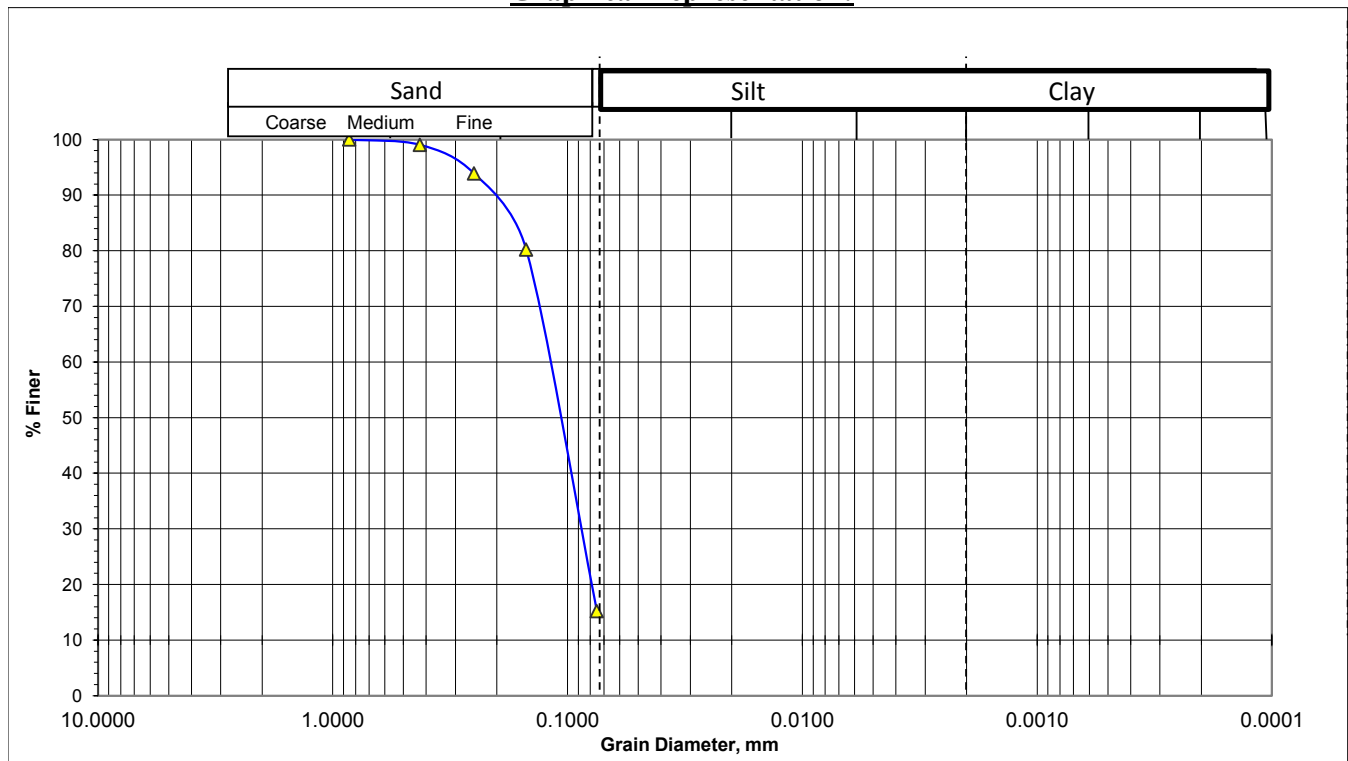
Sampled Date: 09/01/2016

Sample No : D-15

Test Date : 08/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, D_{50} = 0.11 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.58

% Particles (from the grain -size analysis graph).

(0.075mm size) = 85

(0.005mm size) & (0.001mm size) = 15

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No : BH F04

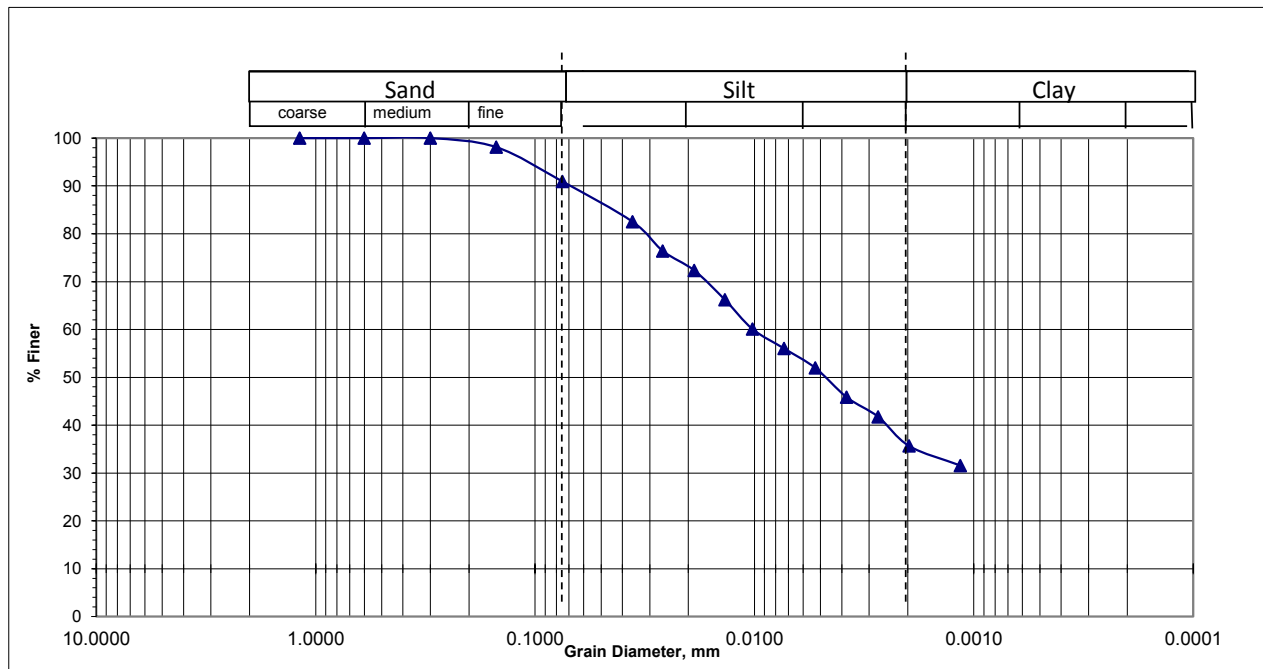
Sample No. D27

Sampled Date: 06/01/2016

Depth (m) : 40.5

Test Date : 04/06/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.005 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.12

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =9%, Silt (0.005mm size)= 55% & Clay (0.001mm size) = 36%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Pallikobi Jasimuddin Saranshala, Ambikapur

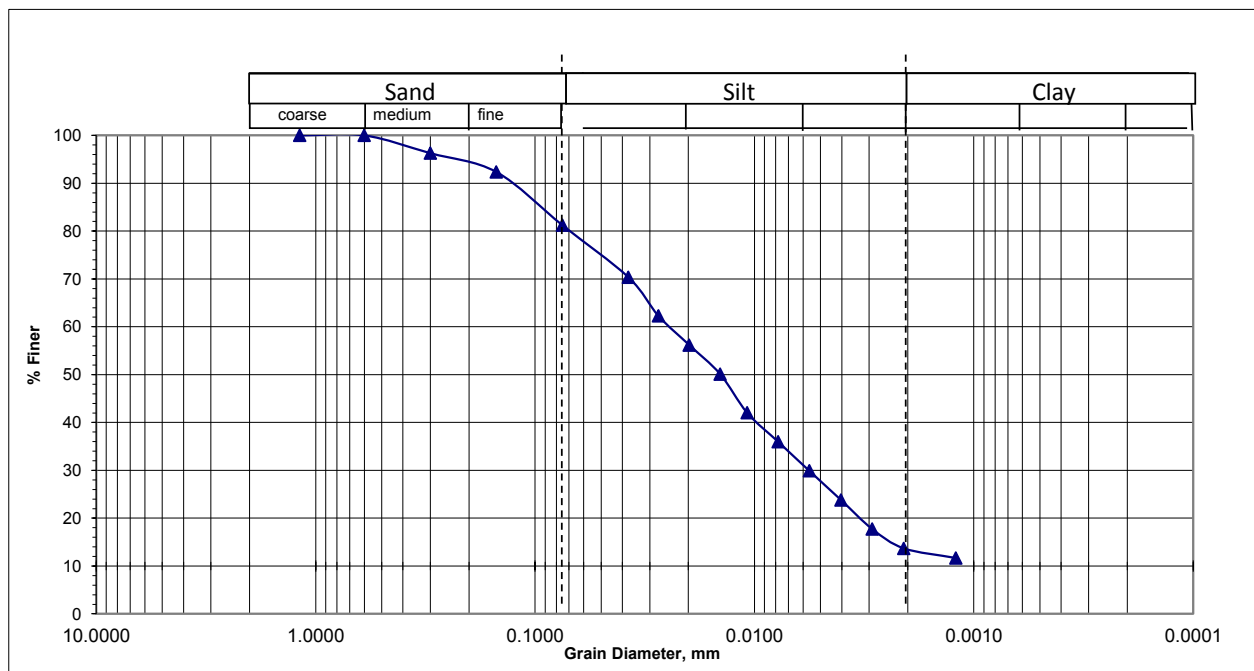
Bore Hole No : BH F06 Sample No. D2

Sampled Date: 10/01/2016

Depth (m) : 3.0

Test Date : 15/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.016 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.22

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =20%, Silt (0.005mm size)= 67% & Clay (0.001mm size) = 13%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Madhankali Swith gate, Ambikapur

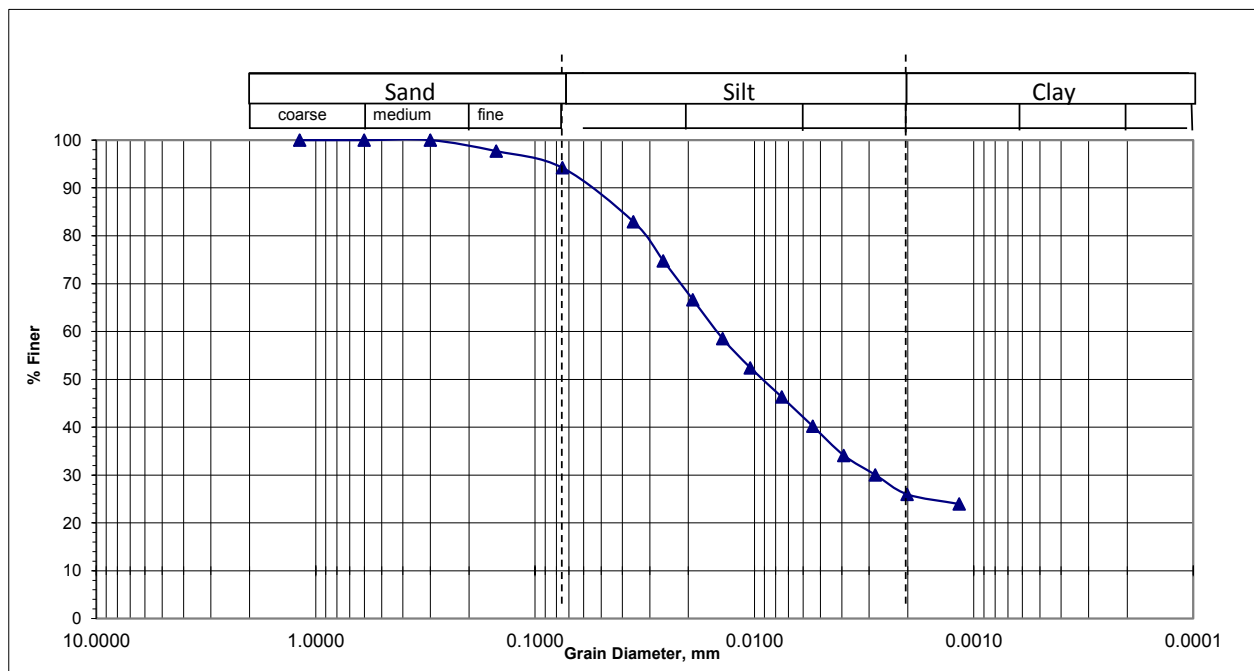
Bore Hole No : BH F07 Sample No. D3

Sampled Date: 31/12/2015

Depth (m) : 4.5

Test Date : 16/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.01 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.17

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =6%, Silt (0.005mm size)= 69% & Clay (0.001mm size) = 25%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dhuldi Railgate, Dhuldi Bazar, Majchar

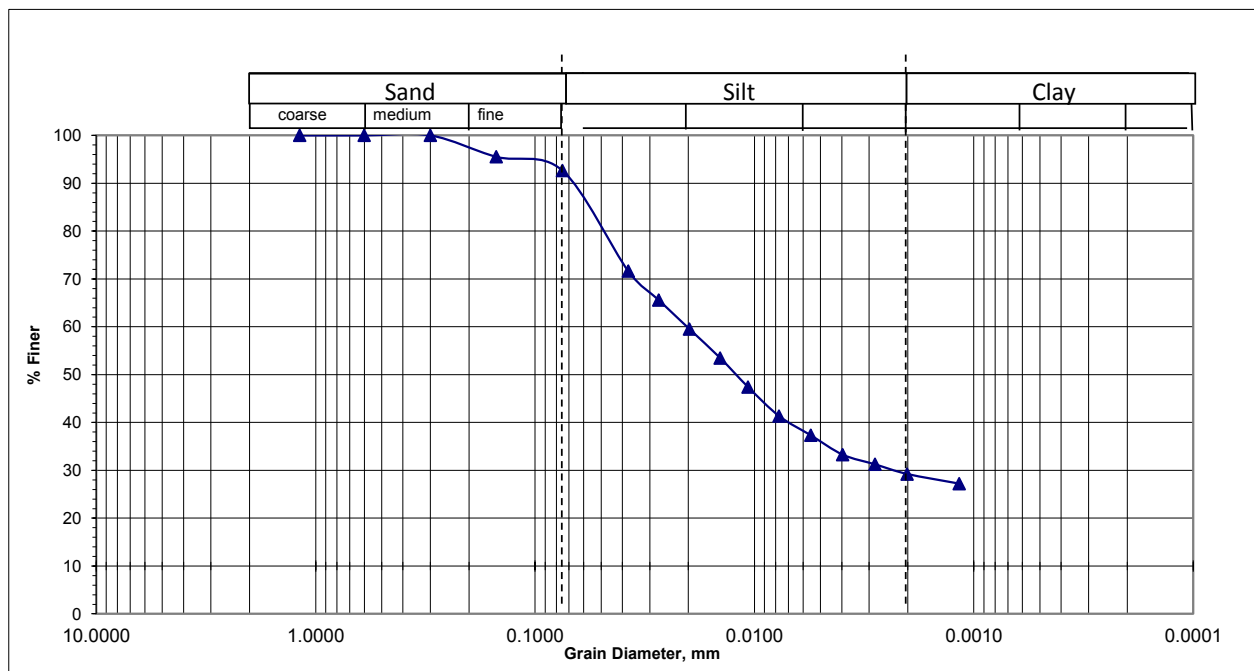
Bore Hole No : BH F09 Sample No. D4

Sampled Date: 08/01/2016

Depth (m) : 6.0

Test Date : 16/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.012 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.19

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 63% & Clay (0.001mm size) = 29%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar

Bore Hole No : BH F11

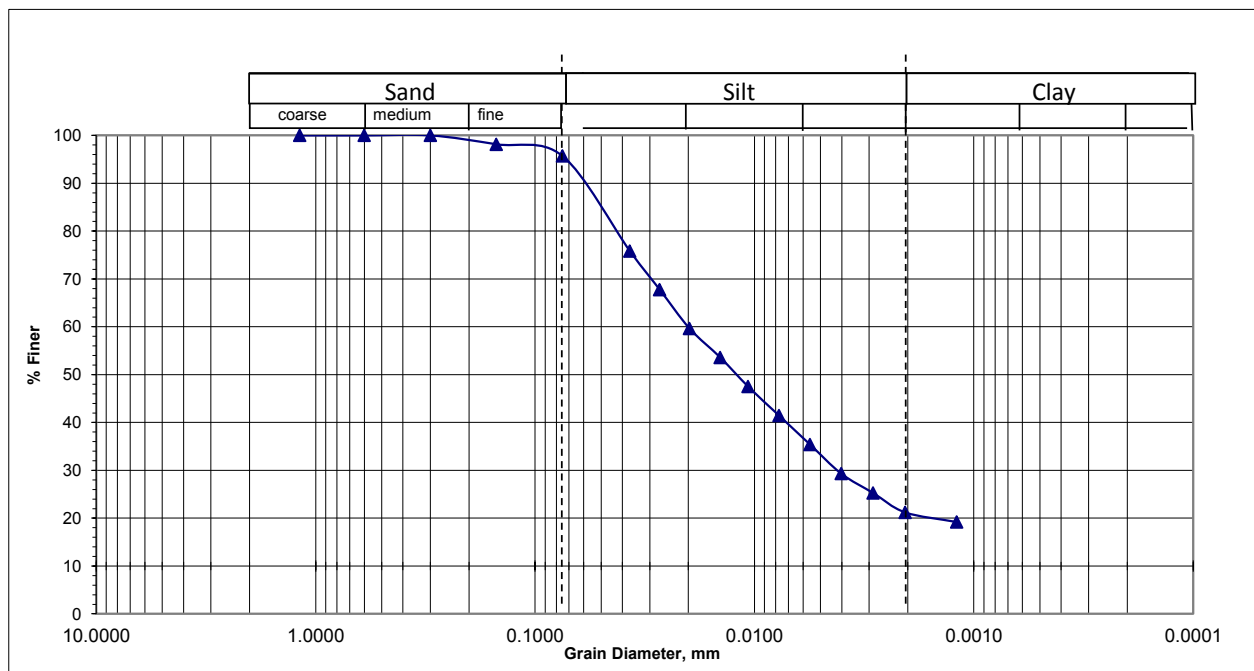
Sample No. D3

Sampled Date: 31/12/2015

Depth (m) : 4.5

Test Date : 16/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.013 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.20

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =4%, Silt (0.005mm size)= 74% & Clay (0.001mm size) = 22%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client :Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Dokin Char Kamolpur

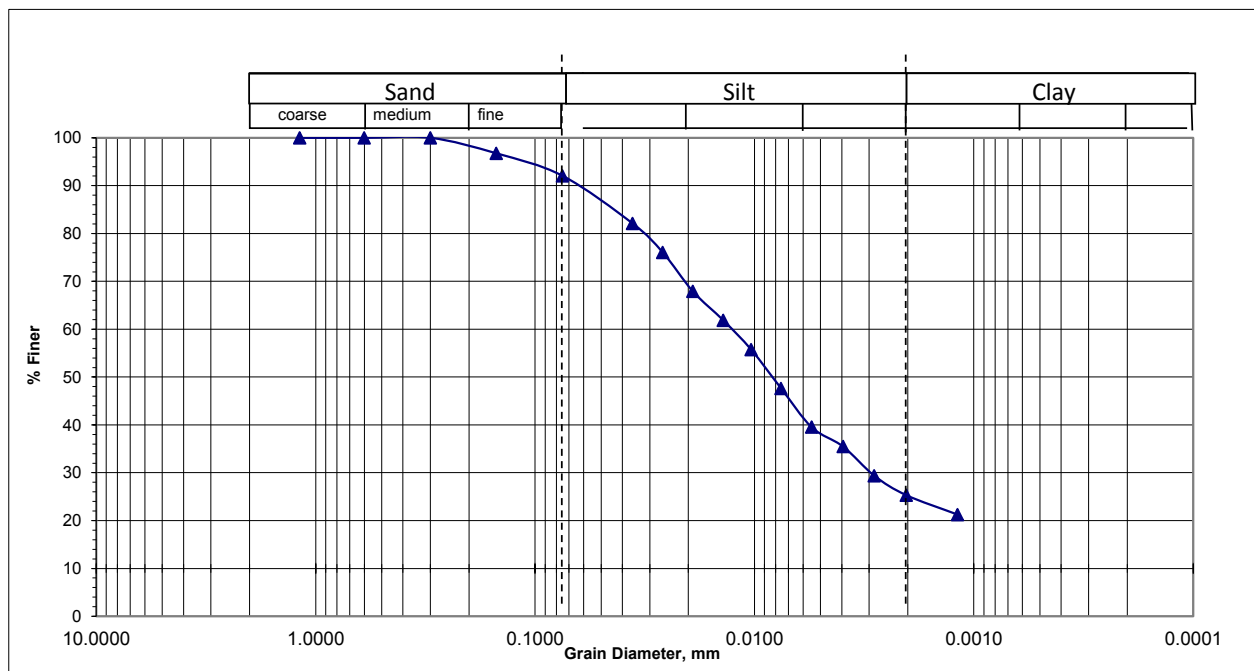
Bore Hole No : BH F33 Sample No. D4

Sampled Date: 10/01/2016

Depth (m) : 6.0

Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.008 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.16

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 67% & Clay (0.001mm size) = 25%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vajon Dangga Govt. Primary School, Faridpur Sadar

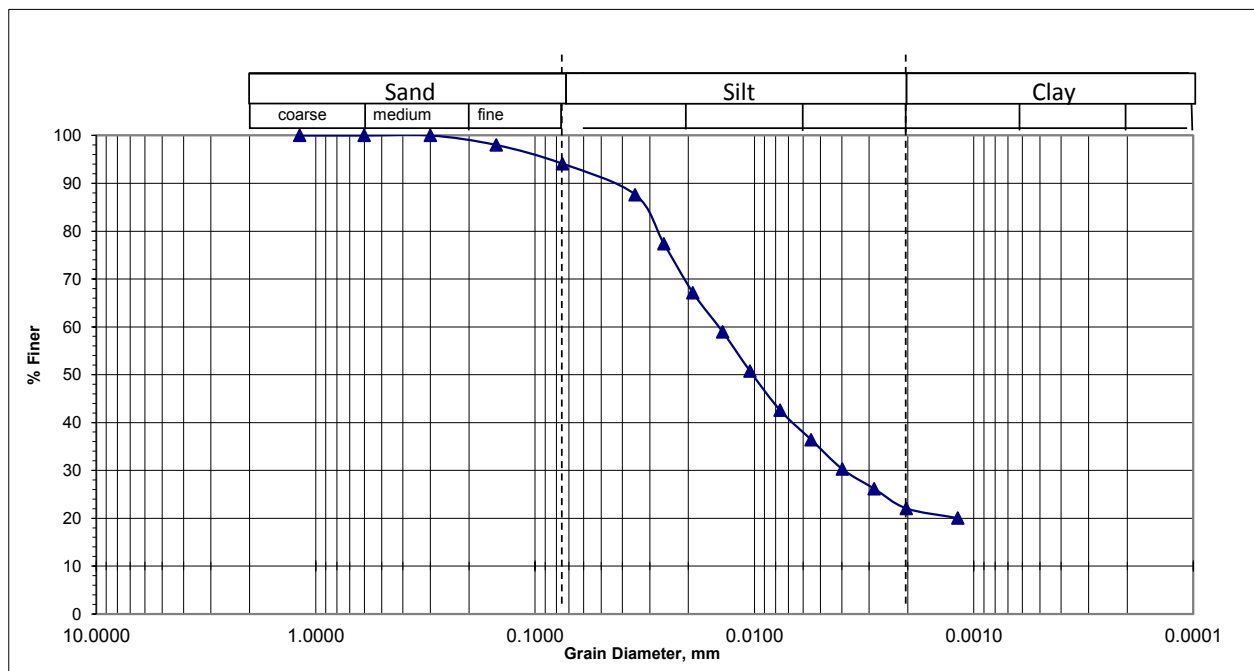
Bore Hole No : BH F14 Sample No. D3

Sampled Date: 31/12/2015

Depth (m) : 4.5

Test Date : 19/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.01 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.18

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =6%, Silt (0.005mm size)= 72% & Clay (0.001mm size) = 22%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

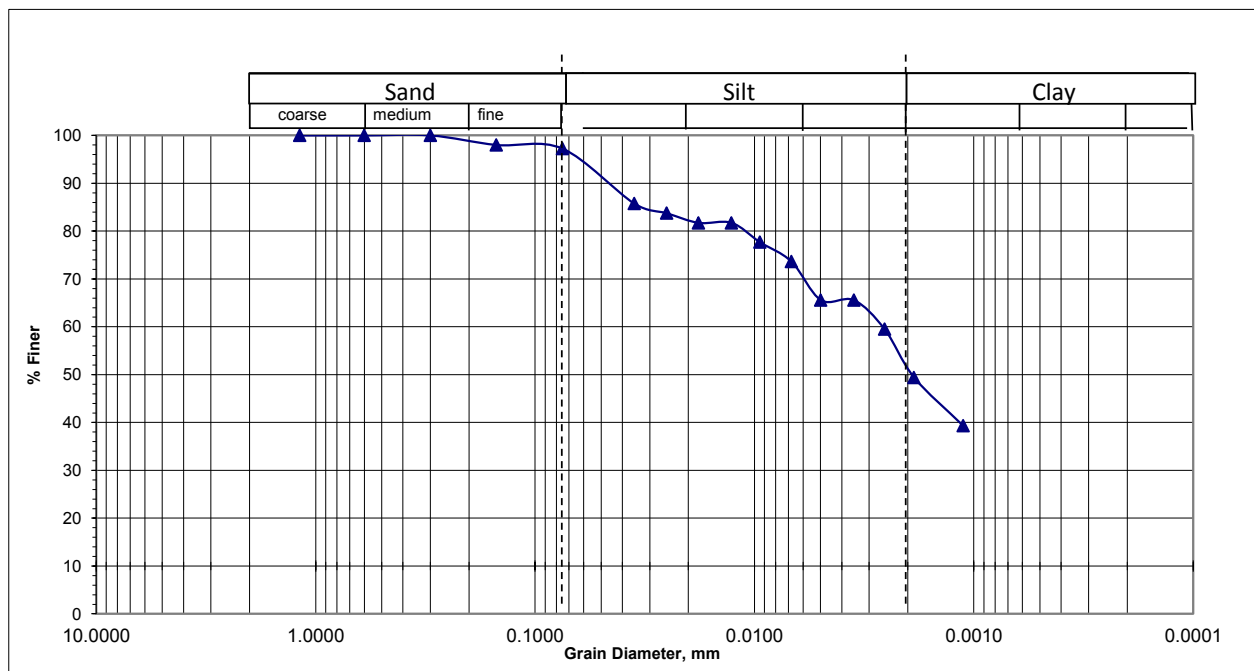
Bore Hole No : BH F15 Sample No. D2

Sampled Date: 30/12/2015

Depth (m) : 3.0

Test Date : 20/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.002 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.08

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =3%, Silt (0.005mm size)= 45% & Clay (0.001mm size) = 52%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

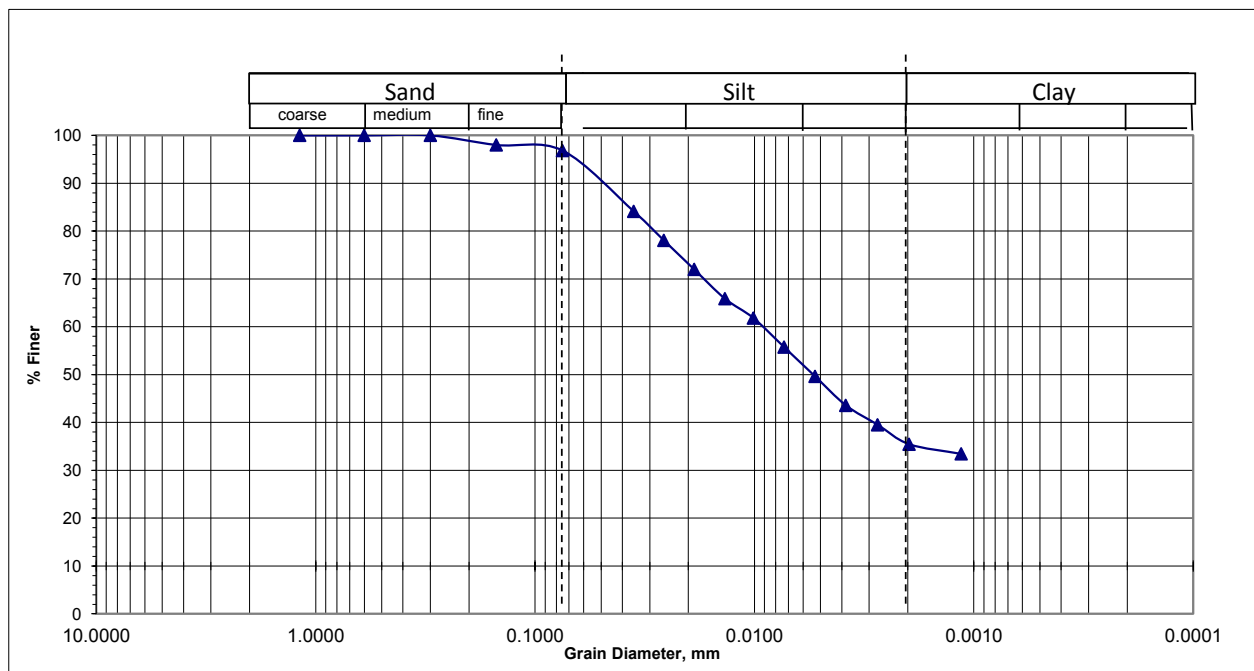
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Bore Hole No : BH F16 Sample No. D2 Sampled Date: 30/12/2015

Depth (m) : 3.0 Test Date : 20/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.002 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.08

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =3%, Silt (0.005mm size)= 62% & Clay (0.001mm size) = 35%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mohim School Field, Faridpur Sadar

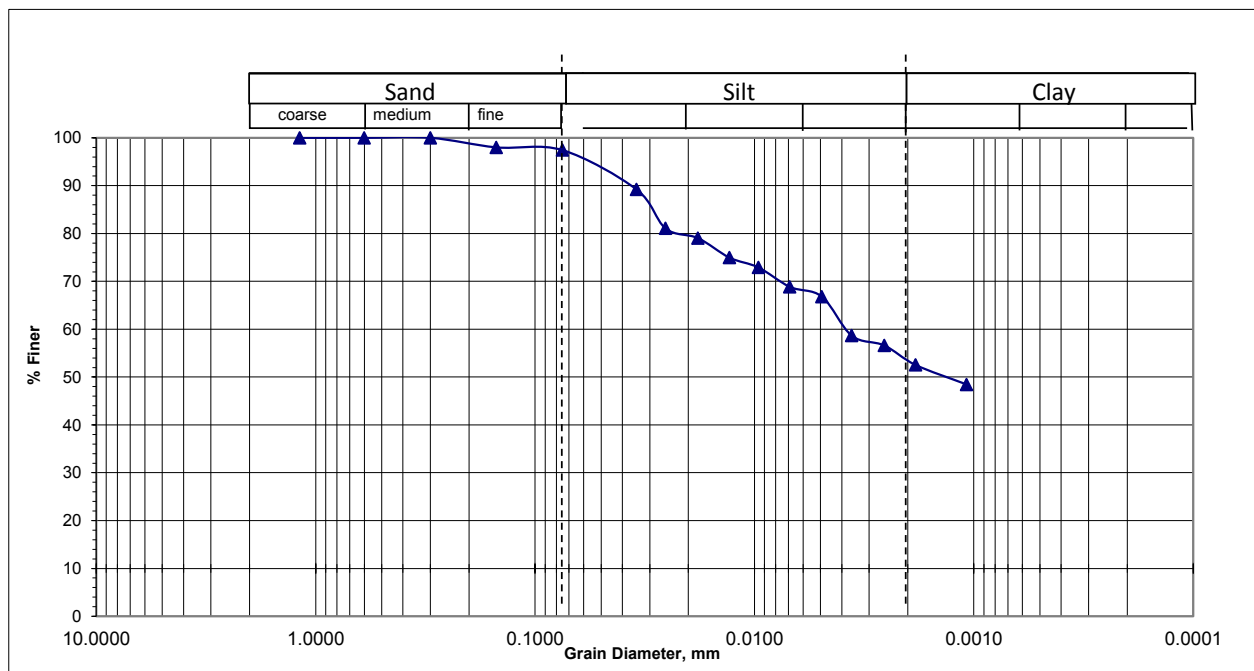
Bore Hole No : BH F17 Sample No. D1

Sampled Date: 27/12/2015

Depth (m) : 1.5

Test Date : 21/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.0015 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.07

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =3%, Silt (0.005mm size)= 43% & Clay (0.001mm size) = 54%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mohim School Field, Faridpur Sadar

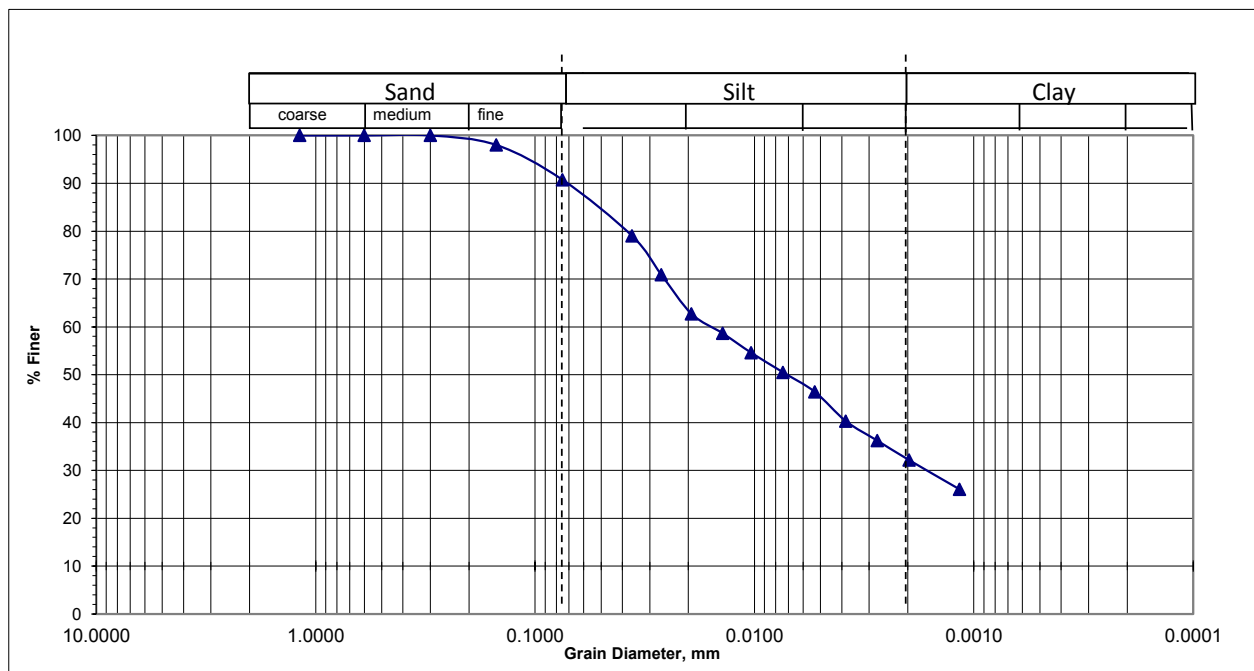
Bore Hole No : BH F17 Sample No. D3

Sampled Date: 27/12/2015

Depth (m) : 4.5

Test Date : 21/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.007 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.15

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =10%, Silt (0.005mm size)= 57% & Clay (0.001mm size) = 33%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mohim School Field, Faridpur Sadar

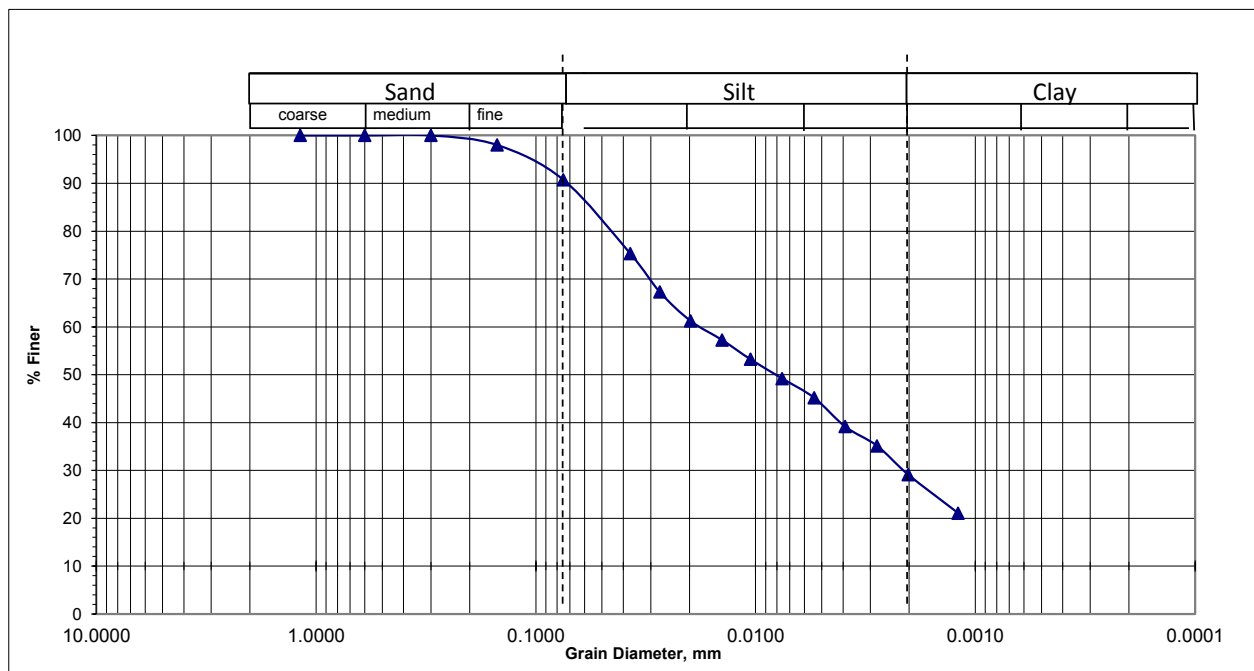
Bore Hole No : BH F17 Sample No. D10

Sampled Date: 27/12/2015

Depth (m) : 15.0

Test Date : 21/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.008 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.16

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =10%, Silt (0.005mm size)= 60% & Clay (0.001mm size) = 30%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Raghu Nandanpur Madrasha, Ambikapur

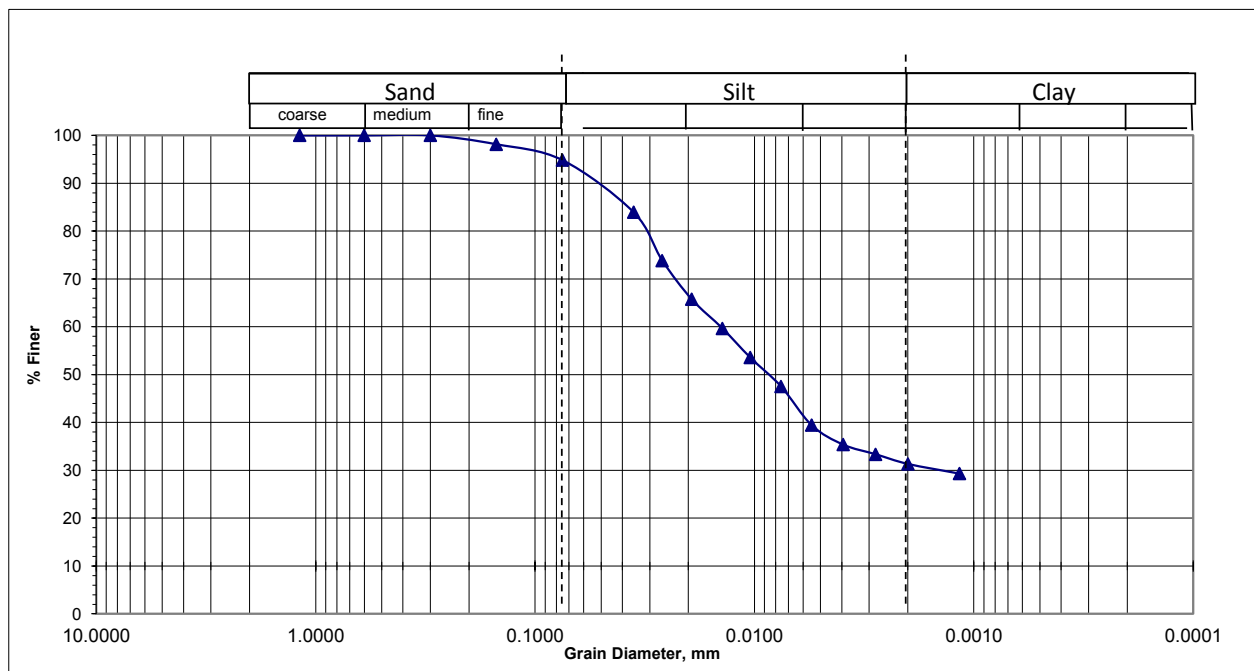
Bore Hole No : BH F18 Sample No. D2

Sampled Date: 28/12/2015

Depth (m) : 3.0

Test Date : 19/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.009 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.17

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =5%, Silt (0.005mm size)= 63% & Clay (0.001mm size) = 32%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Porunpur Govt. Primary School, Porunpur Bazar, Majchar

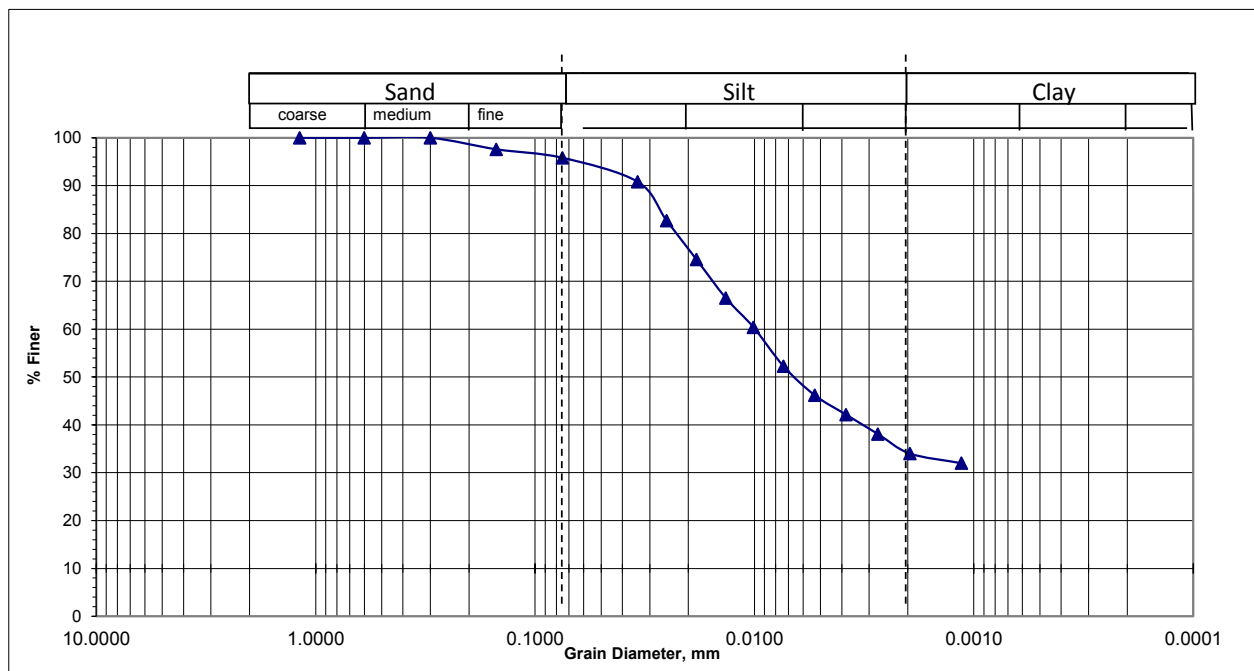
Bore Hole No : BH F19 Sample No. D2

Sampled Date: 06/01/2016

Depth (m) : 3.0

Test Date : 23/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.03 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.30

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =5%, Silt (0.005mm size)= 61% & Clay (0.001mm size) = 34%

Depth (m) : 3.0 Test Date : 22/02/2016

175

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hadhokandi Govt. Primary School, River Research Institute, Kaijuri

Bore Hole No : BH F20

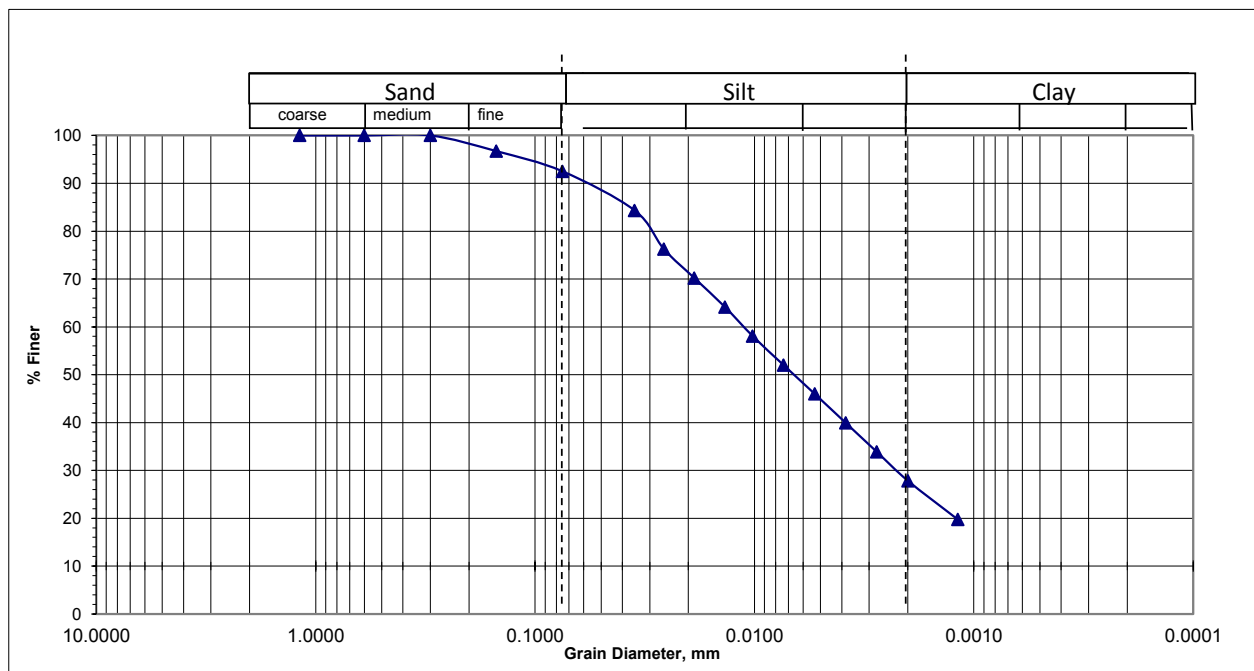
Sample No. D5

Sampled Date: 01/01/2016

Depth (m) : 7.5

Test Date : 22/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.007 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.15

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 65% & Clay (0.001mm size) =27%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar

Bore Hole No : BH F21

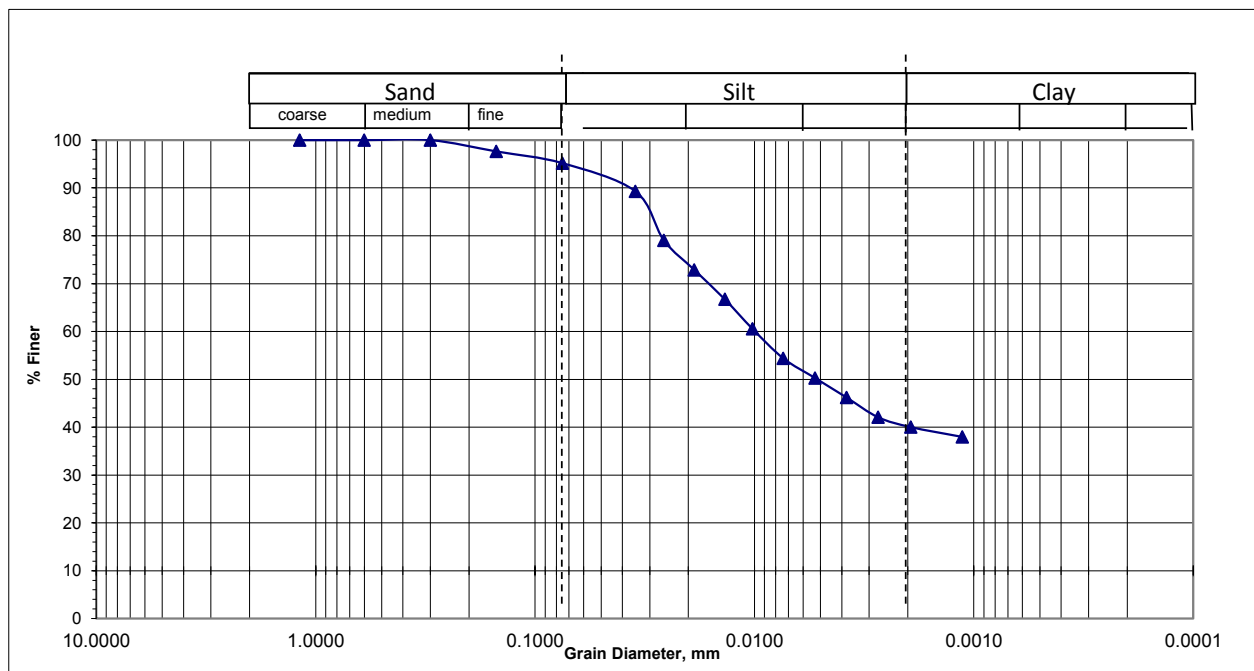
Sample No. D3

Sampled Date: 27/12/2015

Depth (m) : 4.5

Test Date : 23/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.005 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.13

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =5%, Silt (0.005mm size)=55% & Clay (0.001mm size) = 40

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar

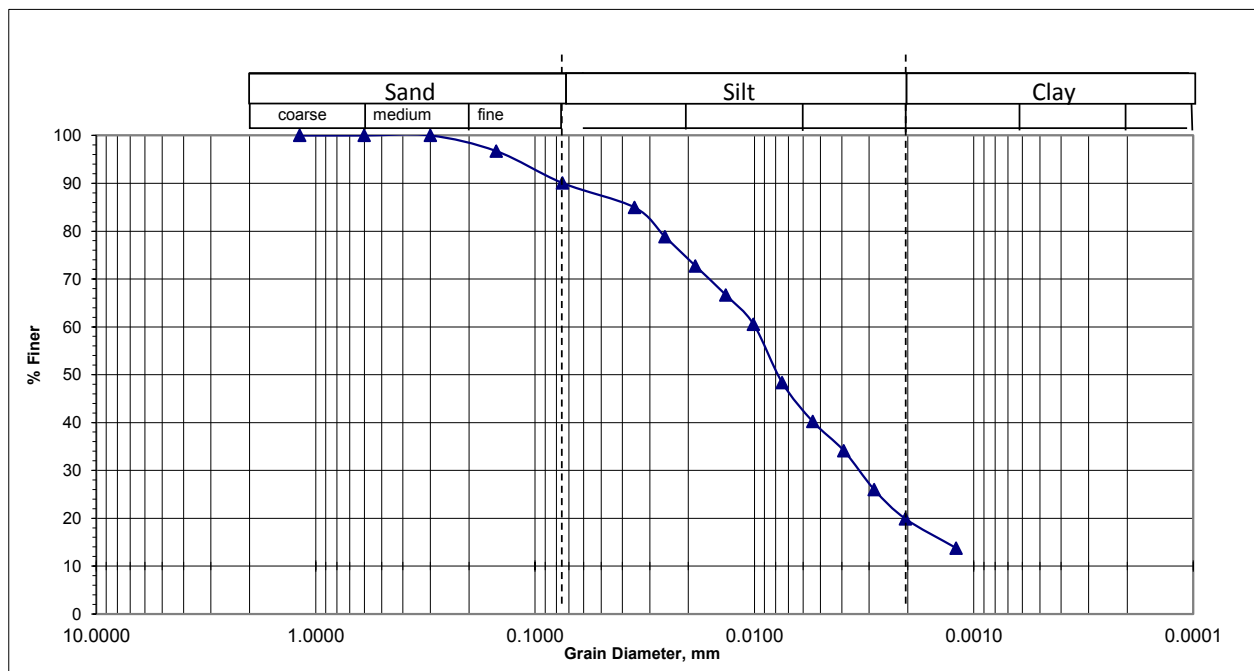
Bore Hole No : BH F21 Sample No. D6

Sampled Date: 27/12/2015

Depth (m) : 9.0

Test Date : 23/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.008 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.16

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =10%, Silt (0.005mm size)= 61% & Clay (0.001mm size) =19%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Payarpur Godaoun, Kaijuri

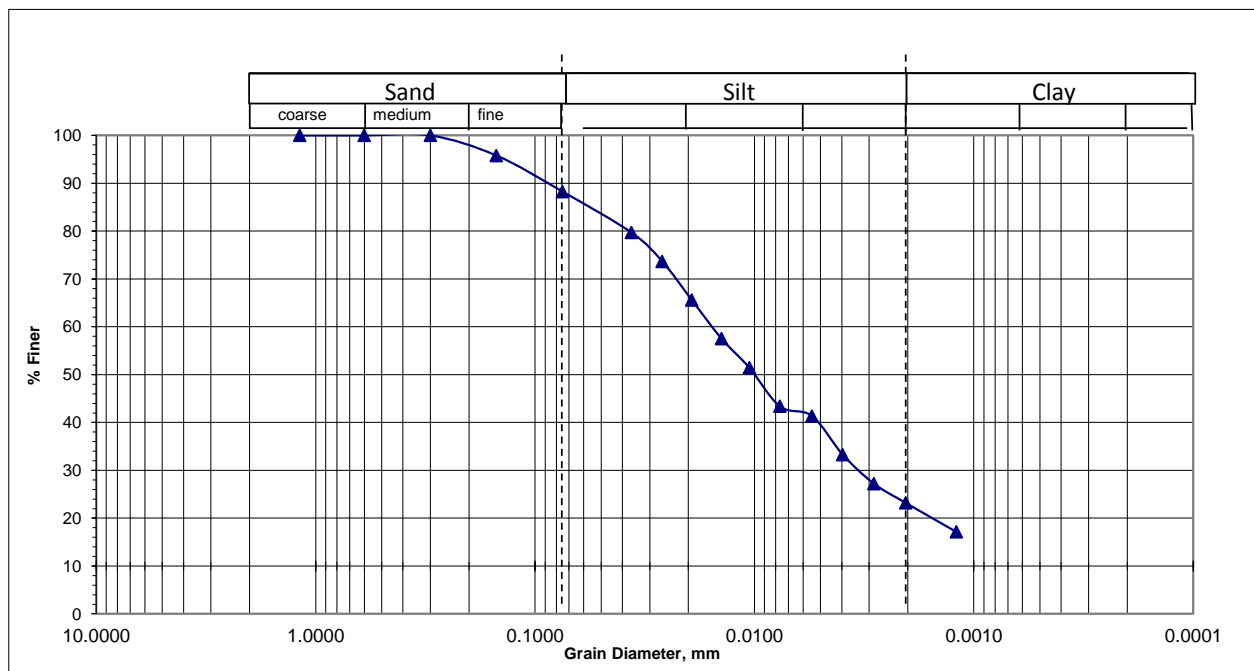
Bore Hole No : BH F24 Sample No. D7

Sampled Date: 02/01/2016

Depth (m) : 10.5

Test Date : 27/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.01 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.18

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =12%, Silt (0.005mm size)= 65% & Clay (0.001mm size) = 23%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

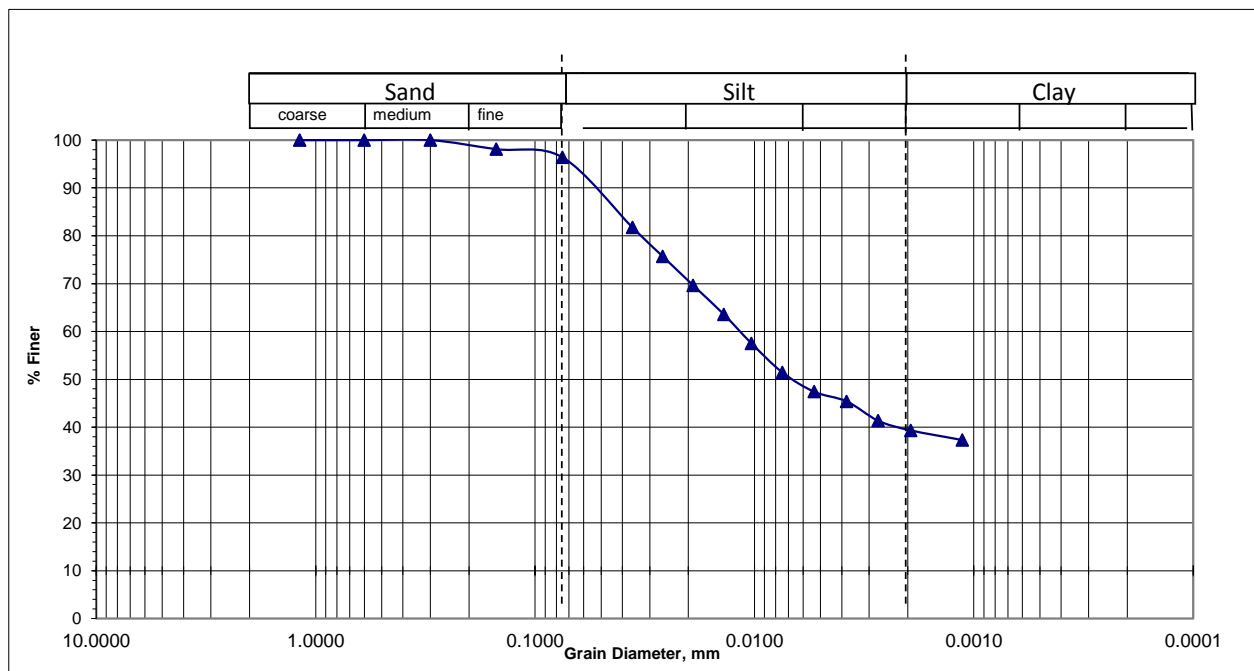
Bore Hole No : BH F205 Sample No. D2

Sampled Date: 04/01/2016

Depth (m) : 3.0

Test Date : 27/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.007 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.15

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =4%, Silt (0.005mm size)= 56% & Clay (0.001mm size) = 40%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

Bore Hole No : BH F25

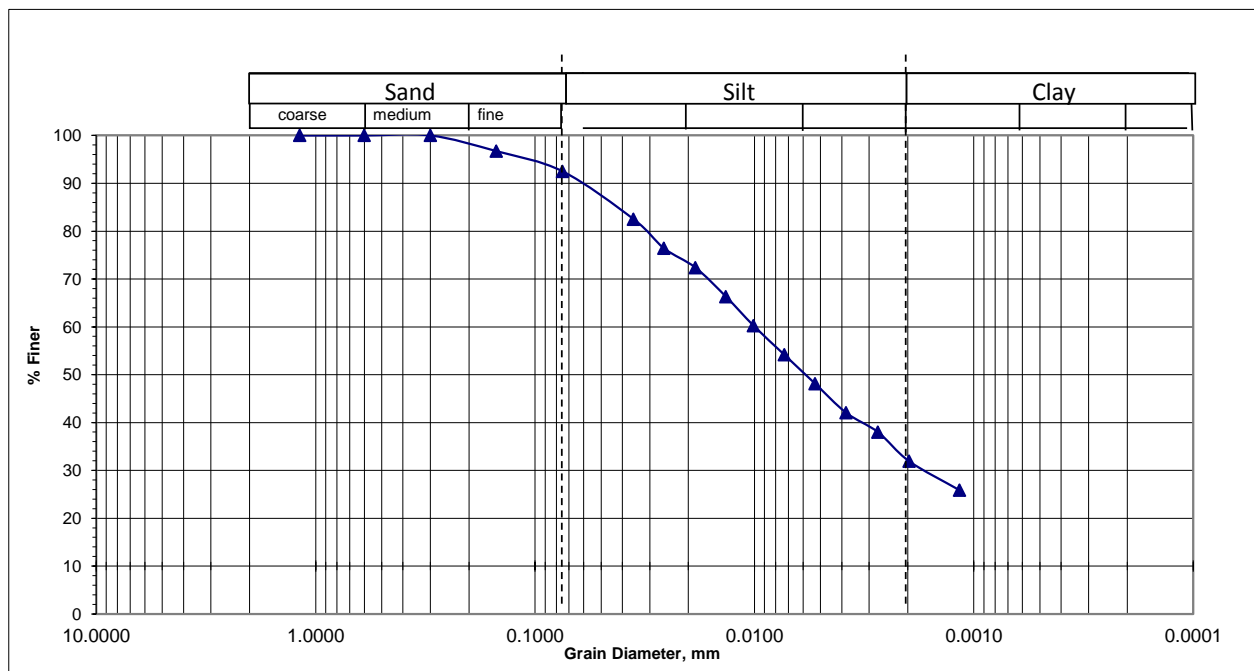
Sample No. D9

Sampled Date: 04/01/2016

Depth (m) : 13.5

Test Date : 27/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.006 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.14

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 60% & Clay (0.001mm size) =32%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gobinddapur Hat, Krishnanagar

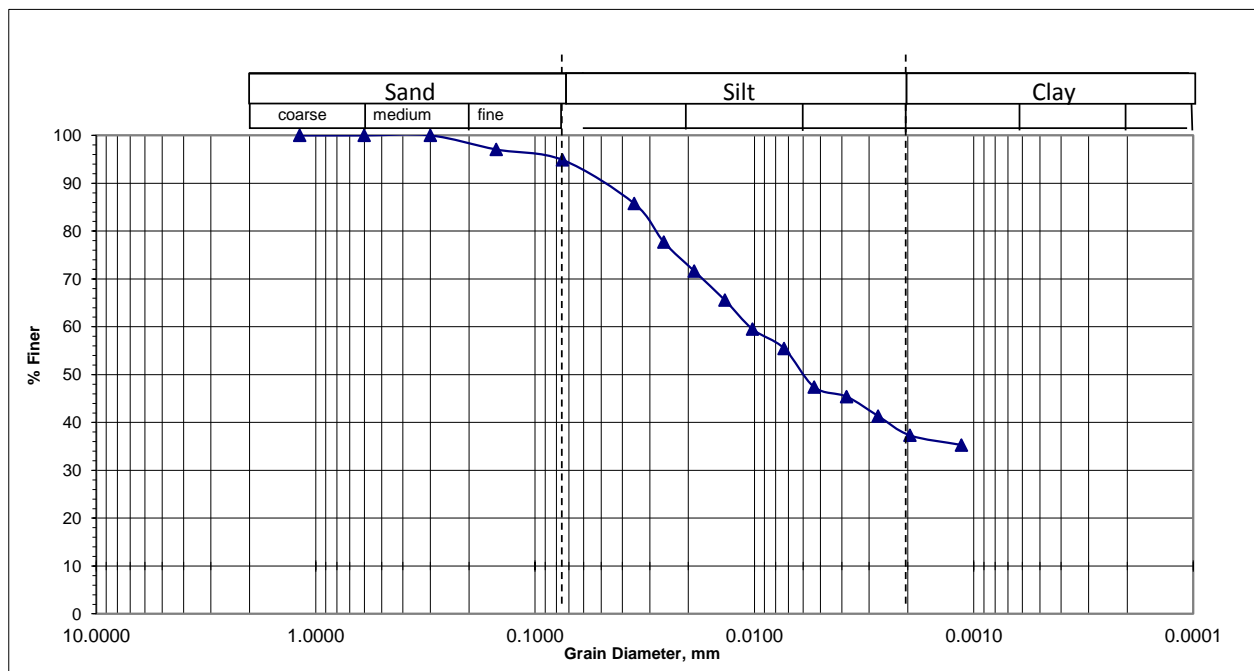
Bore Hole No : BH F26 Sample No. D2

Sampled Date: 04/01/2016

Depth (m) : 3.0

Test Date : 27/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.006 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.14

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =5%, Silt (0.005mm size)= 58% & Clay (0.001mm size) = 37%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Bakhunda College Field, Bakhunda, Greda

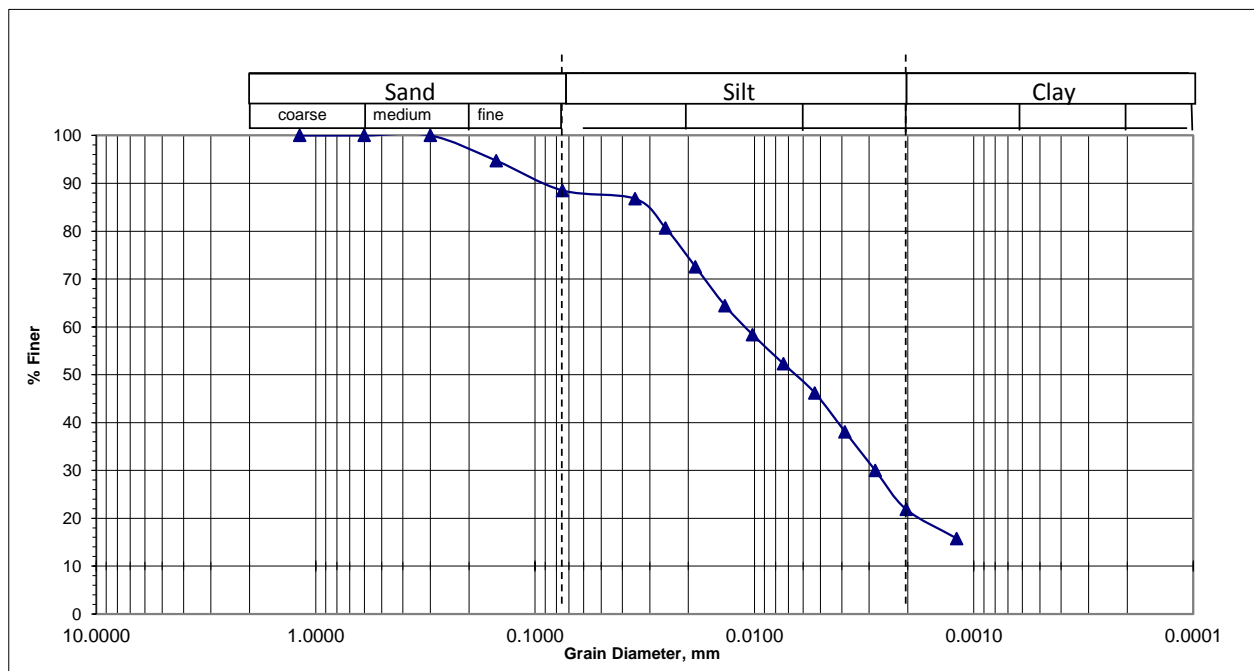
Bore Hole No : BH F27 Sample No. D5

Sampled Date: 02/01/2016

Depth (m) : 7.5

Test Date : 26/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.007 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.14

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =12%, Silt (0.005mm size)= 68% & Clay (0.001mm size) =20%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Kanaipur Akhak Centre, Kanaipur

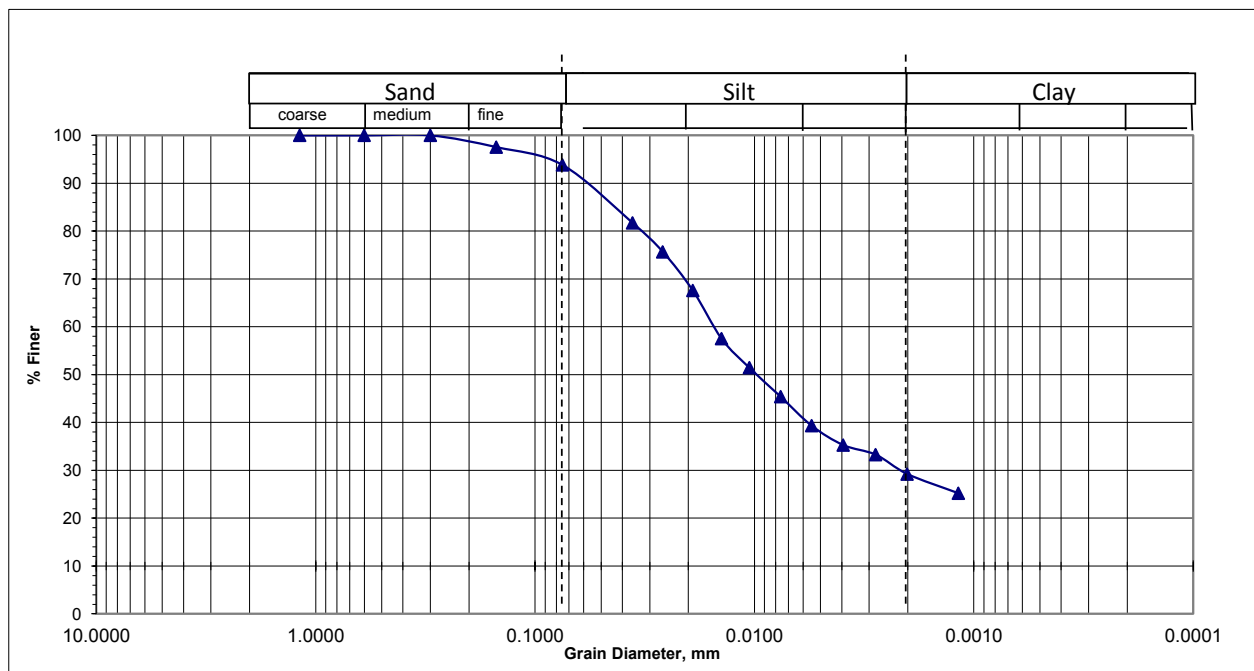
Bore Hole No : BH F29 Sample No. D2

Sampled Date: 04/01/2016

Depth (m) : 3.0

Test Date : 25/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.01 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.18

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =7%, Silt (0.005mm size)= 63% & Clay (0.001mm size) = 30%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Bore Hole No : BH F30

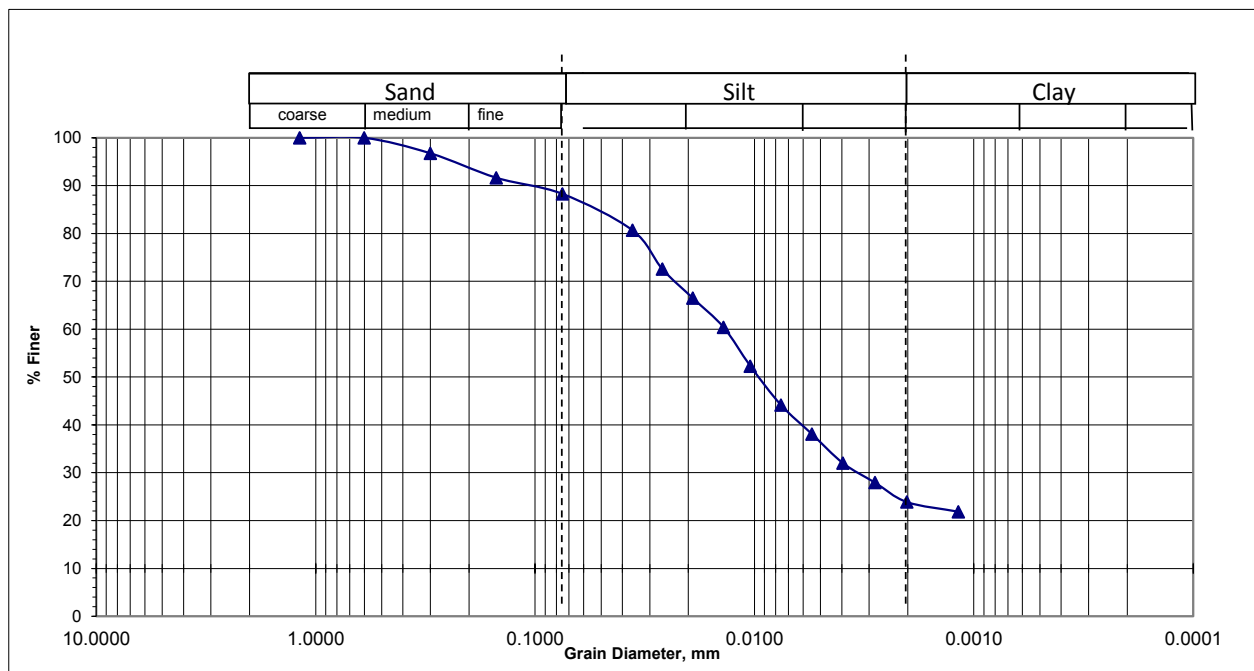
Sample No. D4

Sampled Date: 05/01/2016

Depth (m) : 6.0

Test Date : 25/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.012 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.19

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) = 12%, Silt (0.005mm size)= 65% & Clay (0.001mm size) = 23%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vhatpara Govt. Primary School, Kaijuri

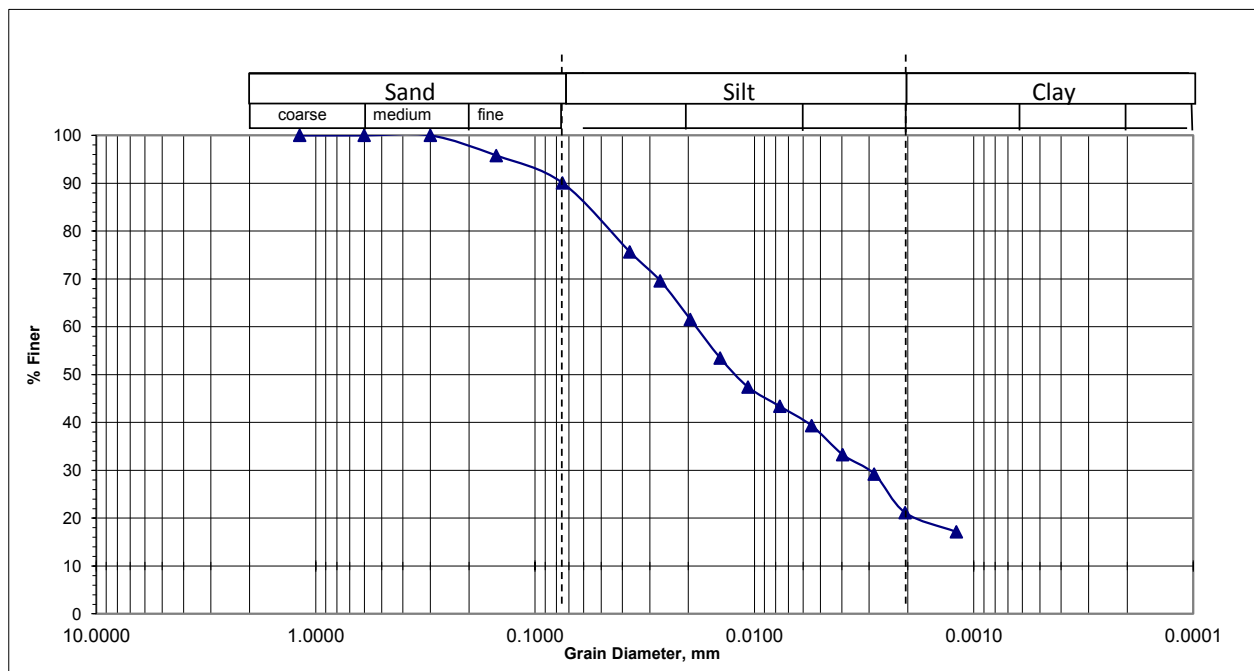
Bore Hole No : BH F31 Sample No. D4

Sampled Date: 03/01/2016

Depth (m) : 6.0

Test Date : 25/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.013 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.20

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =10%, Silt (0.005mm size)= 70% & Clay (0.001mm size) = 20%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Fursha Govt. Primary School, Kanaipur

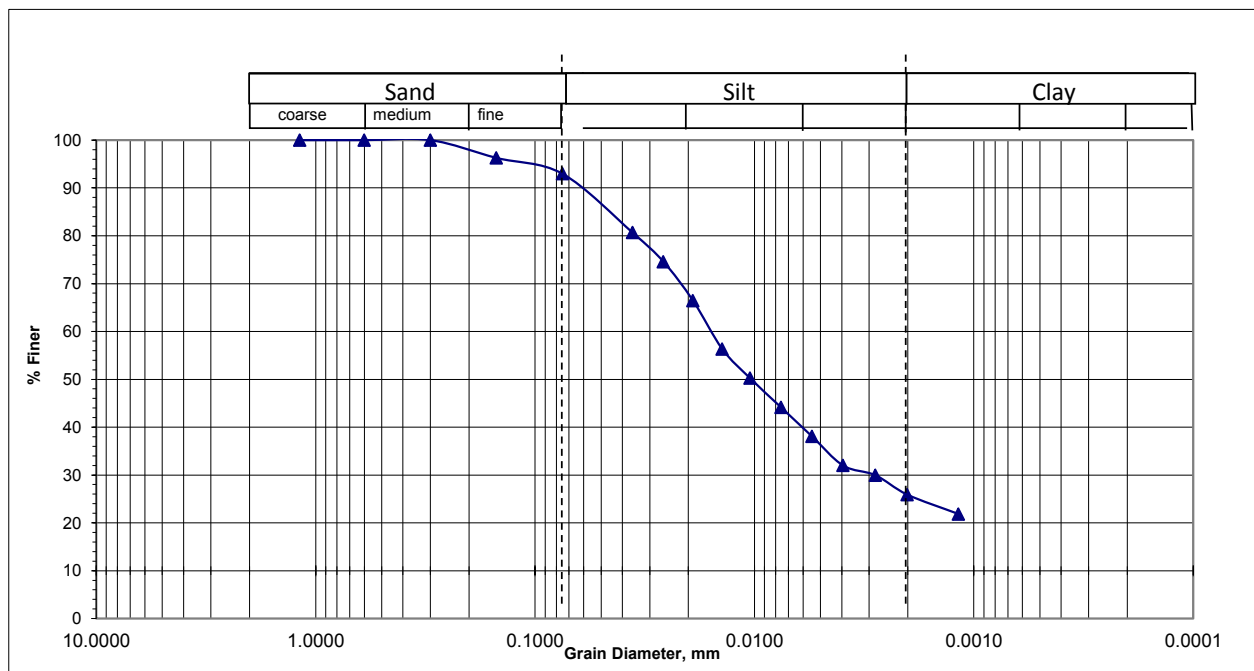
Bore Hole No : BH F32 Sample No. D4

Sampled Date: 05/01/2016

Depth (m) : 6.0

Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.01 mm

Silt-Factor, $f = 1.76 \times \sqrt{D_{50}}$ = 0.18

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 66% & Clay (0.001mm size) = 26%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Tonthoniar Hat, End of Kanaipur Union

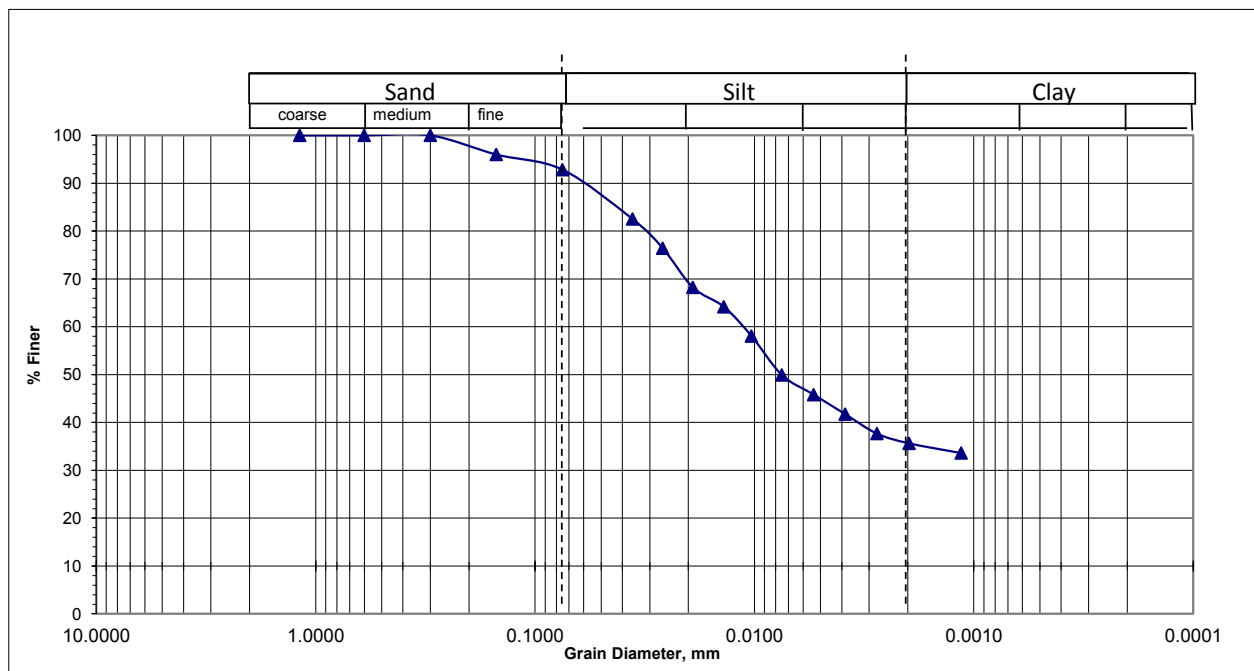
Bore Hole No : BH F34 Sample No. D2

Sampled Date: 10/01/2016

Depth (m) : 3.0

Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.008 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.15

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =8%, Silt (0.005mm size)= 57% & Clay (0.001mm size) = 35%

GRAIN SIZE ANALYSIS BY HYDROMETER

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Health Coplex, Ishan Gopalpur

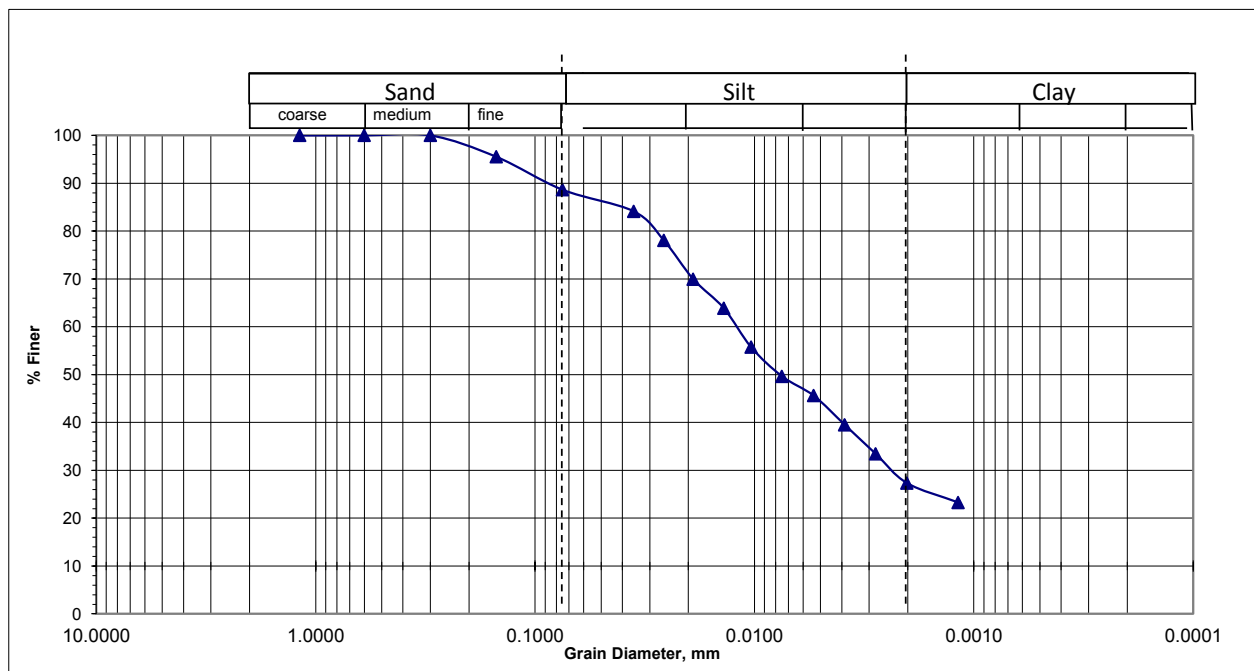
Bore Hole No : BH F36 Sample No. D4

Sampled Date: 09/01/2016

Depth (m) : 6.0

Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, D_{50} = 0.008 mm

Silt-Factor, $f = 1.76\sqrt{D_{50}}$ = 0.16

% Particles (from the grain -size analysis graph).

