JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ Agriculture Survey Report/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Agriculture SurveyReport of RaipuraUpazila, Narsingdi.

Dear Sir,
We are pleased to submit herewith the Final Agriculture SurveyReport of RaipuraUpazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul IslamNazem)
Team Leader, Package -2

Dr. Santosh Sarker
Agriculture Expert, Package -2

Encl: As stated.

Copy to:
1. Project Manager, Package-2, 14 Upazila Project, UDD
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

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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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Participatory Rural Appraisal (PRA)
of
Ishwarganj Upazila, Mymensingh

August, 2016

Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ PRA Report/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Participatory Rural Appraisal Report of Raipura Upazila, Narsingdi.

Dear Sir,
We are pleased to submit herewith the Final PRA Report of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)
Team Leader, Package -2

(Md. Azibar Rahman)
Socio-economic Expert, Package -2

Encl: As stated.

Copy to:
1. Project Manager, Package-2, 14 Upazila Project, UDD
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Executive Summary

Upazila is now considered very important echelon of development that will incorporate all social, economic, administrative and infrastructure services for the region. Participatory Rural Appraisal (PRA) is an operative approach to gather information in rural areas. In village, community manages their natural resources through PRA. In this study, nine wards and eleven unions of Raipura Upazila have been covered through PRA. Varied participants such as rich and poor, well-educated and less educated, man and woman and leaders and common people have been included in this PRA session which helps to find the problems and potentials exclusively. They have discussed about their problems and spoken about potentials of Raipur Paurashava and unions. The five major problems identified and prioritized for Municipality are Lack of employment, Lack of water supply, No gas connection, Lack of drain and problem of education system. Major potentials are also identified to solve these problems such as their availability of Agricultural land, foreign remittance, existing gas sub-station, river exist, poultry.

There are several development priorities for Raipur Paurashava and as well rural unions. It has been found that short-term priorities are those related to basic needs i.e. demand of pure drinking water and developed education system. Their mid-term priorities are availability of developed drain and health services which are basic urban needs. Their long term priority is to fulfill the demand of pure drinking water as water borne diseases are severe in this area and developed other basic services like transportation system, health services etc.

The five major problems identified and prioritized for Unions are Poor Transportation, Lack of drainage, Lack of pure drinking water, Lack of proper Utility Facilities (Electricity, Gas), and Infrastructure problem. Major potentials are also identified to solve these problems such as agricultural land, hardworking people, close Proximity to river, cattle rearing, small and cottage industry

There are several development priorities for Raipur unions. Among the short-term 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. Among the mid-term priorities, most common demands were development of agriculture and veterinary, development of education system and industrialization to create employment opportunity. Among the long-term priorities, most common demand was creating employment opportunities to fight poverty. This PRA session has been observed by the facilitators and planners.It springs a comprehensive process of understanding the problems. Different problems and potentials have been identified which would be helpful for development plan of Raipur Upazila.

Abbreviation/Acronyms

a.m.	ante meridiem
ABL	Arc Bangladesh Limited
BBS	Bangladesh Bureau of Statistics
CBOs	Community Based Organizations
CSOs	Civil Society Organizations
EPZ	Export Processing Zone
GoB	Government of Bangladesh
GIS	Geographic Information System
HH	Household
hr	hour
i.e.	that is
ICA	Institute of Cultural Affair
km	Kilometer
NGOs	Non-governmental Organizations
p.m.	post meridiem
PRA	Participatory Rural Appraisal
REB	Rural Electrification Board
SCPL	ShelTech Consultants Private Limited
ToP	Technology of Participation
ToR	Terms of Reference
UP	Union Parishad
UDD	Urban Development Directorate

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CHAPTER ONE: PARTICIPATORY RURAL APPRAISAL APPROACH AND PROCESS

1.1 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, 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 Rural Appraisal (PRA) Sessions at each Union level in the rural areas and one session each ward under municipality areas. Participatory Rural Appraisal (PRA) session has been conducted on 02 November to 23 November 2015 at Raipura Upazila where 692 participants were involved. 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 Raipura 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 three wards in the municipal area of Raipura 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/sketches.

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/madrasa, 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 (This session is called Warm Up)

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 (This session is called Orientation)

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 three 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 692 participants have attended in the PRA sessions in 10 different study locations of Raipura Upazila from 02-23 November 2015 towards. PRA session has started at 11:00 a.m. and continued up to 14:30 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-1.1

Table-1.1: PRA Team and Organization

PRA Team	Organization
Md. Abdur Razzaque Azad (Social Expert) Co-Facilitator: Rakeeb Askari and Md. Walid Reza Logistics: Mehedi Alam Rapporteur: Rakeeb Askari	Sheltech Consultants Pvt. Limited And Arc-Bangladesh, Dhaka

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 timey arrival and facilitation of these workshops.

Up officials and the planning team of the Package 2 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-1.2: Schedule of PRA Session

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	PRA Schedule Raipur Upazila.		PRA Schedule Raipur Pourashava	
	Name of Union	PRA Date	Name of Ward	PRA Date
01	Adiabad Union	12-11-2015	01,02,03	19-11-2015
02	Alipara Union	07-11-2015		
03	Amirganj Union	09-11-2015		
04	Banshagri Union	15-11-2015		
05	Chanderkandi Union	10-11-2015		
06	Chandpur Union	18-11-2015		
07	Char aralia Union	16-11-2015		
08	Char Madhuya Union	16-11-2015		
09	Char Subuddhi Union	18-11-2015		
10	Daukar charUnion	09-11-2015	04,05,06	22-11-2015
11	Himara Union	19-11-2015		
12	Mahespur Union	14-11-2015		
13	Marjal Union	08-11-2015		
14	Mirzanagar Union	11-11-2015		
15	Mirzapur Union	12-11-2015	07,08,09	23-11-2015
16	Mirzachar Union	17-11-2015		
17	Muchapur Union	11-11-2015		
18	Nilakhya Union	14-11-2015		
19	Paratoly Union	07-11-2015		
20	Polastoly Union	10-11-2015		
21	Radhanagar union	02-11-2015		
22	Raipura Union	17-11-2015		
23	Sreenagar	15-11-2015		
24	Uttar Bakhar Nagar	08-11-2015		

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 Parishad/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 three wards under municipal area. PRA session has been held at Union Parishad. 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 very 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 big 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 Raipura Municipality/Pourashava

Raipura Paurashava is under the jurisdiction of Raipura Upazila of Narsingdi district. Area of Raipura paurashava is 312.77 sq km. Total Population is 34411 and total no of ward is 9. Population density of this paurashava is 1453. The Pourashava 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:

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

West: On the west side of the study area, Adiabad Union is situated

South: On the south side of the study area, Sreenagar Union is located

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

Map 2.1: Raipura Paurashava

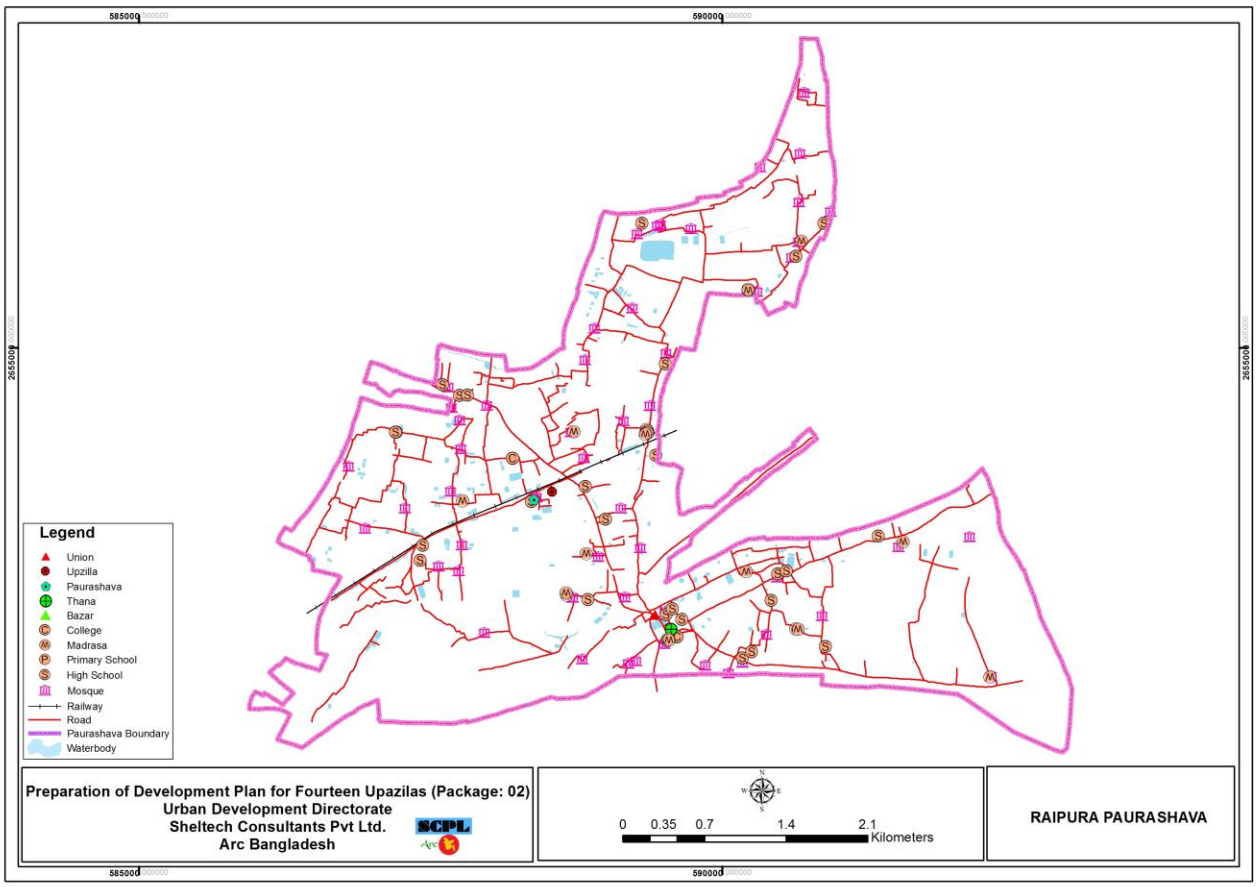


Table 2.1: Raipura paurashava

	Type	No.
Religious Institutions	Mosque	655
	Temple	20
Communication facilities	Pucca road	171.44 km
	Kacha road	230 km
	Railway	27km
Educational institutions	Primary school	213
	Secondary school	43
	College	5
	Madrasa	51
Cultural organizations	Library	6
	Club	22
	Cinema hall	3
	Women Society	18
Markets		40
Health centers	Upazilla Health Complex	1
	Clinic	17
	Diagnostic Center	5
Sources of drinking water	Tubewell	92.22%
	Tap	.57%
	Ponds	.37%
	Others	6.84%

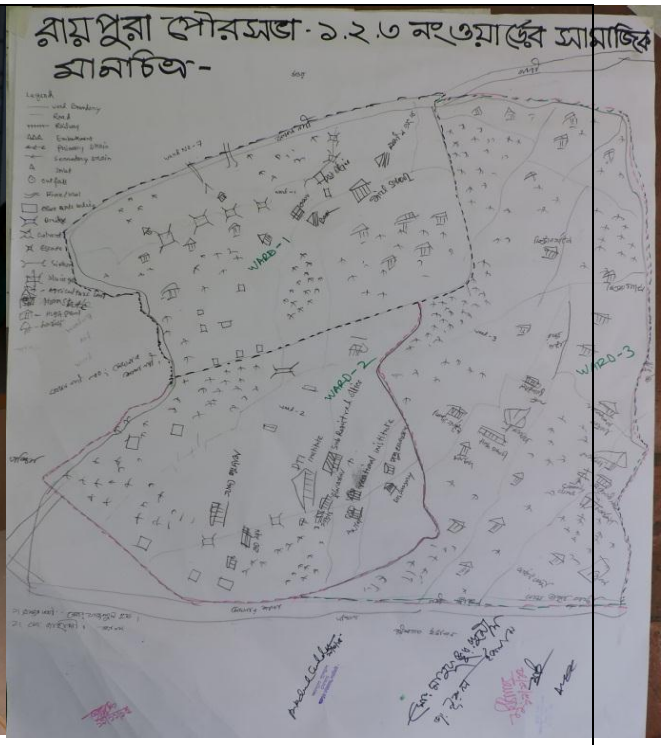
Source: Raipura Pourashava, 2015

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 or three persons for preparing the social map of Ishwarganj Paurashava 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/madrasa, 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 2.1: Preparing Social Map



Photograph 2.2: Social Map of Raipura Paurashava

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 Raipura

Major Problems of Raipura	
Type of problems	Ward No
• Lack of drain	1,2,3 ,4,5,6,7,8
• Lack of health services	1,2,3
• No gas connection	1,2,3 ,4,5,6,8,9
• Weak Transportation system(broken road)	4,5,6,7,8
• No Road light	1,2,3,4,5
• Problem of education system	1,2,3 ,4,5,6,7,8,9
• Lack of water supply	1,2,3 ,4,5,6,7,8,9
• Lack of sanitation	4,5,6,7,8,9
• Drug addiction	4,5,6,7,8,9
• Child marriage	7,8,9
• Dowry	7,8,9
• Problem of beggars (Outsider)	4,5,6,7,8
• Problem of conservancy management	1,2,3,4,5,6

• Lack of employment	1,2,3,4,5,6,7,8
• Lack of nutrition of children	1,2,3,4,,8,9

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. Lack of employment: Bureaucratic complexity is a vital issue on lack of employment

2. Lack of water supply: Supply line cannot constructed due to shortage of budget. Environment is polluted due to use unsecured open latrine by people

3. No Gas Connection: Gas is not connected because of political discrimination

4. Lack of Drain: Fund has not been risen for development budget. Political discrimination is another cause.

5. Problem of educational system: There is shortage of educational institutes at few wards. There is also no adjustment with top level.\

Table 2.3: Major Potentials of Raipura

Major potentials of Raipura	
Type of potentials	Ward No
• Commercial bank (Krishi bank, AlArafa bank)	1,2,3
• Hat bazar	1,2,3
• Agricultural land	1,2,3,4,5,6,7,8
• Ponds	1,2,3,4,5
• Foreign remittance	1,2,3,4,5,6,7,8,9
• Existing gas sub station	1,2,3,4,5,6,7,9
• `River exist	1,3,4,5,6,7,8,9
• Small & Cottage industry	1,2,3
• Hardworking people	4,5,6
• Canal &Beel	4,5,6
• Rail line	4,5,6,7
• Proposed E.P.Z.area	4,5,6,9
• Branch of Meghna river	4,5,6,7
• Fishermen	4,5,6,8
• Poultry	1,2,3,4,5,6,7,9
• N.G.O.s	3,7,8,9
• Furniture and wood business	2,3,7,8,9
• Still factory	1,2,3,7

Source: PRA, 2015

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

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;

- Agricultural land
- Foreign remittance
- Existing gas sub station
- River exist
- Poultry

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.Lack of employment	• Bureaucratic complexity • Careless in education • Increase of population	• Increase of poverty rate	• Enough hard working people exist
2.Lack of water supply	• Bureaucratic complexity • Supply line cannot constructed due to shortage of budget	• Increasing uses of polluted water as a result increasing diseases • Environment is polluted due to use unsecured open latrine by people	• Industrious and workable Paurasava

Identified Problems	Causes	Impact	Potentials/Probability
3.No Gas Connection	• No gas connection in entire upazilla and Paurosava • Beurocratic complexity • Political discrimination	• Increase fuel cost • Environment became polluted • Forest Desolate • No industrialization • Frightened from environmental disaster	• Gas substation is in the mid of Paurasava • Gas pipe line is going through the Upazila
4.Lack of Drain	• Shortage of budget • Beurocratic complexity • Political discrimination • Limitation of the proper top level • No fund for development budget	• Some areas communication disrupted for 5 to 7 days • In rainy season Roads go under water disrupted transportation	• Enough land exist for constructio n of main drain • Existing hard working people
5.Problem of educational system	• No adjustment with top level • No educational institute at few Wards, Only one private K.G. school exists	• Literacy rate of education decreasing • Many children are dropout due to not getting educational environment	• A lot of pupil exist

Source: PRA, 2015

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

2.4 Perceived Development Priorities of Raipura Paurashava under Narsingdi District.

Based on Individual Ward Level PRA reports (please see Annexure: II), the recommended development priorities of Raipura Paurashava have been outlined in Table-2.5, 2.6 & 2.7. It has been found that short-term priorities are those related to basic needs i.e. demand of pure drinking water and developed education system. Their mid-term priorities are availability of developed drain and health services which are basic urban needs. Their long term priority is to fulfill the demand of pure drinking water as water borne diseases are severe in this area and developed other basic services like transportation system, health services etc.

Table 2.5: Short Term Development Priorities of Raipura Paurashava

Short Term Development Priorities	Ward No
• Demand of pure drinking water supply	All Ward
• Demand of developed education system	All ward
• Demand of development of transportation system	All ward
• Demand of development of health services	7,8,9
• Demand of developed drain	7,8,9
• Demand of development of Entertainment	1,2,3,4,5,6
• Demand of gas connection	1,2,3,4,5,6
• Demand of water supply	1,2,3,4,5,6
• Demand of Corruption free land office	1,2,3
• Demand of drug free Society	1,2,3
• Demand of employment	1,2,3,4,5,6

Table 2.6: Mid Term Development Priorities of Raipura Paurashava

Mid Term Development Priorities	Ward No
• Demand of developed drain	All Ward
• Demand of gas connection	All Ward
• Demand of development of health services	1,2,3,4,5,6
• Demand of water supply	All Ward
• Demand of development of transportation system	All Ward
• Demand of excavation of river and canal	4,5,6
• Demand of E.P.Z.	4,5,6,

Table 2.7: Long Term Development Priorities of Raipura Paurashava

Long Term Development Priorities	Ward No
• Demand of pure drinking water supply	All Ward
• Demand of development of transportation system	All Ward
• Demand of developed drain	1,2,3,4,5,7,8
• Demand of excavation of river and canal	1,2,3,4,6,7
• Demand of Employment	1,3,5,7,9,10
• Demand of E.P.Z.	4,5,6,
• Demand of development	7,8,9
• Demand of intercity train stoppage	7,8,9
• Demand of developed drain	1,2,3
• Demand of development of Entertainment	4,5,6

CHAPTER THREE: PRAs At UNION LEVEL

3.1 Overview

Raipura Upazila is consisted of 24 Unions named: Adiabad Union, Alipura Union, Amirganj Union, Banshgari Union, Chandpur Union, Char Aralia Union, Char Madhuya Union, The Char Shubuddhi Union, Daukarchar Union, Himar Union, Maheshpur Union, Marjal Union, Mirzanagar Union, Muchapur Union,Mirzarchar Union ,Mirjapur Union Nilakkhya Area, Paratoly Union ,Polashtoly Union, Radhanagar Union, Raipura Union, Sreenagar Union, Uttar Bakhar Nagar.Union.Area of Raipura Upazilla is 312.77 sq.km. Total Population is 413766.

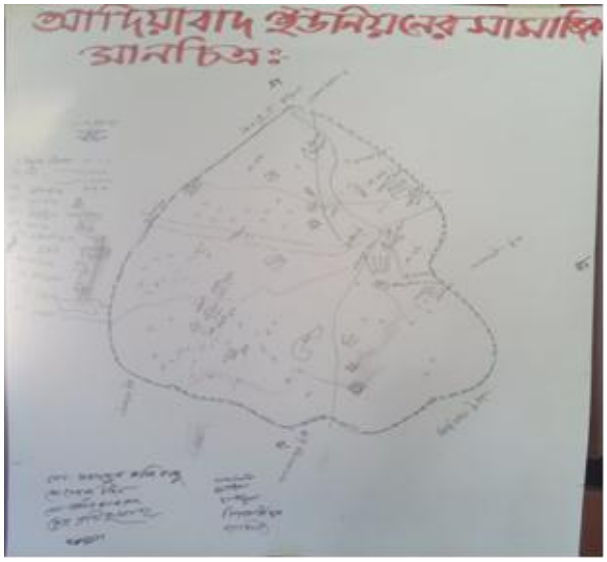
Map 3.1: Raipura Upazilla

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 Raipura Upazila 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/madrasa, 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: Preparing Social Map



Photograph 3.1.2: Social Map of one Union (Adiabad Union)

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 14 (sixteen) problems identified in different unions (please see Table-3.1) of Raipura Upazila. Among them, poor transportation, lack of drainage, lack of pure drinking water, lack of proper utility 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 Raipura Upazila..

Table 3.1: Major problems of twenty four Unions of Raipura

Major Problems	**Unions***
Poor Transportation	All Unions
Lack of drainage	All Unions
Lack of hospital	2,3,14,15
Lack of pure drinking water	All Union
No Disaster shelter center	1,4,6,7,14
Problem of agriculture, irrigation	1,3,5,6,7,9,10,12,13
Lack of proper Utility Facilities (Electricity, Gas)	All Unions
Problem of dowry	1,3,6,
Detrition of law and enforcement system	1,23,7,8
Infrastructure problem	All Union
Poverty	3,8,20,15
Unemployment	8,9,10,11,20,18
River erosion	5,9,13,15,19,22
Lack of modern education system	All Unions

Source: PRA Survey, 2015

Note: *

1 = Adiabad Union
2 = Alipura Union
3 = Amirganj Union
4 =Banshgari Union
5 = Chanderkandi Union
6 = Chandpur Union
7 = Char Aralia Union
8 = Char Madhuya Union
9 = Char shubuddhi Union
10 = Daukar Char Union
11 = Hairmara Union
12 = Maheshpur Union
13 =Marjal Union
14= Mirjanagar Union
15 =Mirzapur Union
16 =Mirzarchar Union
17 =Musapur Union
18 =Nilakkhya Union
19 =Paratoly Union
20 =Polashtoly Union
21 = Radhanagar Union
22 =Raipura Union
23 = Sreenagar Union
24 =Uttar Bakhar Nagar Union

3.3.2. Problems Prioritization Analyzing Venn diagram

After a long discussion, the participants have come to the consensus to identify the 6 (six) major problems as priority basis. The five major problems are as follows:

1. Poor Transportation
2. Lack of drainage
3. Lack of pure drinking water
4. Lack of proper Utility Facilities (Electricity, Gas)
5. Infrastructure problem
6. Lack of modern education system

3.3.3. Major Potential Identification

There were threadbare discussions on potentials of rural Raipura to 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 Raipura which can be utilized for their future development (please see Table 3.2).

Table 3.2: Major Potentials of twenty four Unions of Raipura

Major Potentials	Unions*
Agricultural land	All Unions
Hardworking People.	3,5,10,13,18,20,21,24
Educated people	1,3,11,19,20,21,24
Close Proximity to river	1,3,4,7,8,12,16,19,20,21,24
Cattle rearing	1,3,4,6,7,8,11,19,20,21,23
Small and cottage industry	3,11,13,14,20,21,24
Foreign remittance	3,4,7,8,10,11,12,13,21
Market	10,11,14,20,21,23
Beel	1,4,11, 21,24
Poultry	1,2,3,5,6,10,12,13,14,17,20,21,22
Fisheries	5,6,11,13,16,21

Source: PRA Survey, 2015

Note: *

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24 =Uttar Bakhar Nagar Union

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**:**

- Agricultural land
- Hardworking People
- Close Proximity to river
- Cattle rearing
- Small and cottage industry
- Poultry

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	Impact	Potentials/Probability
1.Poor Transportation	•Lack of budget •Lack of influence •Problem of Union quota for the supply of money	•Financial loss •Problem of transportation •Loss of time	•Existing necessary land for road construction •Local Bamboo, wood and soil available •Hardworking people
2.Lack of drainage	•Lack of govt. initiative •Poor management	•Crops are being damaged because of stagnant water	•Increasing agriculture development • Existing ditches
3.Lack of pure drinking water	•Arsenic and iron mixed with water •Want of deep tube-well •Lack of budget for Union Parisad	•People are drinking unsafe water •Affected people in various diseases •People are in health danger of the area	•Local U.P. Chairman along with the local peoples have cooperative and Intense effort
4.Lack of proper Utility Facilities (Electricity, Gas)	•Lack of budget •Lack of people's consciousness •Indifference of local agent	•Lack of development •No Industrialization •People are deprived from digital service	•Donation land for established electric sub center
5.Infrastructure problem	•Lack of budget •Lack of economy	• River erosion • Financial loss	•Economic development
6.Lack of proper	•Lack of teachers	•Decreasing of	•Enough school and

education system	•Lack of classroom in the educational institutions •Problem of managing committee	educational rate •Students are in danger road •Increasing of early marriage •Increasing of social chaos	college existing(2 high schools, one college and five primary school exists

Source: PRA Survey, 2015

3.4 Perceived Development Priorities for twenty four unions of Raipura Upazilla of Narshingdi District.

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 twenty four Unions of Raipura Upazilla

Short Term Development Priorities	Unions*
Demand of safe water and electricity, sanitation	1,2,10,11,13,14,16,17,18,20
Development of bazar	1,2,11,13,22
Demand of Employment	2,11,13,14,18,21
Demand of shelter center	1,11,16
Development of transportation system	2,5,6,9,13,16,17,19,23
Demand of developed agricultural irrigation and drainage	2,3,7,11,20
Demand of development of Entertainment	1,2,11,13,17,18,19,23,
Demand of improved health services	1,5,6,10,11,13,16,19
Need to establish digital post office	1,2,3,23,
Solving River Erosion Problem	6,11

Source: PRA Survey, 2015

Note: *

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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 twenty four Unions of Raipura Upazilla

Mid Term Development Priorities	**Unions***
Improvement of Utility services	1,2,5,10,11,12,17,21
Development of agriculture and veterinary	1,2,6,7,8,11,12,13,19,23
Need to develop education system	1,2,5,6,8,11,12,14,17,19
Demand of industrialization	1,6,10,11,12,14,22
Demand of U.P. complex	1,9,11,12,24

Source: PRA Survey, 2015

Note: *

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6 = Chandpur Union
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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 Raipura Upazila. Moreover, they gave emphasis on introducing modern agricultural system to increase productivity.

Table 3.6: Long term Development Priorities for twenty four Unions of Raipura Upazila

Long Term Development Priorities	Unions*
Demand of developed agricultural system	1,8,10,19,21
Demand of electricity for all	10,19
Demand of employment	10,12,17,19,21,23
Establishment of shelter center	1,2,12,13,17,19
Demand of development of transportation	2,3,6,7,10,21,22

Source: PRA Survey, 2015

Note:

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CHAPTER FOUR: CONCLUSION

4.1 Key Observations

The key observations of PRA study are:

- From the social mapping, it is evident that Raipura Paurashava and all 24 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. Total 43 no. of problems have been identified from the study areas, of which Insufficient Educational Facilities, No gas connection, Unemployment, Water logging, Poor communication system, Lack of Agricultural extension services and Poor medical facilities are the common problems in all locations. Again, Lack of vocational training, Electricity Problem and some social problems like drug addiction, early marriage, are also identified as their less important problems. Among all the study areas, in spite of being a Paurashava, Raipura Paurashava is also suffering from lack of medical facilities, educational, communication, Absence of gas connection, waterlogging, poor road development and so on.
- From the opinions of local people, there is no gas connection in the study locations. The people from Adiabad Union, Amirganj Union, Sreenagar Union, Radhanagar, Mirzarchar, Maheshpur are suffering from insufficient electricity supply. All the study areas' communication systems are very poor. Sreenagar, Radhanagar, Paratoly, Uttar Bakhar Nagar, CharAralia, Raipura Paurashava are experiencing serious water logging among all other areas due to lack of drainage system. There is a limitations of improved, modern hospital, experienced doctor and other medical facilities in all the areas. In the context of educational sector, almost all the areas are suffering most except Raipura Paurashava, Adiabad, Amirganj Union. Again the people also spoke about lack of industries, lack of playground/ park and cultural amenities, lack of vocational training, unemployment, lack of graveyard, lack of allowances as 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 (Paddy), Canal, River, Beel, Human resource, Fisheries, Fruit garden, Poultry Farm, Foreign Remittance and Livestock Rearing 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, safe water and electricity, Gas Connection, employment sector and found almost all the area. On the other hand, gas supply, auditorium, park facilities 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 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 hr.
- 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.

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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"

Participatory Rapid Appraisal (PRA) Guideline

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 (ToP™) 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 Councillors, Teachers, Businessmen/dealers/brokers/traders, NGOs/CBOs/Clubs, Imams/religious priests or leaders, Farmers/labourer, 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.

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 (UnionP/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/Municpal Ward of project Upazillas 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, hydrogeological, 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 councillor 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

I. Distribution of PRAs by Upazila, Ups and Municipality

Upazilla	No. of Unions	No. of Municipal Wards	No. of PRA
Sagata	10	-	10
Sonatola	7	9	16
Sariakandi	12	9	21
Total	29	18	**47**

J. **Timeline for PRA Sessions**

Upazilla	PRA
Sagatha	June 8-12, 2015 (Monday -Friday)
Sonatola	June 13-17, 2015 (Saturday-Wednesday)
Sariakandi	June 18-24, 2015 (Thursday-Wednesday)
Draft Report	June 30, 2015 (Tuesday)

K. **Process Description of Tools**

Social Mapping

Objectives

- To map local area's assets, resources and features (natural, physical, environmental, social, economic etc.)
- to locate problems and resources in the area through map
- To prepare a map based on resource base of the area

Timeframe:

45 minitues – 60 minutes

Materials needed:

Union/Pourashava Map, Drawing paper/Flipchart paper, Colour markers/Sketch pen; Pencils, Pencil cutter, Eraser, Gum, Sticky wall, Masking Tape, Chalk, Floor mat/Carpet etc.

Norms

Set norms or remind pre-set norms for this group learning exercise and one of the norms is that it is not necessary for everyone to agree on everything but needs most people's agreement. However, everyone in the group deserves respect. Participants should refrain from judging, interrupting or ridiculing others, and should respect the privacy of others by maintaining confidentiality.