Sand (0.075mm size) =12%, Silt (0.005mm size)= 61% & Clay (0.001mm size) = 27%

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : SOUTH DIGRIRCHAR MADHOBDA GOVT. PRI. SCHOOL, Madhubdia

Sample Information:

Sample Date: 5/1/2016

Test Date: 12/9/2016

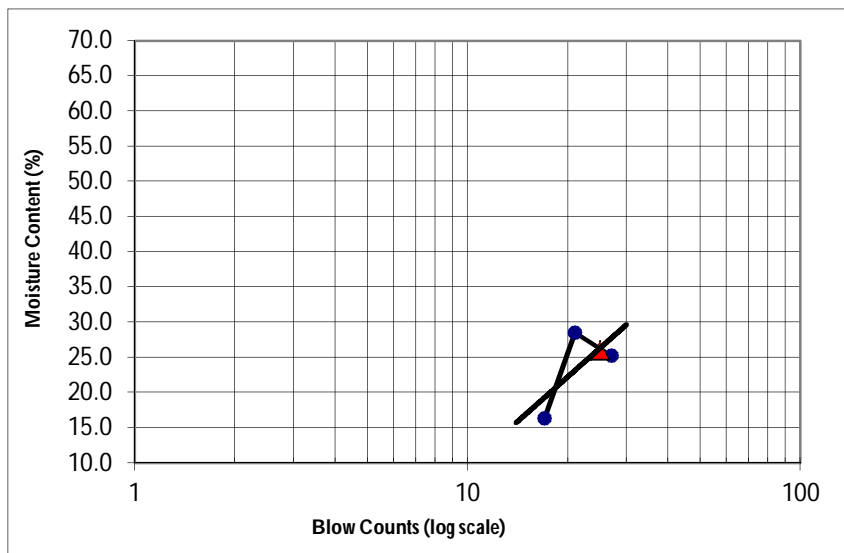
Boring Number BH-02

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C55	C66	C77	Cup Number	Ct103	Ct103
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	99.09	65.03	71.6	Weight of Wet Soil and Cup (g)	21.19	21.55
Weight of Dry Soil and Cup (g)	91.09	60.42	65.5	Weight of Dry Soil and Cup (g)	21.04	21.13
Moisure Content (%)	16.3	28.5	25.3	Moisure Content (%)	10.1	26.6
Blow Counts	17	21	27			

Compilation of Test Results



Liquid Limit	26
Plastic Limit	18
Plasticity Index	8

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

Sample Information:

Sample Date: 6/1/2016

Test Date: 12/9/2016

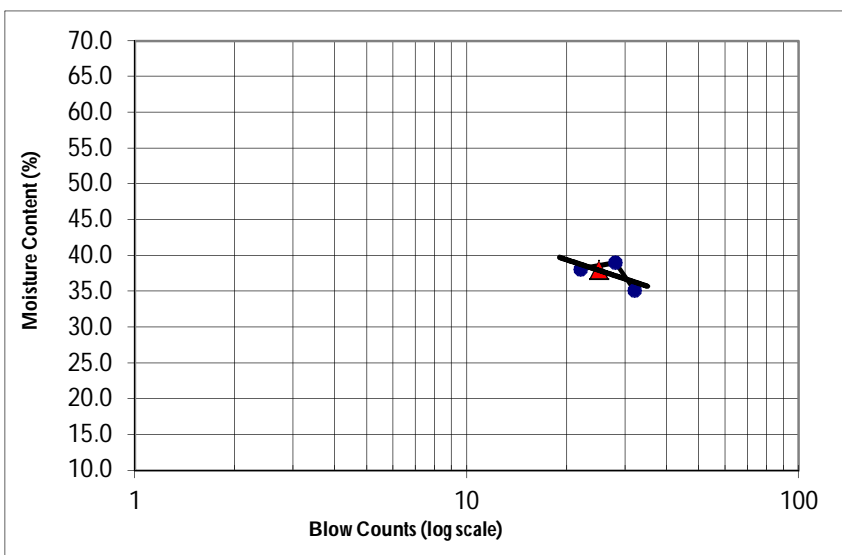
Boring Number BH-04

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	118.08	64.13	52.28	Weight of Wet Soil and Cup (g)	13.77	14.08
Weight of Dry Soil and Cup (g)	95.68	56.36	48.22	Weight of Dry Soil and Cup (g)	13.35	13.66
Moisure Content (%)	38.1	39.0	35.2	Moisure Content (%)	35.0	27.8
Blow Counts	22	28	32			

Compilation of Test Results



Liquid Limit	38
Plastic Limit	31
Plasticity Index	7

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Khalilpur Bazar,Majchar

Sample Information:

Sample Date: 7/1/2016

Test Date: 12/9/2016

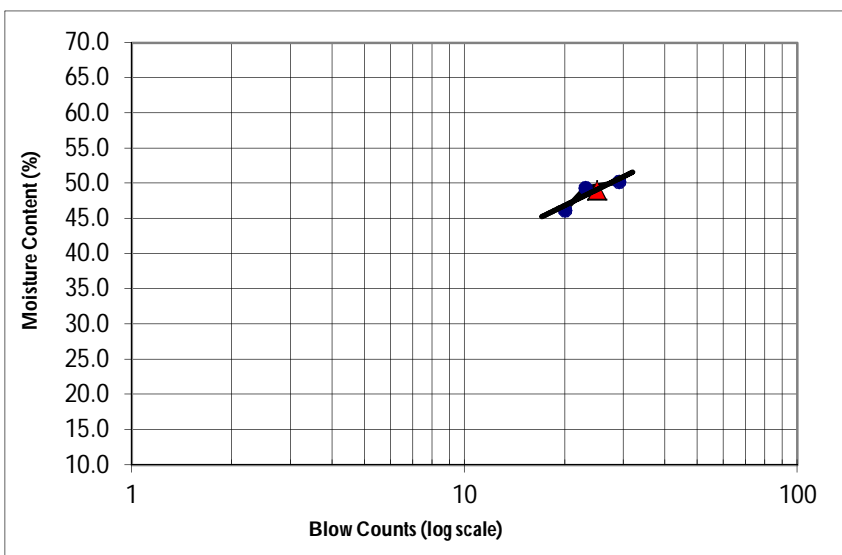
Boring Number BH-10

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C03	C08	C09	Cup Number	Ct111	Ct111
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	105.95	65.52	71.61	Weight of Wet Soil and Cup (g)	21.86	21.95
Weight of Dry Soil and Cup (g)	85.77	58.5	61.49	Weight of Dry Soil and Cup (g)	21.62	21.2
Moisure Content (%)	46.2	49.3	50.2	Moisure Content (%)	11.6	45.5
Blow Counts	20	23	29			

Compilation of Test Results



Liquid Limit	49
Plastic Limit	29
Plasticity Index	20

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 5 nos. Decreeerchar, Munshitanggi Aftabuddin Madrasha, Decreeerchar

Sample Information:

Sample Date: 31/12/2015

Test Date: 12/9/2016

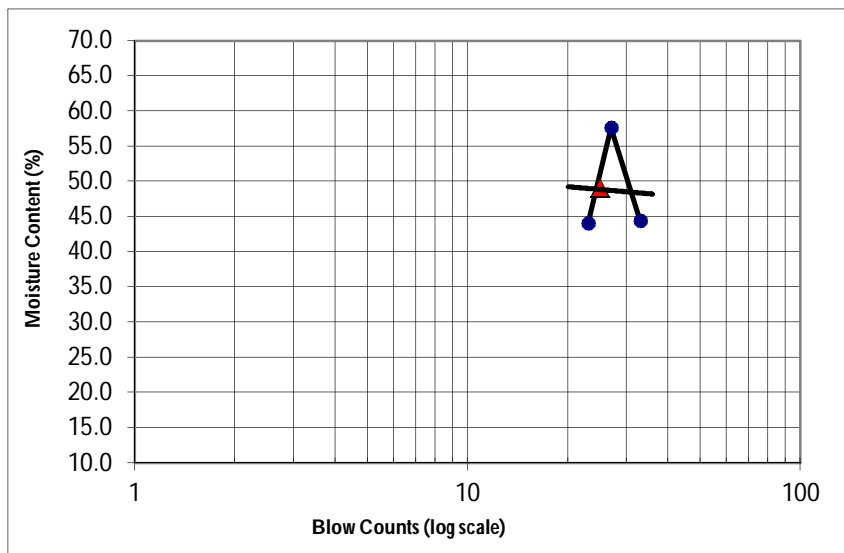
Boring Number BH-11

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	117.18	69.43	55.37	Weight of Wet Soil and Cup (g)	14.45	14.38
Weight of Dry Soil and Cup (g)	92.65	57.37	49.62	Weight of Dry Soil and Cup (g)	13.85	13.56
Moisure Content (%)	44.0	57.6	44.4	Moisure Content (%)	35.3	58.2
Blow Counts	23	27	33			

Compilation of Test Results



Liquid Limit	49
Plastic Limit	47
Plasticity Index	2

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Vajon Dangga Govt. Primary School, Faridpur Sadar

Sample Information:

Sample Date: 31/12/2015

Test Date: 12/9/2016

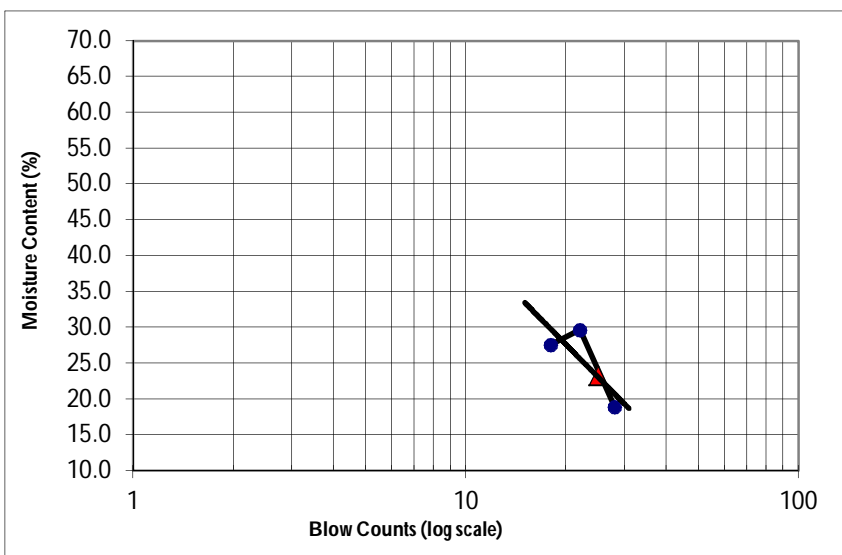
Boring Number BH-14

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	100.89	70.53	73.63	Weight of Wet Soil and Cup (g)	21.86	21.65
Weight of Dry Soil and Cup (g)	88.19	64.52	68.5	Weight of Dry Soil and Cup (g)	21.54	21.23
Moisure Content (%)	27.6	29.7	18.9	Moisure Content (%)	16.1	25.0
Blow Counts	18	22	28			

Compilation of Test Results



Liquid Limit	23
Plastic Limit	21
Plasticity Index	3

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Sample Information:

Sample Date: 30/12/2015

Test Date: 13/9/2016

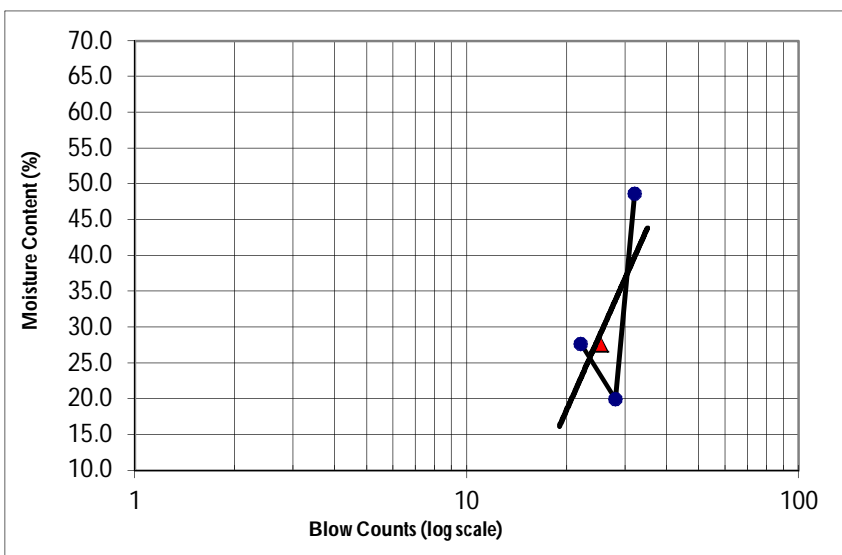
Boring Number BH-15

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	117.08	65.13	61.28	Weight of Wet Soil and Cup (g)	13.77	14.18
Weight of Dry Soil and Cup (g)	99.68	60.36	53.22	Weight of Dry Soil and Cup (g)	13.3	13.96
Moisture Content (%)	27.7	19.9	48.7	Moisture Content (%)	40.9	12.2
Blow Counts	22	28	32			

Compilation of Test Results



Liquid Limit	28
Plastic Limit	27
Plasticity Index	1

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Sample Information:

Sample Date: 30/12/2015

Test Date: 13/9/2016

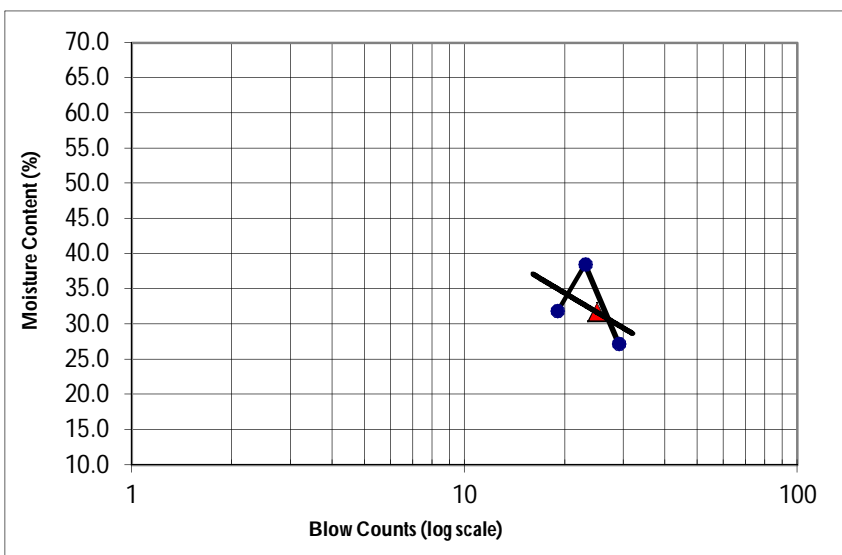
Boring Number BH-16

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C03	C08	C09	Cup Number	Ct111	Ct111
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	104.95	69.52	74.61	Weight of Wet Soil and Cup (g)	21.86	21.85
Weight of Dry Soil and Cup (g)	89.77	62.5	67.49	Weight of Dry Soil and Cup (g)	21.52	21.39
Moisture Content (%)	31.9	38.5	27.2	Moisture Content (%)	17.3	25.0
Blow Counts	19	23	29			

Compilation of Test Results



Liquid Limit	32
Plastic Limit	21
Plasticity Index	11

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mohim School Field, Faridpur Sadar

Sample Information:

Sample Date: 27/12/2015

Test Date: 13/9/2016

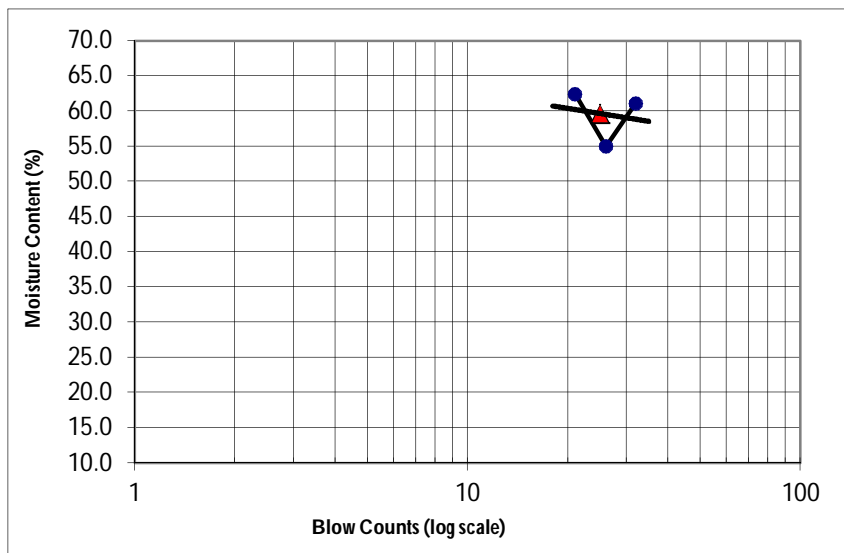
Boring Number BH-17

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	124.18	70.43	62.37	Weight of Wet Soil and Cup (g)	14.75	14.68
Weight of Dry Soil and Cup (g)	90.65	58.37	52.62	Weight of Dry Soil and Cup (g)	13.85	13.79
Moisture Content (%)	62.5	55.0	61.1	Moisture Content (%)	52.9	54.3
Blow Counts	21	26	32			

Compilation of Test Results



Liquid Limit	60
Plastic Limit	54
Plasticity Index	6

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

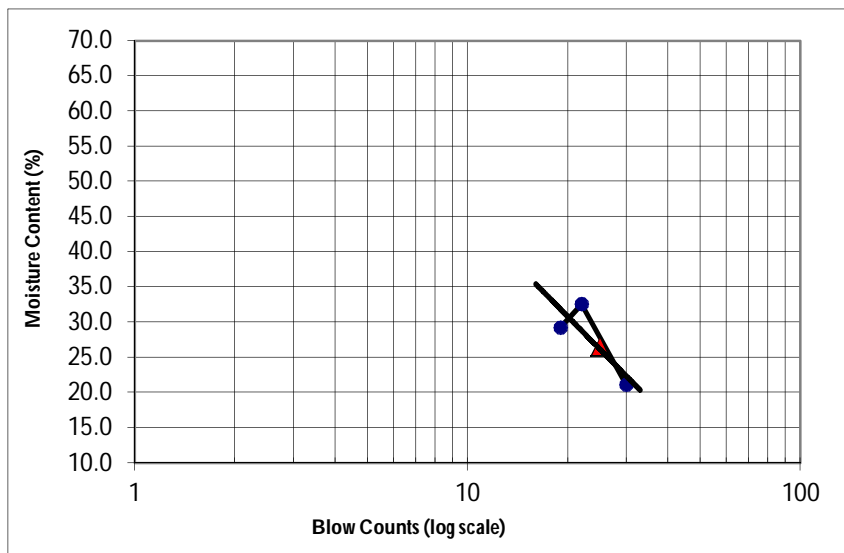
Project Location : Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri

Sample Information:

Sample Date: 1/1/2016
Test Date: 13/9/2016
Boring Number BH-20
Sample Number D3
Depth of Sample(m) 4.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C55	C66	C77	Cup Number	Ct103	Ct103
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	95.09	63.03	70.6	Weight of Wet Soil and Cup (g)	21.66	21.55
Weight of Dry Soil and Cup (g)	83.09	58.42	65.5	Weight of Dry Soil and Cup (g)	21.39	21.29
Moisure Content (%)	29.3	32.6	21.1	Moisure Content (%)	14.7	14.9
Blow Counts	19	22	30			

Compilation of Test Results



Liquid Limit	26
Plastic Limit	15
Plasticity Index	12

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Johora Begum High School Field, Parchim Khabashpur, Faridpur Sadar

Sample Information:

Sample Date: 27/12/2015

Test Date: 13/9/2016

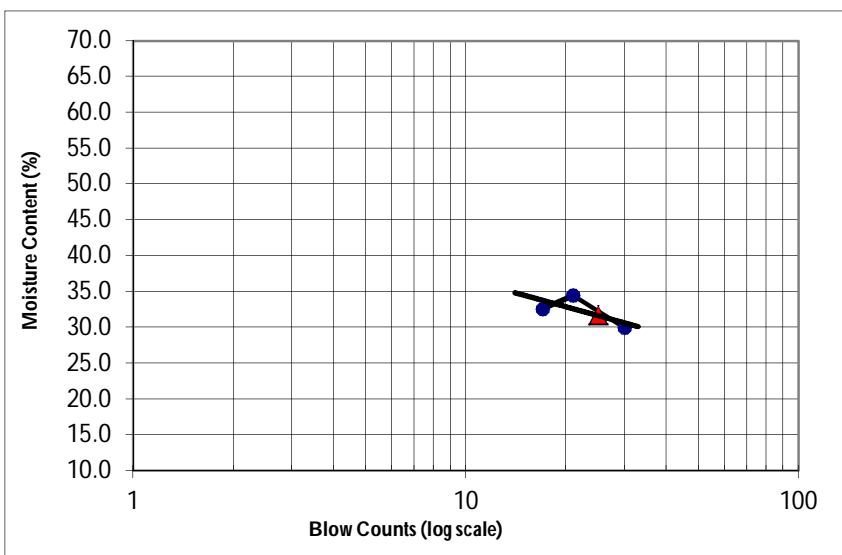
Boring Number BH-21

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	101.89	75.53	76.63	Weight of Wet Soil and Cup (g)	21.76	21.37
Weight of Dry Soil and Cup (g)	87.19	67.52	68.5	Weight of Dry Soil and Cup (g)	21.39	21.03
Moisure Content (%)	32.6	34.5	29.9	Moisure Content (%)	20.1	23.0
Blow Counts	17	21	30			

Compilation of Test Results



Liquid Limit	32
Plastic Limit	22
Plasticity Index	10

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

Sample Information:

Sample Date: 4/1/2016

Test Date: 14/9/2016

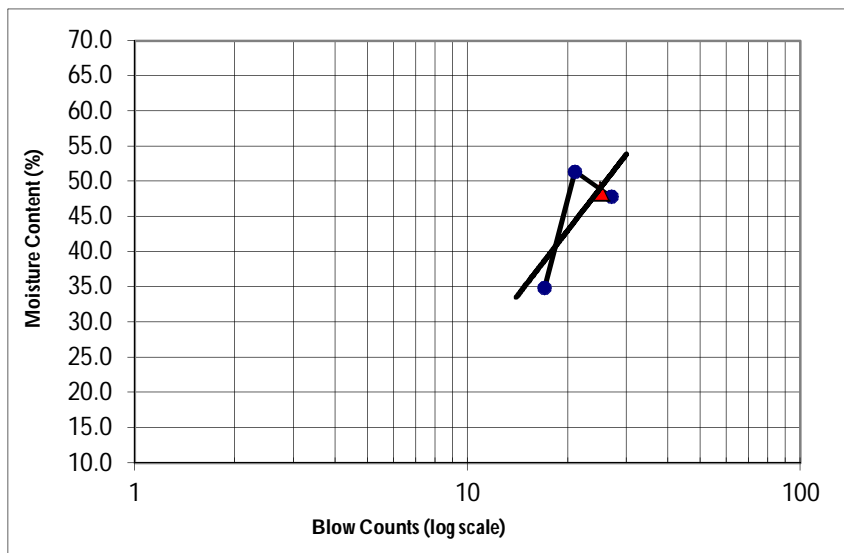
Boring Number BH-19

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C03	C08	C09	Cup Number	Ct111	Ct111
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	96.95	60.52	66.69	Weight of Wet Soil and Cup (g)	21.06	21.75
Weight of Dry Soil and Cup (g)	82.77	55	58.49	Weight of Dry Soil and Cup (g)	20.53	21.59
Moisure Content (%)	34.9	51.4	47.8	Moisure Content (%)	54.1	7.8
Blow Counts	17	21	27			

Compilation of Test Results



Liquid Limit	49
Plastic Limit	31
Plasticity Index	18

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar

Sample Information:

Sample Date: 29/12/2015

Test Date: 14/9/2016

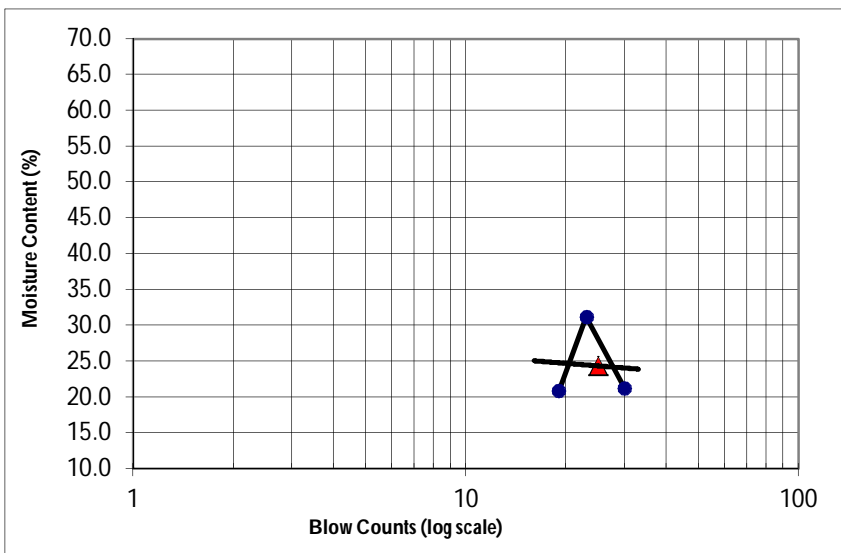
Boring Number BH-22

Sample Number D5

Depth of Sample(m) 7.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	109.89	69.53	70.63	Weight of Wet Soil and Cup (g)	21.86	21.45
Weight of Dry Soil and Cup (g)	98.19	63.52	65.5	Weight of Dry Soil and Cup (g)	21.44	21.23
Moisure Content (%)	20.9	31.2	21.2	Moisure Content (%)	22.2	13.1
Blow Counts	19	23	30			

Compilation of Test Results



Liquid Limit	24
Plastic Limit	18
Plasticity Index	7

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Choyata, Aliabad

Sample Information:

Sample Date: 31/12/2016

Test Date: 14/9/2016

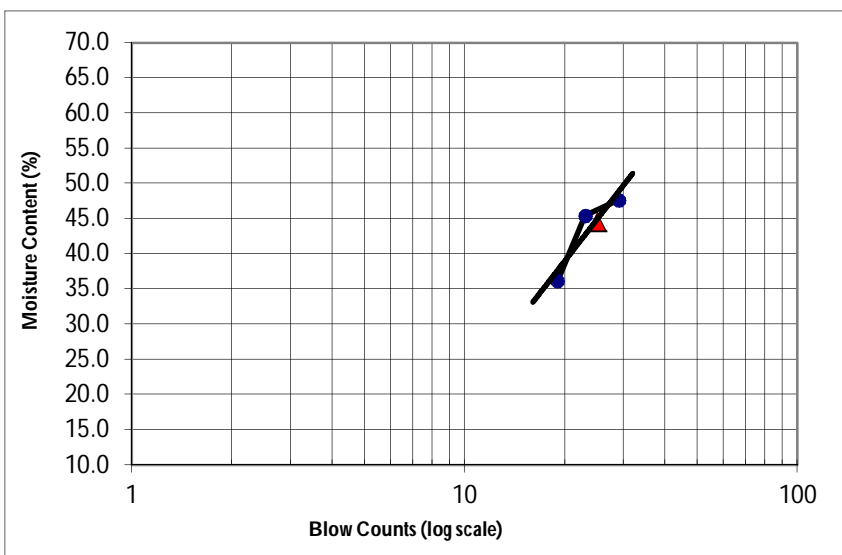
Boring Number BH-23

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C55	C66	C77	Cup Number	Ct103	Ct103
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	91.09	59.03	64.6	Weight of Wet Soil and Cup (g)	21.86	21.75
Weight of Dry Soil and Cup (g)	78.09	54.42	57.1	Weight of Dry Soil and Cup (g)	21.44	21.23
Moisure Content (%)	36.2	45.4	47.6	Moisure Content (%)	22.2	31.0
Blow Counts	19	23	29			

Compilation of Test Results



Liquid Limit	45
Plastic Limit	27
Plasticity Index	18

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Payarpur Godaoun, Kaijuri

Sample Information:

Sample Date: 2/1/2016

Test Date: 14/9/2016

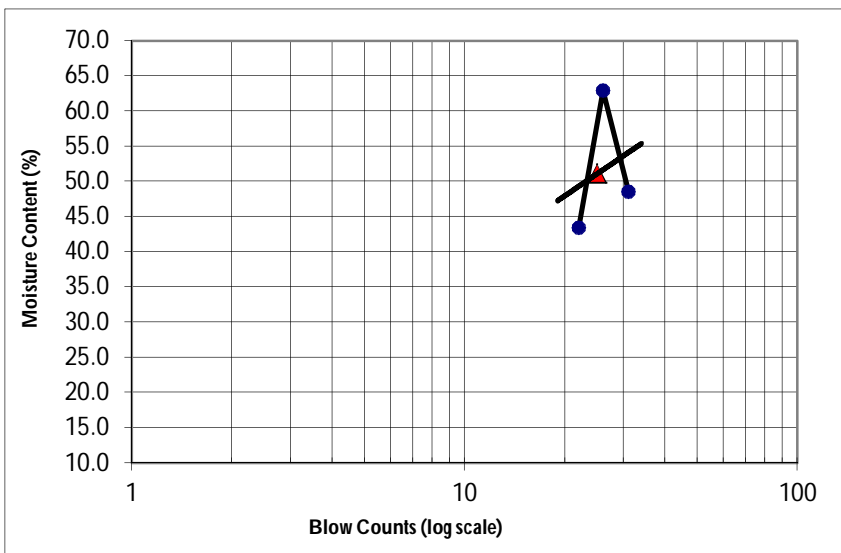
Boring Number BH-24

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	121.18	75.43	60.37	Weight of Wet Soil and Cup (g)	14.59	14.38
Weight of Dry Soil and Cup (g)	95.65	60.37	52.62	Weight of Dry Soil and Cup (g)	13.59	13.96
Moisure Content (%)	43.5	63.0	48.6	Moisure Content (%)	69.4	23.2
Blow Counts	22	26	31			

Compilation of Test Results



Liquid Limit	51
Plastic Limit	46
Plasticity Index	5

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gobinddapur Hat, Krishnanagar

Sample Information:

Sample Date: 4/1/2016

Test Date: 14/9/2016

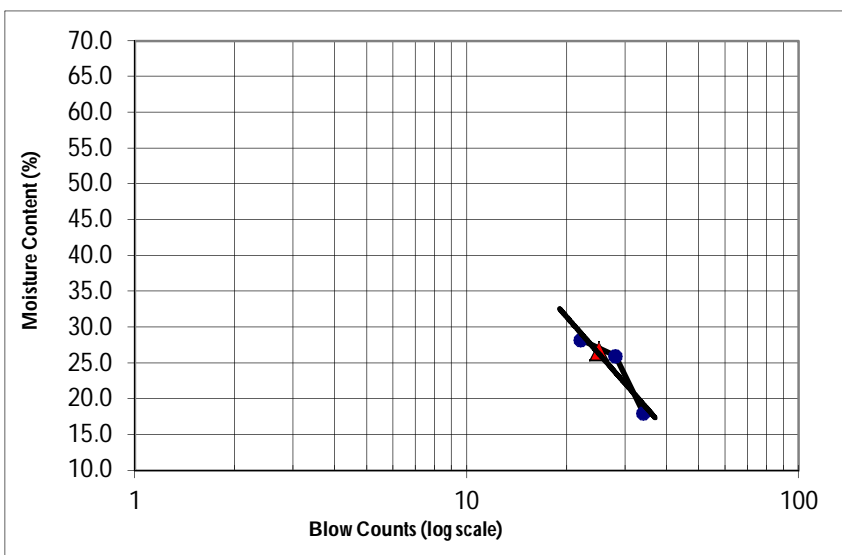
Boring Number BH-26

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	125.08	74.13	63.28	Weight of Wet Soil and Cup (g)	13.45	14.18
Weight of Dry Soil and Cup (g)	105.68	66.36	59.22	Weight of Dry Soil and Cup (g)	13.35	13.66
Moisure Content (%)	28.2	26.0	18.0	Moisure Content (%)	8.3	34.4
Blow Counts	22	28	34			

Compilation of Test Results



Liquid Limit	27
Plastic Limit	21
Plasticity Index	5

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Bakhunda College Field, Bakhunda, Greda

Sample Information:

Sample Date: 2/1/2016

Test Date: 15/9/2016

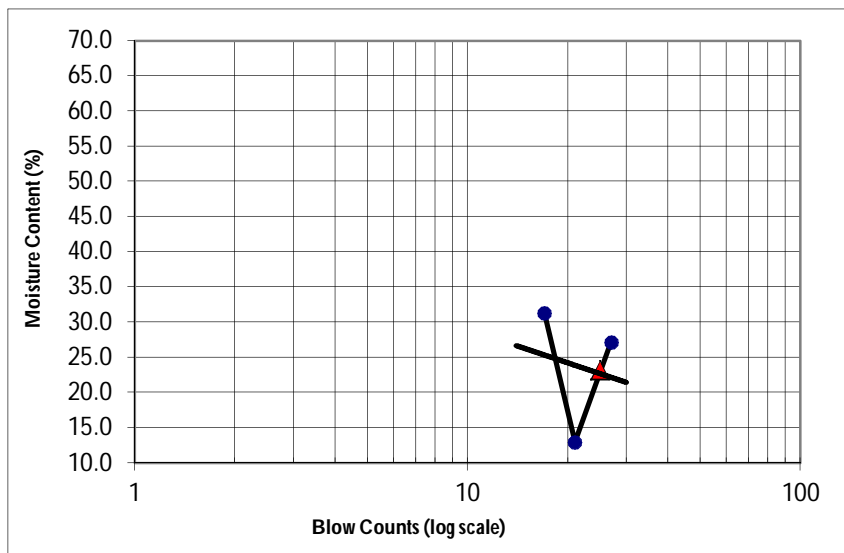
Boring Number BH-27

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C55	C66	C77	Cup Number	Ct103	Ct103
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	105.09	67.03	74.6	Weight of Wet Soil and Cup (g)	21.76	21.75
Weight of Dry Soil and Cup (g)	90.09	64.42	67.5	Weight of Dry Soil and Cup (g)	21.44	21.33
Moisure Content (%)	31.3	13.0	27.2	Moisure Content (%)	16.9	23.6
Blow Counts	17	21	27			

Compilation of Test Results



Liquid Limit	23
Plastic Limit	20
Plasticity Index	3

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Chacia fokirbari Road, Kaijuri

Sample Information:

Sample Date: 2/1/2016

Test Date: 15/9/2016

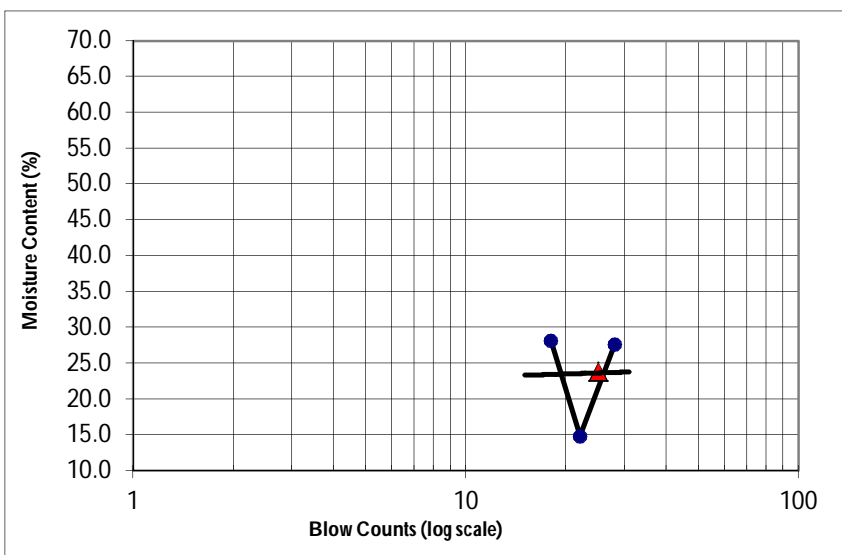
Boring Number BH-28

Sample Number D1

Depth of Sample(m) 1.5

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	99.89	67.53	69.63	Weight of Wet Soil and Cup (g)	21.96	21.63
Weight of Dry Soil and Cup (g)	87.19	64.52	63.5	Weight of Dry Soil and Cup (g)	21.51	21.33
Moisure Content (%)	28.2	14.9	27.7	Moisure Content (%)	23.0	16.9
Blow Counts	18	22	28			

Compilation of Test Results



Liquid Limit	24
Plastic Limit	20
Plasticity Index	4

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Kanaipur Akhak Centre, Kanaipur

Sample Information:

Sample Date: 4/1/2016

Test Date: 15/9/2016

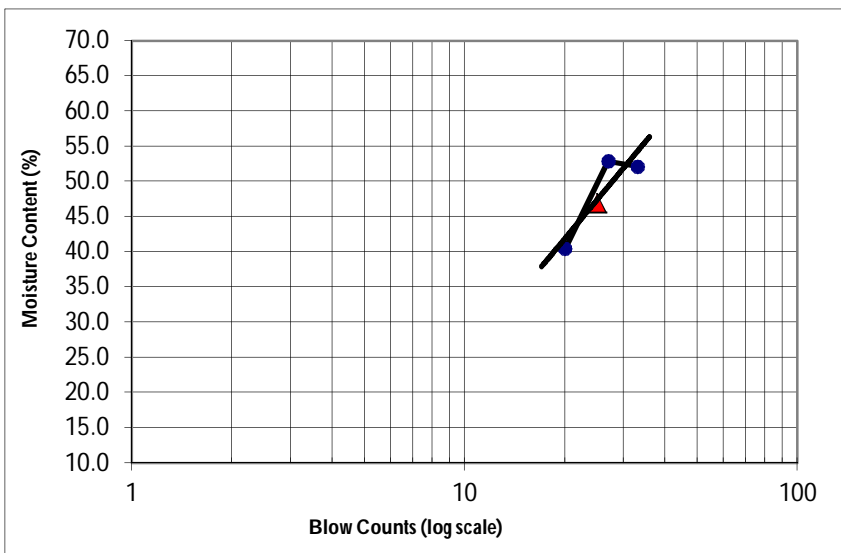
Boring Number BH-29

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	115.18	68.43	56.37	Weight of Wet Soil and Cup (g)	14.61	14.39
Weight of Dry Soil and Cup (g)	92.65	57.37	49.62	Weight of Dry Soil and Cup (g)	13.85	13.76
Moisure Content (%)	40.5	52.9	52.1	Moisure Content (%)	44.7	39.1
Blow Counts	20	27	33			

Compilation of Test Results



Liquid Limit	47
Plastic Limit	42
Plasticity Index	5

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Sample Information:

Sample Date: 5/1/2016

Test Date: 15/9/2016

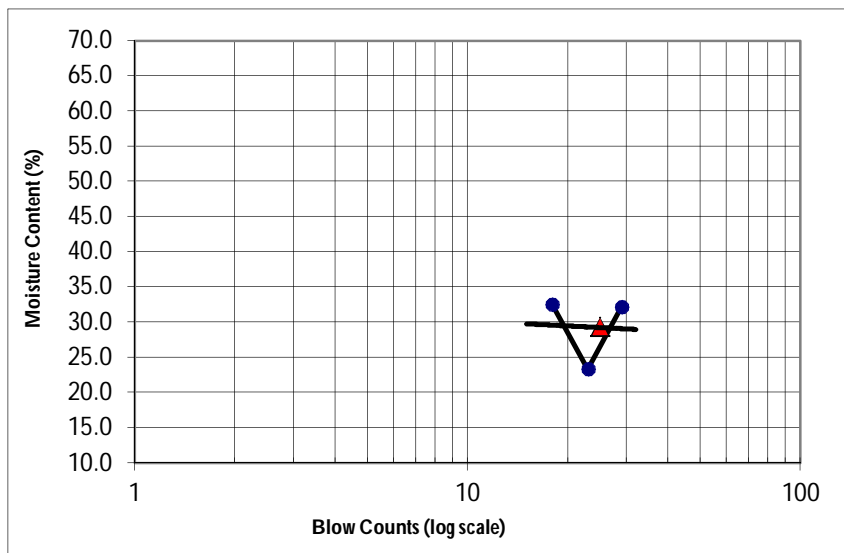
Boring Number BH-30

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C03	C08	C09	Cup Number	Ct111	Ct111
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	99.95	65.52	70.61	Weight of Wet Soil and Cup (g)	21.96	21.95
Weight of Dry Soil and Cup (g)	85.77	61.5	63.49	Weight of Dry Soil and Cup (g)	21.62	21.26
Moisure Content (%)	32.5	23.3	32.2	Moisure Content (%)	16.4	40.4
Blow Counts	18	23	29			

Compilation of Test Results



Liquid Limit	29
Plastic Limit	28
Plasticity Index	1

Laboratory Test Results of Atterberg Limits of Soil (ASTM Designation:D4318)

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Tonthoniar Hat, End of Kanaipur Union

Sample Information:

Sample Date: 10/1/2016

Test Date: 15/9/2016

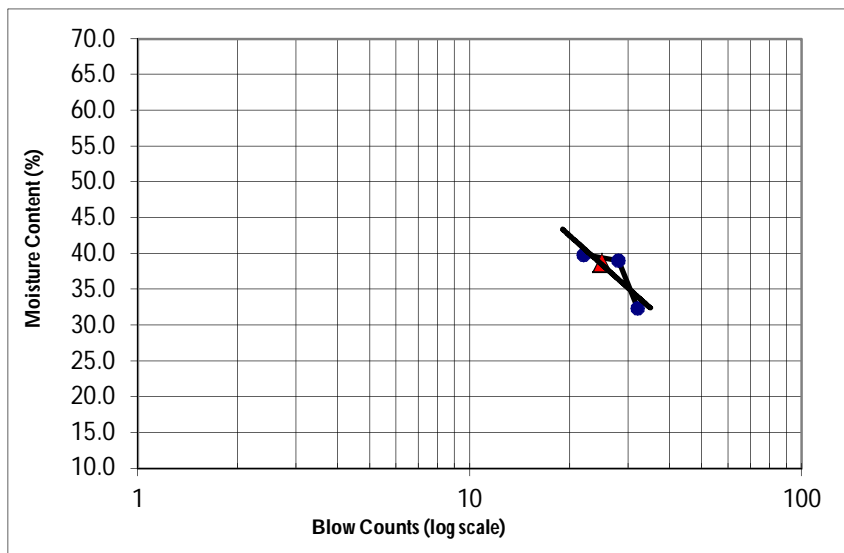
Boring Number BH-34

Sample Number D2

Depth of Sample(m) 3.0

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	119.08	64.13	53.28	Weight of Wet Soil and Cup (g)	13.77	14.08
Weight of Dry Soil and Cup (g)	95.68	56.36	49.22	Weight of Dry Soil and Cup (g)	13.35	13.76
Moisure Content (%)	39.9	39.0	32.4	Moisure Content (%)	35.0	19.9
Blow Counts	22	28	32			

Compilation of Test Results

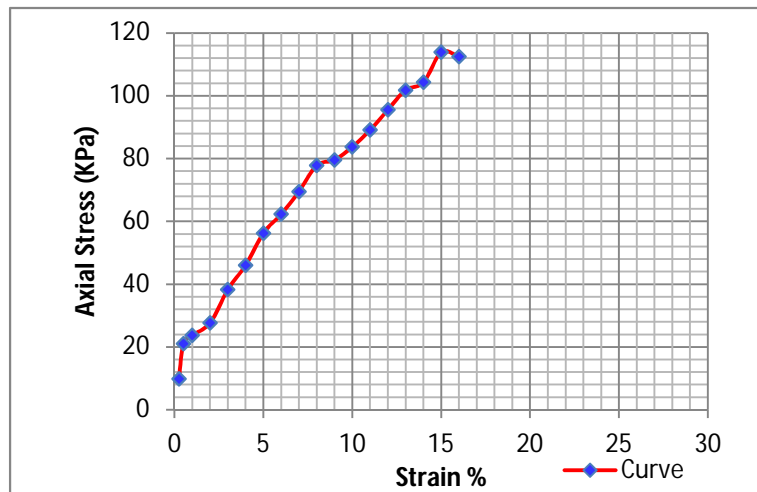


Liquid Limit	39
Plastic Limit	27
Plasticity Index	11

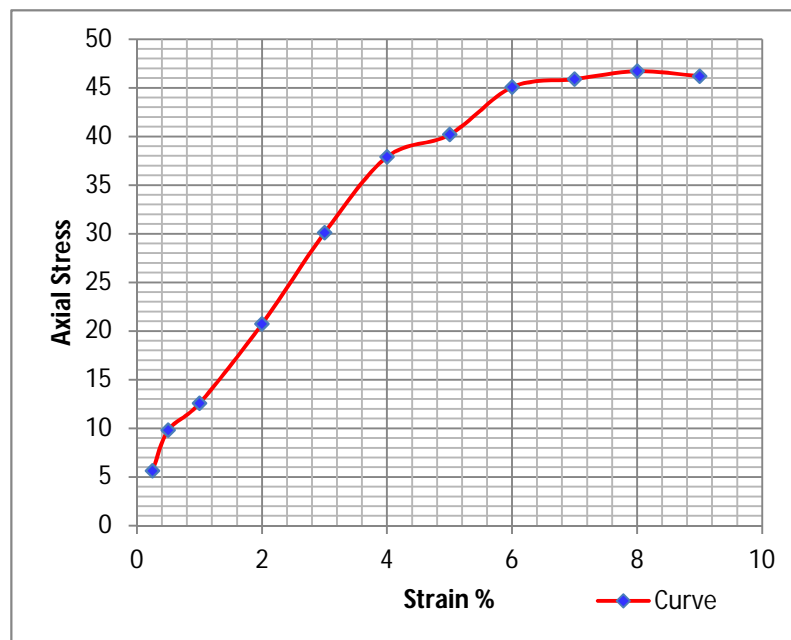
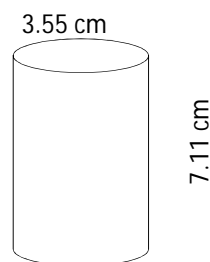
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: SOUTH DIGRIRCHAR MADHOBDA GOVT. PRI. SCHOOL, Madhubdia & Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

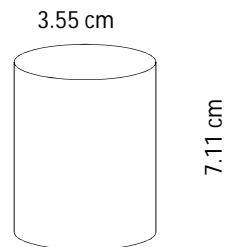
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-02
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	silty clay with sand
qu (Kpa)	113.85
% Strain	15.0
γ_{wet} (gm/cc)	1.91
γ_{Dry} (gm/cc)	1.44
% Moisture	32.34
Cohesion (Kpa)	56.93

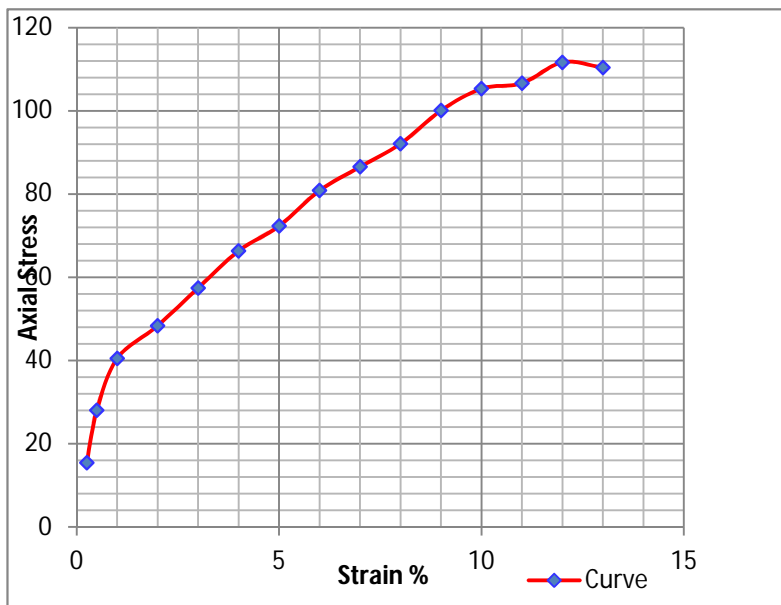


Bore hole No.	BH-04
Sample No.	UD-1
Depth (m)	2.10 to 2.55
Description of soil	Clay with Sand
qu (Kpa)	46.70
% Strain	8.0
γ_{wet} (gm/cc)	2.19
γ_{Dry} (gm/cc)	1.84
% Moisture	18.81
Cohesion (Kpa)	23.35

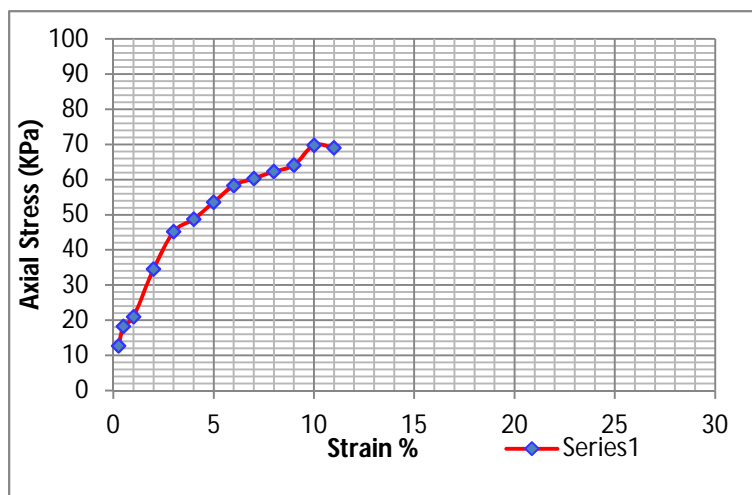
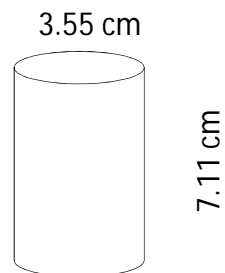


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Near Madhankali Swith gate, Ambikapur & Dhuldi Railgate, Dhuldi Bazar, Majchar

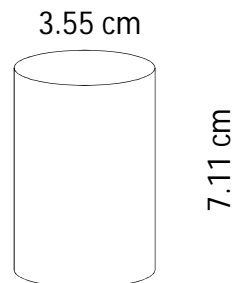
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-07
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt with Clay and Sand
qu (Kpa)	111.67
% Strain	12.0
γ_{wet} (gm/cc)	1.84
γ_{Dry} (gm/cc)	1.49
% Moisture	23.54
Cohesion (Kpa)	55.83

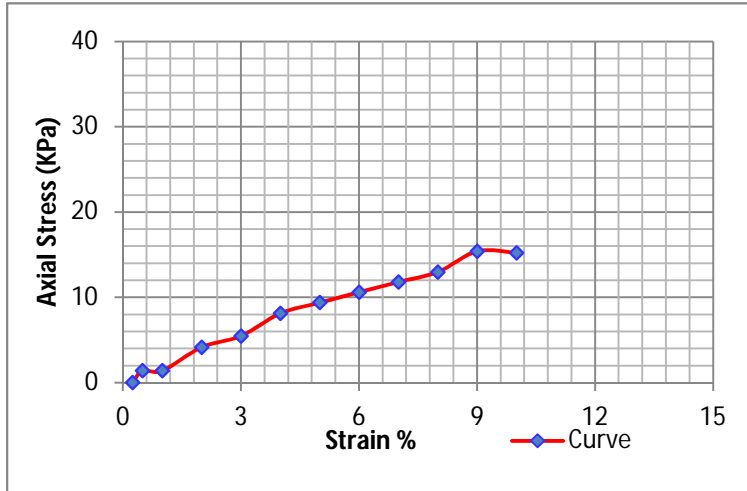


Bore hole No.	BH-09
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	SILT with Sand
qu (Kpa)	62.26
% Strain	8.0
γ_{wet} (gm/cc)	2.20
γ_{Dry} (gm/cc)	1.77
% Moisture	24.19
Cohesion (Kpa)	31.13

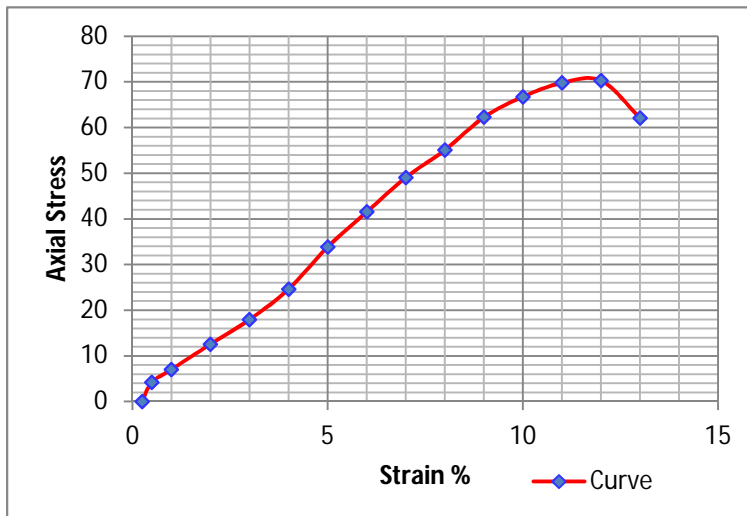
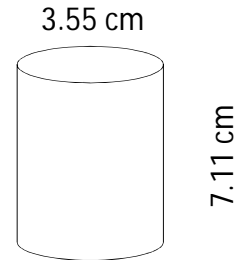


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar
& Vajon Dangga Govt. Primary School, Faridpur Sadar

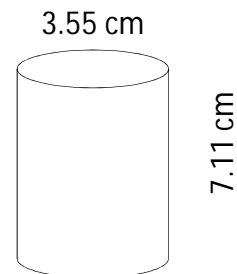
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-11
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	15.40
% Strain	9.0
γ_{wet} (gm/cc)	1.39
γ_{Dry} (gm/cc)	0.78
% Moisture	78.05
Cohesion (Kpa)	7.70



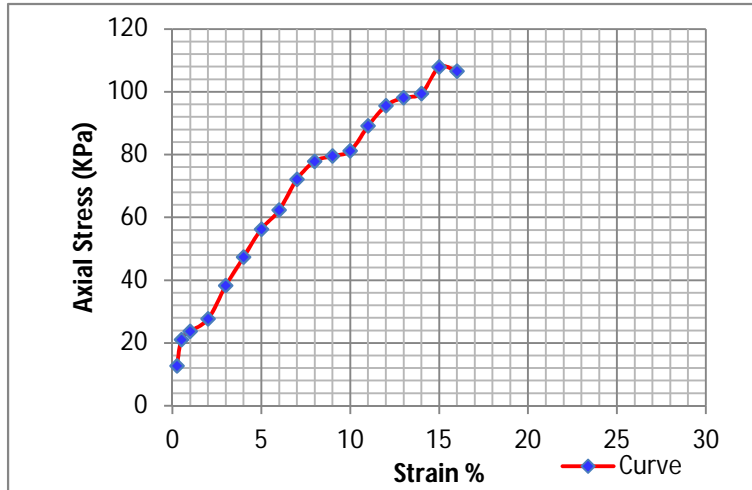
Bore hole No.	BH-14
Sample No.	UD-1
Depth (m)	4.40 to 4.85
Description of soil	Silty Clay
qu (Kpa)	40.20
% Strain	14.0
γ_{wet} (gm/cc)	1.82
γ_{Dry} (gm/cc)	1.36
% Moisture	33.59
Cohesion (Kpa)	20.10



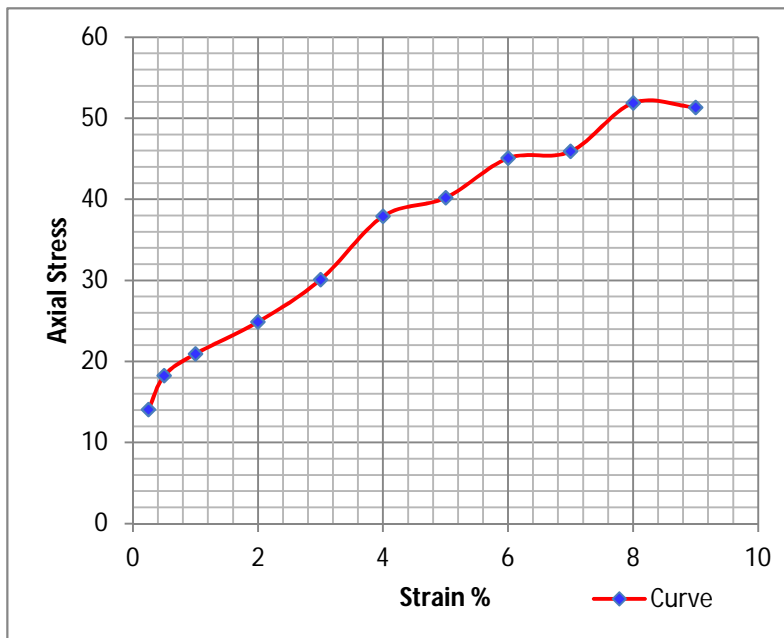
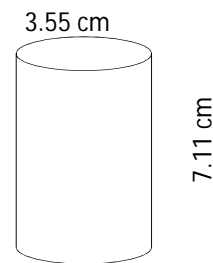
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar & 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

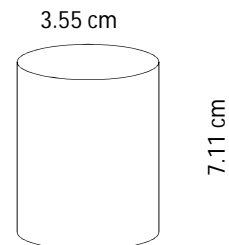
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-15
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	107.86
% Strain	15.0
γ_{wet} (gm/cc)	2.01
γ_{Dry} (gm/cc)	1.44
% Moisture	39.29
Cohesion (Kpa)	53.93

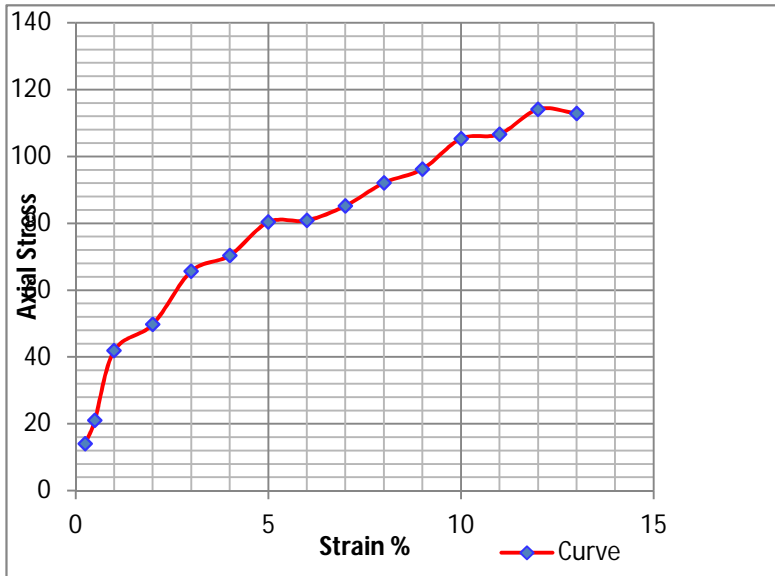


Bore hole No.	BH-16
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Clay with Sand
qu (Kpa)	51.89
% Strain	8.0
γ_{wet} (gm/cc)	2.12
γ_{Dry} (gm/cc)	1.84
% Moisture	15.21
Cohesion (Kpa)	25.94

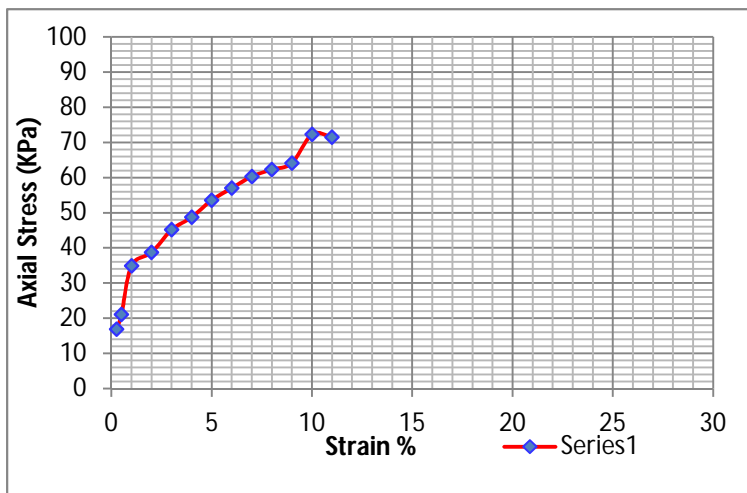
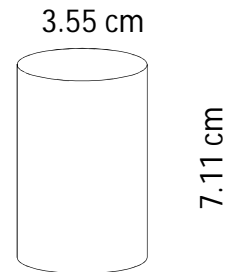


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Mohim School Field, Faridpur Sadar & Raghu Nandanpur Madrasa, Ambikapur

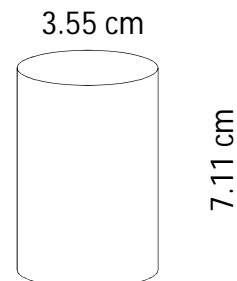
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-17
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt With Sand
qu (Kpa)	114.15
% Strain	12.0
γ_{wet} (gm/cc)	1.92
γ_{Dry} (gm/cc)	1.52
% Moisture	26.46
Cohesion (Kpa)	57.08



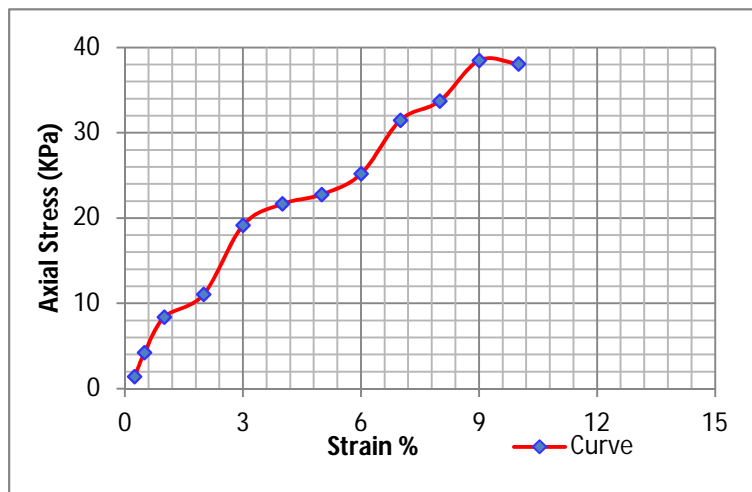
Bore hole No.	BH-18
Sample No.	UD-1
Depth (m)	2.10 to 2.55
Description of soil	SILT with Sand
qu (Kpa)	72.33
% Strain	10.0
γ_{wet} (gm/cc)	2.20
γ_{Dry} (gm/cc)	1.82
% Moisture	20.34
Cohesion (Kpa)	36.17



Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

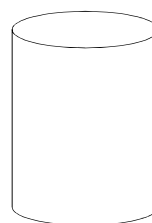
Location: Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri & Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar

UNCONFINED COMPRESSION STRENGTH TEST

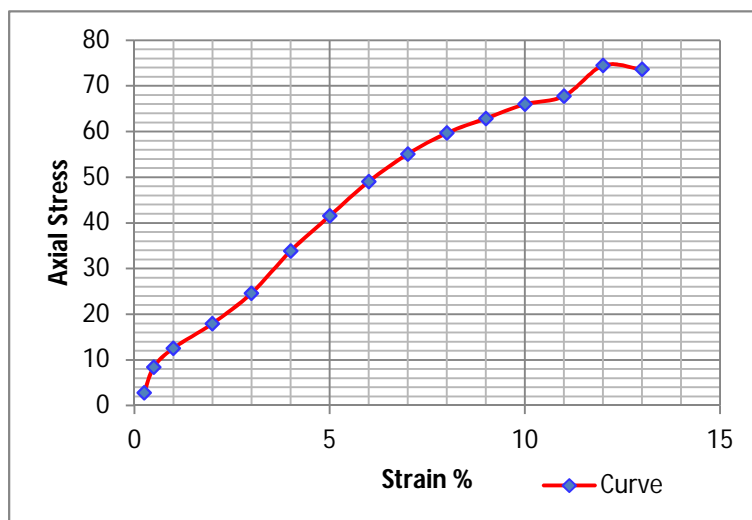


Bore hole No.	BH-20
Sample No.	UD-1
Depth (m)	4.10 to 4.55
Description of soil	Clay
qu (Kpa)	38.49
% Strain	9.0
γ_{wet} (gm/cc)	1.42
γ_{Dry} (gm/cc)	1.11
% Moisture	27.93
Cohesion (Kpa)	19.25

3.55 cm

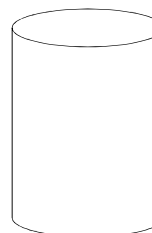


7.11 cm



Bore hole No.	BH-21
Sample No.	UD-1
Depth (m)	2.10 to 2.55
Description of soil	Silty Clay
qu (Kpa)	40.20
% Strain	14.0
γ_{wet} (gm/cc)	1.87
γ_{Dry} (gm/cc)	0.51
% Moisture	267.79
Cohesion (Kpa)	20.10

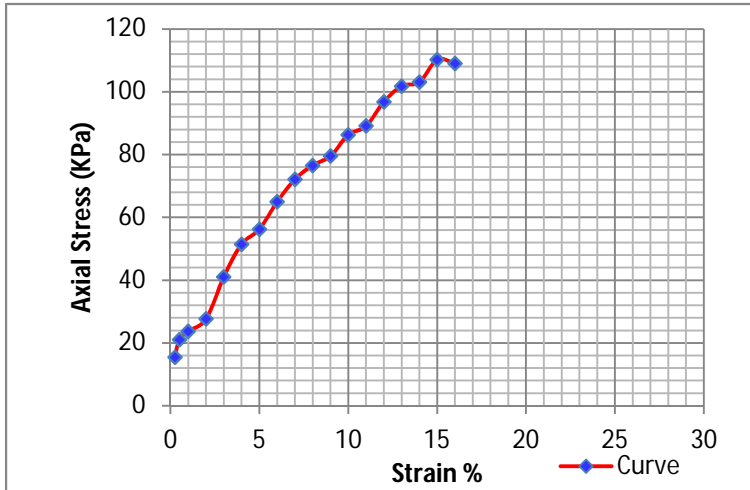
3.55 cm



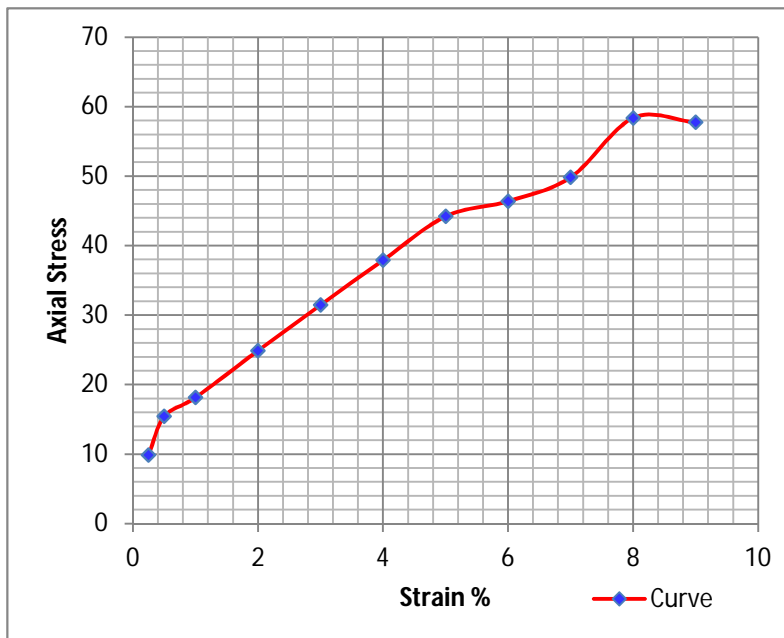
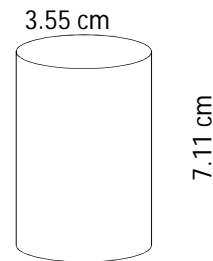
7.11 cm

Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar
& Choyata, Aliabad

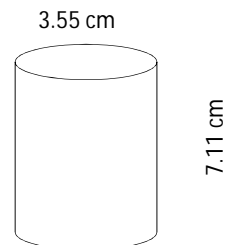
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-22
Sample No.	UD-1
Depth (m)	4.10 to 4.55
Description of soil	Silty Clay
qu (Kpa)	110.26
% Strain	15.0
γ_{wet} (gm/cc)	2.02
γ_{Dry} (gm/cc)	1.51
% Moisture	33.63
Cohesion (Kpa)	55.13

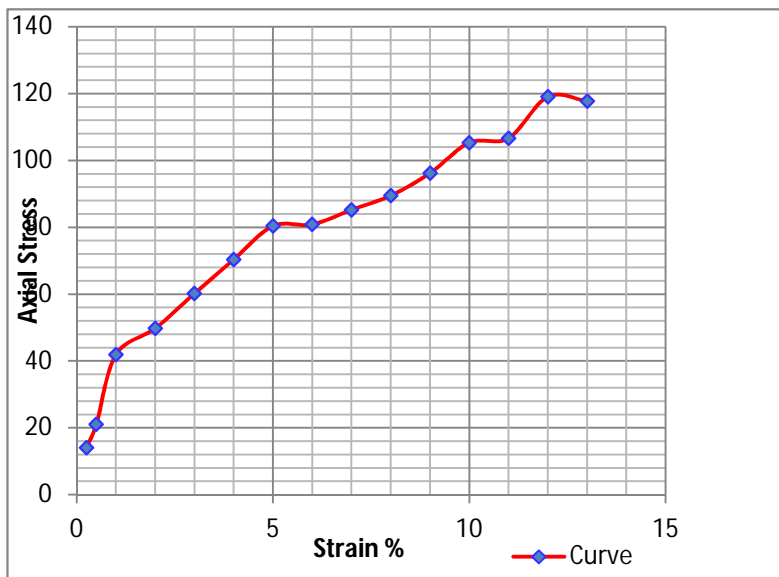


Bore hole No.	BH-23
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	58.37
% Strain	8.0
γ_{wet} (gm/cc)	2.17
γ_{Dry} (gm/cc)	1.93
% Moisture	12.34
Cohesion (Kpa)	29.19

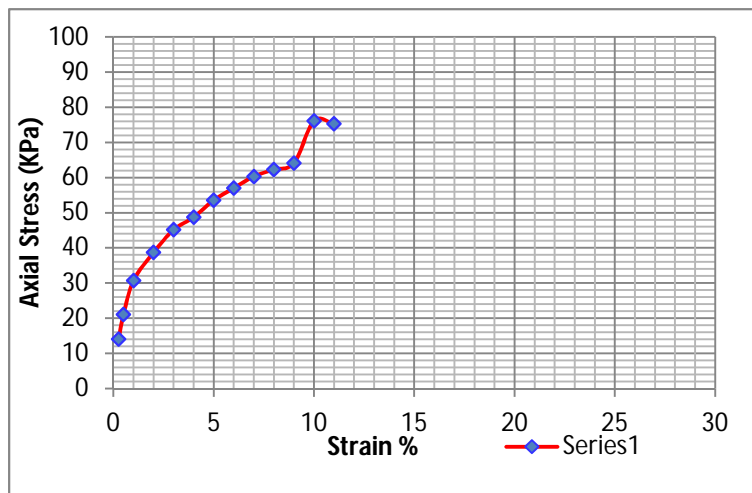
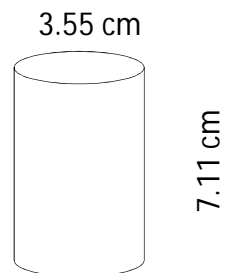


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Near Payarpur Godaoun, Kaijuri & Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

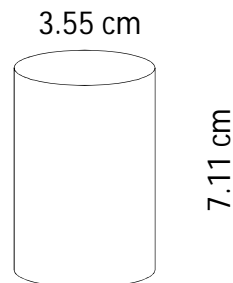
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-24
Sample No.	UD-1
Depth (m)	2.20 to 2.65
Description of soil	Silty Clay
qu (Kpa)	119.11
% Strain	12.0
γ_{wet} (gm/cc)	1.94
γ_{Dry} (gm/cc)	1.56
% Moisture	24.83
Cohesion (Kpa)	59.56

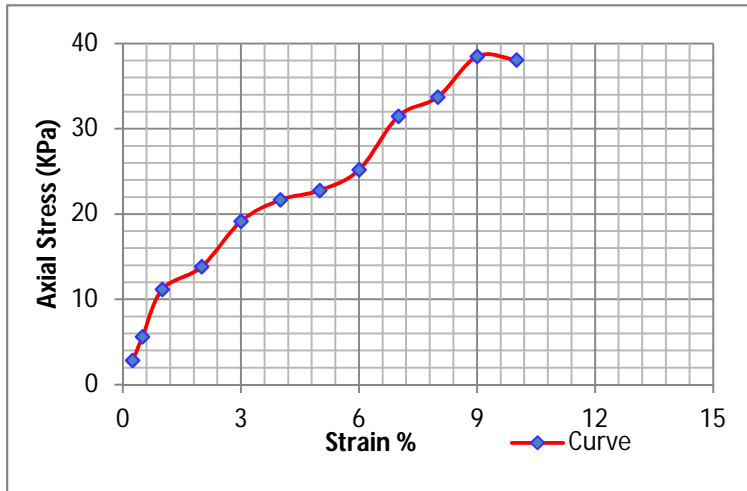


Bore hole No.	BH-25
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	SILT with Sand
qu (Kpa)	76.14
% Strain	10.0
γ_{wet} (gm/cc)	2.29
γ_{Dry} (gm/cc)	1.85
% Moisture	23.84
Cohesion (Kpa)	38.07

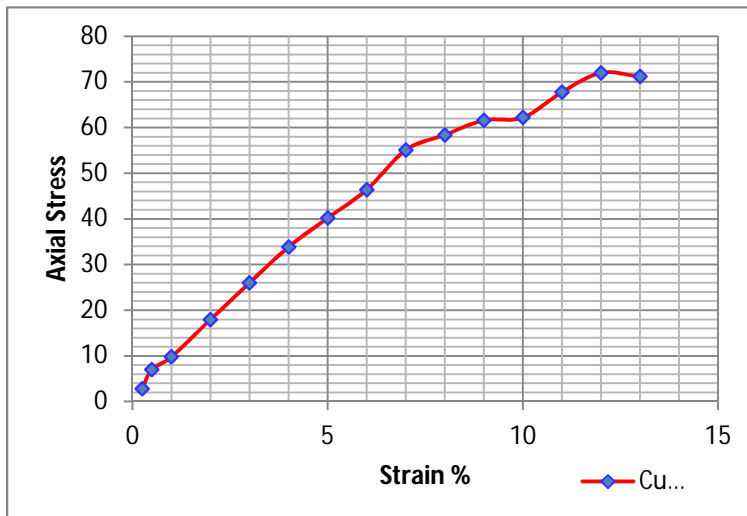
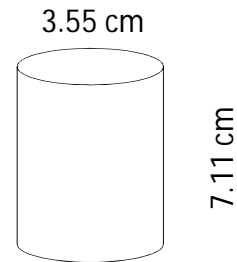


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Gobinddapur Hat, Krishnanagar &Bakhunda College Field, Bakhunda, Greda

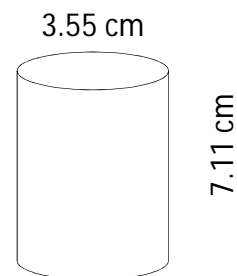
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-26
Sample No.	UD-1
Depth (m)	3.20 to 3.65
Description of soil	Silty Clay
qu (Kpa)	38.49
% Strain	9.0
γ_{wet} (gm/cc)	1.58
γ_{Dry} (gm/cc)	1.20
% Moisture	31.86
Cohesion (Kpa)	19.25

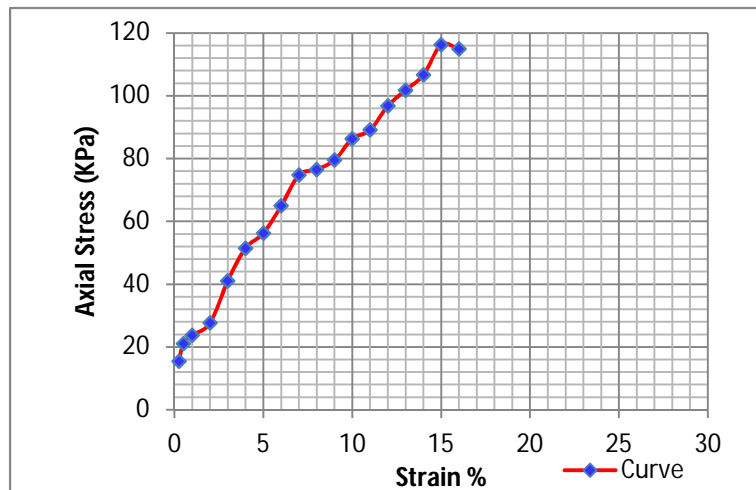


Bore hole No.	BH-27
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silty with Clay & Sand
qu (Kpa)	40.20
% Strain	14.0
γ_{wet} (gm/cc)	2.01
γ_{Dry} (gm/cc)	1.40
% Moisture	44.20
Cohesion (Kpa)	20.10

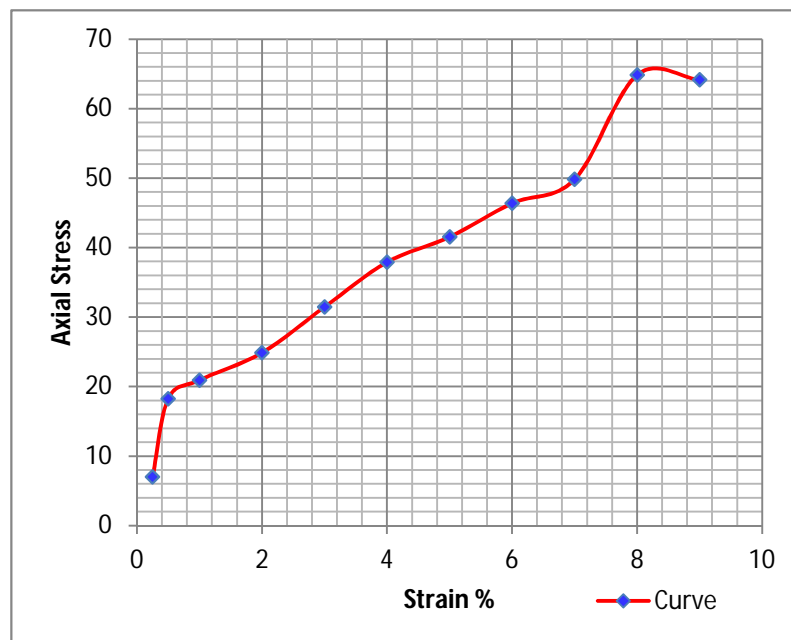
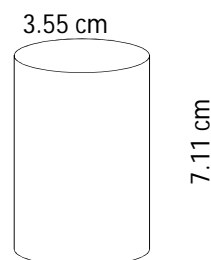


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar
& Tonthoniar Hat, End of Kanaipur Union

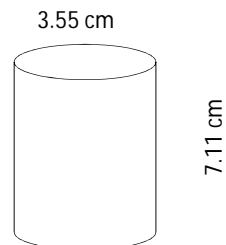
UNCONFINED COMPRESSION STRENGTH TEST



Bore hole No.	BH-30
Sample No.	UD-1
Depth (m)	5.20 to 5.65
Description of soil	Clay With Sand
qu (Kpa)	116.25
% Strain	15.0
γ_{wet} (gm/cc)	1.88
γ_{Dry} (gm/cc)	1.43
% Moisture	31.67
Cohesion (Kpa)	58.13



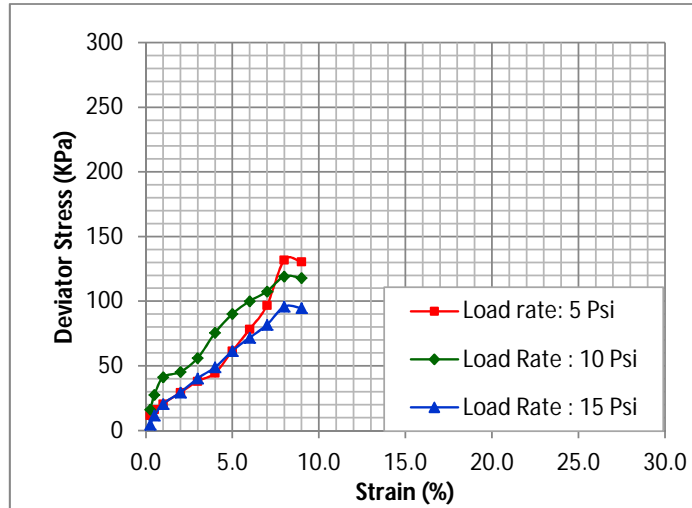
Bore hole No.	BH-34
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt with Sand
qu (Kpa)	64.86
% Strain	8.0
γ_{wet} (gm/cc)	2.02
γ_{Dry} (gm/cc)	1.79
% Moisture	13.32
Cohesion (Kpa)	32.43



Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
SOUTH DIGIRCHAR MADHOBDA GOVT. PRI. SCHOOL, Madhubdia

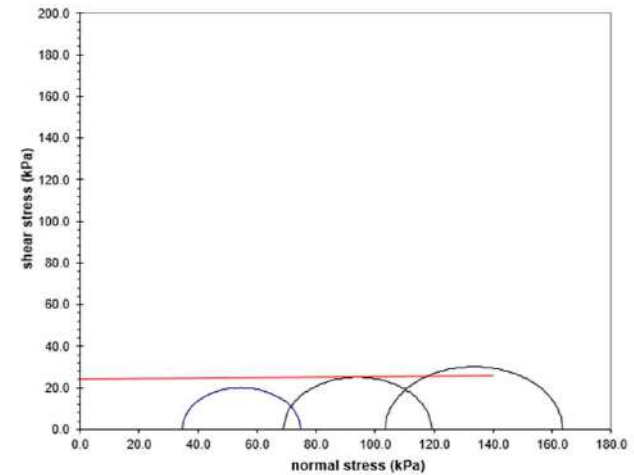
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	22.97	1.70
—◆—	27.57	1.67
—▲—	22.66	1.69

MOHR'S STRESS DIAGRAM



Borehole No.	BH-02
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	24
Angle of Friction (Degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

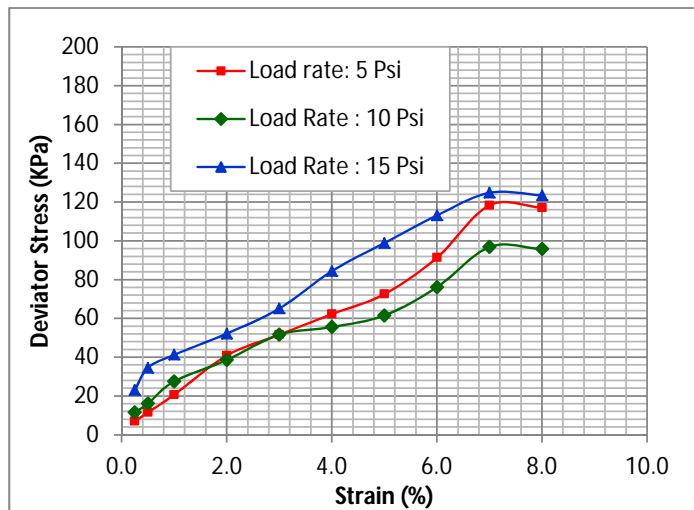
Location: 31 Char Madhabdia Govt.Primary School, Char




Madhabdia Bazar, Char Madhabdia

Triaxial Compression Test

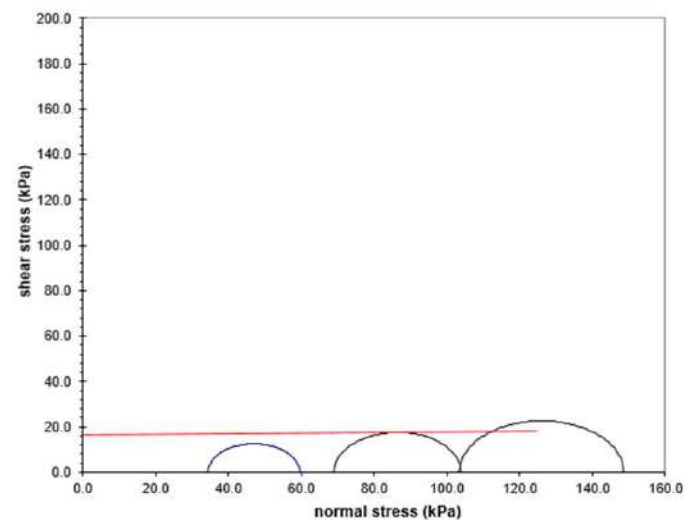
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	19.10	1.73
	19.60	1.76
	19.10	1.73

MOHRS STRESS DIAGRAM

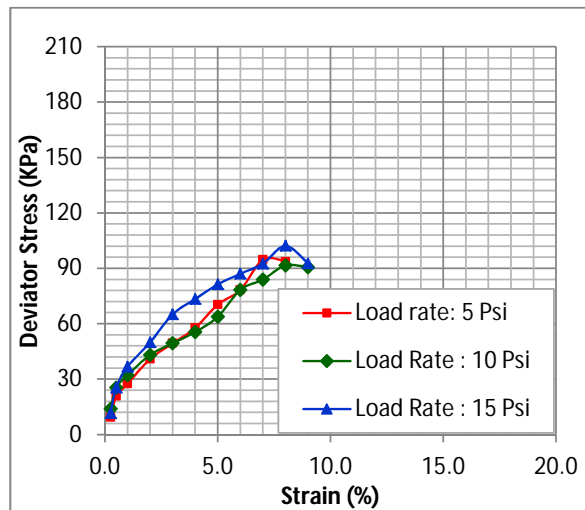





Borehole No.	BH-04
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	17
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Near Madhankali Swith gate, Ambikapur

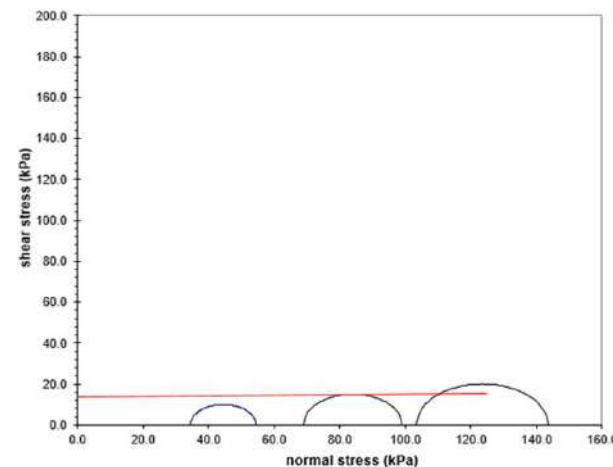
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	22.23	1.68
	23.61	1.60
	25.17	1.57

MOHR'S STRESS DIAGRAM



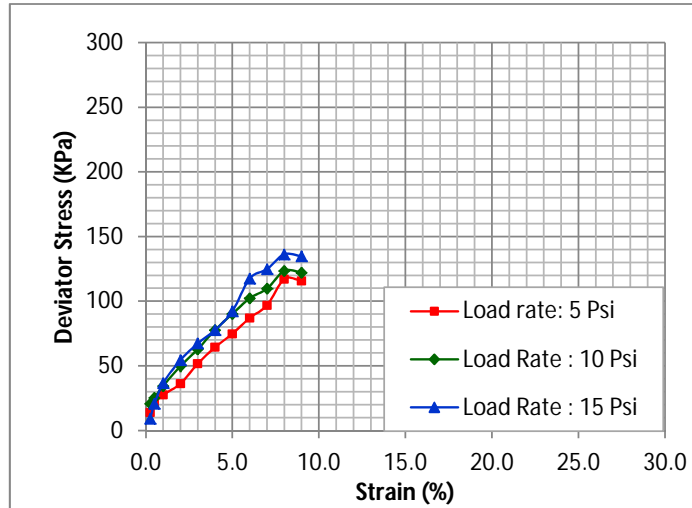
Borehole No.	BH-07
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	15
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Dhuldi Railgate, Dhuldi Bazar, Majchar

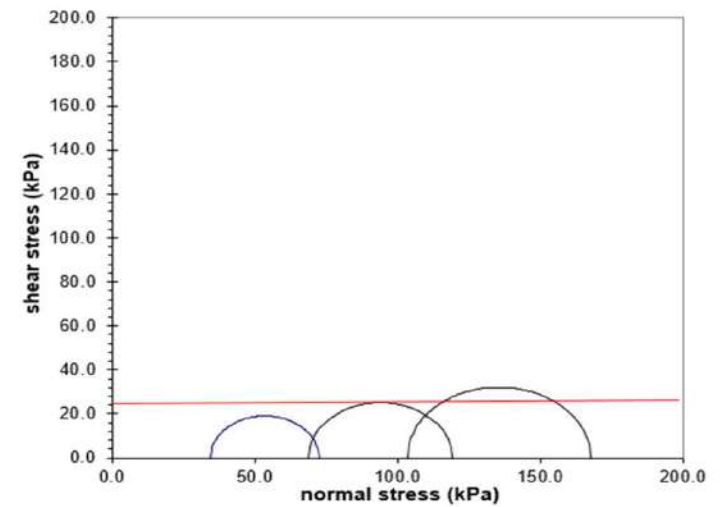
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	24.22	1.73
—◆—	27.09	1.71
—▲—	24.15	1.68

MOHR'S STRESS DIAGRAM



Borehole No.	BH-09
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	25
Angle of Friction (Degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

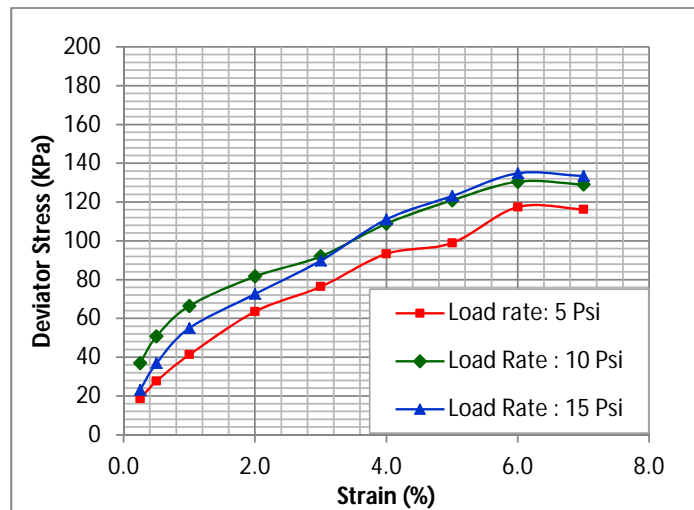
Location: 5nos. Decreerchar, Munshitanggi

Aftabuddin Madrasha, Decreerchar

Triaxial Compression Test

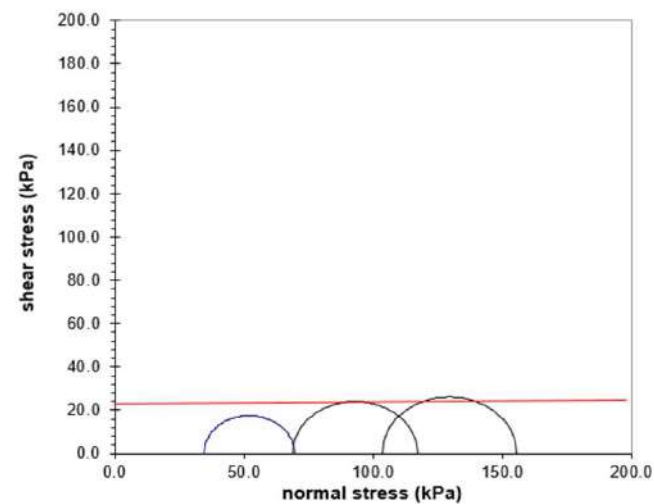
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	19.26	1.71
—◆—	19.10	1.73
—▲—	19.10	1.73

MOHR'S STRESS DIAGRAM



Borehole No.	BH-11
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	23
Angle of Friction (degree)	0

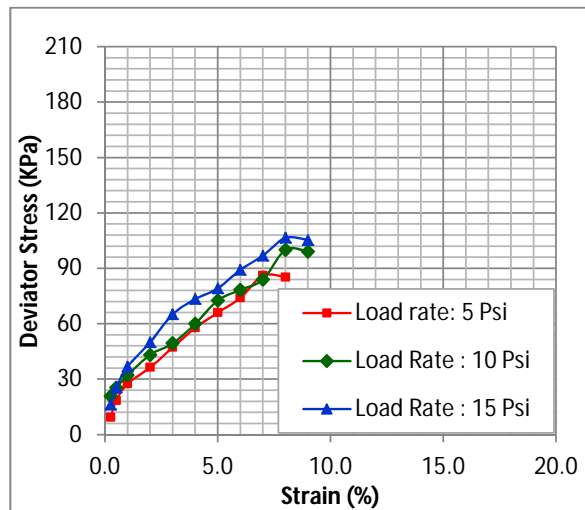
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)




Location: Vajon Dangga Govt. Primary School, Faridpur

Triaxial Compression Test

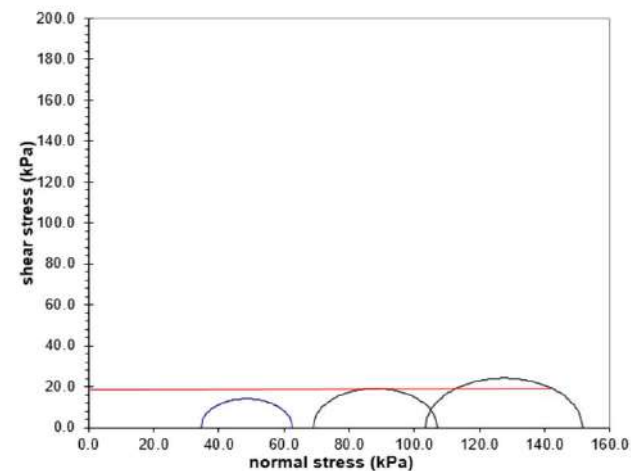
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	15.61	1.75
	23.76	1.66
	23.31	1.65

MOHRS STRESS DIAGRAM



Borehole No.	BH-14
Sample No.	UD-01
Depth (m)	4.40 to 4.85
Cohesion (KPa)	19
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-1)

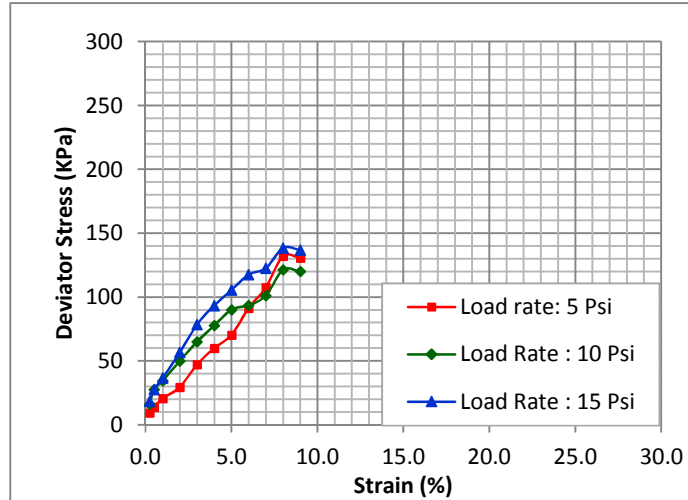
Location:

Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Triaxial Compression Test

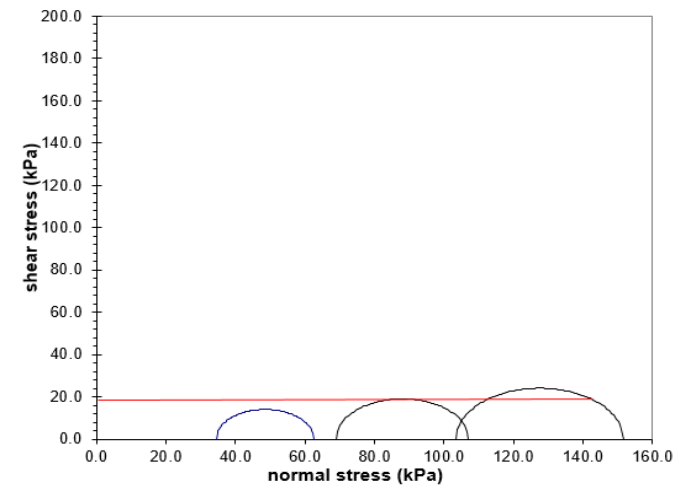
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	23.80	1.70
—◆—	22.12	1.71
—▲—	26.24	1.71

MOHR'S STRESS DIAGRAM



Borehole No.	BH-15
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	18
Angle of Friction (Degree)	0

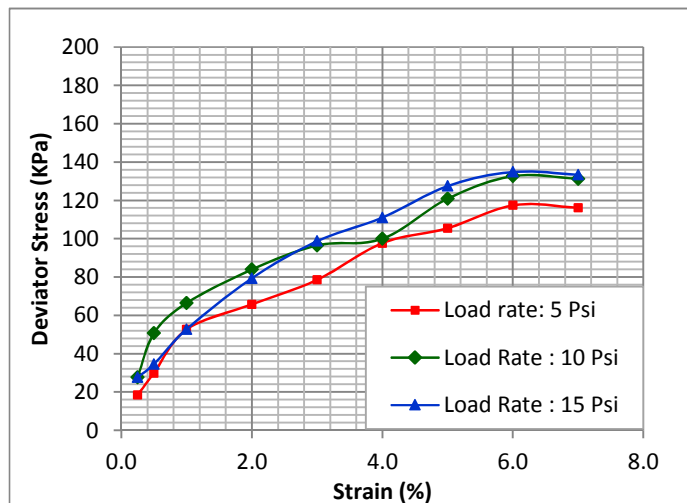
Project : Preparation of Development Plan for Fourteen Upazilas(Package-1)

Location: 94

nos. Zhiltuki Govt. Primary School, Panir Tangki Mor,
Faridpur Sadar

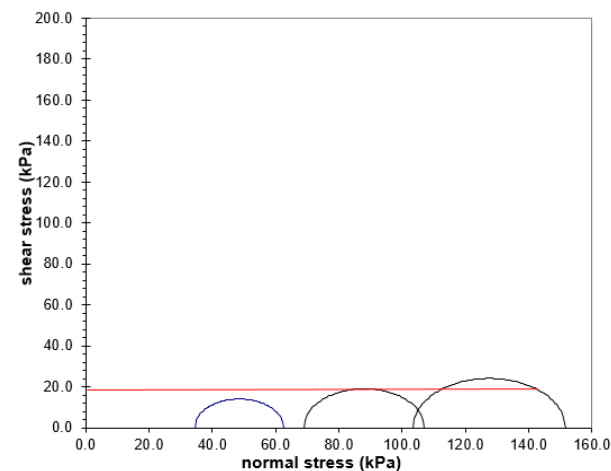
Triaxial Compression Test (Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	20.08	1.71
—◆—	22.00	1.63
—▲—	20.42	1.69

MOHRS STRESS DI

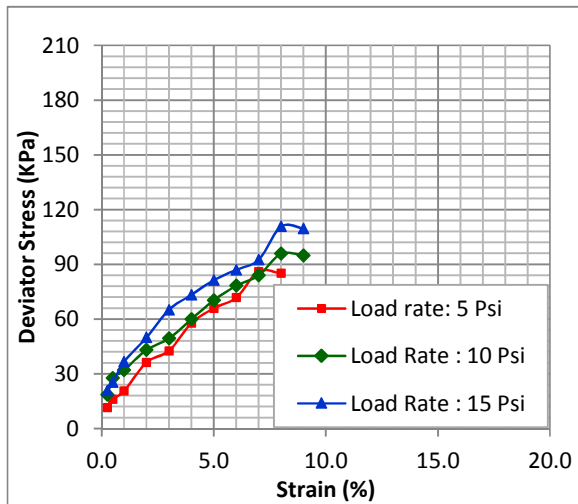


Borehole No.	BH-16
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	18
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-1)
Location: Mohim School Field, Faridpur Sadar

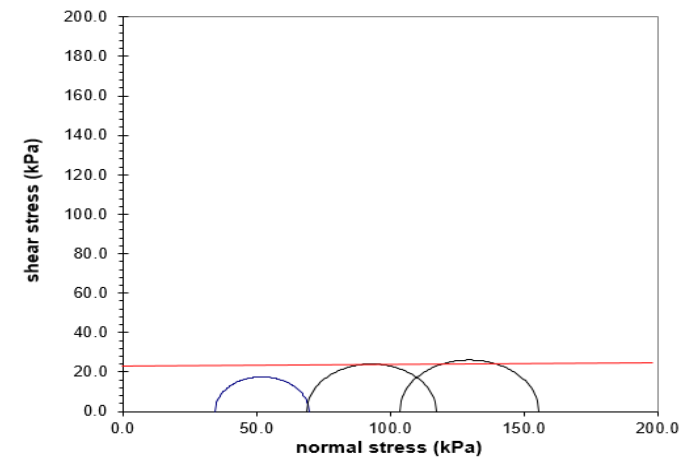
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	23.61	1.55
—◆—	21.21	1.66
—▲—	26.26	1.62

MOHR'S STRESS DIAGRAM



Borehole No.	BH-17
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	23
Angle of Friction (degree)	0

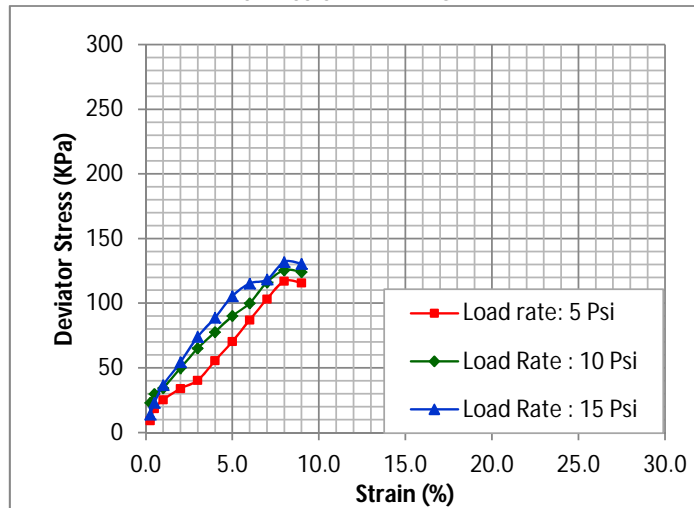
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Raghu Nandanpur Madrasa, Ambikapur

Triaxial Compression Test

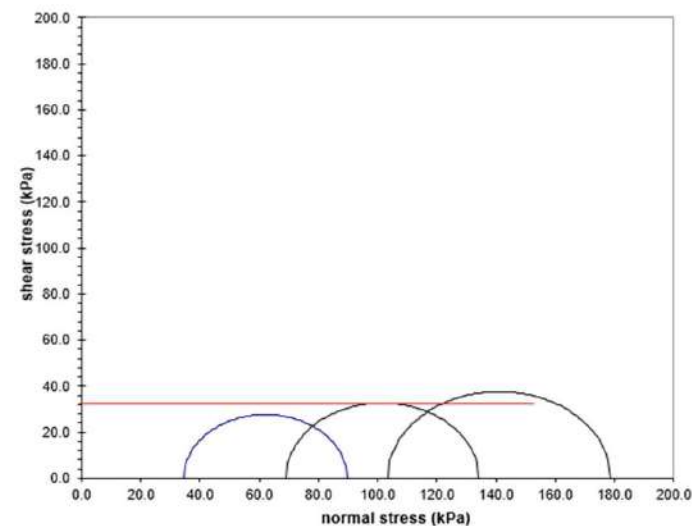
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	28.53	1.62
—◆—	91.45	1.72
—▲—	21.27	1.71

MOHR'S STRESS DIAGRAM

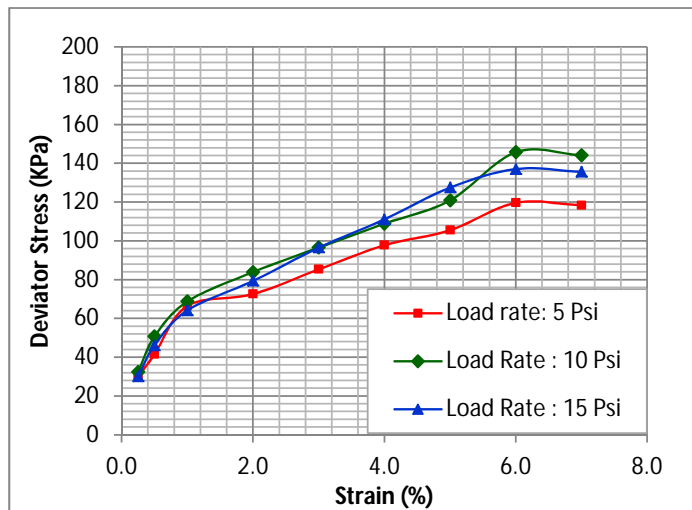


Borehole No.	BH-18
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	32
Angle of Friction (Degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Hadhokandi Govt. Primary School, Oposite side of River Research Institute, Kaijuri

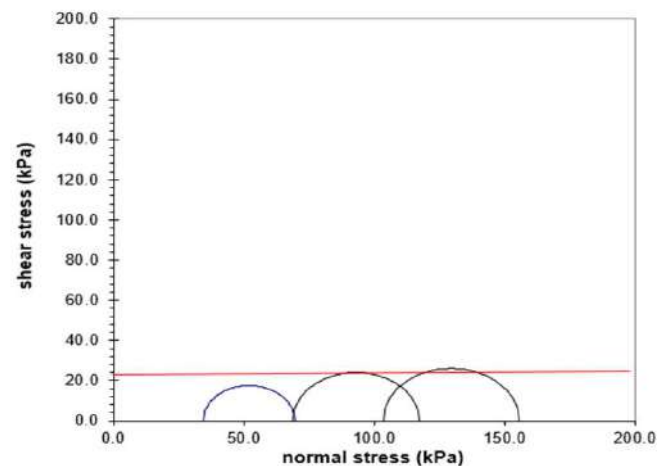
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	19.06	1.66
—◆—	23.94	1.62
—▲—	25.87	1.66

MOHRS STRESS DIAGRAM

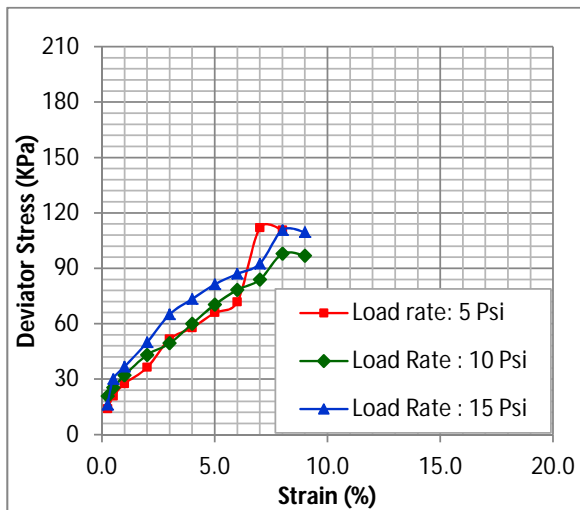





Borehole No.	BH-20
Sample No.	UD-01
Depth (m)	4.10 to 4.55
Cohesion (KPa)	23
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Johora Begum High School Field, Mia Para Road

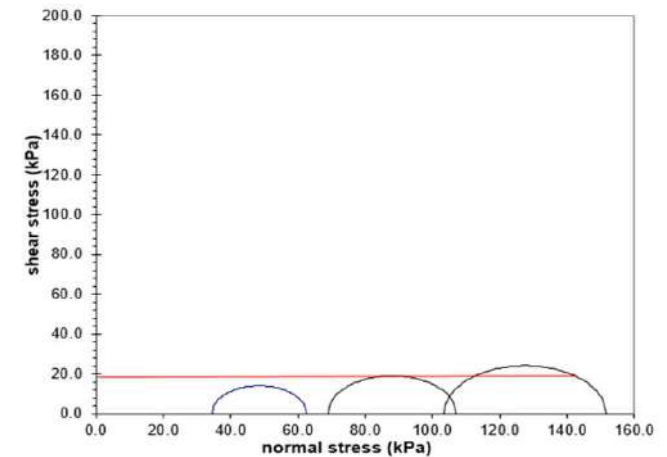
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	1.98	2.01
	28.13	1.60
	28.76	1.57

MOHRS STRESS DIAGRAM

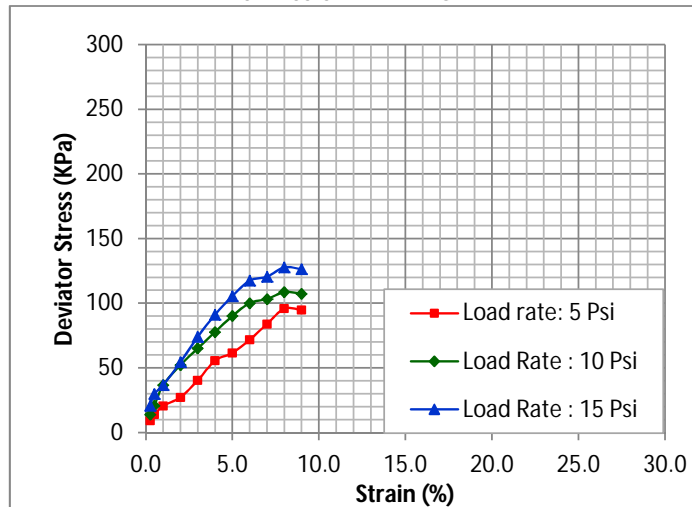


Borehole No.	BH-21
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	17
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar

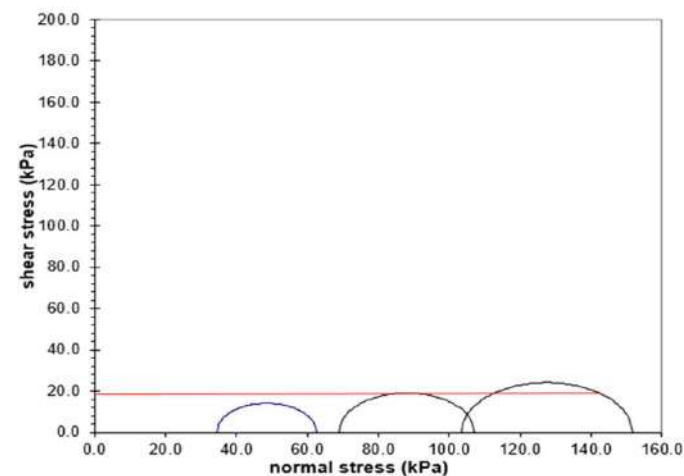
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	26.33	1.65
—◆—	25.86	1.68
—▲—	23.31	1.68

MOHR'S STRESS DIAGRAM



Borehole No.	BH-22
Sample No.	UD-01
Depth (m)	4.10 to 4.55
Cohesion (KPa)	17
Angle of Friction (Degree)	0

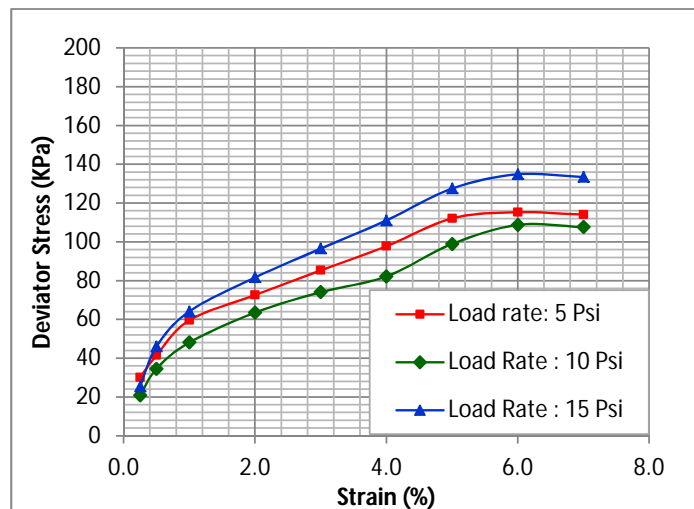
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Choyata, Aliabad

Triaxial Compression Test

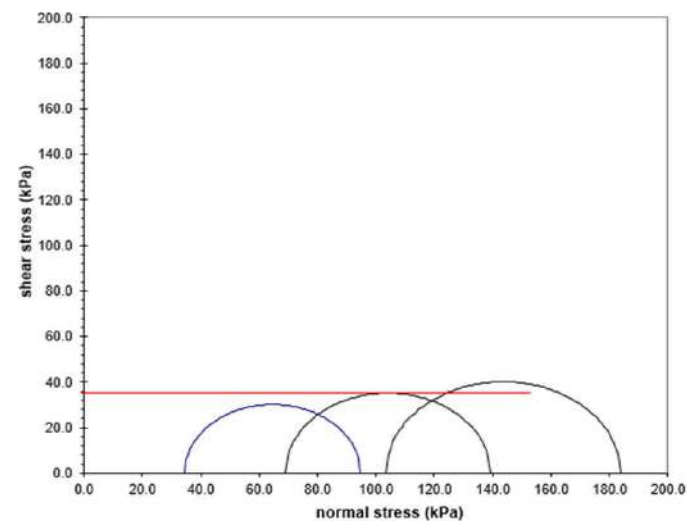
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	21.62	1.66
—◆—	29.34	1.56
—▲—	32.08	1.60

MOHR'S STRESS DIAGRAM

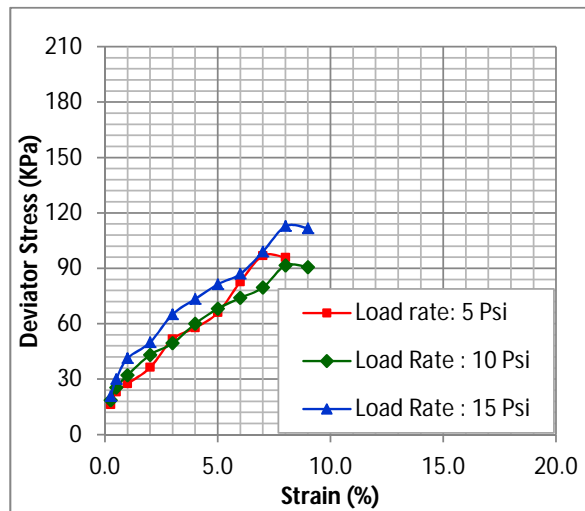





Borehole No.	BH-23
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	35
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Near Payarpur Godaoun, Kaijuri

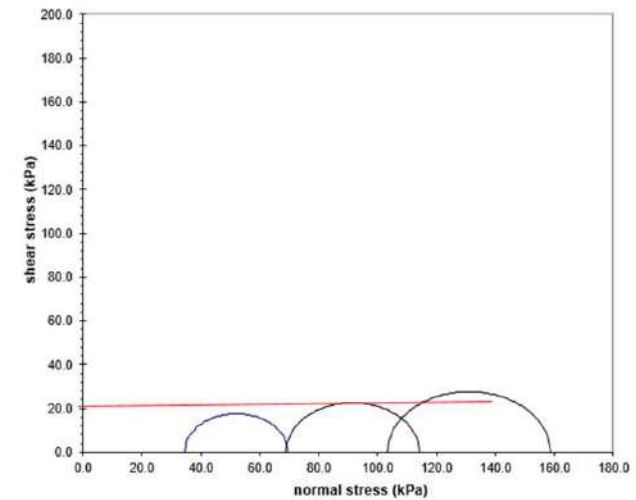
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	24.32	1.62
	30.63	1.52
	23.37	1.57

MOHRS STRESS DIAGRAM



Borehole No.	BH-24
Sample No.	UD-01
Depth (m)	2.20 to 2.65
Cohesion (KPa)	21
Angle of Friction (degree)	0

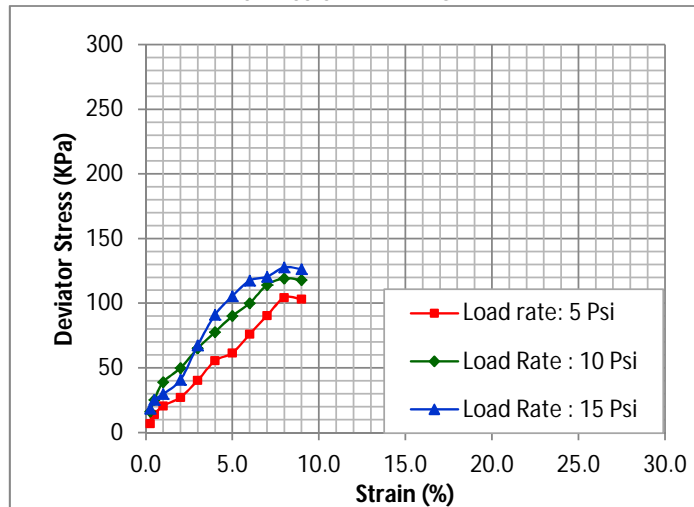
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Krish poshikhan Institute gate, Gunggabodi, Krishnanagar

Triaxial Compression Test

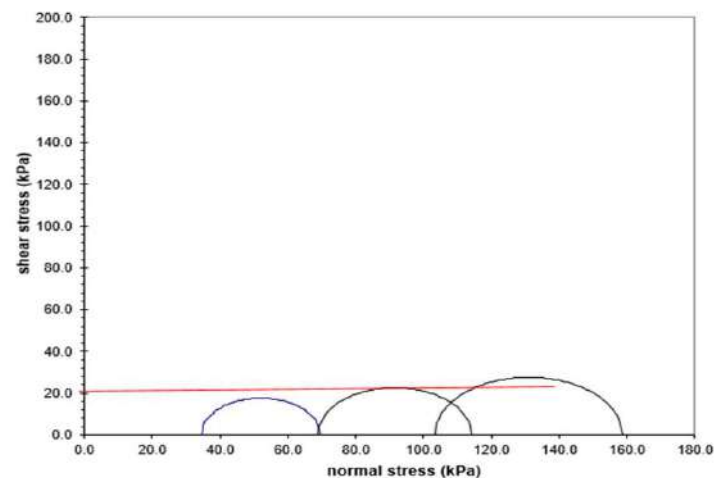
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	25.88	1.68
—◆—	23.14	1.69
—▲—	23.12	1.69

MOHRS STRESS DIAGRAM



Borehole No.	BH-25
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	21
Angle of Friction (Degree)	0

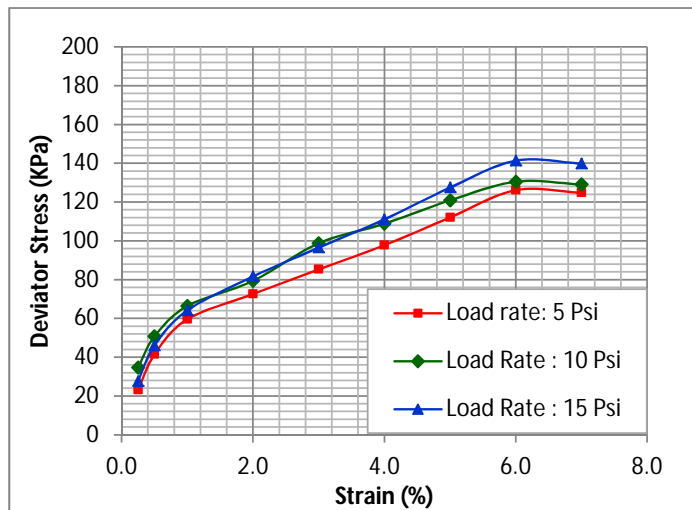
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)




Location: Gobinddapur Hat, Krishnanagar

Triaxial Compression Test

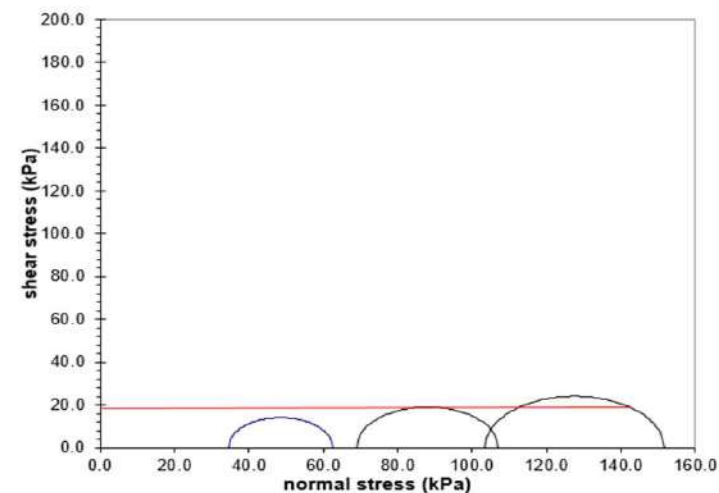
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	17.76	1.70
	27.59	1.66
	23.32	1.66

MOHRS STRESS DIAGRAM

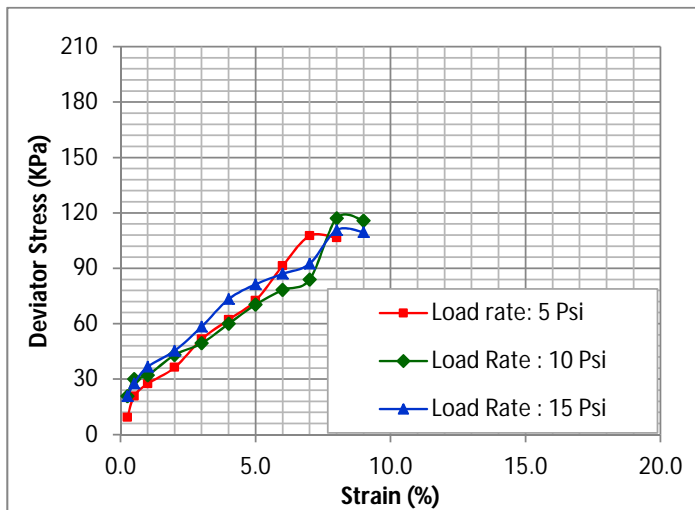





Borehole No.	BH-26
Sample No.	UD-01
Depth (m)	2.20 to 2.65
Cohesion (KPa)	18
Angle of Friction (degree)	0

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Bakhunda College Field, Bakhunda, Greda

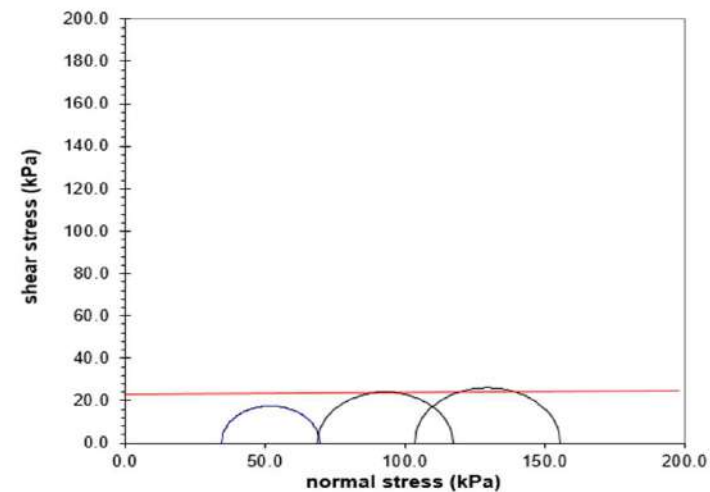
Triaxial Compression Test
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	17.30	1.70
	27.74	1.57
	23.37	1.57

MOHRS STRESS DIAGRAM



Borehole No.	BH-27
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	23
Angle of Friction (degree)	0

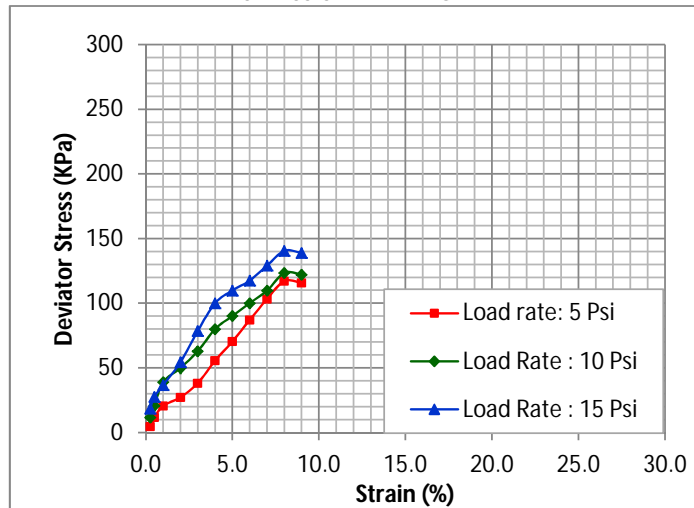
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Triaxial Compression Test

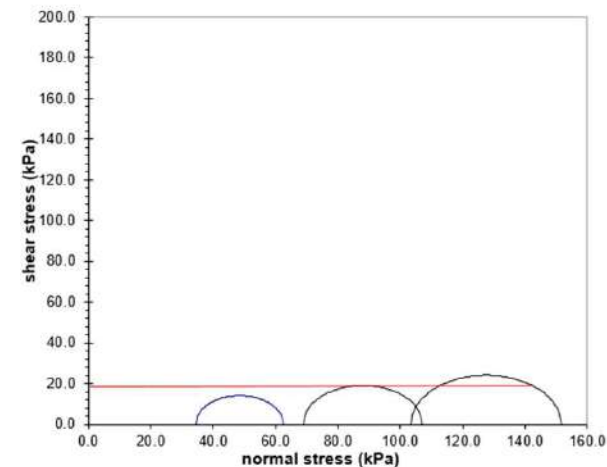
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
—■—	25.04	1.68
—◆—	22.12	1.71
—▲—	25.20	1.72

MOHRS STRESS DIAGRAM



Borehole No.	BH-30
Sample No.	UD-01
Depth (m)	5.20 to 5.65
Cohesion (KPa)	19
Angle of Friction (Degree)	0

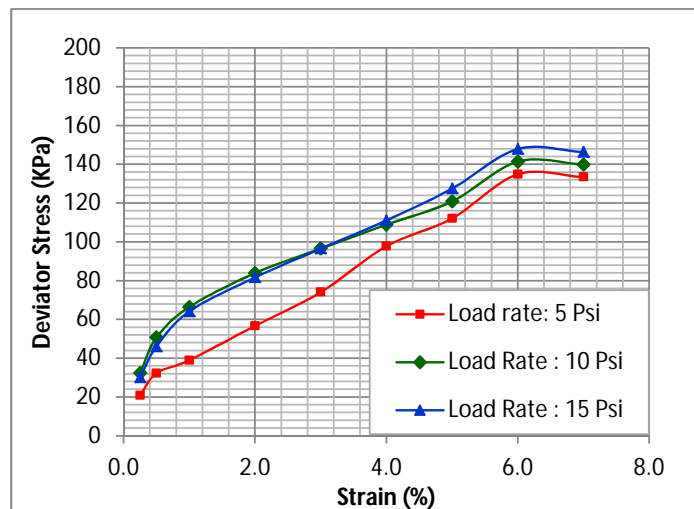
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)




Location: Tonthoniar Hat, End of Kanaipur Union

Triaxial Compression Test

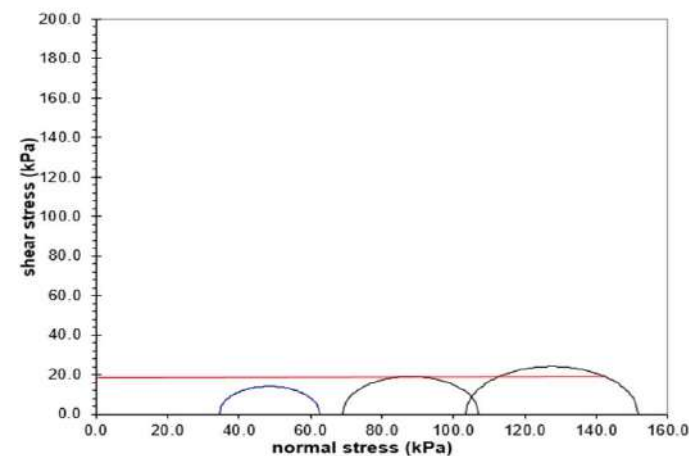
(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM



Symbol	Moisture Content (%)	Dry density (g/cc)
	22.09	1.69
	19.10	1.73
	25.02	1.66

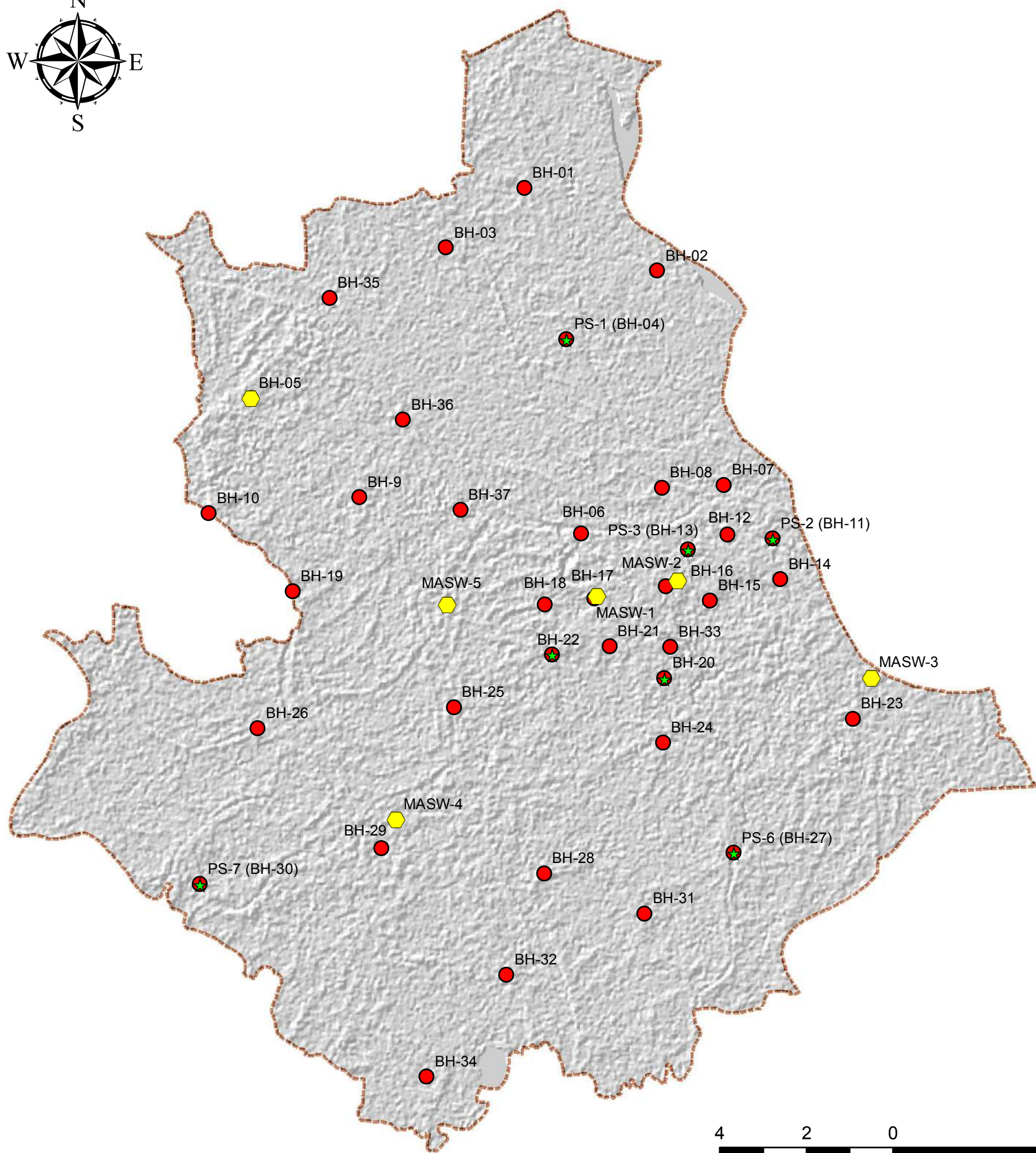
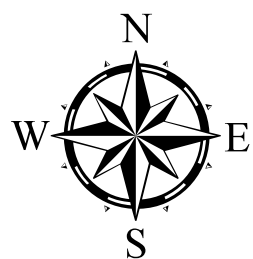
MOHR'S STRESS DIAGRAM



Borehole No.	BH-34
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	18
Angle of Friction (degree)	0

Appendix E

All Thematic Maps and Final Infrastructure Suitability Map



Geotechnical and Geophysical Test locations of Faridpur Sadar Upazila

Legend

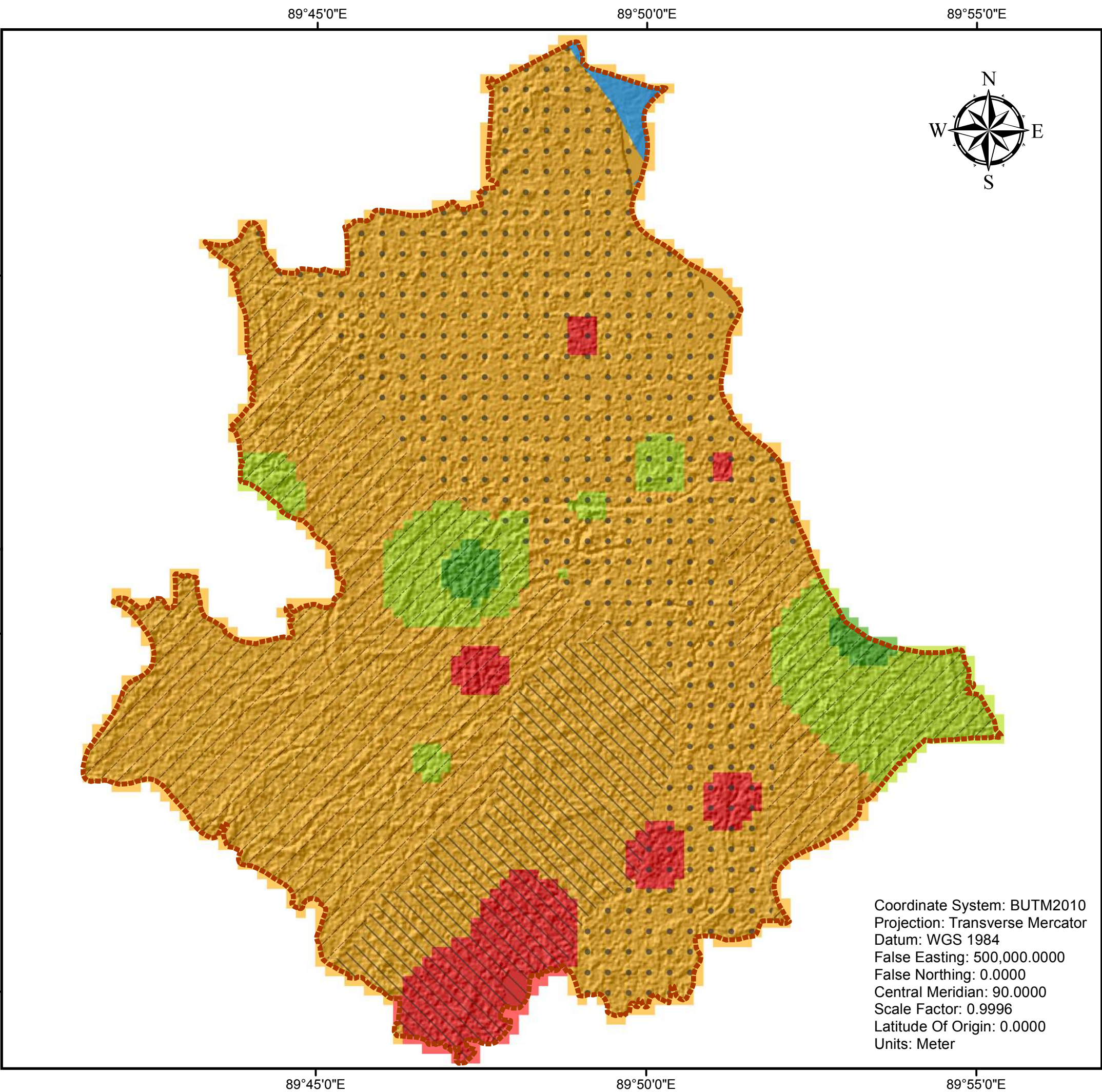
Work Locations

Geotechnical and Geophysical Test

- Standard Penetration Test (SPT) Drilling
- ⬡ Multi-channel Analysis of Surface Wave (MASW)
- ★ Downhole Seismic Test (PS Logging)
- Upazila Boundary


This map has been produced by plotting the co-ordinates of all the Geotechnical and Geophysical works which were acquired during field investigation. The drilling depth of those boroholes are up to 30m from the existing ground level (EGL).

Coordinate System: BUTM2010
 Projection: Transverse Mercator
 Datum: WGS 1984
 False Easting: 500,000.0000
 False Northing: 0.0000
 Central Meridian: 90.0000
 Scale Factor: 0.9996
 Latitude Of Origin: 0.0000
 Units: Meter






Engineering Geological Map based on Avarage Shear wave Velocity (upto30m)

Legend





 Upazila Boundary

Surface Geology Units

Map Units

-  Deltaic sand
-  Deltaic silt
-  Marsh clay and peat
-  Water

Soil Classification Type

-  D3 - Medium Stiff to Stiff/Medium Dense to Dense Soil
-  D4 - Medium Stiff/Medium Dense Soil
-  D5 - Soft/Loose to Medium Stiff/Medium Dense Soil
-  E- Very Soft to Soft/ Very Loose to Loose Soil

Site Class	Site class description	Shear wave velocity (m/sec)	
		Min	Max
A	HARD ROCK Eastern United States only	1500	
B	ROCK	760	1500
C	VERY DENSE SOIL AND SOFT ROCK Unstrained shear strength $u_s > 2000\text{psf}$ ($u_s = 100\text{kPa}$) or $N = 50$ blows/ft	360	760
D	STIFF SOILS Stiff soil with undrained shear strength $1000\text{psf} = u_s = 2000\text{psf}$ ($50\text{kPa} < u_s < 100\text{kPa}$) or $15 = N = 50$ blows/ft	180	360
E	SOFT SOILS Profile with more than 10 ft (3m) of soft clay defined as soil with plasticity index $PI > 20$, moisture content $w > 40\%$ and undrained shear strength $u_s < 1000\text{psf}$ (50kPa) ($N = 15$ blows/ft)		180
F	SOILS REQUIRING SITE SPECIFIC EVALUATIONS 1. Soils vulnerable potential failures or collapse under seismic loading: e.g., liquefiable soils, quick and highly sensitive clays, collapse weakly connected soils. 2. Peats and/or highly organic clays: (10ft (3m) or thicker layer) 3. Very high plasticity clays: (25ft (8m) or thicker layer with plasticity index > 75) 4. Very thick soft/medium stiff clays: (120ft (36m) or thicker layer)		

Site class based on V_{s30} — according to NEHRP (National Earthquake Hazard Reduction Program, USA) provisions

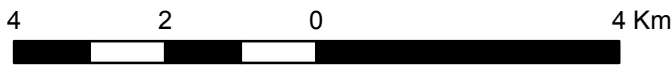
This map was produced by interpolating velocity of the soil layer in different Bore hole. Afterward it was classified by their velocity range according to a method provided by NEHRP (stands for National Earthquake Hazard Reduction Program, USA) Provisions but as most of the shear wave velocity of soil is within 168-244m/s the classification was modified as follows.

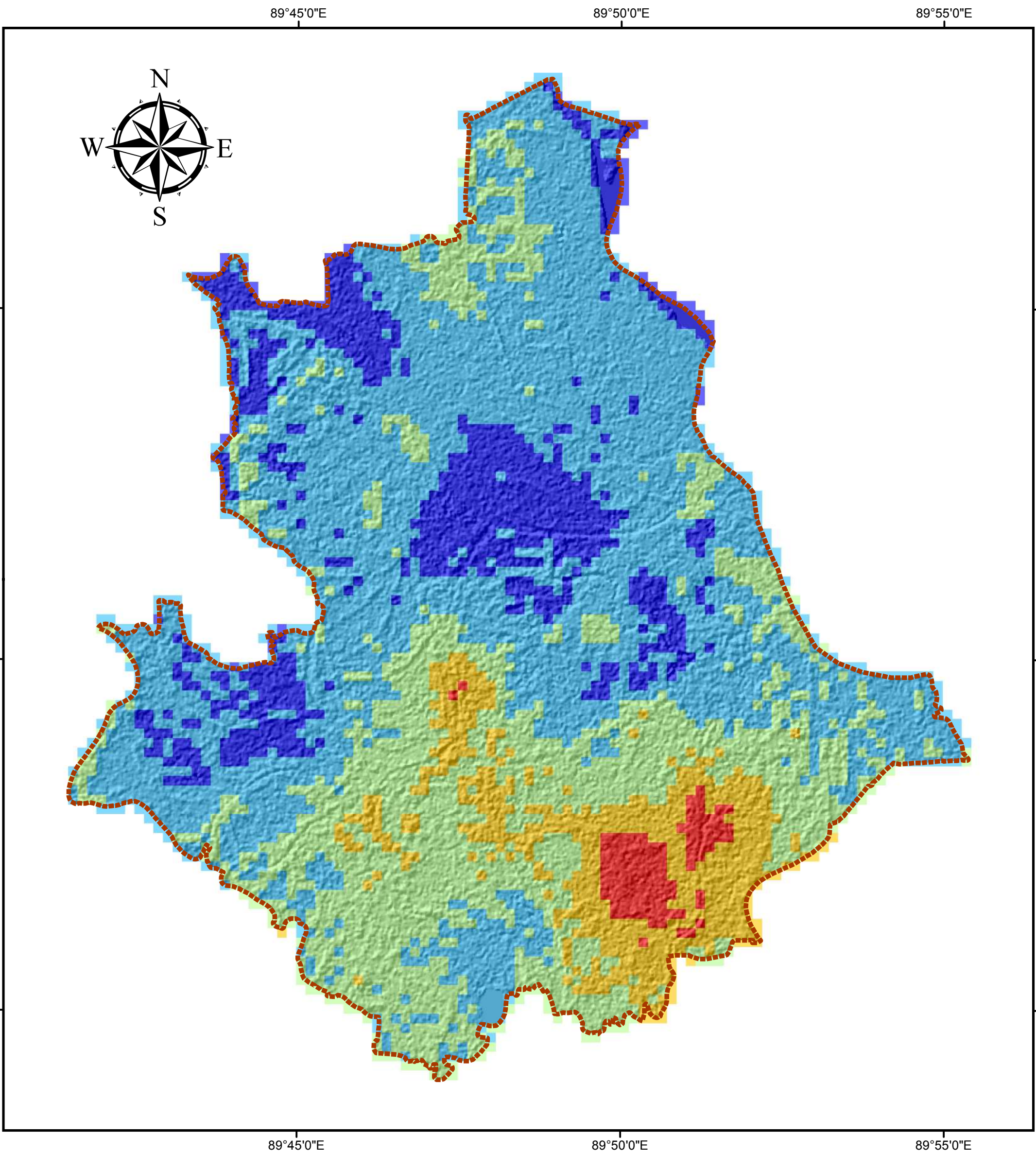
Ground Class	V_{s30}	Soil Type
C	360 - 760 m/sec	Very Dense/ Hard Soil and Soft rock
D1	300 - 360 m/sec	Stiff/ Dense to very dense/Hard Soil
D2	250 - 300 m/sec	Stiff/ Dense Soil
D3	220 - 250 m/sec	Medium Stiff to Stiff/ Medium Dense to Dense Soil
D4	200 - 220 m/sec	Medium Stiff/ Medium Dense Soil
D5	180 - 200 m/sec	Soft/Loose to Medium Stiff/ Medium Dense Soil
E	- 180 m/sec	Very Soft to Soft/ Very Loose to Loose Soil

Modified classification of the soils applied in this study

Scale:

1 centimeter = 1 kilometers





Foundation Layer Recommendation Map

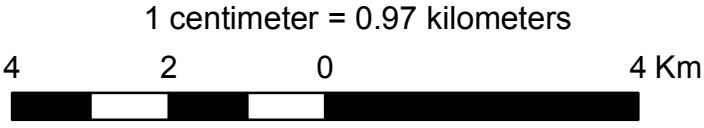
Legend

Upazila Boundary

Engineering Soil Layers

Foundation Depth (m) from EGL

- 1.54 - 10.00
- 10.01 - 15.00
- 15.01 - 20.00
- 20.01 - 25.00
- 25.01 - 35.23



Coordinate System: BUTM2010
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Lithological description

Layer 1: Brown soft silty CLAY/clayey SILT

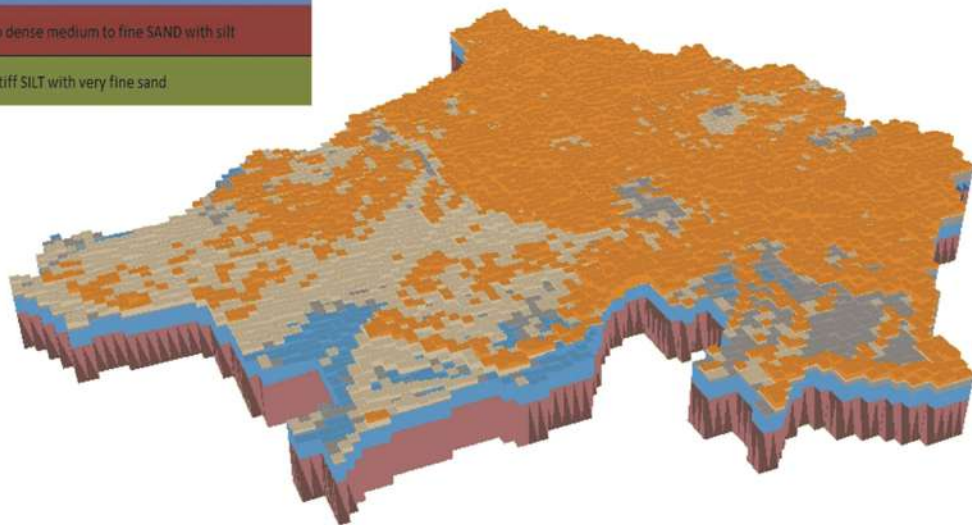
Layer 2: Gray loose/medium Dense very fine to fine SAND

Layer 3: Light Grey soft to medium stiff SILT with Clay and Sand

Layer 4: Light Brown to Grey loose to medium dense fine SAND with silt

Layer 5: Light Grey medium dense to dense medium to fine SAND with silt

Layer 6: Light Grey medium stiff to stiff SILT with very fine sand





23°40'0"N

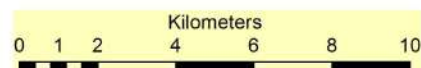
23°35'0"N

23°30'0"N

23°40'0"N

23°35'0"N

23°30'0"N



Coordinate System: WGS 1984 UTM Zone 46N
 Projection: Transverse Mercator
 Datum: WGS 1984
 false easting: 500,000.0000
 false northing: 0.0000
 central meridian: 93.0000
 scale factor: 0.9996
 latitude of origin: 0.0000
 Units: Meter

89°40'0"E

89°45'0"E

89°50'0"E

89°55'0"E

Surface Geology of Faridpur Sadar Upazila

Legend



Upazila Boundary

Surface Geology Units

Map Unit



Deltaic sand



Deltaic silt



Marsh clay and peat



Water

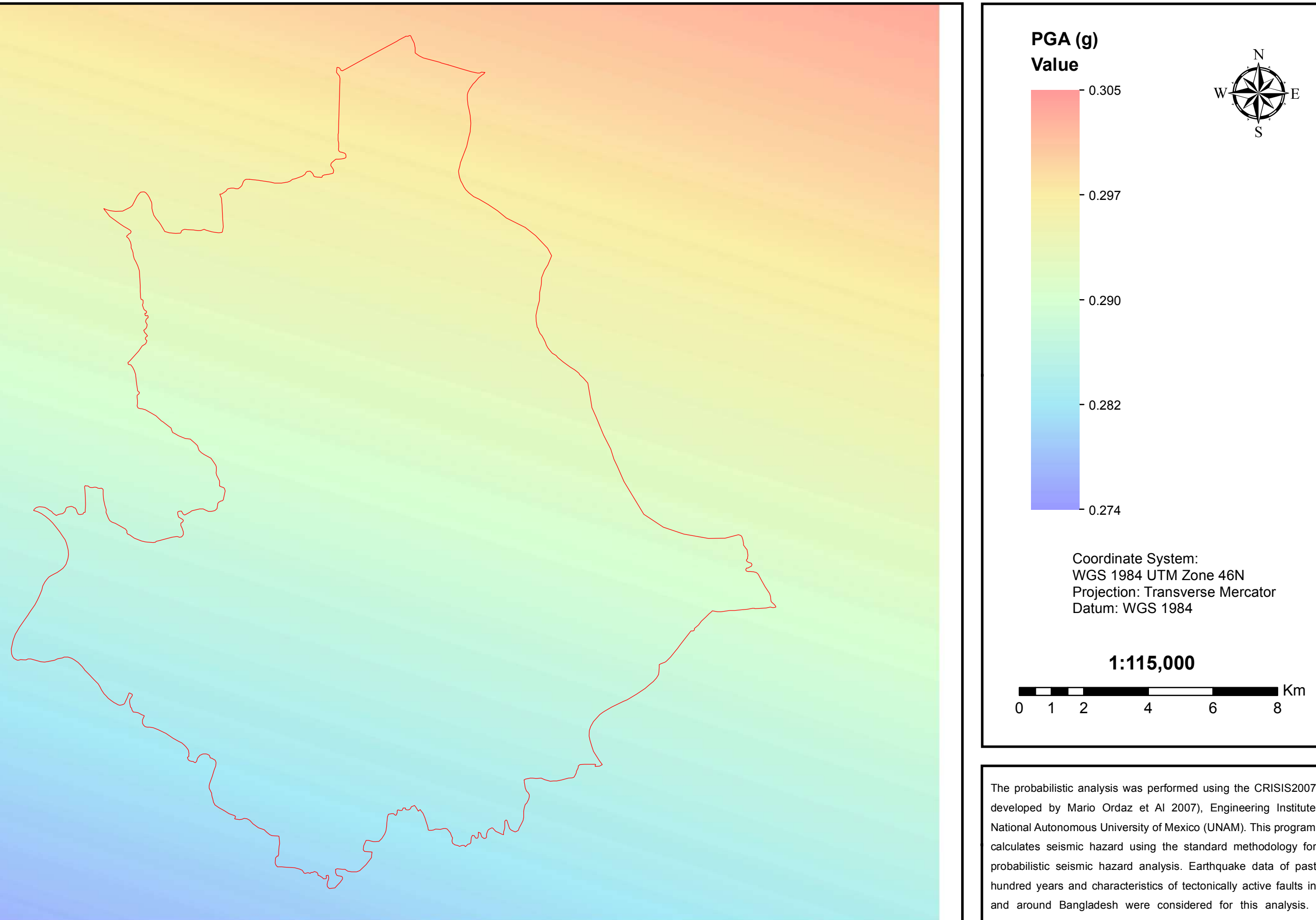
Deltaic Sand and Deltaic Silt:

Deltaic sands accumulate in fluvial and tidal channels, distributary-mouth bars, beach ridges, barrier islands, and on delta-front platforms. It consists of sand, silt, clay and organic matters. The deposit may be sand or silt depending on the river water energy. Sands are particle sizes having 1/16 to 2 mm diameter. Sediment particles ranging from 0.004 to 0.06 mm (0.00016 to 0.0024 inch) in diameter irrespective of mineral type are called Silt. Silt is easily transported by moving currents but settles in still water. Hence river deposits are ideally rich in silty deposits. Energy content for silt deposition is slightly lower than sand body.

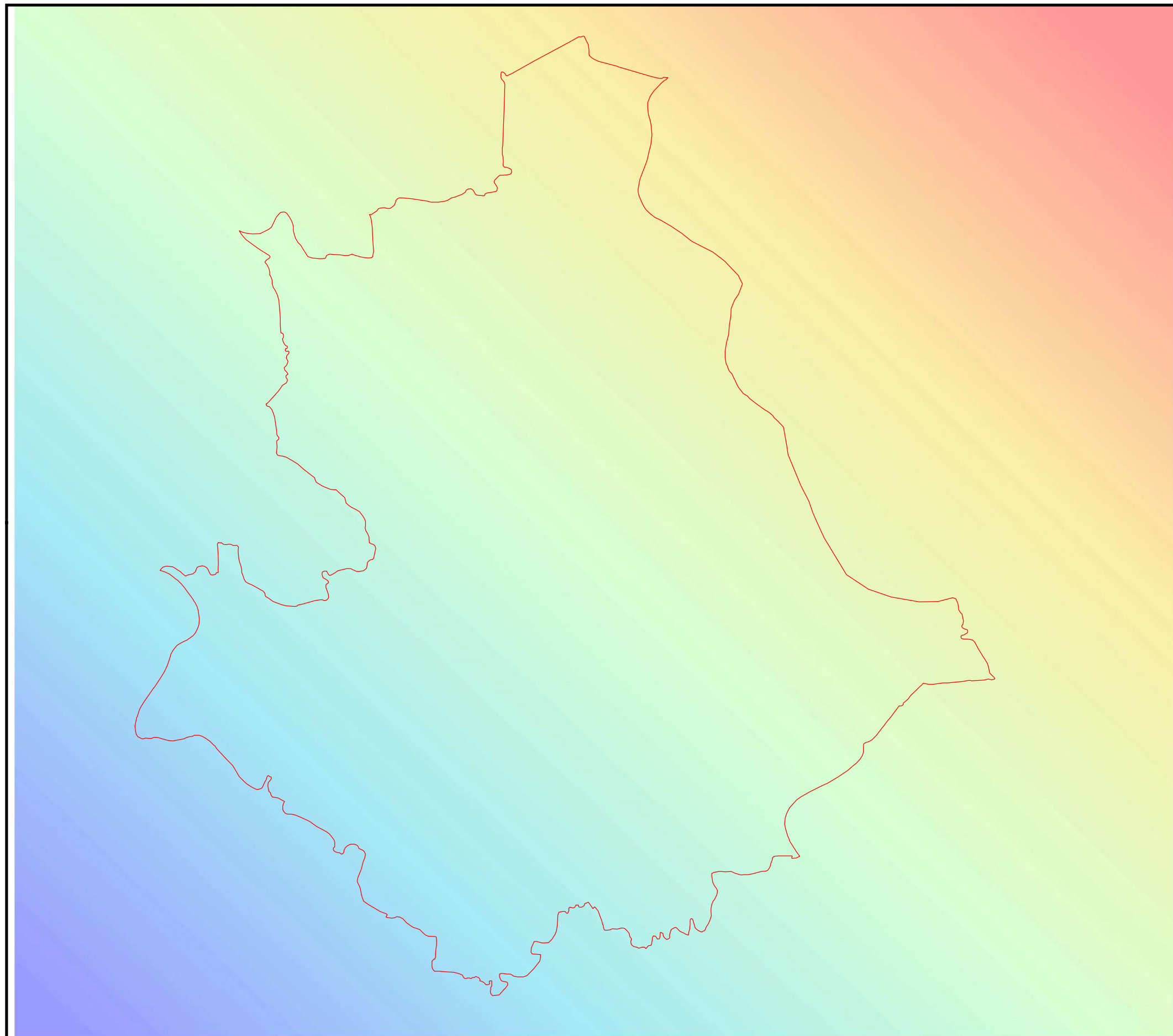
Marshy Clay and Peat:

Peat soils and Marshy clays in the surface geology of the area is indication of swampy and humid environment of present active river plain deposits. In these soils, partially or wholly decomposed organic matters are present. These soils have a low infrastructure and of low quality on engineering value. Peat and muck layers are black to dark brown, strongly reduced, and neutral in reaction under persisting conditions. When these layers are allowed to dry, they become extensively acidic. The unit is seasonally flooded by both increased river water and rainwater hence, remains wet around this time. During the dry season where mineral topsoil is present they become dry. Under dry condition mineral top-soils are mainly grey or dark grey and become strongly acidic.

Peak Ground Acceleration (PGA) (g) at Engineering SeismicBaserock (Vs30=760 m/sec) Corresponding to a Probabillity of Exceedance of 10% in 50 years

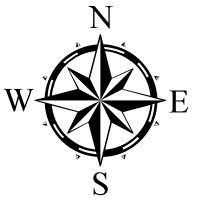
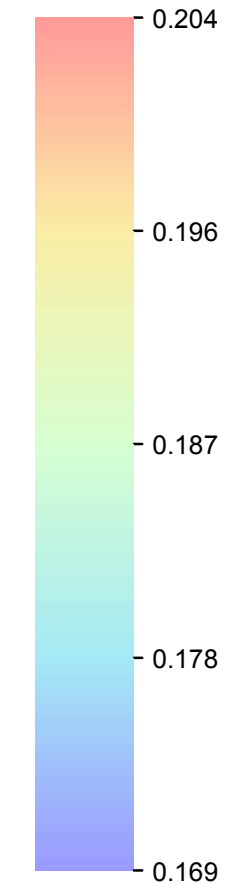


Spectral Acceleration (SA) (g) for 1 sec Structural period at Engineering Seismic Baserock (Vs30=760 m/sec) Corresponding to a Probabillity of Exceedance of 10% in 50 years



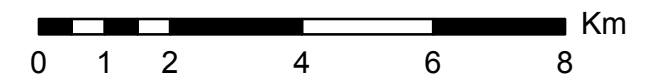
SA1 for 1sec (g)

Value



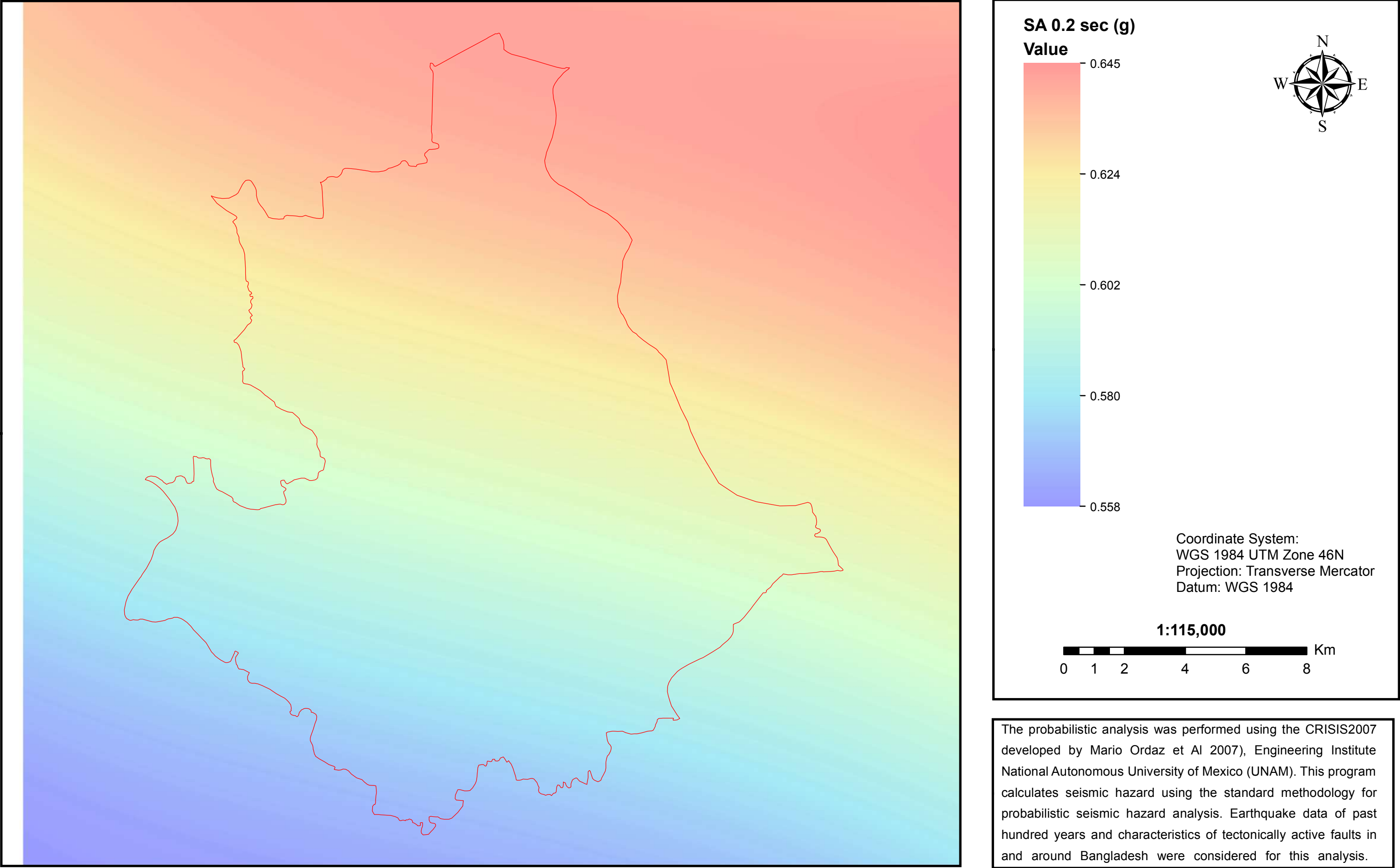
Coordinate System:
WGS 1984 UTM Zone 46N
Projection: Transverse Mercator
Datum: WGS 1984

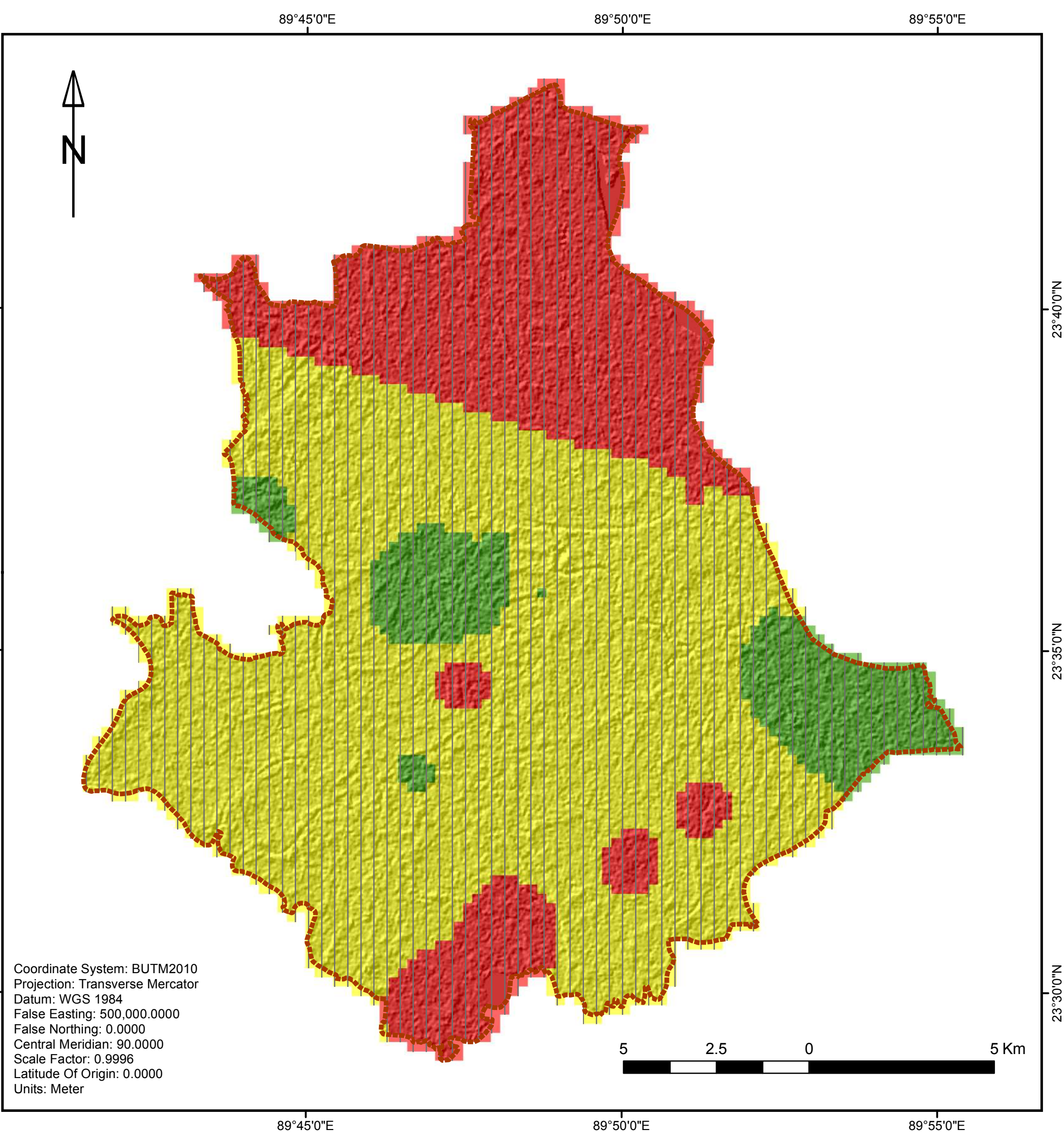
1:115,000



The probabilistic analysis was performed using the CRISIS2007 developed by Mario Ordaz et Al 2007), Engineering Institute National Autonomous University of Mexico (UNAM). This program calculates seismic hazard using the standard methodology for probabilistic seismic hazard analysis. Earthquake data of past hundred years and characteristics of tectonically active faults in and around Bangladesh were considered for this analysis.

Spectral Acceleration (SA) (g) for 0.2 sec Structural period at Engineering Seismic Baserock (Vs30=760 m/sec) Corresponding to a Probabillity of Exceedance of 10% in 50 years





Peak Ground Acceleration (PGA) (g) at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years



Upazila Boundary

Provable Earthquake Intensity

Intensity and Shaking

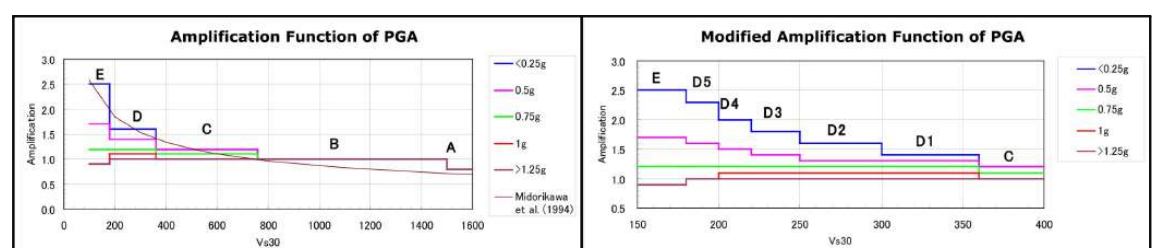
VIII, Severe

Probabilities Seismic Hazard Assessment (PSHA)

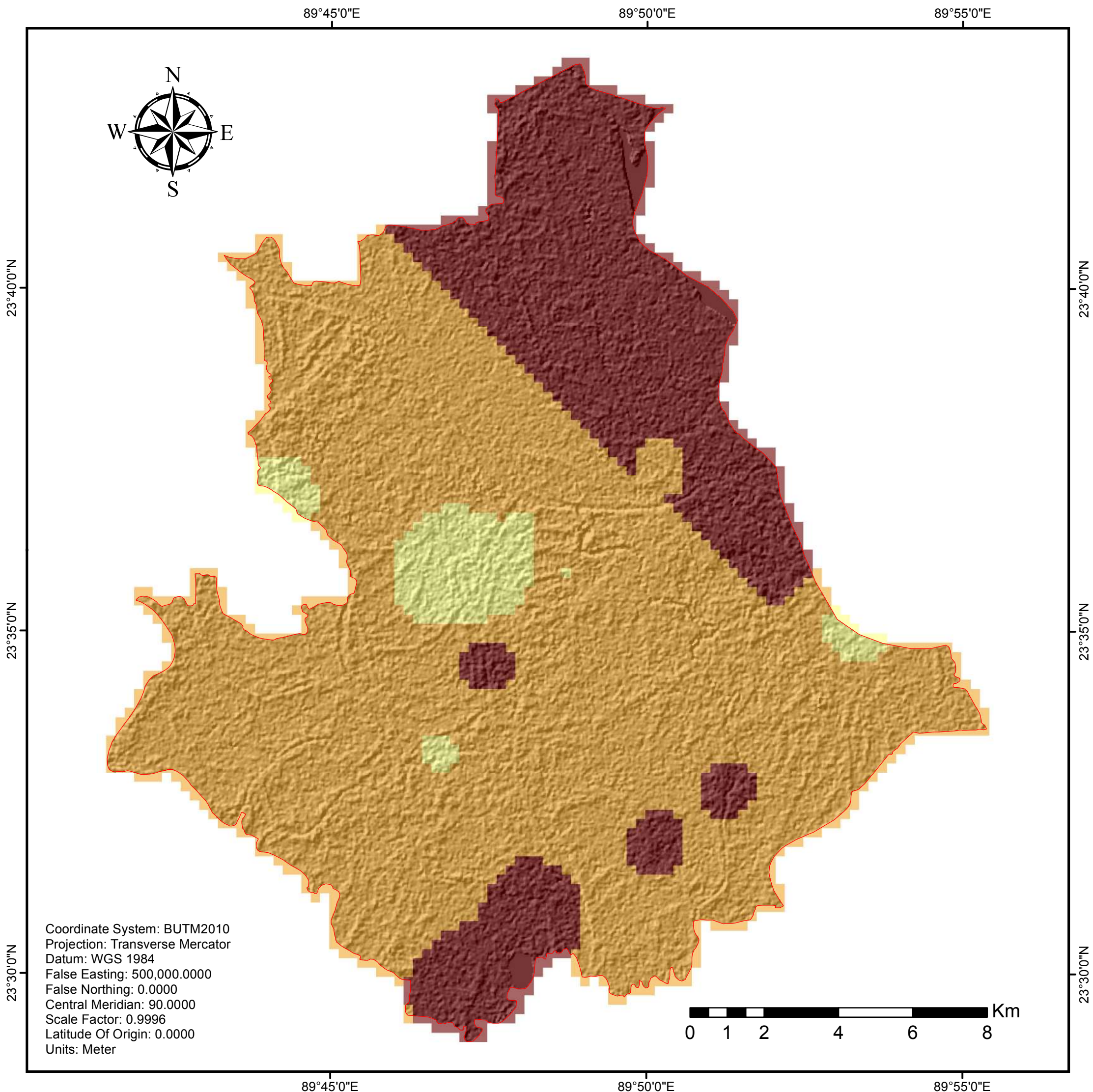
Earthquake Sensitivity with Peak Ground Acceleration (PGA)

- 1st Degree Sensitive
- 2nd Degree Sensitive
- 3rd Degree Sensitive

This map was produced by multiplying PGA values with Amplification factors corresponded for different soil type. as the V_s is within 168-244m/s so soil was classified as (E,D5,D4,D3). thus the amplification factor was also modified. Spectral Acceleration (PGA) (g) at Engineering Ground Surface(Depth upto 30) corresponding to probability of exceedance of 10% in 50 year was count for each grid.




The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions




Spectral Acceleration (SA) (g) for 1 sec Structural period at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years

 Upazila Boundary

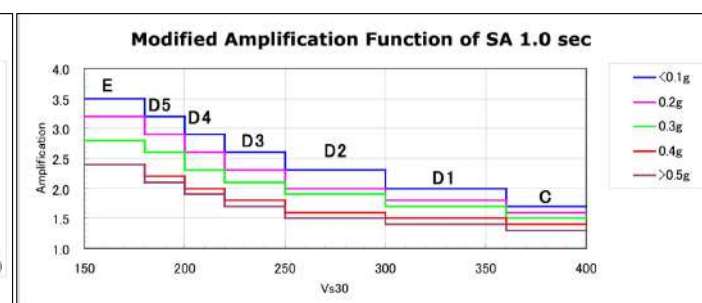
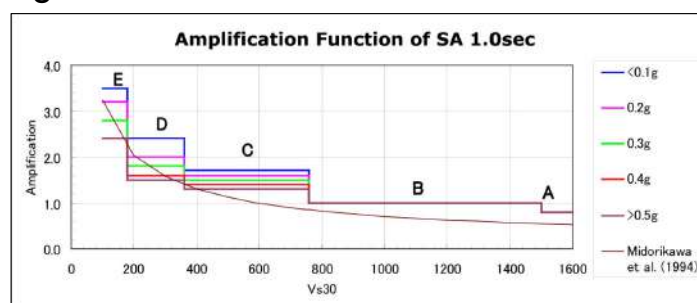
SA 1sec (g)

 0.4257 - 0.4871

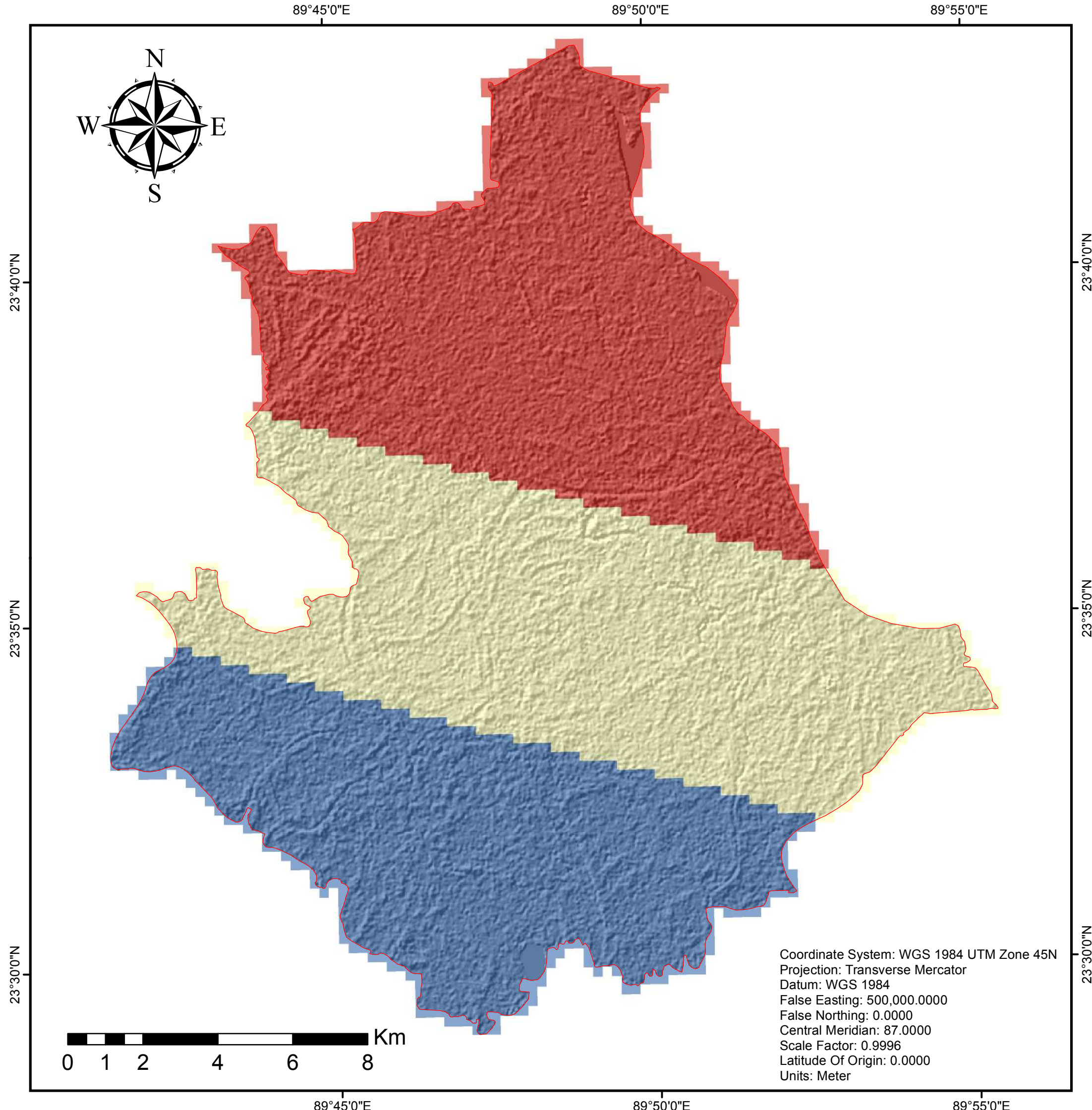
 0.4872 - 0.5484

 0.5485 - 0.6098

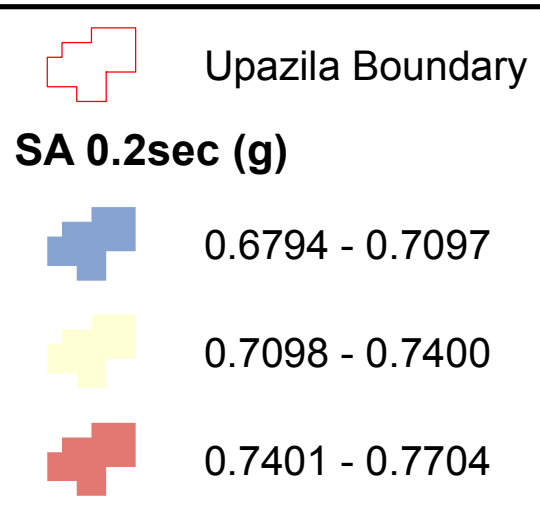
This map was produced by multiplying SA values with Amplification factors corresponded for different soil type. as the V_s is within 168-244m/s so soil was classified as (E,D5,D4,D3). Thus the amplification factor was also modified. Spectral Acceleration (SA) (g) for 1 sec at Engineering Ground Surface(Depth upto 30)corresponding to probality of exceedance of 10% in 50 year was count for each grid.



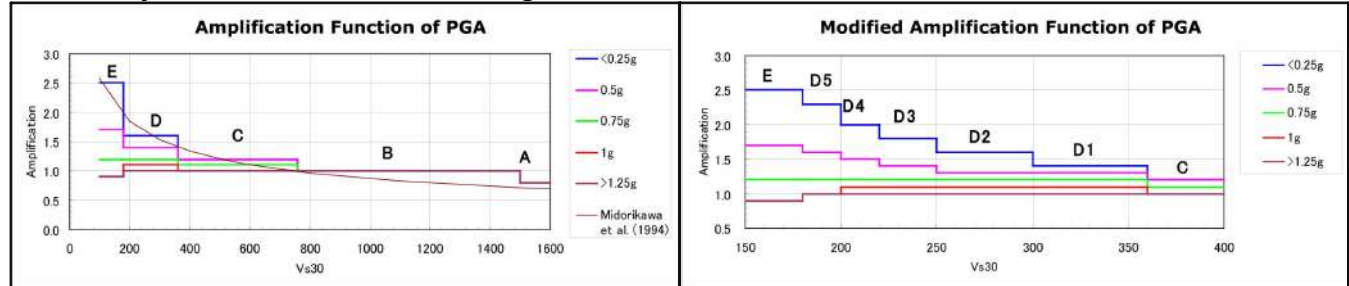
The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions



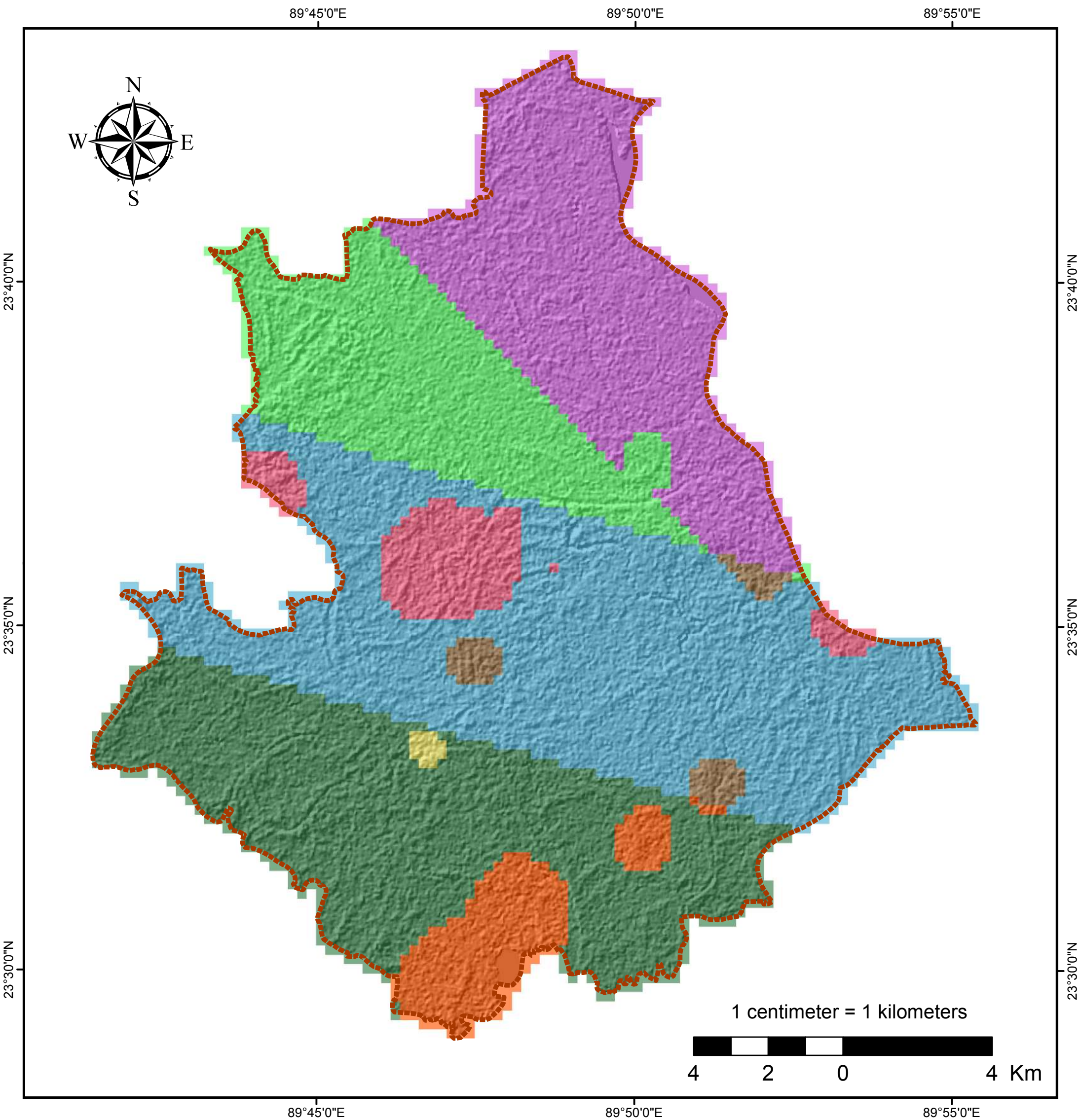
Spectral Acceleration (SA) (g) for 0.2 sec Structural period at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years



This map was produced by multiplying SA values with Amplification factors corresponded for different soil type. as the Vs is within 168-244m/s so soil was classified as (E,D5,D4,D3). Thus the amplification factor was also modified. Spectral Acceleration for 0.2 sec at Engineering Ground Surface(Depth upto 30) corresponding to probability of exceedance of 10% in 50 year was count for each grid.




The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions











Building Height Recommendation Map of Faridpur Sadar Upazila

Legend

 Upazila Boundary

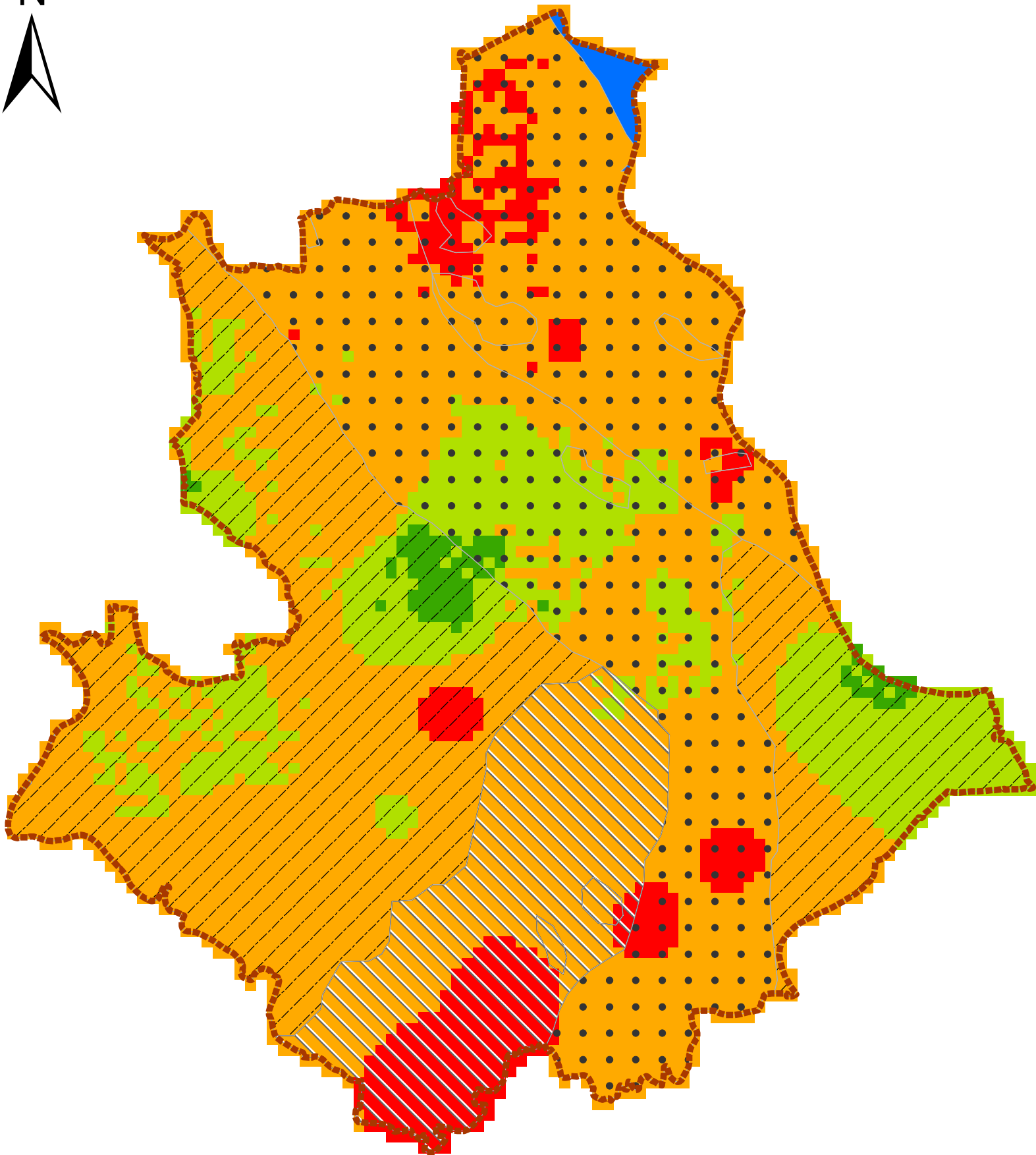
Building Sensitivity

Low and High Rise Building

-  1st Degree Sensetive for Lowrise Building, 1st Degree Sensetive for Highrise Building
-  1st Degree Sensetive for Lowrise Building, 2nd Degree Sensetive for Highrise Building
-  2nd Degree Sensetive for Lowrise Building, 1st Degree Sensetive for Highrise Building
-  2nd Degree Sensetive for Lowrise Building, 2nd Degree Sensetive for Highrise Building
-  2nd Degree Sensetive for Lowrise Building, 3rd Degree Sensetive for Highrise Building
-  3rd Degree Sensetive for Lowrise Building, 1st Degree Sensetive for Highrise Building
-  3rd Degree Sensetive for Lowrise Building, 2nd Degree Sensetive for Highrise Building
-  3rd Degree Sensetive for Lowrise Building, 3rd Degree Sensetive for Highrise Building

Coordinate System: BUTM2010
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Infrastructrure Suitability Map Faridpur Sadar Upazila



Legend

Upazila Boundary

Infrastructure Suitibility Class

Very Good

Good

Moderate

Poor

Surface Geology

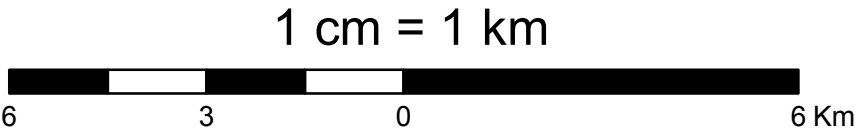
Map Unit

Deltaic sand

Deltaic silt

Marsh clay and peat

Water



Infrastructure Suitability	Infrastructure Foundation Suitability	Suggested Land Use Suitability
Very Good	4-6 story light infrastructure is suitable with a foundation depth of up to 2 m. Large and tail infrastructure requires pile foundation placed on Soil layer no 3 or 5.	Commercial area Residential area Industrial zone
Good	4-6 story light infrastructure is suitable in Madhupur Clay. General foundation depth is within 5 m, at places higher Large and tall infrastructure requires pile foundation placed on layer no 3 or 5	Commercial area Residential area Industrial zone
Moderate	4-6 story light infrastructure requires on-site subsoil investigation and proper foundation design. Deep pile foundation is needed for large and tail infrastructure	Industrial zone Residential area Commercial area Agricultural Zone Park and Recreation
Poor	Detail subsoil investigation and proper foundation design is required for all types of infrastructure, due to low bearing capacity with hazard potential.	Agricultural zone Flood flow zone Wetland Rural settlement Park and Recreation
Very Poor	Detail subsoil investigation for deep pile foundation is essential, due to very low bearing capacity and high hazard potential. Shallow foundation is not preferred.	Agricultural zone Flood flow zone Wetland Rural settlement Park and Recreation

EXECUTIVE SUMMARY

This report presents the hydrological survey data obtained during the hydrological survey works conducted at Faridpur Sadar Upazila under Faridpur district. The task is a part of the project, “Preparation of Development Plan for Fourteen Upazilas”, Package-3. Bathymetric survey of Kumar River has been done. During rest of the survey works, information regarding any existing water control structure, river crossings, distributaries and tributaries were collected. It also presents the detailed survey data of the existing drains within the township. The existing drainage systems or drainage network data has been collected by the field survey. Cross sections were surveyed at the locations of the existing structures on the rivers, at junctions with and of other channels or rivers. For drains, sizes were charted at starting locations, junctions and end points. The reduced levels of the existing ground at those locations were measured too. To measure the reduced levels on the field, dumpy levels were used. The levels were measured with respect to nearby benchmarks or temporary benchmarks of authorized organizations like Bangladesh Water Development Board, Public Works Department, Roads and Highways Department, Local Government Engineering Department, etc. GPS locations at each BM/TBM location, at the point of start of each cross section, at any structure location and at all the control points of the drains were recorded. Other data include flow directions, depth, width, structure type have been collected by the field survey. The information will be incorporated with the DEM on GIS and if needed, adjusted according to the established GCPs. This will subsequently facilitate any sort of numerical watershed analysis and hence extrapolate a prediction for the future. This report also presents the analysed rainfall data.

1. PROJECT OVERVIEW

1.1 Background and Objective

The project, “Preparation of Development Plan for Fourteen Upazilas” was initiated by Urban Development Directorate, Ministry of Housing and Public Works, Government of Bangladesh. The main objective of the project is upgrading the living standard of the local people. The Kumar River is the main drainage channels in the vicinity. The whole system of rivers in and around the Upazila is essentially connected to Padma River on the north-east. The urban area has a lack of proper drainage system. Flood modeling software should be used to understand flooding conditions, identify the water logging areas and establish the drainage requirements. Models should also be used to assess the efficiency of the existing and proposed drainage system.

One aspect of this Hydrological Survey is the bathymetric survey of the main rivers within the project area. The purpose of bathymetric survey is to provide bathymetric information of the Kumar River with connected others river. The water level data of those rivers will be used as boundary conditions for model analysis. The information obtained in the field will be incorporated in the DEM through a process called “Burning”. This will be necessary for analyzing the surface water flow to assess flood through flood modeling software PCSWMM 2D. It is required to assess the flood conditions during different time period and season against different water levels and discharge (*Sample results shown in Fig: 1*). If the actual cross-section of the river or channel is not obtained, the analysis will be faulty and will overstate the flood. This type of analysis will be helpful for preparation of effective and long lasting development plans for this Upazila. Hence, accuracy of the analysis is of prime importance.

To run a flood model of the area, water level, discharge and rainfall data of the vicinity have been collected from secondary source and analyzed. Water level data of FFWC gauge stations Kumar river at Faridpur Sadar have been collected. The rainfall data of the stations Faridpur station has also been collected to obtain a rational rainfall data by interpolation. The data are to be analyzed to obtain water level, discharge and rainfall data for different return period. The water level and discharge data are needed to set the boundary condition in flood models. The rainfall data will be used to obtain runoffs to calculate discharge at pour points of the sub-catchments.

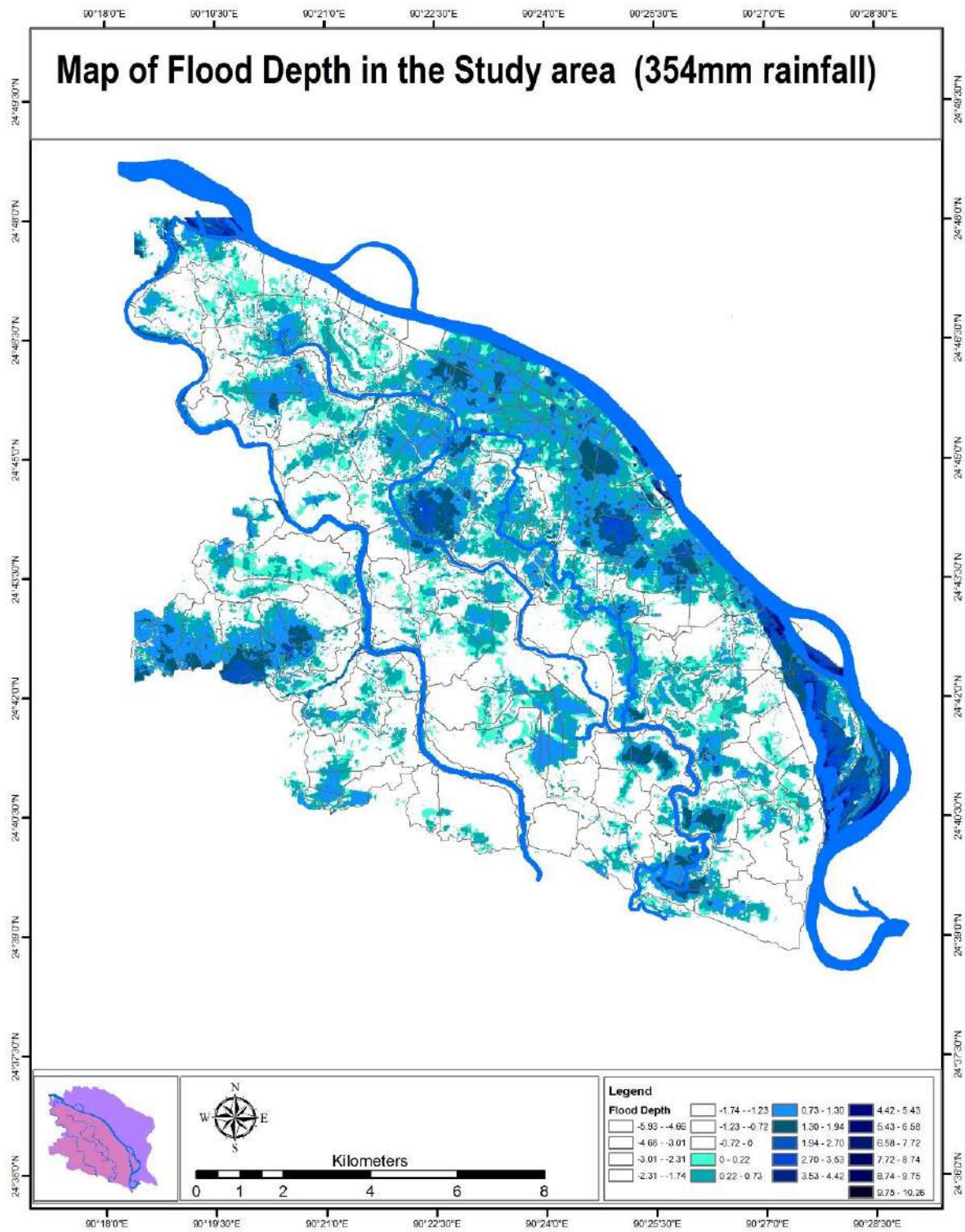


Figure 1: Flood Depth of 5 in 5 years rainfall derived by PCSWMM 2D

2. DETAILS OF SURVEY WORK

2.1 Project Boundary

According to the RFP, role and importance of the secondary towns of Bangladesh can be envisaged from the fact that the contribution of the urban sector to gross domestic product (GDP) is increasing day by day. Considering the importance of the growth of the secondary towns, fourteen Upazila are considered for the preparation of Development Plan. Faridpur Sadar Upazila of Faridpur district is also the concern area. It contains Faridpur Town near the banks of the Padma River.

Faridpur Sadar came into existence as a thana in 1894. Nothing is definitely known about the origin of the upazila name. It is learnt that, there lived a renowned religious leader and pious saint named **Shah Farid** in this locality. He was buried in the present place of Faridpur town after his death. It is generally believed that the upazila might have derived its name Faridpur Sadar from the name of that great saint Shah Farid.

The upazila occupies an area of 412.86 sq.km. It is located between 23° 29' and 23° 34' north latitudes and between 89° 43' and 89° 56' east longitudes. Faridpur Sadar Upazila consists of 11 Unions with an area of 407.02 sq. km under Faridpur Districts. Total population of the Upazila is about 4,89,017 (almost 50% are female) whereas rural population is about 3, 46,985 and urban population is about 1,42,032. That means about 29% people are living in the Urban area of and the rest are living rural area of Faridpur Sadar Upazilla. The no of total household of the Upazila is 103535 (BBS, 2011).

2.2 Survey Component

The current survey work comprises the following components

1. Pipe network
2. Open/ Covered drain
3. Khal/ Natural canal
4. Spot Level
5. Hydrological survey

2.3 Measuring Reduced Levels

To measure the reduced levels, dumpy levels and 5m staffs were used. In case of rivers, the levels were measured with respect to the nearest known benchmarks of Bangladesh Water Development Board or temporary benchmarks of any authorized government organizations viz., Roads and Highways Department or Local Government Engineering Department etc. After establishing a horizontal line of collimation / line of sight with respect to a BM/TBM, staff readings are taken within the range of visibility of the dumpy level. For any reading beyond the visibility range, the dumpy level needs a change of station. A temporary benchmark is established and further measurements are made with respect to that. In case of a change of level of more than the height of the staff (5m generally), the levelling machine needs to be shifted and setup again. Subtracting the level of line of sight from the staff readings provides

the reduced levels at the point concerned. In figure 4, a schematic diagram of survey method using Dumpy Levels is shown.