Steps

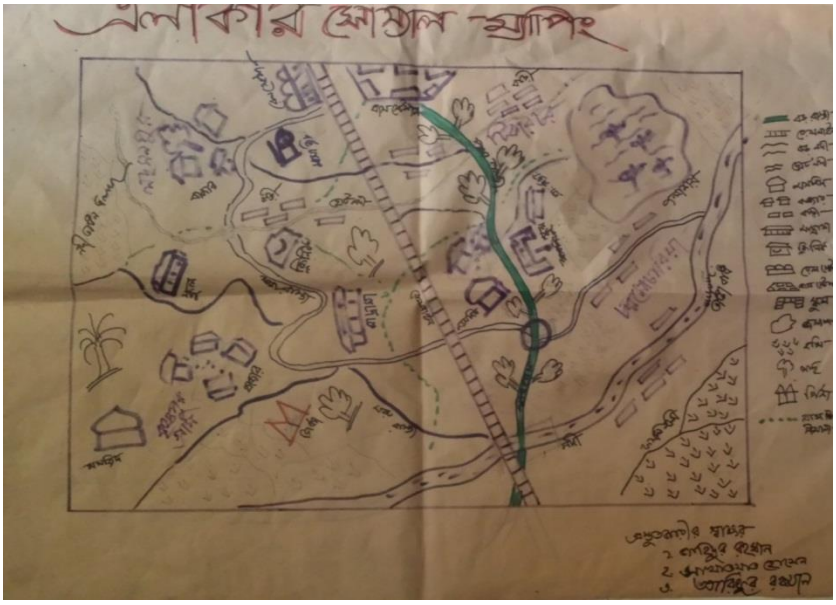
(a) The facilitator will explain the procedure of the preparation of social mapping to the participants in an easy and simple manner.
(b) The facilitator will elect person (s) for drawing the social map on the basis of group discussion and request the other participants to the person involve in social mapping.
(c) Hang the Union/Pourashava map (if available) in a suitable place where all participants can look it clearly. If not available, explain that you are asking them to imagine about the existing

scenarios of their union/target wards of pourashava and draw that image on drawing paper or on the ground.

(d) The poster or paper will be placed on the table, floor or board.

(d) Some participants may not be accustomed to using a writing utensil, so encouragement and patience are needed. Some participants may not be accustomed to using a writing utensil, so encouragement and patience are needed. One alternative is to clear an area of dirt or sand and ask people to create a map using objects found in area. Reassure the participants that things do not have to be drawn exactly – the map is only to get a general idea of what the community looks like. One alternative is to clear an area of dirt or sand and ask people to create a map using objects found in area. Reassure the participants that things do not have to be drawn exactly – the map is only to get a general idea of what the community looks like. The boundary of the area will draw cautiously, and then the map will be drawn collectively with the help of marker of sign pen. Then ask to the participants to draw the wards as well as mouza boundary on the floor or on the paper.

(e) Ask the participants to draw all of the resources in the Union/Target Wards of Pourashava. Different types of resources such as road, pond, agricultural land, river, homesteads, school etc. will be located on the map by using marker or sign pen. (Explain that "resources" are buildings, organizations, people, or services that are available to the area 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, agricultural land, forest, etc.).



(f) Surrounding unions and important areas or establishments around the boundary will also be plotted on the map.

(g) Ask the participants to mark the north direction of the map and to draw the boundary of the Union/ Wards of Pourashava on the floor with chalk on floor or on paper by wooden pencil.

(h) Signature of the participants' will take on the map drawn by them.

(i) Necessary correction will be made by displaying the map just drawn.

(j) Facilitators will observe all activities closely and ask to the participants whether all existing features have drawn correctly or not. lf the participants agreed that all available features have drawn on the map correctly and no need to adding or deleting any object. Then the map will draw on the paper without changing any object in case of map drawn on the ground.

- Ask participants to mark where different groups in the community live (i.e. the wealthy, the labourers, different religious groups, different ethnic groups etc.).
- Ask them to identify the various community resources by name or with a symbol which can easy understand to third person.
- Ask the participants whether all features have drawn on the paper correctly or not. lf the participants agreed that all features have drawn on the paper correctly.
- Then Facilitators will thank to participants for providing their input and product a nice purposeful map.

Venn Diagram

Objectives

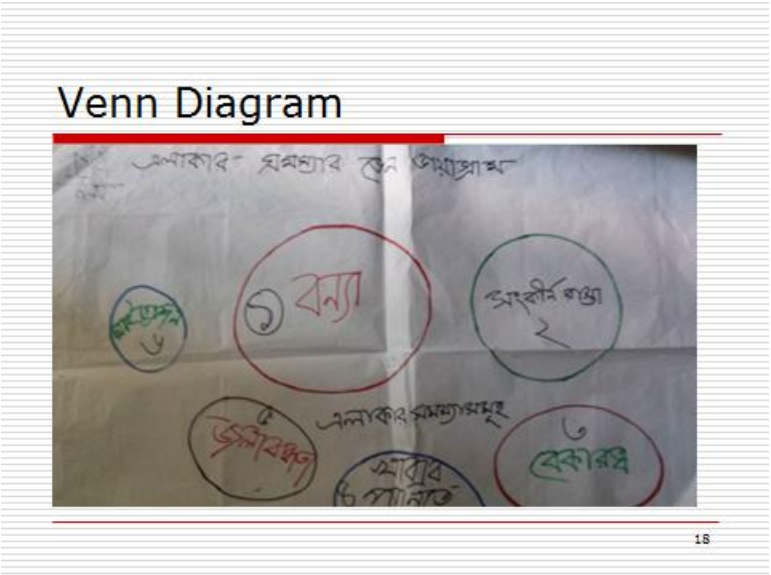
- To identify the problems/risks/threats of the areas, potentials of the area, causes and effects the major problems
- **To** identify the severity and impacts of problems

Norms

Set norms or remind pre-set norms for this group learning exercise and one of the norms is that it is not necessary for everyone to agree on everything but needs most people's agreement. However, everyone in the group deserves respect. Participants should refrain from judging, interrupting or ridiculing others, and should respect the privacy of others by maintaining confidentiality.

Materials: Poster Paper (white and colour), Marker Pen, Sign Pen, Scissors, Glue stick, Masking tape, Wall or Black Board, Sticker, Table or Floor and Color Paper may be used (if necessary)

Material: Poster Paper (white and colour), Sign Pen, Scissors, Glue stick, Masking tape, Wall or Black Board



Procedure of Venn Diagram:

Problem identification

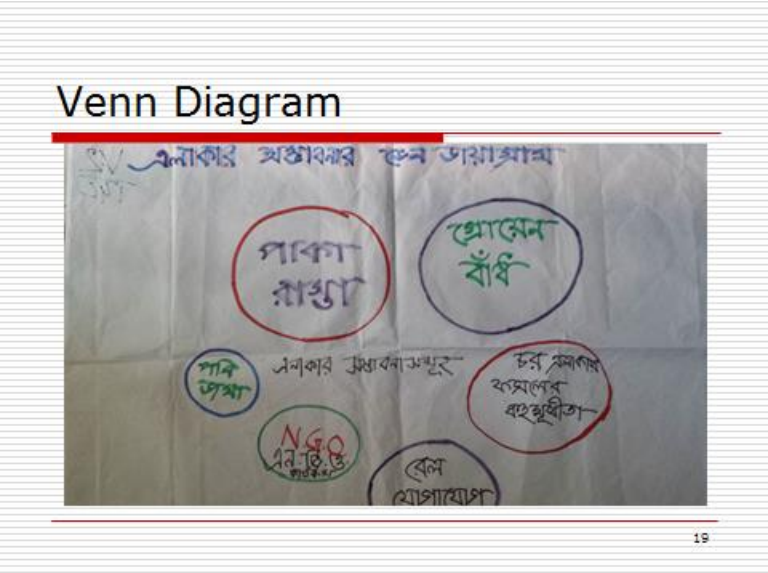
(a) The facilitator will select a person among the participants' for assistance, who would cut the paper into circular form of different size for venn diagram and stick them on poster paper.

(b) The facilitator will identify the problems of the basis of their severity e.g., 1,2,3… with the help of participants'.

(c) Colour poster paper is cut into circular form according the severity of the problems and would stick them on the white colour poster paper.

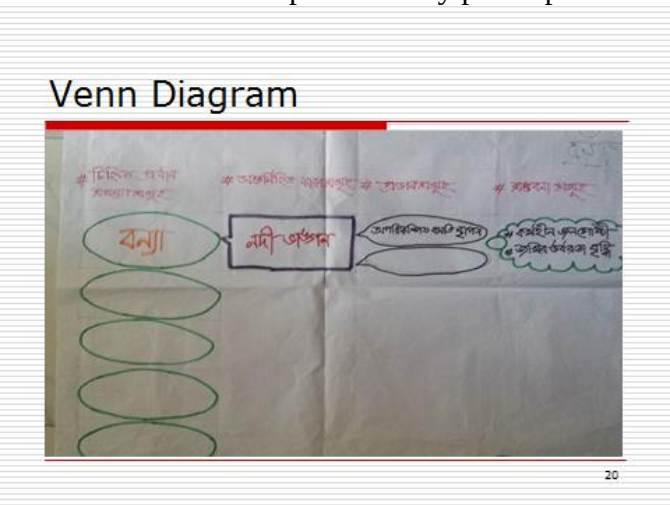
(d) The biggest circular sized paper will indicate the most severe problem i.e., no. 01 problem and the size of the circle will reduce according to descending order.
(e) The main area will be stickled at the centre of the poster paper.
(f) The problems would be arranged according their importance for aesthetics.
(g) Necessary correction will be made in the problems diagram by participants.

Potentials identification
Same as Problem Identification



Cause and effects of Problems and Potentials

(a) Facilitator will select a person among participants to write the cause & effects
(b) Facilitator will try to involve all participants in discussion to identify the cause & effects
(c) Necessary correction will be made in the cause& effects diagram by participants.
(a) Facilitator will select a person among participants to write the potentials
(b) Facilitator will try to involve all participants in discussion to identify the potentials to solve the problems of the area
(c) Necessary correction will be made in the potentials by participants.



Technology of Participation (ToP™) Workshop

(www.ica-international.org, www.ica-bangladesh.org)

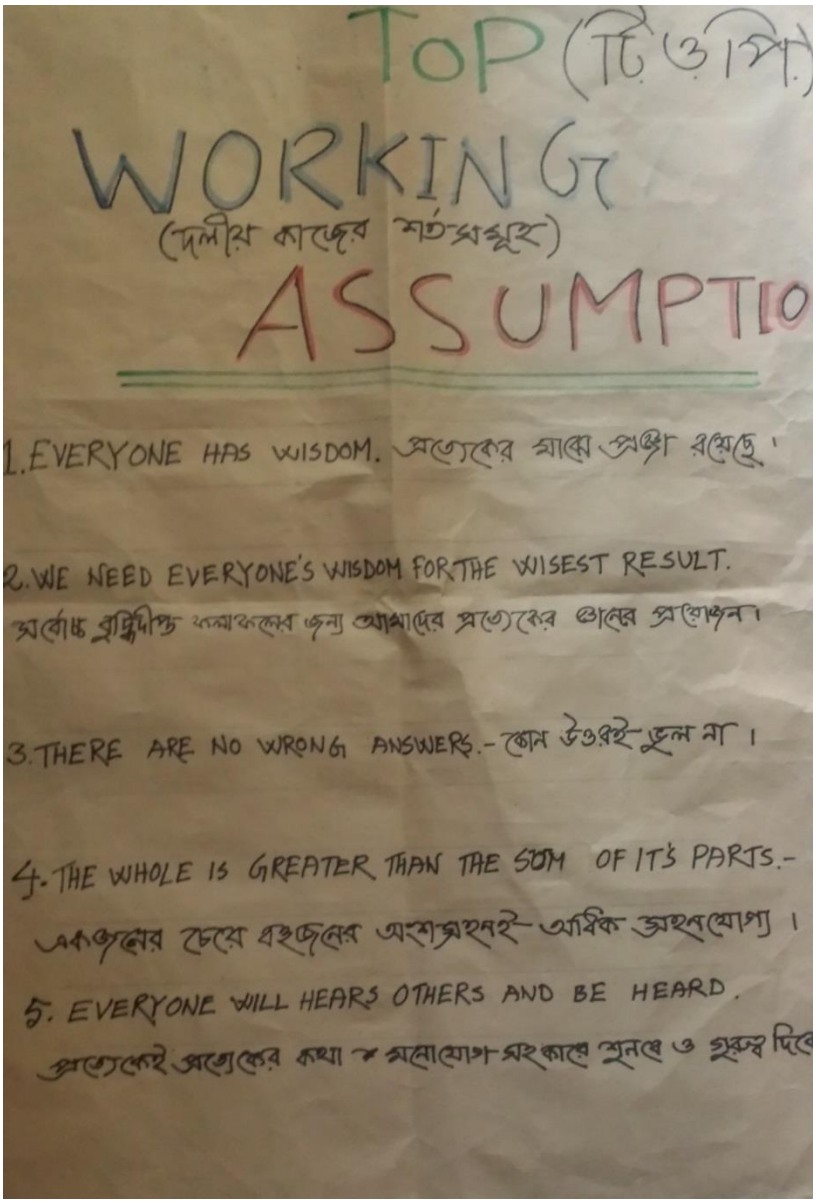
Objectives

A. 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.
B. To get getting people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.
C. In all cases spatial dimension of local people's information will be checked for development planning purpose.

Materials

First field facilitators will ensure materials needed --- flip chart, sticky wall, spray, masking tape, sticky glue, board pin, meta cards, white papers, color markers, sign pens, poster papers, registration sign up sheets, camera and videos, etc.

They will hang social map, venn diagrams, tables from previous sessions, day agenda, working assumptions, norms etc. on wall visible to all participants.

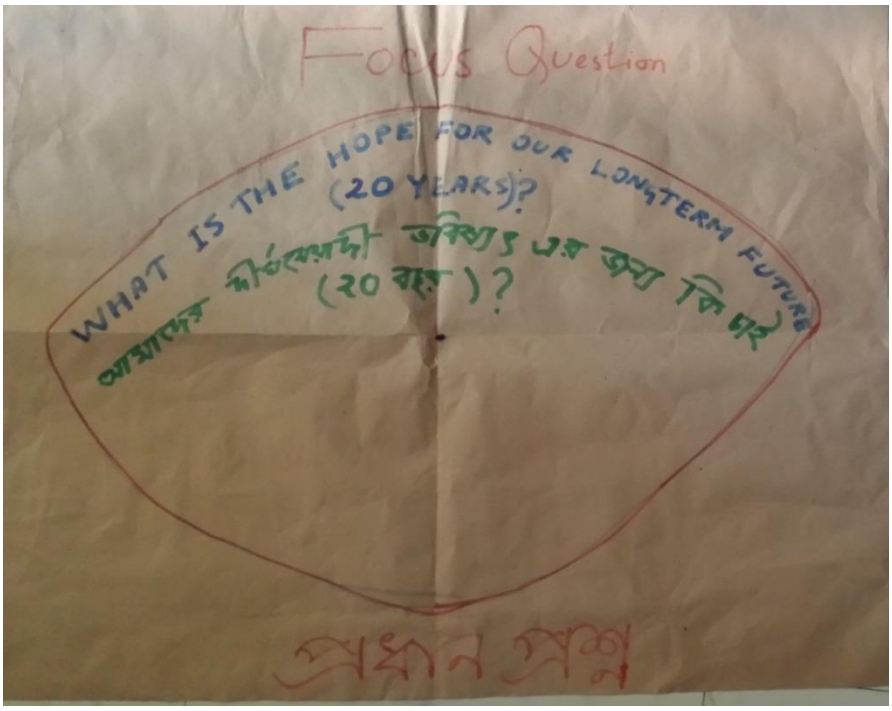


Introductions and Context (10 minutes)

Then ToP session will start with explaining the context (purpose, aims and goals and the process) of ToP session. A warm up or ice breaking exercise at the beginning may be made in the beginning of ToP.

Participants will be reminded of group norms (5 working assumptions (everybody has wisdom, no wrong answers, hear others and be heard) and others (raise hand to speak or ask for anything etc.) and also meta card instructions (1 idea per card, 5-6 words per idea, and Write BIG).

At the start, the facilitator will remind of the whole group - what they got from previous sessions (resources/assets, potentials, problems, risks etc.) showing map and diagrams hanged on room wall or sticky wall or flip chart stand. Then the facilitator will ask participants to look at the focus question if they are clear on the question wording or meanings.



Brainstorming (20 minutes)

The facilitator will read out the focus question --- What they want to see take place in next 20 years in their area.

The facilitator will ask all participants to close eyes for 2 minutes and dream of what they want to see practical things/events/actions in 20 years which will be visible if they take photograph after 20 years.

Then the facilitator will ask participants to brainstorm individually the focus question and write their ideas in note books in next 5 minutes. The facilitator will ask them to write ideas in meta cards following instructions (indicating the poster on wall) and keep 3-5 key/best ideas ready at hand to hand in to cofacilitator. The ideas written on cards will be posted on the wall. The co facilitator will keep meta-cards in hand and distribute those proportionally on tables/floor. The facilitator will the ask participants to write their 5 major ideas in meta-cards. The facilitator and co-facilitators will go to different participants in the room and check if they need any help.

The facilitator will check if they want more time (better to keep time schedule), otherwise will ask participants to select best 3 cards and keep in hands ready for instruction to post on wall.

Organizing (10 minutes)

The facilitator will ask the best card first from each person, the co-facilitator will collect and give to the facilitator. The facilitator will read each card and check if all are clear, if not ask the writer to clarify the intent of the card. The facilitator will put 1st cards on the sticky wall or board. Then the facilitator will ask participants for pairing on wall and he will ask for 2nd best card same way. Afterwards, the facilitator will ask participants for pairing on wall and he will ask participants

which cards can be pair. Some cards will be fit easily as pair and some will not. The facilitator then will ask to give next card which are different so far. Those cards will be read out and put under pair cards for clustering if fit based on suggestion from participants. And then final cards will asked if ideas not appeared yet. The facilitator will organize the longest cluster on the left hand side of the facilitator and the remaining accordingly based on participants' agreement.

Naming (20 minutes)
After clustering cards based on participants' suggestion, for preliminary naming, the facilitator will read out cards of each cluster starting from the longest one (in terms of size) and ask participants label the cluster of ideas with two or few words based on the intents/intuition of cards. Thus all clusters will be roughly labeled.

Then the facilitator will let the group name the first column of ides stating the underlying intents of each card. Then all participants will be divided into groups in terms of number of clusters/columns of cards and let each group name the remaining columns in their own group. The names of other clusters were put on the sticky wall and asked for consensus. Thus all clusters were named and at the end of this session. Participants will be instructed to post the column of cards with Final title on top with signs similar on all cards for not mistaking to post if displaced.

Conversation on Priorities (30 minutes)

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

Read the names of the clusters out loud.
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)

Now that you can see what others have said, let's put these under the headings of immediate, medium, and long- term needs. For dots, color markers can be used.

Focus Question?						
Short-term			**Medium-term**		**Long-term**	
Title	**Title**	**Title**	**Title**	**Title**	**Title**	**Title**
Idea	Idea	Idea	Idea	Idea	Idea	Idea

Closing Reflection

At the end of PRA with ToP, the facilitator will ask 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.

The Guest of honour or the designated person will do a closing speech and the team will thank the participants for their cooperation and working together for development for all.

Annexure 1

PRA Documentation

Name of Upazilla:

Nam of Union:
Municipal Ward:

Date:

Time:

Venue:

List of Participants:

Sl.	Name	Ward	Village/Moholla	Occupation	

Process Description:

Findings:

Social Mapping (includes text with spatial dimension and 1 diagram with photos of participants and activities)
Venn Diagram (includes text with spatial dimension and 3 diagrams with photos of participants and action photos)
ToP Workshop (includes text with spatial dimension and 2 tables/charts with participants and action photos)

Conclusion:

Annexure-I: Copy of PRA ToR

Annexure II

1. Raipura Paurashava (Ward No 1, 2, 3)

1.1 Overview

The Raipura Paurashava (Ward No 1, 2, 3) is under the jurisdiction of Raipura Upazila of Narsingdi district. The boundary of the Paurashava is as follows

Ward no 1

North: On the north side of the study area, River Kakon and Part of Ward no 6 and 7 are situated

South: On the south side of the study area, Ward no 2 is located

East: On the east side of the study area, Ward no 3 is located

West: On the west side of the study area, River Meghna is situated.

Ward no 2

North: On the north side of the study area, Ward no 1 is situated

South: On the south side of the study area, Ward no 3 is located

East: On the east side of the study area, Ward no 3 is located

West: On the west side of the study area, River Meghna and part of ward no 1are situated.

Ward no 3

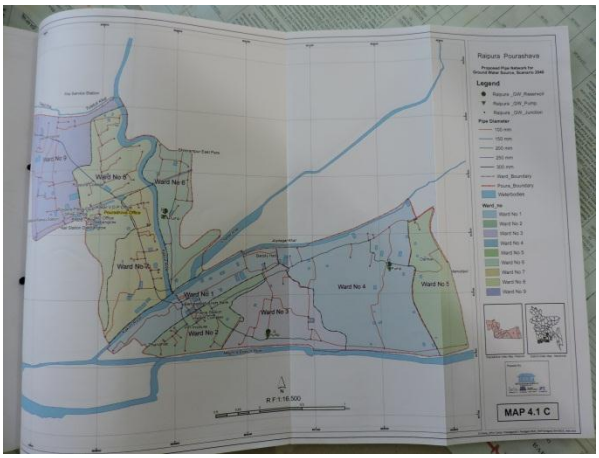
North: On the north side of the study area, Ward no 1and 4 are situated

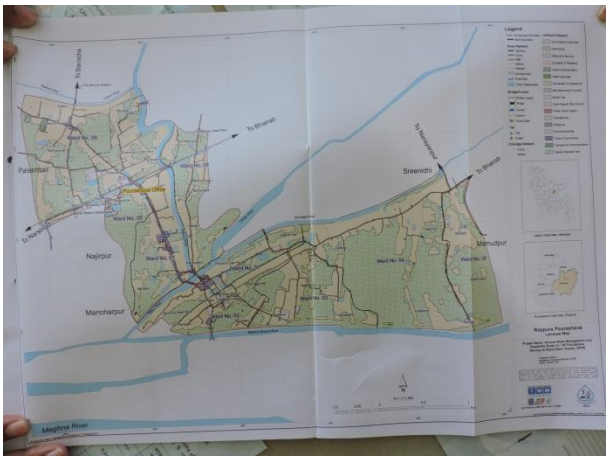
South: On the south side of the study area, Branch of River Meghna is located

East: On the east side of the study area, Ward no 4 is located

West: On the west side of the study area, ward no 2.1 is situated.

Map 1.1: Raipura Paurashava (Ward No 1,2,3)





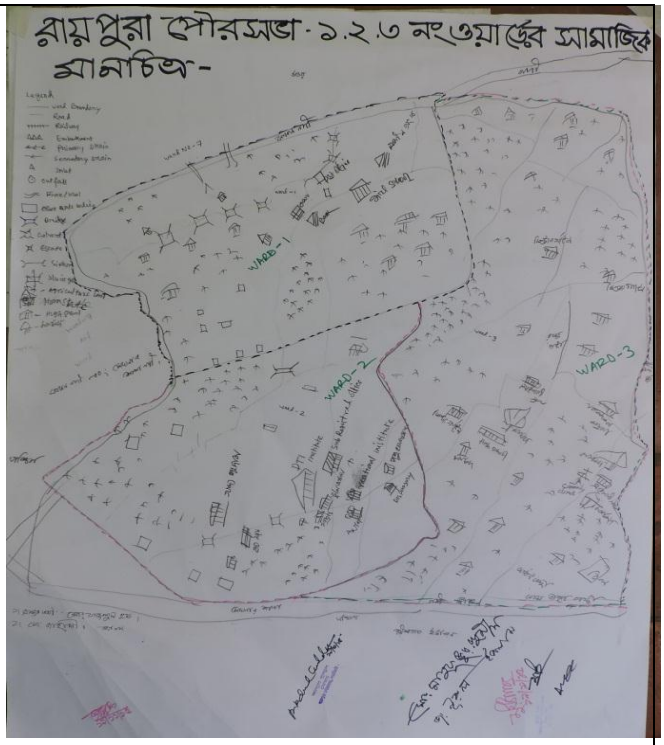
1.2 Spatial Aspects

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.

The Facilitator has selected two or three persons for preparing the social map of Raipura Paurashava (Ward No 1, 2, 3) 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/madrasa, 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 1.1: Preparing Social Map



Photograph 1.2: Social Map of Raipura Paurashava (Ward No 1, 2, 3)

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, impact and potentials. The following problems have been identified during PRA which are as follows:

Ward no 1

- Problem of drain
- Lack of health services
- No gas connection
- Weak Transportation system(broken road)
- No Road light
- Problem of conservancy management
- Trouble of education system (Lack of Educational institution structure , no primary school in Ward no 1 , no high school, Current education system is not satisfactory)
- No water supply
- No deep tube well
- Lack of sanitation

- Shortage of pure drinking water
- Drug addiction
- Child marriage
- Dowry
- Problem of beggars (Outsider)
- No own land of Paurashava
- Economical problem
- No office for Ward councilor

Ward no 2

- Problem of drain
- Sewage problem
- Lack of sanitation
- Weak transportation system
- No road light
- No gas connection
- No water supply
- No tube well
- Lack of pure drinking water
- River erosion (Branch of Meghna river)
- Land registry documentation and land sell and purchase problem (More cost to land registry than land price)
- Bureaucracy of all government officers
- Corruption in land office
- No commercial bank
- Employment problem

Ward no 3

- Weak transportation system (Broken road , earthen road, no road)
- Lack of sanitation
- No water supply
- River erosion
- Lack of emergency health services (no clinic and shortage of doctor)
- No road light
- Problem of drain
- Lack of educational structure (Land problem , Shortage of classroom)
- No gas connection
- Problem of conservancy management
- Unemployment
- No community clinic
- Environmental pollution
- Lack of social plantation

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;

Ward no 1

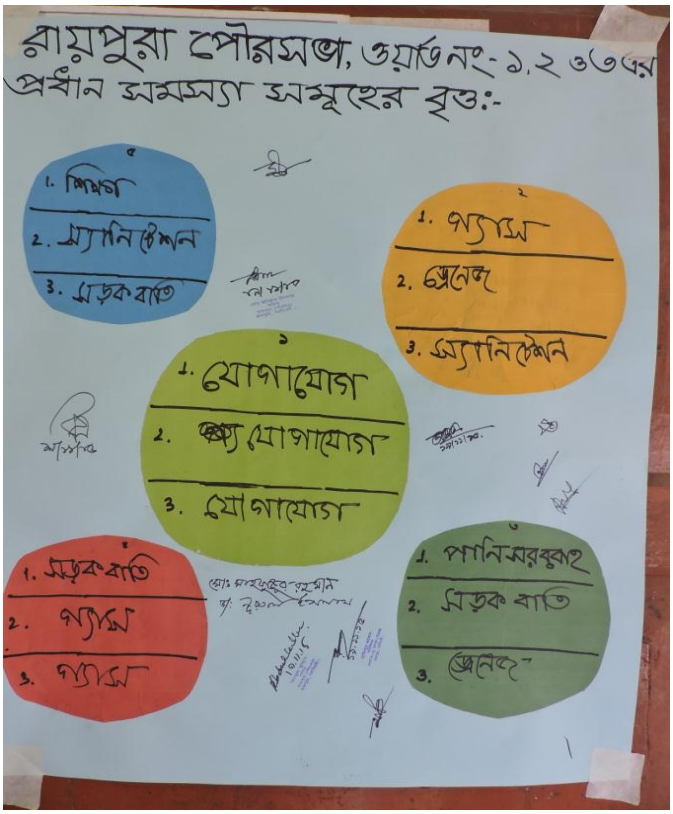
1. Weak Transportation System
2. No Gas
3. lack of water supply
4. lack of road light
5. problem of educational system

Ward no 2

1. Weak Transportation System
2. No Drain
3. No road light
4. No Gas
5. lack of Sanitation

Ward no 3

1. Weak Transportation System
2. No Gas
3. lack of water supply
4. No road light
5. problem of educational system



Photograph 1.3: Venn diagram of problems

1.3.c 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

- Commercial bank(Krishi bank, AlArafa bank)
- Hat bazar (Leased 2.1)
- Agricultural land (Very few)
- Poultry industry (very few)
- Girls high school
- Ponds
- Foreign remittance
- Educated and hardworking people

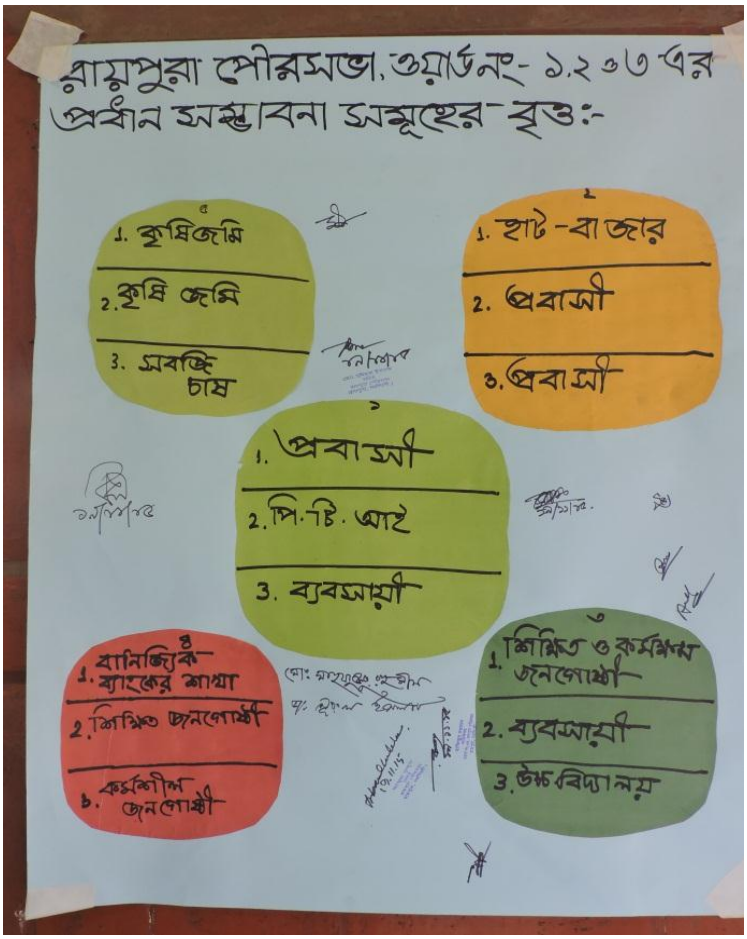
Ward no 2

- Primary Training Institute (P.T.I.)
- Vocational technical training center
- Land Registry office)
- Hafezia madrasa (Kaomi madrasa)
- Educated people
- Hard working people
- Agriculture

- Foreign remittance
- Businessman

Ward no 3

- Foreign remittance
- School(High and primary school)
- Hard working people
- Vegetables
- Banana cultivation
- N.G.O. office(SEFDA)
- Businessman



Photograph 1.4: Major Five Potentials

1.3.d 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 1.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Weak Transportation System	• Broken roads , No repairing of road for many days • Political discrimination • Bureaucratic complexity • Many areas roads not existed in **Ward no 3**	• People of Paurashava deprived from Facilities of Paurashava Citizen of Paurashava deprived from Facilities of Paurashava for Undeveloped communication	• Existing necessary land for road Repairing at **Ward no 1 & 2** • Hardworking people and labor
2.1.Ward no. 1-Gas Ward no. 2-Drain Ward no. 3-Sanitation	• No gas connection in entire upazila and Paurashava • Bureaucratic complexity • Political discrimination • Shortage of budget • People has little knowledge of sanitation • Negligence of local top level about developed drain system	• Increase fuel cost • Environment became polluted • It influenced the environment • People is in high risk for undeveloped sanitation • It is difficult for transportation at road in rainy season for water logging and for undeveloped drain system	• Kindness of Municipality Mayor Mr. Abdul Kuddus Mia and Union Council
3.Wardno 1-Water supply Ward no2.1-Road light Ward no 3-Drain	• Shortage of budget • No fund for development budget • No adjustment with top level • In spite of contact with top level Paurashava cannot get facilities	• After sunset area became dark for no road light • Many area is in security risk • People are suffering day by day for scarcity of supply water	• Full assurance of Union Council top level
4.Ward no 1-Road light Ward no 2.1 and 3-Gas	• Bureaucratic complexity • Political Discrimination • Shortage of Finance • No gas connection in entire Upazila • There is no adjustment with district because of large Upazila	• Increase of fuel cost • Creating bad influence on Environment • Trees are demolished • After sunset area became dark for no road light and criminal activity are then increasing • People are in security risk	• Enough land space exists in Paurshava for connection of Road light • Many people has interest for gas connection

5.Wardno 1-EducationWard no2.1-Sanitation no 3-Road light	• Problem of structure in educational institution • Shortage of classroom for students • No Primary school in Wad no 1 • No High school for boys • Shortage of budget • Bureaucratic complexity • Political discrimination	• Decreasing literacy rate • Young people are inn danger road • Decreasing rate of consciousness • Increasing health risk • After sunset area became dark	• Exists one girls high school in Ward no 1 • Many students are interested for education

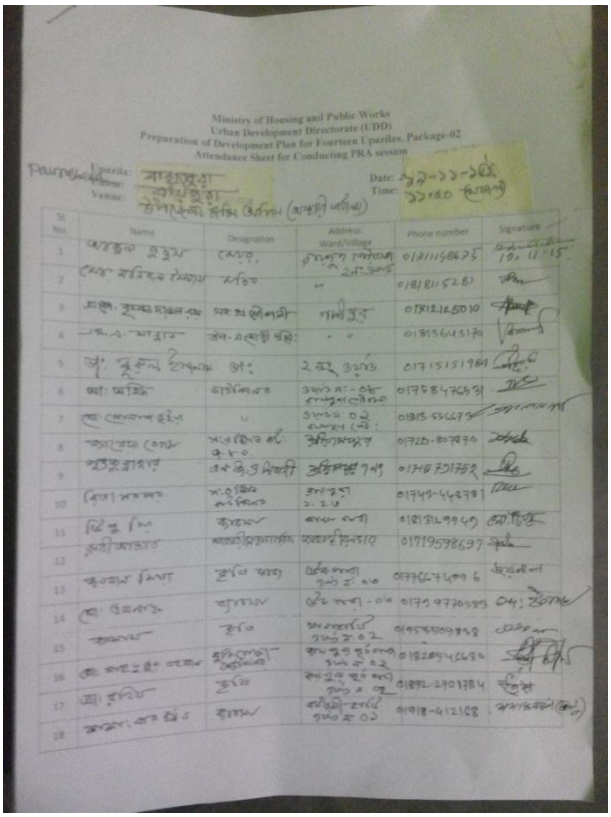
1.4 Perceived Development Priorities of Raipura Paurashava (Ward No 1, 2, 3) under Narsingdi District.