2.4 BM Used for the Survey

During the study of hydrological survey, a good number of BM has been used to carry out level and positions. Survey of Bangladesh also has BM 6181. Apart from around 20 number BM being establishment by ECAL has been used to carry out the level . The list of BM used during the survey work is presented in Table 1

Table 1: BM location with RL using During the hydrological survey

BM	Latitude	Longitude	RL	Location name
SOB 6181	23.552047	89.777757	7.673	BISC Shilpo, Kanaipur
BM01	23.589546	89.809134	8.968	Upazila Parishad Headquater, Rajbari raster more
BM02	23.615466	89.842921	8.6525	Bhati lokhipur primary school, bhatilokhipur
BM03	23.599571	89.827247	8.6287	Goalchamut primary school, бага more
BM04	23.58871	89.834487	7.8814	Alipur primary school, medical bazar
BM05	23.611482	89.818022	8.8785	Gobindopur primary school.
BM06	23.601201	89.839238	7.369	Jhiltoli primary school, jhiltoli
BM07	23.612044	89.856541	9.1191	Tapatola primary school, Tepakhola
BM08	23.595128	89.861653	7.9221	Rajendro University college, Bitul aman
BM09	23.586917	89.861455	8.0927	Aliyabad UP, Aliyabad
BM10	23.559565	89.814432	7.271	Koijuri Up, Koijuri bazar
BM11	23.547002	89.856976	7.338	Gerda Up,Bakunda Bazar
BM12	23.635816	89.779581	8.6057	Ishan Gopalpur Up,
BM13	23.607754	89.800826	8.087	Ambikapur Up, Ambikapur
BM14	23.569689	89.758778	9.3586	Krishnanagar Up, Krishnanagar
BM15	23.539804	89.774316	7.0817	Kanipur Up, Kanipur Bazar
BM16	23.631276	89.761807	9.6791	Machaar up, Dhaka-Faridpur highway
BM17	23.650899	89.817656	9.2435	Char Madhabdia Up, Char Madhabdia bazar
BM18	23.663447	89.840114	8.7167	Uttar channel Up, Boalmari

BM19	23.630535	89.85471	8.0463	Aizuddin Matubbar primary school, CNB Ghat
SOB 2903	23.612563	89.852886	8.1827	Kanaipur Primary school, SOB_BM_2903

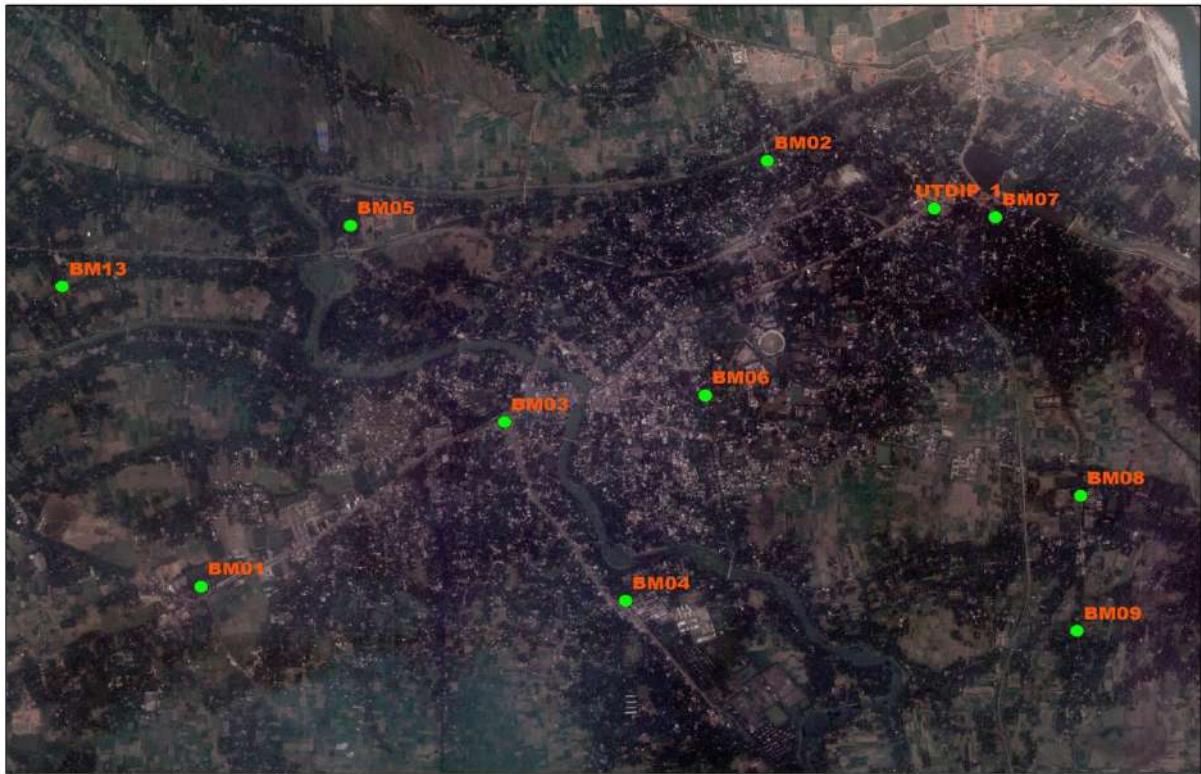


Figure 2: BM location of the Faridpur Sadar

2.5 Drainage Network Survey (pipe & open/covered drains)

The drainage network of the faridpur paurashava contained both of the pipe network and open/covered drains has been surveyed under current study. For pipe network the surveyed parameter was alignment with length, invert level with position, diameter, flow direction, outfall location, surface level and physical capacity condition. These parameters were recorded at every accessible point/manhole. For open drains open drains the measured parameter were alignment with length, top width, bottom width, top level, bottom level, depth, outfall location and capacity condition. These parameters were measured at not more than 250 meter interval but include all starting, ending and junctions.

2.6 Canal/Khal Survey

The main river of Faridpur Sadar is Kumar river. the cross sectional survey of kumar river has been done. The cross sectional survey of connected khal with kumar river and other khal of the area have been done by the field survey. The length of kumar khal is 10.75 km length. This river is the main arteries of drainage system of Faridpur sadar. To get the present condition of all these khals cross sectional survey has been conducted at an interval of 500 meter.

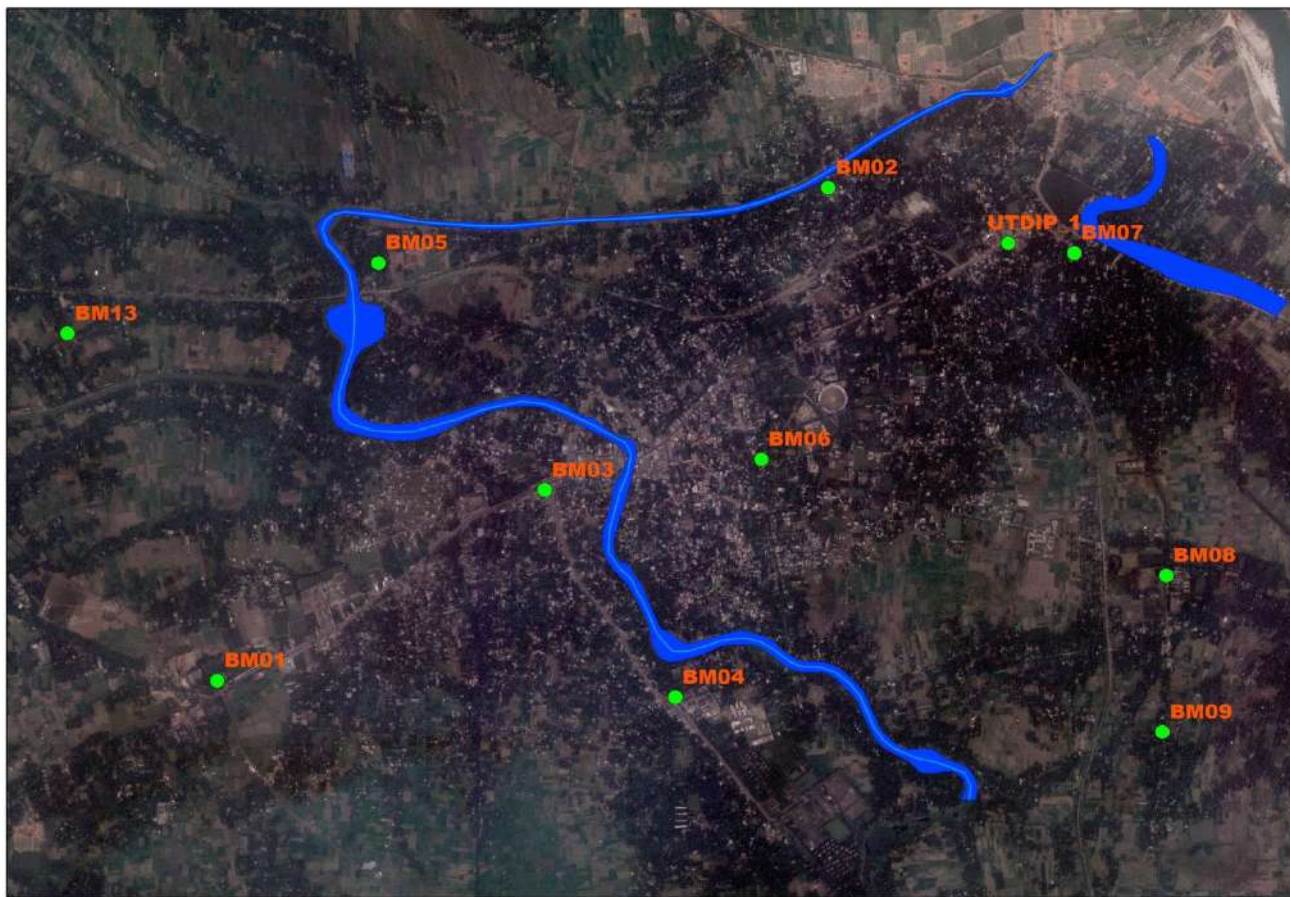


Figure 3: Kumar River and BM location of Faridpur Sadar

2.7 Methodology for Drainage Network Survey

The alignment of road has been collected from LGED and the road network has been divided into small grids. The survey team identified all the accessible point of subsurface pipeline inside a grid. Then from nearest BM level has been carried out with level machine to all the accessible point. For pipe line inner bottom level, inner top level and road surface level has been recorded with GPS position. The diameter of the pipe is calculated from difference of inner top and inner bottom level. The alignment of the pipe network has also been recorded with GPS tracking. The direction of flow along the drainage network was also recorded. Around 30 surveyors have worked for drainage data collection.



Figure 4: Data Collection of Drain network

2.8 Methodology for Canal/ Khal Survey

To get the present condition of the khals of Faridpur sadar, cross sectional survey was conducted at an interval of 500 meter. The khals mainly consist two parts – under water bed and above water land portion (on both bank). For land portion total station and level machine was used and echo-sounder was used to get the bed profile of khal. Position and level was carried out from nearest BM. Additional TBM was established as per requirement of field condition. The cross sectional data was recorded at an offset of not greater than 5 meter. Furthermore edge of bank, toe of slope and deepest point has been marked. From the edge of bank maximum 20 meter length has been covered towards country side. RL of water level and direction of flow was also recorded for every section. After collection the land data and under water data has been combined to get the cross section.



Figure 5 : Data Collection or River cross section with Total station survey of Faridpur Sadar.

3. HYDROLOGICAL ANALYSIS

3.1 Climate and Weather Data

The extreme rainfall in Faridpur sadar Upazila is 257mm in 20 July 2017. The climate data in Faridpur sadar Upazila in 2016 is given below table

Table 2.1: Climate Data Faridpur sadar Upazila in 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	0.82	.95	1.57	2.47	2.44	2.31	1.99	1.71	1.55	.94	.62	.66
Wind speed												
Normal maximum temperature	24.6	28.1	33.2	36.3	35.8	34.1	32.7	33.0	32.8	32.4	30.1	26.4
Normal minimum temperature	10.6	14.1	18.8	23.4	25.2	26.1	26.2	26.2	25.6	23.50	18.1	12.5
Monthly normal humidity(%)	70	72	65	68	74	83	86	86	86	83	78	78
Average monthly normal rainfall (mm)	14.8	26.6	20.2	39.8	142.8	235.4	351.7	232.8	297.1	101.3	21.0	13

3.2 Daily Rainfall Data of Faridpur sadar

Daily rainfall data of Faridpur for 62 (sixty-two) years ranging from 1948 to 2010 have been processed from Bangladesh Meteorological Department (BMD). BMD- 11505 (23.93 89.85) Faridpur rain gauge data has been used for Faridpur upazila. The yearly rainfall distribution of Faridpur sadar Upazilla has been shown in below figure

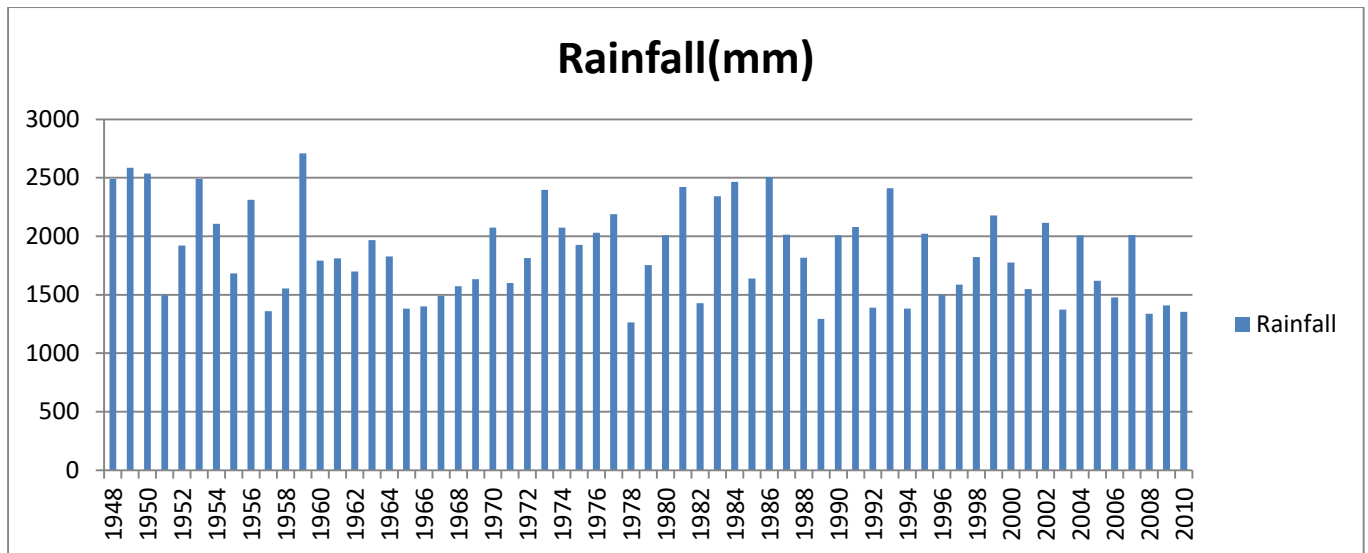


Figure 6: yearly rainfall data of Faridpur station

3.3 Calculation of Short Term Rainfall Intensity

Since there are no short duration rainfall records for Faridpur sadar, short duration rainfall data for Dhaka have been used for Faridpur sadar. The Gumbel distribution for estimating probability of occurrences will be used to develop the frequency analysis of rainfall intensities of Faridpur sadar for 2-year, 5-year, 10-year and 25-year recurrence intervals. Detailed calculations are presented below.

Table 2 Summary of Data used in the Hydrological Analysis.

No of years of Long-term for Dhaka	50
Average rainfall of Dhaka (Average 1) mm	2044
No of years of data of Faridpur sadar	62
Average rainfall of Faridpur sadar (Average 2) mm	1861

3.4 Preparation of Rainfall Intensity-Duration-Frequency Curve

3.5.1 Time of Concentration

➤ Entry Time

It is the time taken for runoff from the farthest point in the contributing area to flow over the ground and into the drain. Entry time has been calculated by the following Kirpich Equation.

$$T_e = 0.019621 L^{0.77} / S^{0.385} \quad (2.1)$$

where, L = Maximum Length of overland flow, and S = Average ground slope.

➤ **Travel Time**

It is the time taken for runoff to flow through the drain. It is calculated by dividing the length of the drain by the water velocity.

$$T_t = L/V \quad (2.2)$$

where, L = Length of Drain (m), and V = Design Velocity (m/s).

➤ **Time of Concentration**

It is the sum of entry time and travel time.

$$T_c = T_e + L/V \quad (2.3)$$

where, T_c = Time of Concentration (minutes).

Figure 2.1 shows these parameters.

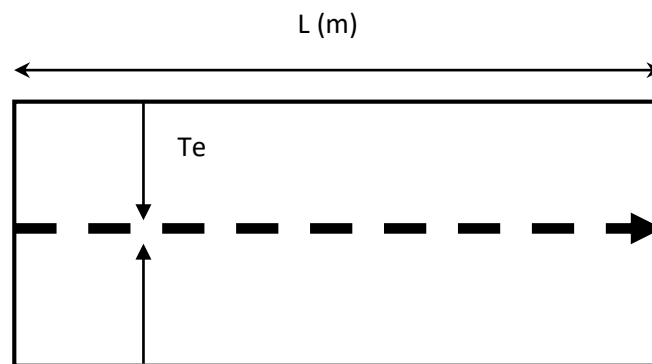


Figure 2.1: Illustration of Parameters of Time of Concentration.

3.5.1 Design Rainfall

➤ **Conversion Factor**

Data for individual storm events are scarce and inadequate for design, but relatively long term daily rainfall records are available for most areas. Rainfall data for durations less than one day is however available only for Dhaka. It is therefore practical to assume that the relationship observed between the Dhaka daily rainfall and the Dhaka rainfall of durations less than one day has the same relationship for the rainfalls in the other project towns. A procedure to estimate rainfall for durations less than one day for other locations can then be proposed.

Project town rainfall data are generally available for a shorter period (years) than the Dhaka rainfall data available. It is therefore necessary to calculate the adjustment of the Dhaka long term mean annual maximum daily rainfall corresponding to period of records of project towns. The ratio between the project town annual maximum daily rainfall and the Dhaka annual maximum rainfall data is then calculated.

The procedure to calculate the conversion factor is:

- The Dhaka long term mean annual maximum daily rainfall is 141.967mm = **Average 1.**
- Obtain annual maximum daily rainfall data from the rain gauge nearest to nearest to project town and calculate the mean annual maximum daily rainfall for period of record, to give **Average 2**
- From the mean annual maximum daily rainfalls measured at Dhaka, calculate the mean annual maximum daily rainfall of Dhaka for the same period of record in (b) above, to give **Average 3.** Note that years with missing data in the project towns must also be excluded from the calculation of the Dhaka average.
- Calculate the ratio (Ratio1) between Dhaka long term mean annual maximum daily rainfall to Dhaka shorter period rainfall, i.e. **Ratio1 = Average 1/Average 3**
- Calculate the rain ratio (Ratio 2) between the project town mean annual maximum daily rainfall and corresponding period Dhaka mean annual rainfall i.e. **Ratio2 = Average 2/Average 3**
- The adjustment factor is thus Ratio 1 multiplied by Ratio 2 i.e. **Conversion Factor = Ratio 1 * Ratio 2.**

Table 3: Annual Maximum Daily Rainfall Data (mm) for Dhaka and Faridpur sadar.

Year	Dhaka	Faridpur sadar
1989	118	108
1990	94	115
1991	123	86
1992	90	76
1993	140	143
1994	74	115
1995	83	193
1996	150	95
1997	121	86
1998	122	89
1999	141	125
2000	158	75
2001	71	109
2002	88	116

2003	93	86
2004	341	164
2005	128	209
2006	185	105
2007	152	198
2008	190	72
2009	333	108
2010	87	113

3.5.1 Rainfall Intensity Analysis

The rainfall data for Dhaka has been analyzed using the Gumbel Analysis method and the derived return period rainfalls for a range of storm durations are presented in Table 2.3. Note the values have been adjusted to take in account the frequency of maximum daily rainfalls occurring during the period of observation and the long term average values. For use in a specific project area, the rainfall intensity values must be multiplied by the rainfall conversion factor.

Short duration rainfall data are not available for Faridpur sadar Pourashava area. The daily (24 hours) rainfall records are available for the period from 1962-2016. To generate short duration rainfall data, the following approach has been adopted. Based on the ratio of 24 hours rainfall, the short duration rainfall for Faridpur sadar Pourashava has been converted from the short duration record for Dhaka City.

The Rainfall Intensity Duration Frequency (IDF) curves for a 12-hour storm with 2-year and 5-year recurrence intervals for Faridpur sadar Pourashava have been developed by using the following equation.

$$i = a / (T^b + c) \quad (2.4)$$

where, i = Rainfall Intensity (mm/hour), T = Duration (hour), and a , b , c = Constant

Table 4: Constant values for IDF curves.

Return Period (Years)	a	b	c
5	152.8	0.95	1.12

Since there are no short duration rainfall records for Faridpur sadar, short duration rainfall for Dhaka has been used for Faridpur sadar also. The Gumbel distribution for estimating probability of occurrences was used to develop the frequency analysis of rainfall intensities of

Faridpur sadar for 2-year, 5-year, 10-year and 25-year recurrence intervals. Detailed calculations are presented below.

Table 5: Short Duration Rainfall Data for Dhaka.

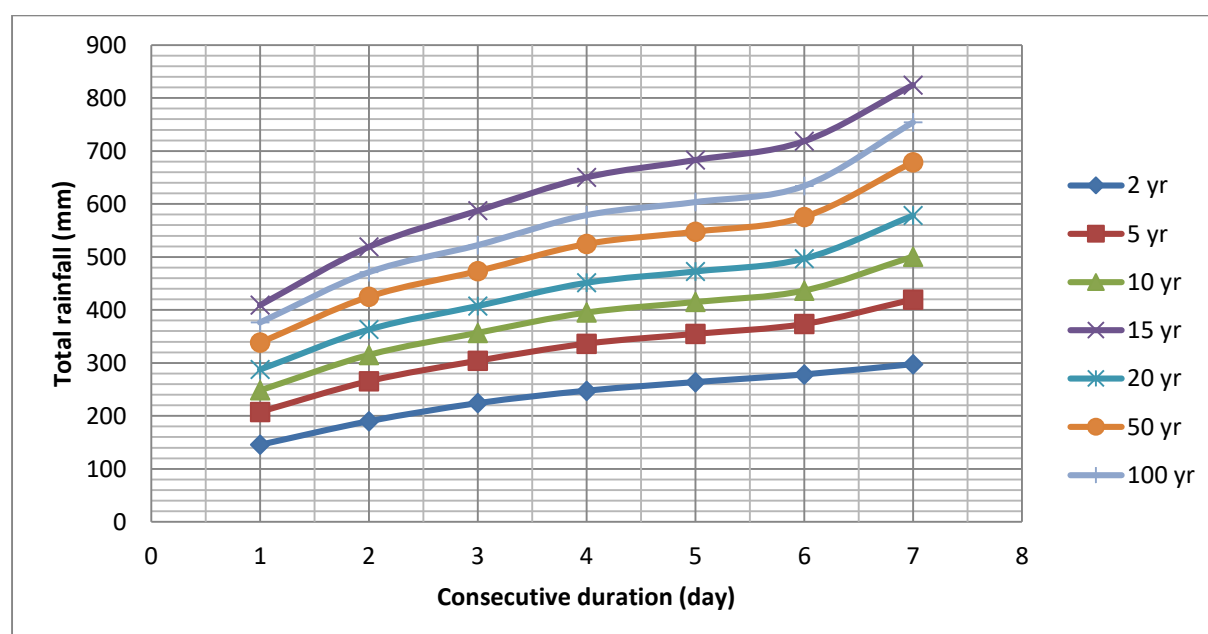
Return Period (Years)	T (hrs)	0.25	0.5	1	2	3	6	12
2	i	92.40	78.60	56.20	36.70	27.00	15.40	9.40
5	i	109.70	95.70	71.40	50.10	39.00	23.00	14.10
10	i	121.10	107.00	81.40	58.90	46.90	28.00	17.30
25	i	135.60	121.30	94.10	70.10	56.90	34.30	21.20
50	i	146.30	132.00	103.50	75.40	64.30	39.00	24.10

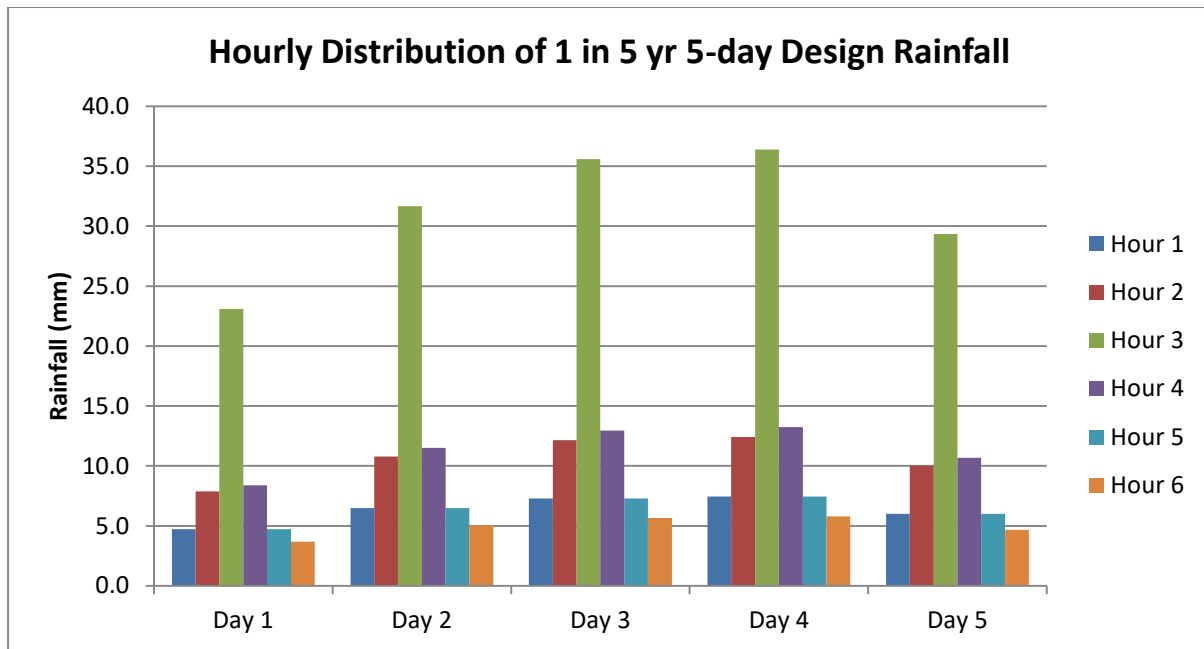
Table 6: Short Duration Rainfall Data for Faridpur sadar.

Conversion

Factor = 1.09

Return Period (Years)	T (min)	15	30	60	120	180	360	720
2	i							
5	i							
10	i							
25	i							
50	i							





3.5 Determination of Drainage Capacity

3.5.1 Peak Runoff

The Modified Rational design method presented in this report is for areas less than 60ha. For larger areas a hydrograph routing method should be used so that the attenuating effects of channel storage is included in the design. Failure to include this storage will result in over design of the drains.

The Rational Method was derived by considering the effect of a uniform intensity rainfall of a long duration on a catchment. The runoff rate starts at zero and reaches a maximum value when flow from the most remote part of the catchment reaches the outlet. The flow would then remain constant. The time for the flow to reach the peak value is called the time of concentration. The designed rainfall intensity is selected from a set of standard rainfall intensity duration curves by selecting the rainfall intensity for duration equal to the time of concentration. There is a rainfall intensity duration curve for each return period.

3.5.1 Modified Rational Method

The Modified Rational method calculates the peak runoff using the following formula:

$$Q_P = C_S C_R I A / 360 \quad (2.5)$$

where, Q_P = peak runoff (m³/sec), C_S = storage coefficient, C_R = runoff coefficient, I = rainfall intensity (mm/hr), A = area (hectares).

➤ **Storage Coefficient (Cs)**

Due to the very flat topography in many parts of Bangladesh, runoff is significantly slower than that would occur in many other countries. Rain first ponds on the ground and then runs off. To take this effect a storage coefficient is used. The value of the coefficient is based on the average ground slope and the nature of the ground surface. Coefficient of Storage is a factor to allow for the reduction in peak runoff due to the storage effects on the overland flows.

Table 7: Storage Coefficients.

Type of Area	Coefficient corresponding to ground slope		
	<1:1000	<1:500	>1:500
Paved areas – roads and markets	0.8	0.9	1.0
Densely built up areas	0.8	0.9	1.0
Central areas mixed commercial and housing	0.7	0.8	1.0
Residential areas with detached houses	0.7	0.8	0.9
Walled areas and gardens	0.6	0.7	0.8
Large permeable areas (e.g. dry paddy)	0.5	0.6	0.8
Paddy fields (flooded)	0.3	0.4	0.5

A storage coefficient is evaluated for each contributing area. The use of an average coefficient value for all drains is not correct. Use of an average coefficient will lead to under-sizing of drains in relatively impermeable and steeper areas and the over-sizing of drains in the more rural and flatter areas.

➤ **Runoff Coefficient (C_R)**

A runoff coefficient is used in the Modified Rational method, as not all of the rainfall falling on the ground flows off into the drains. Some water infiltrates into the ground and some go into storage in ponds or tanks. The runoff coefficient represents the ratio between the volumes of rainfall. In Bangladesh taking into account the fact that at the time of intense rainfalls in the Monsoon period the ground is normally saturated, the following coefficients should be used:

Table 8: Runoff Coefficients.

Type of area	Coefficient
Paved areas – roads and markets	0.9
Areas of paddy (flooded)	0.8
Densely built up areas	0.7
Central areas mixed commercial and housing	0.6

Residential areas with detached houses	0.4
Walled areas and gardens	0.3
Large permeable areas (e.g. dry paddy)	0.3

➤ **Rainfall Intensity (I)**

Rainfall Intensity is the amount of rainfall falling in a unit time period. Conventionally this is quoted in millimeters per hour (mm/hr). The Rainfall Intensity will reduce in magnitude as the time of concentration increases.

➤ **Contributing Area (A)**

The Contributing Area is the total catchments area upstream of a drain that can contribute flow. This includes the total area contributing flows to upstream drains. Contributing / Catchment Area is the area of ground surface that can drain to a length of drain. For any one drain, this also includes area draining into upstream drains. The contributing area is measured in hectares.

4. Numerical Modelling

4.1 Model Boundary and Schematization

Three steps have been taken for implementation of this model:

- Preprocessing
- SWMM model
- Post processing

ArcGIS 10.1 software has been used in preprocessing and post processing step. That process has been discussed in section 3.3. PC SWMM 2D has been used to run this model. The friendly usable PC SWMM software is more comfortable and easier than EPA SWMM because this software is directly connected to the GIS software. However, the study area has been characterized by river network surrounded by the area, drainage network in urban part and overland flow in rural part. For that reason, The SWMM model has been combined with three different analysis such as Hydrological, hydraulics and hydrodynamic analysis. This analysis has been done by PC SWMM software.

For hydrological analysis, overland flow and sheet flow have been derived by DEM data. From the field survey, the Hydraulics information has been collected. On the other hand, by using PC SWMM software, the river cross section data has been derived from 10m DEM data of the study area. The rational formula and Manning equation have been used to run this model. Long term and short term rainfall frequency data has been used. 5 days 5 year rainfall frequency has been used for design condition to calculate both peak discharge and water volume which was ponded in ponding area for long time period. The 5day rainfall distribution has been followed by the report of Hallcrow. This distribution has described both hourly distribution and daily distribution. For hourly distribution, the peak intensity value has been considered to measure peak discharge. The 5 days rainfall has been considered to find out the volume of water which has been trapped by the ponded area.

The contour line and flow path has been followed to identify and calculate the ponded area. For extreme event 1 day 100 year and 50 year rain fall frequency has been used to calculate the peak discharge of this area. In a simulation option, Horton law has been used for infiltration model. Dry antecedent condition has been applied from start of simulation. Also for routing, dynamic wave method has been used where Hazen-Williams equation has been applied. The ponded area has been allowed. The boundary condition of river data has been derived from gage station.

4.2 Integration with GIS

In preprocessing step, the ArcGIS 10.1 software has been used to -

- Building the attribute table and data base which has been collected from field survey
- Create the flow accumulation, flow direction and natural flow path by 10m DEM data
- Delineate the subcatchment area
- Classification of land use of the area to calculate the percentage of pervious and impervious area for every subcatchment .
- Soil map has been merged to the land use data to find out infiltration characteristics of every subcatchment area.

In post processing step,

- Flood depth data derived by the swmm model has been used to create the water surface elevation
- Flood area has been created by minus water surface elevation data with DEM data
- Different thematic information derived by SWMM model has been shown in Map

4.3 Input and Output

In a SWMM model,

- To add the Gis shape file such as catchment and subcatchment boundary, flow path, drainage network, DEM , soil, river and land use which has before been done in arcgis
- To add the junction point and outfall point on the drainage network
- Digitizing the drainage network, river network and overland flow path.
- To connect the every subcatchment area with those junction point where the water of subcatchment area first reach
- To Input the junction attribute of urban drainage network. Such as rim and invert elevation data which has been collected from field survey.
- Input the attribute of conduit in urban drainage network. Such as width, height
- For open channel of these conduits, the cross section has been used. The cross section has been derived from DEM data. The height and width collected by the field survey have to be used in the main channel of these conduits. The roughness value has been used in these conduits.
- For the overland flow and river network of the area, the cross section has been used and which is also derived by DEM data. The deriving cross section has been input into the every section of the river and over land flow. The height value of the river data has been input to the junction point.
- The invert and rim elevation data has also been extracted from DEM data.
- To add the subcatchment attribute such as land use data, manning's number, infiltration value.
- Add the rainfall data and dry weather flow in every junction of urban catchment area
- To select the simulation start and end time of the model

- To add the boundary condition of the river and out fall point.
- To Run the simulation and check and solve the error if it has been found
- Flooded node, peak discharge, flooded volume, total inflow, runoff coefficient and surface runoff etc data have been obtained from this model. Later these data has been used in post processing step (arc gis) to prepare the flooded map.

4.4 Calibration and Validation

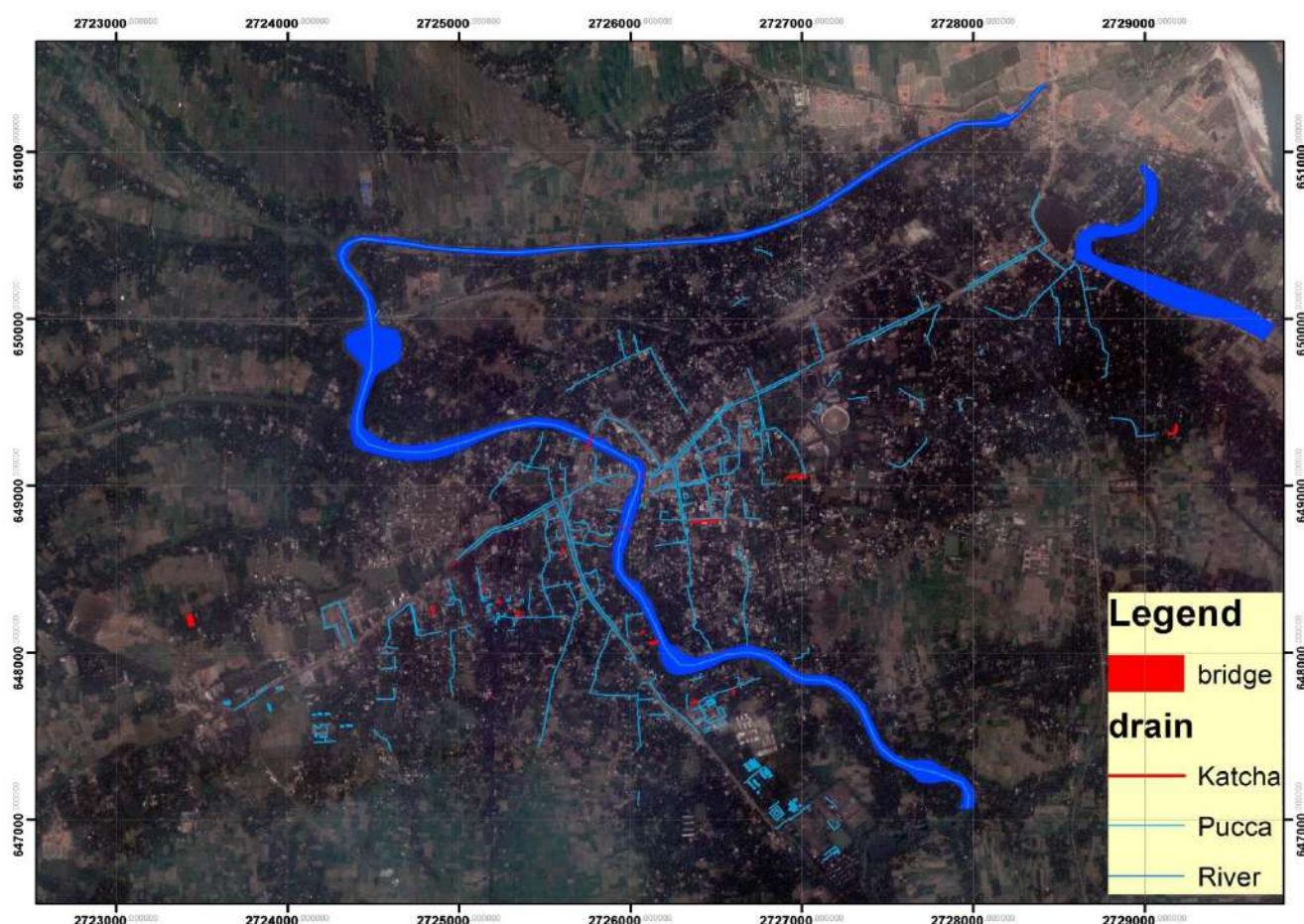
The following steps were followed:

- Collection of Rainfall data from Meteorological stations.
- Water level, velocity and flow data from known point on the canal systems.
- Comparison of observed data with model simulations
- Goodness of fit of the model
- Improve model performance during calibration
- Verification of model with another event.

5. Simulation of Baseline Condition

5.1 Drain inventory:

Two types of drain has been found in field survey. The total length of drain is 40.923km. Pucca drain is 40.173 km and katcha drain is .75 km. the figure shows the existing drainage network of Faridpur sadar.



5.2 Runoff calculation

Runoff is one of the most important hydrologic variables used in most of the water resources applications. Its occurrence and quantity are dependent on the characteristics of rainfall event, i.e. the intensity, duration and distribution. Apart from these rainfall characteristics, there are number of catchment specific factors, which have a direct effect on the occurrence and volume of runoff. This includes soil type, vegetation cover, slope and catchment type. SCS-CN provides an empirical relationship for estimating initial abstraction and runoff as a function of soil type and land-use. Curve Number (CN) is an index developed by the Natural Resource

Conservation Service (NRCS), to represent the potential for storm water runoff within a drainage area.

The runoff coefficient will be derived from the PCSWMM model. Also the runoff depth in different return period of each junction flow path will be derived from the PCSWMM model. The runoff depth will be used to findout the ponding area and to prepare flood hazard map in different return period

6. RECOMMENDATIONS

The following recommendations will be made based on the drainage analysis.

After getting the hydrological model of this area, providing the recommendation to improve the drainage system to alleviate water logging in areas identified in the study. Build and protect detention areas and flood buffer zones. Develop a contingency plan to allow limited flooding in designated areas in case of extreme rainfall events. Integrate the drainage plan with other cross-cutting plans such as the structure plan, ecological sustenance plan, etc. Prepare a plan for stormwater management and institutional arrangement involving key stakeholders, service providers and decision makers. Prepare a plan for priority activities and financing, to prepare a comprehensive plan for solid waste management

7. Annex A: Rainfall Data of Faridpur

Year	M o n t h	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1948	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1948	2	0	0	0	11	1	49	1	0	0	0	0	0	0	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
1948	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	1	0	0	0	2	0	0	0	0	0	0	0	12	0	12
1948	4	0	0	0	0	2	2	11	0	9	0	0	0	0	0	0	25	1	4	4	1	99	66	0	4	0	5	0	0	0	0
1948	5	1	16	12	10 2	0	11	4	0	0	0	0	3	0	3	59	0	30	0	0	0	0	41	1	0	0	39	0	2	0	3
1948	6	0	8	0	0	0	0	0	0	0	0	0	18	0	11	0	17 0	0	43	64	14	0	10	0	0	0	4	42	9	6	4
1948	7	2	0	1	0	0	0	3	4	12	1	8	22	51	45	8	79	4	2	16	7	31	3	0	0	0	1	1	5	48	3
1948	8	2	2	10 8	0	0	14 0	1	0	0	1	3	0	0	0	13	23	1	3	2	5	9	3	0	2	2	3	57	18	0	5
1948	9	2	22	1	1	11	0	3	1	0	0	1	6	8	12	0	0	0	0	0	4	0	0	0	3	1	0	0	24	3	0
1948	10	1 1 7	11 9	61	1	16	0	0	0	0	1	72	89	1	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0
1948	11	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	1	1	17	0
1948	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	2	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	5 3
1949	3	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	11	0	52	0	0	0	0	0	0	0	2	0

1949	4	0	0	0	0	50	4	0	92	0	0	0	0	0	1	0	0	0	0	0	0	32	61	0	0	10	12	10 7	17	0	4
1949	5	4 3	0	10	10 4	22	0	54	36	1	0	0	0	1	10 5	0	0	0	0	0	1	20	0	1	0	11	0	1	7	0	2
1949	6	7 7	0	38	1	1	0	1	4	6	8	49	2	6	14 1	3	0	0	0	0	0	6	0	3	60	62	0	10	0	0	0
1949	7	1 9	4	0	3	16	9	12	2	0	9	0	0	0	8	2	11	27	11	38	25	0	15 8	30	19	0	0	2	1	0	2
1949	8	1 0	10	23	19	15	9	47	0	1	4	3	2	2	1	4	30	7	6	2	36	0	0	25	1	2	0	2	0	9	0
1949	9	8	45	5	9	14	0	1	1	11	0	0	0	29	16	11	19	10 4	0	0	0	0	0	0	0	0	5	0	68	3	0
1949	1 0	5	0	6	0	0	0	1	7	4	0	0	2	3	0	0	1	0	31	0	32	0	0	0	0	0	0	0	1	0	0
1949	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1949	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1950	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1950	2	0	0	9	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
1950	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
1950	4	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1950	5	0	6	4	11	9	0	0	0	51	47	0	0	15	0	24	47	0	34	0	0	9	2	98	0	4	0	0	11	0	1
1950	6	0	0	10	0	0	0	0	3	2	38	68	50	58	58	0	37	52	18 1	10 5	3	0	0	1	4	20	6	1	9	0	5
1950	7	4 6	12	1	0	0	0	10	2	11	5	0	4	6	35	13	2	19 7	27	11	1	15	1	2	1	0	0	6	8	0	0
1950	8	2 5	11 1	21	39	1	0	1	6	30	30	12	13	5	0	15	4	0	1	14	16	6	8	57	0	4	0	0	12	9	0
1950	9	1 3	1	0	0	0	0	1	0	0	0	0	6	8	8	53	1	0	0	0	0	5	1	7	0	0	5	1	0	0	0

1950	1 0	8	1	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	3	24	63	33	0	2	0	15	4	0	0
1950	1 1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	34	12 7	1	0	0	0	0	0	0	0	0	0	1
1950	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
1951	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
1951	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	4
1951	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0	22	0	0	9	0	0	16	2
1951	4	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2
1951	5	5	0	0	0	0	0	0	4	5	1	0	0	7	0	0	0	0	0	0	0	9	0	2	0	3	0	0	17	0	6
1951	6	0	0	1	61	18	3	23	1	0	0	0	0	0	0	67	4	0	3	0	0	22	0	9	0	0	1	3	11	0	1
1951	7	4 3	1	45	33	12	22	1	5	43	0	1	2	11	12	0	18	19	65	0	0	0	0	0	0	2	6	6	6	1	0
1951	8	5	0	1	0	0	1	5	2	2	0	31	4	10	2	1	1	6	1	0	1	0	71	80	3	3	2	4	0	0	0
1951	9	0	17	0	0	12	24	23	15	11	52	5	6	1	7	0	1	8	0	4	9	0	0	0	0	0	0	0	0	0	0
1951	1 0	3 0	10	8	48	0	10	0	0	0	0	4	9	3	1	0	25	1	0	0	0	0	0	0	0	0	0	2	0	0	0
1951	1 1	1 1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	22	0	0	0
1951	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1952	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1952	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1952	3	0	0	0	0	0	0	0	0	4	2	1	1	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	37	0
1952	4	5	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	68	0	11	41	2	10	74	3	

1952	5	1	26	0	41	3	6	0	6	1	7	2	21	0	25	40	0	0	0	0	0	0	25	16	76	0	0	0	0	21	0
1952	6	2 7	4	0	4	0	17	8	0	0	0	0	0	0	0	0	1	29	2	0	3	1	0	36	0	3	6	2	0	3	0
1952	7	1 2	0	32	2	10	9	2	45	29	4	99	16	14	7	21	10	4	0	2	2	3	3	5	5	8	17	9	20	0	0
1952	8	1	2	10	5	5	0	0	1	2	4	21	3	1	0	8	10	2	2	4	0	1	9	3	18 1	3	10	5	0	0	0
1952	9	1 6	4	0	0	4	26	0	1	6	38	16	6	0	0	0	9	1	11	1	0	7	59	24	3	4	6	11	0	0	0
1952	1 0	1	0	0	0	7	0	0	26	16	18	10	0	2	12	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1952	1 1	0	2	3	0	0	0	0	0	3	6	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1953	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1953	2	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
1953	3	0	16	2	4	0	0	0	32	2	26	21	0	0	22	0	0	0	0	0	0	0	4	0	0	0	0	0	0	3	0
1953	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	4	0	10	5	0	
1953	5	0	0	26	0	28	2	0	2	19	0	3	0	9	3	9	0	23	11	21	10	34	21	0	0	0	0	0	25	8	0
1953	6	0	9	46	6	11	0	28	0	32	10	3	12 4	34	0	27	0	10	9	1	6	10	4	15	20	35	36	10 4	8	0	0
1953	7	1	3	12	10 6	12	14	0	5	25	13	20	0	1	5	4	35	4	1	3	2	15	67	19	18	12 6	13 9	21	2	0	0
1953	8	8	16	22	4	10	0	0	1	0	0	0	1	3	14	10	0	0	2	62	25	24	0	6	28	11	18	7	20	0	0
1953	9	0	11	0	33	0	1	0	20	28	11	14	6	0	45	12	0	3	52	14	0	0	0	0	0	5	25	1	0	4 3	
1953	1 0	0	0	1	0	24	21	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	0	0	0	
1953	1 1	0	0	0	0	0	0	0	8	26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1 3

1953	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1954	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	9	0	0	0	0	0	0	0	1 8	
1954	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1954	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	
1954	4	2 3	0	4	0	0	0	0	0	19	21	19	9	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	1	0	
1954	5	3 2	1	0	0	0	38	16	0	16	3	0	0	2	0	11	0	5	0	21	11	27	8	4	3	0	0	0	0	0	0	0
1954	6	2	55	6	53	30	17	6	37	68	0	25	0	0	10 6	33	9	17	5	0	29	20	22	69	88	66	12	0	0	0	0	
1954	7	4	35	9	0	0	2	18	5	1	6	0	1	95	22	25	13	0	0	0	0	1	0	0	0	7	0	13 3	37	0	0	
1954	8	1	1	0	0	0	0	0	0	0	3	14	14	47	11	27	2	0	0	9	19	15	21	2	36	0	5	1	10	0	0	
1954	9	9	9	6	0	0	0	27	8	6	16	0	0	0	0	0	0	5	1	2	0	0	1	5	6	0	0	0	1	0	1 8	
1954	1 0	1	26	0	3	2	77	22	0	0	3	1	6	0	0	0	0	0	0	0	0	0	0	0	0	1	10	7	0	0	3	
1954	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1 5	
1954	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	
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1955	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	4	0	0	
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1957	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	11	0	0	0	0	
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1958	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1960	5	0	0	0	5	0	0	0	0	0	0	0	0	0	2	2	0	33	10	0	45	15 7	6	23	2	1	0	4	10	0
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1962	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1962	2	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	20	0	0	0			
1962	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
1962	4	0	0	0	0	0	0	0	0	0	25	0	2	0	0	0	0	49	0	15	4	0	2	0	0	0	45	0	0	1			
1962	5	0	0	7	0	16	0	0	28	55	10	0	42	0	0	0	0	35	0	0	0	0	0	0	0	19	0	0	2	3			
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1962	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	
1962	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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1963	4	0	0	10	0	0	0	9	2	0	3	12	0	4	0	33	1	0	0	25	0	0	11	0	0	0	0	1	0	8	3	3	
1963	5	0	22	0	0	29	0	11	0	18	11	0	0	0	0	1	0	0	0	17	13	0	0	0	0	23	0	0	5	0	0	0	
1963	6	5	9	0	0	0	3	0	88	33	0	22	7	35	97	16	0	13	19	27	93	11	0	0	0	4	0	0	0	0	30	0	
1963	7	1	0	0	19	0	0	3	43	28	3	23	17	36	10	57	0	0	0	5	25	20	10	0	3	18	11	2	0	6	0		
1963	8	0	0	8	20	0	0	1	10	6	6	4	8	0	0	0	0	8	4	1	0	0	0	0	0	0	21	0	10	26	0		
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1963	10	2	5	15	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	12	4	4	1	0	0	0	

1963	1 1	0	35	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1963	1 2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5 4	
1964	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3 1
1964	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	4	0	0	0	52	4	0	0	0	0	0	0	3	1	5	0	7	31	0	5	0	0	0	0	0	0	0	0	16 2	0	0
1964	5	0	0	0	0	0	0	0	11	0	0	1	0	2	0	8	0	1	12	27	0	0	0	0	0	1	0	0	0	28	0
1964	6	0	0	0	0	0	0	24	0	4	19	8	0	0	10	15 5	14	26	4	27	5	17	0	3	0	3	0	0	1	5	0
1964	7	0	20	0	0	5	35	25	8	2	5	9	4	1	0	17	40	78	15	3	22	65	3	13	19	9	0	0	0	0	0
1964	8	0	0	11	0	0	0	0	0	20	30	27	3	0	4	9	2	1	23	1	8	11	3	28	26	4	24	0	0	0	0
1964	9	5	17	22	19	5	19	0	2	2	0	1	0	0	0	0	0	0	0	26	0	3	4	4	6	7	0	0	0	0	0
1964	1 0	0	0	0	2	39	89	7	0	0	0	0	0	0	0	5	6	8	2	41	22	17	17	6	0	0	14	32	0	0	0
1964	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5
1964	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1965	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1965	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	9	0	0	0	0	0	0	0	5	0
1965	3	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1965	4	0	0	0	0	0	0	0	10	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
1965	5	0	0	0	0	12	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0
1965	6	2 0	1	18	33	17	0	0	0	0	2	0	0	0	0	0	0	1	0	18	0	0	0	0	23	2	43	68	13	0	0
1965	7	7 7	0	0	2	0	12	34	0	71	93	0	1	0	0	5	6	0	0	4	7	2	6	0	0	2	6	0	0	0	0

1965	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3 2		
1965	9	1 9	1	0	0	12	0	8	6	5	63	0	12	1	1	0	0	0	4	69	66	0	0	0	2	0	32	35	2	0	0
1965	1 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	1 7	
1965	1 1	1 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
1965	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5 8	
1966	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 8	
1966	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1966	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	
1966	4	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	23	0	0	0	0	0	0	44	3	47	26	3	0	10	0
1966	5	0	0	0	0	0	0	7	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	1	0
1966	6	0	0	0	9	11	26	0	0	0	0	0	0	13	17	0	12	20	14	2	5	9	99	3	0	6	1	13	2	42	0
1966	7	1 4	7	10 0	0	28	8	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	17	0	0
1966	8	1 3	0	2	0	0	12	15	20	7	3	2	22	0	1	5	14	6	7	0	9	0	0	60	13	39	2	0	0	0	0
1966	9	0	2	0	0	9	2	0	36	4	0	15	6	16	1	0	34	9	0	0	10	0	0	1	0	0	0	0	0	0	0
1966	1 0	4 9	18	0	0	0	0	0	0	0	0	0	0	22	23	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1966	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	** *	0
1966	1 2	0	1	1	0	0	0	0	0	0	0	0	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1967	1	0	0	0	0	0	0	0	34	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3 9
1967	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0

1967	3	0	0	0	0	0	1	1	0	3	0	0	0	0	0	6	0	0	0	0	0	19	0	0	0	0	5	0	9	36	0	
1967	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	40	1	0	0	0	0	8	10	0	1	3	0	
1967	5	0	0	0	0	0	16	8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	39	0	0	0	0	0	
1967	6												13																			
	6	0	0	0	0	0	0	0	0	0	43	19	19	1	0	46	0	0	53	0	10	3	4	0	0	0	0	28	6	0	0	
1967	7	4	3	6	9	24	7	13	34	41	3	6	5	0	0	0	17	1	3	1	5	0	0	0	3	1	1	1	8	1	0	
	8	2																														
	8	5	0	4	2	3	15	51	24	1	20	2	6	0	0	1	0	0	0	14	7	2	1	1	1	22	30	0	0	0	0	
1967	9	0	10	1	0	8	0	1	0	0	5	1	8	0	5	1	8	16	52	3	0	17	8	0	37	0	0	7	4	0	2	
	9	0																														
1967	10	0	0	0	18	15	0	0	0	4	10	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	0																														
1967	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11	0																														
1967	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12	0																														
1968	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0																														
1968	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	
	2	0																														
1968	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	35	0	4	0	0	0	0	0	1	0	
	3	0																														
1968	4	0	0	0	0	0	0	5	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	6	16	3	0	0	0	0	
	4	0																														
1968	5	0	0	3	0	23	5	0	0	0	0	0	0	14	13	16	1	0	0	24	8	32	9	23	7	0	0	0	0	3	0	
	5	0																														
1968	6	0	0	0	0	0	0	0	0	0	5	29	25	21	34	13	43	1	54	1	1	92	8	13	1	0	11	3	7	0	0	
	6	0																														
1968	7	0	0	0	0	4	5	0	0	59	70	63	0	28	0	1	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	
	7	0																														
1968	8	6	7	10	5	2	6	2	0	20	8	9	7	3	1	15	0	57	8	0	0	0	1	0	6	19	50	5	15	0	0	
	8	6																														
1968	9																															1
	9	0	0	0	0	0	0	0	25	38	0	0	0	5	6	0	37	12	26	1	0	0	0	31	4	0	6	3	0	0	0	8
	10	0	3	13	13	0	18	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1968	10	0																														5
	10	0																														
1968	11																															0
	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1968	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0								
1969	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
1969	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0								
1969	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	9	0	5	0	1	17	0	0	0	3	3	0							
1969	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	35	0	23	0	0	0	0	0	0	60	0							
1969	5	0	16	0	1	8	0	0	4	0	25	0	0	4	0	0	0	0	0	0	0	2	0	0	0	0	17	0	23	0	0							
1969	6	0	2	1	8	5	4	1	7	0	0	0	0	32	1	26	0	17	8	6	0	80	5	0	41	9	0	6	0	0	0							
1969	7	2 9		2	15		5	14	14		0	1	48	36	13	3		0	1	1		0	33	5	4		0	1	1	26		0	1	0	1	0	0	4
1969	8	1 4	90	15		2		0	1	3	7	9	4	1	0	6	7	9	16	7	7	31	78	42	8	4	0	0	9	19	18	0	0		2	0		
1969	9	0	0	0	0	0	6	0	15	1	5	5	6	0	0	0	0	0	1	1	33	3	0	0	0	19	29	7	9	0	0		7	3				
1969	1 0	0	0	0	0	0	0	0	0	26	6	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
1969	1 1	0	0	0	0	0	0	0	0	0	0	0	34	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
1969	1 2	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
1970	1	0	0	0	0	0	0	0	0	0	0	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
1970	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	21	2					
1970	3	0	0	0	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	19	0					
1970	4	0	1	5	0	0	0	0	0	0	0	1	1	0	29	0	0	10	3	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0				
1970	5	0	4	28	0	0	0	0	0	34	0	0	0	0	1	0	19	27	12	47	0	0	0	0	0	0	1	0	0	0	0	0	0	0				
1970	6	0	1	63	31	0	1	30	46	8	0	24	1	0	0	0	12	11	0	5	14	24	1	11	15	5	3	2	0	0	0	0	0					
1970	7	3 4		7	5		3		0	0	9	6	57	5	73	12	3		0	0	15		0		0	0	13	13	38	19		1	14		0	4	0	1
1970	8	1 0		0	0	0	4	1	5	25	0	3	0	4	67	0	0	14	2	1	0	0	3	8	59	42	11	0	3	6	0	0		2	4			

1970	9	1	23	12 0	34	6	0	0	1	2	25	18	0	0	38	9	0	17	38	25	0	0	1	0	0	0	0	0	0	0	0	0	0
1970	1 0	3	53	51	31	5	15	43	0	21	0	0	0	0	0	0	0	0	0	0	0	0	7	45	13 9	0	0	0	0	0	3	0	
1970	1 1	0	0	0	0	0	0	0	0	0	0	8	11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1970	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1971	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1	0	0		
1971	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	1	3 2		
1971	3	*	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	0	0
1971	4	*	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	0	6
1971	5	*	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	0	1 5
1971	6	*	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	0	5 3
1971	7	1 3	4	70	11	5	1	14	0	0	0	0	14	3	0	0	20	5	2	1	0	46	13	18	16	3	0	0	0	0	0	7	
1971	8	5	32	46	4	6	5	0	10	12	0	0	38	31	26	6	54	4	23	10	14	1	0	0	3	0	94	49	9	0	0	0	
1971	9	1 5	0	0	64	1	16	51	5	0	0	7	6	0	0	0	0	0	0	0	0	10	6	4	0	0	0	9	6	0	0	0	
1971	1 0	7 1	4	0	3	0	0	0	0	0	6	0	0	0	0	0	0	16	0	0	11	3	0	0	0	0	0	0	0	0	0	0	0
1971	1 1	5 8	0	0	0	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	14 8	0	

1971	1 2	0	0	0	0	0	0	0	0	0	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	12	6	
1972	1	* * *	** *	** *	** *	** *	** *	** *																						3 2	
1972	2	0	0	0	12	51	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1972	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	4	2 0																					** *								
1972	5	0	20	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	19	8	23	4	11	19	34	19	46	0	0	3 5
1972	6	0	0	0	0	0	0	3	9	0	0	0	0	5	51	7	36	67	17	0	15	0	1	15	8	3	9	0	0	0	3 2
1972	7	1	1	0	1	4	6	7	3	3	5	1	0	0	17	7	6	8	8	9	6	0	2	0	10 3	0	0	0	2	0	0
1972	8	8 9	0	43	0	7	92	0	0	0	0	0	13	6	4	10	54	8	6	17	0	0	0	6	1	0	0	5	3	3	0
1972	9	1 1	0	0	26	39	0	0	0	0	0	10	12	9	0	0	0	0	1	33	0	0	24	57	0	0	5	8	0	22	0
1972	10	0	0	0	0	0	0	9	14	6	17	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0
1972	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
1972	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1973	1	2 3 9 8																													
1973	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	1 5
1973	3	0	13	0	0	0	0	0	24	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8

1973	4	0	0	0	0	0	0	0	0	0	0	0	0	11	65	0	0	0	0	0	0	15	58	4	4	3	0	1	57	0	1
1973	5	2 1	47	0	0	4	21	0	0	55	0	49	36	0	0	0	17	17	8	9	22	14	19	1	9	9	0	45	36	0	0
1973	6	1	0	0	1	0	0	0	32	0	0	5	0	0	27	3	41	4	0	0	28	3	1	0	0	0	34	97	0	0	0
1973	7	0	9	0	0	0	0	0	0	0	0	1	0	0	8	18	0	0	0	0	34	7	15	6	0	28	34	3	1	0	0
1973	8	1 1	18	0	0	0	70	6	32	17	0	37	61	0	0	0	3	0	22	6	8	80	0	0	1	15	0	7	25	0	0
1973	9	3	1	1	18	19	18	6	0	0	0	0	0	0	6	0	34	20	13 6	17	0	12	13	4	32	50	0	0	0	16	0
1973	1 0	2 8	1	0	0	0	0	0	0	0	0	52	8	11	72	0	0	0	0	0	0	0	0	0	1	34	0	0	0	60	0
1973	1 1	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0
1973	1 2	0	0	0	0	0	0	0	0	18	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1974	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 7
1974	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	13	7	31	6	0	0	3
1974	4	0	0	0	0	0	0	0	0	0	2	0	4	0	88	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	2 0
1974	5	6	45	0	0	0	0	0	0	0	18	1	0	1	0	10	8	0	89	0	0	0	0	0	0	0	0	0	53	** *	0
1974	6	1 2 7	0	0	0	0	18	0	58	0	0	0	0	0	0	0	0	16	25	1	57	14	0	0	0	28	0	0	0	0	0
1974	7	3 4	60	14	2	50	74	6	11	3	0	3	2	2	1	37	22	72	48	20	18	0	0	27	53	39	39	17	4	42	0
1974	8	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0	1	3	1	19	3	4	0	18	0	0	19	22	2	0	0
1974	9	1 1	32	0	0	0	0	0	0	0	0	11	2	10	0	10	4	0	0	3	2	49	0	42	23	0	0	0	29	0	0

1974	1 0	2 7	0	4	0	0	0	0	0	18	0	0	0	0	0	1	0	0	60	0	2	0	4	21	55	0	18	0	0	6	0
1974	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1974	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	
1975	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 3	
1975	2	0	0	0	0	0	0	8	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1975	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	24	60	11	6	2	0
1975	5	2 4	0	0	18	17	0	0	0	0	1	6	9	3	0	13	0	0	0	27	0	0	0	14	0	15	60	0	9	0	0
1975	6	1 1	2	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	2	0	10	48	90	0	0	0	0	0	7	0	0
1975	7	1 9	11	2	5	0	3	56	0	0	0	10	13	0	20	79	86	71	19	35	21	10	7	11	4	14	10	5	2	2	0
1975	8	4	0	0	14	2	6	1	0	15	2	3	0	2	0	0	0	0	1	10 1	59	6	0	9	0	1	0	1	3	13	1 3
1975	9	2 1	2	0	15	1	2	2	24	4	14	0	0	0	10	74	4	20	17	0	0	0	0	0	27	47	9	0	0	2	0
1975	1 0	0	71	53	18	13	0	0	0	1	1	11	0	0	0	0	0	0	66	10	0	0	0	0	0	0	0	0	0	5	4
1975	1 1	0	0	0	0	0	0	0	0	0	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	* * *
1976	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1976	2	3	0	0	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5
1976	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1976	4	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	38	0	0	0	12	4	3	0	0	
1976	5	0	0	0	0	0	6	0	70	9	0	16	21	34	1	34	0	0	0	59	0	1	62	62	0	0	17	0	11	16	0
1976	6	1	11	0	1	0	86	0	17 5	4	3	13	1	0	0	12	0	5	0	0	0	0	0	0	0	0	0	0	3	9	
1976	7	0	10 8	12	33 5	0	0	0	17	0	11	5	8	10	11	1	0	4	0	0	0	0	0	0	16	9	18	1	0	0	0
1976	8	0	2	13	12	21	1	2	0	0	0	4	2	18	21	54	60	15	15	0	0	0	0	0	1	0	0	0	** *	0	
1976	9	1 9	1	4	0	8	0	0	0	0	12	0	0	0	6	20	11	0	0	0	1	0	0	0	11	0	17	6	10	2	0
1976	1 0	0	3	4	4	0	15	4	0	0	0	0	0	0	0	0	0	0	0	3	48	0	0	0	0	0	0	0	3	6 4	
1976	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1976	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1977	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	
1977	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	
1977	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3 6	
1977	4	0	0	9	12	3	30	0	0	11	18	27	5	10	0	13	35	2	0	1	0	1	22	17	28	9	10	0	0	0	0
1977	5	0	3	1	0	0	0	4	0	0	4	0	12	35	2	0	0	0	0	0	0	10	10	0	48	0	0	0	44	0	0
1977	6	0	0	22	33	33 0	13	0	1	44	0	1	0	1	0	1	5	7	5	30	89	6	69	33	12	2	10	3	32	62	0
1977	7	1	0	0	1	0	27	22	4	1	3	8	2	26	48	10	20	0	3	0	0	0	0	0	1	13	55	34	0	0	
1977	8	1 1	3	1	1	2	12	2	3	0	0	0	0	0	2	0	8	14	0	0	0	0	2	1	0	1	30	20	9	0	3 6
1977	9	7	5	1	1	0	0	0	0	40	32	0	0	1	0	0	5	5	41	41	0	0	9	0	0	0	0	2	0	44	0
1977	1 0	2 5	0	53	25	0	7	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

1977	1 1	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	
1977	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	** *	0	0
1978	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	2	0	0	0	3	0	0	0	0	5	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0
1978	3	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	4	0	0	15	0	0	0	0	0	0	0	** *	0	2	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0
1978	5	0	0	0	0	0	0	3	15	9	0	0	0	0	40	0	0	0	0	0	0	15	29	13	44	0	24	6	50	1 6	
1978	6	7	0	0	0	17	3	0	2	0	64	16	0	28	0	0	0	22	1	53	0	9	13	2	0	31	12 3	9	1	6	4 4
1978	7	* * *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	** *	9	** *	** *	** *	** *	** *	** *	** *	** *	0	4 9
1978	8	0	2	16	5	1	4	0	0	0	0	1	0	0	0	19	0	0	0	0	0	22	1	0	0	0	0	3	13	1	
1978	9	1	17	0	15	13	0	8	28	0	55	0	0	0	13	0	0	0	0	0	5	0	1	0	0	32	1	6	0	1 8	
1978	1 0	0	2	3	11	3	0	0	0	0	0	9	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0
1978	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1978	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	2	0	15	9	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	3	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1979	4	0	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	6	5	0	6	0	0	0	0	0	0	21	0
1979	5	0	6	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3

1979	6	0	0	0	0	0	0	0	0	37	77	19	9	0	11 1	28	0	2	1	0	0	0	0	0	9	25	6	2	15	20	1 1
1979	7	0	22	0	0	3	19	3	0	0	3	16	0	27	3	0	5	11	65	10	60	10	0	0	30	0	0	9	0	0	0
1979	8	0	7	2	3	0	13	8	16	5	7	0	0	0	18	62	12 1	0	13	0	68	9	0	0	2	5	18	0	0	0	7 6
1979	9	0	0	5	14 2	3	0	0	0	0	0	27	0	30	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1979	10	8	0	0	0	0	15 0	7	0	0	0	3	5	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
1979	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	12	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	13	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	14	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	9	64	0	0	0	0	0	0	0	0	0	0	0	3
1980	15	3	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	3	0	9	0
1980	16	0	0	0	0	0	14	0	0	0	0	0	11	0	14	4	0	0	0	3	9	43	0	0	0	0	0	0	0	12	0
1980	17	2 5	0	0	0	6	50	2	0	50	0	28	37	1	0	0	1	2	31	0	0	20	0	3	0	0	23	0	19	1	0 3
1980	18	0	45	0	5	0	0	0	0	0	52	7	57	8	8	0	31	47	7	15	19	8	3	4	0	8	4	1	6	4	0
1980	19	2	5	11	0	6	0	0	20	10	0	0	0	0	0	22	64	9	3	40	1	55	0	1	0	1	43	1	13	6	0
1980	20	0	27	0	7	1	0	23	2	17	7	0	30	8	0	0	0	0	7	0	0	6	0	17	0	28	9	16	13	0	0
1980	21	1	0	0	34	0	0	19	0	0	0	26	0	2	0	0	0	60	16	0	0	0	0	24	2	0	0	28	1	0	0
1980	22	0	7	16	13	0	0	3	39	0	0	20	0	0	0	0	0	0	21	24	70	55	22	0	0	0	0	0	0	0	0
1980	23	0	1	2	1	0	0	0	0	4	0	2	0	0	0	0	0	0	2	2	0	6	2	0	0	0	0	0	0	0	0
1980	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
1981	25	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0

1981	2	1 1	11	0	0	0	0	0	0	11	6	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	3	1	0	0	0	0	0	0	0	0	0	0	0	52	2	0	0	0	0	0	0	6	0	30	0	18	0	15	6	0	3
1981	4	7	23	0	8	0	0	0	0	0	0	0	0	30	0	0	36	16	13 9	22	23	0	0	0	8	1	0	0	0	20	0
1981	5	0	0	0	0	0	5	0	0	0	7	0	0	4	0	19	3	55	56	0	0	17	2	0	0	13	0	2	3	0	4
1981	6	2 7	88	0	0	4	0	0	0	4	28	20	0	0	0	0	11	0	38	0	5	34	8	9	1	0	0	1	0	0	2 5
1981	7	2	74	** *	** *	** *	4	0	14	19	7	0	7	13	5	8	6	2	42	9	0	6	2	4	4	0	5	0	15	0	1
1981	8	2	0	2	0	4	5	4	8	85	0	2	0	37	0	10 0	15 0	40	0	14 0	60	0	28	4	13	1	50	1	4	0	0
1981	9	3	37	2	16	23	3	2	10	0	7	11	12	7	13	0	10	0	0	0	30	0	0	0	0	0	0	9	0	0	0
1981	1 0	1 1	0	0	0	19	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	1 2	0	0	0	0	0	0	0	0	0	2	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
1982	2	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1982	3	0	0	0	0	0	2	28	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	2	6	0	0	0
1982	4	0	0	0	0	0	13	3	0	0	0	0	0	6	16	10	4	4	0	16	0	0	0	0	0	0	24	5	22	39	3
1982	5	0	0	0	0	0	0	0	0	26	51	27	11	45	6	31	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2
1982	6	0	0	4	12	0	0	0	0	0	15	29	22	0	0	0	12	0	12	29	15	9	11	0	3	13	0	5	8	0	4
1982	7	1 0	0	23	0	0	1	0	0	0	0	0	28	5	5	0	0	0	0	0	19	0	18	11	0	0	0	2	0	7	0
1982	8	0	17	66	0	0	14	3	6	18	0	0	22	0	5	3	0	0	21	5	1	0	1	7	3	10	31	0	1	0	0

1982	9	1	0	0	0	36	0	0	1	0	7	11	25	18	0	0	15	0	4	5	0	0	0	0	0	0	18	0	0
1982	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0
1982	11	0	0	0	0	0	0	0	0	0	3	47	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0
1982	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
1983	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	7	0	0	8	33	0	0	1
1983	3	0	0	0	4	5	2	0	0	0	0	0	0	0	0	32	5	0	0	0	35	0	0	0	0	0	0	2	54
1983	4	0	0	0	0	0	0	0	0	4	5	0	21	2	0	0	0	0	0	0	0	0	0	0	0	41	0	78	0
1983	5	9	30	49	74	6	31	19	14	0	6	0	0	0	0	0	0	40	0	16	0	8	18	0	0	0	0	0	0
1983	6	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	45	0	0	24	0	0	15	0	10	22	23	3	21
1983	7	35	1	4	10	23	0	0	8	10	0	6	0	0	0	0	0	11	43	0	2	26	15	0	0	13	45	31	0
1983	8	2	3	48	73	39	40	10	0	0	6	0	10	0	0	0	0	8	0	14	8	0	50	109	81	43	0	0	0
1983	9	0	0	0	0	25	7	3	14	6	4	3	0	0	4	25	15	8	0	1	41	0	0	0	0	0	3	14	0
1983	10	0	0	0	0	0	60	30	37	4	28	95	47	10	4	25	12	0	0	0	0	17	0	0	0	6	0	0	0
1983	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
1983	12	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0
1984	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	0	0	0	0	3
1984	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	26	1
1984	4	0	0	0	0	0	0	0	3	0	33	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	7	5

1984	5	3 0	13	0	0	10	0	0	0	8	45	39	27	4	12 6	66	35	0	0	0	0	0	0	0	40	0	30	0	0	0	
1984	6	0	0	14	14 8	14 8	11 9	0	0	0	0	2	12	7	13	9	1	5	6	0	49	43	69	7	2	13	3	0	0	0	
1984	7	1	0	0	2	1	5	4	0	10	12	12	10	4	12	27	3	2	1	4	0	2	23	42	33	12	7	0	0	2	0
1984	8	9	5	39	4	0	5	0	5	3	23	3	2	3	8	9	2	49	6	6	2	3	3	8	19	1	44	4	12	0	0
1984	9	0	21	7	10	39	7	1	23	0	0	10	18	1	0	0	54	63	46	0	11	2	0	0	0	0	0	0	0	0	0
1984	1 0	0	0	0	0	0	5	0	0	76	0	2	0	0	19	1	0	0	0	0	0	0	0	36	0	0	0	0	0	1	0
1984	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	1	5	
1984	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
1985	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	
1985	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	
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1985	1 0	1 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	22	0	0	0	0	0	0	0	0	0	48	6 9	
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1987	8	1 0 2																									10 0				
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1990	11	0	0	0	9	16	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0
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1991	1	0	0	6	18	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	2	0	0	0	41	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
1991	3	14	0	0	0	0	0	0	0	0	0	0	0	9	15	0	0	0	0	0	0	0	0	0	0	7	0	0	8	0	0
1991	4	0	0	0	0	0	0	0	0	2	3	14	0	0	21	0	1	0	0	0	0	0	0	6	29	0	21	0	0	0	0
1991	5	2	0	0	7	0	3	0	0	0	2	0	0	7	21	0	27	1	22	43	0	0	15	22	10	0	0	27	22	0	0
1991	6	0	47	4	18	6	35	11	0	0	5	12	26	39	6	17	30	1	38	19	18	0	0	0	0	0	3	0	0	0	0
1991	7	7	27	6	0	22	39	7	0	3	11	1	3	1	0	1	0	3	12	14	30	12	14	55	20	0	0	0	0	20	10
1991	8	0	13	25	10	0	0	0	0	0	7	0	1	0	1	0	5	34	2	10	0	17	1	6	3	0	2	26	11	1	0
1991	9	8	3	23	34	30	23	40	25	5	8	16	0	6	8	9	2	0	0	0	1	0	9	5	5	34	20	32	0	0	31
1991	10	0	0	0	26	1	60	86	3	4	0	9	0	31	53	28	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1991	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	39	49	14	0	0	0
1992	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0
1992	2	9	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	2	1	0	0	0	0	0
1992	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33
1992	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	44

1992	5	2 3	15	4	0	1	0	0	0	0	0	0	0	0	0	11	0	1	0	0	14	19	3	0	0	0	62	57	4	0	4
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1992	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1993	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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1994	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	8	0	
1994	4	0	0	15	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	43	72	0	0	0	0	0	23	7	
1994	5	0	0	0	0	7	12	2	8	23	0	0	0	0	17	0	34	19	8	0	13	0	0	39	1	14	0	0	58	0	
1994	6	0	0	0	10	14	9	0	14	3	0	29	21	3	1	2	6	11	18	6	10	4	1	0	12	2	31	0	15	5	6
1994	7	1	2	0	3	4	0	28	11 5	2	0	1	16	4	0	6	1	0	1	5	0	11	1	21	3	0	3	0	0	16	0
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1994	9	4	1	1	0	4	1	1	0	0	0	17	2	0	4	0	23	1	14	7	25	0	0	0	0	2	0	0	0	0	0
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1994	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
1994	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
1995	1	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2 6
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1995	4	0	0	0	0	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	11	0
1995	5	0	0	0	25	0	0	0	0	2	0	0	0	3	2	9	20	19 3	21	0	0	0	6	0	0	0	0	0	0	6	0
1995	6	0	0	7	0	0	0	0	0	0	0	6	3	95	22	0	0	2	12 0	10 9	8	2	0	5	10	0	5	0	1	0	0
1995	7	2	52	19	14	36	92	13	0	0	56	9	19	2	0	4	12	19	4	1	0	1	2	2	13	4	0	12	78	3	0
1995	8	1	0	2	7	14	8	0	0	2	11	3	16	11 2	28	19	0	6	2	10	10 9	3	2	7	0	0	1	3	0	0	0

1995	9	0	3	36	10	0	3	4	0	0	0	25	0	11	0	0	0	26	10	12	1	0	0	0	0	27	18	11	20	0	2
1995	1 0	1 1							2	7	0	0	7	0	0	0	0	0	0	1	0	0	8	0	0	0	0	0	0	0	0
1995	1 1										89	3	0	0	0	0	0	0	1	0	0	0	0	0	0	2	2	0	0	0	2 7
1995	1 2																														
1996	1																	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	2																	0	0	0	0	0	0	0	0	0	0	5	10	0	6
1996	3																	0	0	0	0	0	0	0	21	0	0	0	7	0	1 0
1996	4																	0	0	0	0	0	0	5	27	21	30	4	0	3	0
1996	5		15										46	3	0	56	2	0	17	0	0	0	0	0	0	0	6	0	0	0	2
1996	6		27	25		23			11				24					2	0	0	27	88	15	17	1	17	2	28	2	0	0
1996	7	2 9																													
1996	8	4 5																													
1996	9		25		8	11				1		1		1				0	0	1	0	24	6	0	0	3	12	1	16	0	0
1996	1 0																	0	0	0	0	0	0	0	0	0	0	0	37	1	2 7
1996	1 1																	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	1 2																	0	0	0	0	0	0	0	0	0	0	0	0	0	2 1
1997	1																	8	0	0	0	1	2	0	0	0	0	0	0	5	4 8
1997	2	5			1							1						0	0	0	17	1	0	0	0	0	1	0	80	5	
1997	3	1														3	0	0	0	0	0	0	2	0	6	0	0	0	0	0	0
1997	4			41			3						5	3	0	0	14	0	0	0	0	0	0	5	0	12	4	53	1	0	
1997	5	2				34			2								3	0	0	1	8	0	0	4	11	8	21	14	1	0	

1997	6	0	0	0	0	4	0	34	14	22	14	0	0	29	0	0	0	0	0	0	15	20	0	5	0	3	20	1	4	0	0	
1997	7	6	9	29	11	0	34	0	11	20	37	67	8	6	2	0	26	0	0	0	0	17	28	2	1	0	1	0	7	77	1	
1997	8	2 1		0	0	5	7	3	1	20	7	6	13	2	93	4	0	7	0	0	0	0	9	3	6	0	0	0	3	0	2 4	
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1997	1 0		3	17	0	0	0	0	0	0	1	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 7	
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1998	3	0	0	0	0	0	0	1	25	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	14	16	0	0	0	0	0	
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1998	1 0	1 3		0	0	0	13	0	0	0	0	0	0	18	0	0	0	0	4	0	1	15	0	4	0	0	0	0	0	0	1 0	
1998	1 1		0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	6	71	12	0	0	0	0	0	0	3 9	
1998	1 2		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	
1999	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	9	
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1999	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0		
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1999	6	0	12	1	0	0	0	0	0	0	17	13	8	9	1	0	0	0	0	2	0	0	2	61	32	16	95	6	29	0	0	
1999	7	1 5	18	12	2	0	0	1	1	0	26	10 1	44	56	19	5	4	0	6	17	42	28	1	0	0	0	1	2	10	0	0	
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1999	10	1 0	1	4	5	0	0	5	51	0	23	0	0	0	0	1	5	0	3	18 5	72	61	2	4	0	0	0	0	0	0	0	3
1999	11	1 1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
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2000	7	0	0	0	0	0	0	0	17	3	29	0	0	9	8	4	6	1	2	19	6	9	15	7	4	5	0	4	4	0	0	
2000	8	3	42	75	3	2	0	0	0	2	9	19	9	16	1	4	37	3	10	7	3	0	12	0	0	0	4	0	17	0	1	
2000	9	3 6	12	2	0	0	7	4	27	14	1	7	10	0	0	4	30	25	0	77	58	2	3	44	23	5	8	0	0	0	5	
2000	10	1 0	5	17	0	0	5	0	0	0	41	6	0	0	0	0	0	24	0	2	0	2	0	4	0	0	0	0	70	0	0	
2000	11	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 0	

2000	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
2001	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
2001	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
2001	3	1 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	20	0
2001	4	0	13	0	0	0	0	0	0	0	0	0	0	0	0	57	0	27	0	0	0	0	0	0	0	0	0	0	0	0
2001	5	7	0	47	34	12	1	0	50	44	7	14	0	0	0	0	0	0	0	5	27	0	0	31	0	0	1	0	0	0
2001	6	2	1	0	1	17	37	2	1	0	0	0	0	5	13	10	18	29	27	26	42	56	1	3	6	3	0	1	0	0
2001	7	1	37	0	2	0	0	3	0	0	46	5	6	15	8	1	1	2	0	3	7	9	4	6	1	9	3	3	18	0
2001	8	5 2	0	0	0	5	0	0	0	19	0	0	0	0	2	60	10	0	0	5	0	0	1	3	0	3	13	26	3	0
2001	9	4	2	0	0	4	4	22	4	94	13	0	0	0	0	0	0	20	20	0	0	0	0	0	1	9	0	0	0	1 3
2001	1 0	0	2	4	38	5	0	0	0	0	4	0	0	0	0	17	0	0	27	55	0	0	0	0	0	0	0	0	0	0
2001	1 1	0	0	0	0	0	0	1	0	0	0	1	3	3	0	0	0	0	0	17	18	0	0	0	0	0	0	0	17	0
2001	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
2002	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	0	0	0	0	0	0
2002	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	24	0
2002	4	9	0	21	2	0	0	0	0	21	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	29	0	0
2002	5	0	0	0	16	0	20	37	0	18	0	0	13	0	0	32	0	0	0	0	17	0	3	4	9	27	7	64	2	0
2002	6	1	5	3	1	34	0	0	47	14	24	9	0	12	44	3	0	0	0	0	0	0	26	84	7	3	12	23	1	0
2002	7	3 2	30	60	37	35	8	1	0	0	4	7	21	0	61	11 9	26	0	4	6	3	11	61	5	0	0	0	0	2	0
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2002	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	11	6	0	0	0	0	11	0	0	0	19	0	
2002	11	0	0	0	0	0	17	0	0	0	0	0	11	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	
2002	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	
2003	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	
2003	2	0	0	0	0	3	0	0	0	0	0	0	94	3	3	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	1
2003	3	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11	0	81	0	0	3	0	0	0	0	0	0	0	1	0	0	0
2003	4	15	0	0	0	14	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	43	14	0	0	0	0	0	0	0	0	0
2003	5	6	0	1	0	0	0	15	0	24	7	0	0	0	0	0	0	0	0	0	0	30	0	0	0	6	0	0	0	0	0	1
2003	6	0	0	0	0	4	37	0	14	0	0	9	0	0	0	62	0	0	15	4	0	15	43	27	33	0	0	3	15	0	0	1
2003	7	41	0	7	0	0	0	1	0	1	0	10	0	2	46	1	0	0	0	0	3	4	0	0	0	58	19	6	7	0	1	0
2003	8	1	0	0	3	0	0	0	0	1	3	0	0	41	14	3	1	0	0	0	0	4	15	0	13	0	0	0	0	0	0	0
2003	9	15	8	0	0	1	0	9	4	0	0	0	0	0	2	0	14	0	0	0	0	6	5	0	0	0	0	0	6	10	0	0
2003	10	0	0	0	0	0	0	10	29	25	31	0	0	0	0	0	0	0	0	25	0	3	2	0	4	0	1	7	45	12	0	0
2003	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	23	0	0	0	0	0	0	0	0	0	3	0	0
2004	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	2
2004	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[illegible]

2005	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
2006	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2006	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2006	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2006	4	0	0	0	1	14	39	25	0	0	0	0	0	1	0	0	0	4	14	0	0	8	9	0	11	0	2	0	0	
2006	5	0	0	0	0	0	1	30	15	1	1	14	11	17	0	18	0	0	0	0	0	0	0	7	0	13	5	1	0	
2006	6	0	4	8	0	25	5	11	0	10 5	2	9	0	0	0	12	7	0	0	0	4	3	0	0	0	2	9	3	1	0
2006	7	0	0	0	1	19	8	3	41	17	13 4	4	33	0	2	0	4	1	3	0	0	0	4	0	1	0	0	0	40	10
2006	8	1	0	2	1	30	16	3	13	0	33	1	5	1	0	4	0	0	2	0	43	2	2	8	2	2	2	1	0	0
2006	9	1 1	0	9	1	1	0	0	0	10 1	0	54	38	19	0	0	1	0	0	0	4	69	31	10 2	8	0	0	0	0	0
2006	1 0	0	3	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	24	0	11	11	0	0	0	0	0	0	0	1
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2006	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2007	2	1	0	0	0	4	0	0	7	22	0	0	0	0	11	2	0	8	2	0	0	0	0	0	0	2	0	0		
2007	3	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2007	4	0	0	0	0	0	0	0	0	0	0	0	0	2	0	28	0	0	3	0	0	0	0	0	16	0	11	0		
2007	5	0	0	0	0	0	0	0	0	5	0	3	0	18	0	0	4	0	2	6	9	2	19	0	0	25	0	0	0	
2007	6	0	1	0	11	22	83	0	47	3	14 2	27	3	14	2	0	85	27	11	0	1	1	0	14	10	5	6	1	0	
2007	7	2 5	45	0	1	11	20	0	18	1	0	1	0	7	0	1	12	1	0	19	4	82	89	19 8	60	15	10	29	12	
2007	8	8	65	2	0	0	0	0	8	0	0	5	34	18	5	15	4	22	20	0	0	0	0	0	1	9	0	0	0	

2007	9	0	4	9	0	6	10	11	30	4	0	17	0	0	1	0	1	0	0	7	0	0	0	2	12	2	1	0	10			
2007	10	0	7	0	0	0	0	0	53	80	9	0	0	0	0	14	6	1	0	10	0	0	0	0	0	0	0	0	0			
2007	11	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0	0	0	0	0	0	0	0	0			
2007	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2008	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	20	9	0			
2008	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0			
2008	15	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0			
2008	16	0	0	1	24	2	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0			
2008	17	0	0	3	5	0	12	0	0	8	0	0	0	0	0	0	0	2	0	10	2	0	0	0	0	1	0	11	3			
2008	18	0	0	24	0	16	0	0	34	31	6	1	15	0	0	0	6	9	16	5	7	9	0	0	0	14	0	0	1			
2008	19	2	8	23	83	28	8	23	23	3	7	1	1	2	3	55	19	14	17	15	6	10	35	0	0	0	5	1	5	1		
2008	20	4	0	0	0	5	4	0	0	23	6	20	5	0	6	2	1	2	7	5	30	0	0	4	3	0	6	4	13			
2008	21	0	0	0	0	0	0	0	0	72	0	0	0	0	25	0	24	6	2	4	0	0	0	3	11	0	15	32	26			
2008	22	0	0	28	0	3	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	112	5			
2008	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2008	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2009	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2009	26	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2009	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0			
2009	28	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2009	29	0	3	1	28	0	0	0	0	0	0	0	29	0	0	1	6	0	29	3	0	0	0	0	0	31	20	0	0			

2009	6	1 1	0	8	24	0	0	2	14	0	0	3	0	46	0	0	0	23	0	0	17	0	0	0	0	0	0	0			
2009	7	6 6	10 8	47	19	0	2	1	16	3	2	1	11	0	0	0	8	4	0	1	0	0	5	7	22	0	35	12	75		
2009	8	2 3	0	0	2	40	89	22	11	28	2	0	0	9	1	31	40	2	8	26	40	2	0	0	8	2	0	17	6		
2009	9	4	0	3	3	3	9	2	1	4	20	0	0	0	1	0	0	1	14	0	0	44	2	51	1	0	2	0	0		
2009	1 0	0	0	3	0	16	19	10	8	9	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0		
2009	1 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0		
2009	1 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2010	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2010	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0		
2010	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2010	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	7	0		
2010	5	2 5	0	1	0	0	27	0	1	0	0	0	0	0	1	24	0	0	0	0	0	12	11	3	0	0	2	7	28		
2010	6	6 7	0	2	17	31	33	0	0	0	0	0	0	4	18	0	1	1	33	2	0	1	1	56	4	9	2	22	24		
2010	7	0	1	16	7	16	20	7	2	4	7	0	2	67	0	1	0	0	0	0	0	0	0	43	0	2	7	6	0		
2010	8	6	0	0	0	6	0	1	0	0	0	0	4	18	0	9	15	1	0	0	11 3	18	5	1	0	3	1	0	0		
2010	9	1	0	1	0	4	0	2	9	19	28	0	0	45	2	16	2	0	3	14	3	0	5	1	0	34	5	0	0		
2010	1 0	0	0	0	0	0	38	19	22	87	0	0	0	0	0	10	0	0	0	0	0	1	6	6	0	0	0	0	0		
2010	1 1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0		
2010	1 2	0	0	0	0	0	0	0	0	26	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

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Executive Summary

Faridpur Sadar Upazila is the prominent Upazila under Faridpur District in respect of area, population and high potential for agriculture production. It has productive plain land, char land agriculture, housing, forestry, water bodies, capture and culture fisheries etc. Faridpur Sadar Upazila consists of erosion prone char land and mixed use with agriculture and semi urban and commercial activities. This Upazila is susceptible to natural and human induced disasters like flood, drought, river erosion, water pollution, deforestation, loss of fertile agricultural land, unplanned growth of brick fields and housing in agricultural land. The study is to determine the present scenario of agriculture practices and assessment of the potential sustainable future development of the sector. Both the primary and secondary data were reviewed for preparing the survey report. The project entitled “**Preparation of Development Plan for Fourteen Upazilas**”, Package-03 is expected to contribute to achieving the objectives of the National Agriculture Policy.

The landscape is complex and seasonally flooded. The AEZ of the Upazila has been identified as (a) Active Ganges River Floodplain (AEZ-10) and (b) Low Ganges River Floodplain (AEZ-12) which is mainly typical meander floodplain landscape of broad ridges and basins. The Upazila consists of 11 unions, and 01 Paurashava, 164 mauzas, 34 agriculture blocks and 363 villages. There are many famous places of interest in the Upazila. There are six types of land zoning identified for Faridpur Sadar Upazila. These are: (1) Agriculture Zone, (2) Agriculture –Historical Place Zone (Poet Jashimuddin), (3) Mixed Use Zone (Agriculture-Semi Urban and Commercial), (4) Agriculture-Farm Land Forest Zone, (5) Agriculture- Erosion Prone Char Land Zone and (6) Paurashava.

The highest percentage is double cropped area (58%) followed by triple cropped area (37%) and single crop area (5%) under Faridpur Sadar Upazila. The cropping intensity of Faridpur Sadar Upazila is 232% which is higher than average Faridpur District cropping intensities (227%) and also higher than average National Cropping Intensities (192%).

The scenario of present cropping pattern under Faridpur Sadar Upazila is predominantly Boro (HYV/Hybrid), Aus & T. Aman (HYV/LV) Rice, Jute, potato, Wheat, Maize, Vegetables, Onion/Garlic Oilseeds, Pulses, Spices, Sugarcane, Groundnut, Chili, vegetables and orchard etc. Study finding shows that 19 different cropping pattern are practiced by Faridpur Sadar Upazila farmers. Faridpur Sadar Upazila present five main cropping pattern are:

Pulses/oilseeds/Spices→Jute→T.Aman (HYV) (16.06%), Onion/Garlic→Fallow→T.Aman (15.45%), Wheat→Jute→T.Aman (12.20%), Wheat→Jute→fallow(10.37%), and Boro (HYV/Hybrid)→Fallow→T. Aman (8.13%). Both winter and summer vegetables cropping pattern covering about 5% of the NET Cultivable Area. Faridpur Sadar Upazila soil and climate are suitable for diversified crop production.

The present total diversified cropped area is 42749 ha of which rice cropped area are 16415 ha and the rest 26334 ha is covered by non-rice crops (Jute, Potato, W & S. vegetables, pulses, and oilseeds and Fruits etc). The rice and non-rice cropped area are about 38% and 62% respectively of the total cropped area. The highest land area was used for T. Aman (HYV) rice, Pulses, Wheat and Spices cultivation. Total crop production is 212754.95 metric tons of which rice production is 75444.35 metric tons and non-rice production is 137310.6 metric tons. Among the rice crops the highest contributions of T. Aman (HYV) and Boro (HYV) are about 60% and 34% respectively. The highest contribution among the non-rice crops are spices (48%) followed by Wheat (15%) & winter vegetables (11%), and pulses (8%) and overall, rice and non-rice production difference is 35% and 65% in this upazila.

The main source of irrigation water is both surface and ground water. A total of 6607 machine were used for irrigation under Unions in Faridpur Sadar Upazila. A total 22 DTW, 6573 STW and 12 LLP along with other indigenous irrigation tools are used for lifting water. All DTW, 439 STW and 6 LLP has electricity facilities but 6134 STW & 6 LLP has no electricity. Inadequate electricity supply during Boro season was acute problems. Farmers wanted nonstop electricity supply during Boro season. Farmers reported irrigation drainage system of DTW, STW and LLP 95-100% drain is kutchha which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Study finding shows that 11 Unions & Paurashava 81-99 % land area covered by irrigation water in rabi season. Only Uttar Channel and Krishnagar Unions 46-70% land are covered by irrigation water. Farmers have given supplementary irrigation in drought prone and water logged areas in this Upazila. This indicates that farmers have access to irrigation water that facilitated ground water and surface water lifting. About 80% farmers used power tiller and 20% farmers used tractor during land preparation and per hector cultivation cost is Tk. 6000-7000/-.

During 2015-16, BRRRI study shows that farmer's average per kg cost of Boro Tk.20.07 followed by Aus Tk.18.37 and Aman Tk.17.83 in the year 2015-16. Cost of per kg Boro rice production is increased Tk.1.42. Department of Agriculture Marketing was estimated production cost for Boro rice Tk. 22.06, Aman rice Tk.19.0 and Wheat Tk. 28.50 per kg in the year 2016-17. On this basis Government has declared buying rate of Boro rice Tk.20.70, Aman rice Tk.18.50 per kg and Wheat 27.02 per kg respectively in 2016. Farmers wanted and also need to ensure the profitable farm gate price for rice.

The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower vegetables production under Faridpur Sadar Upazila. Finding shows that Tomato cultivation is more profitable Tomato Tk. 925000/-per ha followed by Brinjal Tk. 825000/- per ha, Cabbage/Cauliflower Tk. 455000 per ha and potato Tk 290000per ha respectively. Study finding indicated that all four types of vegetables cultivation are profitable for farmers of this Upazila.

Study finding shows above 98% local variety rice was decreased during last ten years. The HYV/Hybrid paddy cultivation area 204% was increased. The reason for increased HYV rice cultivated area due to higher yield many farmers were cultivated HYV and Hybrid rice. Study finding shows that maize production is 272% increased but wheat production is gradually above 54% decreased. Remarkable significant changed or increased during 10 years was occurred in winter (250%) and summer vegetables (86%) production under this Upazila. Highly significant changed or increased during ten years was occurred in Spices (335%) followed by Tuber crops (128). Among the other purposes remarkable significant changed were occurred in Brick field (215%) and followed by poultry farm (118%), Industries (37%) and fish cultivation (6%) respectively. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on agriculture crop production.

Major problems are: Severe river erosion damages valuable land and properties, Sand deposition on agricultural land affecting normal crop cultivation, Risk of early flood damage the field crops, Water stagnation, silted canals and Kutcha irrigation drainage system, Acute drought in char land area and no sustainable agricultural planned for char land areas, lack of quality seed & equipments supply, Kutcha road and damaged and poor transportation in some of the Unions, Farmers lack of knowledge on modern crop production technology, Shortage of cold storage & seed store and lack of wholesale market infrastructure, Shortage of high quality HYV & Hybrid crop seeds and cultivation equipments, Productive

agricultural lands are reducing due to construction of houses and industries on agricultural land, Top soil cutting, Increase water & air pollution and decreasing fruit setting, No agro processing center and industries under Unions level, Sand filling on fertile agricultural land, unplanned expansion of urban and commercial areas, Decreasing level of underground water, arsenic problem, and City migration.

Construction of embankment for controlled of river erosion and protecting crops from early flood. Road network at local level, agro-processing and whole sale marketing infrastructure development, Re-excavation of canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Reconstruction of damaged water management infrastructures need to be made. In each Union, one wholesale market infrastructure needs to be constructed. Further in each Union, one seed store infrastructure need to be constructed and also multiperposes cold storage and food store need to be established. Nonstop electricity supply during Boro crop season and Kutchra drain need to be made pucca drain or underground pipe system. Needs sustainable agricultural development plan for char land areas. Need to adopt Biodynamic/eco-friendly agriculture, Rice and non-rice crops integrated farming, Grow vegetables predominantly and Fruit tree based Agro-forestry system. Protection of present triple and double cropped land is the top priority issue. Agricultural land identified in the present study should be protected by taking relevant administrative measures and also implementation of **“Preparation of Development Plan for Fourteen Upazilas”** Package 03. The local people are in favor of present Preparation of Development Plan for Fourteen Upazilas Package-03 and found very much positive to protect arable land through implementing proposed plan.

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List of Abbreviations

AEO	Agriculture Extension Officer
AEZ	Agro-Ecological Zone
AVRDC	Asian Vegetable Research and Development Center
BARI	Bangladesh Agriculture Research Institute
BCR	Benefit Cost Ratio
BINA	Bangladesh Institute of Nuclear Agriculture
BRRRI	Bangladesh Rice Research Institute
BSRI	Bangladesh Sugarcane Research Institute
CC	Climate Change
DAE	Department of Agricultural Extension
DTW	Deep Tube well
DS/m	Deci-Siemens/meter
FAO	Food and Agricultural Organization
GED	General Economic Division
GO-	Government Organization
GoB	Government of Bangladesh
Ha	Hectare
HL	High Land
HQ	Head Quarter
HYV-	High Yielding Variety
HHS	Household Survey
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan (IPMP)
KII-	Key informant Interview
LIV	Local Improved Variety
LV	Local Variety
LL	Low Land
LLP	Low Lift Pump

MoL	Ministry of Land
MHL	Medium High Land
MLL	Medium Low Land
NCA	Net Cultivable Area
NIPM	National Integrated Pest Management
NLUP	National Land Use Policy
NWP	National Water Policy
NWMP	National Water Management Plan
P ^H	Negative Logarithm of Hydrogen Ion Concentration
RRI	River Research Institute
SAAO	Sub-Assistant Agricultural Officer
SRDI	Soil Resource Development Institute
SPSS	Statistical Package for the Social Sciences
STW	Shallow Tube Well
T. Aman	Transplanted Aman
T. Aus	Transplanted Aus
ToT	Training of Trainers
UAO	Upazila Agricultural Officer
UDD	Urban Development Directorate
VLL	Very Low Land
ULO	Upazila Livestock Officer
UFO	Upazila Fisheries Officers
WARPO	Water Resources Planning Organization
W& S	Winter & Summer

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Faridpur Sadar Upazila of Faridpur District is located in central Bangladesh and lies on the bank of mighty Ganges River. The District was named after the name of Sufi Saint Shah Sheikh Farid. It has an ancient and historical heritage. Faridpur Sadar came into existence as a Thana in 1894. It is an erosion prone and historical Upazila in Faridpur district with a total area of about 39623ha and located between 23° 29' and 23° 34' north latitudes and between 89° 43' and 89° 56' east longitudes. The Upazila is bordering to the north with Goalanda of Rajbari district and Shibalaya and Harirampur Upazilas of Manikganj district; to the east with Char Bhadrasan Upazila; to the south with Nagarkanda and Boalmari Upazila; and to the west with Madhukhali and Rajbari Sadar Upazila of Rajbari district. The Upazila consists of 11 unions, and 01 Paurashava, 164 mauzas, 34 agriculture blocks and 363 villages. There are many famous places of interest in the Upazila. Some of them are: house of famous poet Jasimuddin, Rajendra College, River Research Institute, Regional Jute Research Institute, Kanaipur industrial zone and Zaminder house etc. In the past this Upazila suffered severe flood in almost every year and damaged crops since the District was very low and remained under water for long period. The Upazila was reputed for inland land open water delicious fishes of the beel areas. There were also famous Hilsha fish and other river water fisheries of the Ganges River.

Faridpur Sadar Upazila consists of erosion prone char land and mixed use with agriculture and semi Urban and commercial activities. The char areas are thinly populated and some land remains uncultivated or occasionally cultivated as chance crop due to early flood and other natural calamities. The AEZ of the Upazila has been identified as (a) Active Ganges River Floodplain (AEZ-10) and (b) Low Ganges River Floodplain (AEZ-12) which is mainly typical meander floodplain landscape of broad ridges and basins. Soils of this region are sandy loams and silty clay loams on the ridges and silty clay loam to heavy clays on lower sites. The fertile agricultural land is decreasing due to severe erosion of Ganges and rapid urbanization and commercial activities on agricultural land creating pressure on land resources. It has productive plain land, char land agriculture, housing, forestry, water bodies, capture and culture fisheries etc. This Upazila is susceptible to natural and human induced disasters like flood, drought, river erosion, water pollution, deforestation, loss of fertile agricultural land, unplanned growth of brick fields and housing in agricultural land. However, shifting agricultural land to non-agricultural purposes is a common phenomenon in this Upazila. Improper land use causes various forms of land degradation resulting in a reduced agriculture production. Indiscriminate land conversion will impose threat to national food security. As such, land use pattern of the Upazila is changing, creating pressure on land resources and biodiversity. Protecting fertile agricultural land and to meet rational needs of

other sectors are our great national challenges. To protect agricultural land, to minimize land degradation and introducing modern technology are the basic needs to cope-up with the increasing demand of food for the growing population of this Upazila.

In view of the above mentioned context, a comprehensive study was conducted in all the Unions of Faridpur Sadar Upazila to assess present situation of land uses, related problems and potentialities of land for different other uses, and to find out possible coping ways to solve the problems. Therefore, considering all available parameters and characteristics of the area a sustainable land management was considered to develop better crop production.

1.2 Objectives of the Study

The main objective of the study is to assess the present cropping pattern and cropping intensities, single, double and triple crop area, land utilization and flood level. The main study questions are to determine the growth or decline of agricultural land during last ten years (from 2005-2016) and their causes for growth or decline covering a possible quality of existing and future agricultural land for the project area. The study is to determine the present scenario in agriculture practices and assessment of potential sustainable future development of the sector.

1.3 Approach and Methodology

A multi-disciplinary, participatory and interactive method has been followed in carrying out the study. Both primary and secondary data were reviewed. The primary data were collected through KII (Key Informant Interview) and field visit. AII information was collected by using questionnaire survey (Annex-1). The secondary data were collected and reviewed on land use from DAE Union and Upazila Office documents. KII information was collected from 34 Sub-Assistant Agriculture Officers under 11 Unions & 01 Paurashava through interview. Structured and semi-structured questionnaire was used for data collection (Annex-2). Data collection and consolidation occurred simultaneously. Data collection activities were completed from 10-30 November 2016. Data consolidation activities, such as editing, coding, classifying and data entry into the computer software for analysis were carried out simultaneously. Frequency tables (one, two or multiple ways) were prepared for interpretations and analyses using SPSS for data analysis.

CHAPTER-TWO: AGRICULTURE RELEVANT POLICY FRAME WORK

This Chapter presents a review of the national policy, legal, and regulatory framework relevant to the agriculture aspects of the Project.

2.1 National Agriculture Policy, 2013

The National Agriculture Policy, 2013 approved by the Government of Bangladesh focuses on agriculture production, alleviating poverty through generating jobs and ensuring food security. The Policy outlined nine specific objectives. Although the policy does not emphasize the coastal zone separately, all specific objectives are applicable to the development of coastal zone agriculture.

The GoB will pursue programmed for agro-ecologically disadvantaged regions in the hilly area, drought-prone area, Barind tract, char land, haor-baor and coastal belt with appropriate technological support.

To increase water productivity and enhance irrigation efficiency through optimal use of available water resources the GoB will facilitate dissemination of water management technology. Modern irrigation, drainage and water application systems will be introduced for expanding irrigation coverage including difficult or disadvantaged areas i.e. in char, hilly areas, Barind tract, drought-prone and saline areas.

The proposed Preparation of Development Plan for Fourteen Upazilas Package: 03 are expected to contribute to achieving the objectives of the agriculture policy.

2.2 National Water Management Plan, 2001 (Approved in 2004)

The National Water Management Plan (NWMP) 2001, approved by the National Water Resources Council in 2004, envisions establishing an integrated development, management and use of water resources in Bangladesh over a period of 25 years. WARPO has been assigned to monitor the national water management plan. The major programs in the Plan have been organized under eight sub-sectoral clusters: (i) Institutional Development, (ii) Enabling Environment, (iii) Main Rivers, (iv) Towns and Rural Areas, (v) Major Cities, (vi) Disaster Management, (vii) Agriculture and Water Management, and (viii) Environment and Aquatic Resources. Each cluster comprises of a number of individual programs, and a total of 84 sub-sectoral programs have been identified and presented in the investment portfolio. Preparation of Development Plan for Fourteen Upazilas Package: 03 have been designed in line with this Plan and address its key objectives for the water resource management in the Faridpur Sadar Upazila.

2.3 The Ground Water Management Ordinance, 1985 (Ordinance No. XXVII of 1985)

This is an Ordinance to manage ground water resources for agricultural production. This Act authorizes the Thana Parishad (Police Station) to grant license for installing tube wells under its jurisdiction. The Thana Parishad may grant the license if the Parishad is satisfied that the installation of the tube well applied for complies with the following points will be beneficial to the areas where it is to be installed, or will not have any adverse effect upon the surrounding areas, or is otherwise feasible. Preparation of Development Plan for Fourteen

Upazilas Package 03 has been designed in line with this Plan and addresses its key objectives for the ground water management ordinance for Faridpur Sadar Upazila.

2.4 National Land Use Policy (MoL, 2001)

The National Land Use Policy enacted in 2001, aims at managing land use effectively to support trends in accelerated urbanization, industrialization and diversification of development activities. The NLUP urges that increasing the land area of the country may not be possible through artificial land reclamation process, which is cost-effective only in the long run. Therefore, land use planning should be based on the existing and available land resources. The policy suggests establishing land data-banks where, among others, information on accreted reverie and chars will be maintained. Among the 28 policy statements of NLUP, the following are relevant to the Faridpur Sadar Upazila are: forests declared by the Ministry of Environment and Forests will remain as forest lands and re-classification of forest lands will be prevented. Preparation of Development Plan for Fourteen Upazilas Package 03 is designed in

National accordance with this Policy and will comply with the above listed requirements.

2.5 Water Policy, 1999

Endorsed by the GoB in 1999, the National Water Policy (NWP) aims to provide guidance to the major players in the water sector for ensuring optimal development and management of water. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation, and maintenance) are required to enhance environmental amenities and ensure that environmental resources are protected and restored in executing their tasks.

The proposed Preparation of Development Plan for Fourteen Upazilas Package: 03 are expected to contribute to achieving the objectives of the National Water Policy.

2.6 *National Integrated Pest Management (NIPM) Policy*

IPM Action Plan supports a strategy that promotes use of biological or environmental pest control methods and reduces reliance on synthetic chemical pesticides. Agriculture, rural development and health sector projects have to avoid using harmful pesticides. Other pesticides can be used, but only as an element of an Integrated Pest Management Plan (IPMP) that emphasizes environmental and biological controls.

The proposed Preparation of Development Plan for Fourteen Upazilas Package 03 is expected to contribute to achieving the reduce pesticides used in agriculture sector and increases use of other pest control methods under National IPM policy.

2.7 *The Perspective Plan of Bangladesh (2010-2021) and 7 the Five Year Plan (2016-20)*

Both the plans have emphasized on food production with specific targets to achieve by 2021 which will be the golden jubilee year of Bangladesh independence. The 7th Five Year Plan (2016-20) has prescribed for the transformation of agriculture into its newer and modern form which will certainly require short-and medium-term adjustments with adequate investment.

These include among others (i) crop diversification with the application of innovative technology;(ii) modern forms of irrigation and fertilizer use;(iii) well integrated and developed storage facilities and transportation systems;(iv) advanced agriculture research in a wide range of products beyond its traditional focus on rice and introduction of hybrid seeds; and (v) development of drought or flood resistant crops (GED 2010 and GED 2015).

The proposed Preparation of Development Plan for Fourteen Upazilas, Package-03 are expected to contribute to achieving the objectives of the Perspective Plan of Bangladesh (2010-2021) and 7 the Five Year Plan (2016-20).

CHAPTER-THREE: PRESENT LAND USE

3.1 *Description of the Present Situation*

The land of Bangladesh is complex. Land and its resources are owned, developed, managed and maintained by different agencies. Faridpur Sadar Upazila is the prominent Upazila under Faridpur District in respect of area, population and high potential for agriculture production. Major land uses are agriculture, settlement, river water bodies, and fallow char land. Bangladesh has been divided into 30 Agro Ecological Zones based on soil, landform and climatic characteristics. Faridpur Sadar Upazila falls into 02 Agro Ecological Zones: (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12) (BARC 1997). The landscape is complex and seasonally flooded. General soil color of Faridpur Sadar Upazila is grey to dark grey. The top soil is composed of moderately permeable loamy soils and some parts are clayey. In Faridpur Sadar Upazila organic matter contents are low in the high land, but moderate in the lower parts. Moisture holding capacity of soil is low to medium. General fertility is relatively poor. The top soil pH level ranges from 6.0-8.5 (SRDI 2005 and BARC 1997). Most of the people of this Upazila are directly or indirectly dependent on agriculture. Wide range of rabi and kharif crops are grown here. The newly accreted Chars and Islands have special uses also.

3.2 *Faridpur Sadar Upazila and Union Wise Farm Families*

Farmers in Faridpur Sadar Upazila lead their livelihood from land based agricultural activities. It is the main source of their employment and income. Agricultural production is highly dependent on adaptable climatic conditions. Faridpur Sadar Upazila has 11 Unions and 01 Paurashava. It has 164 Mauza and 363 villages. This Upazila has 34 agricultural blocks under DAE. Farm family is categorized according to farmer holding own land. There are five categories of farm family in Bangladesh. These are: landless (0.05-0.50 acre land), marginal (0.51-1.50 acre land), and small (1.51-2.50 acre land), medium (2.51-7.50 acre land) and larger (above 7.50 acre land). Union and category wise farm family under Faridpur Sadar Upazila is shown in Table 3.1. There are 67,446 number of farm families in Faridpur Sadar Upazila. About 10,742 (15.93%) farm families are landless, 27,533 (40.82%) farm families are marginal, and 20,021 (29.68%) farm families are small, 8,107 (12.02%) farm families are medium and 1,044 (1.55%) farm families are larger farmer (Table 3.1 and Figure 3.1). Majority peoples of this Upazila are directly or indirectly involved in agricultural activities. However, with the increasing number of population the pressure on land is increasing day by day. As a result the number of landless farm families is gradually increasing that create pressure on livelihood in the Upazila.

Table 3. 1: Union and Category Wise Farm Family under Faridpur Sadar Upazila

Name of Union	Landless (%)	Marginal (%)	Small (%)	Medium (%)	Larger (%)	Total
	(.05-.50 acre)	(.51-1.50 acre)	(1.51-2.50acre)	(2.51-7.50 acre)	(above 7.50 acre)	
Aliabad	632(12.75)	1873(37.80)	1708(34.48)	681(13.74)	61(1.23)	4954
Ambikapur	840(20.07)	2125(50.78)	1037(24.78)	167(3.99)	16(0.38)	4185
Char Madhabdia	1048(14.84)	3427(48.55)	2125(30.10)	375(5.31)	85(1.20)	7060
Decreer Char	1578(36.94)	1310(30.66)	860(20.13)	430(10.07)	94(2.20)	4272
Greda	988(14.64)	2840(42.09)	1980(29.35)	852(12.63)	87(1.29)	6747
Ishan Gopalpur	640(11.80)	2916(53.77)	1271(23.44)	481(8.87)	115(2.12)	5423
Kaujuri	1324(12.05)	3980(36.23)	3495(31.82)	1986(18.08)	200(1.82)	10985
Kanaipur	2074(29.05)	3105(43.49)	1083(15.17)	767(10.75)	110(1.54)	7139
Krishnagar	774(12.00)	2595(40.23)	2120(32.87)	824(12.78)	137(2.12)	6450
Maj Char	342(6.37)	2472(46.02)	1928(35.89)	582(10.83)	48(0.89)	5372
Uttar Channel	431(10.23)	736(17.46)	2067(49.05)	906(21.50)	74(1.76)	4214
Faridpur Paurashava	71(11.01)	154(23.88)	347(53.80)	56(8.68)	17(2.63)	645
Total	10742(15.93)	27533(40.82)	20021(29.68)	8107(12.02)	1044(1.55)	67446

Source: SAAOs & UAO Faridpur Sadar Upazila, DAE 2016

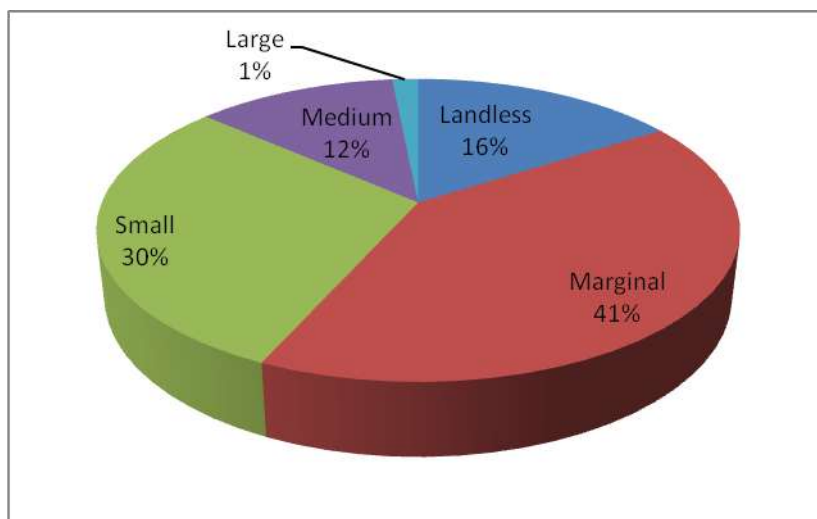


Figure 3. 1: Percentage of Category wise Farm Family under Faridpur Sadar Upazila.

3.3 Present Agricultural Land Use

3.3.1 Present Upazila Land Use

Faridpur Sadar Upazila is an erosion prone Upazila and being used for mixed purposes. Major land uses are agriculture, settlements, river water bodies and fallow char land. The urban built up area is increasing due to unplanned industrialization and rapid expansion of commercial activities and housing. The Upazila is mainly agro-based economy and it is famous for producing high quality of jute, rabi crops, rice and fish production. This Upazila holds an important arena in Faridpur district with her natural resources and ecosystem. The scenario of Faridpur Sadar Upazila present different land utilized is shown in Table 3.2. Types of lands are 7025 ha high land, 9990 ha medium high land, 4677 ha medium low land, 2830ha low land and 66ha very low land respectively. Faridpur Sadar Upazila covers 24548 ha of net cropped area of which about cultivated area is 56891 ha. The highest land area is 14257 ha is used as double crop and followed by triple crop of 9037ha and remaining 1250 ha is used as single crops and only 4 used for cultivation of more than three crops under this Upazila. Other purposes land use: Permanent Fruit Garden 1610ha, and Fish cultivation 4753 ha. It has 956ha permanent fallow land and 2250 ha forest land. Percentage of single, double, triple cropped area used in Upazila is shown in Figure 3.2. The highest percentage is double cropped area (58%) followed by triple cropped area (37%), and single crop area (5%) under Faridpur Sadar Upazila. The cropping intensity of Faridpur Sadar Upazila is 232% which is higher than average Faridpur District cropping intensities (227%). Union-wise Present Agriculture Land Use Information and Identified land Zoning of Faridpur Sadar Upazila are shown in Table 3.3. There are six types of land zoning proposed for Faridpur Sadar Upazila by National Land Zoning project 2016 which is shown in Table 3.4. These are: (1) Agriculture Zone, (2) Agriculture –Historical Place Zone (Poet Jashimuddin), (3) Mixed Use Zone (Agriculture-Semi Urban and Commercial), (4) Agriculture-Farm Land Forest Zone, (5) Agriculture- Erosion Prone Char Land Zone and (6) Paurashava Area Upazila Land used Map shown in Map 3.1.

Table 3. 2: Faridpur Sadar Upazila Present Land Use

Sl. No.	Upazila Land use	Total Area (ha)
1.	Total Agricultural land	24588
2.	High land	7025
3.	Medium high land	9990
4.	Medium low land	4677
5.	Low land	2830
6.	Very Low land	66
7.	Single cropped area	1250
8.	Double cropped area	14257
9.	Triple cropped area	9037
10.	More than three cropped area	4

Sl. No.	Upazila Land use	Total Area (ha)
11.	Net Cropped area	24548
12.	Total cropped area	56891
13.	Cropping Intensity (%)	232
14.	Permanent Fallow Land	956
15.	Current/seasonal fallow land(with fallow period) → Rabi Season fallow	40
16.	→ Kharif-1 seasonal fallow	90
17.	→ Kharif-11 seasonal fallow	205
18.	Irrigated land area	4550
19.	Water land (River, Ponds and others)	4753.35
20.	Forest Area	2250
21.	Permanent Fruit Garden	1610
22.	Roads	723Km

Source Upazila Agriculture Office Faridpur Sadar Upazila, DAE 2016

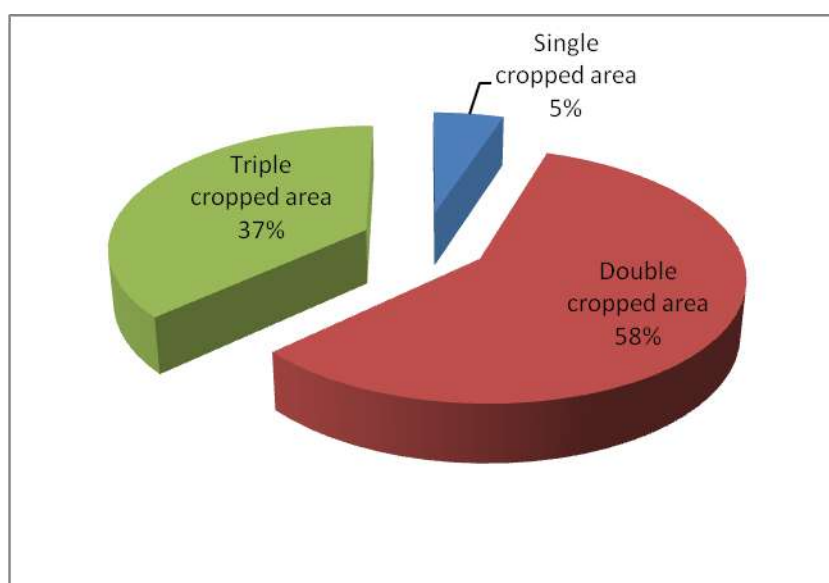


Figure 3. 2: Percentage of single, double, & triple cropped land used Faridpur Sadar Upazila

Table 3. 3: Union-wise Present Land Use Information and Identified Land Zoning

Union	Area (Hectare)	Top Soil Texture	Cropping Intensity (%)	Land Use (Summarized)	Area (Hectare)	%	Recommended Land Zoning
Aliabad	2466	Silt Loam to Clay Loam	225	Agricultural Land	1344.90	54.54	Mixed Use Zone (Agriculture- Semi Urban and Commercial)
				Fallow Char Land	173.60	7.04	
				Important Places	11.59	0.47	
				Road	29.79	1.21	
				Rural Settlement & HV	509.25	20.65	
				Urban Built-up Area	204.78	8.30	
Ambikapur	1708	Loam to Clay Loam	258	Water Bodies	191.92	7.78	Agriculture - Historical Place Zone (Poet Jashimuddin)
				Agricultural Land	1033.99	60.55	
				Fallow Char Land	1.95	0.11	
				Farm Land Forest	10.02	0.59	
				Important Places	5.03	0.29	
				Industrial Area	1.35	0.08	
				Brick-field	49.31	2.89	
				Road	27.87	1.63	
Char Madhabdia	2535	Clay Loam to Loam	202	Rural Settlement & HV	461.90	27.05	Agriculture Zone
				Urban Built-up Area	61.09	3.58	
				Water Bodies	55.10	3.23	
				Agricultural Land	2022.58	79.79	
Decreerchar	2256	Silt Loam to Clay	200	Road	38.75	1.53	Agriculture- Erosion Prone Char Land Zone
				Rural Settlement & HV	442.65	17.46	
				Water Bodies	31.03	1.22	
				Agricultural Land	120.90	5.36	
				Fallow Char Land	1554.30	68.91	
				Brick-field	12.35	0.55	
Greda	2271	Clay Loam to Silt Loam	252	Road	6.67	0.30	Agriculture Zone
				Rural Settlement & HV	72.39	3.21	
				Urban Built-up Area	83.91	3.72	
				Water Bodies	405.13	17.96	
				Agricultural Land	1298.90	57.20	
				Industrial Area	2.65	0.12	
Ishan Gopalpur	3290	Clay Loam to Silt Loam	251	Brick-field	5.60	0.25	Agriculture Zone
				Road	39.19	1.73	
				Rural Settlement & HV	798.20	35.15	
				Urban Built-up Area	22.39	0.99	
				Water Bodies	104.03	4.58	
Kaijuri	4153	Clay Loam to Clay	273	Agricultural Land	2509.03	76.25	Agriculture Zone
				Industrial Area	1.32	0.04	
				Brick-field	5.49	0.17	
				Road	31.67	0.96	
				Rural Settlement & HV	688.40	20.92	
				Water Bodies	54.59	1.66	
				Agricultural Land	2711.62	65.30	
Kanaipur	3699	Clay Loam to Loam	252	Farm Land Forest	13.20	0.32	Mixed Use Zone (Agriculture- Semi Urban and Commercial)
				Industrial Area	3.67	0.09	
				Brick-field	20.47	0.49	
				Road	41.81	1.01	
				Rural Settlement & HV	1110.25	26.74	
				Urban Built-up Area	137.55	3.31	
				Water Bodies	114.12	2.75	
Kanaipur	3699	Clay Loam to Loam	252	Agricultural Land	2056.50	55.59	Mixed Use Zone (Agriculture- Semi Urban and Commercial)
				Sugarcane	244.70	6.61	
				Farm Land Forest	100.61	2.72	
				Industrial Area	40.40	1.09	
				Brick-field	11.23	0.30	
				Road	32.72	0.88	
				Rural Settlement & HV	748.15	20.22	
Kanaipur	3699	Clay Loam to Loam	252	Urban Built-up Area	351.89	9.51	Mixed Use Zone (Agriculture- Semi Urban and Commercial)
				Water Bodies	113.12	3.06	

Source: National Land Zoning Project Report, May 2016

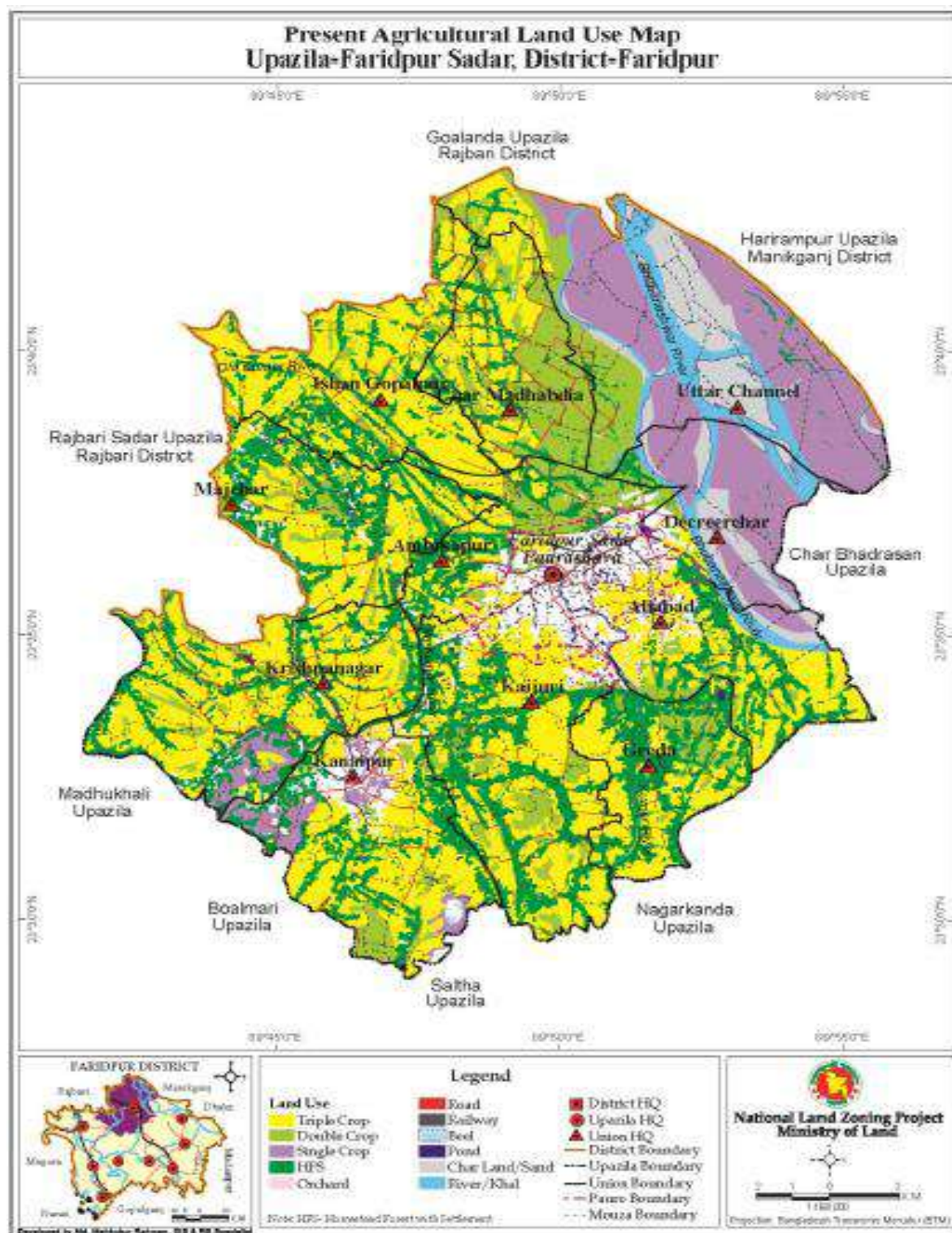
Union	Area (Hectare)	Top Soil Texture	Cropping Intensity (%)	Land Use (Summarized)	Area (Hectare)	%	Recommended Land Zoning
Krishnanagar	4302	Clay Loam to Silt Loam	240	Agricultural Land	2714.10	63.09	Agriculture-Farm Land Forest Zone
				Farm Land Forest	106.79	2.48	
				Sugarcane	221.06	5.14	
				Industrial Area	5.86	0.14	
				Brick-field	7.33	0.17	
				Road	45.80	1.06	
				Rural Settlement & HV	1132.39	26.32	
				Water Bodies	68.67	1.60	
Majchar	2890	Clay Loam to Loam	255	Agricultural Land	1754.55	60.72	Agriculture-Farm Land Forest Zone
				Farm Land Forest	107.11	3.71	
				Industrial Area	5.94	0.21	
				Brick-field	20.75	0.72	
				Road	49.84	1.72	
				Rural Settlement & HV	888.86	30.76	
				Water Bodies	62.52	2.16	
Uttar Channel	5920	Clay Loam to Silt Loam	204	Agricultural Land	1689.52	28.54	Erosion Prone Char Land Zone
				Fallow Char Land	2993.30	50.56	
				Road	9.74	0.16	
				Rural Settlement & HV	249.79	4.22	
				Water Bodies	977.78	16.52	
Faridpur Paurashava	2122	Clay Loam to Silt Loam	217	Agricultural Land	530.46	24.99	Paurashava Area
				Industrial Area	1.79	0.08	
				Important Places	59.66	2.81	
				Brick-field	10.38	0.49	
				Road	51.21	2.41	
				Rural Settlement & HV	74.38	3.50	
				Urban Built-up Area	1289.92	60.77	
				Water Bodies	104.64	4.93	

Table 3.4: Proposed Land Zoning for Faridpur Sadar Upazila

Name of Zone	Union	Remarks
1. Agriculture Zone	Char Madhabdia, Greda, Ishan Gopalpur and Kaijuri	Considering present agriculture land use, land suitability analysis and as per opinion of local people these unions are identified as agriculture zone
2. Agriculture-Historical Place Zone (Poet Jashimuddin)	Ambikapur	Jasimuddin, the popular Bengali poet known for his poems about the folk lore culture is situated in this union which is a very famous historical place and picnic spot in the area
3. Mixed Use Zone (Agriculture-Semi Urban and Commercial)	Aliabad and Kanaipur	River Research Institute, housing estate etc. are situated along the highway in Aliabad union, industrial and commercial zone other commercial infrastructure are increasing at Kanaipur union
4. Agriculture-Farm Land Forest Zone	Krishnanagar and Majchar	Plantation forest in the farm land has been increased remarkably reducing the fertile agricultural land in the area
5. Agriculture-Erosion Prone Char Land Zone	Decreerchar and Uttar Channel	These unions are consisting of newly accreted char land which is vulnerable due to river erosion and other natural hazards
6. Paurashava Area	Faridpur Paurashava	Paurashava urban development activities should be carried out without degrading fertile agriculture land

Source: National Land Zoning Project Report, May 2016

Map 3. 1. Present Agricultural Land use Map of Faridpur Sadar Upazila



Present Agricultural Land Use Map of Faridpur Sadar Upazila

3.4 Union-Wise Present Agriculture Land Use:

Land resources of different Unions and Paurashava under Faridpur Sadar Upazila are used for multiple purposes. Faridpur Sadar Upazila has 11 Unions and 01 Paurashava. Land types are the dominant factor guiding choice of crops and cropping patterns of each Union. The present lands used in different Unions and Paurashava are given below.

3.4.1 Aliabad Union Land Use

General Description

It is situated along the highway at Aliabad Union about 2km toward south of Faridpur town. River Research Institute (RRI) has been established in Aliabad Union in view of devising plans and actions to develop water resources in a sustainable manner to meet the development needs of Bangladesh. Aliabad Union has got high potentials for its land and agriculture production as well as commercial uses. Aliabad union consists of 8 Mauza and 10 villages. This union consists of 8 Mauza and 10 villages. Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). National Land zoning project, May 2016, Aliabad Union was identified and proposed as Mixed Use Zone (Agriculture-Semi Urban and Commercial). This Union having agriculture cultivated area of 4880 ha of land of which net cropped area is 1902 ha. The highest land area is 1175(61.78%) ha is used as triple crops and followed by double crops of 627(32.96%) ha and remaining 100(5.26%) ha is used as single crops. The land types of this union are highland (82%), medium high land (13%), Medium low land (5%) and soil texture is silt loam to clay loam which indicates lands are suitable for different Rabi crops and Kharif crops production (SAAO, 2016). The soil P^H is 6.1-7.8. Multiplicity of cropping system has been one of the main features of the Union. Aliabad Union is highly suitable for cultivation of paddy, Ground nut, Wheat, Sugarcane, Jute and year round vegetables and also Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Rice and wheat are two principal cereals. At present fifteen cropping patterns are practiced under Aliabad Union which is shown in Table 3.5. The cropping intensity of this union is 257%. Banana and papaya are widely grown in this Union

Table 3. 3: Present Cropping Patterns of Aliabad Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Aliabad	1902	Boro(HYV)□Fallow□T.Aman(HYV)	257.57	270	14.20
		Boro (HYV)□Fallow□ Fallow		67	3.52
		Vegetables□ Vegetables □ Vegetables		135	7.10
		Wheat/Maize□Jute□ T.Aman		770	40.48
		Mustard□Boro (HYV)□ T.Aman		74	3.89
		Mustard□ Jute□ T.Aman		45	2.37
		Vegetables□ Fallow□ T.Aman		220	11.57
		Spices□Jute-□T.Aman		30	1.58
		Sweet Potato□Fallow□T.Aman		15	0.79

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Pulses□Fallow□ T.Aman		120	6.31
		Banana/ Papaya□Banana.Papaya□Banana		20	1.05
		Spices□ Fallow□ T.Aman		47	2.47
		Pulses□ Groundnut/Til□ T.Aman		44	2.31
		Sugarcane□Sugarcane□Sugarcane		25	1.31
		Orchard□Orchard□Orchard		20	1.05
		Total		1902	100.00

Source: SAAOs of Aliabad Union 2016

Major Problems on Crop Cultivation

The major problems in Aliabad Union crop cultivation are: (i) River silted and erosion, (ii) Shortage of supply quality agricultural inputs (HYV seeds, power tiller/ tractor, thresher, sprayer/ foot pump etc) and high price, (iii) No cold storage for vegetables and Seed store, (iv) Canals are silted and Kutcha drainage system, (v)Water stagnation, (vi) Lack of vegetables and fruits wholesale market infrastructure, (vii) Prolonged to partial drought or excessive rain and early flood, (viii) Higher cost of LLP,STW, fuel,& pesticides etc, (ix) Low market price of agricultural commodities,and (x) The valuable agriculture land is reducing rapidly due to unplanned construction of houses, settlement, brick field and for various infrastructural development.

Recommendation

Agricultural productivity is measured in terms of agricultural outputs to agricultural inputs. It will increase agricultural production, generate cultivator income, increase purchase capacity and improve rural livelihoods.

(1) Ensure availability of improve quality crop production inputs (HYV crop seeds & equipments) in subsidized price, (2) Re-excavation of canals/rivers, (3) wholesale market infrastructures development , (4) Construction of cold storage and seed store,(5) Uninterrupted power supply to irrigation pumps, (6) Training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides,(7) Kutcha Irrigation drainage need to be converted into pucca, (8) Construction of vegetables and fruits processing, grading and packaging industry/facility and establishment of agro-based industry , and (9) Conversion of productive agriculture land to non- agriculture purposes need to be stopped by implementation of land zoning law and village improvement act.

3.4.2 Ambikapur Union Land Use

General Description

Bengali Poet Jasimuddin was born in Ambikapur Union in 01 Janury 1903. The name of his village is Ambikapur which is just about 2 km apart from the Faridpur town. His house is situated by the river Kumar. Jasimuddin is noted for his depiction of rural life and nature

from the view point of rural people. This had earned him fame as Pollikabi (the rural poet). There is a picnic spot outside the house premise for visitors. During the month of January there used to be a Mela at this ground to commemorate the birth day of the poet. National Land Zoning project, May 2016, Ambikapur Union was identified and proposed as Agriculture-Historical Place Zone (Poet Jashimuddin). Ambikapur union consists of 14 Mauza and 17 villages. The land of this Union is moderate fertile, productive and potential for agriculture uses. The land types of this union are highland (12.71%), medium high land (49.17%), medium low land (34.31%), low land (3.99%) and very low land (0.32%). This Union having agriculture cultivated area of 3830 ha of land of which net cropped area is 1480 ha. The highest land area is 910(61.49%) ha is used as triple crops and followed by double crops of 530(35.81%) ha and remaining 40(2.70%) ha is used as single crops. Soil texture is loam to clay loam which indicates lands are suitable for multiple crops production round the year (SAAO, 2016). The soil P^H is 6.5-7.6. The cropping intensity of this union is 259%. This Union is highly suitable for cultivation of paddy, Pulses, Onion, Jute, Mustard, Wheat, Maize and year round vegetables and also Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present 18 cropping patterns are practiced under Ambikapur Union which is shown in Table 3.6. Cropping patterns clearly indicated diversified crops are grown in this Union. There are 30 Mango, 20 Banana and 4 litchi garden in this Union. Cultivable agricultural lands are reducing rapidly due to unplanned construction and development activities.

Table 3. 6: Present Cropping Patterns of Ambikapur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Ambikapur	1480	Wheat□Jute□ T.Aman	259	270	18.24
		Weat□Jute□ Fallow		80	5.41
		Boro□ Fallow□ T.Aman		45	3.04
		Boro□ Fallow-□ Fallow		33	2.23
		Mustard□Boro---Fallow		50	3.38
		Mustard□Jute□T.Aman		135	9.12
		Spices□Jute□ Fallow		39	2.64
		Onion□Jute□ T.Aman		55	3.72
		Onion/Garlic□Jute--Fallow		150	10.14
		Pulses□ Til□ T.Aman		100	6.76
		Pulses□ Jute-□ T.aman		170	11.49
		Pulses□Til□ Fallow		50	3.38
		Pulses□Aus□T.Aman		40	2.70
		Vegetables□Vegetables□ Vegetables		150	10.14
		Boro□ Fallow□T.Aman		30	2.03
		Onion□ Aus□ Fallow		20	1.35
		Sugarcane□Sugarcane□Sugarcane		50	3.38
		Banana/Papaya□ Banana/Papaya□		13	0.88
		Total		1480	100.00

Source: SAAOs of Ambikapur Union 2016

Major Problems on Crop Cultivation

The major problems of Ambikapur Union crop cultivation are: (i) Water stagnation, River erosion and sand deposition on agricultural land and also top soil cutting, (ii) Kutch irrigation drainage system, (iii) No cold storage for vegetables and Seed store, (iv) Lack of vegetables and fruits wholesale market infrastructure, (v) Shortage of supply quality agricultural inputs (HYV seeds, power tiller/ tractor, thresher, sprayer/ foot pump etc) and high price, (vi) Prolonged to partial drought or excessive rain and early flood, (vii) Higher cost of LLP,STW, fuel, pesticides etc, (viii) Low market price of agricultural commodities and labor shortage during crop harvesting time, (ix) Draught, inadequate electricity supply and early flood, and (x) Productive agricultural land converted into non- agricultural land.

Recommendation

(1) Development of irrigation facilities by excavation or re-excavation of canals/ rivers, (2) Kutch irrigation drainage need to be converted into pucca, (3) Construction of multipurpose cold storage, wholesale market infrastructure and seed store, (4) Ensure availability of improve quality crop production inputs (HYV crop seeds & equipments) in subsidized price, (5) Uninterrupted power supply during Boro crop season, (6) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (7) Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry, (8) Many of the rural infrastructures and construction work for urban expansion and commercial activities are done without having a proper plan. Proper plan are essential for infrastructural development activities which will save the productive agricultural lands, (9) Improvement of road communication system and (10) Ensure supply of drought and water logging tolerant and early crop variety of BRRI, BARI, BINA.

3.4.3 Char Madhabdia Union Land Use

General Description

Char Madhabdia Union is situated Northern part of Faridpur Sadar Upazila and outside the embankment. It is a flood prone Union because beginning of the rainy season all fields are inundated by flood water every year. The land types of this union are medium high land (64.92%), Medium low land (25.54%), and low land (9.54%). Land are moderate fertile, productive and potential for agriculture uses. Char Madhabdia union consists of 4 Mauza and 75 villages with the area of 2438.87 ha. National Land zoning project, May 2016, Char Madhabdia Union was identified and proposed as Agriculture Zone. Soil texture is loam to clay loam and the soil P^H is 6.0-7.8. This Union having agriculture cultivated area of 3205 ha of land of which net cropped area is 1600 ha. The highest land area is 1405(87.81%) ha is used as double crops and followed by triple crops of 100(6.25%) ha and remaining 95(5.94%) ha is used as single crops. The cropping intensity of this union is 200%. Char Madhabdia Union is suitable for cultivation of paddy, Ground nut, Jute, Mustard, Wheat, Potato, Onion, Garlic and year round vegetables (Land Zoning Report, May 2016 & SAAOs November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present sixteen cropping patterns are practiced under **Char Madhabdia Union**

which is shown in Table 3.7. Jute and Onion, Garlic are principal cash crops in this Union. In agriculture, multiple cropping is practice of growing two or more crops in the same space during a single growing season. Farmers of this Union did not cultivate Aman rice due to risk of flooding.

Table 3.7: Present Cropping Patterns of Char Madhabdia Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Char Madhabdia	1600	Wheat□Til□ Fallow	200	30	1.88
		Weat□Jute□ Fallow		80	5.00
		Potato□ Jute□ Fallow		15	0.94
		Boro□ Fallow-□ Fallow		60	3.75
		Mustard□Boro---Fallow		140	8.75
		Onion□ Boro□Aus		55	3.44
		Garlic□ Boro□ Fallow		120	7.50
		Onion□ Boro□ Fallow		185	11.56
		Onion/Garlic□Jute--Fallow		676	42.25
		Spices□ Jute□ Fallow		55	3.44
		Pulses□ Jute-□ Fallow		15	0.94
		Pulses□Til□ Fallow		33	2.06
		Maize□Aus□ Fallow		15	0.94
		Vegetables□Vegetables□ Vegetables		62	3.88
		Vegetables□ Jute□ Fallow		44	2.75
		Chili□ Aus□ Fallow		15	0.94
		Total		1600	100.00

Source: SAAOs of Char Madhabdia Union 2016

Major Problems on Crop Cultivation

The major problems in Char Madhabdia Union crop cultivation are: (i) Risk of early flood and excessive rainfall, (ii) Shortage of cold storage and poor transportation damage perishable agricultural products , (iii) Lack of vegetables wholesale market infrastructure, (iv) Scarcity of quality seed and lack of modern agricultural equipments and farmers knowledge reduce crop yield and crop diversification, (v) Higher cost of LLP,STW, fuel, pesticides etc, (vi) lack of electricity supply hampers irrigation for boro and other irrigated crops,(vii) Essential plant nutrient deficiencies, lack of awareness on proper management of land and over & under uses of pesticides and chemical fertilizers. (viii) Cultivable agricultural lands are reducing due to unplanned construction of houses and industries on agriculture land and sand deposition on agricultural land.

Recommendation

(1) Development of irrigation and other quality crop production inputs facilities, (2) Cold storage facility should be provided to preserve the perishable products, (3) Ensure required electricity supply during irrigation period,(4) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (5)Construction of vegetables and spices processing, grading and packaging industry/ facility and Establishment of agro-based industry, (6) Improvement of road communication system and

(7) Ensure supply of drought and water logging tolerant and early crop variety of BRRI, BARI, BINA, (8) Proper plan are essential for this union infrastructural development activities which will save the productive agricultural lands, (9) Development of irrigation facilities by excavation or re-excavation of old canals/ khals and connecting with nearest river and khal, (10) Following fertilizer recommendation by soil testing and (11)Arranging and allocating sufficient credit for farmers.

3.4.4 Decreeer Char Union Land Use

General Description

This Union is covered by char land. Decreeer Char Union is situated to the east with Char Bhadrasan Upazila. Most of these char land is newly accreted in the river Ganges which is isolated from main land and they are thinly populated. Land is fertile in the char areas but it is unstable and vulnerable due to early flood and natural calamities remains fallow due to sand deposition. Some land remains uncultivated and covered by wild grass like Kashbon. The land types of this union are high land (11%), medium high land (48%), Medium low land (22%), and low land (18%) and also fallow land (1%). Decreeer Char union has 5 Mauza and 30 villages with the area of 2305.67 ha. National Land zoning project, May 2016, Decreeer Char Union was identified and proposed as **Agriculture –Erosion Prone Char Land Zone**. Soil texture is silt loam to clay loam and the soil P^H is 6.3-7.5. Decreeer Char Union having agriculture cultivated area of 3029 ha of land of which net cropped area is 1512ha. The highest land area is 987(65.28%) ha is used as double crops and followed by triple crops of 265(17.52%) ha and remaining 260(17.20%) ha is used as single crops. The cropping intensity of this union is 200%. The land of Decreeer Char Union is suitable for cultivation of paddy, Ground nut, Jute, Mustard, Wheat, Potato, Onion, year round vegetables and Rabi crops (Land Zoning Report, May 2016 &SAAOs November 2016). At present twenty three cropping patterns are practiced under Decreeer Char Union which is shown in Table 3.8. Jute and Onion, Garlic, Groundnut are principal cash crops in this Union. Land use is changeable and duration of crop period is short and uncertain due to flood and natural hazards. More than thirty different crops are suitable for cultivation in char land during Rabi and early Kharif season and large number of them are high value cash crops.

Table 3.8: Present Cropping Patterns of Decreeer Char Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Decreeer Char	1512	Wheat□Jute□ T.Aman	200	35	2.31
		Weat□Jute□ Fallow		158	10.45
		Mustard/Kheshari□ Aus□ Fallow		110	7.28
		Boro□ Fallow-□ Fallow		128	8.47
		Mustard□Boro-□T.Aman		60	3.97
		Mustard/Kheshari□Fallow□ Aman		92	6.08
		Groun nut□ Fallow□ Aman		78	5.16
		Wheat□ Jute□Mungbean		47	3.11
		Pulses□ Ground nut□ Fallow		90	5.95
		Onion/Garlic□Boro□Mungbean		30	1.98

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Onion□ Aus□ Fallow		43	2.84
		Onion/Garlic□Jute--Fallow		88	5.82
		Mustard□ Jute□ Fallow		40	2.65
		Pulses□ Jute-□ Fallow		50	3.31
		Pulses□Boro□ Fallow		98	6.48
		Ground nut□Til□ B.Aman		116	7.67
		Spices□Aus□Fallow		25	1.65
		Ground nut□ Fallow□ Mungbean		112	7.41
		Til□Jute□Fallow		35	2.31
		Vegetables□Vegetables□ Vegetables		27	1.79
		Vegetables□ Jute□ Fallow		25	1.65
		Chili□ Jute□ Fallow		15	0.99
		Banana□Banana□ Banana		10	0.66
		Total		1512	100.00

Source: SAAOs of Char Decree Char Union 2016

Major Problems on Crop Cultivation

The major problems in Decree Char Union crop cultivation are: (i) Early flood damages the crops, (ii) Sand deposition on agricultural land affecting normal crop cultivation, (iii) Severe river erosion damages valuable land and properties, (iv) Kutch irrigation drainage system, (v) Water stagnation, (vi) lack of quality seed & equipments supply, (vii) Kutch road and damaged, (viii) Oppression of jotdars (land grabber) and their hooligans in the char land areas, (ix) Acute shortage of food, drinking water and proper sanitation and (x) Communication and marketing facilities are very poor and (xi) Affected people have to migrate for their livelihood in city area.

Recommendation

- (1) Construction of embankment for controlled of river erosion and protecting crops from early flood,
- (2) Development of irrigation and other quality crop production inputs facilities, (2) Cold storage facility should be provided to preserve the perishable products, (3) Improvement of road communication system, (4) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (5) Large scale tree plantation by social forest program, 6) Char infrastructural development plan are essential for this union, (7) Construction of vegetables and spices processing, grading and packaging industry/ facility and Establishment of agro-based industry, and (8) Communication & market facilities need to developed, (9) Re-excavation of old and silted canals, and (10) Needs sustainable development of agricultural plan for char land areas.

3.4.5 Greda Union Land Use

General Description

Greda Union is situated to the south with Nagarka Upazila. Land type is the dominant factor guiding choice of crops and cropping patterns of Greda Union. Selection of crop largely

depends on topographic position of land. The land types of this union are high land (16.24%), Medium high land (35.06%), medium low land (39.61%) and low land (6.82%) and also fallow land (2.27%). Land are moderate fertile, productive and highly potential for agriculture uses. This Union has 13 Mauza and 16 villages with the area of 2323.48 ha. Greda Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). National Land zoning project, May 2016, Greda Union was identified and proposed as Agriculture Zone. Soil texture is loam to silt loam and the soil P^H is 6.0—8.5. Greda Union having agriculture cultivated area of 4089 ha of land of which net cropped area is 1520 ha. The cropping intensity of this union is 269%. The highest land area is 1095(72.04%) ha is used as triple crops and followed by double crops of 363(23.88%) ha and remaining 60(3.95%) ha is used as single crops and 35(0.13%) is used for more than three crops. This Union is suitable for diversify crops cultivation of paddy, Wheat, Jute, Onion, Sesame, Mustard and year round vegetables (Land Zoning Report, May 2016 & SAAOs, November 2016). Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. At present twenty different cropping patterns are practiced under Greda Union which is shown in Table 3.9. In agriculture, multiple cropping is practice of growing two or more crops in the same space during a single growing season. This union is mainly aro-based economy and it is famous for producing high quality of Jute, rabi crops and rice. This Union has 3 brick fields.

Table 3.9: Present Cropping Patterns of Greda Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Greda	1520	Kheshari□Jute□ T.Aman	269	105	6.91
		Weat□Jute□ T.Aman		400	26.32
		Boro□ Fallow□ Fallow		25	1.64
		Boro□ Fallow-□ T.Aman		215	14.14
		Mustard□Jute□T.Aman		85	5.59
		Onion□ Jute□T.Aman		50	3.29
		Garlic□ Boro□ T.Aman		10	0.66
		Garlic/Malon/Lentil□Fallow□ T.Aman		8	0.53
		Onion□ Boro□ T.Aman		30	1.97
		Mustard/Lentil□Til□T.Aman		20	1.32
		Wheat□Jute□ B.Aman		50	3.29
		Spices□ Jute□ T.Aman		220	14.47
		Pulses□ Jute-□ T.Aman		82	5.39
		Pulses□Aus□ T.Aman		55	3.62
		Til□Jute□ T.Aman		5	0.33
		Onion□Vegetables□T.Aman		27	1.78
		Vegetables□Vegetables□ Vegetables		71	4.67
		Sugarcane□ Sugarcane□ Sugarcane		18	1.18
		Orchard□Orchard-□Orchard		14	0.92
		Wheat□ Aus/Jute□ Fallow		30	1.97
		Total		1520	100.00

Source: SAAOs of Greda Union 2016

Major Problems on Crop Cultivation

The major problems in Greda Union crop cultivation are: (i) High potential cultivable agricultural lands are reducing rapidly due to unplanned infrastructural activities, river erosion, silted most of the canals, (ii) Risk of early flood and excessive rainfall and water stagnation, (iii) Shortage of cold storage and wholesale market infrastructure, (iv) Scarcity of quality seed and lack of modern agricultural equipments and lack of knowledge reduce crop yield and crop diversification, (v) Higher cost of LLP, STW, fuel, pesticides etc, (vi) lack of electricity supply hampers irrigation for boro and other irrigated crops, (vii) Essential plant nutrient deficiencies, lack of awareness on proper management of land and over & under uses of pesticides and chemical fertilizers, (viii) Drought and cold wave create negative impact on crop diversification of crops, (ix) Lack of farmers knowledge on modern crop production technology and (x) Agriculture labor crisis and high wage rate.

Recommendation

(1) Development of irrigation facilities by excavation of new and old canals and river, (2) Kutch irrigation drainage need to be pucca, (3) Multipurpose Cold storage facility should be provided to preserve the perishable products, (4) Ensure uninterrupted power supply to irrigation pumps, (5) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (6) Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry, (7) Proper plan are essential for this union infrastructural development activities which will save the productive agricultural lands, and (8) Ensure HYV of short duration and drought & water logging tolerant crop variety seeds, (9) select best available seeds from market, (10) Following fertilizer recommendation by soil testing, (11) Developing market infrastructures and road communication at local level, (12) Arranging farmers technological training on crop production and also allocating sufficient credit for farmers and (13) Need to be reduced new or existing unplanned infrastructure and urban expansion by implementing land zoning law, village development act and preparation of development plan fourteen Upazila package-03.

3.4.6 Ishan Gopalpur Union Land Use

General Description

Multiplicity and diversify of cropping system has been one of the main feature of the Union. Union is situated bordering to the north with Goalanda and Rajbari Sadar Upazila. This Union has got high potentials for its lands and agricultural production. National Land zoning project, May 2016, Ishan Gopalpur Union was identified and proposed as **Agriculture Zone**. This union has 13 Mauza and 13 villages with the area of 3552.63ha. Field study data shows that Ishan Gopalpur Union comprises predominantly with Medium high land (45.51%), followed by medium low land (23.40%), high land (15.76%), low land (6.11%), very low land (0.99%) and fallow land (8.23%). Ishan Gopalpur Union organic matter contents are low in the high land, but moderate in the lower parts. Moisture holding capacity of soil is low to medium. The top soil P^H level ranges from 6.0-7.9.¹ Ishan Gopalpur Union having total agriculture cultivated area of 6344 ha of land of which net cropped area is 2329 ha. Major

land area is 1775(76.21%) ha is used for triple crops and followed by double crops of 360(15.46%) ha and remaining 159(6.83%) ha is used as single crops and 35(1.15%) is used for more than three crops. The cropping intensity of this union is 272% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present twenty four different cropping patterns are practiced in Ishan Gopalpur Union which is shown in Table 3.10. This Union is suitable for cultivation of paddy, Wheat, Jute, Onion, pulses, Mustard and year round vegetables and rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). This Union has 3 brick fields.

Table 3.10: Present Cropping Patterns of Ishan Gopalpur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Ishan Gopalpur	2329	Wheat-Jute-T.Aman	272	345	14.81
		Wheat-Jute-Fallow		80	3.43
		Boro-Fallow-Fallow		95	4.08
		Boro-Fallow-T.Aman		80	3.43
		Boro-Fallow-B.Aman		60	2.58
		Pulses-Jute-T.Aman		247	10.61
		Mustard-Jute-T.Aman		85	3.65
		Spices-Jute-T.Aman		145	6.23
		Pulses-Jute-Fallow		120	5.15
		Spices-Jute-Fallow		33	1.42
		Spices-Aus-T.Aman		45	1.93
		Onion-Jute-T.Aman		395	16.96
		Onion/Garlic-Jute-Fallow		40	1.72
		Pulses-Til-T.Aman		130	5.58
		Pulses-Til-Fallow		30	1.29
		Pulses-Aus-B.Aman		130	5.58
		Pulses-Aus-T.Aman		15	0.64
		Oilseeds-Jute-Fallow		40	1.72
		Pulses/Oilseed-Chili-Chili		15	0.64
		Vegetables-Vegetables-Vegetables		105	4.51
		Tobacco-Jute-T.Aman		18	0.77
		Potato-Aus-T.Aman		5	0.21
		Sugarcane-Sugarcane-Sugarcane		7	0.30
		Banana/Papaya-Banana/Papaya-contd		64	2.75
		Total		2329	100.00

Source: SAAOs of Ishan Gopalpur Union 2016

Major Problems on Crop Cultivation

The major problems in Ishan Gopalpur Union crop cultivation are: (i) Less supply of quality HYV/Hybrid different crop seeds and modern agricultural equipments, (ii) Drought and inadequate electricity supply hampers irrigation for boro and other irrigated crops, (iii) No cold storage and seed store for vegetables, (iv) Higher cost of LLP, STW, fuel, pesticides etc, (v) Most of canals are silted and irrigation drainage are kutcha, (vi) Less market price for

produce crops, agricultural labor crisis and high wage rate, (vii) Converted highly productive agricultural land to non-agricultural purposes is a acute problem in this Union,(viii) There is no infrastructural development plan for this Union, (ix) Poor communication and market infrastructure rural level , (x) Lack of awareness on proper management of land and improper use of pesticides and chemical fertilizers and (xi) Top soil cutting and decrease of productive agricultural land.

Recommendation

(1) Adopting modern cultivation techniques and growing vegetables predominantly, (2) Ensure quality high yield and drought tolerant and early crop varieties,(3) Excavation and re-excavation of canals and also connecting with river or khal, (4) Kutcha irrigation drainage need to be pucca or underground pipe system, (5) Multipurpose Cold storage facility should be provided to preserve the perishable products, (6) Ensure required electricity supply during irrigation period, (7) Following fertilizer recommendation by soil testing (8) Construction of vegetables and fruits processing, grading and packaging industry/ facility and establishment of agro-based industry,(9) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands,(10) Protect productive agricultural land by implemented and maintained through the enforcement of land zoning law and village improvement act and preparation of development plan for fourteen Upazila, package-03 and (11) Training on modern agriculture practices and proper uses of fertilizer and pesticides.

3.4.7 Kaujuri Union Land Use

General Description

In Kaujuri Union land is highly suitable and potential for diversified agricultural crop cultivation. This Union is situated bordering to the south with Nagarkanda Upazila. Kaujuri union consists of 21 Mauza and 40 villages with the area of 4172.06ha. National Land zoning project, May 2016, Kaujuri Union was identified and proposed as **Agriculture Zone**. Kaujuri Union falls into Agro-ecological zones is Lower Ganges River Floodplain (AEZ-12). Field study data shows that Kaujuri Union comprises predominantly with Medium high land (58.07%), followed by medium low land (26.39%), low land (8.91%), high land (5.74%), and very low land (0.89%). General soil color of Kaujuri Union is grey to dark grey. Moisture holding capacity of soil is low to medium. The top soil P^H level ranges from 6.4-7.5. Kaujuri Union having total agriculture cultivated area of 9817 ha of land of which net cropped area is 3650 ha. The highest land area is 2533(69.40%) ha is used for triple crops and followed by double crops of 1020(27.94%) ha and remaining 70(1.92%) ha is used as single crops and 27(0.74%) is used for more than three crops. The cropping intensity of this union is 269% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). This Union is suitable for cultivation of paddy, Maize, Jute, Onion, pulses, sugarcane and year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs, November 2016). This Union has 7 brick fields. At present nineteen different cropping patterns are practiced by Kajuri Union farmers which are shown in Table 3.11. This indicates that farmers have access to crop diversification and cultivated high value crops.

Table 3.11: Present Cropping Patterns of Kaujuri Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Kaujuri	3650	Wheat-Jute T.Aman	269	800	21.92
		Weat-Jute Fallow		155	4.25
		Boro Fallow Fallow		55	1.51
		Boro Fallow- T.Aman		410	11.23
		Boro Fallow B.Aman		90	2.47
		Pulses-Jute T.Aman		305	8.36
		Mustard Jute T.Aman		159	4.36
		Spices Jute T.Aman		195	5.34
		Pulses-Aus T.Aman		96	2.63
		Onion-Jute T.Aman		814	22.30
		Wheat-Aus T.Aman		50	1.37
		Pulses /mustard Til T.Aman		63	1.73
		Pulses-Aus B.Aman		59	1.62
		Mustard Boro Fallow		25	0.68
		Pulses-Chili-Chili		15	0.41
		Vegetables-Vegetables-Vegetables		312	8.55
		Potato-Vegetables-Vegetables		12	0.33
		Sugarcane-Sugarcane-Sugarcane		20	0.55
		Banana/Papaya-Banana/Papaya-contd		15	0.41
		Total		3650	100.00

Source: SAAOs of Kaujuri Union 2016

Major Problems on Crop Cultivation

The major problems in Kaujuri Union crop cultivation are: (i) Most of the canals and river are silted and water logging and irrigation drainage are kutcha, (ii) No cold storage and lack of seed store, (iii) No vegetables wholesale market and infrastructure, (iv) Less supply of quality HYV different crop seeds, (v) Farmers lack of knowledge on modern crop production technology, (vi)) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers, (vii) Converted highly productive agricultural land to non-agricultural purposes is a acute problem in this Union, (viii) Less supply of cultivator and irrigation equipment & high price, (ix) Top soil cutting & decrease agricultural land, (x) Inadequate electricity supply during Boro season and (xi) Temperature fluctuate & changes in rainfall pattern .

Recommendation

(1) Ensure quality high yield and pest & disease resistant, drought tolerant crop varieties, (2) Development of communication and wholesale vegetables market infrastructure (3) Kutcha irrigation drainage need to be made pucca or underground pipe system, (4) Multipurpose Cold storage facility should be provided to preserve the perishable products, (5) , Excavation and re-excavation of canals and river, (6) Growing one leguminous crop (Dhaincha/Pulses/Fodder etc.) between two cereal crops, (7) Following fertilizer recommendation by soil

testing, (8) Farmers Technological training for adopting modern crop production technology, and (9) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands (10) Uninterrupted power supply to irrigation pump, and (11) observing weather conditions and follow weather forecast

3.4.8 Kanaipur Union Land Use

General Description

The industrial and commercial zone has been established at Kanaipur located about 5km west of Faridpur town on the Faridpur-Jessore Highway. There is a big market, jute purchasing centre and other commercial infrastructure located here. Due to good communication and other facilities the urbanization and commercial activities are expanding on agricultural land. National Land zoning project, May 2016, Kanaipur Union was identified and proposed as **Mixed Use Zone (Agriculture-Semi Urban and Commercial)**. In Kanaipur Union land is highly suitable and potential for multiple agricultural crop cultivation. This Union consists of 24 Mauza and 32 villages with the area of 3780.16ha. Kanaipur Union falls into Agro-ecological zones is Lower Ganges River Floodplain (AEZ-12). The land suitability classification indicates the relative suitability of land for sustained production of common agricultural crops and other uses such as fisheries, forest, urban and commercial areas. Field survey data shows that Kanaipur Union comprises predominantly with medium low land (41.02%), followed by medium high land (27.78%), low land (15.88%), very low land (7.94%), high land (6.61%), and fallow land (0.77%). The top soil P^H level ranges from 6.0-7.5. This Union having agriculture cultivated crop area of 8171 ha of land of which net cropped area is 2917 ha. Major land area is 2487(85.26%) ha is used for triple crops and followed by double crops of 280(9.60%) ha and remaining 15(5.14%) ha is used for single crops. This Union is suitable for cultivation of paddy, Maize, Jute, Onion, pulses, sugarcane and year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). At present nineteen different cropping patterns are practiced Kanaipur Union which is shown in Table 3.12. The cropping intensity of this union is 280% which is higher than average Faridpur Sadar Upazila cropping intensity (232%).

Table 3.12: Present Cropping Patterns of Kanaipur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Kanaipur	2917	Wheat□Jute□ T.Aman	280	970	33.25
		Weat□Jute□ Fallow		80	2.74
		Boro□ Fallow□ Fallow		10	0.34
		Boro□ Fallow-□ T.Aman		87	2.98
		Rabi crops□Boro□T.Aman		20	0.69
		Spices□Jute□ Fallow		29	0.99
		Lentil□Jute□T.Aman		412	14.12
		Mustard□ Jute□T.Aman		175	6.00
		Spices□ Jute□ T.Aman		175	6.00
		Pulses□B .Aus□ B.Aman		10	0.34
		Onion□Jute□T.Aman		315	10.80

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Onion/Garlic□ Jute□ Fallow		80	2.74
		Pulses □ Til□ T.Aman		40	1.37
		Kheshari□ B .Aus□ B.Aman		145	4.97
		Mustard□ Boro□ Fallow		45	1.54
		Pulses-□ Aus□ T.Aman		150	5.14
		Vegetables□Vegetables□ Vegetables		95	3.26
		Sugarcane□ Sugarcane□ Sugarcane		75	2.57
		Banana/Papaya□Banana/Papaya□ contd		4	0.14
		Total		2917	100.00

Source: SAAOs of Kanaipur Union 2016

Major Problems on Crop Cultivation

The major problems in Kanaipur Union crop cultivation are: (i) Productive agricultural lands are reducing due to construction of houses and industries on agricultural land, river erosion, sand deposition on agricultural land and top soil cutting, (ii) Most of the canals and river are silted, water stagnation and irrigation drainage are kutcha, (iii) Farmers lack of knowledge on modern crop production technology, (iv) Shortage of cold storage , (v) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,(vi) Agriculture labor crisis, high wage rate and Less market price of produce agricultural crops and production cost is high, vii) Bank loan interest is high, and (viii) Industrial effluent, (ix)High cost LLPs, STWs, fuel and pesticides ,(x)Risk of flooding and(xi) Drought and cold wave create negative impact on diversification of crops and (xii) Unplanned expansion of commercial and urban area.

Recommendation

(1) Development of irrigation facilities by excavation and re-excavation of canals, (2) Kutcha irrigation drainage need to be made pucca or construction of underground pipe system, (3) Ensure quality high yield and Hybrid vegetables and spices seeds, ((4) Construction of modern and multipurpose cold storage and food go-down, (5) Development of wholesale vegetables market infrastructure, (6) Farmers training on adopting modern crop production technology, use of vermi-compost, proper use fertilizer and pesticides, (7) Arranging allocating sufficient credit in less interest rate for farmers and (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands,(9)Protection of double & triple crop land need to be Implemented land zoning law, village improvement act and preparation development plan for fourteen Upazila, package-03,(10)Integrated effort for industrial effluents and waste management, (11) Information on quality seed and monitoring water quality and (12) Rice and non-rice integrated farming.

3.4.9 Krishnanagar Union Land Use

General Description

Plantation programs are getting priority in both public and private sectors. The plantations of forest have some advantages over agriculture due to very easy management, less labor intensive, low input cost and relatively high economic output. Afforestation programs also helps in improving the socio-economic condition of the rural people by generating employment in raising nursery and plantation activities. Land of Krishnanagar Union is highly potential for agriculture crop production and also popular for forest area. This Union has 80ha land used as forest. National Land zoning project May 2016, Krishnanagar Union was identified and proposed as **Agriculture-Farm Land Forest Zone**. This Union is situated bordering to the west with Madhukhali Upazila. This union consists of 28 Mauza and 29 villages with the area of 4387.04ha. Krishnanagar Union falls into 2 Agro-ecological zones are (i) Active Ganges Floodplain (AEZ-10) and (ii) Lower Ganges River Floodplain (AEZ-12). Land type is the dominant factor guiding choice of crops and cropping pattern in Krishnanagar Union. This Union comprises predominantly with medium low land (26.25%), followed by medium high land (32.08%), high land (21.26%), low land (13.49%), very low land (0.55%), and fallow land (6.37%). The top soil P^H level ranges from 6.0-7.2. Krishnanagar Union having agriculture cultivated crop area of 9145 ha of land of which net cropped area is 3776 ha. Selection of crops depends on topographic position of land. The highest land area is 1841(48.76%) ha is used for double crops and followed by triple crops of 1722(45.60%) ha and remaining 185(4.90%) ha is used for single crops and 28(0.74) ha used as more than three crops. Wide range of Rabi and Kharif crops are grown here such as paddy, Maize, Jute, Onion, pulses, Sugarcane, Garlic, and year round vegetables (Land Zoning Report, May 2016 & SAAOs November 2016). The cropping intensity of this union is 242% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present fourteen different cropping patterns are practiced Krishnanagar Union which is shown in Table 3.12. Among the present cropping pattern, the highest contribution cropping pattern are Wheat →Jute→T.aman (34.30%) and Lentil→Jute-→T.Aman(17.16%).

Table 3.13: Present Cropping Patterns of Krishnanagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Krishnanagar	3776	Wheat□Jute□ T.Aman	242	1295	34.30
		Boro□ Fallow□ Fallow		185	4.90
		Boro□ Fallow-□ T.Aman		234	6.20
		Lentil□Jute□T.Aman		648	17.16
		Mustard□ Jute□T.Aman		150	3.97
		Spices (Dhania/Kaligira)□ Jute□ T.Aman		372	9.85
		Pulses□T .Aus□ B.Aman		59	1.56
		Onion□Jute□T.Aman		240	6.36
		Lentil□ Chili□ T.aman		65	1.72
		Lentil□ Til□ T.Aman		162	4.29
		Kheshari□ Fallow□ T.Aman		81	2.15

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Vegetables□Vegetables□ Vegetables		140	3.71
		Sugarcane□ Sugarcane□ Sugarcane		130	3.44
		Banana/Papaya□Banana/Papaya□ contd		15	0.40
		Total		3776	100.00

Source: SAAOs of Krishnanagar Union 2016

Major Problems on Crop Cultivation

The major problems in Krishnanagar Union crop cultivation are: (i) Farmers lack of knowledge on modern crop production technology, (ii) Shortage of cold storage & seed store and lack of wholesale market infrastructure, (iii) Bad road communication and poor transportation, (iv) Shortage of high quality HYV & Hybrid crop seeds and cultivation equipments, (v) Agriculture labor crisis, high wage rate and Less market price of produce agricultural crops and production cost is high, (vi) Productive agricultural lands are reducing due to construction of houses and industries on agricultural land and top soil cutting, (vii) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers, (viii) Risk of early flood, (ix) Most of the canals silted, water stagnation and irrigation drainage are kutchha, and (x) Decrease agricultural land due to Non-agricultural development on productive agriculture land and also unplanned infrastructure and urban expansion is a chronic problem.

Recommendation

(1) Farmers Technological training for adopting modern crop production technology, (2) Construction of modern and multipurpose cold storage and seed store, (3) Ensure quality high yield and Hybrid vegetables and other crop seeds and cultivation & irrigation equipments, (4) Development of irrigation facilities by excavation and re-excavation of canals, (5) construction of underground irrigation pipe system, (6) Development of wholesale vegetables market infrastructure, (7) Arranging allocating sufficient credit in less interest rate for farmers, (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands, and (9) Increasing awareness among the people and land users for conservation of land, (10) Uninterrupted power supply to irrigation pumps and (11) Choosing high yield and drought tolerant varieties.

3.4.10 Maj Char Union Land Use

General Description

Since the national forests in Bangladesh are shrinking rapidly due to encroachments resulting from serious population pressure, so in recent year's plantation forest in the vacant land especially in farm land have been increased remarkable in the Upazila. The plantations of forest have some advantages over agriculture due to very easy management, less labor

intensive, low input cost and relatively high economic output. As because of the acute shortage of timber and fuel wood in Bangladesh, a priority program of introducing fast growing tree species was taken up. Afforestation programs also help in improving the socio-economic condition of the rural people. This Union is situated bordering to the west with Rajbari Sadar Upazila of Rajbari district. Maj Char union consists of 12 Mauza and 14 villages with the area of 4402.02ha. Land of Maj Char Union is highly suitable for multiple crop production and also suitable for plantation of forest tree. Maj Char Union has established 125ha plantation forest land. National Land zoning project, May 2016, Maj Char Union was identified and proposed as **Agriculture-Farm Land Forest Zone**. This Union land falls into Lower Ganges River Floodplain (AEZ-12). Union comprises predominantly with medium high land (61.28%), followed by high land (24.49%), medium low land (8.86%), low land (2.97%), and fallow land (2.40%). The top soil P^H level ranges from 6.5-7.9. Maj Char Union having agriculture cultivated crop area of 4992 ha of land of which net cropped area is 1873 ha. Selection of crops depends on topographic position of land and also ecological conditions and irrigation facilities. The highest land area is 1261(67.33%) ha is used for triple crops and followed by double crops of 552(29.47%) ha and remaining 45(2.40%) ha is used for single crops and 15(0.80%) ha is used for four crops. The cropping intensity of this union is 266% which is higher than average Faridpur Sadar Upazila cropping intensity (232%). At present twenty-five different cropping patterns are practiced in Maj Char Union which is shown in Table 3.14. Among the present cropping pattern, the highest contribution cropping pattern are Wheat →Jute→T. Aman (31.13%) and Boro→ Fallow→T. Aman (12.81%).This clearly indicated that Farmers are producing diversify crops round the year. Wide ranges of Rabi and Kharif crops are cultivated such as Rice (Boro, Aus, T. Aman), Jute, Onion, pulses, Sugarcane, Garlic, and year round vegetables grown here (Land Zoning Report, May 2016 & SAAOs November 2016). This Union has 12 brick field.

Table 3.14: Present Cropping Patterns of Maj Char Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Maj Char	1873	Wheat□Jute□ T.Aman	266.52	583	31.13
		Wheat□Jute-□Fallow		135	7.21
		Wheat□ Aus□T.Aman		35	1.87
		Boro□ Jute□ T.Aman		110	5.87
		Boro□ Fallow-□ T.Aman		240	12.81
		Boro□ Dhaincha□T.Aman		17	0.91
		Boro□Fallow□Fallow		40	2.14
		Boro□Aus□ T.Aman		55	2.94
		Mustard□Boro□Fallow		50	2.67
		Mustard□Til□T.Aman		40	2.14
		Mustard□Jute□T.Aman		65	3.47
		Lentil□Til□T.Aman		95	5.07
		Lentil□ Jute□T.Aman		80	4.27
		Spices (Dhania/Kaligira))□ Jute□ T.Aman		99	5.29

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Kheshari□.Aus□ Fallow		30	1.60
		Pulses(Mator/Mungbean)□Jute□T.aman		12	0.64
		Onion/Garlic□ Boro□T.Aman		14	0.75
		Onion□Jute□ T.aman		13	0.69
		Pulses(Mungbean/Mashkalai□ Jute□ T.aman		6	0.32
		Turmeric□ Turmeric□ Turmeric		7	0.37
		Chili□ Cucumber□ Bean		9	0.48
		Vegetables□Vegetables□ Vegetables		87	4.64
		Water Kachu□Water kachu□Water Kachu		10	0.53
		Sugarcane□ Sugarcane□ Sugarcane		17	0.91
		Banana/Papaya□Banana/Papaya□cont d		24	1.28
		Total		1873	100.00

Source: SAAOs of Maj Char Union 2016

Major Problems on Crop Cultivation

The major problems in Maj Char Union crop cultivation are: (i) Irrigation drainage are kutcha which is wastage of water and also reduce the target area, (ii) Scarcity of high quality HYV & Hybrid crop seeds and cultivation & irrigation equipments and high price, (iii) Shortage of cold storage & seed store and lack of wholesale market infrastructure, (iv) Most of the canals are silted,(v) Farmers lack of knowledge on modern crop production technology, (vi) Inadequate supply of electricity during Boro season,(vii) Less market price of produce agricultural crops and production cost is high, and (viii) Decrease agricultural land due to Non-agricultural development on productive agriculture land and also unplanned infrastructure and urban expansion is a acute problem, and (ix) Old canals are silted, sand deposition on agricultural land and top soil cutting etc and (x) Risk of early flood and irregular rainfall.

Recommendation

(1) Kutcha irrigation drainage to be pucca or construction of underground irrigation pipe system which will be reduced wastage of irrigation water, (2) Construction of modern and multipurpose cold storage and seed store, (3) Ensure quality high yield and Hybrid vegetables and other crop seeds and cultivation & irrigation equipments, (4) Development of irrigation facilities by excavation and re-excavation of canals, (5) Development of wholesale vegetables market infrastructure, (6) Ensure required electricity supply during irrigation period, (7) Farmers Technological training for adopting modern crop production technology, (8) Preparation of long term infrastructural development plan for this Union which will save the productive agricultural lands and (9) Protection of agricultural land need to be implemented and maintained through the enforcement of land zoning law and village law and village improvement act and preparation development plan for fourteen Upazila, pakage-03, (10)

Developing market infrastructures and road communication at local level and (11) Increasing agriculture production through optimum use of land and protecting land degradation.

3.4.11 Uttar Channel Union Land Use

General Description

The Union is bordering to the north with Goalandra of Rajbari district and Shibalaya and Harirampur Upazilas of Manikganj district. This Union is covered by char land. Uttar Channel Union is thinly populated. Newly accreted cha land, deposition of sand which is unsuitable for crop production and river erosion prone, and also early flood water damaged crops. Agricultural production is highly dependents on adaptable climatic conditions. Some land remains uncultivated and covered by wild grass like Kashbon. The land types of Uttar Channel union are medium low land (41.19%) followed by medium high land (29.03%), low land (15.24%), and very low land (4.64%) and also fallow land (10%). Uttar Channel union has 9 Mauza and 85 villages with the area of 5365.99 ha. National Land zoning project, May 2016, Uttar Channel Union was identified and proposed as **Agriculture –Erosion Prone Char Land Zone**. Soil texture is loam to silt loam and the soil P^H is 6.0-6.9. This Union land is changeable and duration of crop period is short and uncertain due to flood and natural hazard. Uttar Channel Union having agriculture cultivated area of 3442 ha of land of which net cropped area is 6981ha. The cropping intensity of this union is 203% which is less than average cropping intensity of Faridpur Sadar Upazila (232%). The highest land area is 3035(88.18%) ha is used for double crops and followed by triple crops 252 (7.32%) ha and remaining 155(4.50%) ha is used as single crops. At present 18 cropping patterns are practiced by farmers under Uttar Channel Union which is shown in Table 3.15. Crop land areas are occupied with paddy cultivation in Uttar Channel Union. Other crops like Jute, Mustard, Wheat, Potato, Pulses, Onion, Turmeric, Banana and vegetables are also included in cropping pattern of this Union.

Table 3.15: Present Cropping Patterns of Uttar Channel Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Uttar Channel	3442	Wheat□□Jute□ Fallow	203	415	12.06
		Boro□ Fallow-□ Fallow		160	4.65
		Pulses (Mashkalai)□Boro-□Fallow		280	8.13
		Til□ Jute□ Fallow		97	2.82
		Pulses (Mashkalai)□Ground nut□B.Aman		460	13.36
		Spices□Jute/B.Aus□ Fallow		250	7.26
		Onion/Garlic□ Jute/B.Aus□ Fallow		288	8.37
		Onion/Garlic□Boro/Aus□Fallow		250	7.26
		Pulses/Potato□ B.Aus□ B. Aman		391	11.36
		Mustard□ Boro□ Fallow		90	2.61
		Pulses/Oilseeds□ B.Aus□ Fallow		100	2.91
		Pulses□Til□ Fallow		100	2.91

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
		Pulses□ Maize□Fallow		120	3.49
		Wheat□Aus□ Fallow		150	4.36
		Spices□Aus□Fallow		50	1.45
		Vegetables□Vegetables□ Vegetables		140	4.07
		Kachu□ Kachu□ kachu		10	0.29
		Banana□Banana□ Banana/Papaya		91	2.64
		Total		3442	100.00

Source: SAAOs of Uttar Channel Union 2016

Major Problems on Crop Cultivation

The major problems in Uttar Channel Union crop cultivation are: (i) Sand deposition on agricultural land affecting normal crop cultivation,(ii) Severe river erosion damages valuable land and properties, (iii) Early flood damages the crops, (iv) Water stagnation, silted canals and Kutcha irrigation drainage system, (v) Acute shortage of food, safe drinking water and drought, (vi) lack of quality seed & equipments supply,(vii) Kutcha road and damaged ,(viii) Oppression of jotdars (land grabber) and their hooligans in the char land areas, and(ix) Affected people have to migrated for their livelihood in city area and (x) Shortage of cold storage & seed store and lack of wholesale market infrastructure.

Recommendation

- (1) Construction of embankment for controlled of river erosion and protecting crops from early flood
- (2) Development of irrigation and other quality crop production inputs facilities, (3) Ensure supply of quality drought tolerant and HYV/Hybrid short durable crops seeds and equipments in subsidized price (4) Multipurpose cold storage and market infrastructural facility should be provided to preserve the perishable products, (4)Improvement of road communication system,(5) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides ,(6) Large scale tree plantation by social forest program, and (7) It is an urgent issue and needs sustainable development plan to solve the problem of this char lands.

3.4. 12 Faridpur Sadar Paurashava Land Use

General Description

Agricultural land is limited in context of increasing population of Faridpur Sadar Paurashava. In Faridpur Sadar Paurashava, a substantial area of agricultural land had shifted to a non-agricultural one viz construction of houses, brickfield, sawmill, road, market, urban expansion and other unplanned infrastructure. National Land zoning project, May 2016, Faridpur Sadar Paurashava was identified and proposed as **Paurashava** area. This paurashava falls into Agro-ecological zones are Lower Ganges River Floodplain (AEZ-12). Faridpur Paurashava consists of 9 Wards and 41 Paura Mahalla with the area of 5365.99 ha. The land

types of this Paurashava are medium high land (70%) and followed by high land (16.67%), medium low land (13.33%). Soil texture is loam to clay loam and the soil P^H is 6.3-7.7. Faridpur Sadar Paurashava having agriculture cultivated area of 536 ha of land of which net cropped area is 240ha. The highest land area is 150(62.50%) ha is used as double crops and followed by triple crops of 73(30.42%) ha and remaining 17(7.08%) ha is used as single crops. The cropping intensity of this union is 223% which is less than average cropping intensity of Faridpur Sadar Upazila. Land is moderately fertile. Faridpur Sadar Paurashava is suitable for cultivation of paddy, Jute, Mustard, Wheat, Pulses, Onion, year round vegetables and Rabi crops (Land Zoning Report, May 2016 & SAAOs November 2016). At present 16 cropping patterns are practiced under Faridpur Sadar Paurashava which is shown in Table 3.16. Paddy, Jute and Onion, Wheat are principal crops in this Paurashava. Less risk of flood.

Table 3.16: Present Cropping Patterns of Faridpur Sadar Paurashava

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Faridpur Sadar Paurashava	240	Wheat□Jute□ T.Aman	223	57	23.75
		Boro□ Fallow□ T.Aman		4	1.67
		Mustard□ Boro□ Fallow		6	2.50
		Boro□ Fallow-□ Fallow		8	3.33
		Pulses□ Aus□T.Aman		5	2.08
		Pulses□Jute□T.Aman		14	5.83
		Oilseeds□Jute□ T. Aman		10	4.17
		Spices□ Jute□ T. Aman		20	8.33
		Onion□ Jute□T.Aman		5	2.08
		Pulses□ Til□ T.Aman		10	4.17
		Pulses□ Aus□B.Aman		30	12.50
		Wheat□Fallow□T.Aman		13	5.42
		Pulses□ Fallow□ T.Aman		45	18.75
		Boro□ Fallow-□ B.Aman		1	0.42
		Vegetables□Vegetables□ Vegetables		7	2.92
		Banana□Banana□ Banana		5	2.08
		Total		240	100.00

Source: SAAOs of Char Faridpur Sadar Paurashava 2016

Major Problems on Crop Cultivation

- (1) The major problems in Faridpur Sadar Paurashava crop cultivation are: (1) Sand filling on fertile agricultural land and unplanned expansion of housing, settlements and infrastructure, (ii) Unplanned expansion of urban and commercial areas, (iii) Drainage Congestion in some areas creates livelihood hazard,(iv) Silted canals, irrigation drainage is kutchha which is wastage of water,(v) Farmers lack of knowledge on modern crop production technology, and (vi)Lack of urban facilities,(vii) Industrial effluents ,(vii) Top soil cutting and (ix) Decrease agricultural productive land.

Recommendation

(1) Excavation and re-excavation of silted canals and irrigation drainage system made pucca or underground pipe system, (2) Farmers training on modern agriculture practices and proper uses of organic and inorganic fertilizers and pesticides, (3) Construction of vegetables and spices processing, grading and packaging industry/ facility and establishment of agro-based industry,(4)Ensuring planned and economic use of agricultural productive land and need to minimizing agricultural land degradation and also introducing regulatory measure like adopting land zoning law and urban rural development plan are necessary to protect the agricultural land which will be ensuring "food security" for all.(5) Preparation of Development Plan for Fourteen Upazila Package-03 needs to be followed which will helpful to control unplanned human intervention as well as to ensure proper uses of agricultural land , (6) The urban area need to be well planned and also should have all facilities for the dwellers.

In agriculture, multiple cropping is the practice of growing two or more crops in the same land during a single growing crop season. All 11 Unions and 01 Paurashava percent of land used for single, double and triple crops under Faridpur Sadar Upazila is shown in Table 3.17 and Figure 3.3. It shows that four highest percentage of single cropped area cultivated were in Decreeer Char Union (17.20%) followed by Ishan Gopalpur (6.83%), Char Madhabdia (5.94%), and Aliabad Unions (5.26%). Similarly, out of all Unions 4 highest areas were cultivated double crops in Uttar Channel (88.18%) followed by Char Madhabdia (87.81%), Decreeer Char (65.28), and Faridpur Paurashava(62.50). Further, 4 highest land used unions for triple crops are Ishan Gopalpur Union (76.21%) followed by Greda (72.04%), Kaujuri (69.40%) and Maj Char Union (67.33%). Out 11 Unions and 01 Paurashava only 5 Unions land were used for 4 crops (Table 3.17).

Table 3.17: Union Wise Land Used of Single, Double & Triple cropped Area in Faridpur Sadar Upazila

Name of Union	Present Land Used in ha (%)						
	Cultivat ed Area	Single Cropped Area	Double Cropped Area	Triple Cropped Area	Four Cropped area	Net Cropped Area (ha)	Cropping intensity (%)
Aliabad	4880	100(5.26)	627(32.96)	1175(61.78)	00	1902	257
Ambikapur	3830	40(2.70)	530(35.81)	910(61.49)	00	1480	259
Char Madhabdia	3205	95(5.94)	1405(87.81)	100(6.25)	00	1600	200
Decreeer Char	3029	260(17.20)	987(65.28)	265(17.52)	00	1512	200
Greda	4089	60(3.95)	363(23.88)	1095(72.04)	2(0.13)	1520	269
Ishan Gopalpur	6344	159(6.83)	360(15.46)	1775(76.21)	35(1.50)	2329	272
Kaujuri	9817	70(1.92)	1020(27.94)	2533(69.40)	27(0.74)	3650	269
Kanaipur	8171	150(5.14)	280(9.60)	2487(65.26)	00	2917	280
Krishnagar	9145	185(4.90)	1841(48.76)	1722(45.60)	28(0.74)	3776	242
Maj Char	4992	45(2.40)	552(29.47)	1261(67.33)	15(0.80)	1873	267
Uttar Channel	6981	155(4.50)	3035(88.18)	252(7.32)	00	3442	203
Faridpur Paurashava	536	17(7.08)	150(62.50)	73(30.42)	0	240	223

Name of Union	Present Land Used in ha (%)						
	Cultivated Area	Single Cropped Area	Double Cropped Area	Triple Cropped Area	Four Cropped area	Net Cropped Area (ha)	Cropping intensity (%)
Total	65019	1336(5.09)	11150(42.49)	13648(52.01)	107(0.41)	26241	

Source: SAAOs and UAO Faridpur Sadar Upazila, DAE 2016

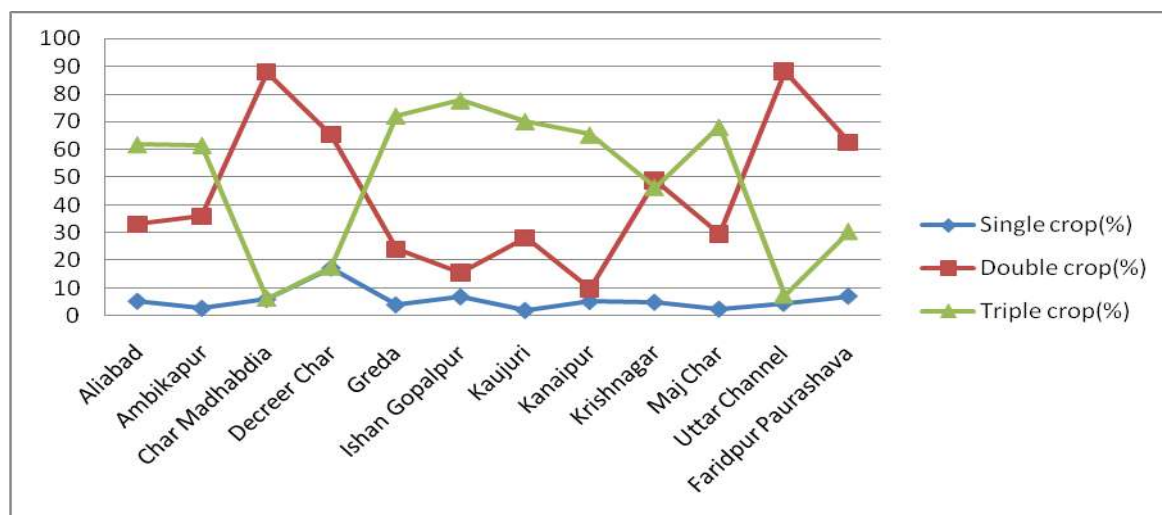


Figure 3. 3: Percent of Union Wise Single, Double and Triple Cropped area under Faridpur Sadar Upazila

CHAPTER-FOUR: CROPPING PATTERN AND CROPPING INTENSITIES

4.1 Cropping Pattern

A cropping pattern is the yearly sequence and spatial arrangement of crops and fallow on a given area. Mixed farming involves the raising of crops, animals and trees. Multiple cropping is the growing of more than one crop on the same land in the period of a year, and sole cropping, or solid planting, is when one crop variety is grown at normal density, alone and in pure stands. The repeated growing of the same sole crop on the same land is monoculture, and crop rotation is the repetitive cultivation of an ordered succession of crops or crops and fallow on the same land. The term 'Cropping pattern' as it applies to the area of reclamation can be defined as the acreage distribution of different crops in any one year in a given farm area such as a water agency, or farm. Thus, a change in a cropping pattern from one year to the next can occur by changing the relative acreage of existing crops, and/or by introducing new crops, and/or by cropping existing crops'. Information that defines a cropping system consists of the number of crops on a given field per year including the accompanying cropping periods from sowing to maturity for each crop cycle and whether each crop is grown under rain fed or irrigated conditions.

Multiplicity of cropping system has been one of the main features of the Faridpur Sadar Upazila. Farmers are harnessing their livelihood by producing various crops round the year. Land utilization and cropping pattern in Faridpur Sadar Upazila depend on effective/planned use of land resources, availability of irrigation facilities, and use of technologies etc.

The scenario of present cropping pattern under Faridpur Sadar Upazila is predominantly Boro (HYV/Hybrid), Aus & T. Aman (HYV/LV) Rice, Jute, potato, Wheat, Maize, Vegetables, Onion/Garlic Oilseeds, Pulses, Spices, Sugarcane, Groundnut, Chili, vegetables and orchard etc. are also included in cropping pattern . Detailed Upazila cropping patterns by season are presented in Table 4.1. Study finding shows that 19 different cropping pattern are practiced by Faridpur Sadar Upazila farmers. Faridpur Sadar Upazila present five main cropping pattern are: Pulses/oilseeds/Spices→Jute→T. Aman(HYV) (16.06%), Onion/Garlic→Fallow→T. Aman(15.45%), Wheat→Jute→T. Aman(12.20%), Wheat→ Jute→ fallow (10.37%), and Boro (HYV/Hybrid)→Fallow→T. Aman (8.13%). Both winter and summer vegetables cropping pattern covering about 5% of the NET Cultivable Area. This finding clearly indicated that Faridpur Sadar Upazila soil and climate are suitable for diversified crop production such as, paddy, wheat, maize, jute, oilseeds, chili, winter and summer vegetables, onion/garlic, pulses, sugarcane, and different fruits (Mango, Litchi, Papaya and Guava) production.