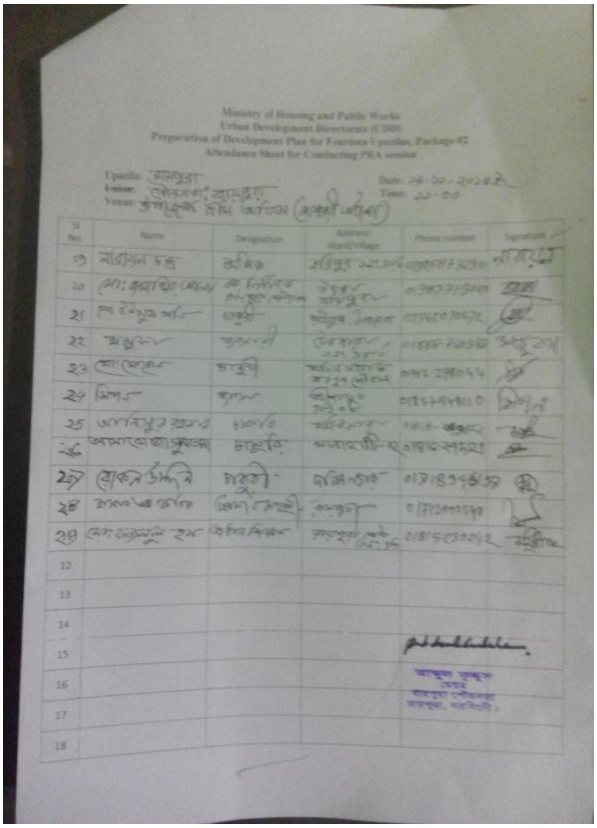
The recommended development priorities of Raipura Paurashava (Ward No 1, 2, 3) are as follows:

Table 1.2: Development Priorities of Raipura Paurashava (Ward No 1, 2, 3)

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of established U.P. complex • Demand of modern sanitation system • Demand of developed drain • Demand of development of Entertainment • Demand of Employment • Demand of Road light • Demand of gas connection • Demand of water	• Demand of developed drain • Demand of gas connection • Demand of development of health services • Demand of water supply • Demand of development of transportation system • Demand of established U.P. complex • Demand of development of Entertainment • Demand of Employment • **Miscellaneous**(Demand of Beautiful life, Demand of good management of society , Demand of good politics, Demand of security for people , Demand of Women power and leadership)	• Demand of development of health services • Demand of development of Entertainment • Demand of developed drain • Demand of Employment • Demand of established U.P. complex • **Miscellaneous**(Demand of Beautiful life, Demand of good management of society , Demand of good politics, Demand of security for people , Demand of Women power and leadership)

supply • Demand of Corruption free land office • Demand of drug free Society • Demand of Stop childhood marriage • **Miscellaneous**(Demand of Beautiful life, Demand of good management of society , Demand of good politics, Demand of security for people , Demand of Women power and leadership)		





Photograph 1.5: Attendance Sheet of Participants

2. Raipura Paurashava (Ward No 4, 5, 6)

2.1 Overview

The Raipura Paurashava (Ward No 4, 5, 6) is under the jurisdiction of Raipura Upazila of Narsingdi district. The boundary of the Paurashava is as follows

Ward no 4

North: On the north side of the study area, jaynagar canal & Chanderkandi union are situated.

South: On the south side of the study area, River Meghna and Sreenagar U.P are located

East: On the east side of the study area, Ward no 5 is located

West: On the west side of the study area, Ward no 3 and Ward no 1 are situated.

Ward no 5

North: On the north side of the study area, part of Chanderkandi & Raipura U.P.) situated

South: On the south side of the study area, River Meghna and Sreenagar U.P are located

East: On the east side of the study area, Raipura U.P.is located

West: On the west side of the study area, Part of Ward no 4 is situated.

Ward no 6

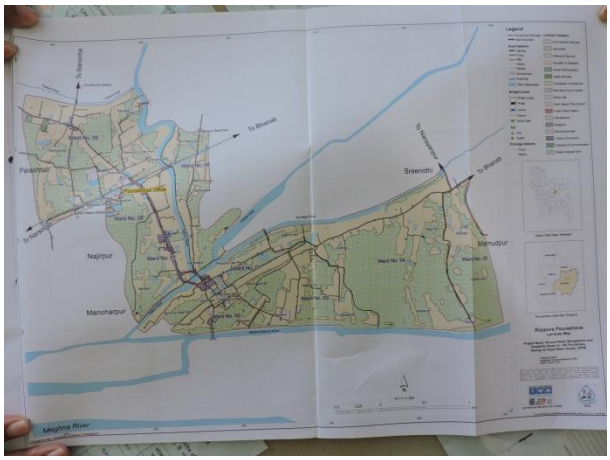
North: On the north side of the study area, Chanderkandi Union is situated

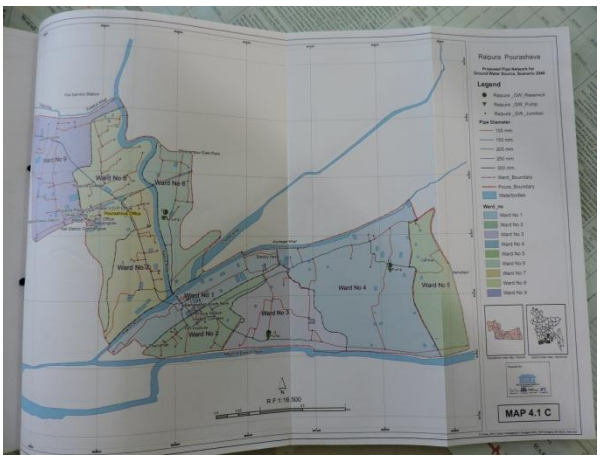
South: On the south side of the study area, River Kakon and Ward no1 are located

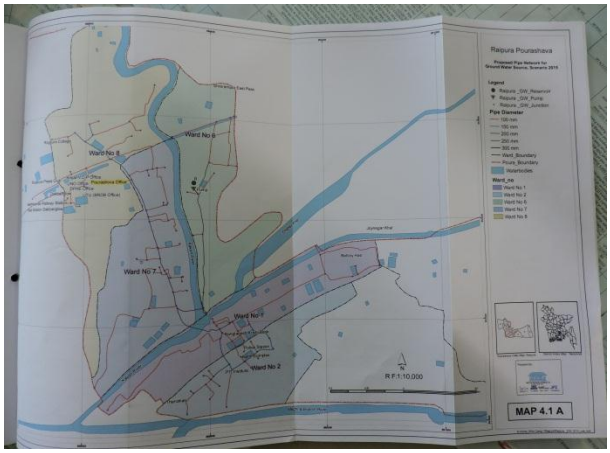
East: On the east side of the study area, part of Chanderkandi U.P is located

West: On the west side of the study area, Ward no 7 and 8 are situated.

Map 2.1: Raipura Paurashava (Ward No 4, 5, 6)





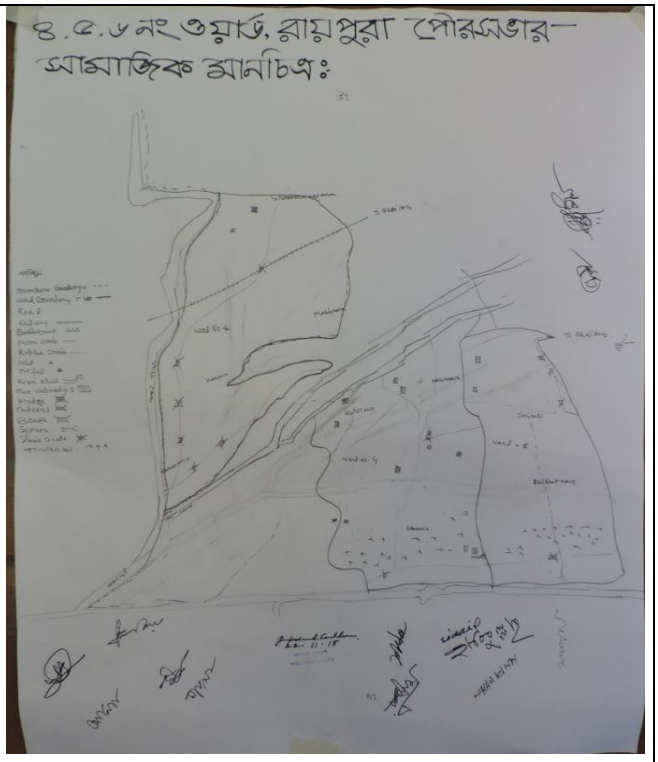


2.2. Spatial Aspects

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 or three persons for preparing the social map of Raipura Paurashava (Ward No 4, 5, 6) 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/madrasa, 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 2.1: Preparing Social Map



Photograph 2.2: Social Map of Raipura Paurashava (Ward No 4, 5, 6)

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, impact and potentials. The following problems have been identified during PRA which are as follows:

Ward no 4

- Weak Transportation system(road repair , broken road ,earthen road 4no ward)
- Educational construction problem(No boundary wall exist , Shortage of teachers, shortage of classroom(Ward no 4 &6)
- No gas connection(Ward no 4,5&6)
- Problem of drain(Ward no 4,5&6)
- No water supply
- No road light
- Problem of conservancy management
- Lack of sanitation
- No industrialization
- No office for Ward councilor
- No Paurashava complex
- No public toilet

Ward no 5

- Weak Transportation system(5no ward- broken bridge from Naihati to Baikhantipur , Raipur-Maheshpur UP.road repair , broken road ,earthen road)
- No gas connection(Ward no 4,5&6)
- Problem of drain (Ward no 4,5 Hashimpur –Maulovibazar & Ward no. 6)
- Problem of canal excavation (Ward no 5&6)
- Lack of emergency health services(Ward no 5 hospital without doctor)
- No college, no high school
- Problem of stealing cow
- Problem of unemployment
- Problem of river erosion (Branch of river Meghna)
- Various structural problem including Baikhunthapur private primary school
- No water supply
- No road light
- Problem of conservancy management
- Lack of sanitation
- No industrialization
- No commercial bank
- No office for Ward councilor
- No Paurashava complex
- No public toilet

Ward no 6

- Weak Transportation system(road repair , broken road ,earthen road ,6 no ward)
- Educational construction problem(No boundary wall exist , Shortage of teachers, shortage of classroom(Ward no 4 &6)
- No gas connection(Ward no 4,5&6)
- Problem of drain (Ward no 4,5&6)
- Problem of canal excavation (Ward no 5&6)
- Lack of emergency health services(No community clinic in Ward no 6)
- No college, no high school
- Problem of unemployment
- No water supply
- No road light
- Problem of conservancy management
- Pontoon problem at river
- Poverty
- Lack of sanitation
- Lack of pure drinking water
- Need foot over bridge on rail line
- No industrialization
- No commercial bank
- Siltation problem at Kakon river
- No office for Ward councilor

- No Paurashava complex
- Problem of Access Road to cremation yard
- No public toilet
- Problem of drug addiction
- No repairing of Mandir (Hindu temple)

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;

Ward no 4

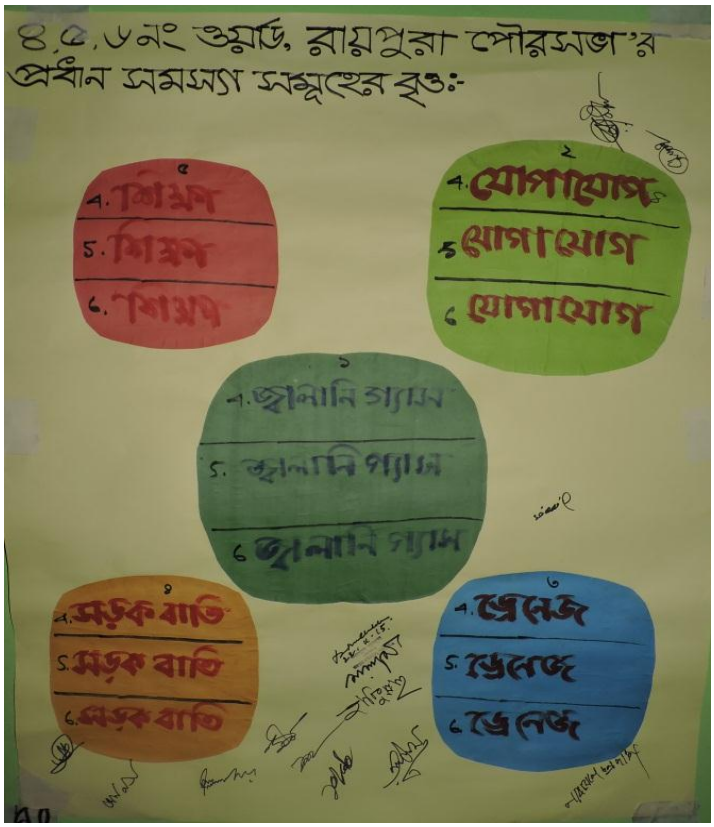
1. No Gas
2. lack of Transport
3. Lack of Drain
4. lack of road light
5. problem of educational system

Ward no 5

1. No Gas
2. lack of Transport
3. Lack of Drain
4. lack of road light
5. problem of educational system

Ward no 6

1. No Gas
2. lack of Transport
3. Lack of Drain
4. lack of road light
5. problem of educational system



Photograph 2.3: Venn diagram of problems

2.3.c 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 4

- Existing gas sub station
- River exist
- Small & Cottage industry
- Foreign remittance
- Hardworking people
- Canal & Beel
- Agricultural land (Rice ,jute, mustard, Vegetables)
- Rail line
- Proposed EPZ. area
- Branch of Meghna river
- Fishermen

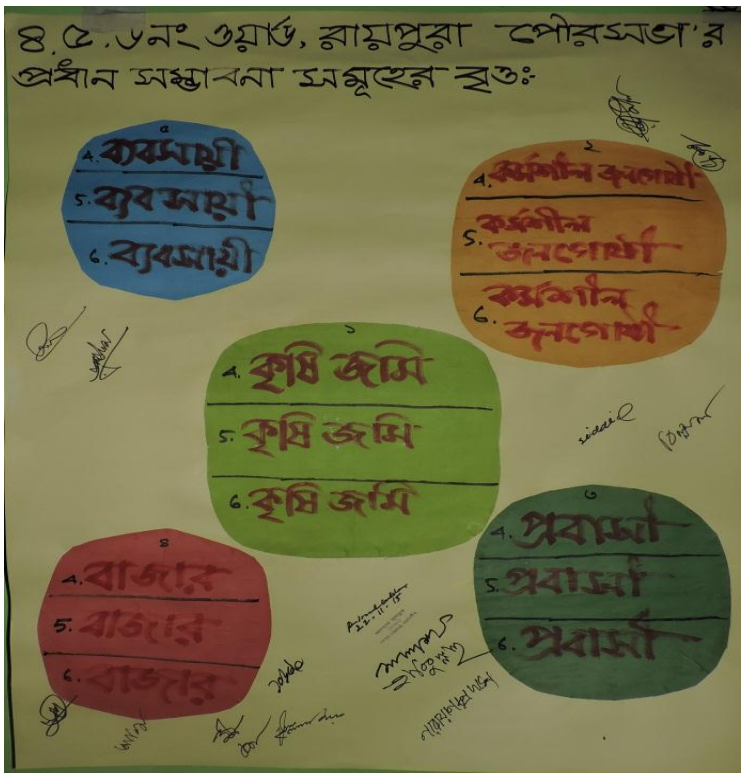
Ward no 5

- Existing gas sub station
- River exist
- Small & Cottage industry
- Foreign remittance

- Hardworking people
- Canal & Beel
- Agricultural land (Rice ,jute, mustard, Vegetables)
- Rail line
- Proposed E.P.Z. area
- Branch of Meghna river
- Businessmen
- Branch of Grammen bank
- Branch of N.G.O.s
- Fishermen

Ward no 6

- Existing gas sub station
- River exist
- Foreign remittance
- Hardworking people
- Canal & Beel
- Agricultural land (Rice ,jute, mustard, Vegetables)
- Rail line
- Proposed EPZ area
- Branch of Meghna river
- One primary school and Dhakhil Madrasa and one Kinder Garden school
- Fishermen



Photograph 2.4: Major Five Potentials

2.3.d 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 2.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Problem of Gas/Fuel (Ward no-4 5 &6)	• No gas connection in entire upazila and Paurashava • Bureaucratic complexity • Political discrimination	• Increase fuel cost • Environment became polluted • Forest Desolate • No industrialization • Frightened from environmental disaster	• Gas substation is in the mid of Paurashava • Gas pipe line is going through the Upazila
2.Weak Transportation System(Ward no-4 5 &6)	• Broken roads , • Broken bridges and culvert in many areas • No repairing of road for many days • Bureaucratic complexity • Shortage of budget	• People are suffering for getting education and health treatment for undeveloped communication • Farmers are facing heavy losses because transport of agricultural product is costly and time spending	• Existing necessary road for r Repairing • Existing necessary soil for Repairing • Hardworking people exist for construction of new road
3.Lack of drain(Ward no-4 5 &6)	• Shortage of budget • Bureaucratic complexity • Political discrimination • Limitation of the proper top level • No fund for development budget • No adjustment with top level • In spite of contact with top level Pourashava	• Some areas communication disrupted for 5 to 7 days • In rainy season Roads go under water disrupted transportation	• Enough land exist for construction of main drain • Existing hard working people
4.No Road light(Ward no-4,5&6)	• Bureaucratic complexity • Budget shortage of Paurashava	• After sunset area became dark • After sunset area became security risk for transport	• Enough kindness of mayor • Proper help and Assistance from top level of Paurashava

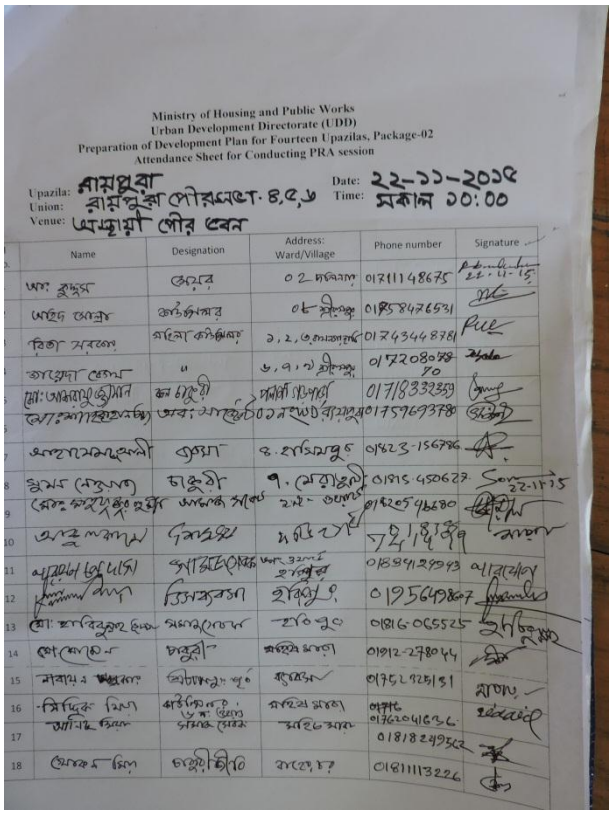
5.Education(Ward no_4,5&6)	• No high school • No college • Shortage of teachers • Shortage of classroom • No vocational technical students • Numerous physical structural problem in educational institute • No educational institute in many areas	• Decreasing literacy rate • Young people are in danger road • Increasing social unrest in the society	• Numerous students exists • Many people are interested in education

2.4 Perceived Development Priorities of Raipura Paurashava (Ward No 4, 5, 6) under Narsingdi District.

The recommended development priorities of Raipura Paurashava (Ward No 4, 5, 6) are as follows

Table 2.2: Development Priorities of Raipura Paurashava (Ward No 3, 4, 5)

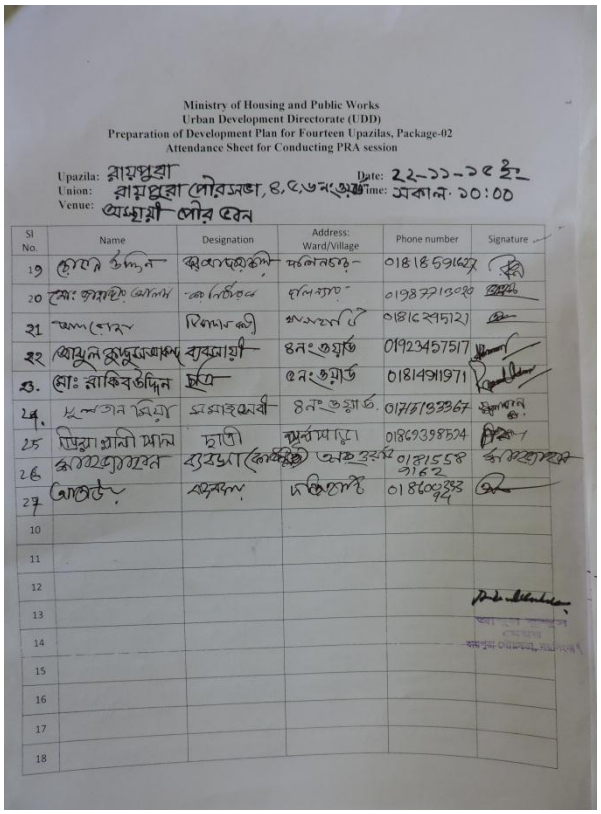
Short term	Midterm	Long term
• Demand of development of transportation system • Demand of established Paurashava complex • Demand of developed drain • Demand of development of Entertainment • Demand of Employment • Demand of Road light • Demand of fuel gas connection • Demand of pure drinking water supply • Demand of excavation of river and canal • Demand of E.P.Z. • Miscellaneous(Demand of hospital , Demand of elder allowance, Demand of govt. high school, Demand of drug free society, Demand of sanitation)	• Demand of development of transportation system • Demand of established Paurashava complex • Demand of developed drain • Demand of development of Entertainment • Demand of Employment • Demand of Road light • Demand of fuel gas connection • Demand of pure drinking water supply • Demand of excavation of river and canal • Demand of E.P.Z. • Miscellaneous(Demand of hospital , Demand of elder allowance, Demand of govt. high school, Demand of drug free society, Demand of sanitation)	• Demand of pure drinking water supply • Demand of development of Entertainment • Demand of developed drain • Demand of excavation of river and canal • Demand of Employment • Demand of E.P.Z. • Demand of development of transportation system • Miscellaneous(Demand of hospital , Demand of elder allowance, Demand of govt. high school, Demand of drug free society, Demand of sanitation)



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: রায়পুরা পৌরসভা ৪,৫,৬
Venue: আমুয়া পৌর ভবন
Date: ২২-১১-২০১৫
Time: সকাল ১০:০০

	Name	Designation	Address: Ward/Village	Phone number	Signature
	মো: হুমায়ুন	কেরানী	০২ নরসিংদী	01711148675	22.11.15
	মোছা: আক্তার	কর্মকর্তা	০৮ শ্রীনগর	01858476531	
	রিতা সরকার	মহিলা কাউন্সিলর	১,২,৩ নরসিংদী	01743448781	
	আফরোজা বেগম	"	৬,৭,৯ শ্রীনগর	01720807870	
	মো: আমিরুল ভূঁইয়া	জন চৌধুরী	পাবলী [illegible]	01718333359	
	মো: [illegible]	অব: সার্ভেয়ার [illegible] রায়পুরা	01759693788		
	[illegible]	ব্যবসা	৪. হাসিমবুড	01823-156786	
	সুমন (নয়ন)	চাকুরী	৭. মেরাইল	01915-450627	22-11-15
	মো: [illegible]	[illegible]	[illegible]	01820596680	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	01884125943	
	[illegible]	[illegible]	[illegible]	01956498607	
	মো: হাবিবুর রহমান	[illegible]	[illegible]	01816065525	
	[illegible]	চাকুরী	[illegible]	01912-278044	
	নারায়ণ [illegible]	[illegible]	[illegible]	01752925181	
	সিদ্দিক মিয়া	[illegible]	[illegible]	01762041636	
	[illegible]	[illegible]	[illegible]	01818249322	
	[illegible]	চাকুরীজীবি	[illegible]	01811113226	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: রায়পুরা পৌরসভা, ৪,৫,৬নং ওয়ার্ড
Venue: আমুয়া পৌর ভবন
Date: ২২-১১-১৫ ইং
Time: সকাল ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	[illegible]	[illegible]	[illegible]	01818591627	
20	মো: [illegible]	[illegible]	[illegible]	01987713028	
21	[illegible]	[illegible]	[illegible]	01812[illegible]	
২২	আবুল কাদের	ব্যবসায়ী	৪নং ওয়ার্ড	01923457517	
২৩.	মো: লাকিবউদ্দিন	[illegible]	৫নং ওয়ার্ড	01814911971	
২৪.	[illegible]	সমাজসেবী	৪নং ওয়ার্ড.	01718193367	
25	[illegible]	ছাত্রী	[illegible]	01869398604	
26	[illegible]	ব্যবসা	[illegible]	01811558[illegible]	
27	[illegible]	[illegible]	[illegible]	01860[illegible]	
10					
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18					

Photograph 2.5: Attendance Sheet of Participants

3. Raipura Paurashava (Ward No 7, 8, 9)

3.1 Overview

The Raipura Paurashava (Ward No 7, 8, 9) is under the jurisdiction of Raipura Upazila of Narsingdi district. The boundary of the Paurashava is as follows

Ward no 7

North: On the north side of the study area, Ward no 8 is situated

South: On the south side of the study area, River Kakon and Raipura bazar are located

East: On the east side of the study area, River Kakon and Ward no-6 are located

West: On the west side of the study area, Ward no 8 is situated.

Ward no 8

North: On the north side of the study area, Ward no 1 is situated

South: On the south side of the study area, Ward no 7 is located

East: On the east side of the study area, River Kakon and Ward no 3 & 7 are located

West: On the west side of the study area, ward no 9 are situated.

Ward no 9

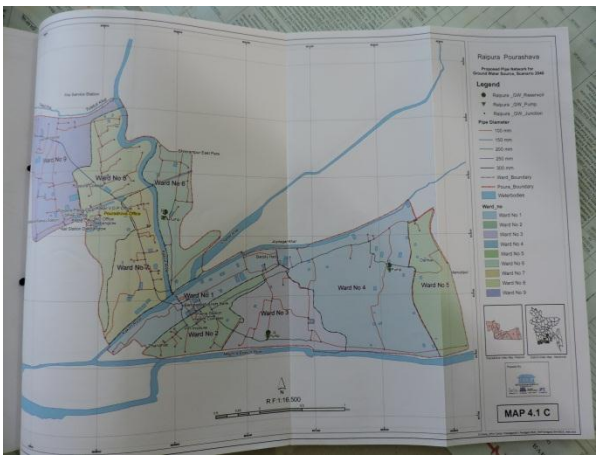
North: On the north side of the study area, part of Olipura U.P. and Zia khal are situated

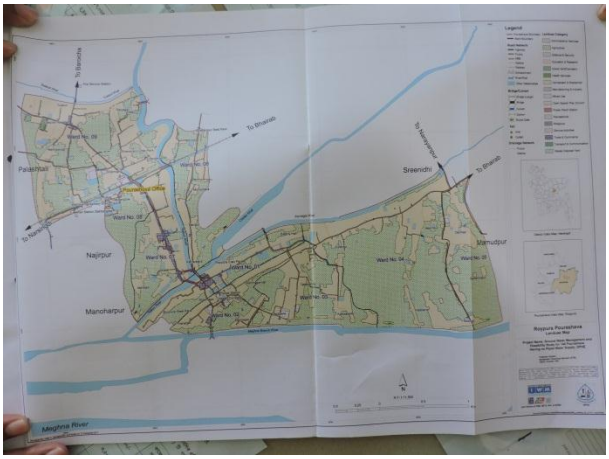
South: On the south side of the study area, Ward no 8 is located

East: On the east side of the study area, Ward no 8 is located

West: On the west side of the study area, Polashtali Union is situated.

Map 3.1: Raipura Paurashava (Ward No 7, 8, 9)





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 Raipura Paurashava (Ward No 7, 8, 9) 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/madrasa, 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: Preparing Social Map	**Photograph 3.2: Social Map of Raipura Paurashava (Ward No 7, 8, 9)**

2.3.3 Major Problems and Potentials

2.3.3.a 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:

Ward no 7

- Weak Transportation system(broken road)
- Gas connection (Fuel gas)

- No Road light
- Trouble of education system (No school,)
- No dustbin
- No water supply
- Lack of sanitation
- Problem of unemployment
- No office for Ward councilor
- Structural problem of Sreerampur Bazar
- Lack of nutrition of children
- River erosion of River Kakon
- Problem of environmental pollution
- Unplanned housing
- Emergency health services(No hospital/No community clinic)
- Bad condition of ladies corner
- Problem of child and mother care
- Problem of mosquito and fly
- Lack of pure drinking water

Ward no 8

- Problem of communication
- Problem of drain
- Waterlogging
- Unemployment
- No gas connection
- No road light
- Lack of emergency health services
- Small and cottage industries Extension problem
- Education problem
- Lack of sanitation
- No industrialization
- No employment
- Various problems of citizens coming from foreign countries
- Problem of drug addiction
- No water supply
- Lack of pure drinking water
- Problem of child marriage

Ward no 9

- Weak transportation system (Unplanned road)
- No gas connection
- Problem of drain
- Lack of sanitation
- No road light
- Unrestrained Law and order

- Unemployment
- No industrialization
- Various problems of citizens coming from foreign countries
- Housing problem
- Poverty
- No commercial bank

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;

Ward no 7

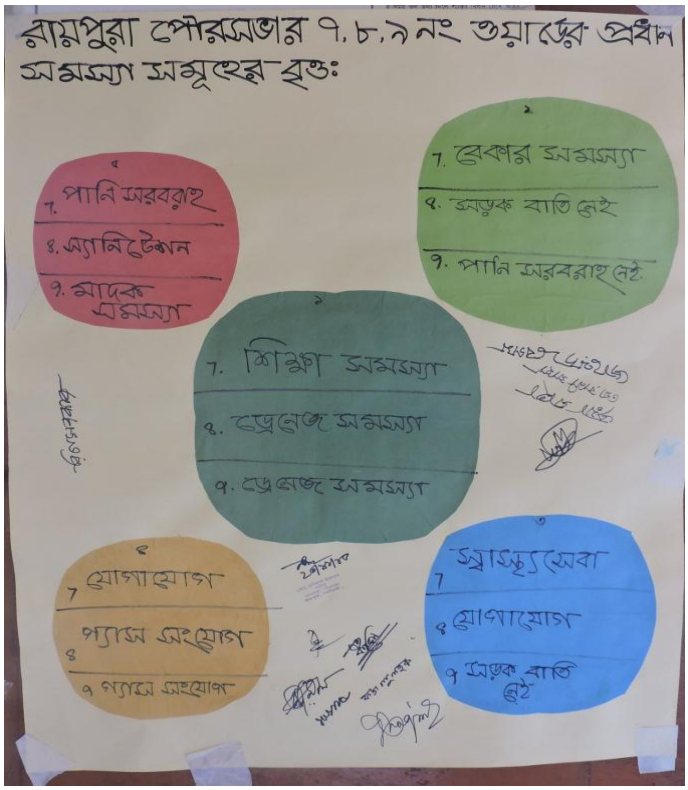
1. problem of educational system
2. Lack of employment
3. Lack of Health Service
4. No Communication
5. lack of water supply

Ward no 8

1. No Drain
2. No road light
3. No Communication
4. No Gas
5. lack of Sanitation

Ward no 9

1. No Drain
2. lack of water supply
3. No road light
4. No Gas
5. Drug Addiction



Photograph 3.3: Venn diagram of problems

3.3.c 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 7

- Foreign remittance
- Poultry
- Srirampur bazar (Leased)
- N.G.O.s
- Furniture and wood business
- Still factory
- Saw mill(6)
- Commercial bank (Sonali and Janata)
- Private hospital (Alsaba)
- Hardworking people
- River Kakon

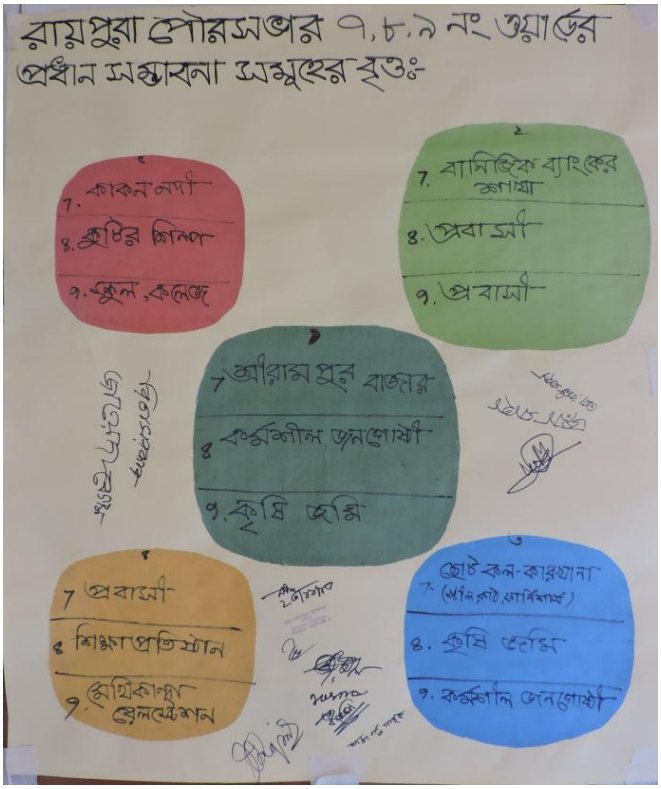
Ward no 8

- River Kakon
- Education institute (Primary school and high school)
- Madras for women
- REB office

- Poultry
- Hard working people
- Foreign remittance
- Upazila office
- Land office
- Private hospital
- Agricultural cultivable land
- Cottage industries

Ward no 9

- Methikanda Rail Station
- Government hospital
- Agricultural land(Rice ,Jute ,Vegetables and spices
- Post office
- School and college
- Foreign remittance
- Hard working people
- Poultry



Photograph 3.4: Major Five Potentials

3.3.d 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 3.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1. Ward no 7-Educations Ward no8-Drain Ward no 9-Drain	• No educational institute at Ward no 7, Only one private K.G. school exists • Budget shortage of Paurashava for drain development supervision • Bureaucratic complexity • Political discrimination	• Literacy rate of education decreasing • Many children are dropout due to not getting educational environment • Water logging is created due to light rain • It is difficult for outdoor walking	• A lot of pupil exist • Enough land for drain construction
2.Wardno7-Unemploment Ward no8-No road light Ward no 9-No water supply	• Bureaucratic complexity • Shortage of budget • Lack of adjustment with top level • Lack of assistance with top level • No industrialization • No gas connection • Undeveloped communication system	• Increase of poverty rate • Economical improvement cannot possible • Stealing and robing occurred often due to security reason • Lack of pure drinking water diseases are increasing	• Enough hard working people exist • Enough land for industrialization
3.Wardno 7-Emergency health services Ward no8-Communication Ward no 9-Road light	• No hospital • No good doctor • No ambulance • Broken Roads • Lack of repairing • Shortage of budget • Bureaucratic complexity • Political discrimination	• People of the area deprived from emergency health services • Children ,Pregnant women and maternal mother deprived from correct health consultancy	• Enough land donor for construction of hospital for the development of health services
4.Ward no 7-Communication Ward no 8- gas and Ward no9-Gas	• No repairing of broken roads • Main road passing through out in the mid of Paurashava owned by ROADS & HIGHWAYS , as a result no repairing due to adjustment by paurashava top level	• Getting Services of education and health people are suffering • Time and money spend due to Emergency patient carrying and agricultural product transporting • Increase fuel cost • Increase environmental	• Gas line passing through in the mid of this upazila • A lot of local labor exist

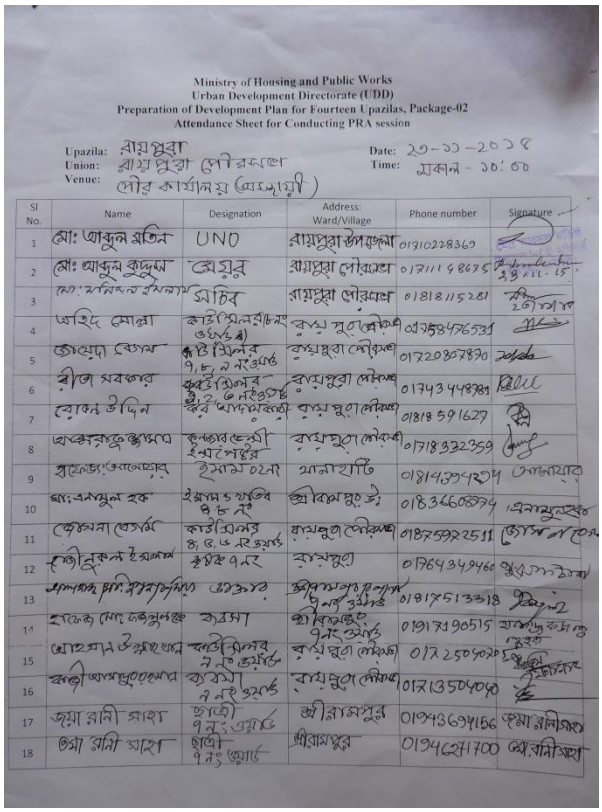
	with them	pollution • Forest and trees are destroying	
5.Wardno 7-Water supply Ward no 8-Sanitation no 9-Drug addiction	• Bureaucratic complexity • Supply line cannot constructed due to Shortage of budget • Decreasing literacy rate is the main reason for drug addiction problem	• Increasing uses of polluted water as a result increasing diseases • Environment is polluted due to use unsecured open latrine by people • Young people are destroying • Increasing social unrest	• Industrious and workable Paurashava • Kindness of everyone

3.4 Perceived Development Priorities of Raipura Paurashava (Ward No 7, 8, 9) under Narsingdi District.

The recommended development priorities of Raipura Paurashava (Ward No 7, 8, 9) are as follows:

Table 3.2: Development Priorities of Raipura Paurashava (Ward No 7, 8, 9)

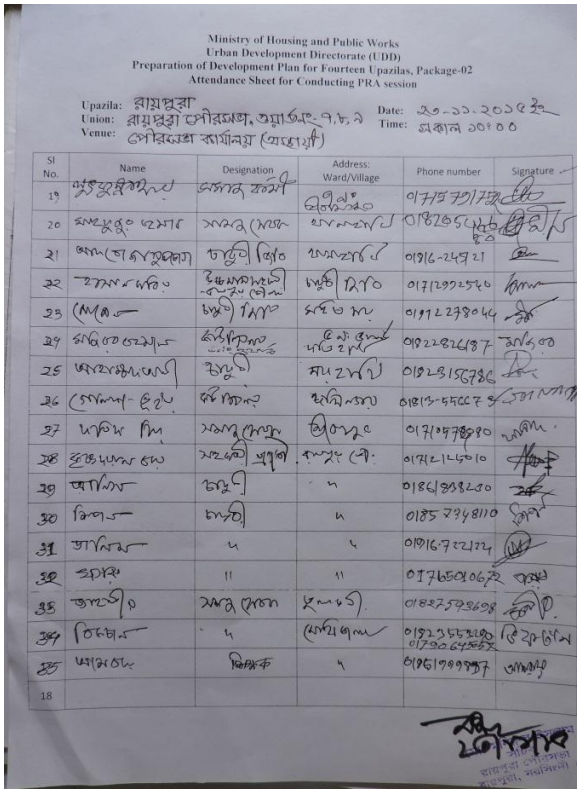
Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of established Model Paurashava • Demand of developed drain • Demand of development of Entertainment • Demand of Road light • Demand of gas connection • Demand of water supply • Demand of intercity train stoppage • Demand of sewerage line • Demand of E.P.Z. • Demand of Employment	• Demand of Road light • Demand of intercity train stoppage • Demand of development of health services • Demand of established Model Paurashava • Demand of developed drain • Demand of development of transportation system • Demand of developed education system • Demand of EPZ • Demand of development of Entertainment • Demand of water supply • Demand of developed drain • Demand of E.P.Z.	• Demand of intercity train stoppage • Demand of developed drain • Demand of development of transportation system • Demand of development of Entertainment • Demand of development of health services • Demand of E.P.Z. • Demand of developed education system • Demand of established Model Paurasova



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: রায়পুরা পৌরসভা
Venue: পৌর কার্যালয় (সেমিনার)
Date: ২৩-১১-২০১৫
Time: সকাল - ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মোঃ আব্দুল মতিন	UNO	রায়পুরা উপজেলা	01310228369	
2	মোঃ আব্দুস কুদ্দুস	মেয়র	রায়পুরা পৌরসভা	01711148675	
3	মোঃ মনিরুল ইসলাম	সচিব	রায়পুরা পৌরসভা	01818115281	
4	জহিদ মোল্লা	কাউন্সিলর (ওয়ার্ড ৪)	রায়পুরা পৌরসভা	01758476531	
5	জাহেদা বেগম	কাউন্সিলর ৭, ৮, ৯ নং ওয়ার্ড	রায়পুরা পৌরসভা	01720857890	
6	রীতা সরকার	কাউন্সিলর ১, ২, ৩ নং ওয়ার্ড	রায়পুরা পৌরসভা	01743448981	
7	বোরহান উদ্দিন	স্থানীয় গণ্যমান্য ব্যক্তি	রায়পুরা পৌরসভা	01818591629	
8	[illegible]	[illegible]	রায়পুরা পৌরসভা	01718332359	
9	হাফেজ ওবায়েদুর	ইমাম ঠেকা	থানাহাটি	01819394204	
10	মোঃ এনামুল হক	ইমাম ও খতিব ৭ ৮ নং	শ্রীরামপুর	01836608974	
11	[illegible]	কাউন্সিলর ৪, ৫, ৬ নং ওয়ার্ড	রায়পুরা পৌরসভা	01875922511	
12	চৌধুরী ইসলাম	[illegible] ৭ নং	রায়পুরা	01764342460	
13	[illegible]	[illegible]	শ্রীরামপুর [illegible]	01817513318	
14	হাফেজ মোঃ [illegible]	[illegible]	শ্রীরামপুর ৭ নং ওয়ার্ড	01917190515	
15	[illegible]	কাউন্সিলর ৭ নং ওয়ার্ড	রায়পুরা পৌরসভা	01725050[illegible]	
16	[illegible]	কাউন্সিলর ৭ নং ওয়ার্ড	রায়পুরা পৌরসভা	01713504050	
17	জয়া রানী সাহা	ছাত্রী ৭ নং ওয়ার্ড	শ্রীরামপুর	01943634156	জয়া রানী সাহা
18	জয়া রানী সাহা	ছাত্রী ৭ নং ওয়ার্ড	শ্রীরামপুর	01942[illegible]1700	জয়া রানী সাহা



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: রায়পুরা পৌরসভা, ওয়ার্ড নং- ৭, ৮, ৯
Venue: পৌরসভা কার্যালয় (সেমিনার)
Date: ২৩-১১-২০১৫ ইং
Time: সকাল ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	[illegible]	[illegible]	[illegible]	01715[illegible]	
20	[illegible]	[illegible]	[illegible]	01870[illegible]	
21	[illegible]	চাকুরী প্রার্থী	[illegible]	01916-245921	
22	[illegible]	[illegible]	চাকুরী প্রার্থী	01712922546	
23	[illegible]	চাকুরী প্রার্থী	[illegible]	01912278044	
24	[illegible]	[illegible]	[illegible]	01822826187	
25	[illegible]	চাকুরী	[illegible]	01823156786	
26	[illegible]	[illegible]	[illegible]	01813-5[illegible]	
27	[illegible]	[illegible]	[illegible]	01710478880	
28	[illegible]	[illegible]	[illegible]	01721[illegible]5010	
29	[illegible]	চাকুরী	"	01861[illegible]8230	
30	[illegible]	চাকুরী	"	0185 7348110	
31	[illegible]	"	"	01916-7[illegible]724	
32	[illegible]	"	"	01765[illegible]0672	
33	[illegible]	[illegible]	[illegible]	01822[illegible]8698	
34	[illegible]	"	[illegible]	01923[illegible] 01790[illegible]	
35	[illegible]	শিক্ষক	"	01861[illegible]997	
18					

Photograph 3.5: Attendance Sheet of Participants

Annexure-III: Individual PRA Report at Union Level of Raipura

1. Adiabad Union

1.1 Overview

Adiabad Union is under the administrative jurisdiction of Raipura Upazilla in Narshingdi District has an area of 03.30 km^2. The boundary of the study area is stated below:

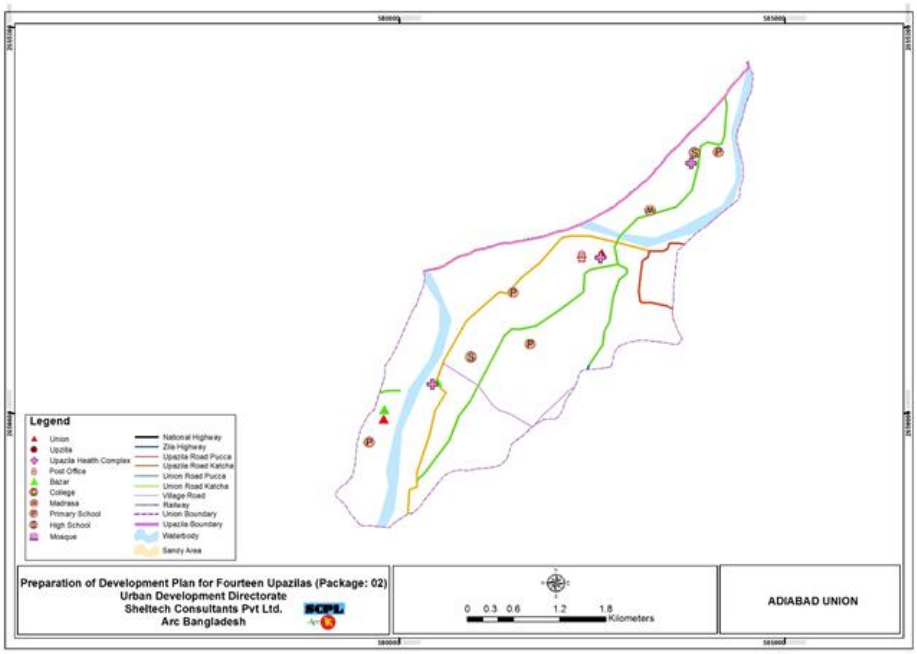
North: On the north side of the study area, Shibpur Upazilla is situated

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

South: On the south side of the study area, Amirgonj, Dawkerchar and Mirzanagar Union are located

East: On the east side of the study area, Kendua Upazilla is located

Map 1.1: Adiabad Union

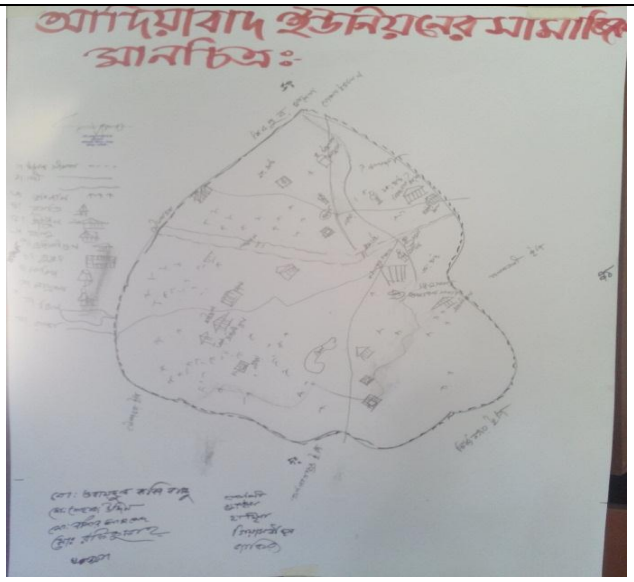


1.2 Spatial Aspects

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.

The Facilitator has selected two or three persons for preparing the social map of Adiabad Union 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/madrasa, 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 1.1:Preparing Social Map



Photograph 1.2: Social Map of Adiabad 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:

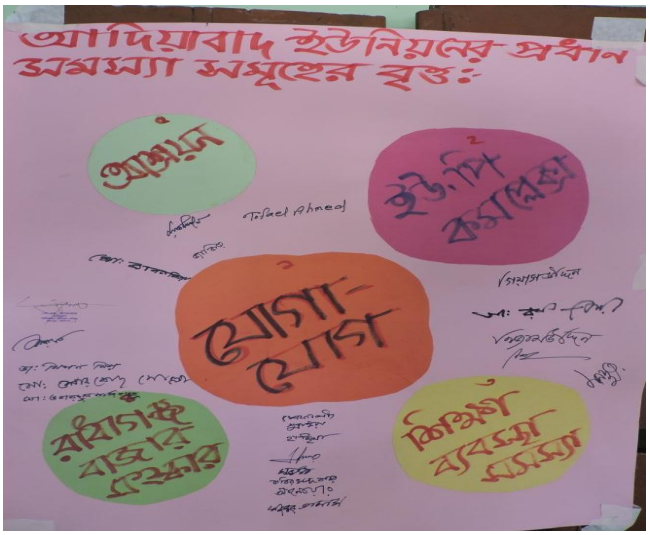
- Poor Transportation (lack of Embankment, Radhagonj bazar to Ward no 6,Masjid gate to Kolo Bari, Ward no 7 Adiabad to Bapari para, college to Badiapara Hijol tree ward no 3 and 5,no bridge(Bamboo bridge, broken ward no 2,Radagonj Bazar Road problem, ward no 2(Nayaarchar Madrasa road to Kutipara earthen road.
- Lack of drainage (at Ward no 3 & 5)
- Lack of hospital (No M.B.B.S. doctor ,no diagnostic center, no 50 bed hospital)

- Lack of pure drinking water
- Scarcity of tube well
- No disaster resistant shelter center (Problem of disaster resistant shelter center in Ward no 6)
- Problem of sanitation
- Lack of modern education system (Lack of Educational institution structure; Such as primary school, classroom, teacher and educational materials and there is no school boundary wall)
- Problem of broken graveyard at Ward no 1,3,4,6 and7
- Lack of public toilet by the government management
- Problem in Radhaganj market (Unplanned parking, Problem of conservancy management)
- Problem of agriculture, irrigation and drainage
- Lack of public roof in Ferry Ghat.
- Lack of Electricity Supply (Load shedding, not 100%electricity connection to the area)
- No gas connection
- No Industrialization
- Problem of dowry
- No Veterinary development center, no reconstruction at Radhaganj bazar

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. Poor Transportation system
2. Lack of U.P. Complex
3. Problem of education system
4. Radhaganj bazar reconstruction
5. lack of shelter



Photograph 1.3: 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;

- Agriculture (Vegetables, rice and banana)
- Foreign remittance
- Bazar (Radhaganj)
- River (Arial Kha)
- Fisheries
- Poultry
- Cattle rearing
- Beel (Large size beel)
- Canal (Purbo para)
- Educated people
- Hard working people
- Bamboo and wood
- Small and cottage industry

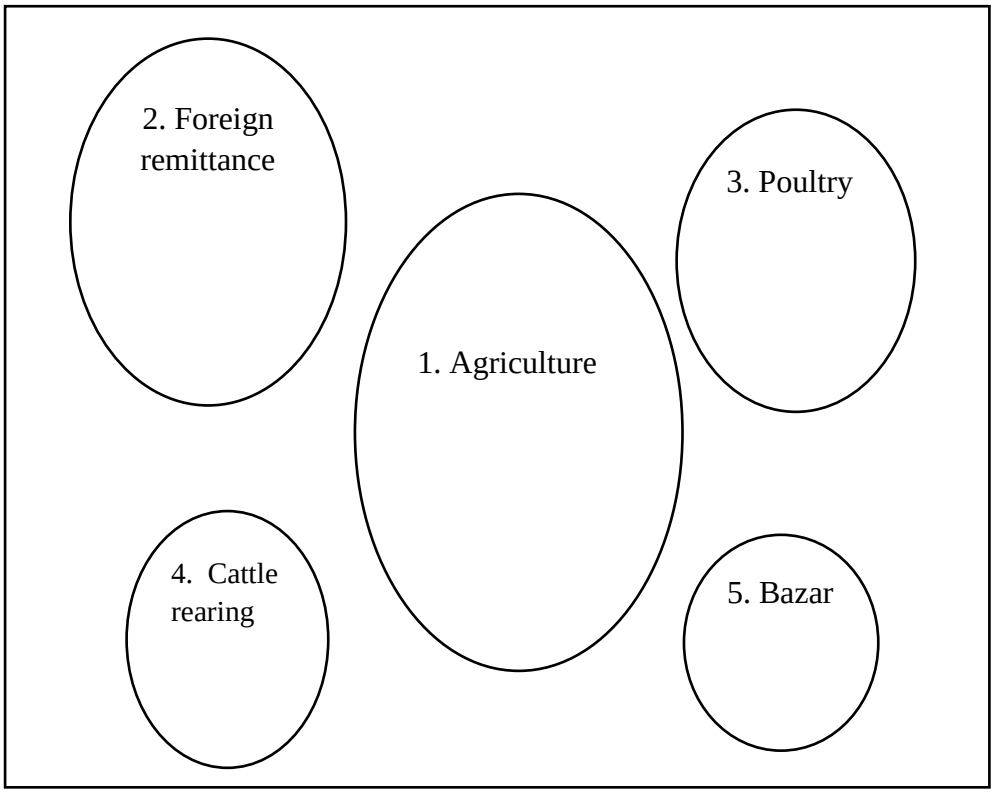


Figure 1.1: Major Five Potentials

1.3.d 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	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Lack of co-operation between authorities • Problem of Union quota for the supply of money	• Financial loss • Problem of transportation • Loss of time	• Existing necessary land for road construction • Local Bamboo, wood and soil available • Hardworking people
2.U.P. complex	• Lack of land donor • Enough land are not available for establishing of U.P. complex	• All development work is badly affected • Development conversation are not possible without the sitting arrangement for the people • Old buildings are at risk	• Existing old building • Present chairman is interested to donate land
3.Problem of education system	• Lack of teachers • Lack of classrooms in the educational institutions • Lack of guardian's consciousness • People are not sending their children to the educational institutions at proper time • Poverty	• Decreased educational rate • Students are deviated to the wrong way • Increased early marriage • Increased social calamites	• Existing school and colleges existing(2 high schools, one college and five primary school exists • Local interested people to education

4. Constraints to development of Radhaganj bazar	• Absence of embankment, bridge and drainage system. • Management of conservation is very weak • Shortage of government budget • Unplanned parking • Absence of proper planning	• People are not moving frequently and difficulties of bargaining • Trouble of frequent moving in rainy season	• 16 lakh taka collected from leasing • Enough manpower for construction
5.No disaster resistant disaster resistant shelter center	• Management from government is absent • Shortage of budget	• Day by day poor people are becoming more poor and homeless	• Existing soil and sand • Hard working people • Existing bamboo and wood

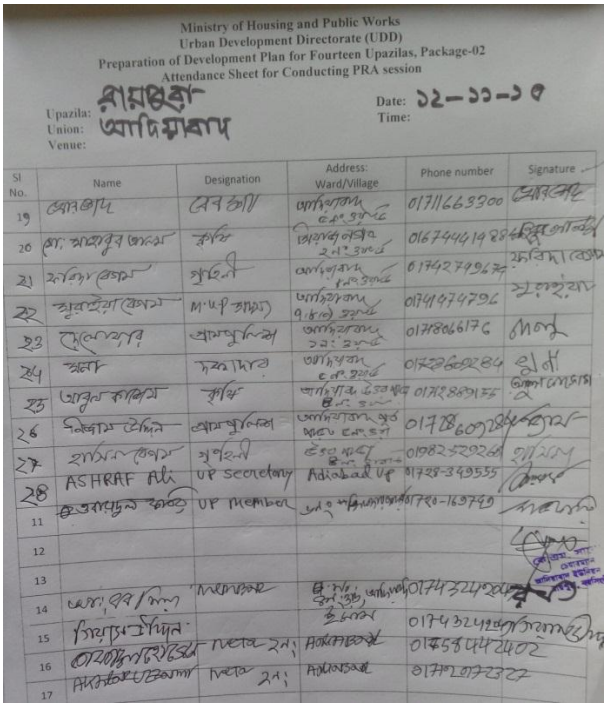
1.4 Perceived Development Priorities for Adiabad Union under Narshingdi District.