Table 4. 1: Present Cropping pattern under Faridpur Sadar Upazila

Major Cropping Pattern			Area(ha)	Contribution %
Rabi	Kharif-1	Khari-2		
Wheat	Jute	T.Aman	3000	12.20
Wheat	Jute	Fallow	2550	10.37

Major Cropping Pattern			Area(ha)	Contribution %
Rabi	Kharif-1	Khari-2		
Boro (HYV/Hybrid)	Fallow	T. Aman	2000	8.13
Boro (HYV/Hybrid)	Fallow	Fallow	1550	6.30
Pulses/Oilseeds/Spices	Jute	T. Aman (HYV)	3950	16.06
Pulses/Oilseeds/Spices	Jute	Fallow	1000	4.07
Onion/Garlic	Fallow	T.Aman	3800	15.45
Onion/Garlic	Jute	Fallow	1250	5.08
Pulses	Til	T.Aman	500	2.03
Pulses	Til	Fallow	400	1.63
Pulses	Aus	B.Aman	700	2.85
Pulses	Aus	T.Aman	300	1.22
Pulses (Maskalai)	Maize	Fallow	250	1.02
Pulses/Oilseeds	Chili	Chili	200	0.81
Potato	Aus	B.Aman	250	1.02
Vegetables	Vegetables	Vegetables	1200	4.88
Maskalai	Groundnut	B .Aman	1100	4.47
Sugarcane	Sugarcane	Sugarcane	500	2.03
Orchard	Orchard	Orchard	88	0.36
Total			24588	100.00

Source: SAAOs and UAO, Faridpur Sadar Upazila, DAE 2016, Note: Rabi Season= Month of November-February, Kharif-1 Season= Month of March-June and Kharif-2 Season= Month of July- October.

4.2 Cropping Intensity

Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area. Cropping intensity is an important index of utilization of land. Crop intensity is the index of assesses farmers actual land use in area and time relationship for each crop or group of crops compared to the total available land area and time, including land that is temporarily available for cultivation. It is calculated by summing the product of area and duration of each crop divided by the product of farmers total available cultivated land area and time periods plus the sum of the temporarily available land area. For a specific crop, the cropping intensity is the number of times that crop is grown in one year on the same field. It is distinguishing single, double and triple cropping systems respectively.

The present Union wise (11 Unions) and Paurashava cropping intensity is shown in Figure-4.1. The average cropping intensity under Faridpur Sadar Upazila is 232% which is higher than cropping intensity of 3 Unions & paurashava and also less than 8 Unions (Fig.4.1). The highest cropping intensities were achieved in Kanaipur (280%), Greda and Kaujuri(269%) and lowest cropping intensity under Char Madhabdia and Decreer Char Union(200%).The

average cropping intensity under Faridpur Sadar Upazila is 232% which is higher than Faridpur district (227%) and national average cropping intensity (192%) (Krishi Diary 2017). Figure 4.1 shows all the 11 unions & Puarashava under Faridpur Sadar Upazila cropping intensities are higher than national average cropping intensity (192%). Study finding clearly indicated that markedly increase crop diversification in this Upazila and it is attributed to agriculture and prevailing socio-economic situations of the farming community.

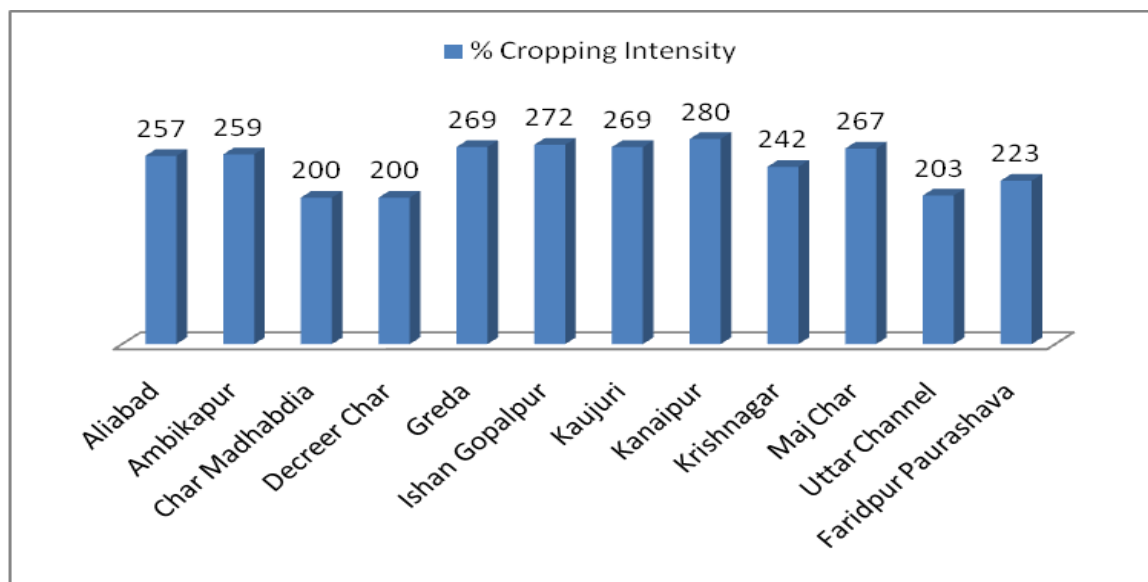


Figure 4. 1: Union wise Cropping Intensities under Faridpur Sadar Upazila

4.3 Present Cropped Area

In Faridpur Sadar Upazila soil and climatic conditions are suitable for growing wide range of both tropical and temperate crops. Rice, Jute, Wheat, Maize, winter and summer vegetables, potato, mustard, groundnut, chili, pulses, and various fruits crops are grown in 11 Unions and Paurashava under this Upazila. Faridpur Sadar Upazila present scenario of different cropped area, yield rate and production levels are shown in Table-4.2. The present total diversified cropped area is 42749 ha of which rice cropped area are 16415 ha and the rest 26334 ha is covered by non-rice crops (Jute, Potato, W & S. vegetables, pulses, and oilseeds and Fruits etc.). The rice and non-rice cropped area are about 38% and 62% respectively of the total cropped area. The highest land area was used for T. Aman (HYV) rice, Pulses, Wheat and Spices cultivation.

4.4 Present Crop Production

Crop yield depends on soil fertility, variety, irrigation facility and other management. HYV/Hybrid rice or others crops gives higher yield in compared to local variety crops. Total crop production is 212754.95 metric tons of which rice production is 75444.35 metric tons and non-rice production is 137310.6 metric tons (Table-4.2). Among the rice crops the highest contributions of T. Aman (HYV) and Boro (HYV) are about 60% and 34% respectively. The highest contribution among the non-rice crops are spices (48%) followed by Wheat (15%) & winter vegetables (11%), and pulses (8%) respectively and other crops

contribution are shown in Table-4.2. Overall, rice and non-rice production difference is 35% and 65% in this upazila. The spices crops (onion,garlic etc) are very popular in this Upazila.

Table 4. 2: Present Cultivated Area, Yield and Production under Faridpur Sadar Upazila

Crop Grown	Crop area (ha)	Yield/ha (mt)	Production (mt)	Contribution (%)
Aus (LV)	175	2.12	371	0.49
T.Aus (HYV)	650	3.23	2099.5	2.78
T. Aman (LV)	475	2.72	1292	1.71
T. Aman (HYV)	11045	4.09	45174.05	59.88
Boro (HYV)	3960	6.46	25581.6	33.91
Boro (Hybrid)	110	8.42	926.2	1.23
Sub Total Rice	16415		75444.35	100.00
Summer Vegetables	480	15	7200	5.24
Winter vegetables	720	20	14400	10.49
Wheat	7050	3	21150	15.40
Maize	250	7.5	1875	1.37
Jute	1100	3.5	3850	2.80
Sweet Potato	50	40.5	2025	1.47
Potato	140	27.74	3883.6	2.83
Spices (Onion & Garlic etc)	6718	9.85	66172.3	48.19
Oil seeds (Mustard, Til, Groundnut)	2416	1.2	2899.2	2.11
Pulses	7272	1.5	10908	7.94
Sugarcane	50	14.95	747.5	0.54
Fruits (Orchard)	88	25	2200	1.60
Sub-Total	26334		137310.6	100.00
Total	42749		212754.95	

Source: SAAOs and UAO, Faridpur Sadar Upazila, DAE 2016

4.5 Irrigation Facilities under Different Unions

Irrigation is the lifeline of agriculture, because without irrigation facility crops diversification or HYV /Hybrid cultivation would be impossible. Irrigation facilities assured production of crops in the dry season as well as stabilized production through supplemental irrigation of the rain fed crops and ensured greater productivity. The main source of water is both surface and ground water. For Boro Rice cultivation ground water conservation and proper utilization in this Upazila is very important. This study is assessed the present scenario of irrigation facilities and problems. For irrigation purposes, generally, Deep Tube Wells (DTW), Shallow Tube Well (STW) and Low Lift Pump (LLP) and also traditional instrument are used. Union wise DTW, STW and LLP under Faridpur Sadar Upazila is shown in Table-4.3. A total of 6607 machine were used for irrigation under Unions in Faridpur Sadar Upazila. A total 22 DTW, 6573 STW and 12 LLP along with other indigenous irrigation tools are used for lifting water. This indicates that farmers have access to irrigation water that through ground water

lifting causing an adverse impact both in agricultural production and surrounding environment. In many cases small and marginal farmers are involved in operation and maintenance of irrigation equipments. All 22 DTW, 439 STW and 6 LLP has electricity facilities but 6134 STW & 6 LLP has no electricity. Electricity user's farmers reported that failed or disruption of electricity supply during Boro season were acute problems under Faridpur Sadar Upazila. Framers wanted nonstop electricity supply during Boro season. Majority of the Farmers reported irrigation drainage system of DTW, STW and LLP 95-100% drain is kutchha which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Table 4. 3: Union Wise Irrigation Machine under Faridpur Sadar Upazila

Name of Union	DTW		STW		LLP		Remarks	
	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	% Pucca drain	% Kutch drain
Aliabad	0	0	26	170	01	0	LLP=50	STW=100,LLP=50
Ambikapur	0	0	45	313	0	0		STW=100
Char Madhabdia	0	0	54	710	0	0		STW=100
Decreer Char	0	0	5	159	0	0		STW=100
Greda	02	0	70	270	03	02	DTW=40,STW=5,LLP=3	DTW=60,STW=95,LLP=97
Ishan Gopalpur	01	0	38	760	0	0	DTW=80, STW=01	DTW=20,STW=99
Kaujuri	06	0	40	960	0	0	DTW=100,STW=01	STW=99
Kanaipur	05	0	35	450	0	0	DTW=01	DTW =99 & STW=100
Krishnagar	03	0	34	1003	0	02	DTW=10	DTW=90,STW & LLP=100
Maj Char	04	0	82	497	02	0	STW=5	DTW & LLP=100,STW=95
Uttar Channel	0	0	04	787	0	0		STW=100
Faridpur Paurashava	01	0	06	55	0	02	STW=02	DTW & LLP=100,STW=98
Total	22	0	439	6134	06	06		

Source: SAAOs under Faridpur Sadar Upazila, DAE 2016

Now-a- days, irrigation is considered as a basic input for producing cereals and many other high value crops. Most of the farmers are dependent on irrigation. Good coordination between land and water is required for ensuring food security. In rabi season mechanized irrigation can help to increase crop diversification. Status of Union wise irrigation and ground and surface water used under Faridpur Sadar Upazila is shown in Table 4.5. It shows that 9 Unions & Paurashava 81-99 % land area covered by irrigation water in rabi season. Only Uttar Channel and Krishnagar Unions 46-70% land are covered by irrigation water. Data of Table 4.5 shows that 1-19% Unions land were not developed irrigation facilities in this Upazila. This indicates that most of the farmers have access to irrigation water which is a good sign for intensive farming. But in the long term, excessive ground water lifting may cause an adverse impact both in agricultural production and in the surrounding environment.

Farmers have given supplementary irrigation in drought prone and water logged areas in this Upazila.

Table 4. 4: Status of Union wise Irrigation and Ground & Surface Water Used Area

Union	Irrigated Area (%)	Non Irrigated Area (%)	Irrigated Area						Availability of Surface Water	Drought Prone Area (in ha)	Char Land Area (in ha)	Water Logged Area (in ha)	Remarks
			Ground				Surface						
			DTW		STW		LLP						
			No	Area (%)	No	Area (%)	No	Area (%)					
Aliabad	90	10	2	2	430	97	1	1	√	5	120	15	Supplemental Irrigation Drought prone & Waterlogged area
Ambikapur	96	4	0	0	534	100	0	0	√	0	150	0	
Char Madhabdia	97	3	0	0	900	92	25	8	√	0	0	0	
Decree Char	81	19	0	0	135	100	0	0	-	100	250	50	
Greda	79	21	3	22	414	47	24	31	√	0	15	15	
Ishan Gopalpur	97	3	1	1	1032	99	0	0	-	0	150	10	
Kaujuri	91	9	6	11	700	89	0	0	-	220	0	20	
Kanaipur	91	9	4	2	845	98	0	0	-	0	0	200	
Krishnagar	70	30	2	1	1200	98	5	1	√	0	0	50	
Majh Char	99	1	3	5	640	92	2	2	√	90	0	95	
Uttar Channel	46	54	0	0	821	100	0	0	-	80	2869	150	
Faridpur Paurashava	88	12	1	5	61	90	2	5	√	10	0	40	

Source: National Land Zoning Project Report, May 2016

4.6 Cultivation Practices

Most of the cultivators of this Upazila are directly or indirectly depends on agriculture. Wide range of rabi and karif crops such as Boro HYV/Hybrid variety of rice and Transplanted Aman (HYV) rice, Jute, wheat, maize, potato, sugarcane, onion, garlic, groundnut, till, turmeric, pulses and different kinds of winter and summer vegetables which are cultivated under both rain fed and irrigation condition. Fruits grow well here are Banana, Mango, Litchi, Papaya and Coconut cultivation are very famous in Faridpur Sadar Upazila. Farmers cultivate different vegetables such as Brinjal, Potato, Chili and Cabbage etc. The main thrust of mechanization is to reduce dependence on human labor and draft/animal power for tillage, planting, intercultural operation and harvesting crops. It contributed to timely cultivation and thus increased cropping intensity, reduce yield losses and wastage. Use of machines has also cut down the cost of threshing. All the SAAOs and UAO reported that about 80% farmers used power tiller and 20% farmers used tractor during land preparation. Generally, per hector cultivation cost is Tk. 6000-7000/-. Boro and T. Aman rice seedlings grown in seedbed are uprooted when they are about 30-45 days old and transplanted in the main fields. They transplanted Boro and T. Aman rice practiced line sowing. Generally, in rice field weeding is done once, about a month after transplanting and this exercise is closely followed by top dressing with urea. Majority of the farmers did not use balance dose of chemical fertilizers due to lack of knowledge. Farmers reported pests are acute problems for crop production. Farmers used pesticides over and under dose as preventive and curative measures for controlling different pests because of lack of knowledge.

4.7 Major Types of Crops Cultivated

Char Land Agriculture: Ganges-Padma River System one of the three major river systems of Bangladesh. Its flow –tendencies and geo-tectonic situation produced a ‘by-product’ called Char. Most char land soil is sand or sandy type. Besides sand, the char land soils also variation as to texture, their being a different textures found through the char lands. Physical, social, economic and political vulnerabilities are the underlying cause of chronic and persistent poverty in char land areas of this Upazila. Majority of char dwellers rely on agriculture for their livelihood. More than thirty different crops are suitable for cultivation in char land during Rabi and early kharif season and large number of them are high value cash crops. Behind flood water leave, the silted sand plain ‘Char’ lands are basically infertile. By sandbar cropping (a new methods) dried-up riverbeds and river basins has been turned into crop product. By simply digging holes in these sandy residues and filling those with manure, compost and pumpkin and other crop seeds have thrived. Sandbar and other innovative technologies farmers has been planting tree like mango, Jujube and banana on these char lands, with diversified crops including maize, chili, lentil, groundnut, sesame, mustard and vegetables including sweet gourd, melon, cucumber, onion, garlic, cabbage and tomato etc.

Rice: Rice is a primary crop and a staple food of this Upazila. The rice production has significantly increased with the adoption of modern rice varieties and introduction of latest appropriate technological innovation and technology: => Replacement of local varieties by modern HYV/Hybrid varieties in Boro, Aus and T. Aman season; => Increase of irrigation areas in both Boro and T.Aman season; and=> Use of quality seeds.

Jute: It is a primary and one of the main cash crops of this Upazila. Jute is an eco-friendly fiber. Jute cultivation requires less labor and less input. Despite the relative decline in importance of jute in agriculture, potential still exists for the fiber to increase its contribution to the economy through productivity increases and diversification. Yield increase, availability of better quality seeds, and improved provision of extension and credit support to growers for this crop. Jute leaf is a common and favorable vegetable item to the farmer.

Maize Cultivation: Maize is third important cereal after rice and wheat. It is a versatile crop and is more nutritious and requires less irrigation. Low risk in maize production is another privilege taken by farmers. Marginal and poor farm families are showing interest in maize cultivating. This is possible due to the adaption of modern maize varieties since production has been expanding fast. Its price, demand, and supply are increasing in domestic market. Pop-corn as an alternative food has been getting priority. It has diversified usages in small business and poultry feed production. Farmers can earn more by maize cultivation. Lack of capital as well as high price of inputs is a barrier to its higher production. Maize cultivation is becoming profitable than other cereals among farmers in Faridpur Sadar Upazila.

Sugarcane: Sugarcane is the principal raw material for sugar, gur, and cane juice. It is only dependable industrial crop in Faridpur Sadar Upazila. Based on sugarcane, the sugar mill in Mudhukhali and gur (Molasses) industries of this region has developed. The by-products obtained from sugarcane include fuel and livestock feed. It is considered as one of the most

efficient converters of solar energy. The soil and climate of Faridpur Sadar Upazila found very suitable for sugarcane plant growth. High humidity during the growing period and dry weather at maturation lead to high production. Family labor cost, cost of fertilizer, number of fertilizing, sowing/planting time of intercrop, cost of sett were the important factors which influence the profitability of sugarcane production both as intercrop and as monoculture. High prices of inputs, lack of scientific knowledge are the major problems in sugarcane production.

Potato/Sweet potato: Potato, a tuber crop, is cooked and eaten as a vegetable. In the context of nutrient, potato is comparable with rice and wheat. It is widely cultivated in winter with huge potential in area. The soil and climate conditions of Faridpur area are favorable for potato/sweet potato production. Sunny land with cool and moisture in soil is appropriate for potato cultivation. But unavailability of quality inputs (seeds, fertilizer and pesticide), lack of knowledge on proper cultivation techniques and finally low investment capacity of the farmers are some of the major challenges in potato farming.

Oilseed crops: Mustard, Groundnut, Sunflower and Til are popularly cultivated in Faridpur sadar Upazila. Mustard as an oilseed crops takes first place in respect of cultivated area in Bangladesh. Farmers of Faridpur Sadar Upazila generally cultivate mustard before Boro cultivation. Mustard oilcake is a nutritious food for cattle. This oilcake also used as organic fertilizer and the dry mustard plants can use as fuel.

Vegetables: Tomato, Sweet potato, Brinjal,, Radish, Cauliflower, Cabbage, Bean, Chili, Lalshakh, Loncho, Kolmi, Peas, Kochu, Bitter gourd, Pumpkins, Gourd, Rai- Shakh, Ladies finger, Palong, Spinach, Cucumber etc. Potato is a tuber crop which cooked and eaten as a vegetable. Encouraging homestead level vegetables cultivation could be alternative source of household income generation. It is widely cultivated in winter with huge potential in Faridpur Sadar Upazila. The soil and climate conditions of this Upazila area are favorable for multiple vegetables production. But unavailability of quality inputs (seeds, fertilizer and pesticide), lack of knowledge on proper cultivation techniques and finally low investment capacity of the farmers are some of the major challenges in vegetables farming.

Spices: The important spices are Chili, Turmeric, Ginger, Onion & Garlic etc. The soil and climate conditions of this Faridpur Sadar Upazila are favorable for Chili and Onion production. There is wide opportunity to grow onion & garlic as commercial basis to meet up internal demand and also to export.

Pulses: The pulses of Bangladesh comprise of six major crops, namely, lentil, khesari, black-gram, mungbean, chickpea and pigeon pea. The soil and climate of Faridpur Sadar Upazila areas are highly suitable for cultivation of different types of pulses. At present 7272 ha lands used for pulses cultivation. Lentil, mungbean and pigeon pea occupy important place in this area. The cropped area and production of these pulses have been on the decline over the past few years mainly because of the increased emphasis on HYV rice, wheat and maize. But pulses are very important because of their protein supply to the human diet and nitrogen fixation for soil nutrition.

Fruits: Mango, Jackfruit, Litchi, Banana, Coconut, Betel Nut, Country Goose Berry, Guava, Plum, Kul, & Papaya. Many farmers have established commercial gardening of Mango, Litchi, Papaya and Guava etc.

Conversion of Agriculture Land to Non-agriculture

Agricultural land denotes the land suitable for crop production. It is one of the main resources in agriculture. Many high value crops are grown in Faridpur Sadar Upazila. There is wide opportunity to grow Jute, onion, garlic, pulses, turmeric, and vegetables as commercial basis to export. “Non-agricultural land” means such land which is used for different purposes and is not connected with agriculture. Such kind of land can be called non-agricultural land, if any developmental activity is carried over on the land and makes land unfit for crop production. In Faridpur Sadar Upazila a substantial amount of agricultural land had been shifted to a non-agricultural one viz construction of houses, brickfield, sawmill, industry, road, market and other infrastructures. Absence of proper planning converts the arable land to other uses rapidly. The major components of transforming agricultural land to non-agricultural purposes are as follows:

- =>Non –agricultural development activities on agricultural land.
- =>New or existing infrastructure and urban expansion.
- =>Construction of brick fields and new settlements in agricultural land.
- =>Acquisition of agricultural land for non-agricultural purposes.



Plate 1: Preparation of Vermi-compost



Plate 2: Floating rice seed bed



Plate 3: Rice Tran's planter



Plate 4: Irrigation by Deep Tube Well



Plate 5: Demonstration of Rice Seed Production



Plate 6: Sugarcane crop Field



Plate 7: Summer Tomato Field



Plate 8: Chili and Jute field



Plate 9: Flower and Fruit Garden



Plate 10: Banana Garden



Plate 11: Cultivation of Dragon Fruit



Plate 12: Farmer Gourd field



Plate 13: Farmers Leafy Vegetables Field



Plate 14: Bean Field



Plate 15: Demo of pheromone Trap



Plate 16: Monitoring Pest Infestation



Plate 17: Demo of Light trapping for pest control



Plate 18: Perching in Rice Field



Plate 19: Discussion with UAO on PDPFUP-03



Plate 20: Discussion with UNO on PDPFUP-03



Plate 21: Discussion with Fisheries Officer



Plate 22: Discussion with all SAAOs for data



Plate 23: SAAOs given agriculture data



Plate: 24: UAO given speech to SAAOs



Plate 25: Discussion with SAAOs



Plate 25: AEO given speech to SAAOs



Plate 26: Open discussion on PDPFUP-03 information



Plate 27: Discussion with SAAOs for Agric-



Plate 28: SAAOs of Faridpur Sadar Upazila



Plate 29: SAAOs of Faridpur Sadar Upazila



Plate 30: Consultant discussion with individual SAAO



Plated 31: SAAOs filled up questionnaire

CHAPTER FIVE: PRODUCTION COST OF RICE AND VEGETABLES

5.1 Cost of Rice production

Bangladesh has achieved the self-sufficient in rice production in 2012. In terms of individual crops, rice continuous to dominate the agriculture sector-occupying more than three fourths of cropped area. The production cost of paddy varies depending on crop season, variety (HYV/Hybrid/LV), land preparation (Power tiller/Tractor/Bullock), seeds and seedlings, manure and fertilizer, irrigation (complete irrigated Boro Rice) and rain fed or provided supplementary irrigation), pesticide and labor. To assess farmers cost of rice production, Agriculture Economic Division of BRRI 2014-15 and 2015-2016 were conducted survey all over the country in three rice seasons (Boro, Aus and Aman paddy). BRRI study findings show that Boro and Aus farmers per kg rice production cost is Tk 18.65 and Tk.18.64 and Aman rice production cost is Tk17.61 which is less than Boro and Aus. During 2015-16, BRRI study shows that farmer's average per kg cost of Boro Tk.20.07 followed by Aus Tk.18.37 and Aman Tk.17.83 in the year 2015-16 (Table 5.1). Cost of per kg Boro rice production is increased Tk.1.42.

Department of Agriculture Marketing was estimated production cost for Boro rice Tk.18.08 per kg, Aman Rice Tk.18.20 per kg and Wheat Tk.23.50 per kg in the year 2015-16 and also production cost was calculated for Boro Tk. 22.06, Aman rice Tk.19.0 and Wheat Tk. 28.50 per kg in the year 2016-17. Table 5.1 shows that farmers production cost of Boro, Aman and wheat is increased in 2016-17 in compared the rice production cost of 2015-16. Generally, Government has declared the buying rate of Boro, Aman and Wheat from farmers every year. On this basis Government has declared buying rate of Boro rice Tk.20.70, Aman rice Tk.18.50 per kg and Wheat 27.02 per kg respectively in 2016. In 2017, Government has declared the buying rate for Boro rice Tk.24.00 and Wheat Tk.28.00. Faridpur Sadar Upazila farmers and DAE SAAOs reported that Boro rice per kg or per ha production cost is higher than T. Aman rice because T. Aman rice is cultivated by natural water or rain water. There is no need for supplementary irrigation for Aman rice production. Fertilizers and pesticides are needed more in Boro rice production in compared to Aman rice. Farmers wanted and also need to ensure the profitable farm gate price for rice.

Table 5. 1: Cost of Rice Production (2014-16 and 2015-2017)

Name of Crops	Average per kg crop production cost (Tk.) in 2014-15 (BRRI)	Average per kg crop production cost (Tk.) in 2015-16 (BRRI)	Average per kg crop production cost (Tk.) in 2015-16 (DAM)	Average per kg crop production cost (Tk.) in 2016-17 (DAM)
Boro	18.65	20.07	18.08	22.06
Aus	18.64	18.37	-	-
Aman	17.61	17.83	18.20	19.00
Wheat	-	-	23.50	28.50

Source: Agriculture Economic Division, BRRI 2016, and Department of Agriculture Marketing (DAM) 2016 &2017

5.2 Cost of Vegetable Production

Production of vegetables is a key factor in ensuring a continuous supply of raw materials for the development of agribusiness in horticulture. It is often argued that vegetable production in Bangladesh has comparative advantages, but despite these opportunities, agribusiness in horticulture is not flourishing commercially, especially for vegetables. The production cost of vegetables varies depending on crop, variety, time, place, and season. During the present survey, farmers were asked to identify the major types of production costs on which they usually spend. According to the respondents, the production cost of vegetables can be categorized into eight major categories: land preparation, seeds and seedlings, manure and fertilizer, irrigation, pesticide, labor, lease/rent of land, and other expenses like fencing, shedding, mulching etc. Farmers of Faridpur Upazila reported that major cultivation occurred in land preparation (Power tiller/tractor cost), irrigation, pesticides, fertilizers and labor. Farmers reported that per ha land cultivation cost is Tk. 7000-8000/- (*Upazila Agriculture Office, Faridpur Sadar*). Generally, supplementary irrigation provided potatoes, Chili and others winter vegetables. Supplementary irrigation cost is 3000-5000 taka or more depends on crops and number of application. The highest supplementary irrigation provided in winter and summer vegetables crop field. Farmers did not practice supplementary irrigation T. Aman crops. The highest pesticides used in T. Aman and Boro rice fields (Tk.5000-6000/-) and Winter & Summer vegetables fields (Taka 4000-4500/ha). Labor cost day by day increased and per day labor cost more or less Tk. 350-400 depends on crop season.

The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower vegetables production under Faridpur Sadar Upazila which is shown in Table 5.2. Finding shows that Tomato cultivation is more profitable Tk. 925000/-per ha followed by Brinjal Tk. 825000/- per ha, Cabbage/Cauliflower Tk. 455000 per ha and potato Tk 290000per ha respectively. Study finding clearly indicated that all four types of vegetables cultivation are profitable for farmers of Faridpur Sadar Upazila. It is important to develop business based on growing vegetables to encourage the farmers, since horticultural crops have comparative advantages in Bangladesh. Cost-benefit analysis of these crops also suggests that production of vegetables is economically viable for the country. Despite the prevailing opportunity for these crops, the country has not been able to create any successful businesses in this sector.

Table 5.2: Financial Profitability of 4 types of Vegetables Production in Faridpur Sadar Upazila

Vegetables	Yield (Kg/ha)	Price (Tk/Kg)	Gross Return (Tk/ha)	Total Cost (Tk./ha)	Net Return (Tk/ha)
Brinjal	53000	20	1060000	235000	825000
Tomato	55000	25	1375000	450000	925000
Potato	36000	15	540000	250000	290000
Cabbage/ Cauliflower	54000	15	810000	355000	455000

Source: SAAOs and UAO, Faridpur Sadar Upazila 2016

Monsura Zaman, Rokhsan-Ara-Hemel and Tahmina Ferdous (2010) assessed the cost of production of four winter vegetables namely cauliflower, cabbage, tomato and brinjal in five villages under Dhaka district. The study finding shows that 39.2% of the total cost was devoted to labor, 30.3% to fertilizer, 3.4% to seed, 4.8% to pesticides, 7.9 % land rent, 6.3% to land preparation, 4.2% to irrigation and 3.6% to interest on capital, whereas, the result estimated by AVRDC (2001) shows that 48.4% of the total cost was devoted to labor, 24.2% to fertilizer, 6.1% to irrigation, pesticides and 3.7% to seeds (Fig.5.1). Cost of per kg and per 40kg was found approximately the highest for tomato and the lowest for cabbage and cauliflower.

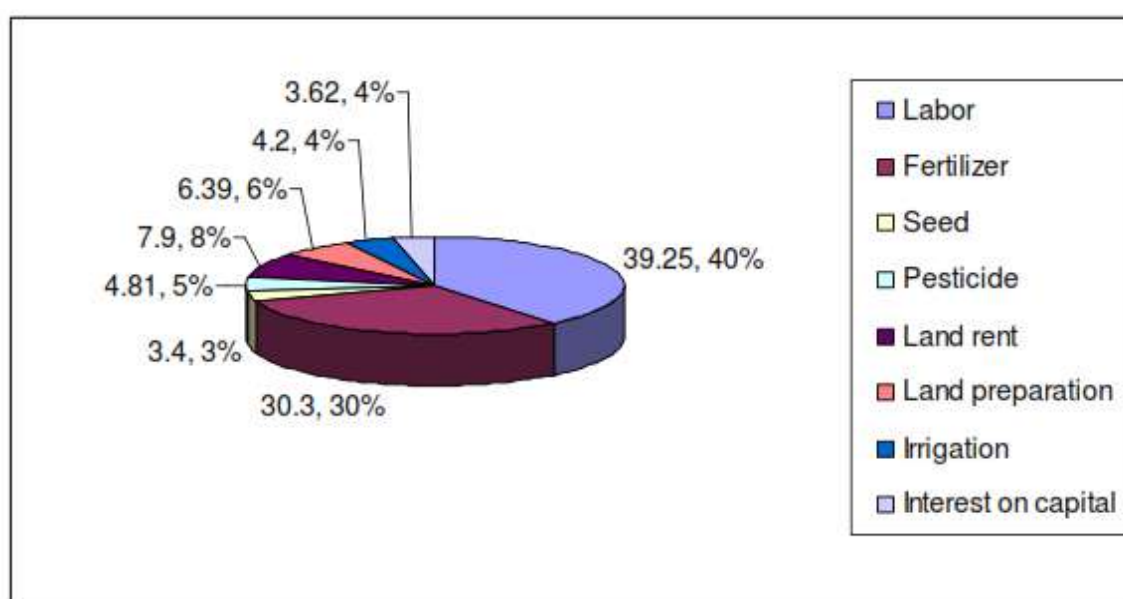


Figure 5. 1: Percentage of Major Types of Production Costs for Vegetables.

(Source: ASA University Review, Vol. 4 No. 1, January–June, 2010)

Brinjal is one of the most popular and important vegetable in Faridpur Sadar Upazila. Farmers are cultivated this vegetables throughout year. Compare the financial profitability of brinjal vegetable production in different region in Bangladesh. Several studies were done to estimate the financial profitability of brinjal vegetable production (Table 5.3). It is evident from the table that productions of brinjal vegetable were increased chronologically. This is due to adoption of farmers for different HYV varieties of brinjal. Price of brinjal vegetable was also increased through time change. Farmers were adjusted their vegetables price due to change the production cost. Now farmers used different insecticide, pesticide and fertilizer to increase production and protect vegetables from disease and pest. For this reason profitability of different vegetables also increased. It is true that total production cost of different vegetables increased but net margin also increased. Farmers were produce different vegetables because vegetables productions were profitable in the present study area which is reflected by high BCR for brinjal vegetable. The previous studies were done several years ago and we can interpret the different return by yield, price and place difference. The prices of brinjal

vegetable are high in all over the country. Finally it is clear that productions of vegetables are more profitable in the study area like other vegetables growing areas.

Table 5. 3: Compare the Financial Profitability of Brinjal Vegetable Production in Different Region

Cultivation year	Study Area	Yield (kg/ha)	Price (Tk/kg)	Gross Return (Tk/ha)	Total Cost (Tk/ha)	Net Return (Tk/ha)	BCR	Sources
1997	Bangladesh	11730	6.0	70372	17,343	53,029	4.06	EPC, 1997
1998	Comilla	24,699	2.51	61,994	31,339	30,655	1.98	Miah et al., 1998
2002	Jessore	43,899	7.09	3,10,293	1,77,457	1,32,836	1.75	Rashid et al. 2002
2014	Dhaka	55,691	18.00	10,02,438	269,627	732,811	3.72	Hasan et.al 2014

CHAPTER SIX: GROWTH OR DECLINE OF AGRICULTURAL LAND DURING LAST TEN YEARS

Land is the most valuable resource among all the natural resources of a country which provides food, shelter including lifesaving elements to her ever increasing population. A census on land resources reported that everyday 220ha of arable land was converting for other uses like construction of houses, roads, commerce and industries and for other non-agricultural activities, which is very alarming for the sustainability of land resources of our country.

Quantification of various parameters in relation to land use and farming is really a very difficult task, specially, in Bangladesh where record keeping is poor either by an organization or by individual. Beside this difficulty in mind a sincere attempt has been made to collect land use last ten years data (2005 to 2015) from Upazila Agriculture Officer, Upazila Fisheries Officer, Upazila Livestock Officer and discussion with 11 Unions and 01 Paurashava all Sub- Assistant Agriculture Officers of Faridpur Sadar Upazila and review the other documents. The present scenario of growth or decline of agricultural land used during last ten years under Faridpur Sadar Upazila is shown in Table 6.1 & Figure 6.1. Table 6.1 finding shows above 98% local variety rice was decreased during last ten years. The main reason for decreased local variety rice area due to yield is less in compared to HYV & Hybrid rice and farmers dictated to switchover cultivated HYV and Hybrid rice. The HYV/Hybrid paddy cultivation area 204% was increased. The reason for increased HYV rice cultivated area due to higher yield many farmers were cultivated HYV and Hybrid rice. Study finding shows that maize production is 272% increased but wheat production is gradually above 54% decreased. Remarkable significant changed or increased during 10 years was occurred in winter (250%) and summer vegetables (86%) production under this Upazila. The main reason for increase maize, winter & summer vegetables due to farmer's switchover cultivated less risk and high profitable crops. Highly significant changed or increased during ten years was occurred in Spices (335%) followed by Tuber crops (128%), Pulses (20%), and Jute (12%) land use. The main reasons for increases are produce crop market demand and price is high. Table 6.1 shows, among the other purposes remarkable significant changed were occurred in Brick field (215%) and followed by poultry farm (118%), Industries (37%) and fish cultivation (6%) respectively. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on agriculture crop production. Protection of double & triple cultivated agricultural land is very important issue. With rapid population growth the area of per capita land is even decreasing. Life style change of huge numbers of people and growing demand of industry, road and developing various infrastructures cause conversion of agricultural land. As a result, the area of agricultural productive land is decreasing gradually making resource base for fisheries, industries, housing and other uses. However, alike other parts of the country, the area of agricultural land of Faridpur Sadar Upazila

are reduced gradually because of growing pressure from increased human population and industrial & commercial development. To ensure food supply to an increased population of the country, cultivable land should be protected from being converted to other land uses. Protection of double and triple cropped land area is the top priority issue.

Table 6. 1: Growth or Decline Agriculture Land Use during the Last 10 Years

Sl. No.	Agricultural land use	Land Use (2005) in ha	Land Use (2015) in ha	% Change
1	Paddy (local varieties)	35000	650	-98.14
2	Paddy(HYV)	8085	24588	+204.08
3	Wheat	5600	2550	-54.46
4	Maize	25	93	+272
5	Vegetables (Summer)	740	1375	+85.81
6	Vegetables (Winter)	8699	30519	+250.8
7	Tuber crops	230	524	+127.83
8	Pulse crops	5922	7127	+20.35
9	Oilseed crops	2600	2400	-7.69
10	Spice crops	890	3875	335.39
11	Sugarcane	1960	450	-77.04
12	Jute	6780	5950	+12.24
13	Water body	5750	6116	6.36
14	-Brick field	45.35(15)	142.90 (75)	+215.10
15	-Poultry farm	4.50(5)	12.24(160)	+117.96
16	Industries	28.9(15)	62.99(50)	+36.51

Source: SAAOs, UAO, ULO, UFO and Upazila Statistic Office of Faridpur Sadar Upazila 2016.

Note: #= Number.

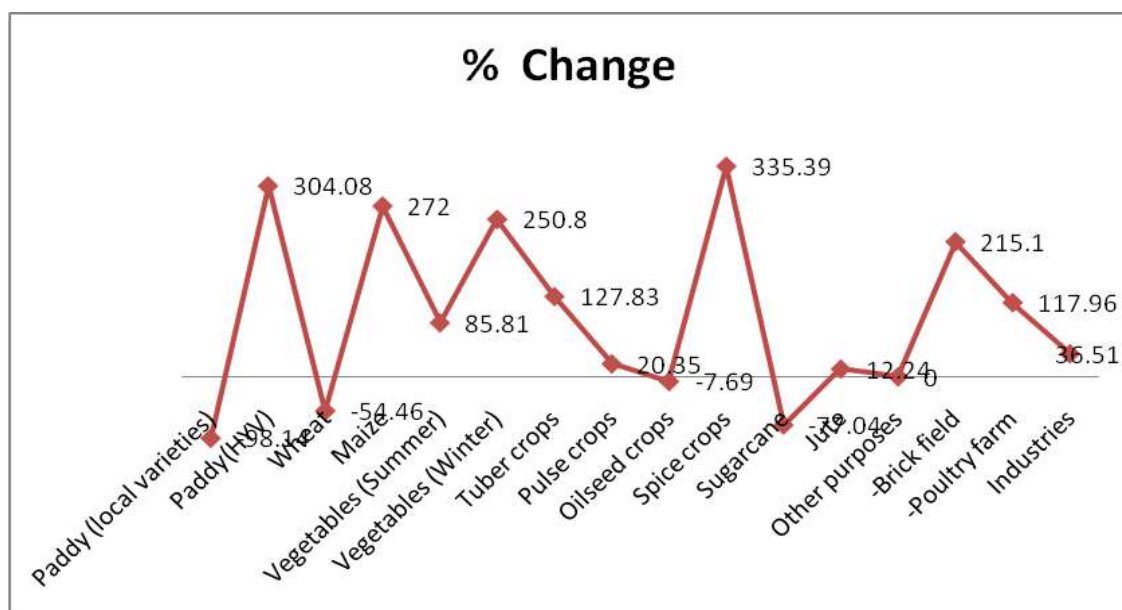


Figure 6.1: Growth or decline Agriculture Land in Faridpur Sadar Upazila during Last 10 Years (2005-2015)

CHAPTER SEVEN: MAJOR PROBLEMS OF CROP PRODUCTION IN FARIDPUR SADAR UPAZILA (11 UNIONS & 01 PAURASHAVA)

Agriculture present survey findings and Participatory Rural Appraisal December 2016 study report findings show farmers some problems are common in different Unions & Paurashava under Faridpur Sadar Upazila such as river erosion, sand deposition, drought, changes in temperature & rainfall, quality planting material and infrastructure. Major problems are:

- (1) Severe river erosion damages valuable land and properties,
- (2) Sand deposition on agricultural land affecting normal crop cultivation,
- (3) Risk of early flood damage the field crops every year,
- (4) Water stagnation, silted canals and Kutcha irrigation drainage system,
- (5) Acute drought in char land area and no sustainable agricultural planned for char land areas,
- (5) Oppression of jotdars (land grabber) and their hooligans in the char land areas,
- (6) Less supply of cultivated and irrigation equipment,
- (7) Kutcha road and damaged and poor transportation in some of the Unions,
- (8) Farmers lack of knowledge on modern crop production technology,
- (9) Shortage of cold storage & seed store and lack of wholesale market infrastructure,
- (11) Shortage of high quality HYV & Hybrid crop seeds of spices & vegetables
- (12) Agriculture labor crisis, high wage rate, Less market price of produce agricultural crops and production cost is high,
- (13) Productive agricultural lands are reducing due to construction of houses and industries, expansion of market on Agricultural land,
- (14) Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,
- (15) Less availability of power tiller/tractor, harvester, sprayer & foot pump and high price,
- (16) Prolonged to partial drought during Rabi & Kharif Season and changes in rainfall pattern
- (17) Inadequate supply of electricity in Boro crop season,
- (18) Poor use of organic matter and soil nutrients deficiency and fertility decrease in agricultural land
- (19) Change in rivers and canals morphology,
- (20) Post-harvest loss of litchi, mango, potato, spices and other vegetables is high.
- (21) Shortage of mechanical tools and equipment (fruit harvesting tool),
- (22) Top soil cutting and expansion of brick field,
- (23) Increase water & air pollution and decreasing fruit setting,
- (24) Farmers are facing increasing pressures of infrastructural development that may encumber Agricultural practices.
- (25) There is no agro processing center and industries under Unions level,
- (26) Sand filling on fertile agricultural land, unplanned expansion of urban and commercial areas,
- (27) Decreasing level of underground water and arsenic problem,
- (28) City migration.

CHAPTER EIGHT: POLICY FRAMEWORK AND CONCLUSION

8.1 Policy Framework

As per Sub-Assistant Agriculture Officers, Farmers and District, Upazila level different organizational Officers opinions and field visit following recommendations are made which will help for proper planning and adoption of appropriate crop production measure in future to different Unions beneficiaries under Faridpur Sadar Upazila.

1. Developing Infrastructural Facilities: Construction of embankment for controlled of river erosion and protecting crops from early flood. Road network at local level, agro-processing and whole sale marketing infrastructure development, Re-excavation of canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Reconstruction of damaged water management infrastructures need to be made. In each Union, one wholesale market infrastructure needs to be constructed. Further in each Union, one seed store infrastructure need to be constructed and also multiple facilities cold storage and food store need to be established.

2. To Reduce the Irrigation water Wastage, proper utilization and increase the irrigated command crop area the DTW, STW and, LLP kutchra drain need to be converted into pucca drainage system or introduce underground pipe irrigation system. Uninterrupted power supply to irrigation pumps (STW & LLP). Need to be monitoring ground water table every year after Boro season.

3. Farming and Adaptation Practices: Adapt modern farming techniques and Choose high yields and drought tolerant & early crop varieties. By sandbar cropping (a new methods) dried-up riverbeds and river basins has been turned into crop product. There is need for conducting, strengthening and expanding crop demonstrations and block farming based on adaptation practices. Introduction of risk resistant crop varieties in agriculture with emphasis on crop diversification should be an integral part of the ToT, farmers training and demonstrations.

4. Vegetables Production: Different types of winter and summer vegetables are grown under 11 unions and Paurashava area. All the Unions are excellent suitable for vegetables cultivation round the year. There is no cold storage and large vegetable selling center (market) under 11 Unions. As results farmers could not get good price for their produced products. There is a need for establishment of multipurpose cold storage each Union and development of market infrastructure.

5. Crop Production Inputs Availability: Ensure availability of quality HYV and Hybrid crop seeds, fertilizer, pesticides, cultivation and irrigation equipments. Information on quality seed need to be provided up to block level.

6. Availability of Crop Seeds: Drought, early variety and submergence tolerant variety of different quality HYV/Hybrid crop seeds. BRRI, BARI, BSRI and BINA have recommended drought tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-71,-72, 55, -57,-66,-67 and BINA Dhan -8, BARI Wheat-25, BARI-28,29,30 Muatard-11,14,17

BARI potato-21,22, 50, widely introduce and Management and Soil Health: Chemical fertilizers application in HYV varieties crops trend increasing but decreasing inorganic fertilizer (Green manure, cow dung). As a result, soil nutritional health will be alarming situation which is in future serious affected on yield. There is a need for soil health improving program for Union farmers. DAE may arrange joint collaborative soil testing and recommendation and training program for beneficiaries. Financial support need to be provided to DAE from different Government project. Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops. Incorporating organic manure in the soil by changing cropping patterns /crop rotation system need to be practiced. DAE has started preparation and sale vermi-compost by farmers under this Upazila which is improves the soil health and increase the crop yield. This vermi-compost program needs to be strengthening by helping financial assistance as well as technological training & financial support for farmers.

8. Pest Management: Insects, rats, weeds and diseases are a chronic problem which causes considerable damage of crops every season and increase the farmers cultivation cost. For control this pests farmers were applied pesticides under or over dose. Farmers applied pesticides 10-12 times in vegetables crop fields. Judicious use of pesticides needs to be developing and implement pest surveillance, monitoring and forecasting system. Farmers also need to increase knowledge on Integrated Pest Management (IPM) technology through practical oriented program and DAE joint collaborative crop production training. Farmers training budget need to be provided to DAE from different Government project.

9. Agro-based Industries: Establishment of Agro-based processing center & industries in 11 unions and 01 Paurashava. There is a need for construction of infrastructure for some agro-base processing center. Construction of potato, spices, vegetables & fruits processing, grading and packaging industry/facility need to be developed under each Union. There is a need to integrated effort for industrial effluents and waste management.

10. Zoning of land: As per its present used and potentialities and the proper implementation of **“Preparation of Development Plan for Fourteen Upazilas”** Package 03 (Faridpur Sadar Upazila, Bagmara Upazila, and Gangni Upazila) which will help to control unplanned human intervention as well as to ensure proper uses of agricultural land. Ensuring planned and economic use of agricultural productive land and need to minimizing agricultural land degradation and also introducing regulatory measure like adopting land zoning law and urban rural development plan are necessary to protect the agricultural land which will be ensuring “food security” for all.

11. The following additional systems may be adapted in an innovated way for sustainable crop production and environmental conditions of Faridpur Sadar Upazila:

- Biodynamic/eco-friendly agriculture.
- Rice and non-rice crops integrated farming
- Grow vegetables predominantly
- Fruit tree based Agro-forestry system
- Integrated pest management
- Natural disasters adaptive, rain fed and resilience farming

- Needs sustainable agricultural development plan for char land areas.

Minimize conversion of agricultural land to non-agricultural use and increase awareness among the people and land users for conservation of land. Ensuring planned and economic use of agriculture land, minimize agricultural land degradation and introducing regulatory measure like adopting land zoning law are necessary to protect the agriculture land.

8.2 Conclusion

Multiplicity of cropping system has been one of the main features of the Fariapur sadar Upazila. Soil and weather conditions are suitable for different vegetables and other high value crops cultivation round the year. There is a need to develop vegetables wholesale market and improvement of communication system different Unions to Upazila. Farmers need modern crop production technological training which will be helpful for crop diversification and proper utilization land and increase crop production. For improvement of irrigation facilities kutchra drain are to be made lined channel which will reduced irrigation water wastage and increase crop production. Integrated pest management need to implement for Banana, Papaya, orchard and vegetable cultivation and reduce the pesticide use. There is a need for char land sustainable agricultural development production plan. Electricity power supply should be ensured during Boro crop season. Construction of potato and vegetables spices & fruits processing, grading and packaging industry/facility need to be developed under each Union. Increase agriculture production through optimum use of land. Many high value crop vegetables are grown in this Upazila. There is wide opportunity to high value different crops such as Maize, Jute, oilseeds, fruits, vegetables and spices (onion/garlic/chili) as commercial basis to export.

However, alike other parts of the country, the area of agricultural land of Faridpur Sadar Upazila is declining gradually because of growing pressure of population and also unplanned industrial & market development. To ensure food supply to an increased population of the country these lands should be protected from being converted to other land uses. Protection of present triple and double cropped land is the top priority issue. Agricultural land identified in the present study should be protected by taking relevant administrative measures. Integration of people's participation and effective monitoring, evaluation, logistics through institutional frame work are essential for successful implementation of **“Preparation of Development Plan for Fourteen Upazilas”** Package 03 (Faridpur Sadar Upazila, Bagmara Upazila, and Gangni Upazila) as a versatile tool to conserve and right uses of agricultural land. The local people are in favor of present Preparation of Development Plan for Fourteen Upazilas Package-03 and found very much positive to protect arable land through implementing proposed plan.

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Annex- 1

Questionnaire for KII

Name----- Designation----- Department-----
Upazila-----District----- Mobile No.----- Date-----

1. Category wise distribution of farm families

Sl No.	Category		No of farm family	%
1.	Land less (.05-.50 acre)			
2.	Marginal (.51-1.50 acre)			
3.	Small (1.51 -2.50 acre)			
4.	Medium (2.51-7.50 acre)			
5.	Larger (above 7.50 acre)			
Total				

2. Present Land Use under Union

Sl No.	Type of Land use	Present land used	
		Area (ha)	%
1.	Cultivated Area		
	Single Cropped area		
	Double Cropped area		
	Triple Cropped area		
2.	Net cropped area		
3.	Cropping intensity		

3. Relationship of Land Type and Flood Depth with Area Cultivated

Sl No.	Land type and Flood Depth. (cm)	Present	
		NCA (ha)	%
1.	High land (0-30 cm) F0		
2.	Medium high land (30-90 cm) F1		
3.	Medium low land (90-180 cm) F2		
4.	Low land (180-360 cm) F3		
5.	Very low land above (360 cm) F4		
Total			

Source: CEIP field data and Upazila Agriculture Office, DAE

4. Major crops/cropping patterns (both improper/exhaustive and sustainable)

Season	Farming Practices
Rabi (Mid October-Mid March)	
Kharif-I (Mid March-Mid July)	
Kharif-II (Mid July-Mid October)	
Irrigated Farming - Rabi (Mid- October to Mid March)	
Kharif-I (Mid March-Mid July)	
Kharif-II (Mid July-Mid October)	
Name major cropping patterns	1. 2. 3. 4.

5. Crop cultivated and variety in polder area

Crop area	Name of crop	Name of variety
Cultivated crops under single crop area=		
Cultivated crops under double crop area=		
Cultivated crops under triple crop area=		
Cultivated crops under irrigated crop area=		
Cultivated crops under non crop area=		
Cultivated crops under homestead garden area=		
Orchard area=		
Seasonal Fallow land =		
How many commercial fruit garden within polder area? Yes ----- No-----	Name of fruits garden Banana: Papaya: Coconuts: Mango: Others:	Number:
In future which crops will be profitable in your polder area:		

6. Present Crop Production and Area under polder/Upazila

Crop Area (ha)	Yield/ha	Total Production (MT)	Crop Area(ha)	Yield / ha	Total Production (MT)
Aus rice= LV = HYV =			Oilseeds=		
Aman rice= LV = HYV = Hybrid =			Mustard=		
Boro Rice= LV = HYV = Hybrid =			Sesame=		
Total Rice=			Sunflower=		
Wheat =			Groundnut=		
Maize =			Others=		
Pulses =			Winter vegetables=		
Khesari =			Summer vegetables=		
Mung bean =			Total vegetables=		
Soybean =			Fruits		
Cowpea =			Watermelon=		
Chickpea=			Species=		
Others=			Chili=		
Tuber crops=			Onion=		
Potato=			Garlic=		
Sweet potato=			Jute=		
Bamboo =			Sugarcane=		
Betel vine(Pan)=			Betel nut=		

7. (a) Short term needs for better crop production under polder

- 1.-----2-----
- 3.-----4-----
- 5.-----6-----

(b) Long term needs for better crop production under polder

- 1.-----2-----
- 3.-----4-----
- 5.-----6-----

Annex- 2

Agriculture Questionnaire for Urban and Rural Economy Study

Name: _____ Designation: _____
Department: _____ Name of Block: _____
Name of Union: _____ Upazila: _____
District: _____ Mobil No.: _____ Date: _____

1. Category wise distribution of Farm Families in Block

Sl. No.	Category	No. of farm family	%
1.	Land less (.05-.50 acre)		
2.	Marginal (.51-1.50 acre)		
3.	Small (1.51 -2.50 acre)		
4.	Medium (2.51-7.50 acre)		
5.	Larger (above 7.50 acre)		
Total			

2. Agricultural land and land Use in Block

Sl. No.	Description of agricultural land	Area(ha)
1.	Total agriculture land area	
	High land	
	Medium high land	
	Medium low land	
	Low land	
2.	Permanent fallow land	
3.	Current/seasonal fallow land (with fallow period) -Rabi fallow	
4.	-Kharif-I fallow -Kharif-II fallow	
5.	Net cropped area	
6.	Single cropped area	
7.	Double cropped area	
8.	Triple cropped area	
9.	Total cropped area	
10.	Cropping intensity (%)	
11.	Irrigated land area (%)	

3. Irrigation Facilities

Deep Tube Well (DTW) Yes----- No----- Number-----
Shallow Tube well (STW) Yes----- No----- Number-----
Low Lift Pump (LLP) Yes----- No----- Number----- Others-----

4. Cultivation Practices

Power tiller-----% Used, Tractor -----% Used
 Bullock -----% Used

5. Cropping Pattern

Sl. No.	Cropping Pattern			Area of Land	Percentage (%)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

6. Cropping type and Present Crop Area & Production under Block

Crop Area (ha)	Area (ha)	Yield/ha	Crop Area (ha)	Area (ha)	Yield/ha
Aus rice LV HYV			Oilseeds		
Aman rice LV HYV Hybrid			Mustard		
Boro Rice LV HYV Hybrid			Sesame		
Total Rice			Sunflower		
Wheat			Groundnut		
Maize			Others		
Pulses			Winter vegetables		
Khesari			Summer vegetables		
Mung bean			Total vegetables		
Soybean			Fruits Watermelon		
Cowpea			Species		
Chickpea			Chilli		
Others			Onion		
Tuber crops			Garlic		
Potato			Jute		
Sweet potato			Sugarcane		
Bamboo			Betel nut		
Betelvine (Pan)			Banana		
Other crops			Mango		
			Papaya		

7. Growth or Decline Agriculture Land During the Last 10 year.

SL No.	Agricultural land use	Land use (2005-06) in ha	Land use (2015-16) in ha	Causes of increase or decline
01	Paddy (local varieties)			
02	Paddy (HYV)			
03	Vegetables (Summer)			
04	Vegetables (Winter)			
05	Tuber crops			
06	Pulse crops			
07	Oilseed crops			
08	Spice crops			
09	Fruit crops			
10	Wheat			
11	Maize			
12	Sugarcane			
13	Jute			
14	Other purposes			
	-Brick field			
	-Poultry farm			
	-Fish/shrimp culture			
	-Gardening/forestry			
	-Industries			
	-Housing			
	-Others			

9. Major problems to Crop Production in Block/Union

1. _____
2. _____
3. _____
4. _____
5. _____

10. Future Need for Sustainable Crop production.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

11. Major problems related to crop production system Under Union

- 1.
- 2.
- 3.
- 4.
- 5.

12. Future Need for Sustainable Crop production under Union

- 1.
- 2.
- 3.
- 4.
- 5.

13. Conclusion and Recommendation

- 1.
- 2.
- 3.
- 4.
- 5.



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas
Package-03

(Faridpur Sadar Upazila, Faridpur District; Bagmara Upazila, Rajshahi District and
Gangni Upazila, Meherpur District)

Final Survey Report
On
Physical Feature, Landuse, Topography and
Photogrammetry
Faridpur Sadar Upazila, Faridpur

June, 2017

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Executive Summary

Faridpur Sadar is an Upazila of Faridpur district in the division of Dhaka, Bangladesh. The upazila occupies an area of 407.02 sq. km (BBS 2011). It is bounded by Char Bhadrasan Upazila to the north, Nagarkanda Upazila, Boalmari Upazila to the south, Rajbari sadar to the east and golandia Upazila of rajbari district to the west. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Faridpur Sadar upazila, based on stereo satellite imagery through photogrammetric technology. High resolution ortho-rectified satellite image along with photogrammetric data are used in preparing base map for conducting the surveys.

This report contains four separate reports. These are: Physical Feature Survey, Land Use Survey, Topographic Survey and Photogrammetric Works. Physical Feature Survey Report covers how the features with their attribute are collected and processed for the preparation of base map for planning. Land Use Survey Report describes the methodology for acquiring and processing of land use data. Topographic Survey Report contains the acquisition and processing of topographic data by using the photogrammetric technology. The report on Photogrammetric Works contains the basic technologies of stereo satellite image processing and extraction of features.

Abbreviations and Acronyms

BM-----	: Bench Mark
BUTM-----	: Bangladesh Universal Transverse Mercator
DEM-----	: Digital Elevation Model
DGPS-----	: Differential Global Positioning System
DLRS-----	: Directorate of Land Records & Surveys
DPI-----	: Dot Per Inch
DPW-----	: Digital Photogrammetry Workstation
DTM-----	: Digital Terrain Model
GCP-----	: Ground Control Point
GIS-----	: Geographic Information System
GPS-----	: Global Positioning System
HBB-----	: Herring Bone Bond
JPEG-----	: Joint Photographic Experts Group
Km-----	: Kilometer
MSL-----	: Mean Sea Level
PD-----	: Project Director
PM-----	: Project Manager
RL-----	: Reduced Level
RMS-----	: Root Mean Square
RS-----	: Revisional Survey
RTK-GPS-----	: Real Time Kinematic Global Positioning System
SOB-----	: Survey of Bangladesh
TIN-----	: Triangulated Irregular Network
TOR-----	: Terms of Reference
UDD-----	: Urban Development Directorate

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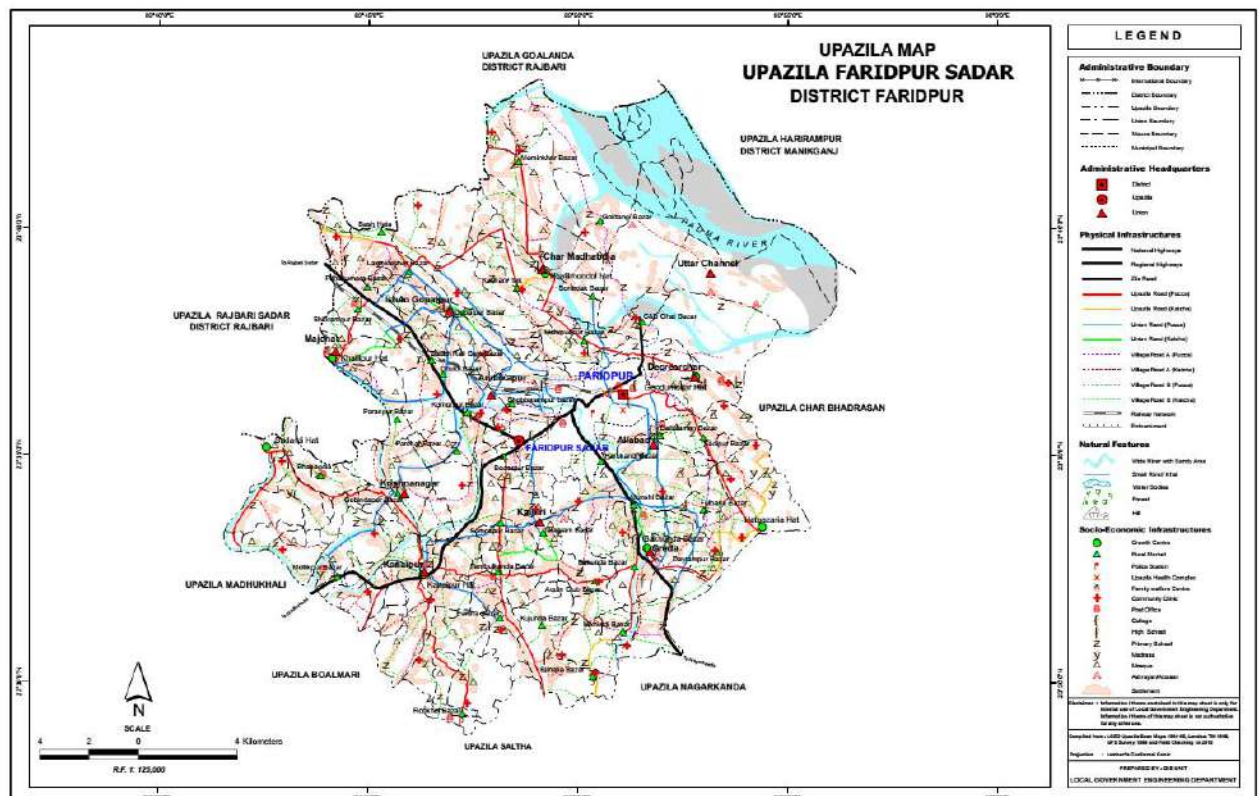
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Annexures:**Annexure-I: RS Mouza List: Faridpur Sadar Upazila****Annexure-II: Technical Specifications of GIS Data****Annexure-III: Sample Log Book for Physical Feature, Landuse, Topography &
Vulnerability Assessment Form**

Chapter One: Introduction

1.0 Background

Faridpur Sadar Upazila (FARIDPUR DISTRICT) area 407.02 sq km, located in between 23°29' and 23°34' north latitudes and in between 89°43' and 89°56' east longitudes. It is bounded by Goa landa and Harirampur upazilas on the north, Saltha upazila on the south, Char Bhadrasan and Harirampur upazilas on the east, Boalmari, Madhukhali and Rajbari Sadar upazilas on the west. Upazila town is situated on the bank of Kumar River. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Faridpur Sadar upazila, based on stereo satellite imagery through photogrammetric technology. High resolution ortho-rectified satellite image along with photogrammetric data are used in preparing base map for conducting the surveys. This report contains three separate reports. These are: Physical Feature Survey, Land Use Survey & Topographic Survey. Physical Feature Survey covers how the features with their attribute are collected and processed for the preparation of base map for planning. Land Use Survey portion describes the methodology for acquiring and processing of land use data. Topographic Survey contains the acquisition and processing of topographic data by using the photogrammetric technology. This report aims to give a potential view of the project 'Preparation of Development Plan for Fourteen Upazilas', for the Package-3, Faridpur Sadar Upazila. All required information for this report has been collected using the advanced technologies in the survey and data Rapid urbanization and development in an unplanned manner which tends to generate the collection process. The survey was carried out according to the methodology mentioned in the TOR. The Project Area map has been shown in **Map-1.1**.



Map-1.1: Project Area Map of Faridpur Sadar Upazila

Chapter Two: Methodology

2.0 Reconnaissance Survey

A reconnaissance survey of the study area has been conducted to identify the existing problems, development constraints and future development potentialities of the upazilas. This reconnaissance survey has given the planning team an initial overview of the area that was necessary to set on the task of preparing a Master plan. This overview pertains not only to the physical features, prospects and problems of the area, but also the ideas, aspirations and mood of the local residents, which are very much essential to develop the methodological approach for required data collection.

2.1 Compilation and Preparation of Base Map

Preparation of base map is an important requirement for planning the project area. The base map will be used to depict the survey findings. Preparation of base map comprises the following item of works presented in sections.

Major task for the compilation and development of Geospatial data of Mouza maps have been summarized in the flow diagram as shown in **Figure-2.1**:

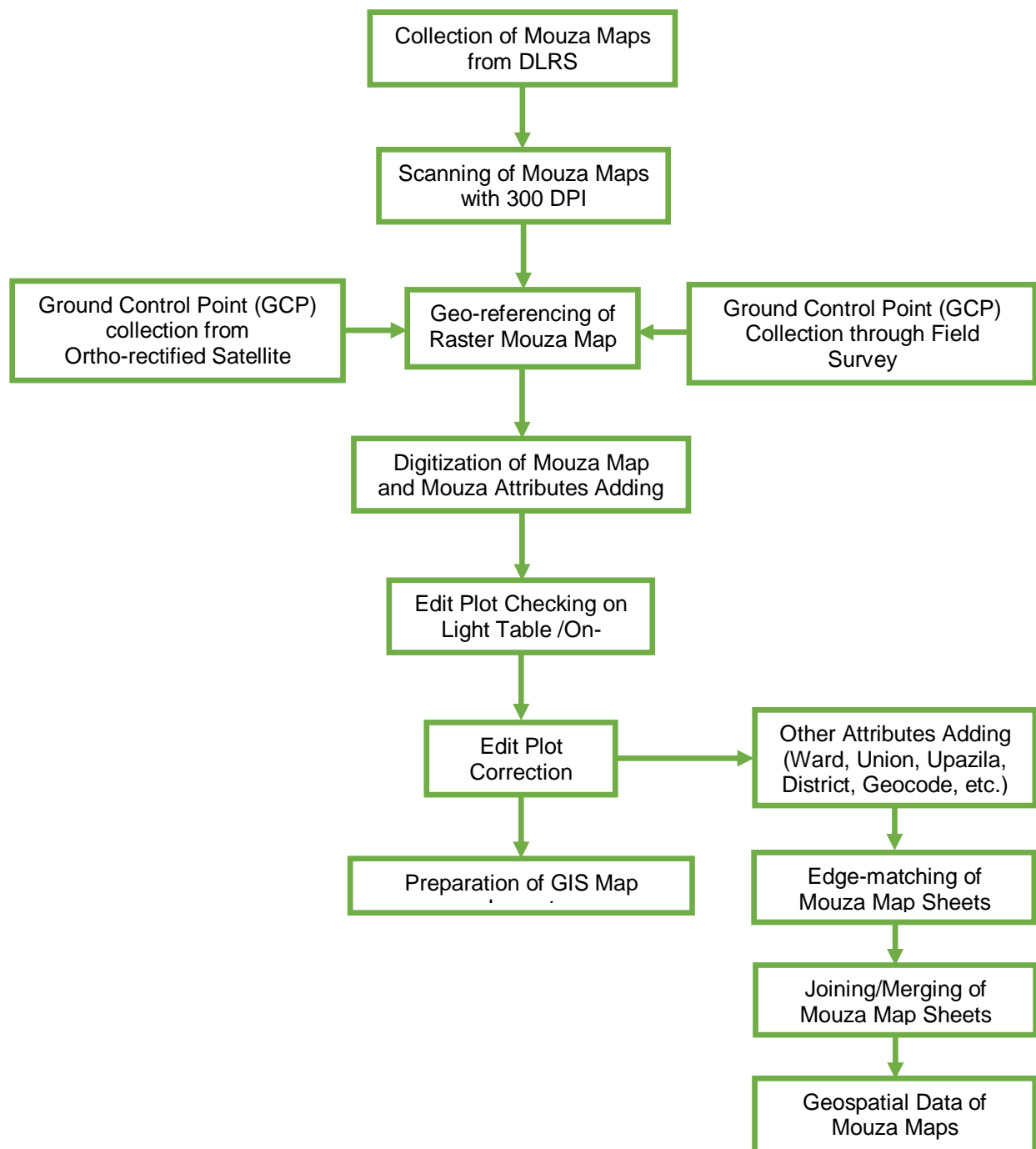


Figure-2.1: Flow Diagram for Preparation of GIS Database using RS Mouza Map

2.1.1 Collection of Mouza Maps

The Consultant has collected all the Mouza maps covering the entire project area from DLRS office. The Mouza sheets having distortion due to rapping or pasting cloths/tape were avoided during collection of Mouza maps. The detail list of Mouza maps are provided in the **Annexure-I**.

Table-2.1: Mouza Maps Collection from DLRS

Upazila	Mouza Version	Mouza Maps		Collection Percentage
		Total No. of Sheet	No of Collected Sheet	
Faridpur Sadar	RS	329	326	99.08%

2.1.2 Approval of Collected Mouza Maps for Scanning and Digitization

After collection of Mouza maps of Faridpur Sadar Upazila from DLRS, all sheets were submitted to PM for review and quality check before scanning and digitizing. The PM of the project has approved all the Mouza maps in presence of the Consultant. A sample of approved scanned Mouza map is shown in **Figure-2.2**.

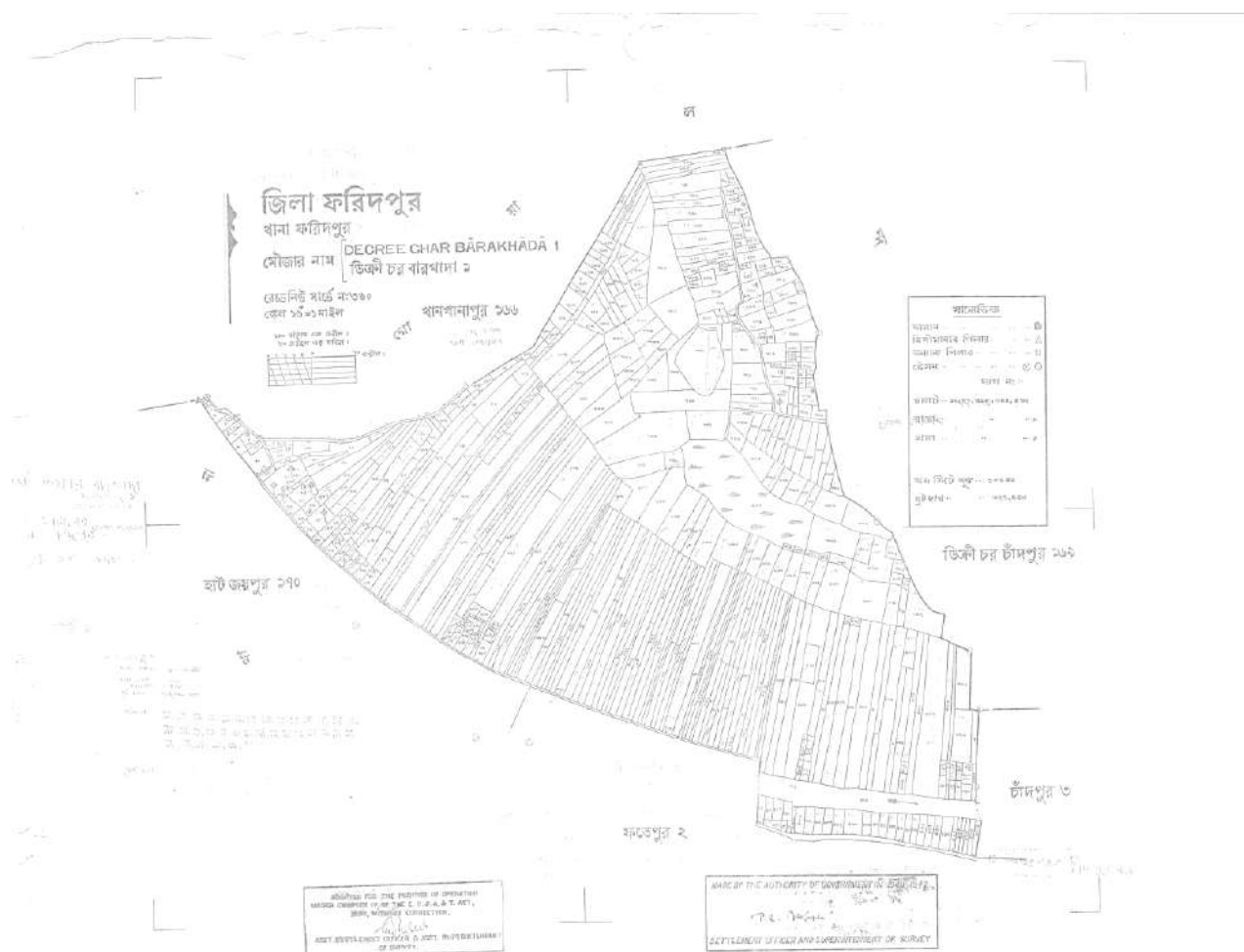


Figure-2.2: Sample of Scanned Mouza Map

2.1.3 Scanning of Mouza Maps

Scanning of all the Mouza maps/sheets was started immediately after their approval by PM. As per TOR, scanning of Mouza maps/sheets was carried out using drum scanner with 300 DPI to obtain good quality image and saved as JPEG format to be used later on for screen digitization. Extra care was taken during the scanning process for maintaining the proper rotation and alignment to minimize the distortion and deviation. As per TOR, the following specifications have been maintained.

Table 2.2: Specifications for Scanned Mouza Maps

Image Type	Grayscale
Image Format	JPEG
Image Resolution	300 dpi

Table 2.3: Specifications of the Scanner used for Scanning of Mouza Maps

Brand & Model	HP Design jet 815 mfp
Scan Resolution, enhanced	2400×2400 dpi, with variable resolution setting from 50 dpi in increments of 1 dpi
Scan Resolution, hardware	800×800 dpi
Bit Depth	24-bit color
Levels of grayscale	256
Maximum scan size	42×unlimited in

Table 2.4: Status of Scanning of Mouza Map

Upazila	Mouza Maps		Scanning Percentage
	Total No. of Hard Copy Sheets	Total No of Scanned Sheets	
Faridpur Sadar	329	326	99.08%

2.1.4 Preparation of Technical Specifications for GIS Database

A document on technical specifications of GIS database was prepared for storing spatial and attribute database of all layers including Mouza maps. Later this document was finalized in consultation with PM and GIS Experts of all the packages. This document is given in **Annexure-II**.

2.1.5 Digitization of Mouza Maps

The Mouza maps have been digitized through On-screen Digitization process using ArcGIS software. In brief, this process involves adding a scanned Mouza map in ArcMap, creating four empty shape files of three basic feature types (point, line, and polygon) in ArcCatalog, and using ArcMap's drawing tools and the mouse to trace features from the image into the shape files. All the features of a Mouza map such as Plot boundary, Plot number, Road, Canal, Building, Mosque, Temple, Traverse Station, Iron Pillar, etc., are created and stored with attributes in four different vector layers as per the

Technical Specification of GIS Database. For attaining maximum level of digitizing accuracy, the Data Frame properties have been set as Map Unit = Inch and Distance Unit = Inch to get 1:1 map scale and later zoom in to 1:30 scale during the digitization process. The **Figure-2.3** shows the on-screen digitization and a sample digitized Mouza map.

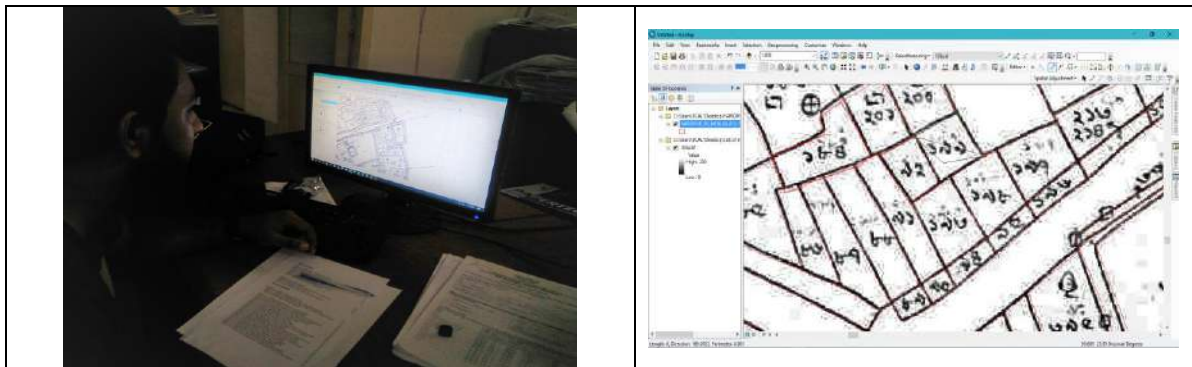


Figure 2.3: On Screen Digitization and Sample Digitized Mouza Map

Table-2.5: Status of Digitizing of Mouza Map

Upazila	Mouza Maps		Digitization Percentage
	Total No. of Mouza Sheets	Total No of Digitized Sheets	
Faridpur Sadar	329	326	99.08%

2.1.6 Edit Plot checking of the Digitized Mouza Maps

After digitization of Mouza maps edit plots were produced containing all the features in different colors. The digitized Mouza maps were checked and verified by superimposing on the original Mouza maps. This checking was done with the joint team of UDD and the GIS Expert. The observed errors normally were, wrong Id of lines, plot numbers and symbols. In some sheets, few arcs have found as missing.

After completion of edit plot checking, necessary corrections have been done using ArcGIS. After correction, the Mouza maps/sheets were printed out again and were checked to ensure that corrections were made accordingly. In this way, utmost effort has been made to ensure quality of digitization. After finalization of digitization of all the Mouza maps, both soft and hard copies of them have been submitted to Project Director.

2.1.7 Geo-referencing of Raster Mouza Map

Geo-referencing is the process of establishing real world coordinates or geographical coordinates of certain points of the map (at least 4 points) with great accuracy while the remaining points are calculated automatically, based on transformation formulas.

In addition to GCP survey for geo-referencing Mouza maps, Ortho-rectified satellite image of the study area has been used as a control layer. This layer contains a rich source of real world coordinates, because it is derived by aerial triangulation of stereo images in photogrammetric environment and later ortho-rectified by the generated DEM of the area. It should be noted here that a required number

of GCPs were acquired through RTK-GPS/DGPS method for the process of Aerial Triangulation that is a pre-requisite for photogrammetric works.

The Coordinate System used for both GCP and ortho-rectified satellite image is the **Bangladesh Universal Transverse Mercator (BUTM2010)** which is established by the national mapping agency **Survey of Bangladesh (SOB)**. The parameters of BUTM 2010 are as below:

Spheroid	: WGS 1984
Datum	: WGS 1984
Unit	: Meters
False Easting	: 500000
False Northing	: 0.0
Central Meridian	: 90.0
Scale Factor	: 0.9996
Latitude of Origin	: 0.0

Since, we can pick real world coordinates (Easting, Northing) of any point on the ortho-rectified satellite image, geo-referencing of Mouza map has been done by using this geometrically corrected satellite image as reference. The process of geo-referencing of Mouza map using satellite image is actually parcel (plot) of Mouza map matching with respect to the ortho-rectified satellite image. The **Figure 2.4** shows a sample geo-referenced raster Mouza map which is overlaid on ortho-rectified satellite image.



Figure-2.4: Sample Geo-referenced Raster Mouza Map Overlaid on Satellite Image

A suitable number of GCP (minimum 4), preferably plot corners and building corners, has been taken for proper geo-referencing of Mouza map depending on its size and 2nd Order Polynomial Transformation was

applied. Total RMS error was kept within 0.5/1.5 meter i.e. within 1 to 3 pixels of the satellite image. Thus individual sheet of the Mouza maps get properly georeferenced. Finally, permanently geo-referenced images of Mouza maps have been created by using 'Rectify' tool of ArcMap.

2.1.8 Geo-referencing of Vector Mouza Map

After geo-referencing of scanned image of Mouza maps (raster Mouza maps), geo-referencing of vector Mouza maps have been done. The vector maps i.e. the shape files of each Mouza map sheet have been spatially adjusted to the respective geo-referenced raster Mouza map sheet. The Spatial Adjustment Tools of ArcMap have been used to do this.

2.1.9 Edge Matching of Mouza Maps

A parcel or plot based digital map of the whole project area is a pre-requisite for planning. But edge-matching is a critical component of creating such a map. The project area encompasses many Mouzas each of which contains one or more than one map sheets. The adjacent Mouza maps are coincident and share the same location of coordinates, boundaries, or nodes. The problem is that, in reality, the common boundaries of adjacent Mouza map sheets actually do not match exactly with each other. Hence the edge-matching problem arises. Mouza maps are especially prone to this problem.

Edge-matching is used to align features along the edges of adjacent layers. Usually, the layer with the less accurate features is adjusted, while the other layer is used as the target layer. By superimposing the vectorized Mouza maps on satellite image the accuracy of the common boundaries with respect to satellite image have been investigated. Then, edge-matching of two adjacent Mouza map layers have been done by comparing the accuracy of their linear features with reference to the satellite image, identifying and keeping more accurate common features from one layer and deleting the less accurate features from other layer. In case of common roads, rivers or canals, the more accurate features have been kept entirely (both edges) from a Mouza map sheet and the same features which belong to other layer have been deleted. The arisen errors such as undershoots, overshoots, etc. have been fixed immediately after deleting features.





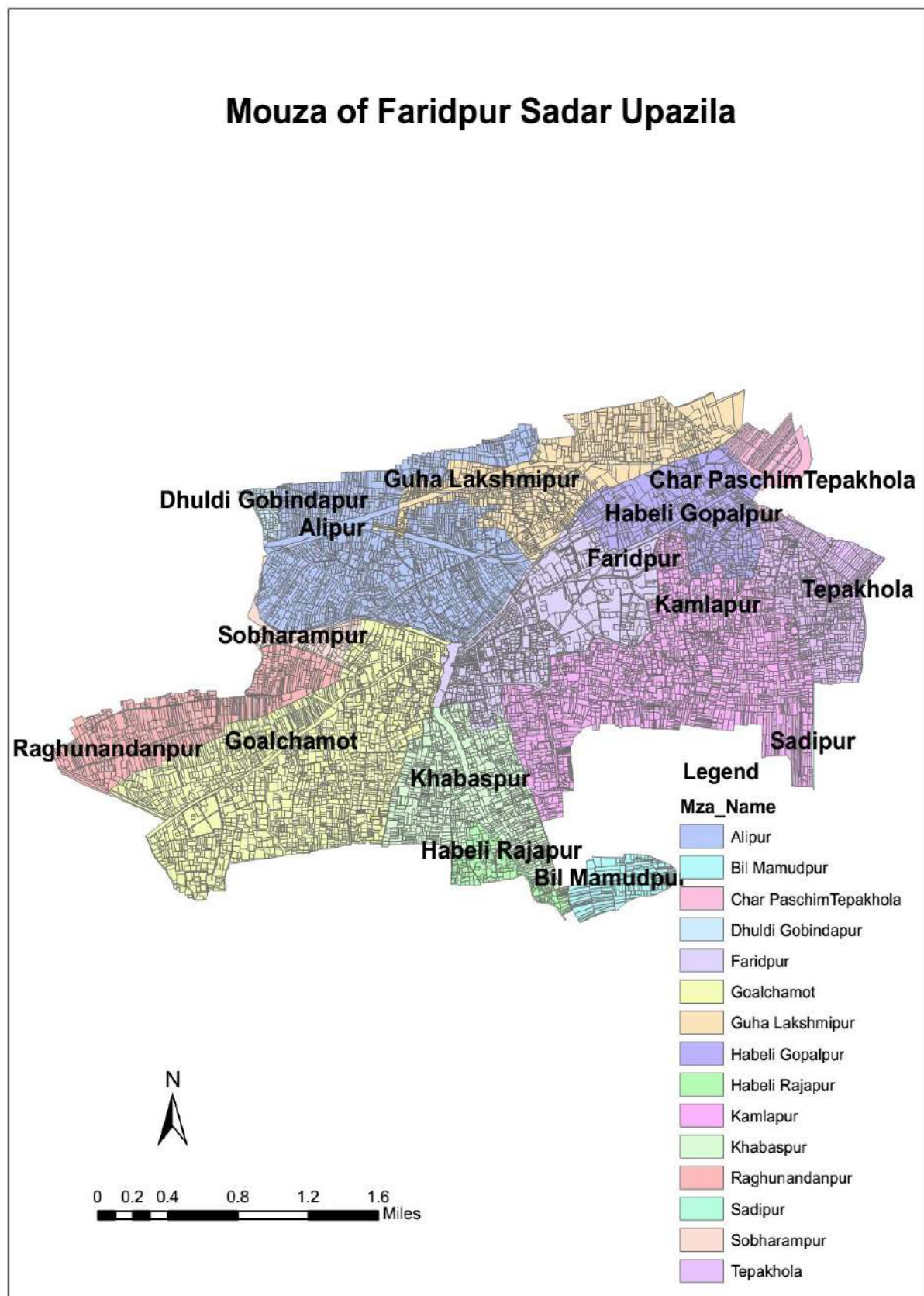
Figure-2.5: Sample Diagram of Edge-matching

2.1.10 Demarcation of the Project Area based on Mouza Maps

Mosaicing of all Mouza maps belonged to the Upazila form the actual boundary of the project area. Before mosaicking, edge-matched Mouza maps have been made as free of topological errors. Finally plot based mosaic Mouza maps of the project area have been created by using ‘Merge’ tool of ArcGIS. The boundary of this merged Mouza map becomes the Project Area Boundary with real world coordinates. Project Area Map of Faridpur Sadar Upazila is shown in **Map 2.1**

The consultant in cooperation with UDD officials has demarcated the actual boundary of the project in the newly formed mosaic Mouza map. Later on, the project boundary was finalized by field verification, which was considered and used for the project after duly approved by UDD.

From the mosaic Mouza map of the project area, the administrative boundaries such as District boundary, Upazila boundary, Union boundary, Mouza boundary and Mouza Sheet boundary have been created by using geo-processing tools of ArcGIS such as Dissolve, Erase, Intersect, Spatial Join, etc.



Map 2.1: Mouza Map of Faridpur Sadar Upazila (partial).

2.2 Establishment of Ground Control Point (GCP) / BM Pillars

A network of permanent Bench Mark (BM)/Ground Control Point has been established having real world coordinates (Easting, Northing, and Elevation) within the study area to carry out the topographic, physical features and land use survey. 19 BM pillars have been established in Faridpur Sadar Upazila. The network establishment for the survey comprises the following item of works:

2.2.1 Selection of Sites for BM Pillars with justification

Appropriate site selection is crucial for establishing BM pillars. The consultant has considered the following points in selecting sites for ground control points:

- i. The site is suitable for RTK-GPS/DGPS observation. There exists Good Sky Visibility (15 degree cut of angle above the horizon) and far from mobile tower or high voltage electric line.
- ii. The site is located on undisturbed location due to natural or human activities.
- iii. The site is located on a corner of government own land, playground, school or beside of road.
- iv. The site is located on such a place that is suitable to set up Total Station equipment in future work.
- v. Two successive BM pillars are inter-visible and at least 100 meters apart.

2.2.2 Design of Pillars

BM pillars in the Study area have been constructed according to the design supplied by UDD. The approved design sheet appears at **Figure-2.6**.

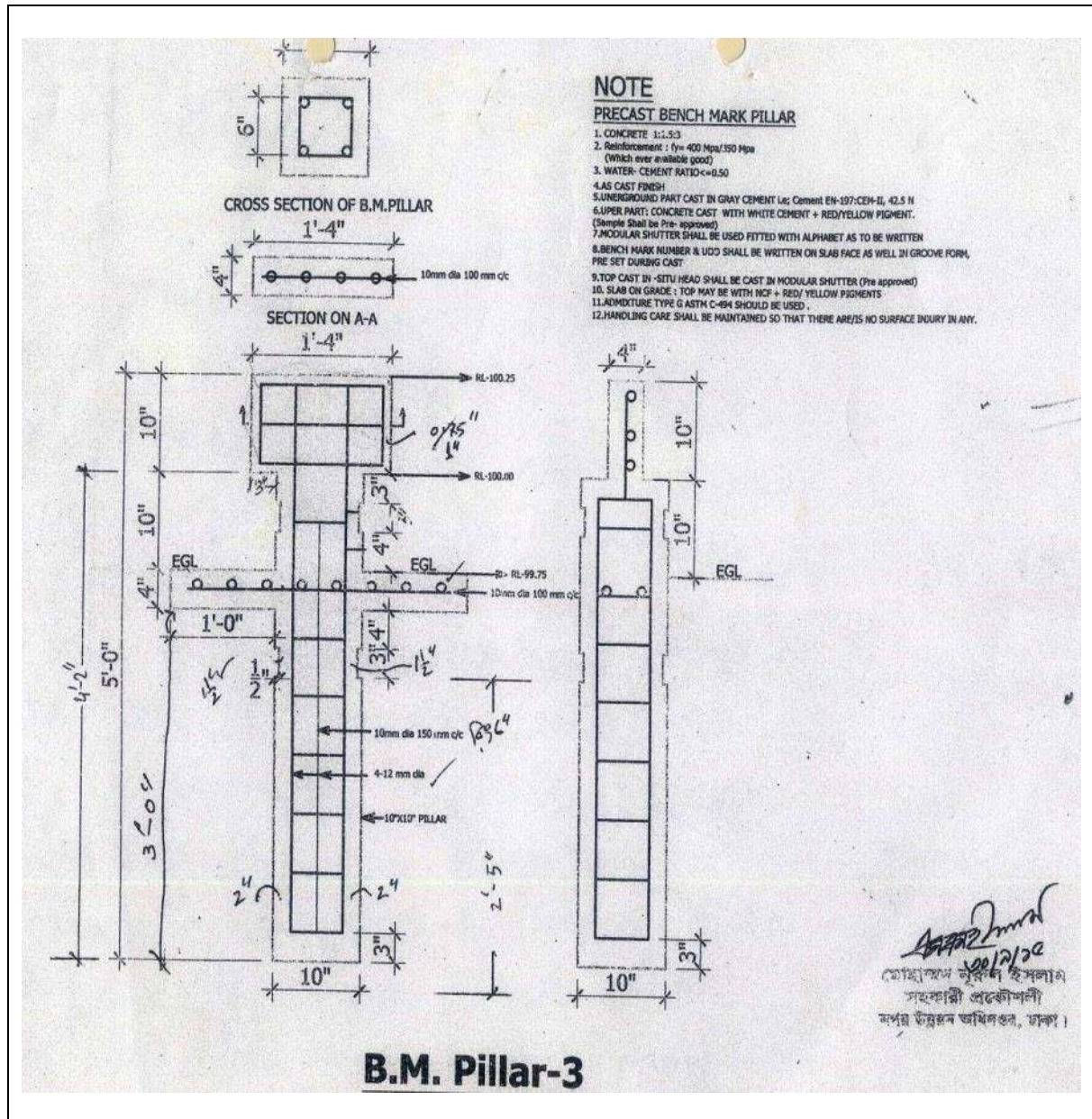


Figure-2.6: Design of BM Pillar

2.2.3 Construction of BM Pillars

Faridpur Sadar Upazila is covered by 19 BM pillars. The BMs are constructed as per approved design of BM pillar. The BM pillars have been installed in the field. Installation of the BM pillars has been monitored by UDD and the Consultant.



Plate-1: Sample of Constructed BM and Installed BM

2.2.4 Description of Reference BM Pillars

For the selection of reference BM, the survey team considered the BM 533, GPS 2317 and GPS 3533 of Survey of Bangladesh (SOB) as reference BM pillar in Faridpur Sadar Upazila. The information of Reference BM Pillars has been collected from Survey of Bangladesh.



Plate-2: Reference BM Pillar in Faridpur Sadar Upazila

The location and its x, y and z value are given in **Table-2.6**. On the basis of this reference BM, 14 BMs have been established as local reference control points within the Project Area.

Table-2.6: Location of Reference BM

ID no.	Height above MSL	Coordinate (WGS-1984)		Coordinate BUTM		Location
		Lat Ddmmss.ssss	Long Ddmmss.ssss	Northing	Easting	
BM 6181	7.6735	23.5520466333	89.77775694722	2607381.488	783574.112	19 meter south east from BSIC office. 15.6 meter west side of a light post and 3.7 meter north east from the narrow road of BSIC. Village: Mirgi, Upazilla: Faridpur Sadar, Dist: Faridpur.

Source: Survey of Bangladesh (SOB), 2017

2.2.5 Baseline Survey by RTK-DGPS Method

The baseline survey is the instantaneous data collection in static mode at two or more fixed points using two or more dual frequency RTK-GPS receivers. The measurement network for RTK-GPS baseline survey is planned by connecting the BM points to be established and the selected reference BM (Known latitude, longitude and ellipsoidal height) near the Study Area. A line connecting two measurement points is known as baseline.

The GPS measurements consists a simultaneous static measurement with two dual frequency GPS receivers one on the known reference BM (base) and another one will be on the BM to be established (Rover). The simultaneous measurement or logging time for a session is usually 20 minutes to an hour depending on the availability of satellite and distance. During taking the measurements, the GPS receivers at the two points record the satellites information or data and the stored data is processed using software.



Plate-3: RTK-GPS Observation




The GPS Survey Team has conducted survey by RTK/DGPS methods. The Base station has been






established by connecting to the Reference BM (BM 533, GPS 2317 and GPS 3533) of SOB) and 10 hours of continuous observation to get precise coordinates. After establishing the base station, the rovers are positioned on the newly installed BM Pillars one by one and observations have been made for each of the 13 BM in the project area.





2.2.6 Establishment of Coordinates (X, Y, Z) for BM Pillars






The GPS data acquired through RTK-GPS/DGPS survey has been processed by using post processing software and the co-ordinates (Northing, Easting and Elevation) of BM Pillars are achieved. Thus the coordinates of all the 13 BM pillars have been established in the Project Area along with their RL (height above MSL). The location of BM's and its x, y and z values are given with photograph of BM are given in **Table-2.7** and location of BM pillars are given in **Map-2.2**.