The recommended development priorities of Adiabad Union are as follows;

Table 1.2: Development Priorities for Adiabad Union

Short term	Midterm	Long term
• Demand of safe water and electricity • Establishment of digital post office • Development of bazar • Demand of Employment • Demand of disaster resistant shelter center • Establishment of U.P. complex • Improvement of education system • Development of transportation system • Development of agriculture and veterinary • Demand of embankment • Demand of modern sanitation system • Demand of developed agricultural irrigation and drainage • Demand of development of Entertainment • Demand of improved health services	• Demand of development of bazar • Demand of developed education system • Demand of development of health services • Demand of development of Entertainment • Demand of embankment • Demand of digital post office • Demand of development of agriculture and veterinary • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system	• Demand of development of health services • Establishment of digital post office • Demand of development of Entertainment • Demand of Employment • Demand of development of agriculture and veterinary • Establishment of disaster resistant shelter center

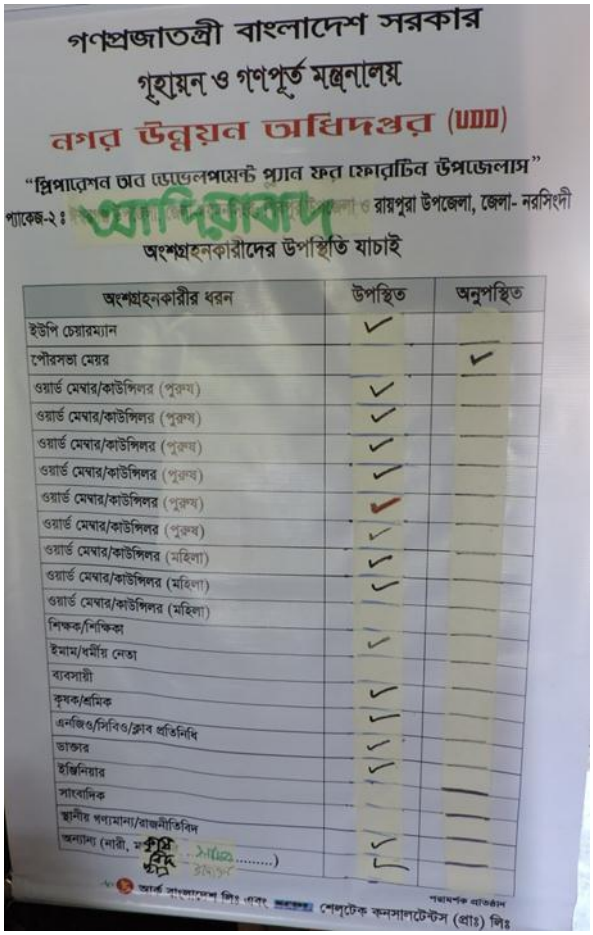
1.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আদিয়াবাদ
Venue:
Date: ১২-১১-১৭
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	[illegible]	[illegible]	[illegible]	01711663300	[illegible]
20	[illegible]	[illegible]	[illegible]	01674441482	[illegible]
21	[illegible]	[illegible]	[illegible]	01742729637	[illegible]
22	[illegible]	M.U.P. [illegible]	[illegible]	01741474796	[illegible]
23	[illegible]	[illegible]	[illegible]	01788066176	[illegible]
24	[illegible]	[illegible]	[illegible]	01728602284	[illegible]
25	[illegible]	[illegible]	[illegible]	01712884376	[illegible]
26	[illegible]	[illegible]	[illegible]	01788607284	[illegible]
27	[illegible]	[illegible]	[illegible]	01982572268	[illegible]
28	ASHRAF Ali	UP Secretary	Adiabad UP	01728-343535	[illegible]
11	[illegible]	UP Member	[illegible]	01728-163740	[illegible]
12					
13					
14	[illegible]	Member	[illegible]	01743214[illegible]	[illegible]
15	[illegible]	Member	[illegible]	01743214[illegible]	[illegible]
16	[illegible]	Ward 2নং	Member	01[illegible]	[illegible]
17	[illegible]	Ward 2নং	Member	01[illegible]	[illegible]



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিন উপজেলাস"
প্যাকেজ-২ঃ [illegible] রায়পুরা উপজেলা, জেলা- নরসিংদী
আদিয়াবাদ
অংশগ্রহনকারীদের উপস্থিতি যাচাই

অংশগ্রহনকারীর ধরন	উপস্থিত	অনুপস্থিত
ইউপি চেয়ারম্যান	✓	
পৌরসভা মেয়র		✓
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)		
শিক্ষক/শিক্ষিকা	✓	
ইমাম/ধর্মীয় নেতা		
ব্যবসায়ী		
কৃষক/শ্রমিক	✓	
এনজিও/সিবিও/ক্লাব প্রতিনিধি	✓	
ডাক্তার	✓	
ইঞ্জিনিয়ার	✓	
সাংবাদিক		
স্থানীয় গণ্যমান্য/রাজনীতিবিদ		
অন্যান্য (নারী, [illegible].....)	✓	

আর্ক সাপোর্ট বাংলাদেশ লিঃ এবং শেলটেক কনসালটেন্টস (প্রাঃ) লিঃ
পরামর্শক প্রতিষ্ঠান

2.0 Alipura Union

2.1 Overview (Study Area)

Alipura Union under the administrative jurisdiction of Raipura Upazilla in Narshingdi District has an area of 03.30 km^2. The boundary of the study area is stated below:

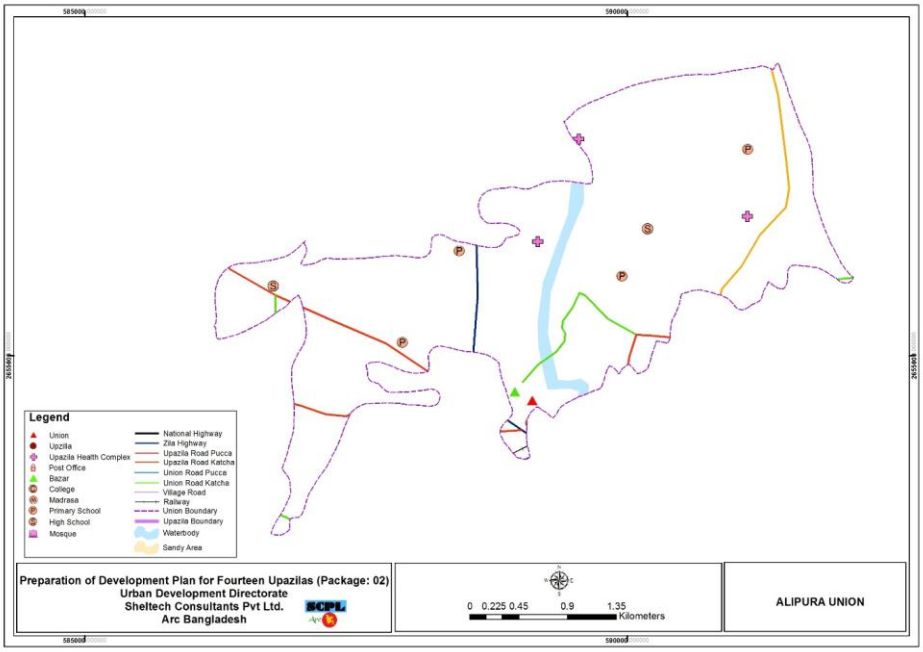
North: On the north side of the study area, Radhanagar Union is situated

West: On the west side of the study area, Raipura Paurashava is located

South: On the south side of the study area, Raipura Paurashava and Canderkandi Union are located

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

Map 2.1: Alipura Union



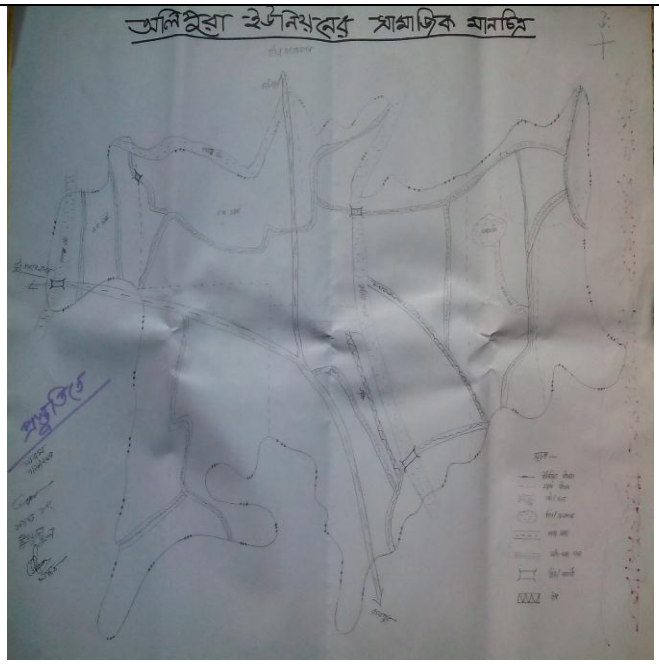
2.2

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 or three persons for preparing the social map of Alipura Union 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/madrasa, 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 2.1: Preparing Social Map



Photograph 2.2: Social Map of Alipura Union

2.3 Major Problems and Potentials

2.3.a Problems Identification

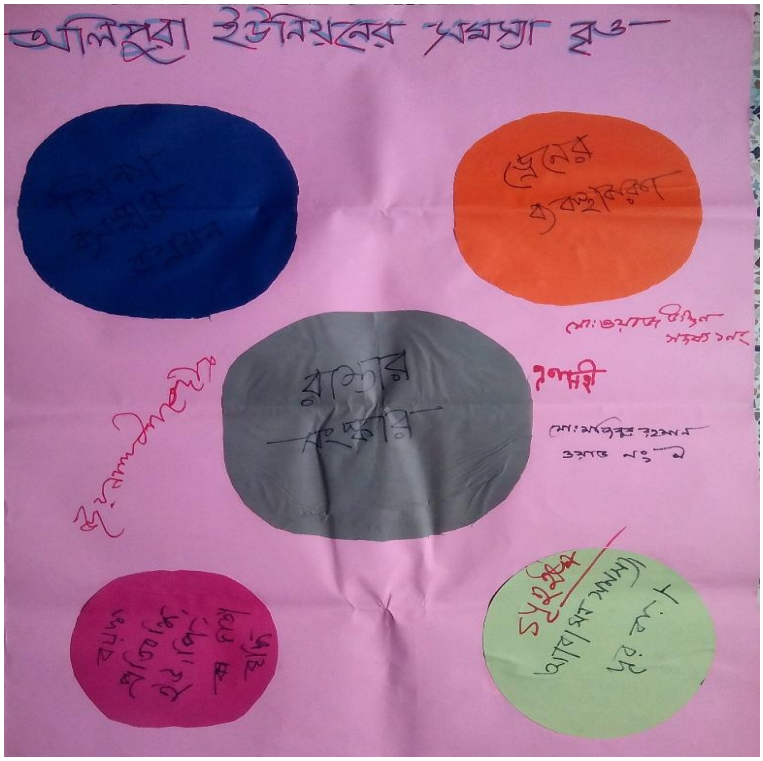
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

- Lack of road re-construction in the village
- Absence of healthy sanitation
- Problem of canal digging and Kakon River silted up
- Unsafe drinking water (Tube well water with arsenic)
- Housing without planning
- Lack of electricity
- Lack of religious institutions
- Problem of infrastructure developments at the health complex
- Lack of high schools
- Infrastructure problem of educational institution
- Lack of Vocational education institution
- Water logging
- Absence of adult education center
- Lack of drainage system

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. Problem of road repairing
2. Underdeveloped Education
3. Lack of Drainage system
4. Less amount of allowances for the disable, old and U.P. members'
5. Lack of Disaster resistant shelter center



Photograph 2.3: 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;

- Gas line
- Big ponds
- Agriculture (Fisheries)
- Roads
- Educational institution (Religion)
- A house and a farm
- Human resource

- Cattle rearing
- Poultry

Figure 2.1: Major Five Potential

2.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 2.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget	• Problem of communication • Poultry industry, fisheries, Green vegetables from farming are getting hampered	• None
2. Problem of education system	• Lack of institutions • Lack of teachers	• Increasing early marriage • Increasing child labor	• None
3. Lack of drainage system	• Lack of govt. initiative • Poor management	• Crops are being rotten because of stagnant water	• Increasing agriculture development • Existing ditches
4.Less amount of allowance (widow, old people, U.P members)	• Lack of govt. management	• People are facing financial problem • Increasing poverty	• Potential Increasing of economic development
5.Problem of housing	• Lack of fund • Lank of land • Landless people	• Unplanned housing • Disintegrated pattern of houses	• Will Develop village beauty • Will remove social problem

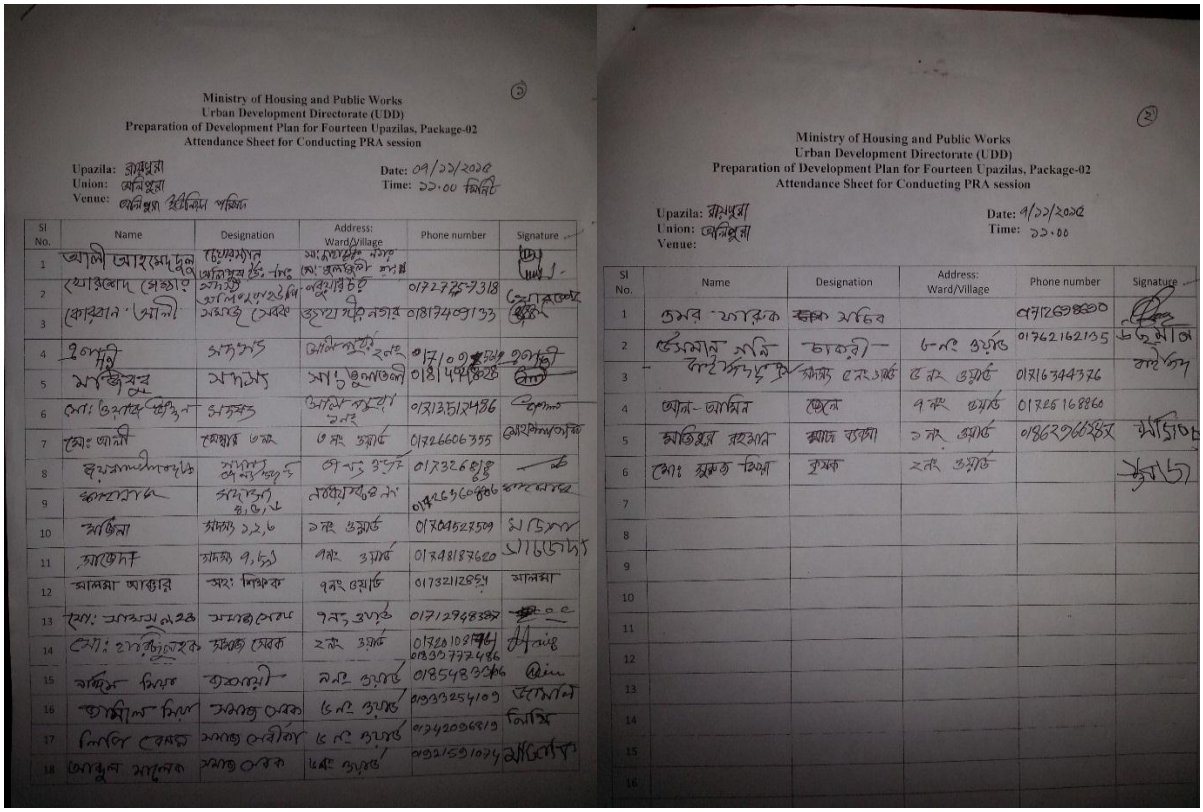
2.4 Perceived Development Priorities for Alipura Union under Narshingdi District.

The recommended development priorities of Alipura Union are as follows;

Table 2.2: Identification of Development Plan for Alipura Union

Short term	Midterm	Long term
• Demand of safe water and electricity • Need to establish digital post office • Development of local bazar • Demand of Employment • Establishment of disaster resistant shelter center • Establishment of U.P. complex • Need to develop education system • Improvement of transportation system • Development of agriculture and veterinary • Demand of embankment • Demand of modern sanitation system • development of agricultural irrigation and drainage • Demand of improved Entertainment • Improvement of health services	• Development of local bazar • Need to develop education system • Improvement of health services • Demand of improved Entertainment • Demand of embankment • Need to establish digital post office • Development of agriculture and veterinary • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system	• Improvement of health services • Need to establish digital post office • Demand of improved Entertainment • Demand of Employment • Development of agriculture and veterinary • Establishment of disaster resistant shelter center

2.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আনন্দপুরা
Venue: আনন্দপুরা ইউনিয়ন পরিষদ
Date: ০৭/১১/২০১৫
Time: ১১.০০ মিনিট

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	আলী আহমেদুল	চেয়ারম্যান	আনন্দপুরা ইউ: পরিষদ		
2	খোরশেদ সরকার	সদস্য	আনন্দপুরা ইউ: পরিষদ	01727[illegible]7318	
3	কোরবান আলী	সমাজ সেবক	ভাড়া বাড়ি নগর	01817409133	
4	[illegible]	সদস্য	আনন্দপুরা ২নং	017[illegible]	
5	মজিবর	সদস্য	সাং: ভুলাতলী	018[illegible]	
6	মো: ওয়াহেদ [illegible]	সদস্য	আনন্দপুরা ১নং	01313[illegible]2486	
7	মো: আলী	চেয়ারম্যান	৩ নং ওয়ার্ড	01726606355	
8	[illegible]	সদস্য	৩ নং ওয়ার্ড	01732[illegible]	
9	[illegible]	সদস্য	[illegible]	017[illegible]	
10	আজিনা	সদস্য ১,২,৬	১ নং ওয়ার্ড	01704527509	
11	সাজেদা	সদস্য ৭,৬,১১	৭নং ওয়ার্ড	01748187620	
12	আলমা আক্তার	সহ: শিক্ষক	৭নং ওয়ার্ড	01732112894	আলমা
13	মো: [illegible]	সমাজ সেবক	৭নং ওয়ার্ড	01712948[illegible]	
14	মো: হারিকুলুজ্জামান	সমাজ সেবক	২নং ওয়ার্ড	01720101[illegible] / 01893772486	
15	বাবুল মিয়া	ব্যবসায়ী	৯নং ওয়ার্ড	01854830486	
16	কামাল মিয়া	সমাজ সেবক	৬নং ওয়ার্ড	01933254109	
17	লিলি বেগম	সমাজ সেবিকা	৬নং ওয়ার্ড	01742096919	লিলি
18	আবুল কালাম	সমাজ সেবক	৬নং ওয়ার্ড	01921591074	

Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আনন্দপুরা
Venue:
Date: ৭/১১/২০১৫
Time: ১১.০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible] সচিব		01712[illegible]	
2	[illegible]	চাকরী	৮নং ওয়ার্ড	01762162135	
3	[illegible]	সদস্য ৫নং ওয়ার্ড	৫ নং ওয়ার্ড	01816344376	
4	আল-আমিন	ছেলে	৭ নং ওয়ার্ড	01726168860	
5	মতিউর রহমান	ব্যাংক ব্যবসা	১ নং ওয়ার্ড	01862[illegible]	
6	মো: সুব্রত মিয়া	কৃষক	২নং ওয়ার্ড		
7					
8					
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3.0 Amirganj Union

3.1 Overview (Study Area)

Boundary of the study area is stated below:

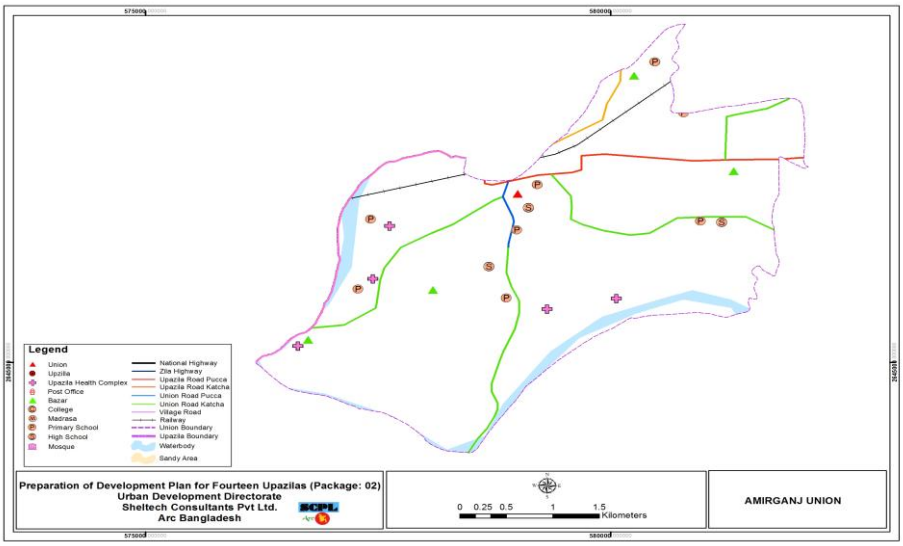
North: On the north side of the study area, Arial Kha River, Adiyabad, Doukar Char and Hazipur are situated

West: On the west side of the study area, Arial Kha River and Korimpur Union are situated

South: On the south side of the study area, Arial Kha River, Char Araliya are located

East: On the east side of the study area, Hairmara and Mirzanogor Union are located

Map 3.1: Amirganj Union



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 Amirganj Union 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/madrasa, 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: Preparing Social Map	**Photograph 3.2: Social Map of Amirganj Union**

3.3 Major Problems and Potentials

3.3.a 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:

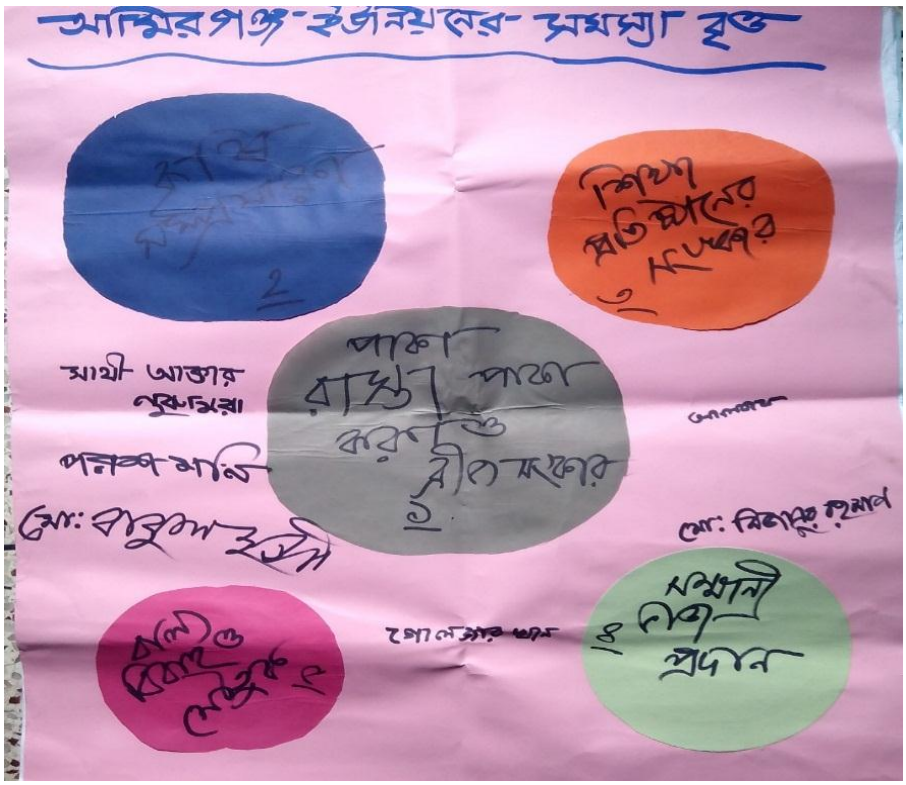
1. Roads and Calvert repairing.
2. Poverty.
3. Health Complex and hospital.
4. Lack of drainage system.
5. Lack of modern agricultural instrument.
6. Absent of skilled doctor in health complex.
7. Lack of health facilities.
8. Repairing of religious institutions.
9. Increasing of honorary of up members.
10. Increasing of maternity honoree.
11. Providing sewing machine for poor women.
12. Establishment of handicraft industries.
13. Increasing of honorary of older and disable people.
14. Acute dowry problem.
15. Lack of modern educational infrastructure.

16. Repairing of Mosques and Madrasa institutions.
17. Unemployment.
18. Acute problem of early marriage and polygamy.
19. Lack of proper education.
20. Lack of cultural facilities and infrastructure.
21. Land registration.

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. Transport Problem
2. Problem of agricultural service extension
3. Lack of educational institution repairing
4. Early marriage and dowry
5. Lack of honorarium



Photograph 3.3: Major five Problems

3.3.c 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;

- Agriculture (Vegetables, rice, jut, potato and nut)
- Foreign remittance
- Poultry
- Cattle rearing
- Beel
- Hard working people
- Meghna River
- Disaster resistant shelter center’s pond (govt.)

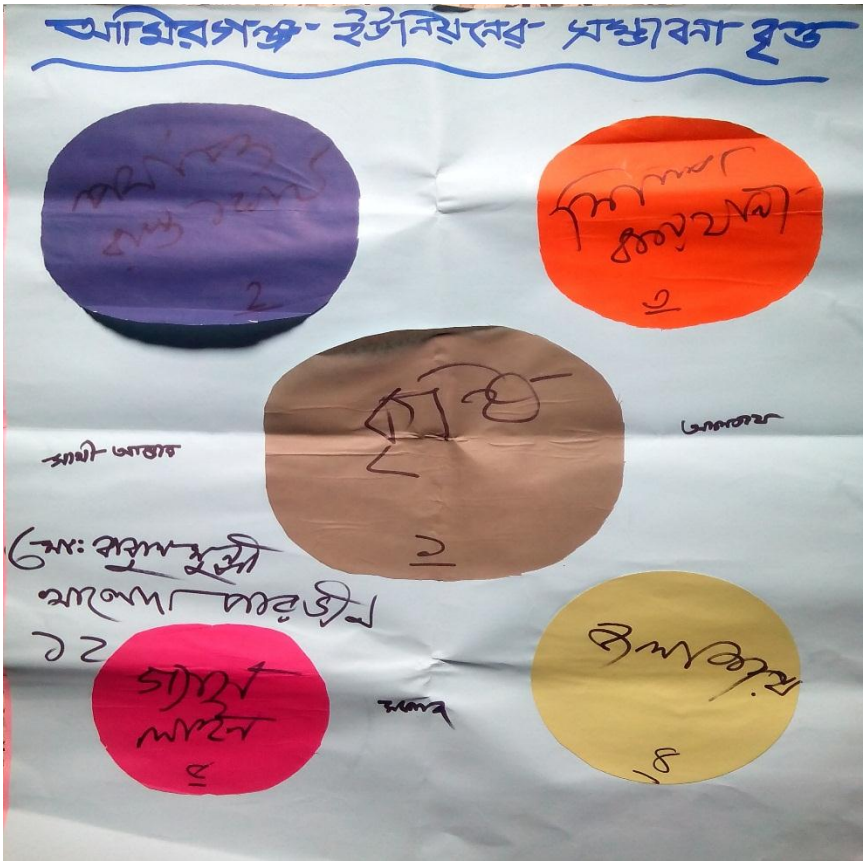


Figure 3.12: Major Five Potentials

3.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 3.12: Problems, Causes, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.No construction of Embankment	• Lack of budget and allotment • Indifference of local agent	• Road, house, agricultural land are dissolving in river • 2000 acre land of the ward no 2, 3, 9 are endanger	• Local conscious people and political leader
2.Health care problem	• There is no F.W.C or hospital only have a community clinic. • No good quality doctor, medicine, ambulance. • Underdeveloped transport system	• People deprive of from health service • Impossible to give proper treatment to emergency patient • Pregnancy and delivery service problem	• There is enough land for building hospital • Enough people for working
3.Trouble of sanitation system	• Lack of budge • Want of people's conscious • Indifference of local agent	• People are living in health danger • Diseases are increasing for using open sanitation	• Conscious and active people in Union parishad
4.Weak transport system	• Broken road, no repairing, most of the places is not bridge and culvert. • Green road, no improvement because of it is bank of the river Meghna • Lack of budget and others difficulties	• Students are facing problem for study • Decreasing rate of literacy • Cost of bearing goods and patients are increasing • Emergency patients aren't getting service timely	• Goods bearing is cheap because of it is the bank of the river Meghna • Lots of commercial people
5.Lack of safe drinking water	• Arsenic and iron mixed with water • Want of deep tube-well • Lack of budget for Union parishad	• People are drinking unsafe water • Affected people in various diseases • People are in health danger of the area	• Local U.P. chairman Mr. Mohammad Akkas Uddin Bhuiyan along with the local peoples have cooperative and Intense effort

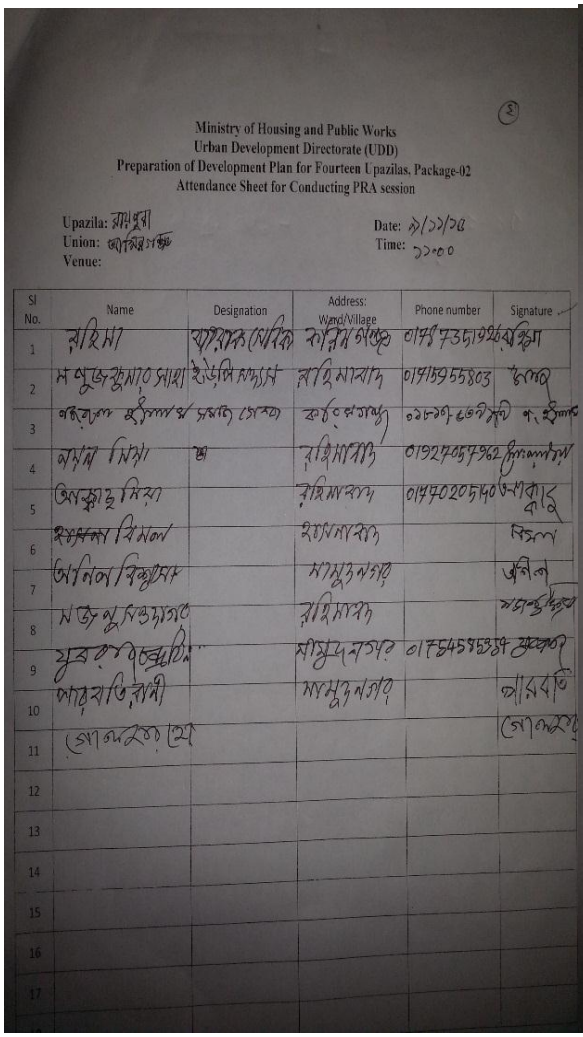
3.4 Perceived Development Priorities for Amirganj Union under Narshingdi District.

The recommended development Priorities for Amirganj Union are as follows;

Table 3.2: Development Priorities for Amirganj Union

Short term	Midterm	Long term
• Demand of Amirganj Pouroshova • Demand of college • Demand of school • Demand of computer • Demand of new primary school • Demand of gas • Demand of sewing machine (ward no 1, 2, 3) • Demand of preventing unemployment problem • Demand of development of health services • Demand of development of Entertainment • Demand of improvement of educational frameworks • Demand of developed transport system • Demand of U.P. complex • Demand of industrialization • Demand of good governance on woman • Demand of stopping torture on woman • Demand of stopping early marriage • Demand of job for unemployment woman	• Demand of increasing oldest allowance • Demand of honorable allowance • Demand of for mosque and madrasa • Demand of developed work for agriculture • Demand of fertilizer	• Demand of development of health services • Demand of development of Entertainment • Demand of improvement of educational frameworks • Demand of developed transport system • Demand of industrialization • Demand of business bank • Demand of good governance on woman

3.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আমিরগঞ্জ
Venue:
Date: ৯/১১/১৫
Time: ১১:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	রহিমা	ব্যবসায়ী (মহিলা)	আমিরগঞ্জ	01757३७१३२४	রহিমা
2	মোঃ মুজিবুল্লাহ সাহা	ইউপি সদস্য	রহিমাবাদ	01713955803	[illegible]
3	[illegible]	সমাজ সেবক	আমিরগঞ্জ	[illegible]	[illegible]
4	নাসিমা বিবি	গৃ	রহিমাবাদ	01927[illegible]	[illegible]
5	আব্দুল মিয়া		রহিমাবাদ	01770205640	[illegible]
6	[illegible] বিমল		হাসনাবাদ		বিমল
7	অনিল বিশ্বাস		মামুদনগর		অনিল
8	মোঃ নুরুল ইসলাম		রহিমাবাদ		[illegible]
9	মুরশিদ [illegible]		মামুদনগর	01754[illegible]	[illegible]
10	পারবতি রানী		মামুদনগর		পারবতি
11	গোলদরুল হোসেন				গোলদরুল
12					
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14					
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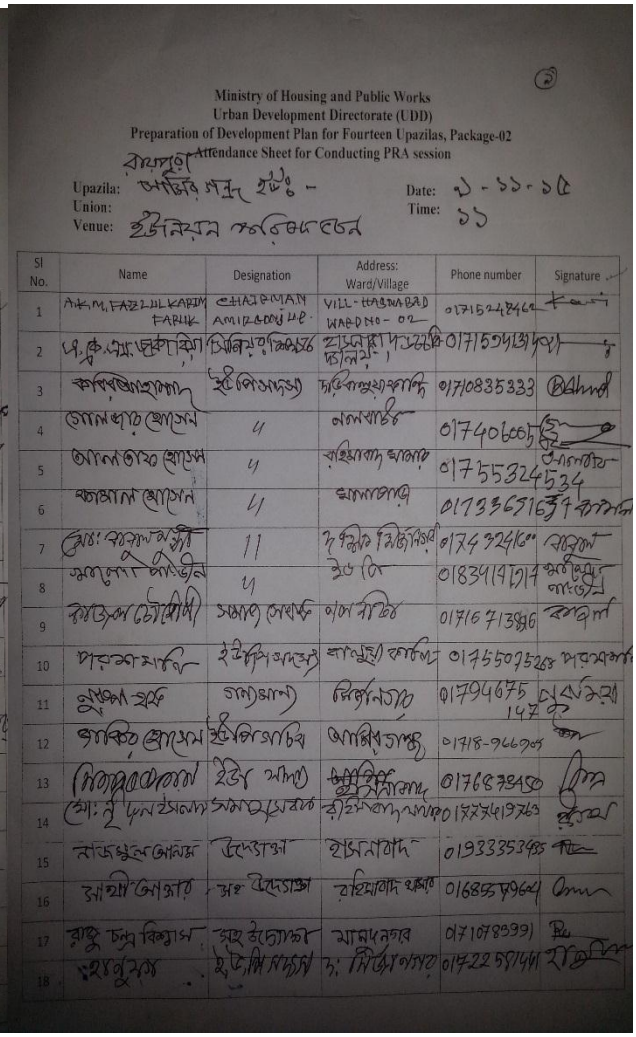
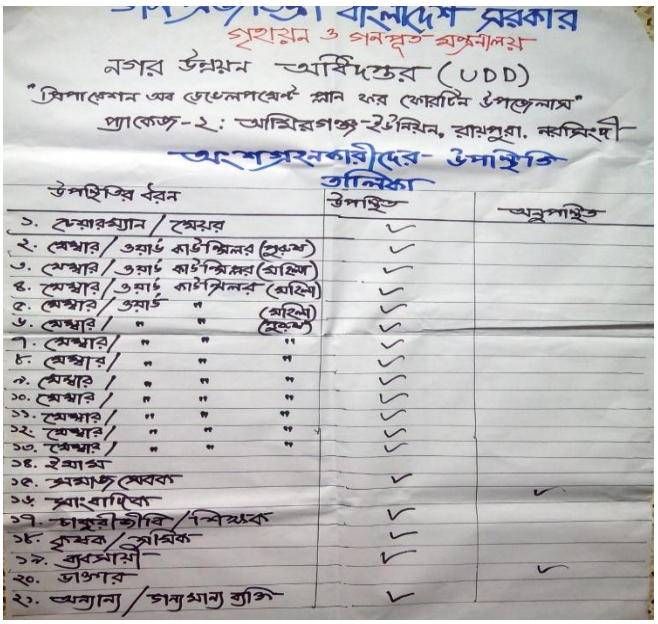
17					



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আমিরগঞ্জ ইউঃ -
Venue: ইউনিয়ন পরিষদ ভবন
Date: ৯-১১-১৫
Time: ১১

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	A.K.M. FAZLUL KARIM FARUK	CHAIRMAN AMIRGONJ UP	VILL-HASNABAD WARD NO-02	01715248462	[illegible]
2	[illegible]	[illegible]	[illegible]	01715[illegible]	[illegible]
3	[illegible]	ইউপি সদস্য	[illegible]	01710835333	[illegible]
4	[illegible] হোসেন	"	[illegible]	01740600[illegible]	[illegible]
5	আলতাফ হোসেন	"	রহিমাবাদ	01755324534	[illegible]
6	[illegible] হোসেন	"	[illegible]	01733651637	[illegible]
7	মোঃ [illegible]	"	[illegible]	01743[illegible]	[illegible]
8	[illegible]	"	ইউপি	01834[illegible]	[illegible]
9	[illegible] চৌধুরী	সমাজ সেবক	[illegible]	01716713846	[illegible]
10	পারভীন	ইউপি সদস্য	[illegible]	01755075268	পারভীন
11	[illegible]	গণ্যমান্য	[illegible]	01794675147	[illegible]
12	[illegible] হোসেন	ইউপি সচিব	আমিরগঞ্জ	01718-966705	[illegible]
13	[illegible]	ইউপি সদস্য	[illegible]	01768738450	[illegible]
14	মোঃ [illegible]	সমাজ সেবক	রহিমাবাদ	01[illegible]	[illegible]
15	[illegible]	উদ্যোক্তা	হাসনাবাদ	01933353455	[illegible]
16	[illegible]	সহ উদ্যোক্তা	রহিমাবাদ	01685[illegible]	[illegible]
17	রাজু চন্দ্র বিশ্বাস	সহ উদ্যোক্তা	মামুদনগর	01710789391	[illegible]
18	[illegible]	ইউপি সদস্য	[illegible]	01722[illegible]	[illegible]



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিন উপজেলাস"
প্যাকেজ-২: আমিরগঞ্জ-ইউনিয়ন, রায়পুরা, নরসিংদী
অংশগ্রহণকারীদের উপস্থিতি তালিকা

উপস্থিতির ধরন	উপস্থিত	অনুপস্থিত
১. চেয়ারম্যান / মেয়র	✓	
২. মেম্বার / ওয়ার্ড কাউন্সিলর (পুরুষ)	✓	
৩. মেম্বার / ওয়ার্ড কাউন্সিলর (মহিলা)	✓	
৪. মেম্বার / ওয়ার্ড " (মহিলা)	✓	
৫. মেম্বার / " " (পুরুষ)	✓	
৬. মেম্বার / " " "	✓	
৭. মেম্বার / " " "	✓	
৮. মেম্বার / " " "	✓	
৯. মেম্বার / " " "	✓	
১০. মেম্বার / " " "	✓	
১১. মেম্বার / " " "	✓	
১২. মেম্বার / " " "	✓	
১৩. মেম্বার / " " "	✓	
১৪. ইমাম		
১৫. সমাজ সেবক	✓	
১৬. স্বাস্থ্যকর্মী		✓
১৭. চাকুরীজীবি / শিক্ষক	✓	
১৮. কৃষক / শ্রমিক	✓	
১৯. ব্যবসায়ী	✓	
২০. ডাক্তার		✓
২১. অন্যান্য / গণ্যমান্য ব্যক্তি	✓	

4.0 Banshgari Union

4.1 Overview (Study Area)

Boundary of the study area is stated below:

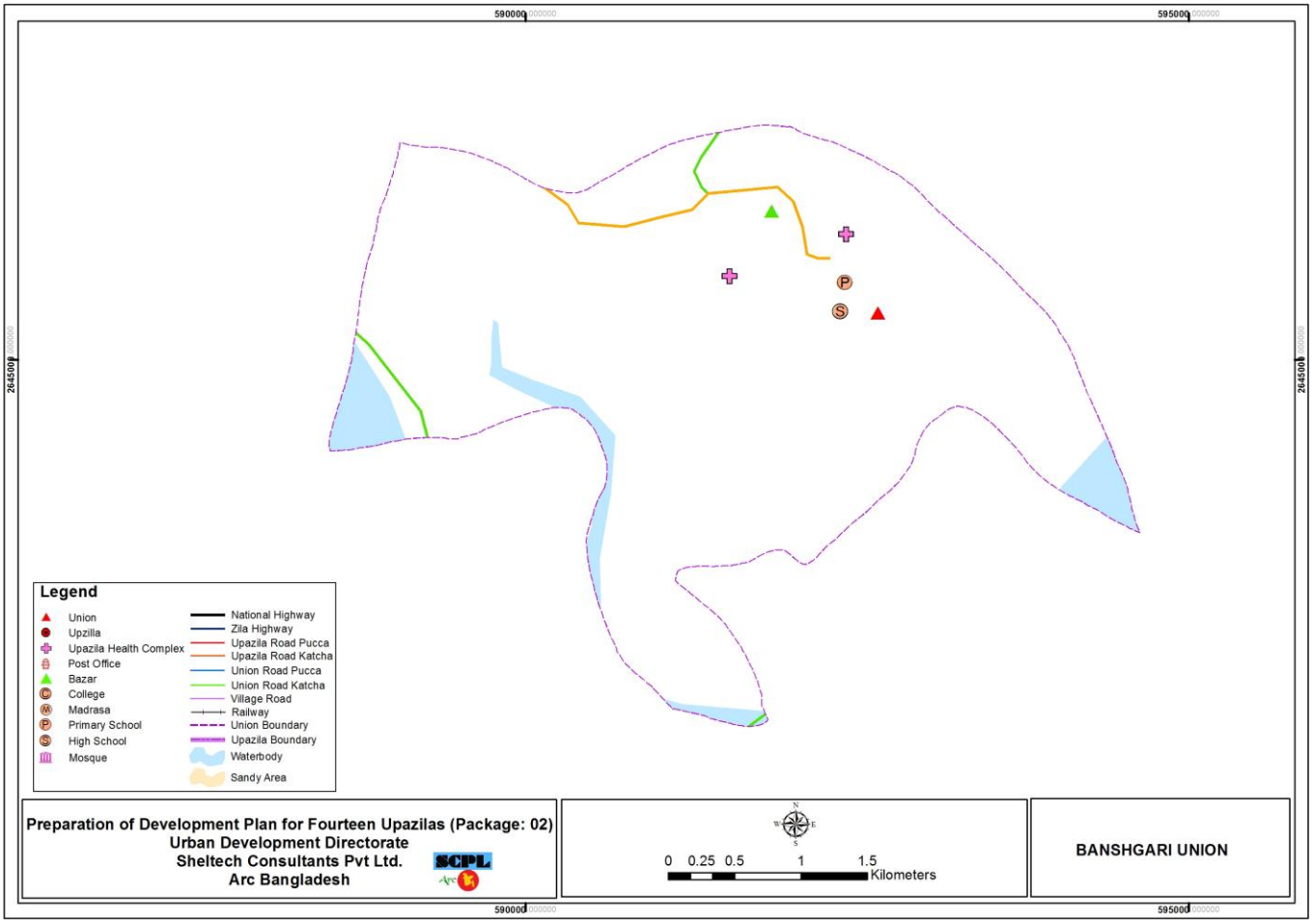
North: On the north side of the study area, Paratali Union is situated

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

South: On the south side of the study area, Mirzarchar Union is located

East: On the east side of the study area, Meghna River is located

Map 4.1: Banshgari 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 or three persons for preparing the social map of Banshgari Union 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/madrasa, 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.

Figure 4.1: Counselling in preparing Social Map

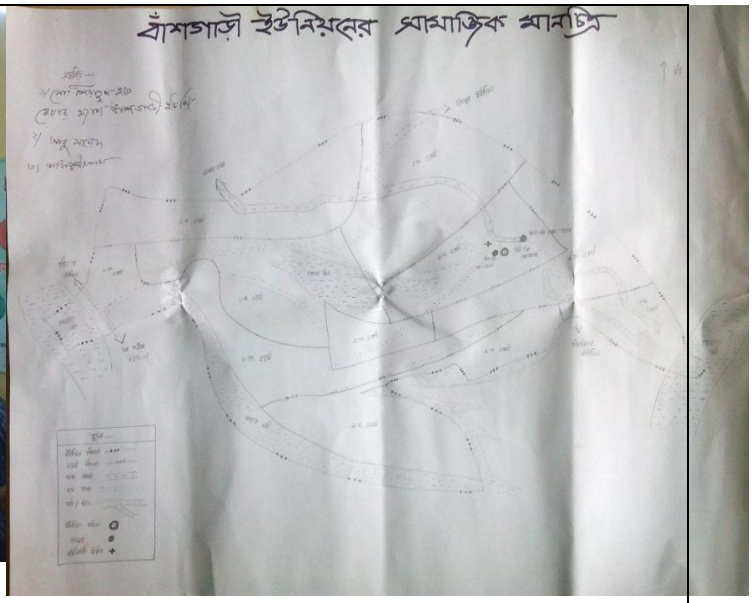


Figure 4.2: Social Map of Banshgari Union

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, impact and potentials. The following problems have identified during PRA which are as follows:

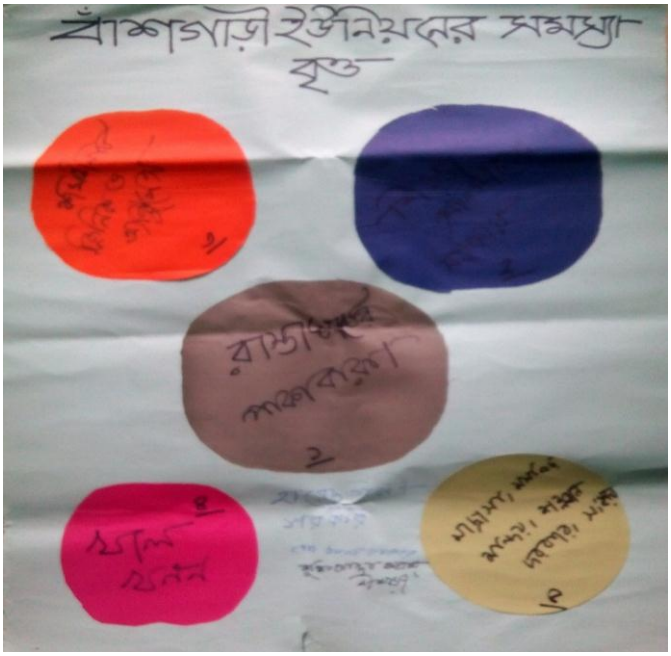
- Kacha road (Green road)

- Lack of teachers and development of institutional infrastructure
- Sanitation
- Tube-well
- Development of community clinic infrastructure
- Residential problems
- Need of women madrassa
- Market place repairing
- Mosque, graveyard repairing
- Veterinary center
- Natural disaster center
- Disable, adult and widow allowance
- Dredging canal
- Unemployment
- Early marriage
- Modernization of information service center
- Cold storage

4.3.b Problems Prioritization through Venn Diagram

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

1. Problem of Transportation
2. Problem of Education
3. Lack of Community Clinic and Ambulance
4. Lack of Canal Digging
5. Lack of Religious Institutions



Photograph 4.3: Venn diagram of major 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 will may be used as resources during planning. The potentials are as follows;

- Agriculture
- River (Meghna)
- Canal
- Fisheries
- Cattle rearing
- Beel (Large size beel)
- Water melon

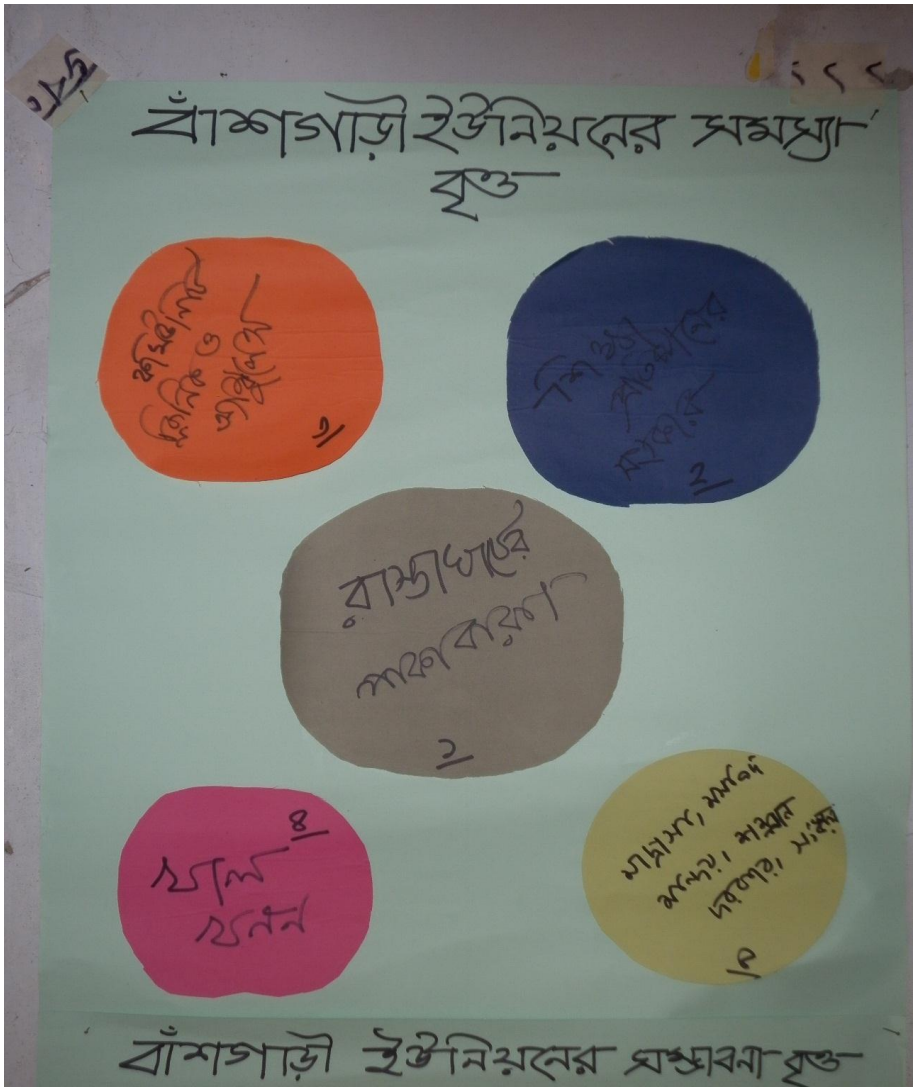


Figure 4.1: Major Five Potentials

4.3.d 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, effect/impact and potentials have furnished in the following table.

Table 4.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget	• Problem of two lakh people	• Communication development
2.Trouble of education system	• Absent head teacher • Far area • Char area • Communication problem	• No enough education	• Educational development
3.Lack of health complex	• Far from town • Broken road • Ne electricity	• Don't get health treatment	• Developed in health service
4.Problem of canal digging	• Earthling day by day	• Agricultural problem	• Irrigation system will be developed
5.Lack of religion institution	• Lack of budget • Lack of enterprise	• Underdeveloped religion institution	• Social developed

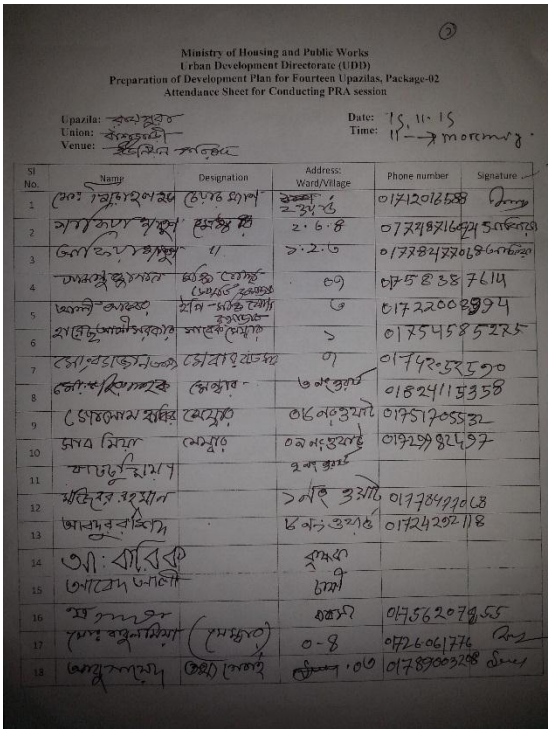
4.4 Perceived Development Priorities for Banshgari Union under Narshingdi District.

The recommended development Priorities for Banshgari Union is as follows

Table 4.2: Development Priorities for Banshgari Union

Short term	Midterm	Long term
• Developed of education • Light of education in every house • Educational development • College • Want educational institution • Demand of concrete road • Good communication system • Development of agriculture • Digging canal • Drainage system for irrigation • Re-digging • Repairing of religious institution • Want developed religious institution • Appointing Imam	• Developing medical treatment • Developed community clinic • Demand of ambulance • Establish digital Union	• None

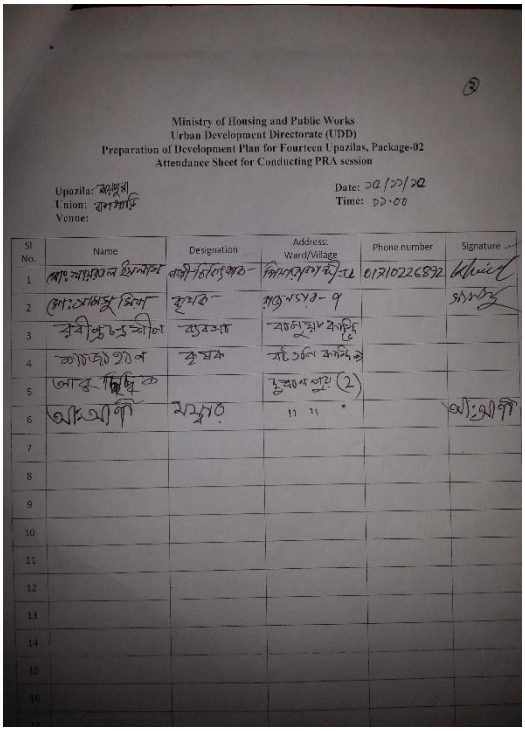
4.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila:
Union:
Venue:
Date:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1				01712016588	
2				01778716[illegible]	
3				01778[illegible]	
4				01758387614	
5				01722008994	
6				01754585285	
7				01742[illegible]590	
8				01824115358	
9				01751705532	
10				01929826937	
11					
12				01778497068	
13				01724202118	
14					
15					
16				01756207955	
17				01726061776	
18				01789003288	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila:
Union:
Venue:
Date:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1				01710226892	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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15					
16					

5.0 Chanderkandi Union

5.1 Overview (Study Area)

Boundary of the study area is stated below:

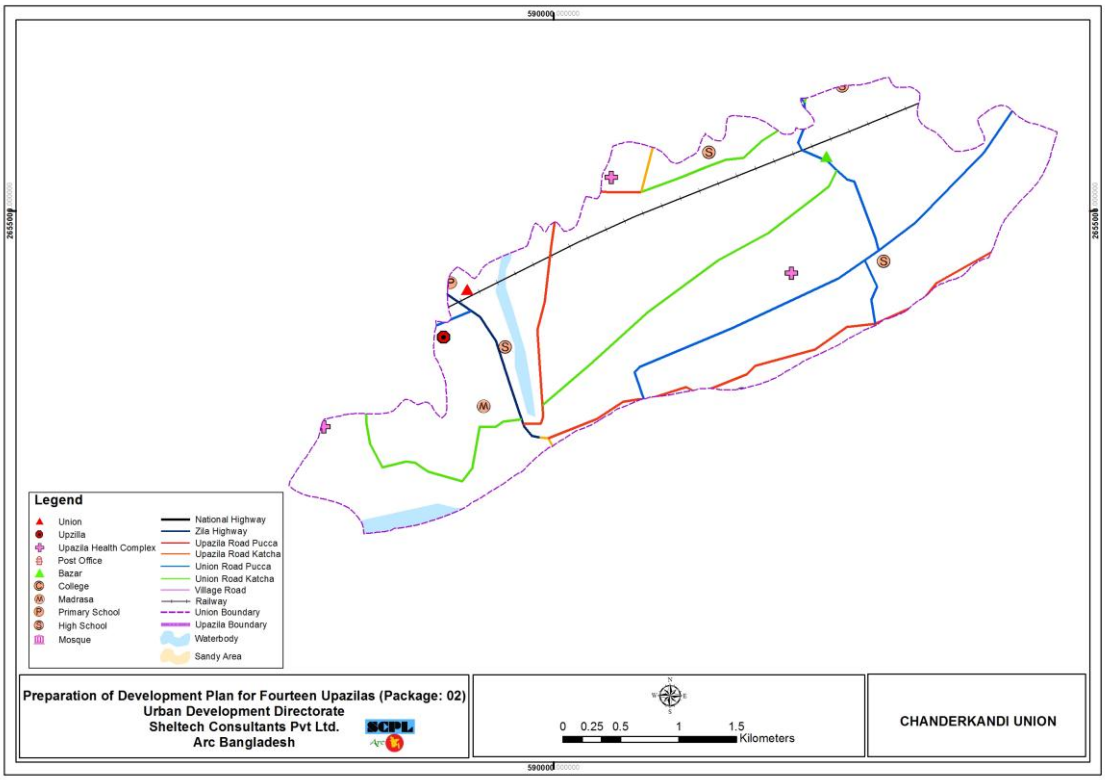
North: On the north side of the study area, Alipura Union is situated

West: On the west side of the study area, Raipura Paurashava is located.