Table-2.7: Coordinates and Details of the BM Pillars

BM No.	RL	Lat.	Long.	Northing	Easting	Location	Photo
1	8.968	23.58954551944	89.80913437222	2611598.813	786697.578	Faridpur Sadar upazila Complex, in front of the main building	
2	8.653	23.61546563333	89.84292089167	2614538.956	790090.620	Vati-lokkipur Govt. Primary school, front right side of entry gate	
3	8.629	23.59957107778	89.82724735833	2612746.085	788525.238	Goalcham ot primary school, right corner of the school building in back	

BM No.	RL	Lat.	Long.	Northing	Easting	Location	Photo
4	7.881	23.58871016944	89.83448678889	2611557.321	789288.294	Al-amin Govt. primary school, right corner of the school area	
5	8.879	23.61148178333	89.81802208889	2614047.197	787557.251	Gobindapur Primary school, at the front of school compound	
6	7.369	23.60120120833	89.83923790833	2612950.964	789745.991	Jhiltuli Govt. primary school	
7	9.119	23.61204400556	89.85654066389	2614187.560	791488.739	Tepakhola Govt. Primary school, front of school building	
8	7.922	23.59512760833	89.86165290278	2612323.618	792048.218	Rajendra College, Baitul aman, left side of entry to college	

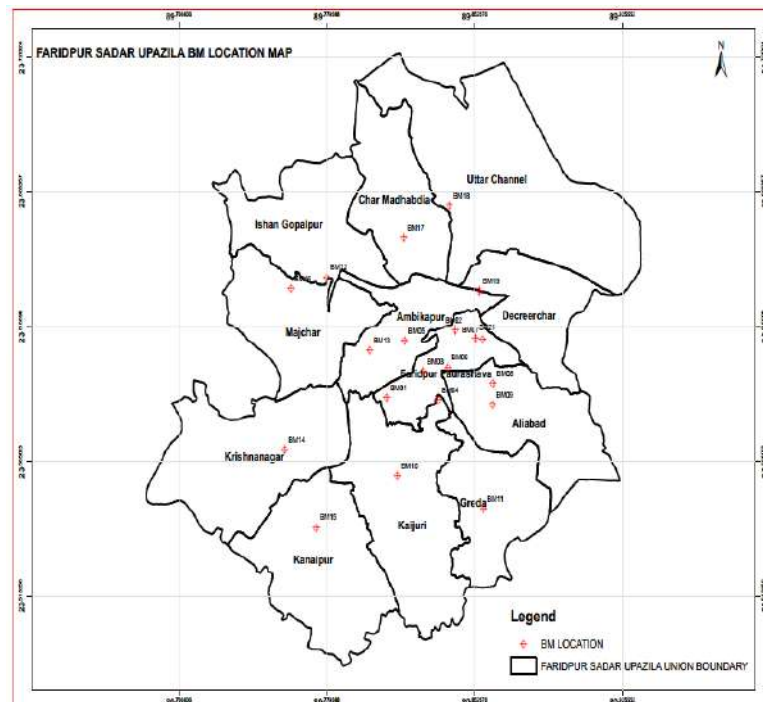
BM No.	RL	Lat.	Long.	Northing	Easting	Location	Photo
9	8.093	23.58691682500	89.86145545833	2611413.439	792046.255	Aliabad UP complex, right corner of UP compound to the front	
10	7.271	23.55956519444	89.81443153333	2608287.645	787303.811	Koijuri UP complex, Left side of the entry of UP complex area	
11	7.338	23.54700246389	89.85697566667	2606981.704	791677.024	Gerda UP complex, front of UP	
12	8.606	23.63581633056	89.77958065833	2616666.555	783580.025	Ishan Gopalpur UP complex, at the right end corner of UP area	

BM No.	RL	Lat.	Long.	Northing	Easting	Location	Photo
13	8.087	23.60775399167	89.80082638333	2613599.653	785809.697	Ambikapur UP complex, Left side of the entry of UP complex area	
14	9.359	23.56968907778	89.75877820556	2609298.738	781597.940	Krishnanaagar UP complex, Left side of the entry of UP complex area	
15	7.082	23.53980396111	89.77431584722	2606018.233	783248.889	Kanaipur UP complex, in front of the UP building	
16	9.679	23.63127574167	89.76180698333	2616128.270	781775.475	Machchor UP complex, Left side of UP main building	
17	9.244	23.65089920833	89.81765623333	2618413.916	787433.733	Char Madhobdi UP complex, Left back side corner of UP building	

BM No.	RL	Lat.	Long.	Northing	Easting	Location	Photo
18	8.71 7	23.66344 652778	89.8401 1410278	2619849. 622	789698 .298	North Channel UP complex, front right corner of UP building	
19	8.04 6	23.63053 491111	89.8547 0997222	2616232. 663	791260 .888	Aij Uddin Matobbor Kandi Primary school, right end corner of playing field	

2.2.7 Marking of BM Pillars

The number of the respective BM pillars has also been inscribed on the face of each pillar as per specification provided by UDD. The team members of the consultant firm have properly supervised the marking of Bench Mark Pillars.



Map-2.2: Location of BM Pillars in Faridpur Sadar Upazila

2.3 Satellite Image Processing for Data Acquisition

Satellite image came with a certain level of processing. However, for the purpose of features extraction, further processing is needed in a number of steps. The step by step procedures has been shown in the **Figure 2.7**.

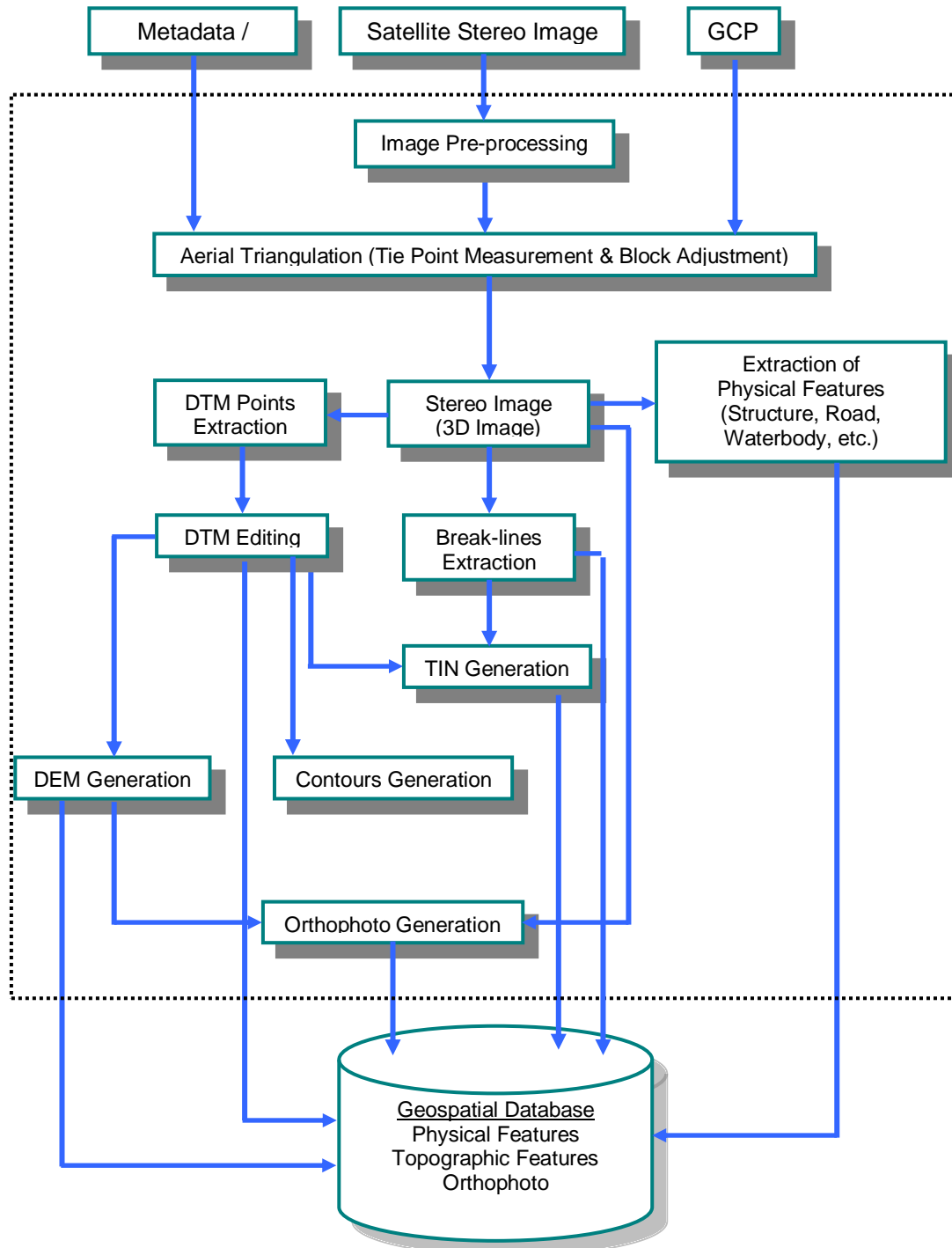


Figure-2.7: Workflow of Stereo Satellite Image Processing and Data Extraction

After collecting raw satellite imagery in stereo pairs, initial image processing has been done by performing Epi-polar Correction, Color Balance, Contrast Adjustment, Sharpening, Pyramid building and Bit Rate Setting. For geometrical correction of satellite images four reliable GCPs has been collected through RTK-GPS survey study area. Using these GCPs, Aerial Triangulation of the stereo

pairs has done and stereo model has been prepared for photogrammetric works. The detail procedure has been described in 2.4.

2.3.1 Physical Feature Extraction from Satellite Image

After initial image processing and building up of stereo models, extraction of physical features has been done by a team of skilled photogrammetrist. All type of physical features including Structures (katcha, pucca, semi-pucca, etc.), Roads, Water bodies, etc. have been extracted as 3D features. Each vertex of features contains z-value (elevation).



Plate-4: Digitization by Digital Photogrammetry

The Photogrammetric Expert and the GIS Expert has monitored the feature extraction works examine the data for their proper registration.

2.3.2 Preparation of Survey Base Map

The survey base map has been created by superimposing Project Area Maps derived from Mouza map and Satellite Image Processed data. This superimposition is very important to form a unique map and database comprising the data collected from satellite imagery and Mouza map data (e.g. plot no, Mouza name, JL no., sheet no.). These base maps have been used to collect attributes of the physical features and missing features which could not be extracted due to dense vegetation in the project area.

Entire Faridpur Sadar Upazila has been divided into 3564 grids and survey base maps have been prepared based on these grids. The base maps have been printed on A3 paper sheet at a scale of 1:990 to make sure that all required physical features are visible enough to carry out the survey works.

The Grids used to prepare survey base map is shown in **Figure-2.8** and Grids with photogrammetric data and satellite image is shown in **Figure-2.9**.

A sample base map comprising photogrammetric data and satellite image is shown in **Map-2.3** and photogrammetric data with Mouza map is shown in **Map-2.4**.

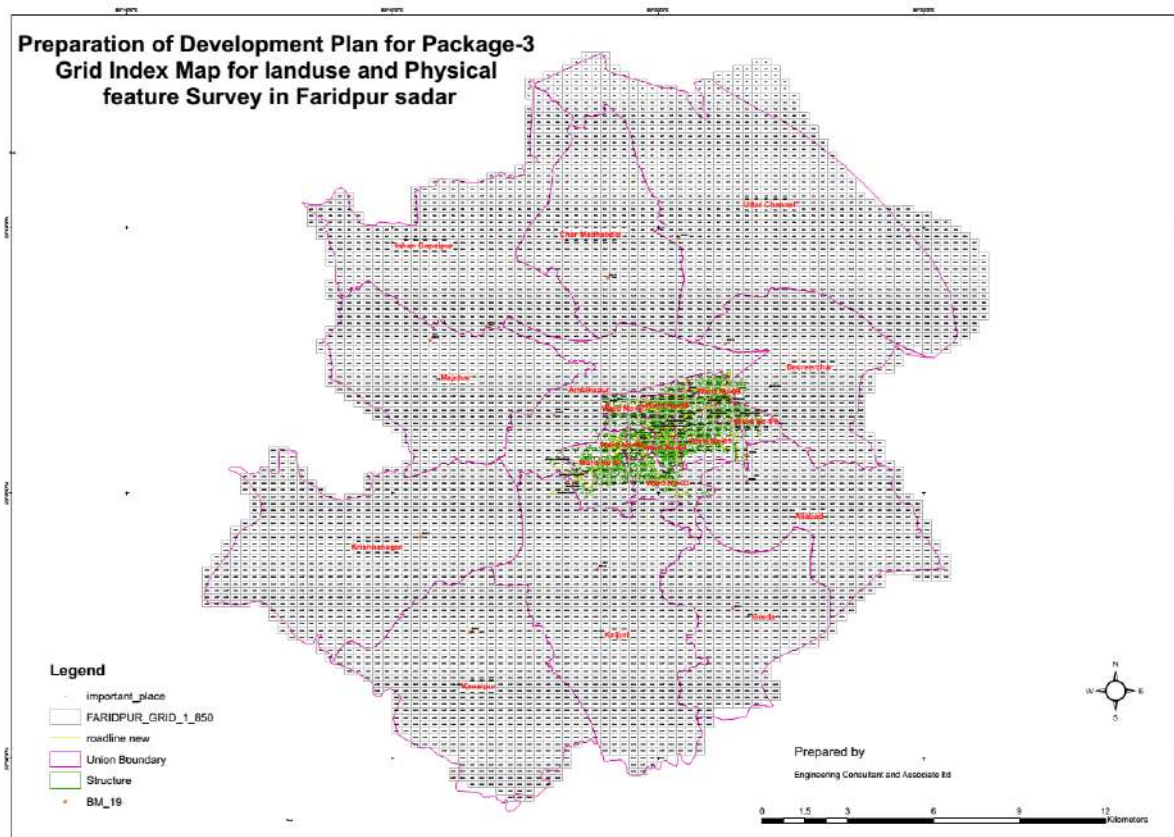


Figure-2.8: Grids for Survey Base Maps of Faridpur Sadar Upazila

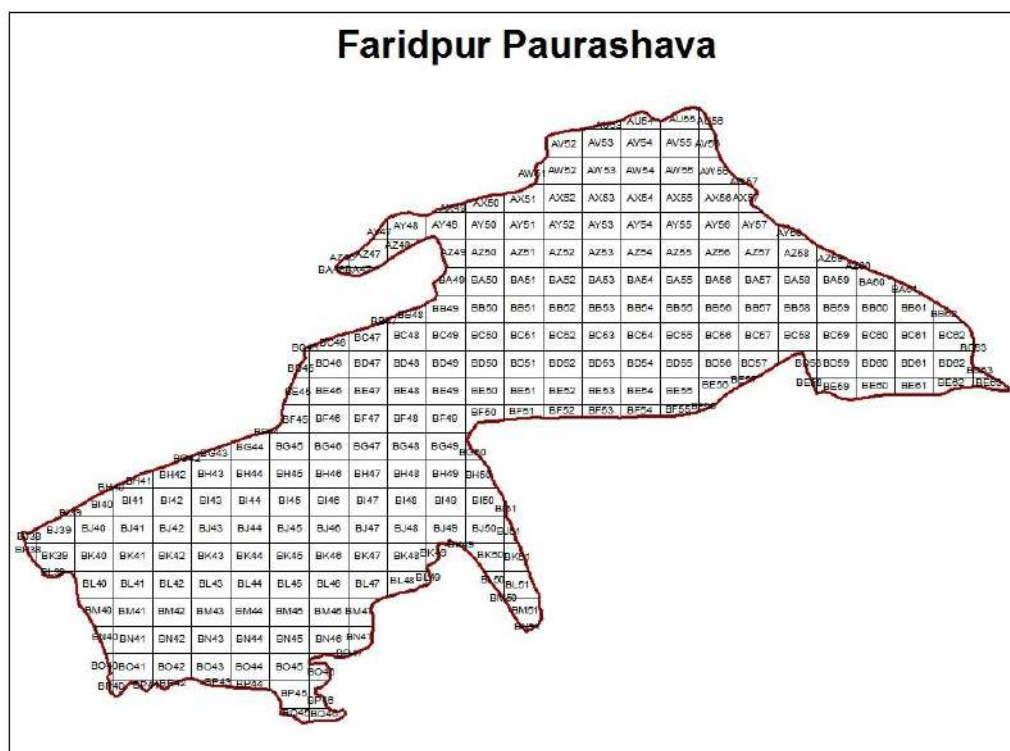
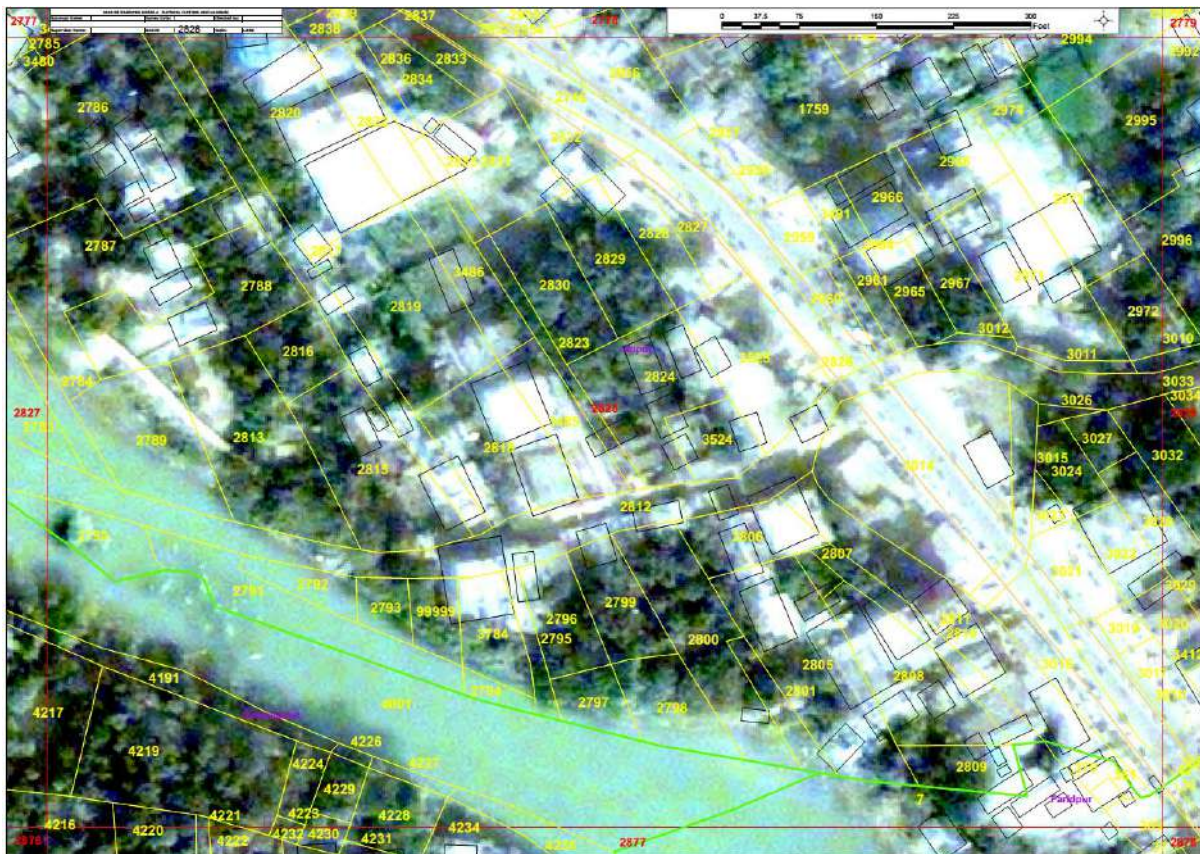


Figure-2.9: Survey Base Maps of Faridpur Sadar Upazila in Grids (Faridpur Paurashava)



Map 2.3: Sample Survey Base Map comprising Satellite Image and Photogrammetric Data



Map 2.4: Sample Survey Base Map comprising Mouza Map and Photogrammetric Data

2.3.3 Preparation of Log Book for Attribute Collection

To collect attributes or textual information, a Log Book comprising data collection forms has been developed. A Form of the Log Book is given in **Annexure-III**. Each page of the book contains columns for collecting following information:

- Type of structure
- Use of structure
- Name of the structure, if any
- Construction year of the structure
- Owner of the structure
- Mobile no. of the owner of the structure, if possible
- Road name beside the structure, if any
- Plot no. and Mouza name belongs to the structure
- Ward/Union belongs to the structure
- Name of the location

2.4. Image Collection

The satellite image was ordered to PCI India. The authorized reseller/partner of Airbus. 0.5 meter stereo pair image has been purchased by the Consultant for Faridpur Sadar. The specifications of the purchased satellite image are as below:

For Faridpur Sadar Upazila:

Image Sensor	: Airbus
Type	: Ortho ready stereo (3D)
Resolution	: 0.5m Panchromatic, 2.0 meter Multispectral
Source	: New Acquisition, 30 th December 2016
Total Area	: 412.86 Sq. km.
Bit Rate	: 16 Bit
Company	: Airbus Defense and Space.

2.4.1 Image Pre-Processing

Satellite image came with two parts. One is multispectral band which resolution is 1.74 meter and another one is panchromatic which resolution is 0.5 meter. We need 0.5 meter multispectral image for feature extraction. After collecting raw digital images, the tasks involved in image processing are:

- Merge the image tile
- Color Balance
- Contrast Adjustment
- Pan-sharpening

2.4.2 Satellite Image Processing

Satellite image came with a certain level of processing. However, for the purpose of features extraction, further processing is needed in a number of steps. The step by step procedures has been shown in the **Figure-2.10**

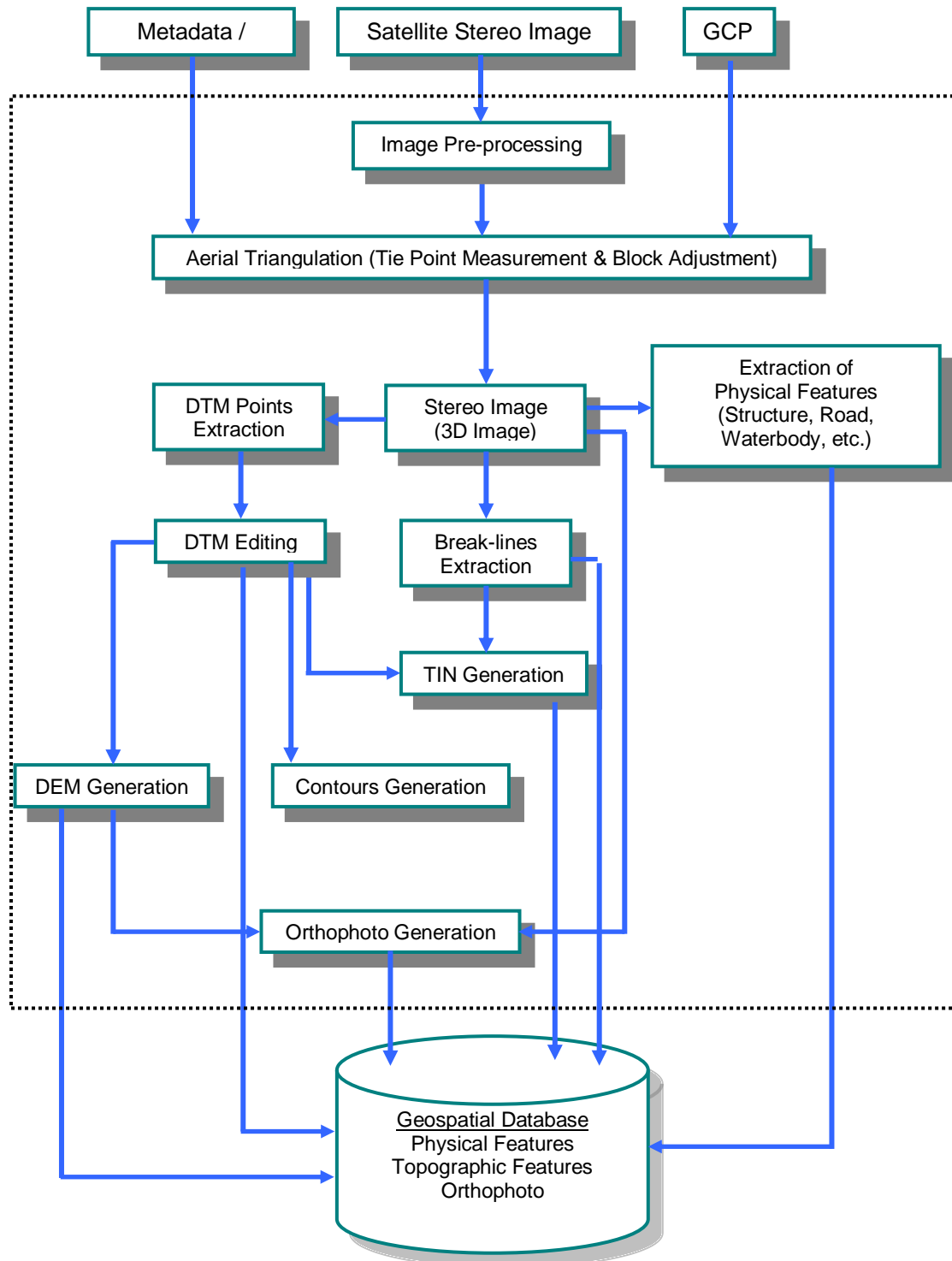


Figure-2.10: Workflow of Stereo Satellite Image Processing and Data Extraction

2.4.3 Merge, Color Balance and Pan-Sharpen

Satellite image comes with lots of small segment which called image tile so that image can be sent by the provider on DVD media. To create an individual image all image tiles have been merged and thus an individual large image has been created.

Image tiles may vary in color and contrast. So during the merge process, color and contrast has been adjusted to get a color balanced image. **Figure-2.11** shows the satellite image tiles without color and contrast balance.

During the image capturing time, satellite captures two types of image, one in multispectral (RGB & NIR) image which is low resolution (2.0 meter) and another in high resolution (0.5 meter) panchromatic image. For feature extraction, 0.5 meter high resolution (0.5m) multispectral image is required. To have this 0.5 meter multispectral image, pan-sharpening tools have been used. This tool produces a 0.5 meter multispectral image by combining 2.0 meter multispectral image and 0.5 meter panchromatic image. **Figure-2.12** shows the merged satellite image with color and contrast balance.

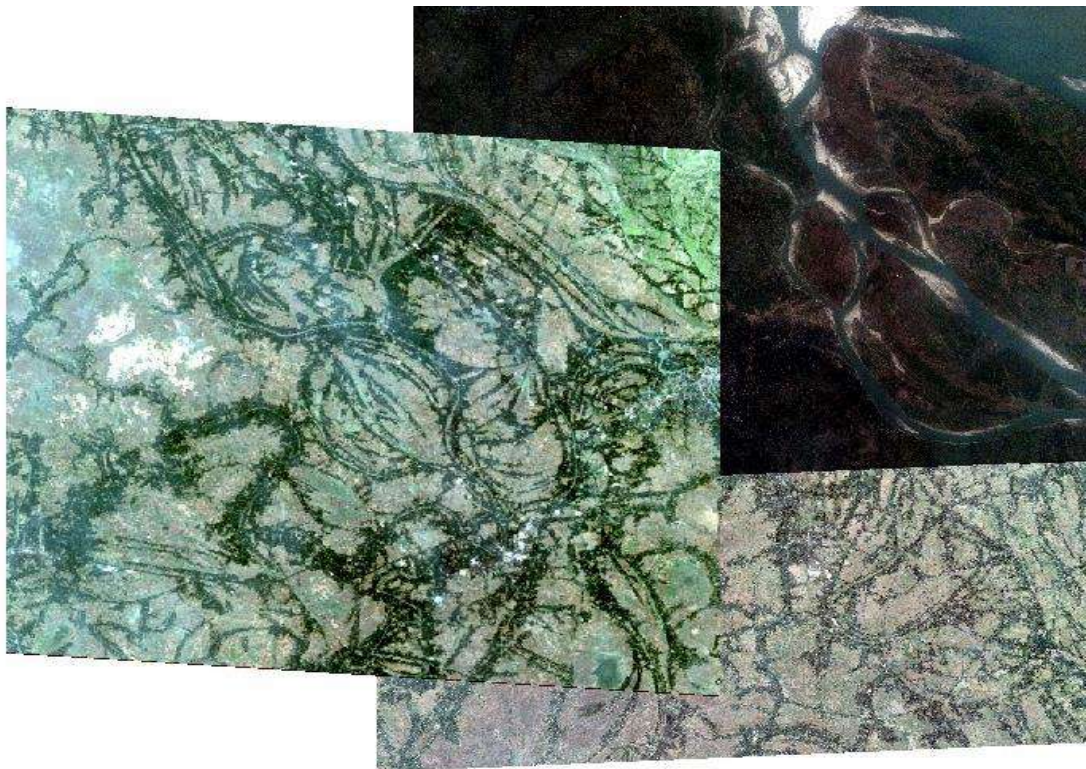


Figure-2.11: Tiles of satellite image without color and contrast balance

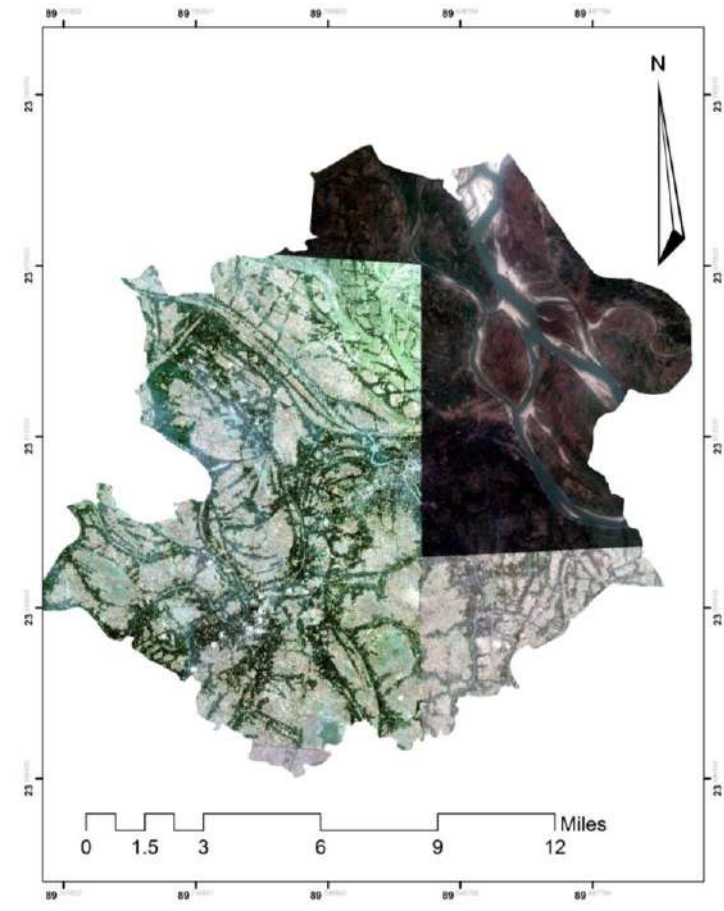
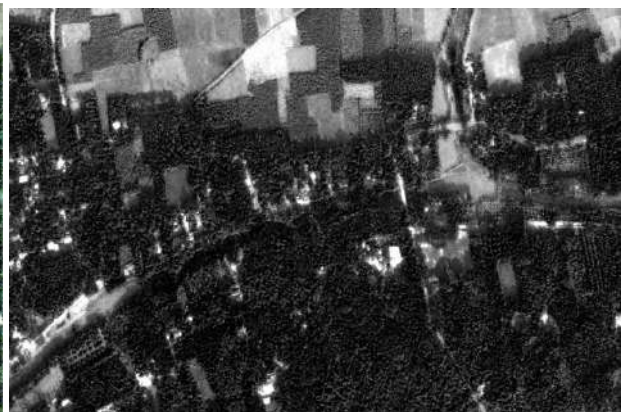


Figure-2.12: Merged satellite image with color and contrast balance



**Figure-2.13: Satellite Image Multispectral
Image 2.0 meter**



**Figure-2.14: Satellite Image Panchromatic
0.5 meter**



Figure-2.15: Pan-sharpen Image - multispectral 0.5 meter

2.4.3.1 Bit Rate, Pyramid and Epi-polar Correction

Bit Rate: In general practice 8 bit images are used. Satellite image can capture 11 bit image. Since the purchased satellite image is in 16bit, it has been changed the 16 bit to 8 bit for radio matrix adjustment and better handling the image.

Pyramid: To efficiently view and pan the image, the pyramid of the image has been built. The DATEM Summit Evolution software has been used for image interpretation.

Epi-polar Correction: Epi-polar geometry is the geometry of stereo vision. When two cameras view a 3D scene from two distinct positions, there are a number of geometric relations between the 3D points and their projections onto the 2D images that lead to constraints between the image points. The 3D models have been created by using the Summit Evolution software.

2.4.4 GPS/INS Processing

Raw IMU (GPS/INS) data of image is processed and adjusted to accomplish Aerial Triangulation. In case of satellite image the RPC file is replaced the GPS/INS file.

2.4.5 Aerial Triangulation

Aerial Triangulation is a mathematical process used to determine the position and orientation of each photograph at the moment of exposure.

Table-2.8: Input-output in Aerial Triangulation

Input for AT		Output of AT
(1)	IMU data	Geo-referenced Stereo Model
(2)	GPS (on board)	

(3)	GCP (collected from field)
(4)	Image
(5)	RPC file

The GCP and BM collected from SOB have been used for correcting the 3D satellite image coordinate using Inpho Match-AT software.

2.4.6 Digital Mapping (Feature Extraction) from Stereo Model

After the orientation of stereo models, digital mapping has been carried out. ArcGIS Geo-database model has been used for storing geo-spatial data. The Geo-database and its feature classes has been designed based on ToR.

Digital Photogrammetric Workstation (DPW) has been used as the platform for acquiring features from digital stereo images (model).

Feature registration has been done considering and measuring the position of the object under its accuracy level. The Summit Evolution & Stereo Plotter of DAT/EM has been used for identifying and registration of the objects and ArcGIS 9.3 of ESRI has been used for vector data storing and editing.

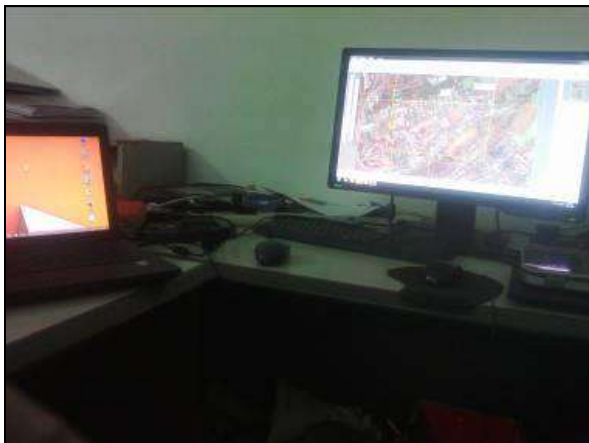


Plate-5: Digital Photogrammetric Workstation (DPW)



Plate-6: Photogrammetrist Extracting Features in DPW

Figure-2.16 and **Figure-2.17** shows the extracted features of Faridpur Sadar Upazila at a glance.



Figure-2.16: Extracted Features of Entire Faridpur Sadar Upazila by Photogrammetry

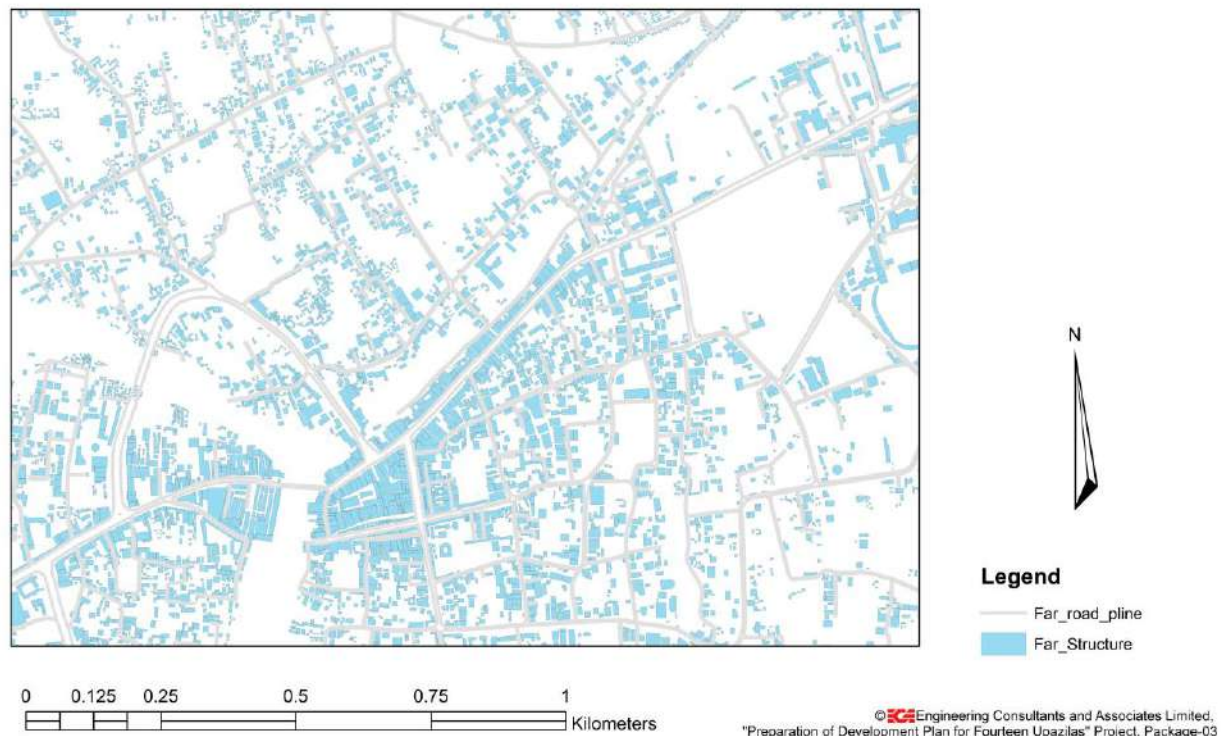


Figure 2.17: Enlarged Partial View of Extracted Features of Faridpur Sadar

For spot heights acquisition, firstly the DTM points have been generated automatically from stereo pair images by the software. Spot heights or land levels are extracted as DTM points at 10 m intervals for urban area and 20 m intervals for rural areas as described in the TOR. These automatically generated points have been then checked and edited by comparing them with stereo model in photogrammetric workstations. **Figure 2.18** shows the Digital Elevation Model of Faridpur Paurashava of Faridpur Sadar Upazila. **Figure 2.19** shows the Contour Lines partially of Faridpur paurashava of Faridpur Sadar Upazila.

The Break-lines have been created and edited after extraction of DTM Points.

The DTM Points and the Break-lines has been used later to create Triangulated Irregular Network (TIN), Digital Elevation Model (DEM) and the Contour Lines which is described in the Topographic Survey Report.

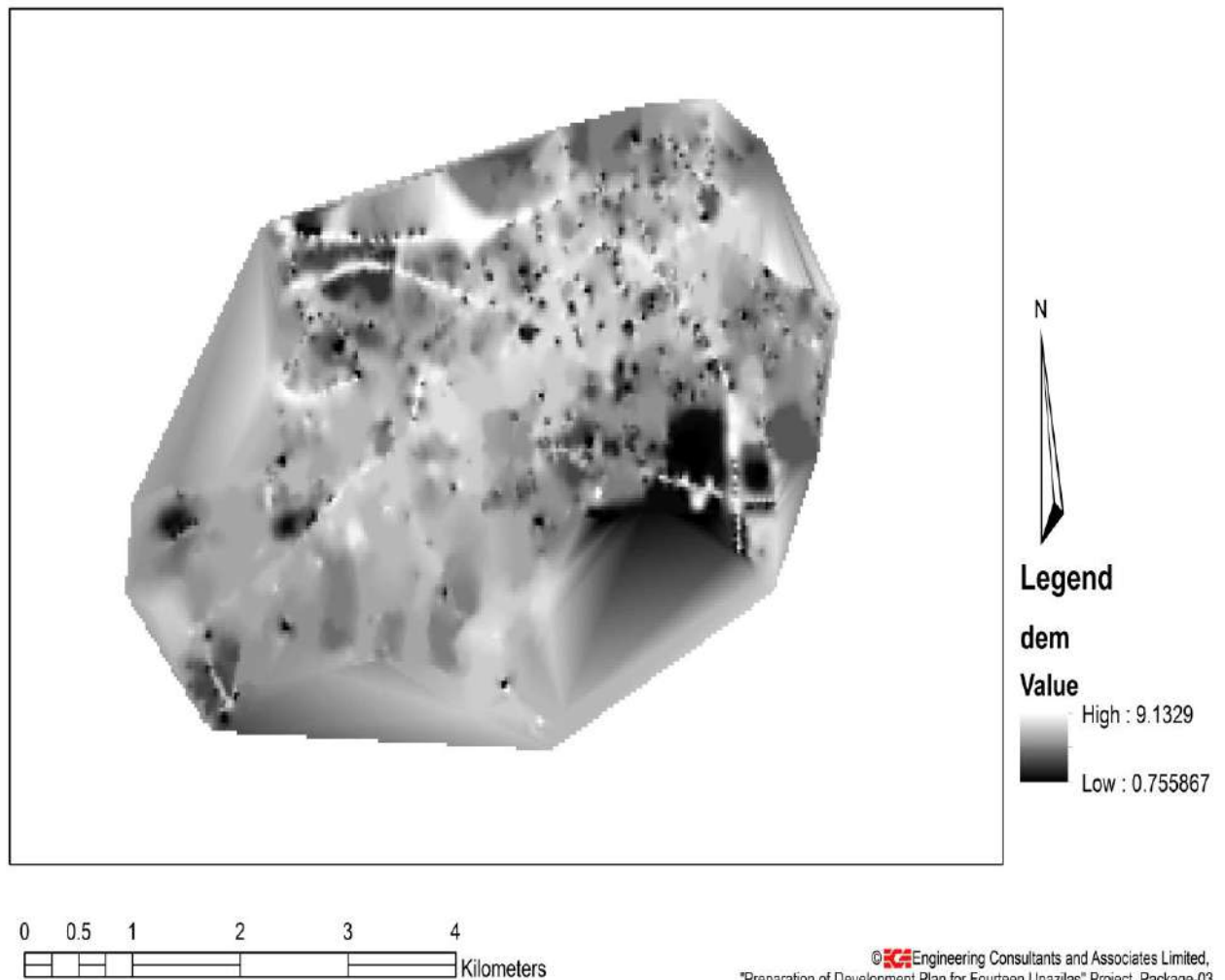


Figure-2.18: Digital Elevation Map (DEM) of Faridpur Sadar Paurashava (Partial)

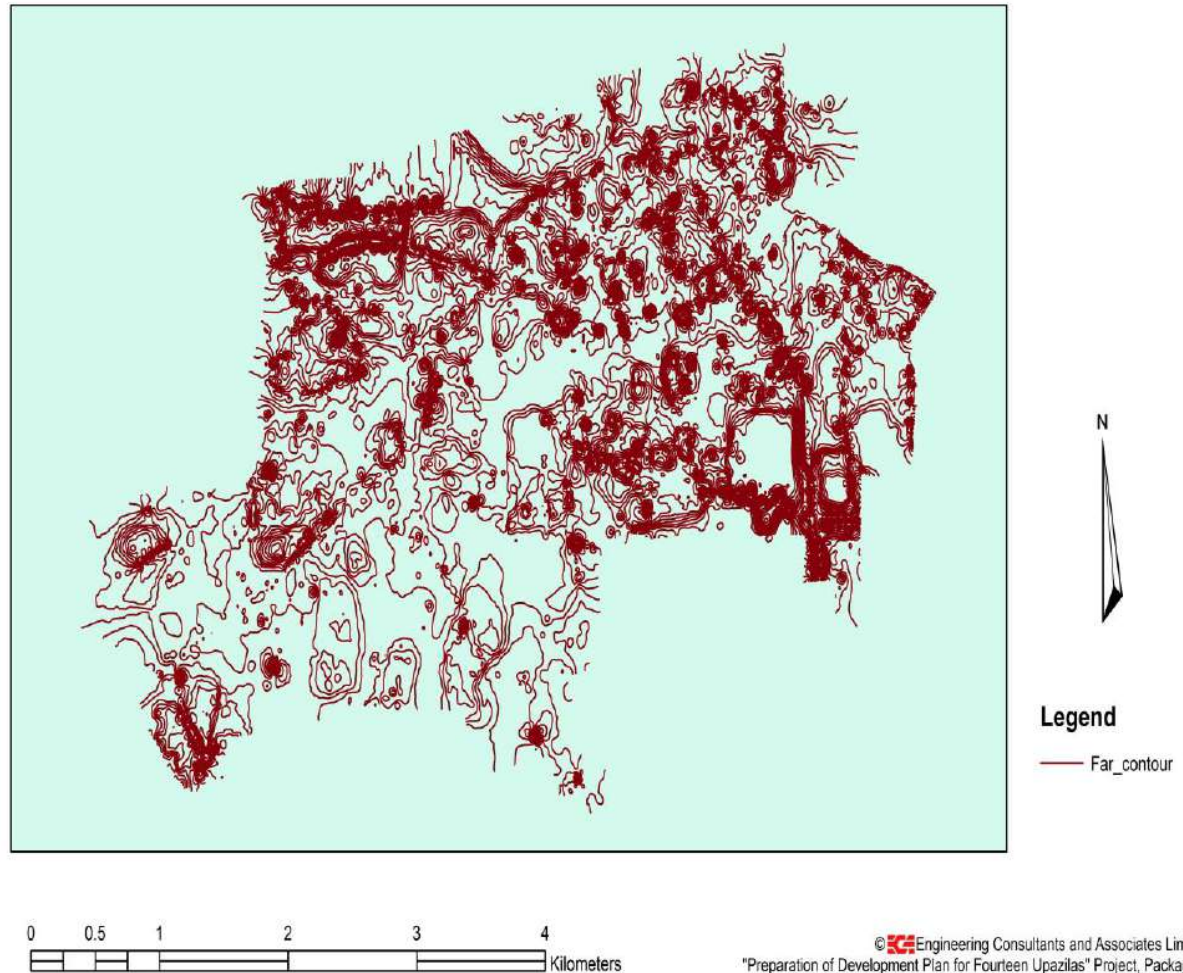


Figure-2.19: Contour Lines of Faridpur Sadar Paurashava (Partial)

2.4.7 Generation of Ortho-rectified Image

An ortho-rectified image or ortho-photo is an image which has been “corrected” for the geometric distortions (different projection, lens/sensor distortion, relief) so that it can be used as a map.

Using the DEM of the Upazila, the Ortho-rectified image has been created using photogrammetric software. Figure-2.20 shows a part ortho-rectified satellite image of Faridpur Sadar Upazila.

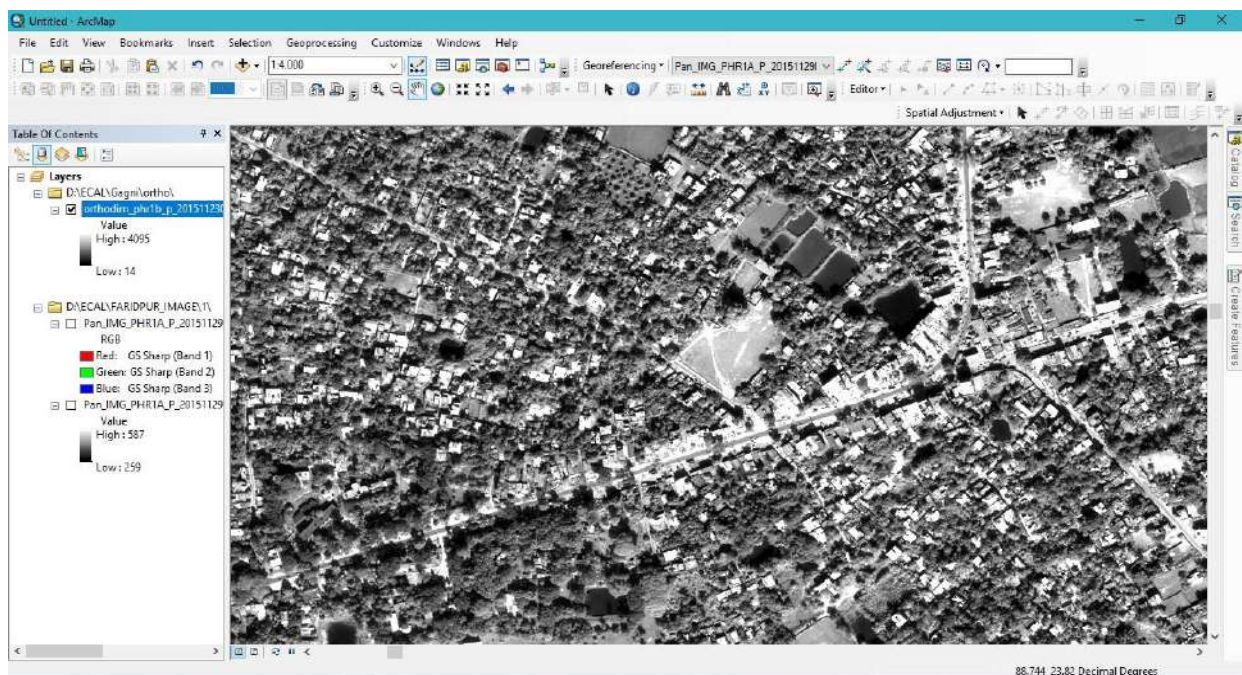


Figure 2.20: Ortho-Rectified Image of Faridpur Sadar Upazila (Partial)

Chapter Three: Physical Feature Survey

3.1 Field Level Data Acquisition

The portion contains the survey findings of physical feature survey consisting of all existing structures according to their floor height, structure type as well as uses like residential, commercial activities, industrial activities, educational facilities, health facilities, administrative uses, recreational facilities, religious facilities etc. Moreover it contains the findings of all types of road, bridge/culverts, dyke/embankment, drain/canal, sewer system, solid waste management, water supply system, utility services etc.

3.1.1 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out physical feature survey, landuse survey and topographic survey. The composition of survey team with their qualification is given **Table-3.1**:

Table 3.1: Composition of Survey Team

Field of Expertise	Qualification	No. of Expert/ Technical Staff
Survey Expert	Bachelor of Urban & Regional Planning (BURP)	1
Survey Supervisor	Diploma in Survey/Civil Engineering	3
Surveyor	Diploma in Survey/Civil Engineering	10
Surveyor	Diploma in Survey Engineering	10

For physical survey this survey team was divided into 7 groups (each group contains two surveyors) to collect all features i.e. structures, water bodies, roads, etc. with their attributes. All these groups were supervised by the Survey Expert and the Survey Supervisor.

3.1.2 Physical Feature Survey

The Physical Feature survey in Faridpur Sadar Upazila has been carried out using the survey base maps as described in previous chapter. Survey team equipped with GPS/Smart Phone, tape, color pen, map sheet, log book, etc. have gone to field and collected required information. A sample surveyed map sheet is shown in **Figure-3.1** and a sample page of log book with collected information is shown in **Figure-3.2**.



Figure-3.1: Sample Scanned Base Map for Physical Features and Land use Survey

The survey team has collected following information from field:

- Position, dimension and number of story of all structures
- Type of structures according to their construction (Pucca, semi-pucca, katcha).
- Type of structures according to their use (Residential, Commercial, Industrial, Mixed use, etc.)
- Bridge/Culverts, drain along with flow direction width and depth, location of deep tubes well, overhead water tank, electric substation, telephone exchange, Water Treatment plant, waste disposal facilities.



Plate-7: Surveyors Working on the Field in Faridpur Sadar

Structure No./Id	Plot No.	Coordinate		Structure Type	Floor nos.	Structure Name	Structure Floor Information & Population No.												Structural Information (V/D)												Owner's Name	Owner's Mobile No.	Year of Construction	Holding No.	Ward No.	Road Name	Locations
							1 st Floor Use		2 nd Floor Use		3 rd Floor Use		4 th Floor Use		5 th Floor Use		6 th Floor Use		Day Population	Night Population	Multiple Tower Overlapping	Soft Story	Pounding	Short Column	Ground Set	Tilting	Set Back	Lamination	Quality								
		Land Use	Land Use				Land Use	Land Use	Land Use	Land Use	Land Use	Land Use	Land Use	Land Use																							
1001	1001	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	N	Y	N	N	N	N	N	G	G	—	2010	—	06	11	11		
11	1004	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	G	—	01935 300124	2002	—	06	11	11		
11	11	—	SP2	SP1	—	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	—	—	—	—	—	—	—	G	—	—	2005	—	06	11	11		
11	1085	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	N	Y	N	N	N	N	N	M	G	—	1992	—	06	11	11		
1004	1385	—	P4	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	M	—	—	1994	—	06	11	11		
11	440	—	P6	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	N	Y	N	N	N	N	N	G	67873	01914 202104	2000	—	06	11	11		
11	11	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	M	—	—	1996	—	06	11	11		
11	450	—	SP2	SP1	—	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	—	—	—	—	—	—	—	G	—	—	2019	—	06	11	11		
11	445	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	M	G	—	1995	—	06	11	11		
11	454	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	N	Y	N	N	N	N	N	G	—	—	2000	—	06	11	11		
11	11	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	N	Y	N	N	N	N	N	G	—	01725 202500	2001	—	06	11	11		
11	11	—	P10	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	1	2	N	Y	N	N	N	N	N	G	G	—	2003	—	06	11	11		
11	11	—	SP2	SP1	—	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	—	—	—	—	—	—	—	M	—	—	1996	—	06	11	11		
11	451	—	P2	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	G	—	—	2012	—	06	11	11		
11	233	—	P12	P1	1	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	3	4	N	Y	N	N	N	N	N	M	—	—	1994	—	06	11	11		
11	11	—	SP2	SP1	—	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	3	—	—	—	—	—	—	—	M	201502 01914 202500	1995	—	06	11	11			
11	460	—	P19	P1	—	2001	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	2	4	N	Y	N	N	N	N	N	G	—	—	2010	—	06	11	11		

Figure-3.2: Sample Log Book Page with Information Recorded in Field

3.2 Survey Data Processing & Analysis

3.2.1 Processing of Spatial and Attribute Data

After completion of field survey, all type of spatial data is properly processed to obtain layers of physical features such as Structures, Roads, Water bodies, etc. All surveyed sheets are scanned and geo-referenced to superimpose on the satellite imagery. The surveyed features (structures, roads, water bodies, etc.) marked on the sheets were then digitized using the ArcGIS software and stored them layer by layer as per Technical Specifications on GIS Database.



Plate-8: Updating Works through GIS

After digitizing all surveyed features, editing and merging and has been done to get complete data sets of different layers of physical features.

The attribute data collected in the Log Book during the field survey have been entered in a relational database through Microsoft Access. The **Figure-3.3** shows the interface of Data Entry and **Figure-3.4** shows the tabular view of entered data in Microsoft Access.

Figure-3.3: Log Book Data Entry Interface in Microsoft Access Software

Table																	5
Structure with Attributes																	
OID	Shape	Id	Str_Type	Grid_ID	Str_ID	Struct_ID	structID	GridNo	Sld	strType	Floor	StrUse_1	StrName	OwnerName	WnerCell	Contyear	
442	Polygon Z	26	chub	AD23	26	AD23_26	AD23_26	26	Katcha	1	Residential	<Null>	KASHEM	<Null>	<Null>	1930	
443	Polygon Z	27	chub	AD23	27	AD23_27	AD23_27	27	Katcha	1	Residential	<Null>	JABBAR	<Null>	<Null>	1920	
444	Polygon Z	28	chub	AD23	28	AD23_28	AD23_28	28	Katcha	1	Residential	<Null>	JAKED	<Null>	<Null>	1930	
445	Polygon Z	29	chub	AD23	29	AD23_29	AD23_29	29	Katcha	1	Residential	<Null>	JAKR	<Null>	<Null>	1970	
446	Polygon Z	31	chub	AD23	31	AD23_31	AD23_31	31	Semi Pucca	1	Residential	<Null>	JULAYED	<Null>	<Null>	1998	
447	Polygon Z	32	chub	AD23	32	AD23_32	AD23_32	32	Katcha	1	Residential	<Null>	BAKR	<Null>	<Null>	1998	
448	Polygon Z	33	chub	AD23	33	AD23_33	AD23_33	33	Katcha	1	Residential	<Null>	DAFUR	<Null>	<Null>	1968	
449	Polygon Z	30	chub	AD23	30	AD23_30	AD23_30	30	Katcha	1	Residential	<Null>	TAYEB	<Null>	<Null>	1977	
450	Polygon Z	36	chub	AD23	36	AD23_36	AD23_36	36	Katcha	1	Residential	<Null>	SHAHIDULLAH	<Null>	<Null>	1990	
451	Polygon Z	35	chub	AD23	35	AD23_35	AD23_35	35	Katcha	1	Residential	<Null>	MUSA	<Null>	<Null>	1938	
452	Polygon Z	34	chub	AD23	34	AD23_34	AD23_34	34	Pucca	1	Residential	<Null>	KHORSHED	<Null>	<Null>	1999	
453	Polygon Z	37	chub	AD23	37	AD23_37	AD23_37	37	Semi Pucca	1	Residential	<Null>	LOKMAN	<Null>	<Null>	1998	
454	Polygon Z	39	chub	AD23	39	AD23_39	AD23_39	39	Semi Pucca	1	Residential	<Null>	KHALEK	<Null>	<Null>	2000	
455	Polygon Z	38	chub	AD23	38	AD23_38	AD23_38	38	Semi Pucca	1	Residential	<Null>	JAKED	<Null>	<Null>	1990	
456	Polygon Z	40	chub	AD23	40	AD23_40	AD23_40	40	Katcha	1	Residential	<Null>	JABBAR	<Null>	<Null>	1911	
457	Polygon Z	1	chub	AD24	1	AD24_1	AD24_1	1	Pucca	1	Religious	<Null>	PUBLIC	01815854957	<Null>	2012	
458	Polygon Z	2	chub	AD24	2	AD24_2	AD24_2	2	Pucca	1	Residential	<Null>	KHALILUR RAHMAN	01815854957	<Null>	2012	
459	Polygon Z	3	chub	AD24	3	AD24_3	AD24_3	3	Semi Pucca	1	Residential	<Null>	SAMSUL HAQ	01815854957	<Null>	2000	
460	Polygon Z	4	chub	AD24	4	AD24_4	AD24_4	4	Katcha	1	Residential	<Null>	ALAM	01815854957	<Null>	1992	
461	Polygon Z	5	chub	AD24	5	AD24_5	AD24_5	5	Katcha	1	Residential	<Null>	MANAN	01815854957	<Null>	1994	
462	Polygon Z	6	chub	AD24	6	AD24_6	AD24_6	6	Katcha	1	Residential	<Null>	ADUL	01815854957	<Null>	1996	
463	Polygon Z	7	chub	AD24	7	AD24_7	AD24_7	7	Katcha	1	Residential	<Null>	KHORSHED	01815854957	<Null>	1990	
464	Polygon Z	8	chub	AD24	8	AD24_8	AD24_8	8	Katcha	1	Residential	<Null>	KADER	01815854957	<Null>	1994	
465	Polygon Z	9	chub	AD24	9	AD24_9	AD24_9	9	Katcha	1	Residential	<Null>	MD ALI	01815854957	<Null>	1998	
466	Polygon Z	10	chub	AD24	10	AD24_10	AD24_10	10	Katcha	1	Residential	<Null>	NUR ISLAM	01815854957	<Null>	2000	
467	Polygon Z	11	chub	AD24	11	AD24_11	AD24_11	11	Pucca	1	Residential	<Null>	MAHUB	01815854957	<Null>	2012	
468	Polygon Z	12	chub	AD24	12	AD24_12	AD24_12	12	Katcha	1	Residential	<Null>	JABE ALI	01815854957	<Null>	1996	
469	Polygon Z	13	chub	AD24	13	AD24_13	AD24_13	13	Pucca	1	Residential	<Null>	LOKMAN CHOWHUR	<Null>	<Null>	2010	
470	Polygon Z	14	chub	AD24	14	AD24_14	AD24_14	14	Pucca	1	Residential	<Null>	EDADUR RAHMAN	<Null>	<Null>	2012	
471	Polygon Z	15	chub	AD24	15	AD24_15	AD24_15	15	Pucca	1	Residential	<Null>	SULAMAN	<Null>	<Null>	2000	
472	Polygon Z	16	chub	AD24	16	AD24_16	AD24_16	16	Semi Pucca	1	Residential	<Null>	REJAUL MUSTAFA	<Null>	<Null>	2014	
473	Polygon Z	18	chub	AD24	18	AD24_18	AD24_18	18	Semi Pucca	1	Residential	<Null>	QIVAS UDDIN	<Null>	<Null>	2009	
474	Polygon Z	17	chub	AD24	17	AD24_17	AD24_17	17	Pucca	1	Residential	<Null>	NASER UDDIN	<Null>	<Null>	2010	
475	Polygon Z	19	chub	AD24	19	AD24_19	AD24_19	19	Pucca	1	Residential	<Null>	DIDARUL ALAM	<Null>	<Null>	2012	
476	Polygon Z	20	chub	AD24	20	AD24_20	AD24_20	20	Katcha	1	Residential	<Null>	SOHEL	<Null>	<Null>	2009	
477	Polygon Z	21	chub	AD24	21	AD24_21	AD24_21	21	Katcha	1	Residential	<Null>	MD RASIB	<Null>	<Null>	1980	
478	Polygon Z	22	chub	AD24	22	AD24_22	AD24_22	22	Katcha	1	Residential	<Null>	MD RAFK	<Null>	<Null>	1984	
479	Polygon Z	23	chub	AD24	23	AD24_23	AD24_23	23	Katcha	1	Residential	<Null>	NURUL ALAM	<Null>	<Null>	1996	
c																	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 (0 out of 52302 Selected)																	
Far Landuse only Structure with Attributes																	

Figure-3.4: Tabular View of Log Book Data Entry in Microsoft Access Software

The data entry works have been checked and processed as usable format. These attribute data have been linked to spatial data of structures through GIS. Finally structures and all other physical data layers have been developed and finally transformed them in to Bangladesh Universal Transverse Mercator (BUTM2010) Coordinate System.

The processed data have been symbolized using different attribute to visualize the physical features of the project area. Sample processed data has been shown in **Map-3.1** and **Map-3.2**. A 3D display of physical features has been shown in **Figure-3.5**.



Map-3.1: Structure Use in Faridpur Sadar Town Area

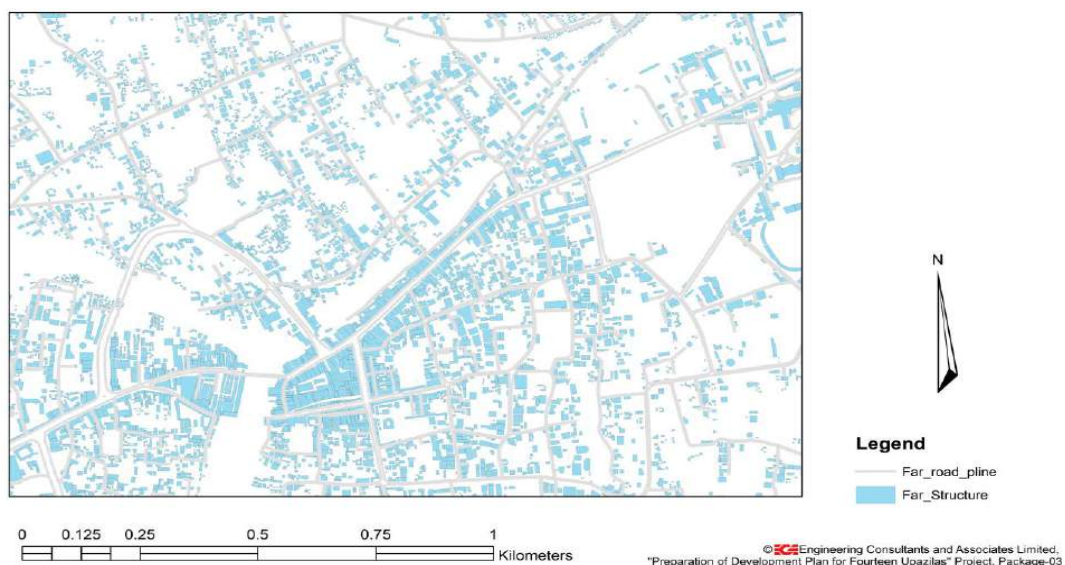
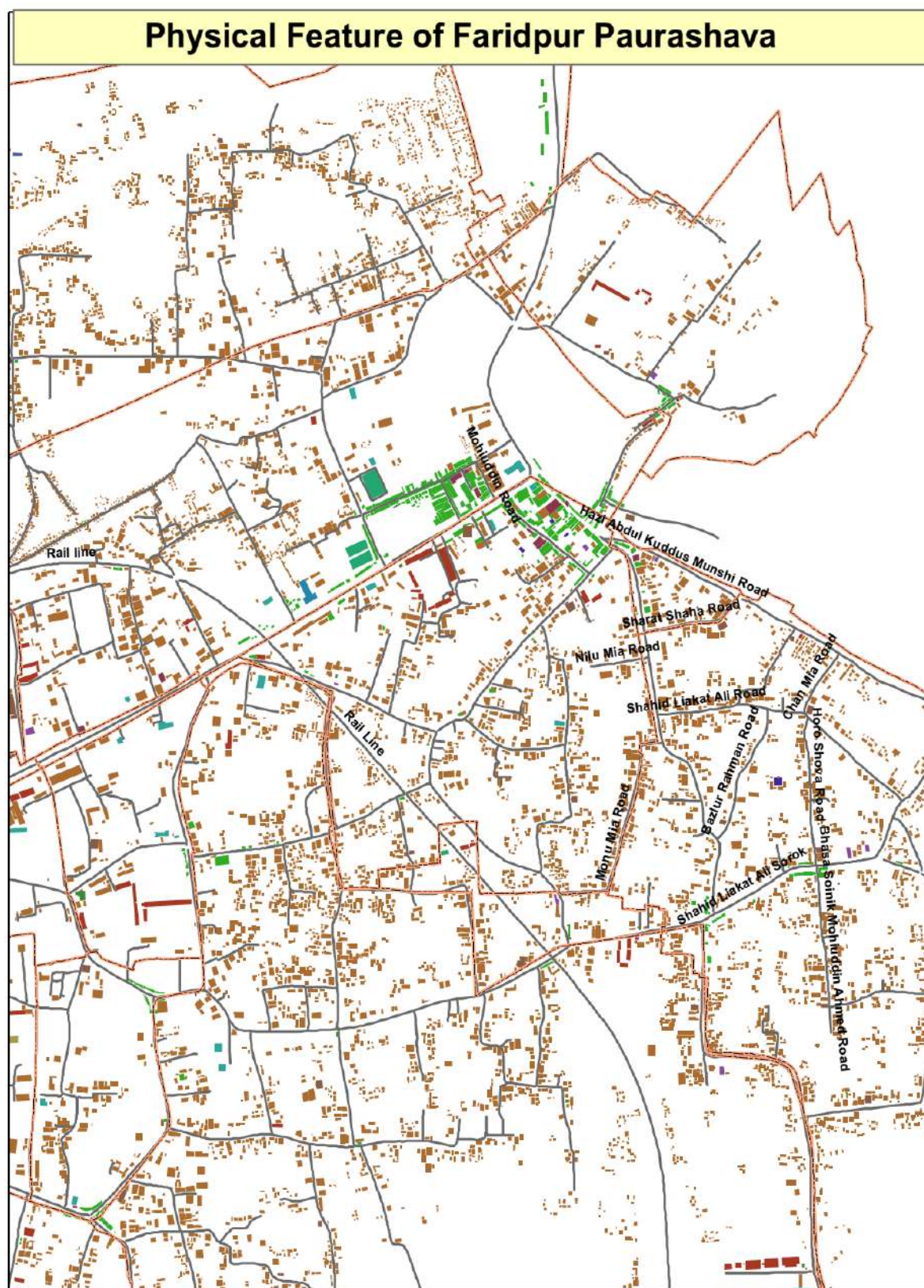


Figure-3.5: 3D Display of Physical Features in Faridpur Sadar Town Area



Map-3.2: Structure Type and Use in Faridpur Sadar Town Area

3.2.2 Development of GIS Database

A GIS database has been developed for systematically organizing, storing and easy retrieving the information and data of the project area. ArcGIS File Geo-database has developed this purpose, since File Geo-database offers structural, performance and data management advantages over Personal Geo-database or shape files. The geo-database contains all the layers generated from the Mouza maps, satellite images and field survey.

Specifications of these layers has been developed to standardize GIS data structure such as layer name, layer type, attribute types and attribute values, and provided in **Annexure-II**.

The **Figure-3.6** shows partial view of attribute table of Structures of Faridpur Sadar Upazila.

ID	Shape	Id	Str_Type	Grid_ID	Str_ID	Struc_ID	GridNo	Sld	StrcType	Floor	StrucNo	StrName	OwnerName	UserCell	ContYear
442	Polygon Z	26	Katcha	AD23_26	AD23_26	AD23_26	AD23	26	Katcha	1	Residential	<Null>	KASHEM	<Null>	1990
443	Polygon Z	27	Katcha	AD23_27	AD23_27	AD23_27	AD23	27	Katcha	1	Residential	<Null>	JABBAR	<Null>	1990
444	Polygon Z	28	Katcha	AD23_28	AD23_28	AD23_28	AD23	28	Katcha	1	Residential	<Null>	JAIED	<Null>	1990
445	Polygon Z	29	Katcha	AD23_29	AD23_29	AD23_29	AD23	29	Katcha	1	Residential	<Null>	JAKR	<Null>	1970
446	Polygon Z	31	Katcha	AD23_31	AD23_31	AD23_31	AD23	31	Semi Pucca	1	Residential	<Null>	ABUVEED	<Null>	1998
447	Polygon Z	32	Katcha	AD23_32	AD23_32	AD23_32	AD23	32	Katcha	1	Residential	<Null>	RAKR	<Null>	1998
448	Polygon Z	33	Katcha	AD23_33	AD23_33	AD23_33	AD23	33	Katcha	1	Residential	<Null>	KAJUR	<Null>	1998
449	Polygon Z	35	Katcha	AD23_35	AD23_35	AD23_35	AD23	35	Katcha	1	Residential	<Null>	TAYEB	<Null>	1977
450	Polygon Z	36	Katcha	AD23_36	AD23_36	AD23_36	AD23	36	Katcha	1	Residential	<Null>	SITAFEDULLAH	<Null>	1990
451	Polygon Z	35	Katcha	AD23_35	AD23_35	AD23_35	AD23	35	Katcha	1	Residential	<Null>	RUSS	<Null>	1998
452	Polygon Z	34	Katcha	AD23_34	AD23_34	AD23_34	AD23	34	Pucca	1	Residential	<Null>	KHOSHED	<Null>	1999
453	Polygon Z	37	Katcha	AD23_37	AD23_37	AD23_37	AD23	37	Semi Pucca	1	Residential	<Null>	L CHORAN	<Null>	1998
454	Polygon Z	39	Katcha	AD23_39	AD23_39	AD23_39	AD23	39	Semi Pucca	1	Residential	<Null>	KHALEK	<Null>	2000
455	Polygon Z	38	Katcha	AD23_38	AD23_38	AD23_38	AD23	38	Semi Pucca	1	Residential	<Null>	JAIED	<Null>	1990
456	Polygon Z	40	Katcha	AD23_40	AD23_40	AD23_40	AD23	40	Katcha	1	Residential	<Null>	JABBAR	<Null>	1991
457	Polygon Z	1	Katcha	AD24_1	AD24_1	AD24_1	AD24	1	Pucca	1	Residential	<Null>	PUBLIC	01815554957	2010
458	Polygon Z	2	Katcha	AD24_2	AD24_2	AD24_2	AD24	2	Pucca	1	Residential	<Null>	KHALILUR RAHMAN	01815554957	2012
459	Polygon Z	3	Katcha	AD24_3	AD24_3	AD24_3	AD24	3	Semi Pucca	1	Residential	<Null>	SAMSUL HAQ	01815554957	2000
460	Polygon Z	4	Katcha	AD24_4	AD24_4	AD24_4	AD24	4	Katcha	1	Residential	<Null>	ALAM	01815554957	1992
461	Polygon Z	5	Katcha	AD24_5	AD24_5	AD24_5	AD24	5	Katcha	1	Residential	<Null>	MANJAN	01815554957	1994
462	Polygon Z	6	Katcha	AD24_6	AD24_6	AD24_6	AD24	6	Katcha	1	Residential	<Null>	ABUL	01815554957	1996
463	Polygon Z	7	Katcha	AD24_7	AD24_7	AD24_7	AD24	7	Katcha	1	Residential	<Null>	KHOSHED	01815554957	1990
464	Polygon Z	8	Katcha	AD24_8	AD24_8	AD24_8	AD24	8	Katcha	1	Residential	<Null>	KADER	01815554957	1994
465	Polygon Z	9	Katcha	AD24_9	AD24_9	AD24_9	AD24	9	Katcha	1	Residential	<Null>	MD ALI	01815554957	1998
466	Polygon Z	10	Katcha	AD24_10	AD24_10	AD24_10	AD24	10	Katcha	1	Residential	<Null>	NUR ISLAM	01815554957	2000
467	Polygon Z	11	Katcha	AD24_11	AD24_11	AD24_11	AD24	11	Pucca	1	Residential	<Null>	MAHUB	01815554957	2012
468	Polygon Z	12	Katcha	AD24_12	AD24_12	AD24_12	AD24	12	Katcha	1	Residential	<Null>	JABIR ALI	01815554957	1996
469	Polygon Z	13	Katcha	AD24_13	AD24_13	AD24_13	AD24	13	Pucca	1	Residential	<Null>	LORDAN CHOWDHURY	<Null>	2010
470	Polygon Z	14	Katcha	AD24_14	AD24_14	AD24_14	AD24	14	Pucca	1	Residential	<Null>	EDADUR RAHMAN	<Null>	2012
471	Polygon Z	15	Katcha	AD24_15	AD24_15	AD24_15	AD24	15	Pucca	1	Residential	<Null>	SULAMAN	<Null>	2000
472	Polygon Z	16	Katcha	AD24_16	AD24_16	AD24_16	AD24	16	Semi Pucca	1	Residential	<Null>	REJAU MUSTAPA	<Null>	2014
473	Polygon Z	16	Katcha	AD24_16	AD24_16	AD24_16	AD24	16	Semi Pucca	1	Residential	<Null>	SHAFI UDIN	<Null>	2000
474	Polygon Z	17	Katcha	AD24_17	AD24_17	AD24_17	AD24	17	Pucca	1	Residential	<Null>	NASIR UDIN	<Null>	2010
475	Polygon Z	18	Katcha	AD24_18	AD24_18	AD24_18	AD24	18	Pucca	1	Residential	<Null>	SHUROL ALAM	<Null>	2012
476	Polygon Z	20	Katcha	AD24_20	AD24_20	AD24_20	AD24	20	Katcha	1	Residential	<Null>	SONEL	<Null>	2009
477	Polygon Z	21	Katcha	AD24_21	AD24_21	AD24_21	AD24	21	Katcha	1	Residential	<Null>	MD RASE	<Null>	1980
478	Polygon Z	22	Katcha	AD24_22	AD24_22	AD24_22	AD24	22	Katcha	1	Residential	<Null>	MD RAFIK	<Null>	1984
479	Polygon Z	23	Katcha	AD24_23	AD24_23	AD24_23	AD24	23	Katcha	1	Residential	<Null>	NURUL ALAM	<Null>	1996

Figure-3.6: Attribute Table of Structure Database of Faridpur Sadar Upazila

The **Figure-3.7** shows partial view of attribute table of Road Centerline of Faridpur Sadar Upazila.

FID	Shape	Id	Road_Type	Road_Name	Road_Width	No_of_Lane	Rd_Owner	Road_Class	Le
73	Polyline	0	Katcha	Vandardia Paschimpara Katcha Road	8	0		Tertiary Road	
239	Polyline	3	Katcha	Uttar Para	8.25	0		Tertiary Road	
5	Polyline	0	Pucca	Upazila Road	15	0		Secondary Road	
70	Polyline	0	Pucca	Shibpur to Dulapur Road	18	1		Secondary Road	
106	Polyline	1	Pucca	Shibpur To Bagha Road	12	1		Secondary Road	
202	Polyline	1	Pucca	Shibpur College Road	15	0		Tertiary Road	
221	Polyline	2	Pucca	Pascham Para	10	0		Secondary Road	
222	Polyline	1	Katcha	Pascham Para	12.21	0		Tertiary Road	
107	Polyline	2	Pucca	Panch Paika Road	8	1		Tertiary Road	
108	Polyline	2	Pucca	Panch Paika Road	8	1		Tertiary Road	

Figure-3.7: Attribute Table of Road Centerline of Faridpur Sadar Upazila

The **Figure-3.8** shows partial view of attribute table of Mouza Map of Faridpur Sadar Upazila.

FID	Shape	Id	MZA_ID	AREATYPE	Area_t2	Area	Mza_Name
7754	Polygon	280	12602	777	777	404.648571	Alipur
7502	Polygon	279	12602	777	777	126.057	Alipur
7909	Polygon	279	12602	777	777	332.52053	Alipur
7932	Polygon	279	12602	777	777	616.620963	Alipur
7938	Polygon	341	12602	777	777	258.302663	Alipur
7954	Polygon	301	12602	777	777	464.445953	Alipur
7955	Polygon	260	12602	777	777	281.781476	Alipur
7986	Polygon	301	12602	777	777	435.903752	Alipur
8017	Polygon	301	12602	777	777	130.430745	Alipur
8049	Polygon	260	12602	777	777	1057.436015	Alipur
8054	Polygon	999	12602	777	777	303.190563	Alipur
8055	Polygon	279	12602	777	777	238.863598	Alipur
8059	Polygon	302	12602	777	777	346.050135	Alipur
8062	Polygon	302	12602	777	777	629.073785	Alipur
8066	Polygon	378	12602	777	777	510.435693	Alipur
8066	Polygon	301	12602	777	777	771.873342	Alipur
8073	Polygon	279	12602	777	777	201.616995	Alipur
8085	Polygon	279	12602	777	777	284.112809	Alipur
8086	Polygon	260	12602	777	777	1584.964889	Alipur
8087	Polygon	279	12602	777	777	531.815785	Alipur
8093	Polygon	260	12602	777	777	84.28952	Alipur

Figure-3.8: Attribute Table of Mouza Map of Faridpur Sadar Upazila

The Figure-3.9 shows partial view of Scanned Mouza Map Files of Faridpur Sadar Upazila.

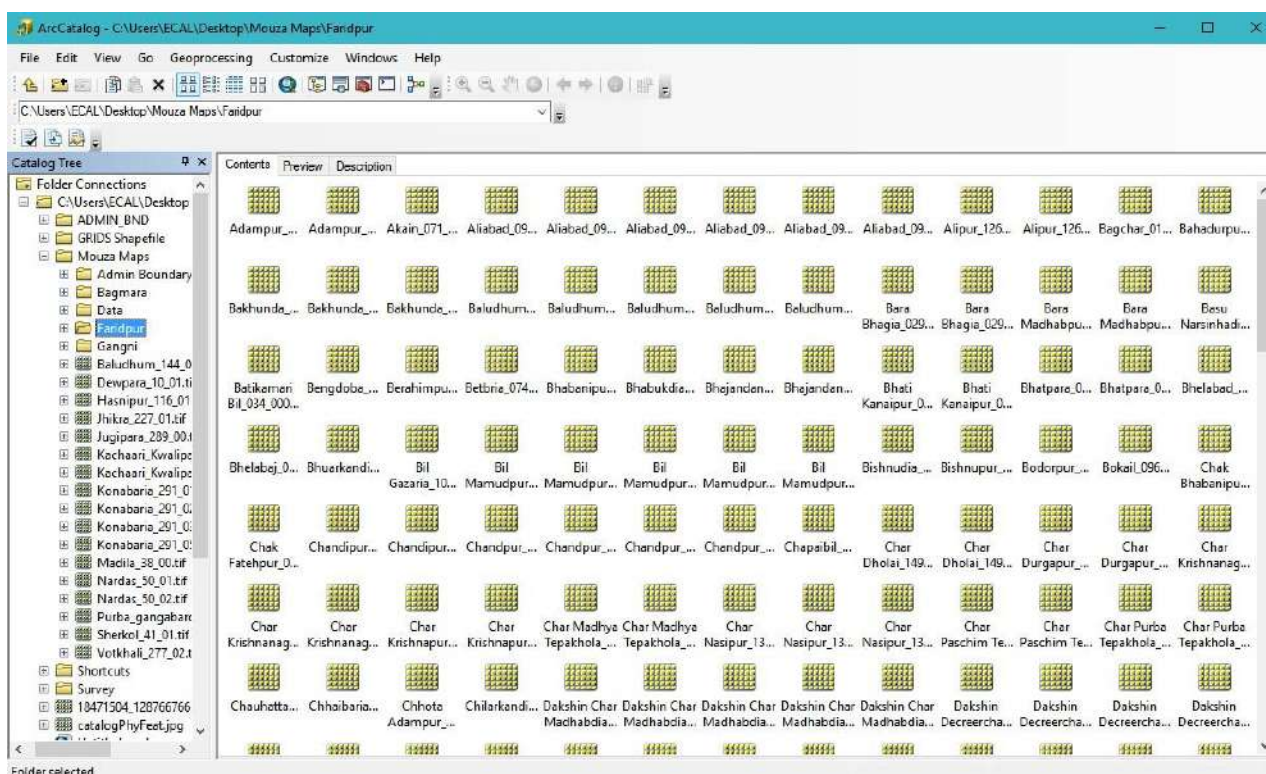


Figure-3.9: Catalog View of Scanned Mouza Map Files of Faridpur Sadar Upazila

The Figure-3.10 shows partial view of Geodatabase of Digitized Mouza Maps Files of Faridpur Sadar Upazila.

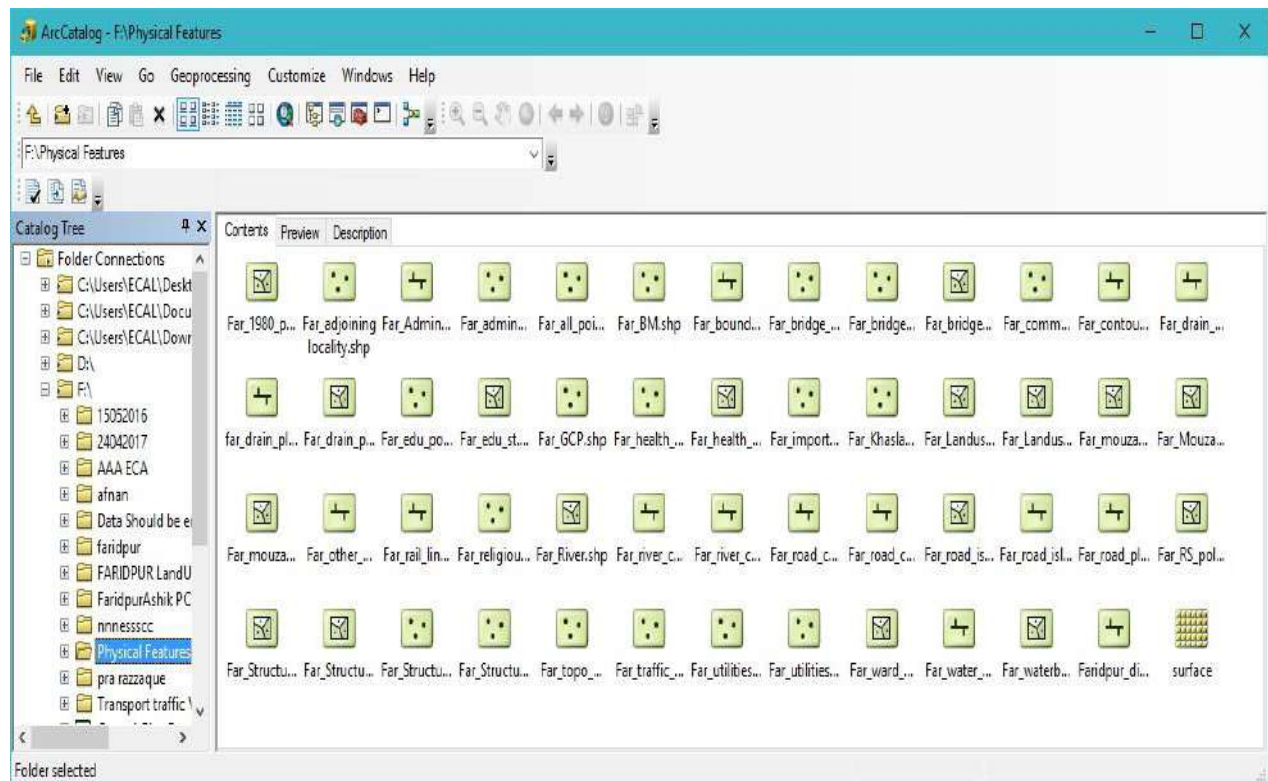


Figure-3.10: Catalog View of Geodatabases of Digitized Mouza Maps of Faridpur Sadar Upazila

3.2.3 Field Verification/Ground Truthing

After developing the GIS database and preparing the field checking map the accuracy of the physical feature database is checked by the UDD and the consulting firm jointly. From 17th august, 2016 the surveyors of UDD and consulting firm are visited the Faridpur Sadar upazila for field checking. Field checking is done by keeping focus on the following area:

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



Plate-9: Field Checking in Faridpur Sadar by UDD and Consulting Firm

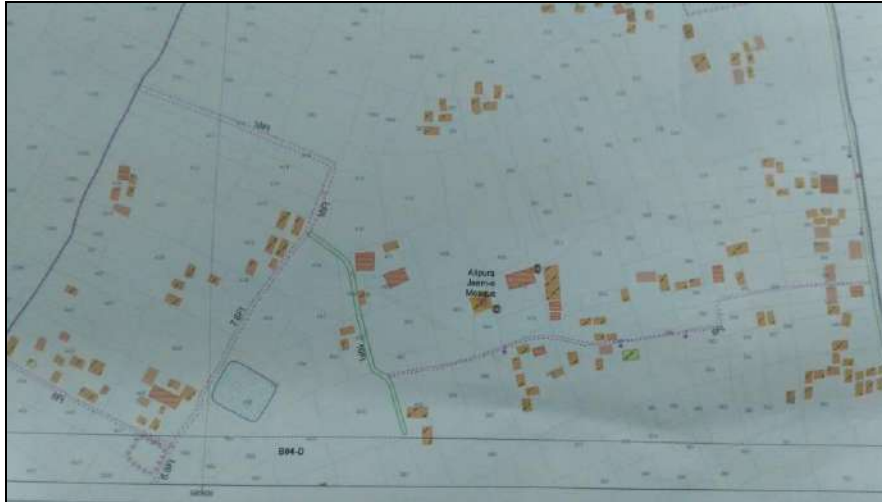


Plate-10: Physical Feature Map for Field Checking in Faridpur Sadar

3.2.4 Earthquake Vulnerability Assessment

Structural vulnerability assessment involves checking whether a building in a seismically active area has sufficient robustness to withstand a specific magnitude earthquake. This is done by analyzing the building structurally in terms of its design, construction and materials in terms of international standards and local building codes, as appropriate. Where buildings are found to be non-resistant or have insufficient resilience to an expected earthquake of a given magnitude (e.g. a 'design' earthquake) remedial measures can be designed and costed for subsequent retrofitting. In extreme cases, the buildings should be demolished and reconstructed.

For this vulnerability assessment some criteria of a structure have been assessed. Such as: Pounding effect, Tilting, ground setting, set back rules, Overhanging, Soft story, Short column etc. The survey has been done through the whole upazila and if any of the problems is found the data has been collected with pictures. Some example of data collection of vulnerability assessment is given below:



Plate-11: Vulnerability Assessment at Faridpur Sadar Upazila

Chapter Four: Land Use Survey

Land Use Survey is a major element in any planning endeavor. Thorough detail land use survey and collection of required information of the project area are needed that helps draw up the plan in a better way.

The Land use survey was carried out by recording the current use of the land in the study area. The current use of land was classified according to the provisions given in the TOR. Land use survey, basically, records the use of land by its functional activity such as residential, industrial, commercial etc. The maps prepared for physical survey were used as base map for land use survey. Land use features were identified and classified using the recorded code and separated in different layers during data processing stage, from where category wise land use map were drawn using the identification layers of each of the land uses features.

4.0 Field Level Data Acquisition

4.1.1 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out land use survey and along with physical feature survey. The composition of survey team with their qualification is given below:

Table 4.1: Composition of Survey Team

Field of Expertise	Qualification	No. of Expert/ Technical Staff
Survey Expert	Bachelor of Urban & Regional Planning (BURP)	1
Survey Supervisor	Diploma in Survey/Civil Engineering	1
Surveyor	Diploma in Survey/Civil Engineering	12
Surveyor	Diploma in Survey Engineering	10

For Land use survey, this survey team was divided into 7 groups (each group contains two surveyors) to collect land use boundary and all physical features i.e. structures, water bodies, roads, etc. with their attributes. All these groups were supervised by the Survey Expert and the Survey Supervisor.

4.1.2 Land Use Survey

The Land use survey has been carried out by recording the current use of the land in the study area. The current use of land has been classified according to provision given in the TOR. Land use survey basically records the use of land by its functional activity such as residential, industrial or commercial. The maps prepared through physical survey have been used as base map for land use survey. Land use features were identified and classified using the recorded code and drawing the boundaries using different color pencils (Figure 4.1). The following color code has been applied in field work of land use map. The Figure 4.2 shows the land use base map after survey.

Land Use Legend for Field Work	
	Education
	Industry
	Forest/Hilly Area
	Agricultural Land
	Commercial
	Water Body
	Pucca Road
	Residential
	Administrative
	Religious Area
	Grave Yard

Figure 4.1: Color used by Color pencil for Land Use Demarcation



Figure 4.2: Landuse Base Map used in Faridpur Sadar Upazila

The methodology and technique followed are as follows:

- Checking every plot of land and demarking unique uses with color pencils
- Checking building and other structure and its current use.
- Checking infrastructure provisions
 - ✓ Social infrastructure e.g. school, hospital, etc. with location
 - ✓ Physical infrastructure e.g. housing, offices, energy, work, sanitation etc.
 - ✓ Transportation with width of roads with and without drainage links with other areas etc.
- Recording of natural physical conditions of the land like: rivers, drainage, canals etc.
- Review of topography of the area from the Topographic Maps.

4.2 Survey Data Processing & Analysis

4.2.1 Processing of Land Use Data

During data processing stage, all type of land use data has been properly processed to obtain the unique land uses. Firstly, survey map sheets have been scanned and geo-referenced, then land use boundary have been digitized with their attributes. On the other hand, physical feature data has been used to identify land use boundaries and categorize then into respective land use categories. The surveyed physical features (structures, roads, water bodies, etc. and land use boundaries, etc.) marked on the sheets were then digitized using the ArcGIS software.

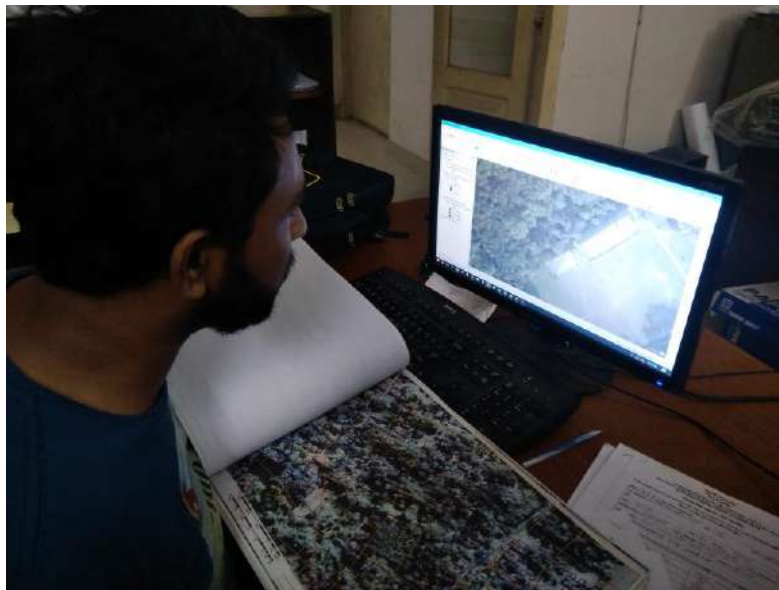
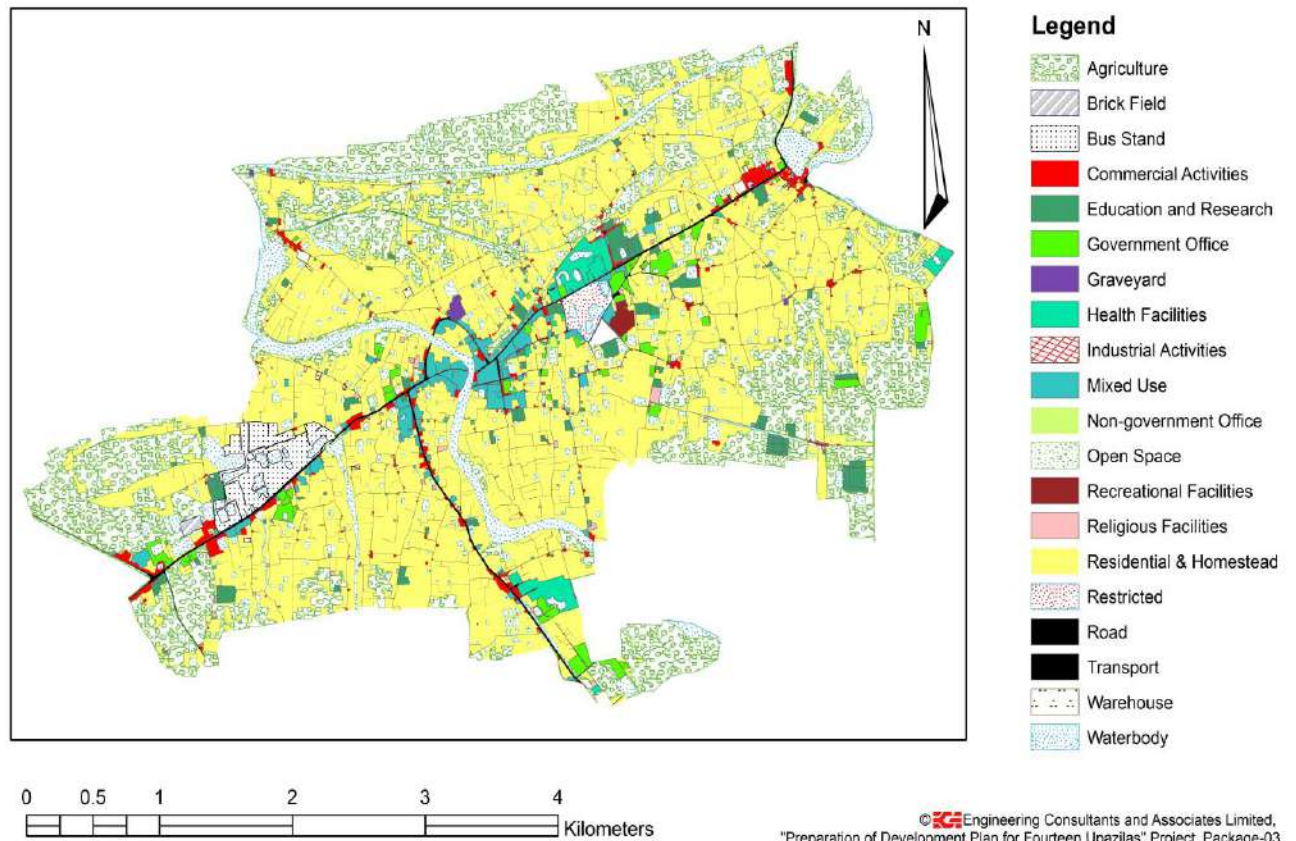


Plate-12: Updating works using Surveyed Map

4.2.2 Preparation of Land Use Map

Utilizing the land use and physical feature base map the land use maps were prepared showing the broad categories of land use. The characteristics of each land use area have fully been described in the survey report. The Land Use Maps were prepared at specified scale based on the data collected through land use survey and the information of the base map.