South: On the south side of the study area, Raipura Paurashava is located

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

Map 5.1: Chanderkandi Union

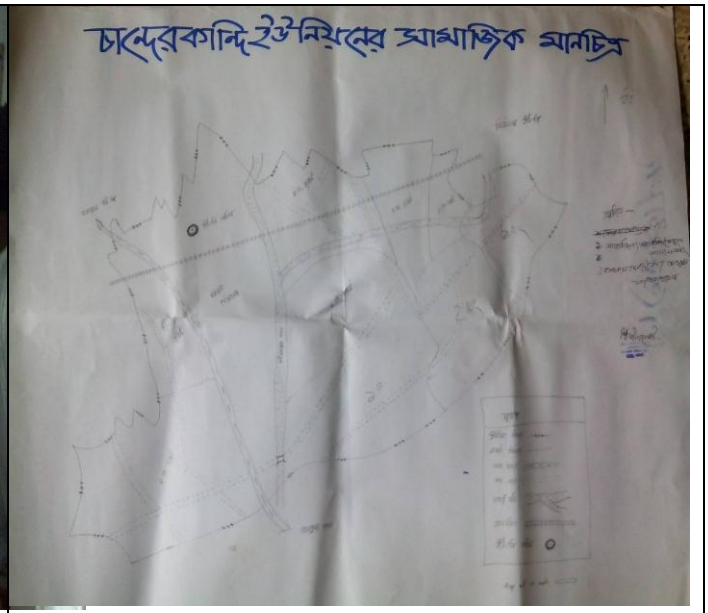


5.2 Spatial Aspects

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 or three persons for preparing the social map of Chanderkandi Union 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/madrasa, 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 5.1: Preparing Social Map



Photograph 5.2: Social Map of Chanderkandi Union

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 identified during PRA which are as follows:

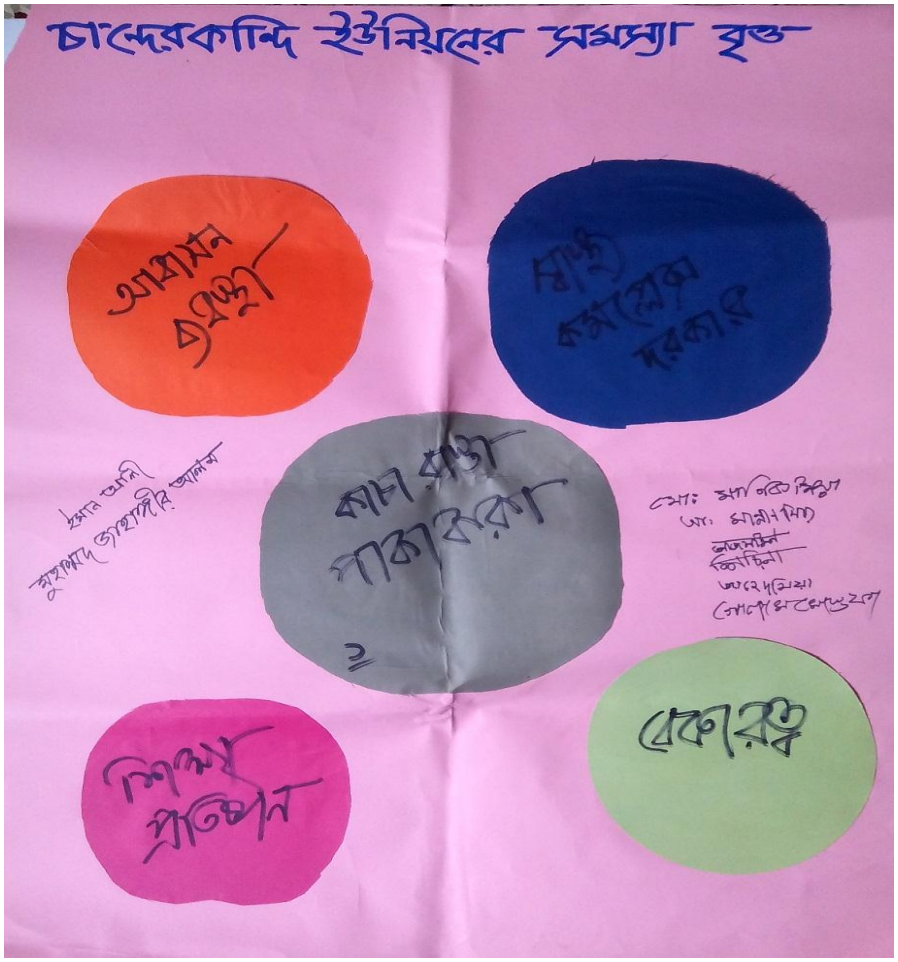
- Reconstruction of local road in all word and especially 4 number words needs a bridge at Dupipara Ghat.
- Health complex needs and have to be risen number of doctors with modernization.
- Homeless people (1 no. word)

- Deep double
- Needs of animal doctors
- Sanitation problem
- High school and college
- Enhancement of primary school and risen of number class room
- Orphan house needs
- Reconstruction of Mosque and madrasa (Milat Ul Ullum Hafizia Madrasa)
- Lack of electricity supply
- Drainage system at agricultural field
- No connection of gas
- Gide wall near of road
- Needs field
- Vocational institute needs
- Water logging
- Unemployment
- Lack of occupation industry

5.3.b Problems Prioritization through Venn Diagram

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

1. Poor Transportation system
2. Lack of Housing
3. Lack of Health Complex
4. Lack of Educational Institution
5. Unemployment Problem



Photograph 5.3: Venn diagram of major problems

5.3.c 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 will may be used as resources during planning. The potentials are as follows;

- Agriculture
- Rail line
- Fishery
- Poultry farm
- Active people

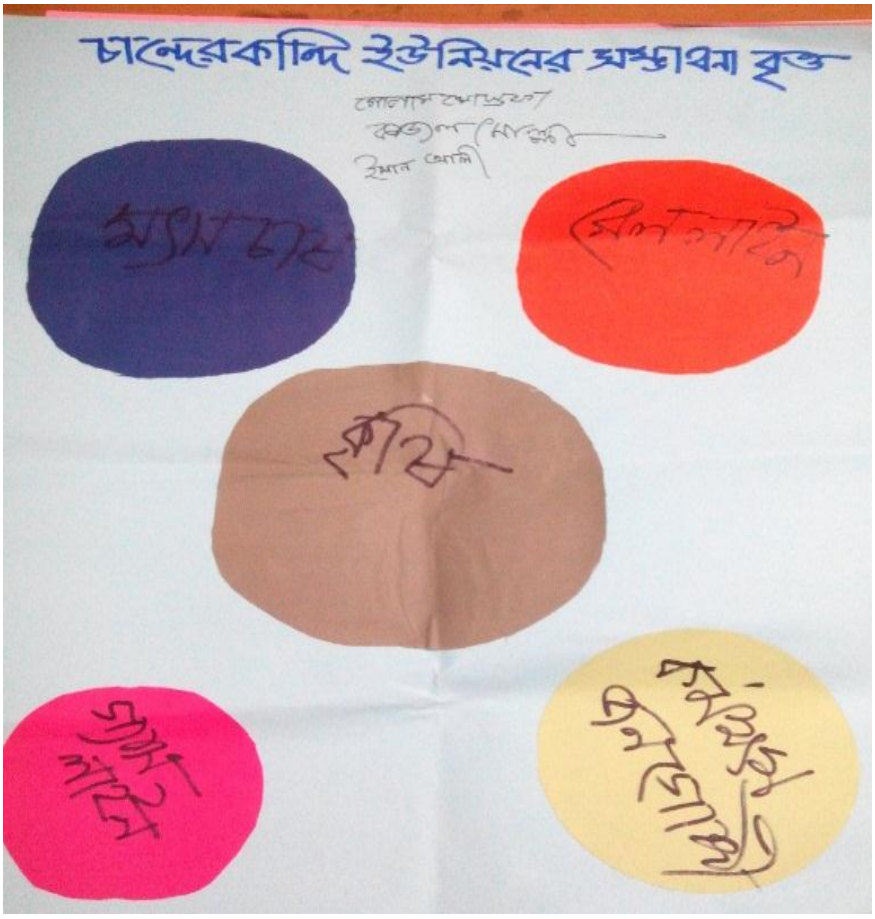


Figure 5.1: Major Five Potentials

5.3.d 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, effect/impact and potentials have furnished in the following table;

Table 5.1: Problems, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Problem of influence • Problem of Union cota for supply of money	• Fall in accident • Waterlogging is created for raining	• Existing necessary land for road construction • Hardworking people

2.Health complex	• Lack of govt. sincerity • Lack of local sincerity	• Lack of health treatment • Problem of preventing disease	• Health will be certain
3.Lack of housing	• Lack of budget • Want of land	• Poverty • Increasing evil activities	• Can be gain livelihood
4.Trouble of education system	• No enterprise of locality	• Children aren't getting opportunity to study	• Literate people will be increased • Literacy rate will be increased
5.Unemployment problem	• No vocational education • Lack of employment • Most of the people are illiterate	• Evil activities are increasing day by day • People are being drug addicted	• Locals will be benefited • Economic condition will be increased

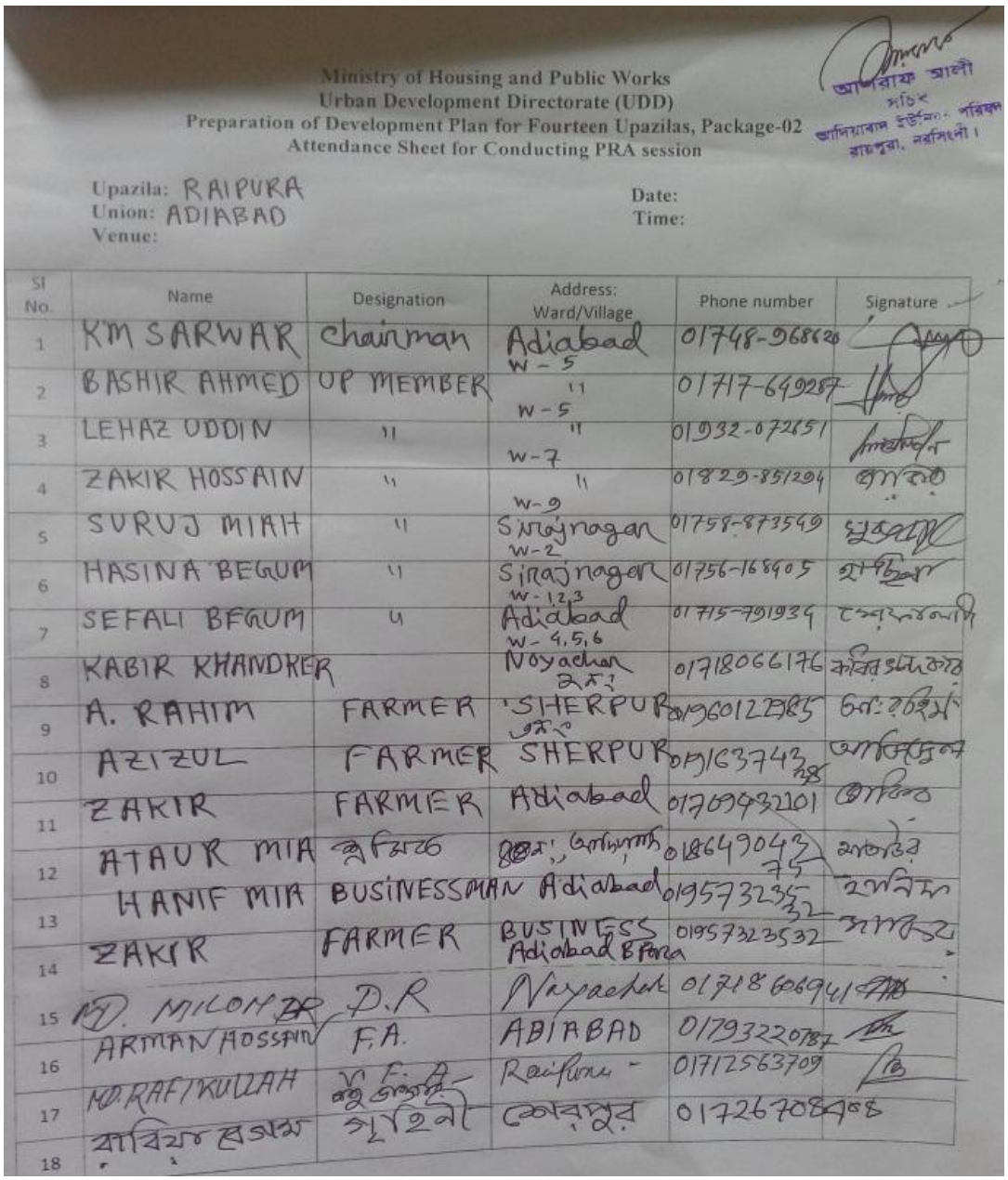
5.4 Perceived Development Priorities for Chanderkandi Union under Narshingdi District.

The recommended development Priorities for Chanderkandi Union are as follows:

Table 5.2: Development Priorities for Chanderkandi Union

Short term	Midterm	Long term
• Demand of developed health service • Demand of transport • Demand of new educational institute • Demand of preventing water passing problem	• Demand of gas and electricity connection • Demand of employment • Demand of repairing of mosque and madrasa	• None

1.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: RAIPURA
Union: ADIABAD
Venue:

Date:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	KM SARWAR	chairman	Adiabad W-5	01748-968620	
2	BASHIR AHMED	UP MEMBER	" W-5	01717-649287	
3	LEHAZ UDDIN	"	" W-7	01932-072651	
4	ZAKIR HOSSAIN	"	" W-9	01829-851204	
5	SURUJ MIAH	"	Sirajnagar W-2	01758-873549	
6	HASINA BEGUM	"	Sirajnagar W-1,2,3	01756-168405	
7	SEFALI BEGUM	"	Adiabad W-4,5,6	01715-791939	
8	KABIR KHANDKER		Noyachar	01718066176	
9	A. RAHIM	FARMER	SHERPUR	01960122885	
10	AZIZUL	FARMER	SHERPUR	01716374348	
11	ZAKIR	FARMER	Adiabad	01709432101	
12	ATAUR MIA	কৃষক		01864904375	
13	HANIF MIA	BUSINESSMAN	Adiabad	01957323532	
14	ZAKIR	FARMER	BUSINESS Adiabad B Para	01957323532	
15	MD. MILON	D.R	Noyachar	01718606941	
16	ARMAN HOSSAIN	F.A.	ADIABAD	01793220787	
17	MD. RAFIKULLAH	F.A.	Raipura	01712563709	
18	রাবিয়া বেগম	গৃহিনী	রায়পুর	01726708488	

6.0 Chandpur Union

6.1 Overview (Study Area)

Chandpur Union under the administrative jurisdiction of Raipura Upazilla in Narshingdi District has an area of 22.70 km^2. The boundary of the study area is stated below:

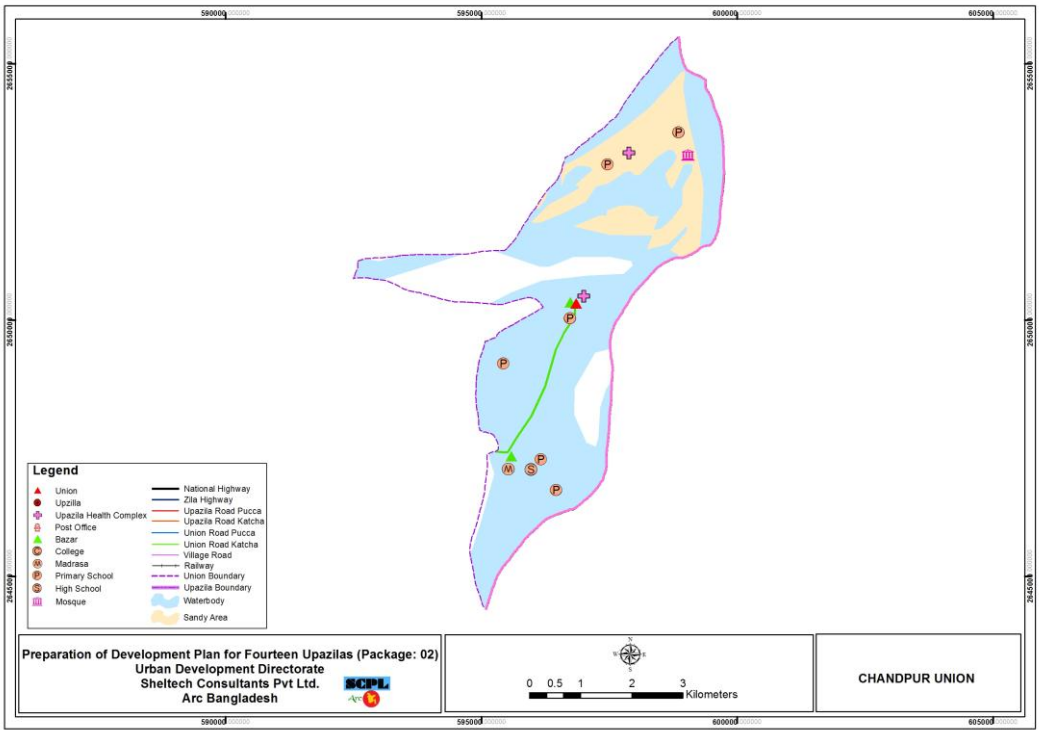
North: On the north side of the study area, Maheshpur Union and Ashuganj Upaziia (DistrictB,Baria) are situated.

West: On the west side of the study area, Paratoli and RaipuraUnion are located.

South: On the south side of the study area, Nabinagar Upazilla (District B.Baria) is located

East: On the east side of the study area, River Meghna is located.

Map 6.1: Chandpur Union



6.2 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 Chandpur Union 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/madrasa, 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 6.1: Preparing Social Map

Photograph 6.2: Social Map of Chandpur 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:

- Poor Transportation (lack of roads , Earthen roads , hole ,no bridge ,no culvert)
- Lack of agriculture and irrigation system
- No electricity

- River erosion (Ward no 1,4,7,8,and 9)
- Inefficiency of health system system (1 F.W.C,2 community Clinic, no doctor, shortage of medicine , only 1 C.H.V.)
- Sanitation problem
- Unemployment
- Robing and sealing in river road
- Lack of pure drinking water (contaminated with Arsenic and iron)
- Water logging
- Lack of industry
- Difficulties of information technology/hampered mobile networking
- Child marriage
- Dowry
- Shortage of Family planning activities.
- Lack of disaster resistant shelter center
- No commercial bank
- No N.G.O. office
- Lack of vocational technical institute
- Lack of agricultural extension services (shortage of modern agricultural machine tools . irrigation, use of fertilizer and seeds)
- No police ferry
- Problem of hat bazar
- No Dakhil madrasa
- Problem of maintenance of Eidgah ground
- Problem of Arbitration district boundary (With Distict B.Baria , Nabinagar Upazilla , Union Birgaon near about 4000 acres)
- Problem of canal excavation

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. Poor Transportation System
2. Lack of Electricity
3. Lack of education facilities
4. Problem of Health Services
5. River Erosion

Photograph 6.3: Venn diagram of major 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;

- Agriculture (Chili , Potato , Rice , Nuts, Wheat Mustard and Water Melon)
- Three Beel /water body (Chandal , Sadarkandi , Rouhal)
- River Meghna
- Hard working people
- Foreign remittance
- Cattle rearing
- Local Duck and chicken rearing
- product transport transportation in River road
- 3 Bazar
- Union digital center
- Government office
- Fisheries
- Union council complex
- Post office

- 1 high school and 9 primary school
- Brick field
- Fisher man
- Sub registry office

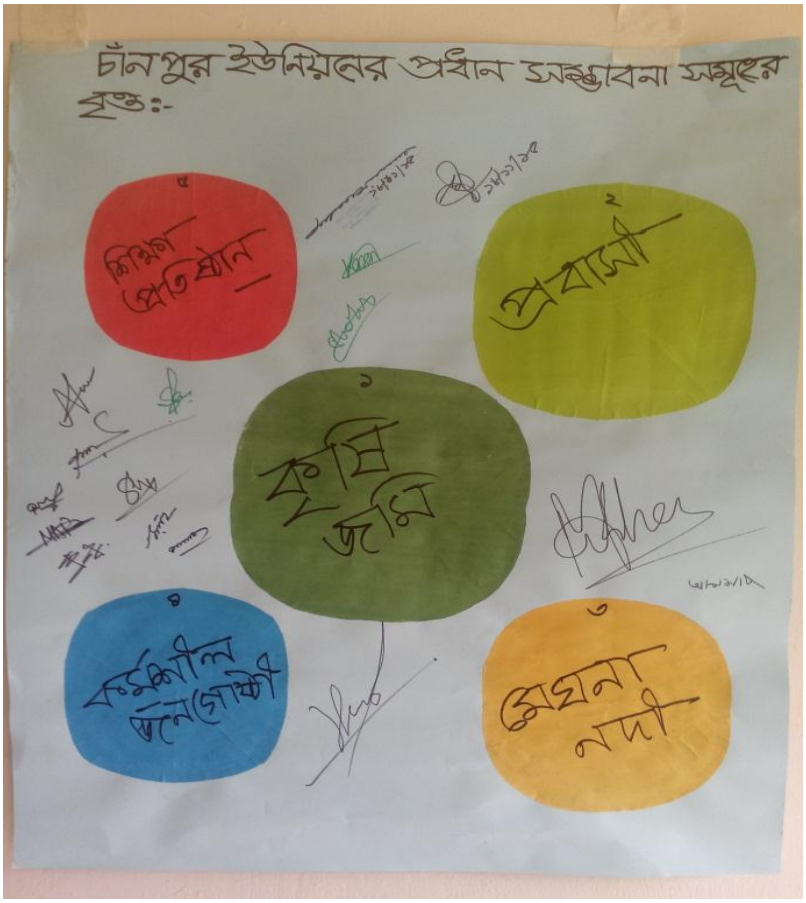


Figure 6.1: Major Five Potentials

6.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify 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 6.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Bureaucratic complexity • Negligence of top level • Shortage of road • Earthen road • No bridge • No culvert	• Communication from Upazilla Sadar is very expensive and more time spending • Patient are suffering to get emergency health services • More facing problem to children getting education • Financial loss • Not to increase business growth and financial transaction • • Problem of transportation and marketing of agriculture products	• Existing earthen roads and necessary land for road construction • Locally sand and soil available • Hardworking people to constructing roads.
2.No Electricity connection	• Negligence of top level • Bureaucratic complexity	• No development in all over Union • No Industrialization • People are deprive from digital service • Farmer are deprived from irrigation facilities • Increase cultivation production • Not possible to use modern machineries in agriculture sector	• Donation land for established electric sub center • Already getting Permission of Administrative and technical

3.Trouble of education system	• Undeveloped communication system • Lack of various structure in educational institute • No head teacher available in any primary school • Shortage of class room • Lack of teachers rather than students • No college • No university • No Vocational technical institute	• Decreasing of educational rate • People are deprived from basic rights • Students are in danger road	• Enough land for established educational institute • Due to close proximity of Meghna river material transportation cost has become cheaper than road transportation.
4.Lack of emergency health services	• River sided area • Communication system is very undeveloped • Shortage of bridge and culvert It is very hard to carry patient • No hospital • Shortage of doctor • Shortage of medicine • No ambulance for patient transport	• Lack of health services Increase death rate of emergency patient • Cannot control increasing birth rate • Pregnant and delivery maternal are deprived to right emergency health services	• Local leaders are very kind • Chandpur Union council chairman give promise any kind of help
5.River erosion and district border problem	• No river preening in river bank • No Embankment in river bank • Lack of budget shortage • Bureaucratic complexity • Negligence of top level	• Many houses are perished in river erosion • Man are become homeless and asset less • Increase rate of poverty • Local people are facing serious problems for facing arbitration about	• Exist Hard working people • Exist sand • Exist soil • Transport cost is cheap for product transport by river road

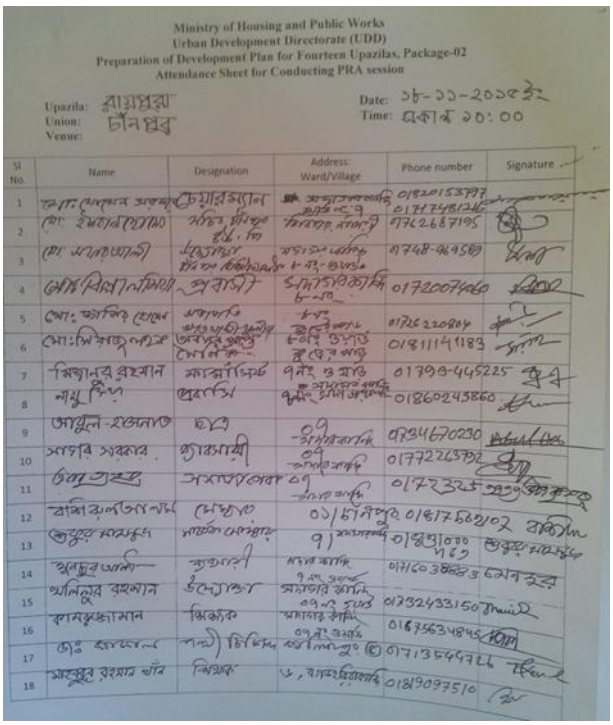
6.4 Perceived Development Priorities for Chandpur Union under Narshingdi District.

The recommended development priorities for Chandpur Union is as follows:

Table 3.6.2: Development Priorities of Chandpur Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of electric substation • Demand of Employment • Demand of solve District border problem • Demand of stop childhood marriage • Demand of industrialization • Demand of bank • Demand of canal excavation • Demand of River erosion • Miscellaneous(Demand of stop harassment of police , Demand of agricultural extension services , Demand of stop birth rate , Demand of tower for network)	• Demand of River erosion • Miscellaneous(Demand of stop harassment of police , Demand of agricultural extension services , Demand of stop birth rate , Demand of tower for network) • Demand of Employment • Demand of development of transportation system • Demand of bank • Demand of developed education system • Demand of development of health services • Demand of electric substation • Demand of industrialization	• Demand of development of transportation system • Demand of Employment • Demand of bank • Demand of developed education system • Demand of development of health services • Demand of industrialization

1.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চাঁনপুর
Venue:
Date: ১৮-১১-২০১৫ ইং
Time: সকাল ১০:০০

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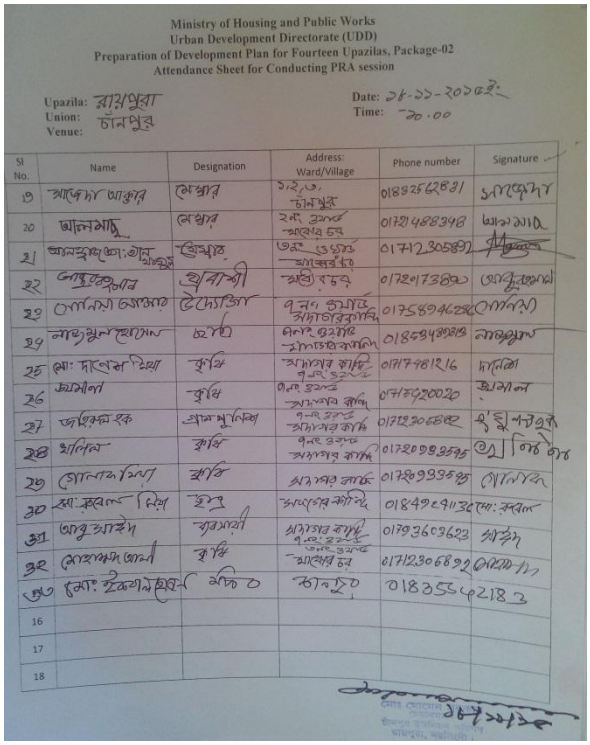

Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চাঁনপুর
Venue:
Date: ১৮-১১-২০১৫ ইং
Time: ১০.০০

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7.0 Char Aralia Union

7.1 Overview (Study Area)

15 no Char Aralia Union under the administrative jurisdiction of Raipura Upazilla in Norshingdi District has an area of 2,237 acre. The boundary of the study area is stated below:

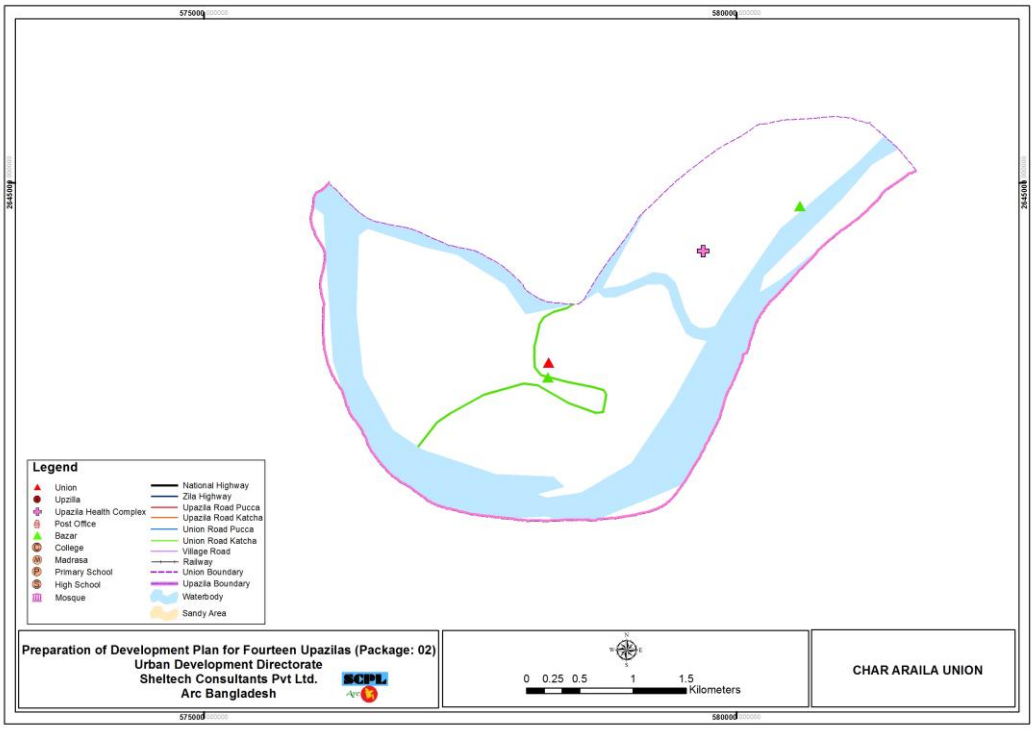
West: On the West side of the study area, the Old River Meghna and Amirganj U.P are situated

North: On the North of the study area, Amirganj Union (Ripura Upazilla) is located

South: On the south side of the study area, Sadarthana (SadarUpazill), River Meghna and Alokkandi Union (Sadar Upazilla) are located

East: On the east side of the study area, Hairmara Union and part of Amirganj Union are located.