Details about land use have been provided in Table 4.2 and generalized land use pattern of Faridpur Sadar town area has been presented in Map-4.1.



Map-4.1: Land Use in Faridpur Sadar Town Area

Table 4.2: Land Use Categories

Sl. No.	Land uses	Illustrated
1.	Urban Residential Zone	Planned Residential Area, Govt. Quarters, Private Housing, Rest/Guest/Circuit House, Banglow, Mess, Orphanage/Old Home, Rural Homestead, Slum, Squatters. House type Pacca, Semi-pacca, Katcaha and Tin Shed are also enlisted at urban residential zone.
2.	Rural Settlement	Rural settlement includes the low dense residential area which is scattered and rural in nature. It may permit only low density uses. Aiming to control the growth in this zone, less service and facilities will be provided.
3.	Commercial Zone	Residential Hotel/ Hotel & Restaurant, Wholesale Rice Market, Wholesale, Vegetables Market, Wholesale Fish Market, Wholesale Paper Market, Wholesale Grocery Goods Market, Wholesale Fruit Market, Book Stall, Cloths Shop, Paper & Magazine, Stationery Shop, Shoe Shop, Bag & Leather Goods, Cosmetics, Spectacles, Electronic Goods, Audio Video Cassette, Utensils/Crockery, Sports Goods, Computer Goods, Motor Car Parts, Jewelry shops, Show Room, Furniture Shop, Department Store, Mobile Sales Center, Hardware Goods, Sweet Shop, Bakery Shop, Gift Shop, Press & Printing, Grocery Shop, Gun Shop, Iron & Steel Shops, Shopping Center/Mall, Shopping Mall, Super Market, Rubber Stamps, Phone-Fax-Photocopy, Cycle Store, Studio/Colour Lab, Drug/Pharmacy, Pottery shop, Electronics, Sports and Athletics, Kitchen Market, Katcha Bazar, Beauty Parlor/Hair dresser, Govt. Food Godown, Cold Storage, Others Godown. Growth centers, Small Bazar, Watehouses are also enlisted under commercial zone.
4.	Mixed Use Zone	Commercial – Residential, Office – Residential, Commercial – Industrial, Two or More categories more use.
5.	General Industrial Zone	Green and Orange, A categories as per The Environment Conservation Rules, 1997
6.	Heavy Industrial Zone	Other toxic and pollution industries (Orange B and Red categories as per the Environment Conservation Rules, 1997)
7.	Government Services/ Administrative	Deputy Commissioner's Office, Zila Parishad Office, SP Office/Police Headquarter, Civil Surgeon Office, LGED Office, Upazila Headquarter, Paurashava Office, Union Parishad Office, Settlement Office, Post office, Bank, Public Works Department Office, R&H Office, DPHE Office, Police Station, Ansar Camp, Jailkhana, Statistical Bureau Office, PDB Office, BWDB Office, DoE Office, All types of Government Office, Private Bank/ Insurance Company, Mercantile & Cooperatives, Money Exchange Center, Private company/Different types of NGO/CBO/Club, Construction Office, Commercial Group Office, Trading Corporation Office, Security Service Office, Law Chamber, Doctor's Chamber, Political Party Office, Professional's Association, Labor Union. Upazila Hearquarter, AC (Land) office can also mark as government services.
8.	Non-Government Services	Other office/service area which are not included in government services.
9.	Educational and Research Zone	Kindergarten and Nursery, Primary School, High School, College, Public University, Private University, Public Medical College, Private Medical College, Homeopathic Medical College, Engineering College/University, Law College, Social Research, Health Research, Economic Research, Vocational Training Institute, Physical Training Institute, Nursing

Sl. No.	Land uses	Illustrated
		Training Institute, Teachers Training College, Computer Training Institute, Dakhil Madrasa, Alim Madrasa, Fazil Madrasa, Kamil Madrasa, Hafezia Madrasa, Tutorial/ Coaching Center, Government Training Institute, Library, Museum, Social Welfare Institution, Kindergarten, University and Madrasas.
10.	Agricultural Zone	Single crop land, Double crop land, Triple crop land, Barren land, Mangogarden/Litchi/Jackfruit/Banana/Lemon/others, fruits garden etc., Different types of flower garden, Tree cultivation, Hatchery/Gher, Livestock / Poultry Farm / Dairy Farm, Agricultural Research Area.
11.	Water body	Equal or more than 0.25 acre and justification by the consultant and well land will merge with water body. Pond, Beels/Marshlands, /Lake/Ditch, Lakes, River, Khals, Streams, Drain.
12.	Open Space	Playground, Park, Botanical Garden, Stadium, Zoo etc. (Facilities without or with minimum building structure)
13.	Vacant Land	Barren Land, Char Land, Gravel Pits, Low Laying Area, Sand Quarries.
14.	Recreational Facilities	Facilities other than those mentioned to Open Space and indoor based facilities with designated building structure such as: Cinema Hall, Theater Hall, Museum & Art gallery, Auditorium /Community Center/Town Hall, Park/Playground/Amusement Park/Theme Park, Stadium/ Gymnasium/ Swimming Pool, Tennis Complex.
15.	Circular Network	All areas covered by the roads and rail ways (Broad/Meter Gauge) network. Bridge, Culvert, Foot over Bridge, Railway Bridge.
16.	Transport Facilities and Communication	Under transport and communication land use, both transport and communication services are considered. This category includes Roads, Airport, Helicopter Station, Rail Station, Bus/Truck Terminal/Stand, Boat/Ferry Ghat, Refueling Filing Station, Garage, Launch Terminals, Passenger Shed, Telephone Exchange, Ticket counter, Road Island, Footpath, Transport office, post office/Post Box, River Port, Traffic Signal Port etc.
17.	Utility Services	Utility services include Overhead Tank, Power Office/Control Room, Public Toilet, Sewerage Office, Waste Disposal, Water Pump House, Water Reservoir, Drainage and Sewerage System, Water/Sewerage Supply Line, Water Treatment Plant etc.
18.	Health Services/ Facilities	Govt. Hospital / Pvt Hospital / Mental Hospital/ Maternity/ Children Hospital / Clinic/ Diagnostic Center, Clinic, Community Hospital and Veterinary Hospital.
19.	Community Facilities/ Services	Community Center, Social Club, Slaughter House, Monument, Graveyard, Crematorium, Cemetery, Eidgah, Shahid Minar etc. which will provide service to the community.
20.	Religious Area/ Facilities	Mosque, Eidgah/Mazar/Dargha, Madrasha, Temple, Church, Pagoda, Graveyard, Cemetery, Cremation place.
21.	Historical and Heritage Site	The entire mentionable historical and heritage site.
22.	Restricted Area/ Facilities	A Restricted Area is an area where no one but certain people can enter. Here, the areas which are not accessible for the general public except some high ranked personnel are considered as restricted area. Cantonment/BDR/Navy, Reserved Forest, TV Station, Radio Station, T&T Board, Power Supply Station.
23.	Forest/ Groups of Trees	Designated Forest area or Forest land.
24.	Beach	Sea Beach
25.	Hilly Area/	Designated Hilly Area with Tilla.

Sl. No.	Land uses	Illustrated
	Hillock	
26.	Miscellaneous	Any other categories which are not related to above categories. EPZ, BM, Growth Centre, Fire Service, Garland, Brick Field, Drainage Outfall, Embankment, River cum embankment, Char, Coastline, Flood Wall, Slum.

The Legend for Existing Generalized Land use is shown in Figure-4.3.

Legend



























Land Use	
 Urban Residential Zone	 Rural Settlement
 Commercial Zone	 Mixed Use
 Heavy Industrial Zone	 General Industrial Zone
 Administrative/Government Services	 Non-Government Services
 Agricultural Zone	 Educational & Research
 Water Body	 Open Space
 Vacant Land	 Recreational Facilities
 Circular Network	 Transportation Facilities and Communication
 Utility Services	 Health Facilities
 Community Service	 Religious Area
 Historical and Heritage Site	 Restricted Area
 Forest Area	 Hill / Hillock
 Beach	 Miscellaneous

Figure-4.3: Legend for Existing Generalized Landuse

	Growth Center		Telephone Pole
	Small Bazar		Light Post
	Kindergarten		High-Volt Electric Tower
	Primary School		Tele-Communication Tower
	School (Secondary/NGO/Others)		Market/Shopping Complex
	College		Dustbin
	University		Post Office/Post Box
	Madrasa		Shallow or Deep Tube-Well/ Water Pump House
	Museum		Passenger shade
	Cinema Hall/Auditorium/ Theater Hall		Bridge
	Monument/Shahid Miner		Culvert
	Mosque/Mazar/Dargah		Foot-over Bridge
	Temple/Church/Pagoda		Railway Bridge
	Historic Sites		Railway Over Bridge
	Electric Pole		Sluice Gate
	Bench Mark (BM)		Refueling Station
	District Headquarter (DC Office)		Power Plant/ Electric Sub-Station
	Upazila Headquarter		Fire Service
	Pourashava Office		Public Library
	Union Parishad Office		Police Box
	Godown		Industry
	Bank		Boat Ghat
	Brickfield		Ferry Ghat/Landing/ Launch Terminal/River Port
	Drainage Outfall		Bus/Truck Terminal
	Railway Station		
	Helipad		

Figure-4.4: Legend for Existing Important Point Feature

Table- 4.3: Generalize Land Use Information of the Project Area (The table below is for Faridpur Sadar Paurashava)

Sl	LANDUSE	Area (Acre)
1	Administrative	10.917
2	Agricultural Area	2349.25
3	Commercial Area	35.69
4	Community Service	4.64
5	Educational & Research	25.12
6	Graveyard	3.5
7	Health Facilities	2.873
8	Industrial Area	4.63
9	Miscellaneous	8.52
10	Mixed Use	11.32
11	Recreational	1.40
12	Religious Area	9.27
13	Residential Area	6.3.67
14	Transportation and Communication	51.88
15	Water Body	213.79

Chapter Five: Topographic Survey

Topography is the study of the shape and features of the surface of the Earth and other observable objects. The topography of an area could refer to the surface shapes and features themselves or a description, specially their depiction in maps. Topographic surveys are carried out to identify and map the contours of the ground and features on the surface or slightly above or below the surface of the earth. Contours are imaginary lines that connect locations of similar elevation. A topographic map is a detailed and accurate two-dimensional representation of natural and human-made features on the Earth's surface. These maps are used for a number of applications like land use planning, resource management, , urban planning etc.

Topographic survey is a very important survey as it shows the suitable land for future development. Topographic Survey means measuring the surface of the earth of any area with standard known coordinates of X, Y, and Z value.

5.1 Field Level Data Acquisition

5.1.1 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out land use survey and along with physical feature survey. The composition of survey team with their qualification is given below:

Table 5.1: Composition of Survey Team

Field of Expertise	Qualification	No. of Expert/ Technical Staff
Survey Expert	Bachelor of Urban & Regional Planning (BURP)	1
Survey Supervisor	Diploma in Survey/Civil Engineering	3
Surveyor	Diploma in Survey/Civil Engineering	10
Surveyor	Diploma in Survey Engineering	10

For Topographic survey, the survey team was divided into 7 groups (each group contains two surveyors) to collect topographic features which could not be collected through photogrammetry due to dense vegetation, clouds, etc. All these groups were supervised by the Survey Expert and the Survey Supervisor

5.1.2 Topographic Survey

The topographic survey of whole project area is inconvenient for direct ground surveying using RTK-GPS and Total Stations within a survey season. Hence, the Consultant adopted the photogrammetric surveying by which topographic data have been extracted from the 3D imagery (stereo imagery) of the project area.

In Photogrammetric Surveying, all topographic features are recorded in three dimensions (x, y, z coordinates) and topography is described by using mass points (spot levels) and break-lines (to describe a change of slope). Spot heights or land levels are extracted as DTM points at 10 m intervals for urban area and 20 m intervals for rural areas as described in the TOR. This data, together with 3D features (road edges, bank of river and other water bodies, etc), are used as break-lines to make Digital Terrain Models (DTMs), Digital Elevation Model (DEM), Triangulated Irregular Network (TIN), and the Contours.

In the densely vegetated area and clouded area RTK-GPS and Total Stations are used mainly to obtain 3-D data (X,Y, Z value) for enriching the photogrammetric data of roads, flood embankments and other drainage divides, drainage and irrigation channels. The Survey team carried out the survey to collect topographic features as much as possible using survey equipment and the satellite image based map sheets. The surveyors collected the following features from the field:

- Alignment of rivers, lake, canal and drainage channels etc. showing depth and direction of flow.
- Alignment of roads, embankments, dykes and other drainage divides.
- Outline of bazaars, water body, swamps, barren land, low land, borrow pits, forest, open space, restricted area, etc.

5.2 Data Processing & Analysis

5.2.1 Processing of Topographic Data

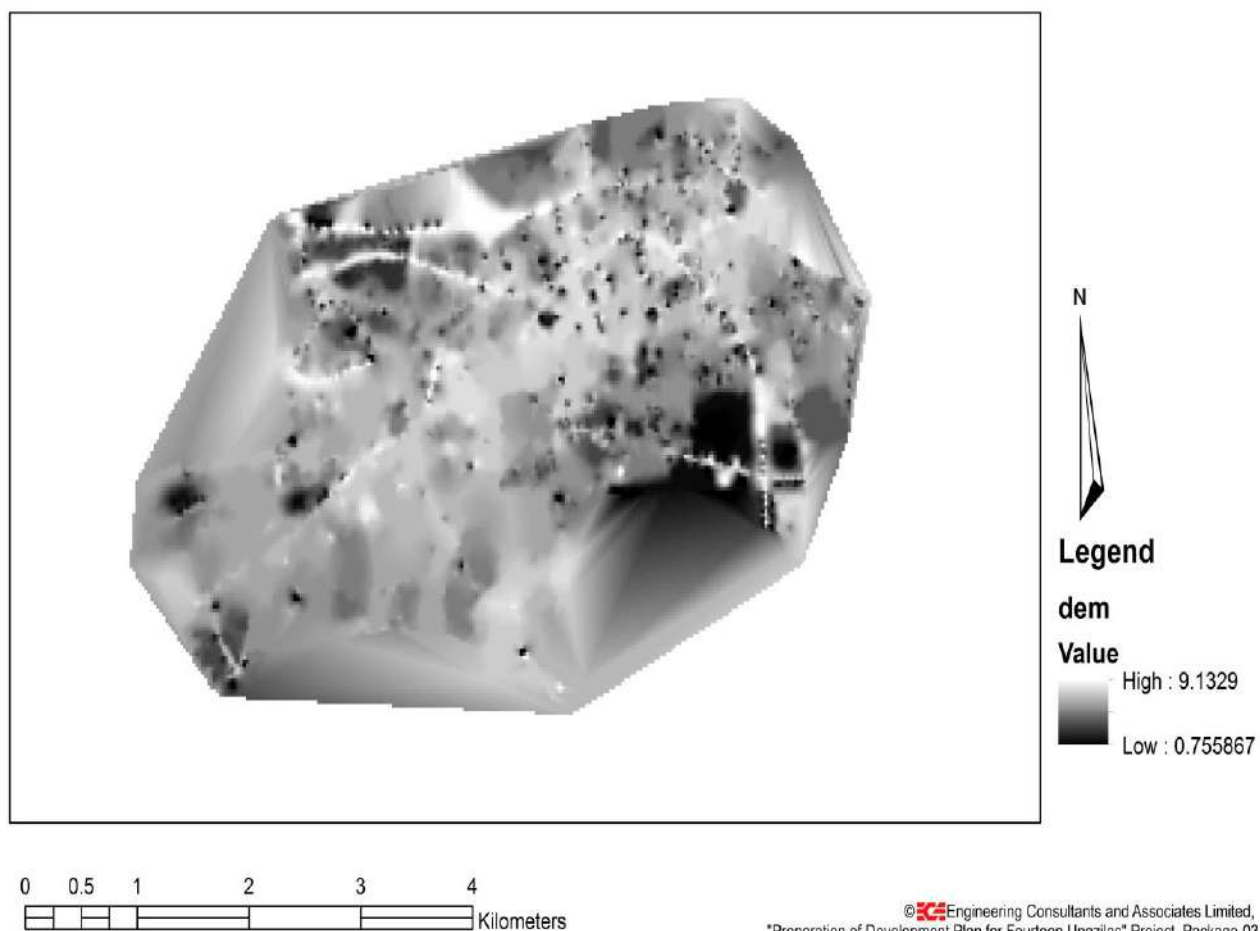
Using the photogrammetric data of DTM Points and the Break-lines Triangulated Irregular Network (TIN) and the Digital Elevation Model (DEM) has been generated. From these derived data the contour lines have been generated with 0.3 meter interval using ArcGIS software. **Map-5.1** shows the DEM of Faridpur Sadar paurashava of Faridpur Sadar Upazila and the **Map-5.2** shows the Contour Lines partially of Faridpur Sadar Paurashava of Faridpur Sadar Upazila.

5.2.2 General Topography of Faridpur Sadar Upazila

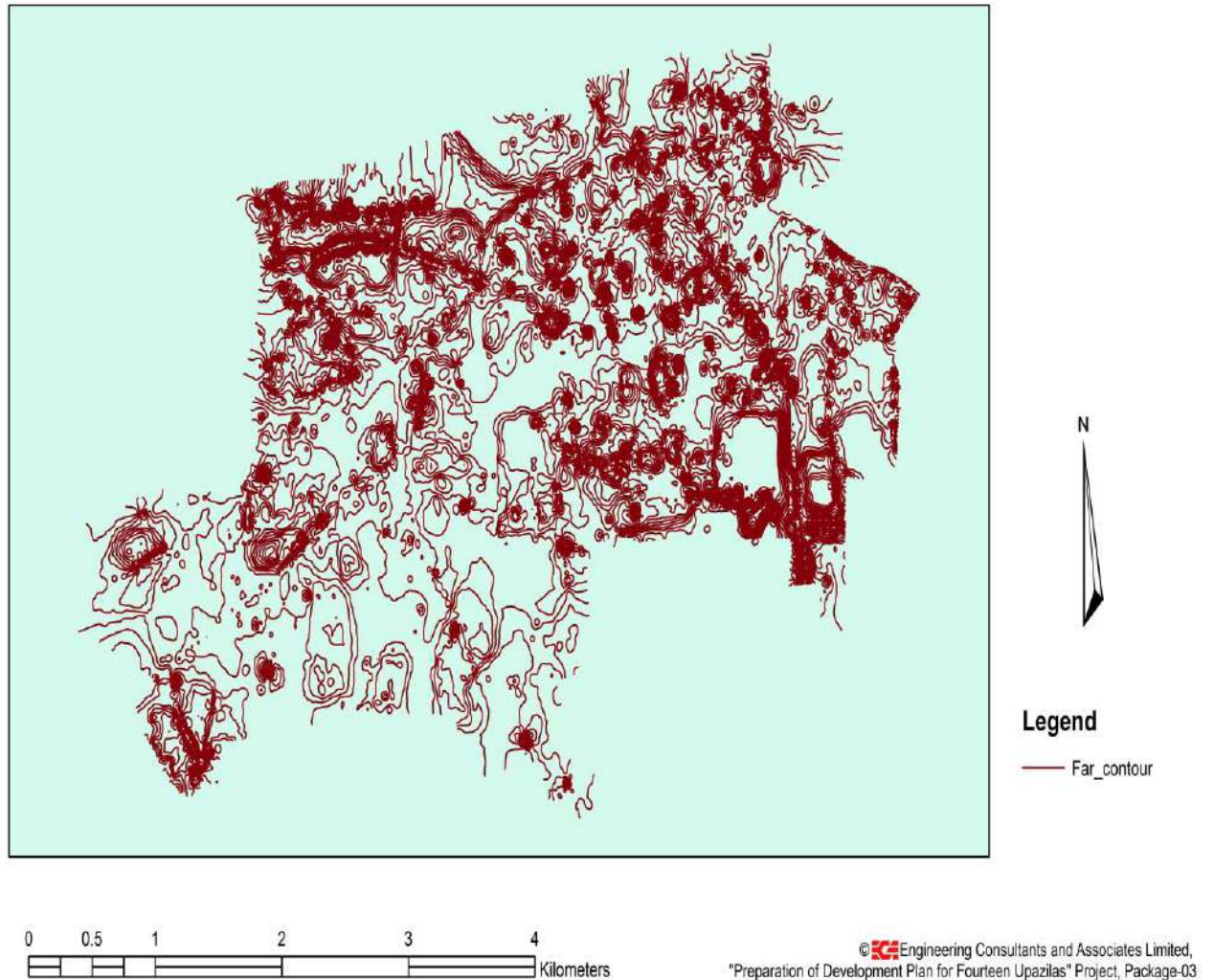
Almost the whole of the Faridpur a number of small rivers and channels is uniform level. The general topography of the study area is ranges from **0.3 to 9.31** meter MSL.

Table 5.2: General Height Information

Total Project Area	Maximum Height (Meter)	Average Height (Meter)	Minimum Height (Meter)
407.02 sq.km	9.31	5.96	0.3



Map-5.1: Digital Elevation Model of Faridpur Sadar Upazila



Map-5.2: Contour map of Faridpur Sadar Paurashava (Partial)

5.2.3 Alignment and Crest Level of Major Roads

The alignment is the route of the road and crest level is the top surface of road, usually known as carriageway.

Geographically, most of the study area lies above flood level and as a result road is the prime means of movement. In Faridpur Sadar, two major highways pass through the study area neighboring area like Faridpur Sadar to Nagarkanda Road, Rajbari Sadar to Faridpur Sadar Road etc. Besides, the study area is also well connected by number of arterial roads with all parts of the study area.

Table-5.3: Crest level of major roads along their alignment in Faridpur Sadar

Name of the road	Height of crest level from MSL, in meter		
	Minimum	Maximum	Average
Mujib Sarak	3.05	7.5	4.35
Rajbari Sadar to Faridpur Sadar Road	6.3	7.8	6.92
Faridpur Sadar to Bhanga Road	6.2	7.1	6.51

Source: Topographic survey, 2016

Chapter Six: Photogrammetric Works

6.1 Satellite Image Processing

Satellite image came with a certain level of processing. However, for the purpose of features extraction, further processing is needed in a number of steps. The step by step procedures has been shown in the **Figure-6.1**

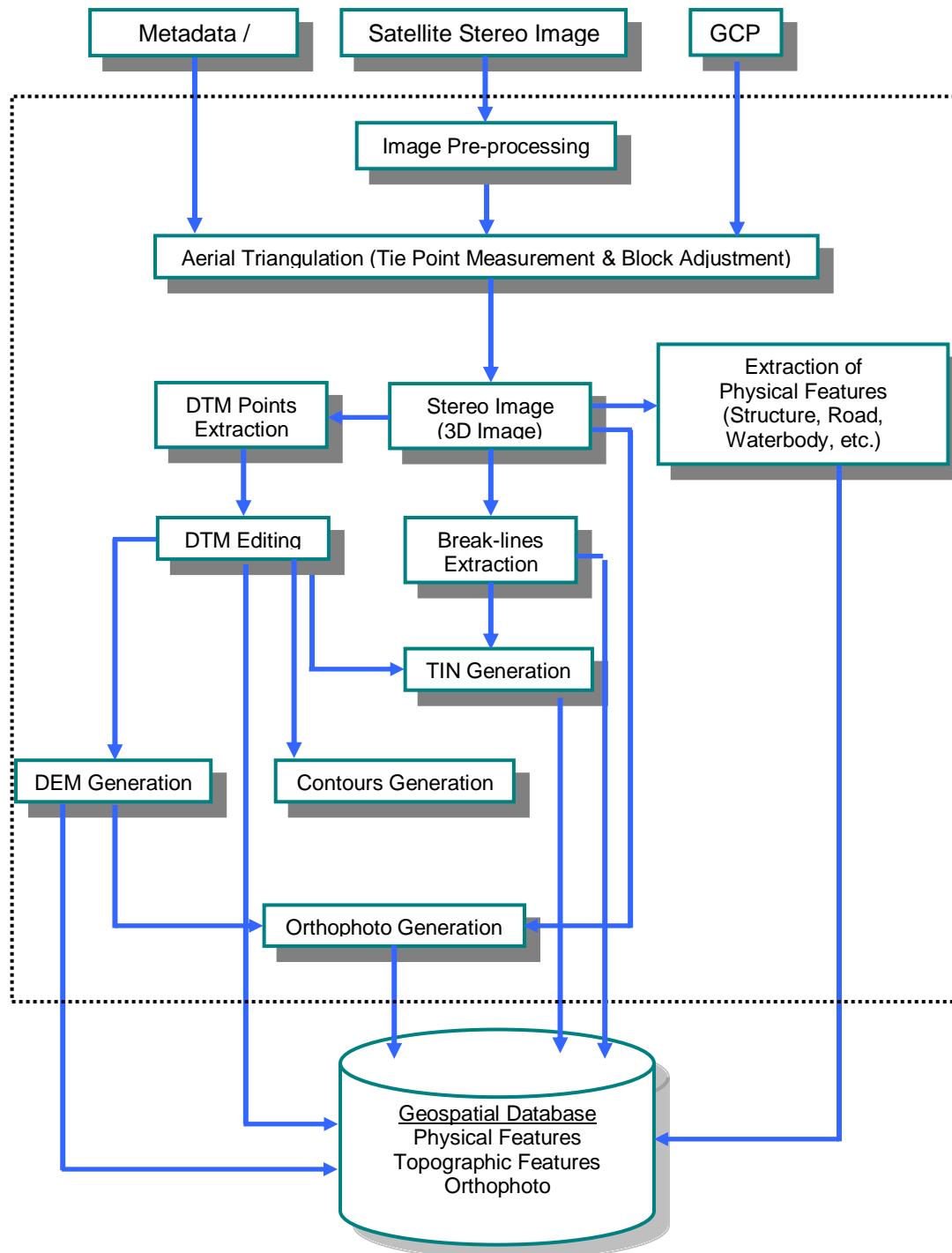


Figure-6.1: Workflow of Stereo Satellite Image Processing and Data Extraction

6.1.1 Image Collection

The satellite image was ordered to PCI India. The authorized reseller/partner of Airbus. 0.5 meter stereo pair image has been purchased by the Consultant for Faridpur Sadar. The specifications of the purchased satellite image are as below:

For Faridpur Sadar Upazila:

Image Sensor	: Airbus
Type	: Ortho ready stereo (3D)
Resolution	: 0.5m Panchromatic, 2.0 meter Multispectral
Source	: New Acquisition, 30 December 2016
Total Area	: 412.86 Sq. km.
Bit Rate	: 16 Bit
Company	: Airbus Defense and Space.

6.1.2 Image Pre-Processing

Satellite image came with two parts. One is multispectral band which resolution is 1.74 meter and another one is panchromatic which resolution is 0.5 meter. We need 0.5 meter multispectral image for feature extraction. After collecting raw digital images, the tasks involved in image processing are:

- Merge the image tile
- Color Balance
- Contrast Adjustment
- Pan-sharpening

6.1.2.1 Merge, Color Balance and Pan-Sharpen

Satellite image comes with lots of small segment which called image tile so that image can be sent by the provider on DVD media. To create an individual image all image tiles have been merged and thus an individual large image has been created.

Image tiles may vary in color and contrast. So during the merge process, color and contrast has been adjusted to get a color balanced image. **Figure-6.2** shows the satellite image tiles without color and contrast balance.

During the image capturing time, satellite captures two types of image, one in multispectral (RGB & NIR) image which is low resolution (2.0 meter) and another in high resolution (0.5 meter) panchromatic image. For feature extraction, 0.5 meter high resolution (0.5m) multispectral image is required. To have this 0.5 meter multispectral image, pan-sharpening tools have been used. This tool produces a 0.5 meter multispectral image by combining 2.0 meter multispectral image and 0.5 meter panchromatic image. **Figure-6.3** shows the merged satellite image with color and contrast balance.

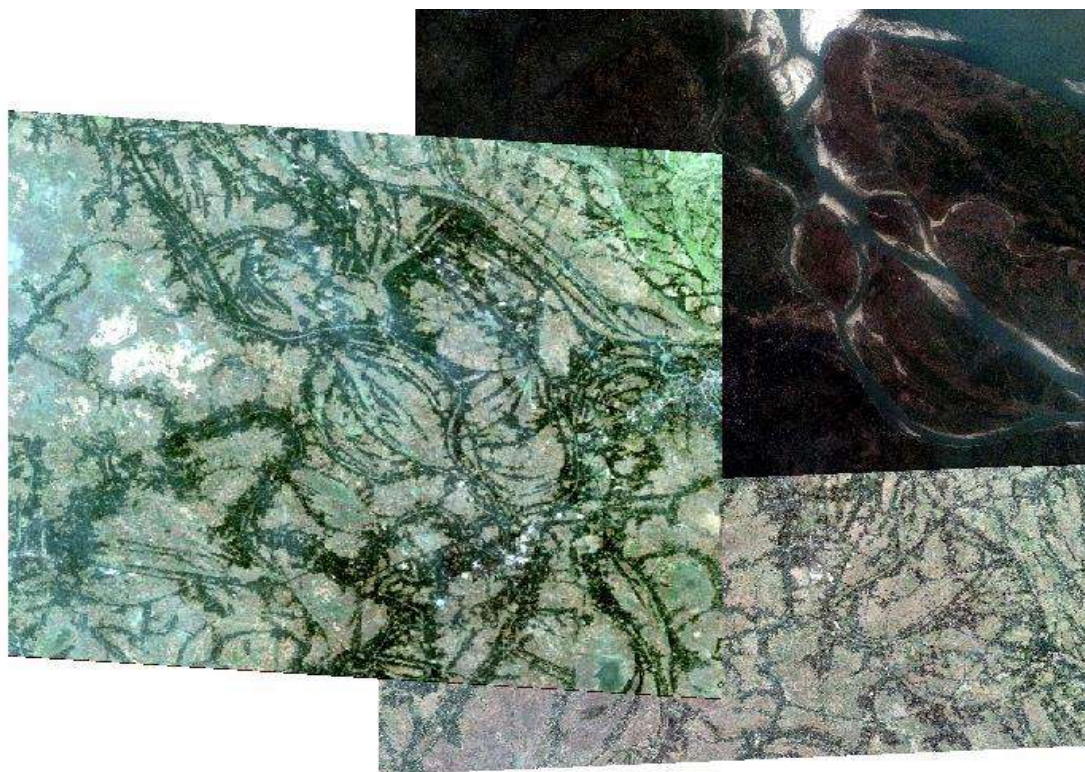


Figure-6.2: Tiles of satellite image without color and contrast balance

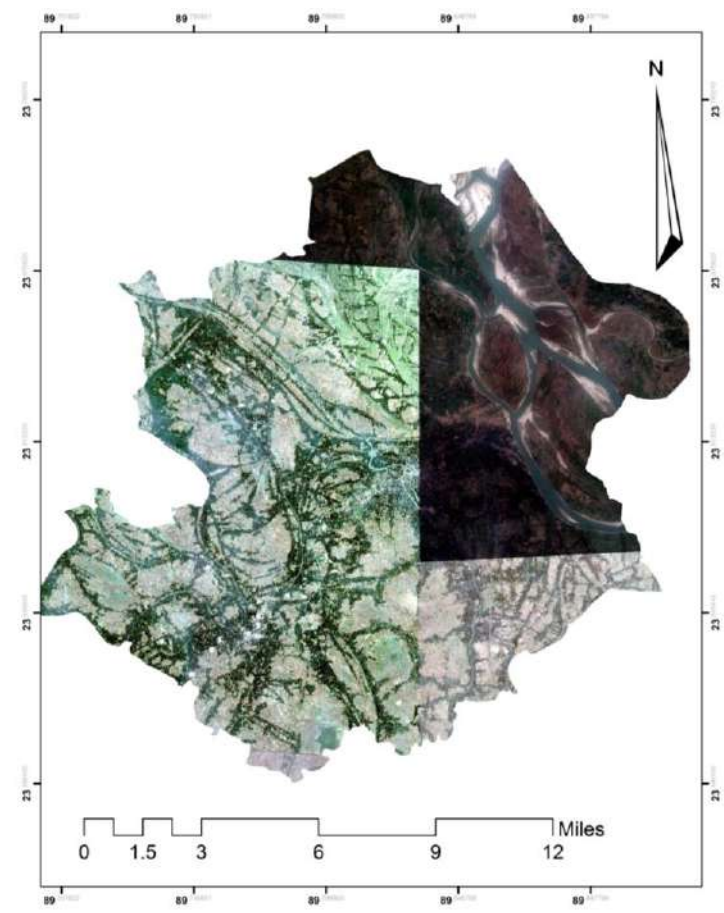
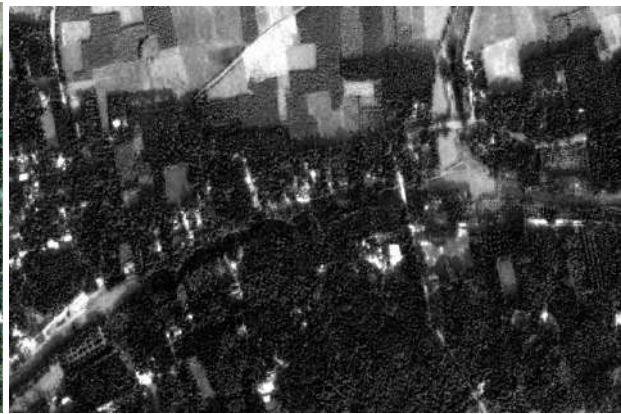


Figure-6.3: Merged satellite image with color and contrast balance



**Figure-6.4: Satellite Image Multispectral
Image 2.0 meter**



**Figure-6.5: Satellite Image Panchromatic
0.5 meter**

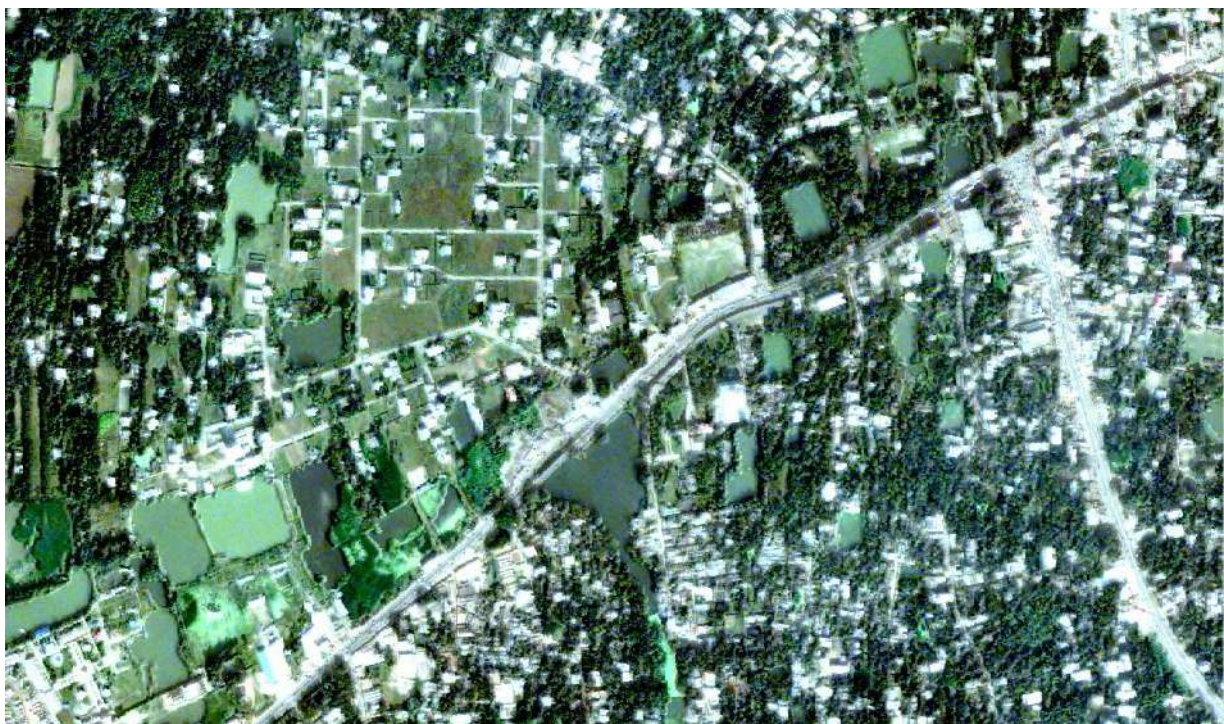


Figure-6.6: Pan-sharpen Image - multispectral 0.5 meter

6.1.2.2 Bit Rate, Pyramid and Epi-polar Correction

Bit Rate: In general practice 8 bit images are used. Satellite image can capture 11 bit image. Since the purchased satellite image is in 16bit, it has been changed the 16 bit to 8 bit for radio matrix adjustment and better handling the image.

Pyramid: To efficiently view and pan the image, the pyramid of the image has been built. The DATEM Summit Evolution software has been used for image interpretation.

Epi-polar Correction: Epi-polar geometry is the geometry of stereo vision. When two cameras view a 3D scene from two distinct positions, there are a number of geometric relations between the 3D points and their projections onto the 2D images that lead to constraints between the image points. The 3D models have been created by using the Summit Evolution software.

6.1.3 GPS/INS Processing

Raw IMU (GPS/INS) data of image is processed and adjusted to accomplish Aerial Triangulation. In case of satellite image the RPC file is replaced the GPS/INS file.

6.1.4 Aerial Triangulation

Aerial Triangulation is a mathematical process used to determine the position and orientation of each photograph at the moment of exposure.

Table-6.1: Input-output in Aerial Triangulation

Input for AT		Output of AT
(6)	IMU data	Geo-referenced Stereo Model
(7)	GPS (on board)	
(8)	GCP (collected from field)	
(9)	Image	
(10)	RPC file	

The GCP and BM collected from SOB have been used for correcting the 3D satellite image coordinate using Inpho Match-AT software.

6.1.5 Digital Mapping (Feature Extraction) from Stereo Model

After the orientation of stereo models, digital mapping has been carried out. ArcGIS Geo-database model has been used for storing geo-spatial data. The Geo-database and its feature classes has been designed based on ToR.

Digital Photogrammetric Workstation (DPW) has been used as the platform for acquiring features from digital stereo images (model).

Feature registration has been done considering and measuring the position of the object under its accuracy level. The Summit Evolution & Stereo Plotter of DAT/EM has been used for identifying and registration of the objects and ArcGIS 9.3 of ESRI has been used for vector data storing and editing.



Plate-13: Digital Photogrammetric Workstation (DPW)

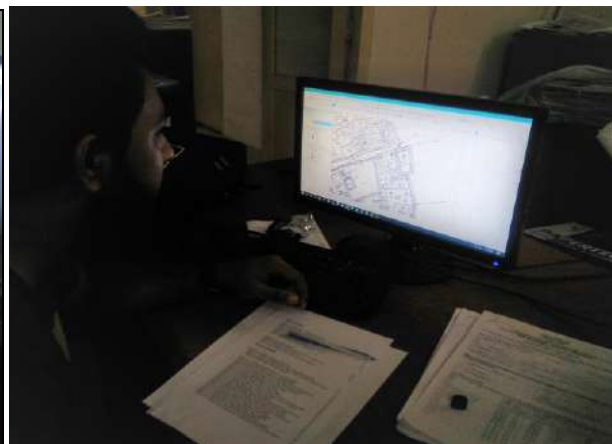


Plate-14: Photogrammetrist Extracting Features in DPW

A team of photogrammetrists has digitized Building roof with MSL height, bridge/culvert, road, khal, pond, lake, ditch, marsh/swam, river, etc. All features have been digitized in 3-dimension (X,Y,Z).

Figure-6.7 and **Figure-6.8** shows the extracted features of Faridpur Sadar Upazila at a glance.

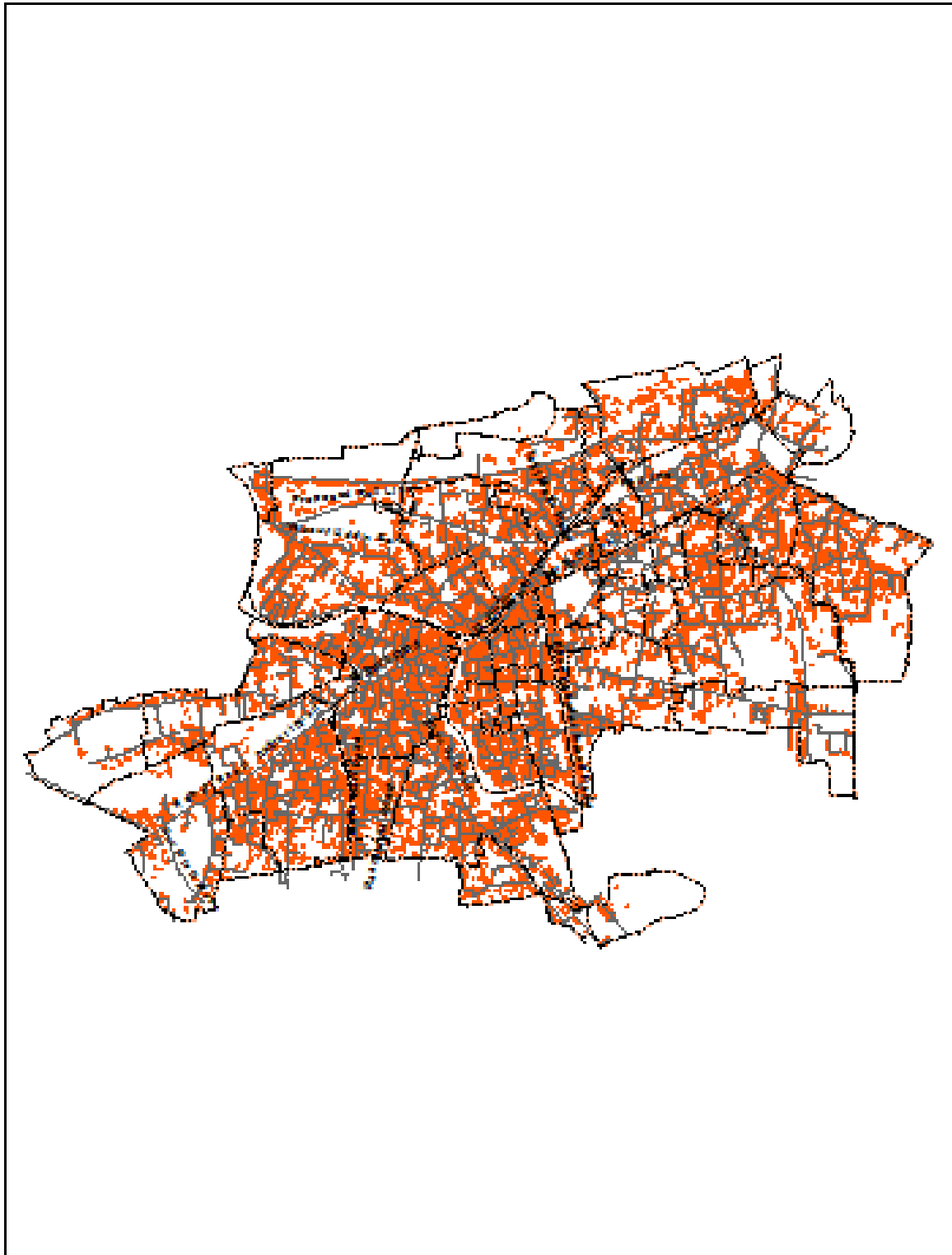


Figure-6.7: Extracted Features of Entire Faridpur Sadar Upazila by Photogrammetry

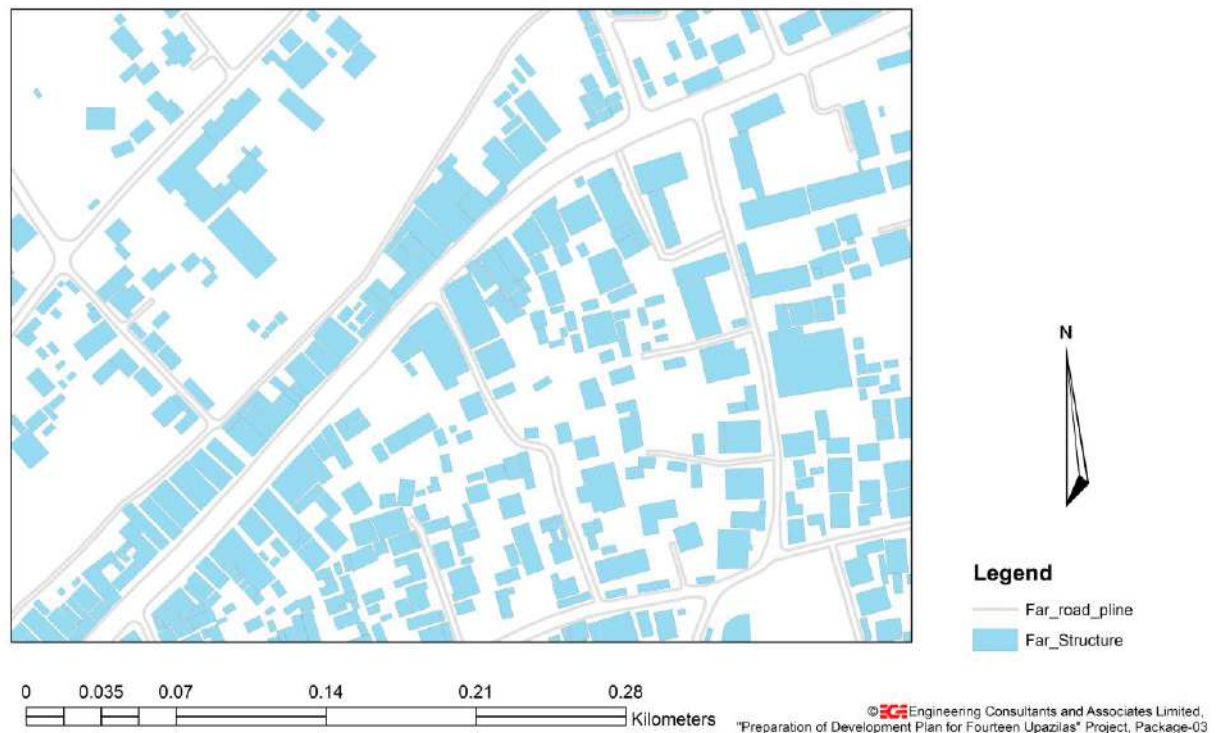


Figure-6.8: Enlarged Partial View of Extracted Features of Faridpur Sadar

For spot heights acquisition, firstly the DTM points have been generated automatically from stereo pair images by the software. Spot heights or land levels are extracted as DTM points at 10 m intervals for urban area and 20 m intervals for rural areas as described in the TOR. These automatically generated points have been then checked and edited by comparing them with stereo model in photogrammetric workstations. **Figure 6.9** shows the Digital Elevation Model of Faridpur Sadar Paurashava of Faridpur Sadar Upazila. **Figure 6.10** shows the Contour Lines partially of Faridpur Sadar paurashava of Faridpur Sadar Upazila.

The Break-lines have been created and edited after extraction of DTM Points.

The DTM Points and the Break-lines has been used later to create Triangulated Irregular Network (TIN), Digital Elevation Model (DEM) and the Contour Lines which is described in the Topographic Survey Report.

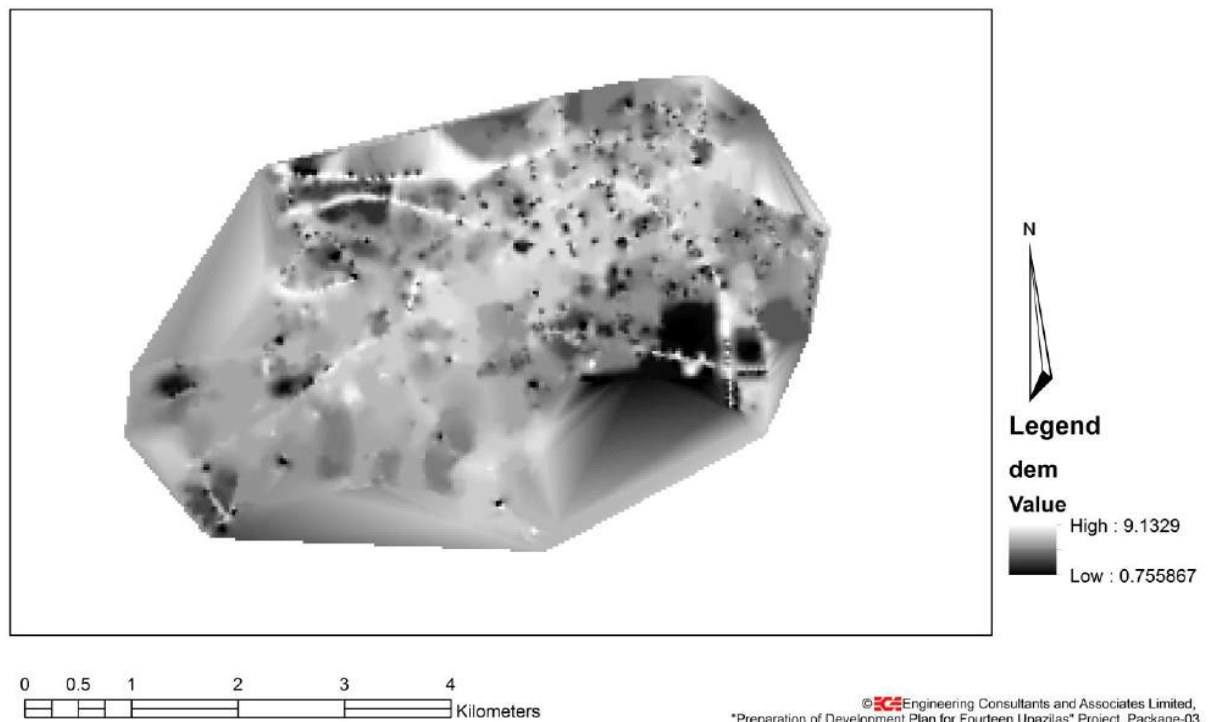


Figure-6.9: Digital Elevation Model (DEM) of Faridpur Sadar Paurashava (Partial)

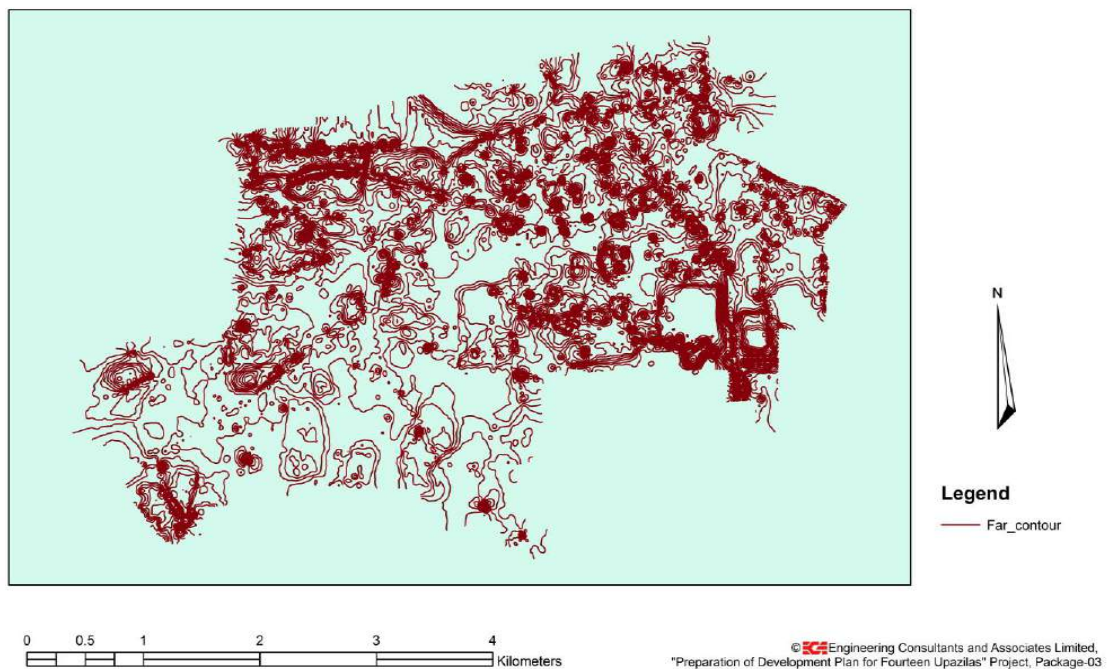


Figure-6.10: Contour Lines of Faridpur Sadar Paurashava (Partial)

Chapter Seven: Conclusion

The land use features of Faridpur Sadar Upazila have been acquired through field survey based on high resolution stereo satellite imagery and RTK-GPS. The existing land use data acquired through land use survey and photogrammetry can play vital role for preparation of development plans of Faridpur Sadar Upazila. By using these data in planning phase, decisions can be made where different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place and which areas should be protected from development due to environmental, cultural, historical, or similar reasons.

The topographic features of Faridpur Sadar Upazila have been acquired mainly through photogrammetric method by using high resolution stereo satellite imagery. These data may be updated and fine-tuned by RTK-GPS based Total Station survey especially in the vegetated and clouded area.

Topographic surveyed data and the derived data such as DEM, Contours, TIN, etc. can play important roles in hydrological analysis (watershed, stream network analysis and flood analysis, etc.), erosion and land slide analysis. Thus topographic survey data can be used to find out the suitable attributes for future developmental activities in the study area.

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Annexure-II: Technical Specifications of GIS Data

This document contains the technical specifications for the development of GIS database. It has two sections: Section-A and Section-B. Specifications for Mouza map scanning and digitization have been provided in Section-A and specifications of GIS layers for preparing Survey and Plan Maps have been provided in Section-B.

Section-A: Specifications for Mouza Map Scanning & Digitization

This section contains the scanning specifications and digitization of Mouza maps.

A.1.0 Specifications for Mouza Map Scanning

The scanning specification of Mouza maps specifies Image Type, Image Format and Image Resolution and Image scale as follows:

Image Type	Color or Grayscale
Image Format	JPEG
Image Resolution	300 dpi

A.1.1 Directory Structure for Storing Scanned Mouza Maps

Directory Structure for systematically storing scanned image files of the Mouza maps may be as follows:

Directory Structure	<p>D:\GIS_Data\Project name & Package \ Division name\District name\Upazila name(Data Type)\Union name or Ward No</p> <p>Where,</p> <ul style="list-style-type: none"> - D:\GIS_Data is the root folder of the UDD's GIS database. - \Project name is the abbreviated name of the Project such as Pkg-3_14Upazila may be the abbreviated name of the project "Preparation of the Development Plan for Fourteen Upazila – Package-03". - \Division name is the name of the Division in which the project area located. - \District name is the name of the District in which the project area located. - \Upazila name is the name of the Upazila in which the project area located. - \Data_Type is the type of GIS data such as Scanned Mouza Maps, Georeferenced Raster Mouza Maps, Survey Data, Proposed Plan Data, etc. - \Union_name is the different name of the Unions of the respective Upazila or Ward number of the Paurashava. <p>Example</p> <p>D:\GIS_Data_UDD\Pkg-3_14Upazila\Dhaka.div\Narsingdi.dis\Faridpur Sadar.upz\Scanned_Mouza\uni\Alibad_Union is the directory to store the scanned Mouza maps of Aliabad_Union of Faridpur Sadar_Upazila.</p>
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A.1.2 File Naming Convention for Scanned Mouza Maps

A systematic naming convention must be followed to name the files of the scanned images of the Mouza maps.

File Name: **Mouza Name+_+JL no+_+Sheet No.jpg**

Where,

- **Mouza Name** is the name of the Mouza. No space or special character is allowed, underscore must be used in case of more than one word in the name.
- **JL no** is the Jurisdiction Line/List number (JL no) of the Mouza. It must be as 3 digit number
- **Sheet No** is the particular sheet number of the Mouza. It must be as 3 digit number

Example:

Mouza Name	JL No	Sheet No	File Name
Kanaipur	32	4	kanaipur_011_001.jpg

A.2.0 Specifications for Mouza Maps Digitization

The specifications for digitization of Mouza maps specifies the settings for map and display unit, scale or zoom level and vertex spacing during the process of on-screen digitization.

Map Unit	Inch
Display Unit	Inch
Scale (zoom level)	1: 15 to 30
No of vertices on linear or polygon feature	<ul style="list-style-type: none"> - Only 2 vertices along a straight line (or a straight segment of the feature) - Extra vertices are not allowed between Start and End point. - Sufficiently dense vertices must be used for curved/complex linear feature. - Vertex must be inserted at the junction of plot boundaries.
Coordinate System	Unknown (produced by scanning process)

A.2.1 Vector Layers for Mouza Map Digitization

Digitization of Mouza map must be done in five vector layers as the format of Shape file, Coverage or Geo data base Feature class. The Geodatabase is preferable.

Features of the Mouza Map	Type of Layer	Name of Layer (as Shapefile/Coverage/Feature class)
All line features, such as plot boundary, road, waterbody, building, etc.	Polyline	ML_XXX_XXX Where, - ML represents Mouza map's Line features. - XXX represents the JL number of the Mouza map (3 digit). - XXX represents the Sheet number of the Mouza map (3 digit).
Dag number (Plot no)	Point	PN_XXX_XXX Where, - PN represents Plot Number of the Mouza map. - XXX represents the JL number of the Mouza map (3 digit).

Features of the Mouza Map	Type of Layer	Name of Layer (as Shapefile/Coverage/Feature class)
		- XXX represents the Sheet number of the Mouza map (3 digit).
Plot area	Polygon	MP_XXX_XXX Where, - MP represents Mouza map as Polygon (area) features. - XXX represents the JL number of the Mouza map (3 digit). - XXX represents the Sheet number of the Mouza map (3 digit).
Point features (except plot no)	Point	PF_XXX_XXX Where, - PF represents Point Features of the Mouza map except plot numbers. - XXX represents the JL number of the Mouza map (3 digit). - XXX represents the Sheet number of the Mouza map (3 digit).
Other area features	Polygon	AF_XXX_XXX Where, - AF represents other Area Features of the Mouza map - XXX represents the JL number of the Mouza map (3 digit). - XXX represents the Sheet number of the Mouza map (3 digit).

A.2.2 Attribute Structure of the Mouza Map Layers

Attribute structure of the above four layers must be as follows:

1) Layer name: **PN_XXX_XXX**

Feature Type: **Point**

This Layer will contain dag number (plot number) of the Mouza maps as point features. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Union	String	25	To contain name of the current Union.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain <i>dag</i> number (plot number)
Plot_Type	String	20	To contain following plot types <ul style="list-style-type: none"> - “Plot” - “Katcha Road” - “Semi-Pucca Road” - “Pucca Road” - “Halot” - “Pond” - “Canal” - “River”
Scale	String	20	To contain scale of the Mouza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mouza as District code+Thana code+Union/Ward code+Mouza code.
UW_Geocode	String	6	To contain 6-digit BBS Geocode of Union or Ward as District code+Thana code+Union/Ward code
Remarks	String	100	To contain remarks, if any.

2) Layer name: **ML_XXX_XXX**
Feature Type: **Polyline**

This shape file/Coverage will contain all line features of the Mouza map. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Union	String	25	To contain name of the current Union.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Scale	String	20	To contain scale of the Mouza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
Line_Code	Short Integer	10	To contain feature code or unique ID of different line feature. For example 11, 12 and 14 are the codes for Mouza boundary, Sheet boundary and Plot boundary respectively.
Line_Desc	String	30	To contain the type of plot boundaries and other line features such as - "Mouza boundary" - "Sheet boundary" - "Plot boundary" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Khal" - "Thoka/ Position mark of adjacent sheet" - "North line" - "Other line"
Remarks	String	100	To contain remarks, if any.

3) Layer name: MP_XXX_XXX
Feature Type: Polygon

This Layer will contain all the plots of the Mouza maps as area or polygon features. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Union	String	25	To contain name of the current Union.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain <i>dag</i> number (plot number)
Plot_Type	String	20	To contain following plot types <ul style="list-style-type: none"> - “Plot” - “Katcha Road” - “Semi-Pucca Road” - “Pucca Road” - “Halot” - “Pond” - “Canal” - “River”
Scale	String	20	To contain scale of the Mouza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mouza as District code+Thana code+Union/Ward code+Mouza code.
UW_Geocode	String	6	To contain 6-digit BBS Geocode of Union or Ward as District code+Thana code+Union/Ward code
Remarks	String	100	To contain remarks, if any.

4) Layer name: PF_XXX_XXX
Feature Type: **Point**

This shape file/Coverage will contain all point features except the plot numbers of the Mouza map. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Union	String	25	To contain name of the current Union.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name + single space + JLno (3-digits) + single space + sheet no(3-digits)
Scale	String	20	To contain scale of the Mouza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
Point_Code	String	6	To contain the user ID of different point features. For example: 45 is the ID of Traverse Station (New)
Point_Desc	String	50	To contain Point description of point features such as - “Traverse Station [Old]” - “Traverse Station [New]” - GT Station, etc. And also to contain texts of label features of adjacent Mouza map such as “Sheet No. 2”, “Aliabad No. 101”, etc.
Remarks	String	100	To contain remarks, if any.

5) Layername: AF_XXX_XXX

Feature Type: **Polygon**

This shape file will contain all other area features such as Dalan (Building), Waterbody (Pond), etc. of the Mouza map. It must contain the fields as described in the following table:

Field Name	Field Type	Field Width	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Union	String	25	To contain name of the current Union.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Scale	String	20	To contain scale of the Mouza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
AF_Code	Long Integer	6	To contain the user ID of different polygon features. For example: 31 is the ID of Permanent Structure (Dalan), 32 is for Tinshed Structure, etc.
AF_Desc	String	50	To contain type of features such as - "Permanent Structure [Dalan]" - "Tinshed Structure" - "Other Structure" - "Pond/Waterbody" - "Pan Baraz" - "Graveyard"
Remarks	String	100	To contain remarks, if any.

A.2.3 Feature Codes for Mouza Map Digitization

The following feature codes (Unique ID) must be assigned in appropriate fields for digitization of different features of the Mouza maps.

Feature Type/Item	Layer Name	Feature Code (ID)
International Boundary	ML_XXX_XXX	10
Division Boundary		11
District Boundary		12
Upazila Boundary		13
Union Boundary		14
Mouza Boundary		15
Sheet Boundary		16
Plot Boundary		17
Thoka/Adjacent\Match Line		18
Embankment		19
Hill		20
Road		21
Halot		22
Khal (Canal)		23
River		24
Rail Line		25
Slope		26
North Line		27
Pucca Road		28
Semi-Pucca Road		29
Katcha Road		30
Unknown Line		99
Permanent Structure [Dalan]	AF_XXX_XXX	31
Tin Shed Structure		32
Other Structure		33
Pan Baraz		34
Pond/Water Body		35
Graveyard		36
Missing or not readable plot number	PN_XXX_XXX	99999
Boundary Pillar	PF_XXX_XXX	41
Bench Mark		42
Iron Pillar		43
Traverse Station(Old)		44
Traverse Station (New)		45
GT Station		46
Other Pillars		47
Pucca Well		51
Tube Well		52
Mosque		53
Temple		54
Adjacent Mouza/Sheet		61
Otier Info		62
Demarcation Pillar		71
Settlement Pillar		72
Stone		73
Station		74

Feature Type/Item	Layer Name	Feature Code (ID)
Pucca Pillar		75
Municipality Pillar		76
CS Iron Pillar		77
Other Point Feature		88
Plot Boundary	ML_XXX_XXX	14
Katcha Road		30
Semi-Pucca Road		29
Pucca Road		28
Halot		22
Pond		14
Canal		23
River		24

Section-B: Specifications for the Layers of Survey and Plan Maps

This section contains the specifications of all physical features, topographical features and proposed plan features. It specifies the name of the spatial layers and the structure of their attribute tables.

B.1.0 File Naming Convention for GIS Layers

A systematic naming convention must be followed to name the layers of the physical, topographical plan features. The name is defined by abbreviated name of the layer with the geocode of the Division+District+upazila (UDD Upazila Master Plan 14 Upazila's) in the following tables:

Sl. No.	Division Name	Division Code	District Name	District Code	Upazila Name	Upazila Code
1	Dhaka	30	Dhaka	26	Nawabganj	62
2	Dhaka		Dhaka	26	Dohar	18
3	Chittagon g	20	Chittagong	15	Rangunia	70
4	Chittagon g	20	Cox bazar	22	Ramu	66
5	Rajshahi	50	Rajshahi	81	Bagmara	12
6	Dhaka	30	Faridpur	29	Faridpur Sadar	47
7	Dhaka		Mymensingh	61	Ishwarganj	31
8	Dhaka		Madaripur	54	Shibchar	87
9	Dhaka		Narsingdi	68	Shibpur	76
10	Dhaka		Narsingdi	68	Raipura	64
11	Rajshahi	50	Bogra	10	Sariakandi	81
12	Rajshahi		Bogra	10	Sonatala	95
13	Rangpur	55	Gaibanda	32	Saghata	88
14	Khulna	40	Meherpur	57	Gangni	47

File Name: **Layer Name+Division+District+Upazila Geocode will be added with Layer Name such as ADBL306864.**

Where,

- **Layer Name** is the abbreviated name of the layer. No space or special character is allowed.
- **Division Geocode** is the 2-digit BBS Geocode of the Division; eg. Geocode of Dhaka is 30.
- **District Geocode** is the 2-digit BBS Geocode of the Dhaka; eg. Geocode of Faridpur is 29.
- **Upazila Geocode** is the 2-digit BBS Geocode of the upazila; eg. Geocode of Faridpur sadar Upazila is 47.

Example:

Layer Description	Layer name
Administrative Boundary as line features	ADBL306864
Plots of Merged Mouza maps as polygon features	MMP306864
Plots of Merged Mouza maps as polyline features	MML306864
Plot Numbers of Merged Mouza maps as polyline features	MMN306864
Structures within the project area	STR306864
Existing Roads of the project area as polygon features	RDP306864
Existing Roads of the project area as polyline features	RDL306864
Centerlines of Existing Roads as polyline features	RDCL306864
Footpaths in the project area as polygon features	RDFP306864
Road Islands in the project area as polygon features	RDIL306864
Waterbodies in the project area as polygon features	WBD306864
Embankments in the project area as polygon features	EMB306864
DTM points (Spot Heights) on the project area as point features	DTM306864

BM pillars established in the project area as point features	BM306864
Contour lines of the project area as polyline features	CON306864
Existing Land use of the project area as polygon features	ELU306864
Rural Homestead areas of the project area as polygon features	HOM306864
Bridge, Culvert, etc. of the project area as polygon features	BRG306864
Bridge, Culvert, etc. of the project area as polyline features	BRGL306864
Bridge, Culvert, etc. of the project area as point features	BRGP306864
Existing Drains of the project area as polyline features	DRN306864
Boundary of the project area as polyline features	BW306864
Water Supply pipe lines of the project area as polyline features	WSL306864
Overhead Tanks in the project area as point features	OHT306864
High voltage Electric Supply Lines in the project area as polyline features	ESL306864
Utilities in the project area as point features	UTL306864
Sewerage network lines in the project area as polyline features	SEW306864
Other Polygon features of the project area as polygon features	OP306864
All other Point features of the project area as point features	AP306864
Important names of locations or structures of the project area as point features	NAM306864
Important Road Names in the project area as Annotation/Polyline features	RN306864
Centerlines of Proposed Roads in the project area as polyline features	PRL306864
Union/Ward derived by dissolving merged Mouza for Population mapping	POP306864
Proposed policy (Structure Plan) of the project area as polygon features	STP306864

B.1.1 Attribute Structure of the Layers

Attribute structure of the above layers must be as follows:

1) Layer name: **ADBL306864**

Feature Type: **Polyline**

This Layer will contain administrative boundaries of project area. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Line Code	Long Integer	10	To Contain Polyline ID
Type	String	100	To contain the following administrative boundaries “International Boundary” “Division Boundary” “District Boundary” “Upazila Boundary” “Paurashava Boundary” “Union Boundary” “Ward Boundary” “Mouza Boundary” “Sheet Boundary” “Plot Boundary” “Katcha Road” “Semi-Pucca Road” “Pucca Road” “Halot” “Pond” “Canal” “River”

2) Layer name: **MMP306864**

Feature Type: **Polygon**

This Layer will contain plots of edge-matched and merged Mouza maps of project area as polygon features. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Paurashava	String	25	To contain name of the Paurashava.
Union_Ward	String	25	To contain name of the current Union or Ward No.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain <i>dag</i> number (plot number)
Plot_Type	String	20	To contain following plot types <ul style="list-style-type: none"> - “Plot” - “Katcha Road” - “Semi-Pucca Road” - “Pucca Road” - “Halot” - “Pond” - “Canal” - “River”
Scale	String	20	To contain scale of the Mouza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mouza as District code+Thana code+Union/Ward code+Mouza code.
UW_Geocode	String	6	To contain 6-digit BBS Geocode of Union or Ward as District code+Thana code+Union/Ward code
Land_use	string	50	To contain existing land use as <ul style="list-style-type: none"> - “Administrative” - “Agriculture” - “Commercial” - “Circulation Network” - “Institutional” - “Flood Flow Zone” - “Industrial” - “Mixed Use” - “Recreational” - “Restricted / Special Use” - “Socio-Cultural” - “Transport & Communication” - “Urban Residential”

Field Name	Field Type	Width of the field	Purpose of the field
			- "Urban Services" - "Vacant Land" - "Water Body"
Single_Crop	string	50	To contain the single crop land
Double_Crop	string	50	To contain the double crop land
Triple_Crop	string	50	To contain triple crop land
Remarks	String	100	To contain remarks, if any.

3) Layer name: MML306864

Feature Type: **Polyline**

This Layer will contain line features of edge-matched and merged Mouza maps of project area as polyline features. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
ID	Long Integer	16	To Contain Mouza polyline ID.
Type	String	20	"Plot Boundary" "Sheet Boundary" "Mouza Boundary" "Katcha Road" "Semi-Pucca Road" "Pucca Road" "Halot" "Pond" "Canal" "River"
Remarks	String	100	To contain remarks, if any.

4) Layer name: MMN306864

Feature Type: **Point**

This layer will contain Plot numbers of edge-matched and merged Mouza maps of project area as point features. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila.
Paurashava	String	25	To contain name of the Paurashava.
Union_Ward	String	25	To contain name of the current Union or Ward No.
Mouza	String	100	To contain name of the Mouza name
JL_No	String	6	To contain JL Number of the Mouza
Sheet_No	String	6	To contain sheet no the Mouza
Mouza_JL_S	String	100	To contain Mouza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain <i>dag</i> number (plot number)
Plot_Type	String	20	To contain following plot types <ul style="list-style-type: none"> - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River"
Scale	String	20	To contain scale of the Mouza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mouza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mouza map.
SV_Period	String	20	To contain survey period of the Mouza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mouza as District code+Thana code+Union/Ward code+Mouza code.
UW_Geocode	String	6	To contain 6-digit BBS Geocode of Union or Ward as District code+Thana code+Union/Ward code
Remarks	String	100	To contain remarks, if any.

5) Layer name: STR306864

Feature Type: **Polygon**

This Layer will contain the information of each structure within the project area. It must contain thirteen fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Division	String	25	To contain name of the current Division.
District	String	25	To contain name of the current District.
Upazila	String	25	To contain name of the current Upazila
Pourashava			To contain name of Paurashava.
Union_Ward	String	25	To contain name of the current Union\Ward.
ID	Long Integer	16	To Contain Structure ID.
Plot_No	Long Integer	10	To Contain the plot No.
Area_Sqft	Double	0	To Contain Structure area in square feet.
Str_Type	String	20	To contain the type of the structure as follows - “Pucca” - “Semi-pucca” - “Katcha”
Storied	Short Integer	-	To contain the number of floors of the structure.
Str_Use1t	String	100	1. To contain the use (1 st) of the structure. 2. The attributes should be according to the given “Existing Landuse” categories.
Str_Use2t	String	100	To contain the use (2 nd) of the structure.
Str_Use3t	String	100	To contain the use (3 rd) of the structure.
Str_name	String	100	To contain the name of the structure.
Cons_Year	Short Integer	-	To contain the year of construction.
Undercons	String	3	To contain the information if it was being under construction during the feature survey. - Yes/No ; True/False ; 1/0
Struc_Owner	String	100	To contain the owner name of the structure.
Owner_Cell	String	100	To contain the owner Cell No. of the structure.
Struc_Use	String	100	To contain the structure use of the Government or private and so on.
Hyperlink	String	100	To contain the picture of the structure.
Holding_no	String	50	To contain Holding number of the structure.
Road_ID	String	50	To contain adjacent road number, It must be follow of the Road Categories.
Road_name	String	100	To contain the name of the nearby road
Locality	String	50	To contain the name of the location.

6) Layer name: RDP306864

Feature Type: **Polygon**

This Layer will contain the existing roads of the project area as polygon features. It must contain three fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Road_name	string	100	To contain the name of the road, if any
Road_ID	string	20	To contain the ID of Road
Road_type	string	20	To contain the physical type of the road as follows - “Pucca” - “HBB” - “Katcha”
Road_Class	string	100	To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - “National Highways ” - “Regional Highways” - “District/Zila Road” LGED Road Class - “Upazila Road(Pucca” - “Upazila Road(Katcha)” - “Union Road(Pucca)” - “Union Road(Katcha)” - “Village Road A (Pucca)” - “Village Road A (Katcha)” - “Village Road B (Pucca)” - “Village Road B (Katcha)”

7) Layer name: **RDL306864**

Feature Type: **Polyline**

This Layer will contain the existing roads of the project area as polyline features. It must contain three fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field			
Road_name	string	100	To contain the name of the road, if any			
Road_ID	string	20	To contain the ID of Road			
Road_Type	string	20	To contain the physical type of the road as follows - “Pucca” - “WBM” - “HBB” - “Katcha”			
Road_Class	string	100	To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - “National Highways ” - “Regional Highways” - “District/Zila Road” LGED Road Class - “Upazila Road(Pucca” - “Upazila Road(Katcha)” - “Union Road(Pucca)” - “Union Road(Katcha)” - “Village Road A (Pucca)” - “Village Road A (Katcha)” - “Village Road B (Pucca)” - “Village Road B (Katcha)”			
Remarks	To prepare the inventory of road, Electricity, Telephone, drainage, Sewerage, pipe line and etc. The inventory will help for the present status of features. Please follow the example right side of the Data Table.	Chainage in Meters		Road_Condition	Type	Additional +Field
		From	To			
		0	500	Pucca	Pucca	To add more field as per Required.
		500	504	Culvert	Culvert	To add more field as per Required.
		504	1000	Katcha	Katcha	To add more field as per Required.
		1000	1012	Bridge	Bridge	To add more field as per Required.

8) Layer name: RDCL306864

Feature Type: **Polyline**

This shape file will contain the centerlines of the existing roads of the project area as polyline features. It must contain the following fields compatible to network analysis:

Field Name	Field Type	Width of the field	Purpose of the field
Road_name	string	100	To contain the name of the road, if any
Road_no	string	20	To contain road number, if any
Road_ID	string	20	To contain the ID of Road
Road_type	string	20	To contain the physical type of the road as follows - "Pucca" - "WBM" - "HBB" - "Katcha"
Road_Class	string	100	To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - "National Highways" - "Regional Highways" - "District/Zila Road" LGED Road Class - "Upazila Road(Pucca)" - "Upazila Road(Katcha)" - "Union Road(Pucca)" - "Union Road(Katcha)" - "Village Road A (Pucca)" - "Village Road A (Katcha)" - "Village Road B (Pucca)" - "Village Road B (Katcha)"
Road_width	numeric		To contain average width of the road segment in meter
Road_length	numeric		To contain calculated length of the road segment in meter
Num_Lanes	numeric		To contain number of lanes on the road segment such as 1, 2, etc.
Road_own	string	100	To contain the name of the department or organization to which the road segment belongs.
METERS	Double	-	To contain length of the road in meters
FT_MINUTES	Float	-	To contain the time duration needed to travel the arc from the start node unto the end node, measured in minutes.
TF_MINUTES	Float	-	To conation the time duration needed to ravel the arc from the end node unto the start node of the arc, measured in minutes,
Oneway	string	2	To contain the value to represent the possible directions to travel an arc
Hierarchy	Long		To contain order or rank assigned to road network elements.

9) Layer name: RDFP306864

Feature Type: **Polygon**

This Layer will contain footpath of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Road_name	string	50	To contain road name
Road_ID	string	20	To contain the adjacent Road ID
Width	numeric		To contain width of Footpath
Status	string	50	To contain footpath conditions.

10) Layer name: RDIL306864

Feature Type: **Polygon**

This Layer will contain road islands of the project area. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Road_name	string	50	To contain road name
Road_No	string	20	To contain road number if any
Road_ID	string	20	To contain the adjacent Road ID
Width	Long integer	20	To contain width of Island
Type	string	50	To contain footpath conditions.

11) Layer name: WBD306864

Feature Type: **Polygon**

This shape file will contain water bodies of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
WBD_ID	Long integer	20	To contain Water body ID.
Type	string	50	To contain following type of water bodies - "River" - "Khal" - "Irrigation Canal" - "Swamp" - "Pond" - "Ditch" - "Borrow Pits"
Type	string	50	To contain the use of water body such as Private or Public use

12) Layer name: EMB306864

Feature Type: **Polyline**

This Layer will contain embankment features of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Emb_name	string	100	To contain the name of the road, if any
Emb_ID	string	20	To contain the ID of Road
Emb_Type	string	20	To contain the physical type of the Embankment to follow the road preparing method.
Emb_Class	string	100	To contain the Class of the Embankment -“Road cum Embankment” -“Embankment”
Emb_width	numeric		To contain average width of the road segment in meter
Emb_width	numeric		To contain average width of the embankment segment in meter
Emb_length	numeric		To contain calculated length of the road segment in meter
Num_Lanes	numeric		To contain number of lanes on the road segment such as 1, 2, etc.
Owner	string	100	To contain the name of the department or organization to which the embankment segment belongs.
Remarks			To follow the Road preparing Methods.

13) Layer name: DTM306864

Feature Type: **Point**

This shape file will contain spot heights as 3D points at regular interval (10m x 10m OR 20m x 20m or as specified) in project area. It must contain four fields as described in the following table:

Field Name	Field Type	Width of the field	No. of Decimal Places	Purpose of the field
ID	Sort Integer	10		To contain the ID
RL	Double	-	-	To contain Reduced Level (RL) of a point in meter as referenced with PWD
Easting	Double	-	-	To contain X-coordinate of the point
Northing	Double	-	-	To contain Y-coordinate of the point

14) Layer name: BM306864

Feature Type: **Point**

This shape file will contain BM Pillars established in the project area. It must contain four fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
RL	Double	-	To contain Reduced Level (RL) of a point in meter as referenced with PWD
Easting	Double	-	To contain X-coordinate of the point
Northing	Double	-	To contain Y-coordinate of the point
Organization	String	100	To contain name of the organization
Cons_Year		10	To contain the year of construction
Remarks	String	100	To contain remarks, if any.

15) Layer name: CON306864

Feature Type: **Polyline**

This shape file will contain the contour lines of the area under project area. It must contain three fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Contour	Double	-	To contain the value (RL) of the contours up to three decimal places.
Label	Double	-	To contain the value of contour up to one decimal place. This can be used to label the contours in map.
Type	String	7	To contain the value of this field as follows: - "Index" - "Intermediate" The purpose of this field is to symbolize and label the contours only. (The values must be calculated in such way that after successive 4 thin (Regular) contours there should be one thick (Index) contour in map. That is if 0.00 is a thick (Index) contour then 0.3, 0.6, 0.9, and 1.2 will be (Regular) contours and 1.5 will be thick contour.

16) Layer name: ELU306864

Feature Type: **Polygon**

This shape file will contain existing land use of project area which will be prepared on the basis of physical feature and land use survey. It may contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Land_use	string	50	To contain existing land use as - “Administrative” - “Agriculture” - “Commercial” - “Circulation Network” - “Institutional” - “Flood Flow Zone” - “Industrial” - “Mixed Use” - “Recreational” - “Restricted / Special Use” - “Socio-Cultural” - “Transport & Communication” - “Urban Residential” - “Urban Services” - “Vacant Land” - “Water Body”
Single_Crop	string	50	To contain the single crop land
Double_Crop	string	50	To contain the double crop land
Triple_Crop	string	50	To contain triple crop land
Remarks	string	100	To contain remarks, if any.

17) Layer name: HOM306864

Feature Type: **Polygon**

This shape file will contain rural homestead areas in project area as polyline features. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Location	String	20	To contain the name of Mouza (Mouza_JL_Sheet) or the locality in which homestead areas lies.
Type			To contain the type of homestead area (Accordingly structures) -Urban -Rural

18) Layer name: BRG306864

Feature Type: **Polygon**

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as polygon features in project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Length	Double	0	To contain the length of the bridge/culvert
Width	Double	0	To contain the width of the bridge/culvert
Abutment	Long integer	20	To contain the number of abutment
Span	Double	0	To contain the span of the bridge/culvert
Location	String	30	To contain the area name (Mouza_JL_Sheet or locality)
Remarks	String	254	To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods.

19) Layer name: BRGL306864

Feature Type: **Polyline**

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as polyline features in project area. Each feature must be a multipart feature. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Length	Double	-	To contain the length of the bridge/culvert
Width	Double	-	To contain the width of the bridge/culvert
Abutment	Double	-	To contain the number of abutment
Span	Double	-	To contain the span of the bridge/culvert
Location	String	20	To contain the area name (locality)
Remarks	String	254	To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods.

20) Layer name: BRGP306864

Feature Type: **Polygon**

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as point features in project area. It is expected that this shape file will be generated/produced from converting the Bridge_CL.shp file into centroids. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Length	Double	-	To contain the length of the bridge/culvert
Angle			To contain the Geographic angle of the bridge/culvert
Width	Double	-	To contain the width of the bridge/culvert
Abutment	numeric	20	To contain the number of abutment
Span	Double	-	To contain the span of the bridge/culvert
Location	String	20	To contain the area name (Mouza_JL_Sheet or locality)
Remarks	String	254	To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods.

21) Layer name: DRN306864

Feature Type: **Polyline**

This shape file will contain the information of existing drains in the project area. It must contain three fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	20	To contain the (construction) type of the drain. The value of the field may be any of the following two - Surface (Katcha) - Surface (Uncovered) - Surface (Covered) - Pipe
Drain_width	Double	0	To contain the width of the drain
Drain_depth	Double	0	To contain the depth of the drain
Drain_radius	Double	0	To contain the radios of the drain
Road_ID	string	20	To contain the adjacent Road ID
Remarks	String	254	*** To follow the road map preparing methods.

22) Layer name: BW306864

Feature Type: **Polyline**

This shape file will contain boundary walls as line features of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	50	To contain line features such as Boundary wall.

23) Layer name: WSL306864

Feature Type: **Polyline**

This shape file will contain water distribution pipe network as line features in project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	20	To contain type of pipe (Steel, PVC, etc)
Dia	Double	0	Diameter of pipe in mm
Remarks	String	254	*** To follow the road map preparing methods.

24) Layer name: OHT306864

Feature Type: **Point**

This shape file will contain overhead water tanks as point features in project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Capacity	Double	-	To contain the capacity of the overhead tank.
Catchment	Double	-	To contain the catchment area in sq. meter
Owner	String	100	Contains the owner name

25) Layer name: ESL306864

Feature Type: **Polyline**

This shape file will contain High Voltage Electric Lines as line features in project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
capacity	string	20	Contains the capacity of each line as 11KV, 33 KV etc.
Owner	string	20	Contains the name of Organization
Remarks	String	254	*** To follow the road map preparing methods.

26) Layer name: UTL306864

Feature Type: **Point**

This shape file will contain locations of various utility features as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	20	To contain - “Electric Pole” - “Electric Tower” - “High Volt Electric Tower” - “Electric Box” - “Power Station” - “Power Sub-station” - “Transformer” - “Gas Transmission Center” - “Light Post” - “Telephone Pole” - “Telephone Box” - “Fire Service Station” - “Traffic Signal Pole”
Owner			Contains the name of the owner
Remarks	String	100	*** To follow the road map preparing methods.

27) Layer name: SEW306864

Feature Type: **Polyline**

This shape file will contain sewerage network as line features in [project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Size	string	20	To contain pipe diameter of sewerage line
Type	string	25	Contains type of waste water carried by the sewerage line such as storm sewerage or household sewerage line etc.
Location	string	20	Contains location of sewerage line
Owner			Contains the name of the owner
Remarks	String	100	

28) Layer name: OP306864

Feature Type: **Polygon**

This shape file will contain various polygon features of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	50	To contain boundary of following features - "Graveyard" - "Crematorium" - "Cemetery" - "Eidgah" - "Restricted Area" - "Airport" - "Brick Field" - "Rikshaw Garage" - "Automobile Garage" - "Slum" - "Monument" - "Open Space" - "Parks" - "Playground" - "Stadium" - "Golf Course" - "Botanical Garden" - "Zoological Park" - "Power Plant/Station" - "Bus Terminal" - "Truck Terminal" - "Water Treatment Plant" - "Sewerage Treatment Plant" - "Waste Disposal Plant" - "Railway Station" - "Bazaar Boundary" - "Forest Land" - "Sand Fill" - "Swimming Pool" - - <i>Other if necessary</i>
Owner			Contains the name of the owner

29) Layer name: AP306864

Feature Type: **Point**

This shape file will contain point features of project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Type	string	50	<ul style="list-style-type: none"> - "Airport" - "Bazar" - "Government Bank" - "Private Bank" - "Brickfield" - "Bridge" - "Bus Terminal" - "Cemetery" - "Church" - "Cinema Hall" - "College" - "Crematorium" - "Deep tube well" - "Dustbin" - "Filling Station" - "Graveyard" - "Growth Center" - "Hand tube well" - "Historic site" - "Government High School" - "Registered High School" - "Non-Registered High School" - "Hospital/Clinic" - "Madrasa" - "Registered Madrasa" - "Non-Registered Madrasa" - "Mazar/Dargah" - "Monument" - "Mosque" - "Museum" - "Oil Reservoir/Depot" - "Over Bridge" - "Pagoda" - "Police Box" - "Police Station" - "Post Office" - "River Port" - "Government Primary School"

Field Name	Field Type	Width of the field	Purpose of the field
			<ul style="list-style-type: none"> - “Registered Primary School” - “Non-Registered Primary School” - “Sluice gate” - “Temple” - “Theater Hall” - “Truck Terminal” - “Under Pass” - “University” - “Private University” - “Well” - “Culvert” - <i>Other if necessary</i>
Name	string	50	To contain name of the feature, if any
PF_ID	Long integer	6	To contain the point feature ID.
PointType	string	50	To contain short name “GPS” of the feature, e.g. Government Primary School (GPS)
Owner			Contains the name of the owner
Remark	string		Contains Further Explanation

30) Layer name: NAM306864

Feature Type: **Point**

This shape file will contain the names of important places and structures as point features in project area.

Field Name	Field Type	Width of the field	Purpose of the field
Name	String	100	To contain - Name of locality, market, bazaar, important structure, historic site, university, play ground, poultry farm, river, khal, lake, pond, etc.

1) Layer name: RN306864

Feature Type: **Annotation/Polyline**

This shape file will contain the names of important places and structures as point features in project area.

Field Name	Field Type	Width of the field	Purpose of the field
Name	String	100	To contain the name of road segment.

32) Layer name: PRL306864

Feature Type: **Polyline**

This shape file will contain center lines of proposed roads as line features in the project area.

Field Name	Field Type	Width of the field	Purpose of the field
Width_m	Double	-	To contain width of the proposed road in meter
Width_ft	Double	-	To contain width of the proposed road in foot
From_To	String	100	To contain the names (of road/place) from where the road starts and to where the road ends.
Prop_type	String	20	To contain any of the two - “New” - “Widening”
Type	String	20	To contain any of the following - “Underground” - “Ground” - “Flyover” - “Viaduct”
Remarks	String	254	*** To follow the road map preparing methods.

33) Layer name: POP306864

Feature Type: **Polygon**

This shape file will contain polygon features of unions/wards derived from dissolved Mouzas of the project area. It must contain the field as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Union_Ward	String	50	To contain name of the Mouza
Area_BBS	Double	-	To contain area from BBS records
Area_GIS	Double	-	To contain area calculated by GIS software
Pop_2001	Long Integer	-	To contain Population in the year 2001
Pop_2011	Long Integer	-	To contain Population in the year 2011
Pop_2021	Long Integer	-	To contain Population in the year 2021
Pop_2035	Long Integer	-	To contain Population in the year 2035
Pop_den_2011	Double	-	To contain population density
Division	String	25	To contain name of Division
District	String	25	To contain name of District
Upazila	String	25	To contain name of Upazila
Union_Ward	String	25	To contain name of Union/Ward
Geocode	String	11	To contain BBS geocode of the Union
Remarks	String	254	Remarks, if any.

34) Layer name: STP306864

Feature Type: **Polygon**

This shape file will contain proposed policy on the merged Mouza map of the project area. It must contain the fields as described in the following table:

Field Name	Field Type	Width of the field	Purpose of the field
Policy_Zone	String	50	To contain proposed policy on the plots.
Remarks	String	100	To contain remark, if any.

B.1.2 Point Feature Codes

The following feature codes (Unique ID) must be assigned in appropriate fields of the layers.

The following Point feature codes (Unique ID) will be used as follows:

Point Feature Categories	Unique ID
- "Airport"	255
- "Bazar"	260
- "Government Bank"	265
- "Private Bank"	270
- "Brickfield"	275
- "Bridge"	280
- "Bus Terminal"	285
- "Bus Stand"	290
- "Cemetery"	295
- "Church"	300
- "Cinema Hall"	305
- "Government Medical College"	245
- "Private Medical College"	250
- "Government College"	145
- "Government Woman College"	150
- "Registered College"	155
- "Non-Registered College"	160
- "Government Poly Technical Institute"	165
- "Private Poly Technical Institute"	170
- "Vocational Institute"	175
- "Jubo Unnayan Kendra"	310
- "Government Teacher's Training College"	235
- "Private Teacher's Training College"	240
- "Crematorium"	315
- "Deep Tube Well"	320
- "Dustbin"	325
- "Filling Station"	330
- "Graveyard"	335
- "Growth Center"	340
- "Hand Tube Well"	345
- "Arsenic Hand Tube Well"	350
- "Tara Pump"	355
- "Historic Site"	360
- "Government High School"	125
- "Government Girl's High School"	130

Point Feature Categories	Unique ID
- "Registered High School"	135
- "Non-Registered High School"	140
- "Hospital/Clinic"	365
- "Government Kamel Madrasa"	180
- "Registered Kamel Madrasa"	185
- "Government Fazel Madrasa"	190
- "Registered Fazel Madrasa"	195
- "Government Alem Madrasa"	200
- "Registered Alem Madrasa"	205
- "Government Eftedayee Madrasa"	210
- "Registered Eftedayee Madrasa"	215
- "Non-Registered Madrasa"	220
- "Mazar/Dargah"	370
- "Monument"	375
- "Mosque"	380
- "Museum"	385
- "ASA NGO"	390
- "BRAC NGO"	395
- "Proshikha NGO"	400
- "TMSS NGO"	405
- "Other's NGO"	410
- "Insurance Company"	415
- "Life Insurance Company"	420
- "Oil Reservoir/Depot"	425
- "Over Bridge"	430
- "Pagoda"	435
- "Police Box"	440
- "Police Station"	445
- "Post Office"	450
- "River Port"	455
- "Government Primary School"	100
- "Registered Primary School"	105
- "Non-Registered Primary School"	110
- "K.G. School"	115
- "Kindergarten School"	120
- "Sluice Gate"	460
- "Temple"	465
- "Theater Hall"	470
- "Truck Terminal"	475
- "Under Pass"	480
- "Government University"	225
- "Private University"	230
- "Well"	485
- "Culvert"	490
- "Other if Necessary	To put or add the Unique ID accordingly 5 Interval

Annexure-III: Log Book of Physical Feature, Landuse, Vulnerability Assessment Attribute Collection Forms

Upazila:	
Union:	
Ward No:	
Grid ID:	
Sheet No.	
Mouza	

Preparation of Development Plan for 14 Upazilas (Package-1)
Urban Development Directorate, Ministry of Housing and Public
Works
Physical feature and Landuse Survey

Date:	
Name of the Surveyor:	
Name of Supervisor:	

Data: Drain/Sewerage Line

ID	Type (Pipe/RCC/Brick/Kacha)	Width (m)	Depth (m)	Radius (m)	Road ID	Remarks

Code: OD= Open Drain, CD= Cover Drain, S=Sewer Line

Date:	
Name of the Surveyor:	
Name of Supervisor:	

[illegible]

ECAL,

Upazila:	
Union:	
Ward No:	
Grid ID:	
Sheet No.	
Data	Bridge/Culvert

Preparation of Development Plan for 14 Upazilas (Package-1)
Urban Development Directorate, Ministry of Housing and Public Works
Physical feature and Landuse Survey

Date:	
Name of the Surveyor:	
Name of Supervisor:	

Data: Bridge/Culvert

ID	Type of Structure (Wooden/RCC/Steel)	Width (m)	Length (m)	Road ID	Northing	Easting	Name

Code: B=Bridge, C= Culvert

Date:	
Name of the Surveyor:	
Name of Supervisor:	

[illegible]

Upazila:	
Union:	
Ward No:	
Grid ID:	
Sheet No.	
Mouza	

Preparation of Development Plan for 14 Upazilas (Package-1)
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Physical feature and Landuse Survey

Date:	
Name of the Surveyor:	
Name of Supervisor:	

Data: Water Body

ID	Type of Water Body (River/Khal/Beel/Baor/ <u>MarshLand</u> /Pond/Gheer))	Owner (Individual/Public/Other)	Name	Width (m)	Depth (m)

Date:	
Name of the Surveyor:	
Name of Supervisor:	

[illegible]

ECAL,

Date:	
Name of the Surveyor:	
Name of Supervisor:	

[illegible]

ECAL,

Upazila:	
Union:	
Ward No:	
Grid ID:	
Sheet No.	
Mouza	

Preparation of Development Plan for 14 Upazilas (Package-1)
Urban Development Directorate, Ministry of Housing and Public Works
Physical feature and Landuse Survey

Date:	
Name of the Surveyor:	
Name of Supervisor:	

Data: Bus/Truck/Railway Station/Hat/Bazar/Growth Centre

ID	Ownership (Individual/Public/Other)	Name	Northing	Easting

Code: B=Bus, T=Truck, R=Railway

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PHYSICAL FEATURE SURVEY

LAND USE SURVEY

TOPOGRAPHIC SURVEY

PHOTOGRAMMETRIC WORKS