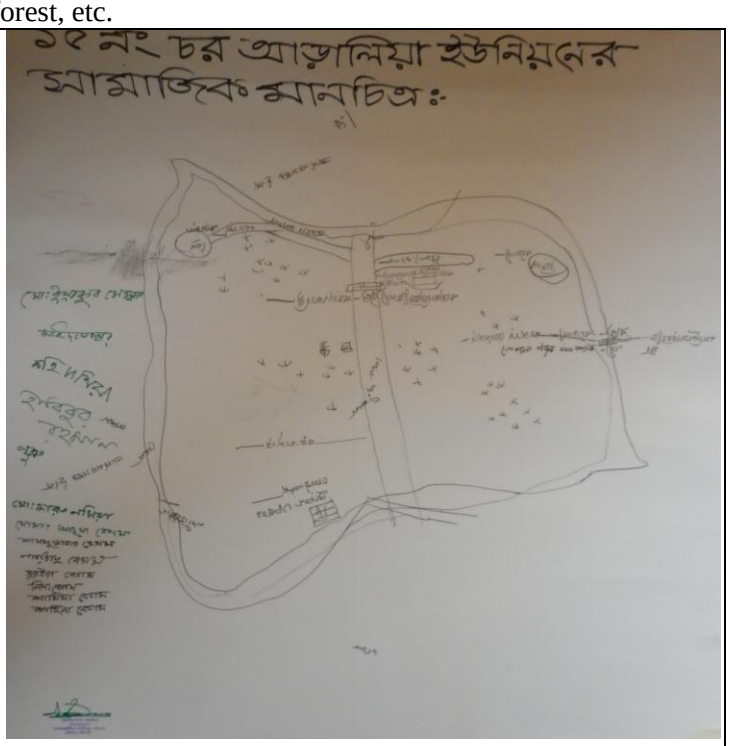
Map 7.1: Char Aralia Union



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 two or three persons for preparing the social map of Char Aralia Union 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/madrasa, 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 7.1: Preparing Social Map	**Photograph 7.2: Social Map of Char Aralia 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:

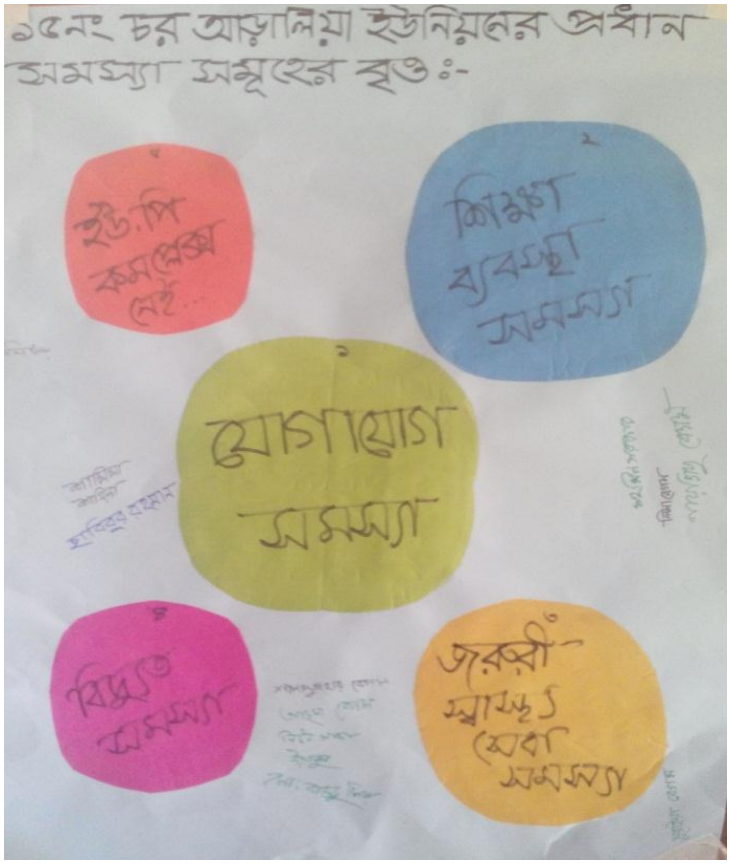
- Lack of Electricity
- Weak Communication System (No Repair of road, no roads, Char of River Meghna, Roads what exists always go under water in Rainy Season , No Bridge at Masimnagar-bottoly and Batakandi-Borddakandi)

- No Guide Wall
- River erosion problem (No Embankment)
- Lack of drainage (Ward no 3 & 5)
- No U.P. complex
- No Land Office
- No Post Office
- Emergency health services (No hospital, Shortage of community clinic, doctor and ambulance)
- No police ferry
- Excavation of canal and river dredging problem
- Lack of irrigation drain in Agriculture
- No market place
- Lack of shelter
- No Entertainment (Shortage of playground , Community center and public library)
- Water logging
- Lack of agricultural extension services
- No gas
- Unemployment
- Lack of vocational technical institute
- Polygamy

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. Poor Transportation system
2. Lack of education facilities
3. No U.P. complex
4. Insufficient electricity supply
5. Lack of medical facilities



Photograph 7.3: Major Five Problems

7.3.c 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;

- Agriculture (Rice , chili , potato, mastered , wheat and vegetables)
- Fisheries
- Branch of River Meghna
- Fisherman
- Yarn industry
- Foreign remittance
- Water road (Transportation in river road)
- Hard working people
- Cattle rearing
- Duck rearing

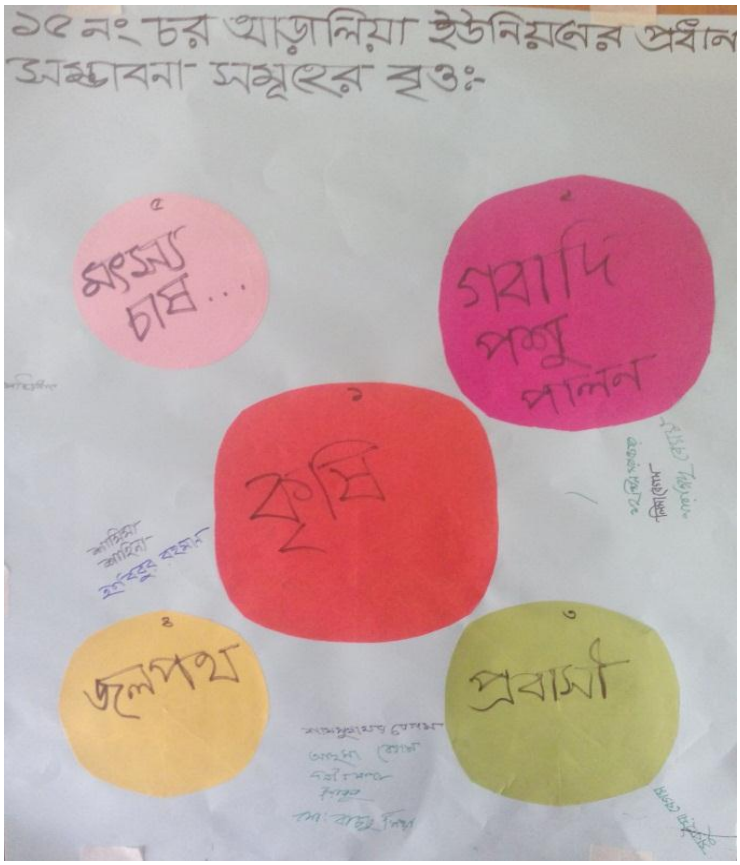


Figure 7.1: Major Five Potentials

7.3.d 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, effect/impact and potentials have furnished in the following table;

Table 7.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• As a result of char of River Meghna there is no road • There is no pucca road in all over the Union • No bridge • No culvert	• Transportation from one area to another is costly and time expensive • Problem of going to school for the students • It is almost impossible to Carry emergency patient	• Existing necessary land for road construction • Hardworking people

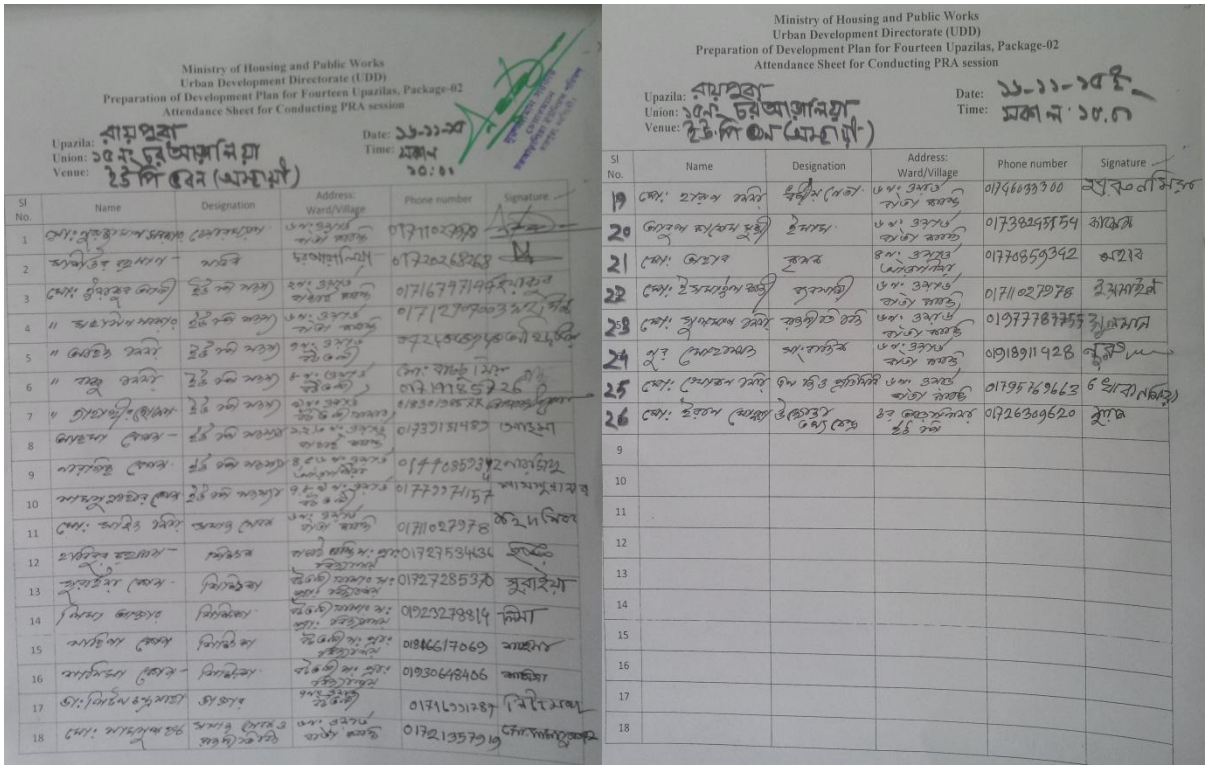
	• Many areas has no communication		
2.Trouble of education system	• Lack of teachers • Lack of classroom in the educational institutions • Lack of guardians consciousness • Not to send their child to educational institution in proper time • Poverty	• Decreasing of educational rate • Students are in danger road • Increase early marriage • Increase social chaos	• Enough schools and colleges. For example existing (two high schools, one college and five primary school exists • Local conscious people
3.Developd problem of Radhaganj bazar	• No embankment, no bridge, no drainage • No conservancy management • Shortage of government budget • Unplanned parking • No proper planning	• People are not moving frequently and difficulties of bargaining • Trouble of frequently moving in rainy season	• 16 lakh taka collected from leased • Enough manpower for construction
4.No disaster resistant shelter center	• No management from government • Shortage of budget	• Poor people day by day going to more poor and homeless	• Existing soil and sand • Hard working people • Existing bamboo and wood
5.U.P. complex	• Lack of land donor • No enough land for establish of U.P. complex	• All development work is badly effected • Cannot discuss development conversation without sitting arrangement for the people • Old building is very risky	• Existence of old building • Present chairman is ready to donate land

7.4 Perceived Development Priorities for Char Aralia Union under Narshingdi District

The recommended development priorities for Char Aralia Union is as follows:

Short term	Midterm	Long term
• Demand of developed education system • Demand of developed fisheries • Demand of developed technical education • Demand of development of transportation system • Demand of electricity connection • Demand of development agricultural system • Demand of Developed modern drainage system • Demand of opportunity to develop employment • Demand of develop emergency health services • Demand of dredging of River and canal • Developed cattle rearing • Demand of established U.P. complex	• Demand of developed education system • Demand of developed fisheries • Demand of developed technical education • Demand of electricity connection • Demand of development agricultural system • Demand of Developed modern drainage system • Demand of opportunity to develop employment • Demand of develop emergency health services • Developed cattle rearing • Demand of established U.P. complex • Demand of development of transportation system	• Demand of developed education system • Demand of developed technical education • Demand of Developed modern drainage system • Demand of developed fisheries • Demand of develop emergency health services • Demand of development of transportation system • Demand of opportunity to develop employment • Demand of dredging of River and canal • Developed cattle rearing

7.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ১৫ নং চরআদালিয়া
Venue: ইউ.পি. ভবন (আংশিক)
Date: ১১-১১-১৫
Time: সকাল ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible]	[illegible]	01711027978	
2	[illegible]	[illegible]	[illegible]	01720268263	
3	[illegible]	[illegible]	[illegible]	01716777145	
4	" [illegible]	[illegible]	[illegible]	01712707003	
5	" [illegible]	[illegible]	[illegible]	[illegible]	
6	" [illegible]	[illegible]	[illegible]	01719185726	
7	" [illegible]	[illegible]	[illegible]	[illegible]	
8	[illegible]	[illegible]	[illegible]	01737131483	
9	[illegible]	[illegible]	[illegible]	01770853	
10	[illegible]	[illegible]	[illegible]	01777774157	
11	[illegible]	[illegible]	[illegible]	01711027978	
12	[illegible]	[illegible]	[illegible]	01787534436	
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15	[illegible]	[illegible]	[illegible]	01816617069	
16	[illegible]	[illegible]	[illegible]	01930648406	
17	[illegible]	[illegible]	[illegible]	01741331787	
18	[illegible]	[illegible]	[illegible]	01721357319	
19	[illegible]	[illegible]	[illegible]	01760333300	
20	[illegible]	[illegible]	[illegible]	01739245554	
21	[illegible]	[illegible]	[illegible]	01708569342	
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25	[illegible]	[illegible]	[illegible]	01795769663	
26	[illegible]	[illegible]	[illegible]	01726309620	
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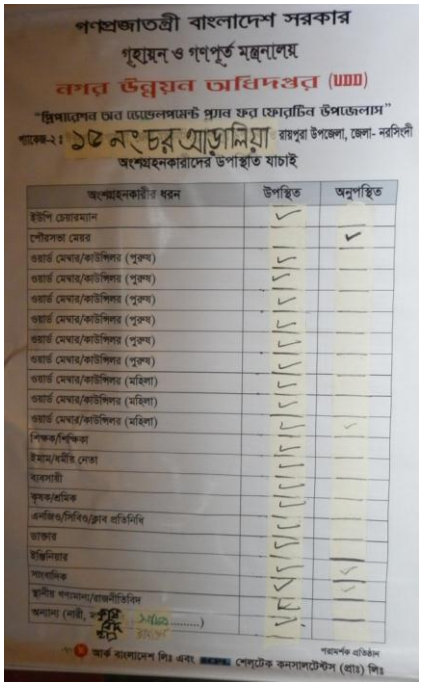

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিন উপজেলাস"
প্যাকেজ-২: ১৫ নং চরআদালিয়া রায়পুরা উপজেলা, জেলা- নরসিংদী
অংশগ্রহনকারীদের উপস্থিত যাচাই

অংশগ্রহনকারীর ধরন	উপস্থিত	অনুপস্থিত
ইউপি চেয়ারম্যান	✓	
পৌরসভা মেয়র		✓
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
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ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)		✓
শিক্ষক/শিক্ষিকা	✓	
ইমাম/ধর্মীয় নেতা	✓	
ব্যবসায়ী	✓	
কৃষক/শ্রমিক	✓	
এনজিও/সিবিও/ক্লাব প্রতিনিধি	✓	
ডাক্তার	✓	
ইঞ্জিনিয়ার		✓
সাংবাদিক		✓
স্থানীয় গণ্যমান্য/রাজনীতিবিদ	✓	
অন্যান্য (নারী, [illegible] .....)	✓	

পরামর্শক প্রতিষ্ঠান
আর্ক বাংলাদেশ লিঃ এবং শেলটেক কনসালটেন্টস (প্রাঃ) লিঃ

8.0 Char Madhuya Union

8.1 Overview (Study Area)

Boundary of the study area is stated below:

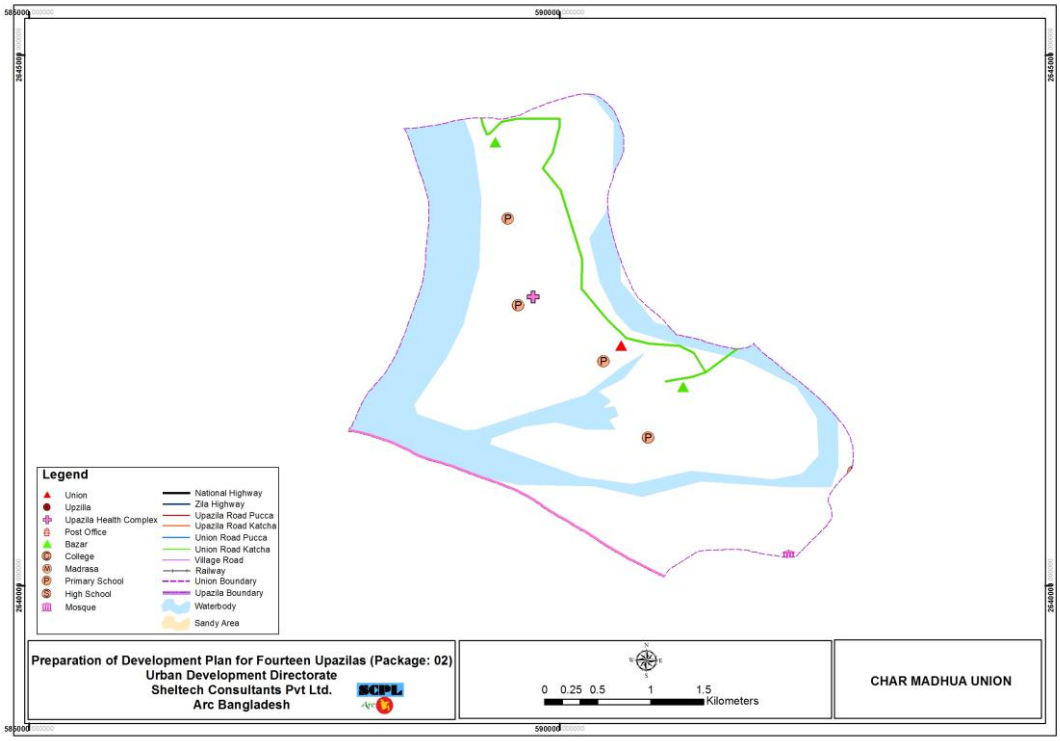
North: On the north & west side of the study area, Banshgari Union is situated.

West: On the west side of the study area, Meghna River is located.

South: On the south side of the study area, Bancharampur Uapazila is located.

East: On the East side of study area, Banshgari and Mirzarchar Union are located.

Map 8.1: Char Madhuya Union

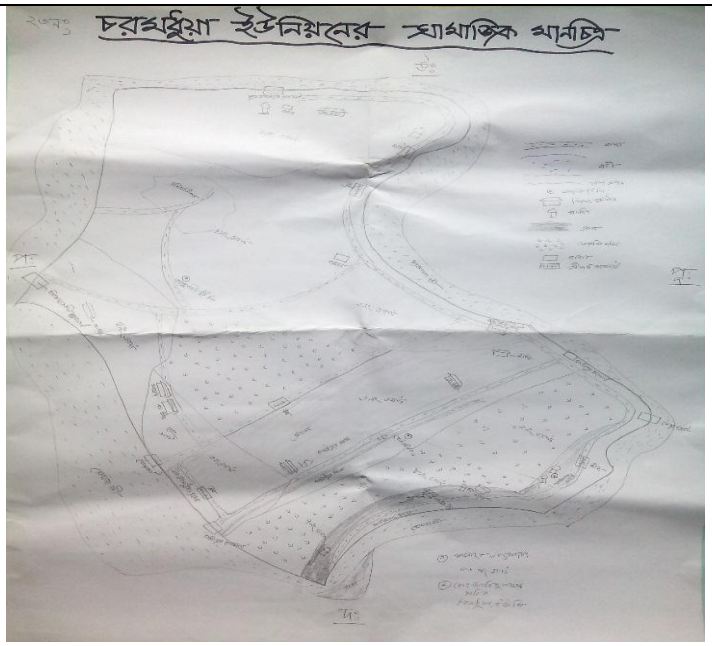


8.2 Spatial Aspects

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 or three persons for preparing the social map of Char Madhuya Union 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/madrasa, 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 8.1: Preparing Social Map



Photograph 8.2: Social Map of Char Madhuya 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:

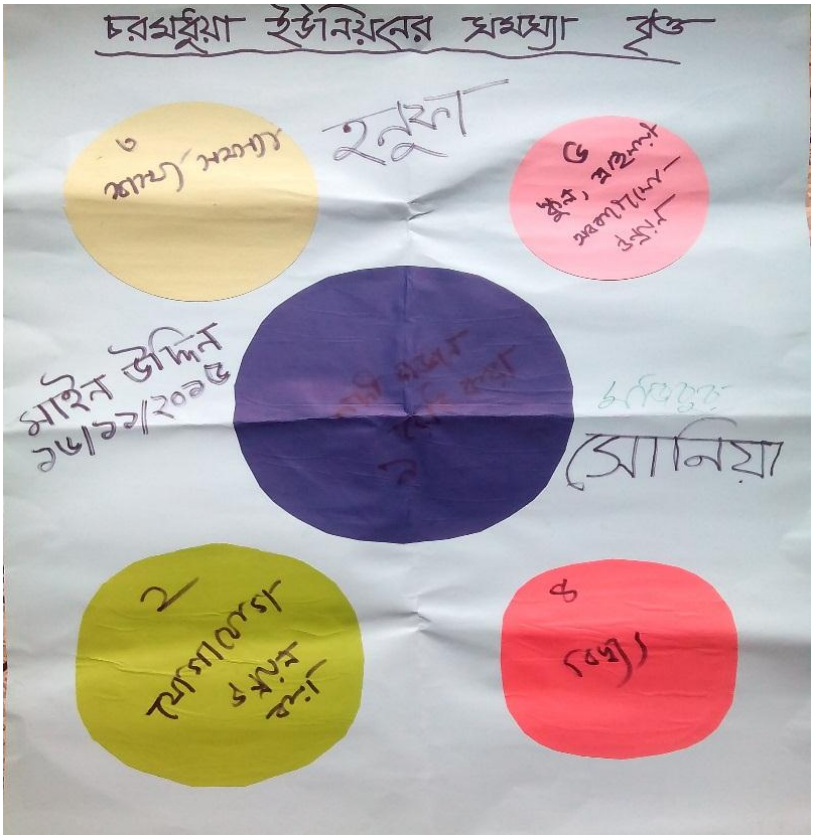
- Making katcha (green) roads into pucca (concrete) road.
- River bank erosion.
- Poverty.
- Construction of culvert.
- Electricity problem.

- Want health complex.
- Development of institutional infrastructure.
- Digging canal and river.
- Sanitation problem.
- Drainage system for cultivation.
- Repairing of religious institution.
- Repairing of market place.
- Need of modern agricultural instruments.
- Unemployment.
- Deep tube well.
- Early marriage and dowry.
- Allowance of adult, disable and widow people.

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. River erosion
2. Poor Transportation System
3. Lack of health facilities
4. Lack of Electricity
5. Lack of educational institution



Photograph 8.3: Major five Problems

8.3.c 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;

- Agricultural land
- River
- Canal and pond
- Cattle rearing
- Foreign remittance

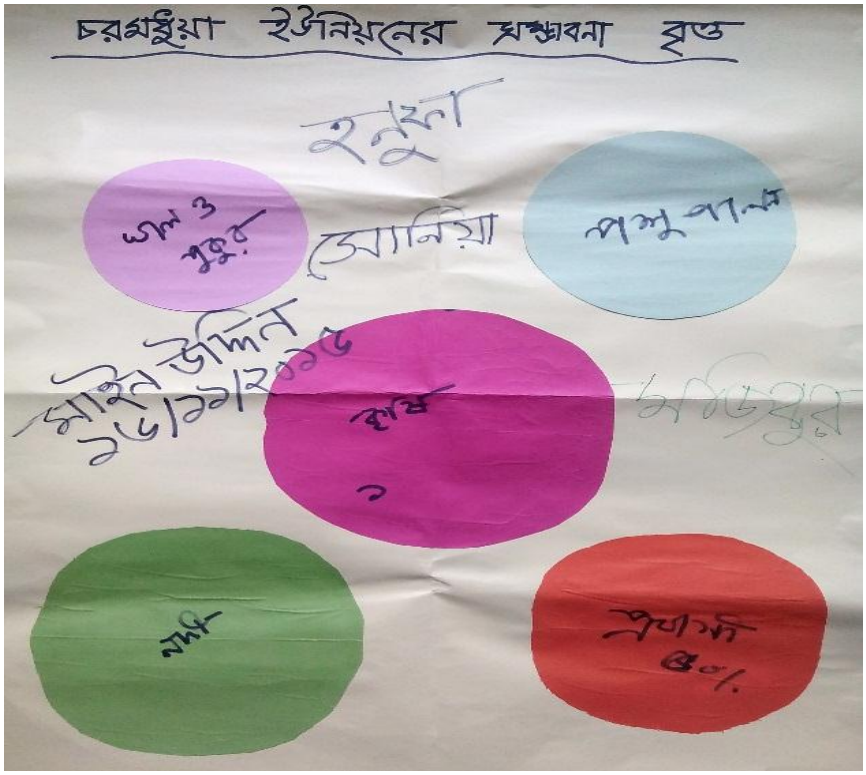


Figure 8.1: Major Five Potentials

8.3.d 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, effect/impact and potentials have furnished in the following table;

Table 8.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.River erosion	• Tide of river • Basin (char) of river	• Endangered 20000 people.	• Economic development
2.Poor Transportation System	• Roads flood in rainy season	• Problem communication	• Developed communication
3.Trouble of health service	• Far area from health center • Lack of doctor	• Lack of consciousness about cancer	• Health development

4.Scarcity of electricity	• Riverine area	• Adversity	• Overall development
5.Underdevelopment in education sector	• Lack of budget	• Decreasing of education	• Overall development

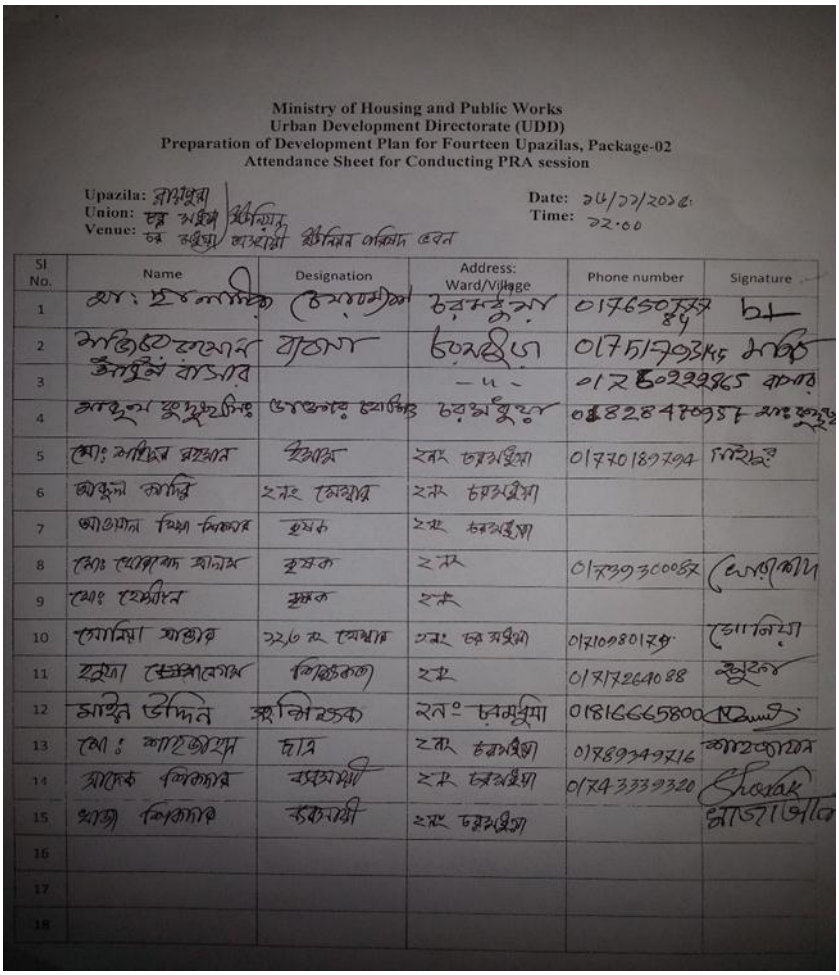
8.4 Perceived Development Priorities for Char Madhuya Union under Narshingdi District.

The recommended development priorities for Char Madhuya Union is as follows:

Table 8.2: Development Priorities for Char Madhuya Union

Short term	Midterm	Long term
• River digging • Construction of embankment along Meghna River • Repairing of river flow • Development of communicational infrastructure • Connectivity road with Upazilla. • Development of communication. • Construction of bridge. • Construction of pucca road. • Need electricity connection • Electricity connection in 100% home.	• Demand of construction of fish bazar • Want permanent fish bazaar on govt. land. • Repairing of bazaar. • Demand of religious institution • Want graveyard development • Want Mosque. • Demand of eidgah • Demand of developed educational institution • Demand of playground • Demand of digital educational institution	• Demand of developed agriculture

8.5 List of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চর মজিদ ইউনিয়ন
Venue: চর মজিদ আহামী ইউনিয়ন পরিষদ ভবন

Date: ১৬/১১/২০২৫
Time: ১২:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মো: ইকনাদিক	চেয়ারম্যান	চরমজিদ	01765[illegible]	[illegible]
2	মতিউর রহমান	ব্যবসা	চরমজিদ	01751703[illegible]	[illegible]
3	আইনি বাজার	— " —		01250222865	[illegible]
4	মাহফুজ ফুড প্রসেসিং	প্রোপ্রাইটর	চরমজিদ	01882847[illegible]957	[illegible]
5	মো: শাহিন রহমান	ইমাম	২নং চরমজিদা	01770189704	[illegible]
6	আবুল কাদির	২নং মেম্বার	২নং চরমজিদা		
7	আওয়াল মিয়া শিকদার	কৃষক	২নং চরমজিদা		
8	মো: মোশারফ হোসেন	কৃষক	২নং	01739300087	[illegible]
9	মো: হেলাল	কৃষক	২নং		
10	সোনিয়া আক্তার	২৫ নং মেম্বার	৩নং চর মজিদা	01700801749	সোনিয়া
11	হুরুন মোল্লা	শিক্ষকতা	২নং	01717264088	[illegible]
12	মাহবুব উদ্দিন	সহকারি শিক্ষক	২নং চরমজিদা	01816665800	[illegible]
13	মো: শাহজাহান	ব্যবসা	২নং চরমজিদা	01789349716	শাহজাহান
14	সাদেক শিকদার	ব্যবসায়ী	২নং চরমজিদা	01743339320	[illegible]
15	আজাদ শিকদার	ব্যবসায়ী	২নং চরমজিদা		আজাদ
16					
17					
18					

9.0 Char Shubuddhi Union

9.1 Overview (Study Area)

The Char Shubuddhi Union is under the administrative jurisdiction of Raipur Upazilla of Narshingdi district. The boundary of the Union is as follows;

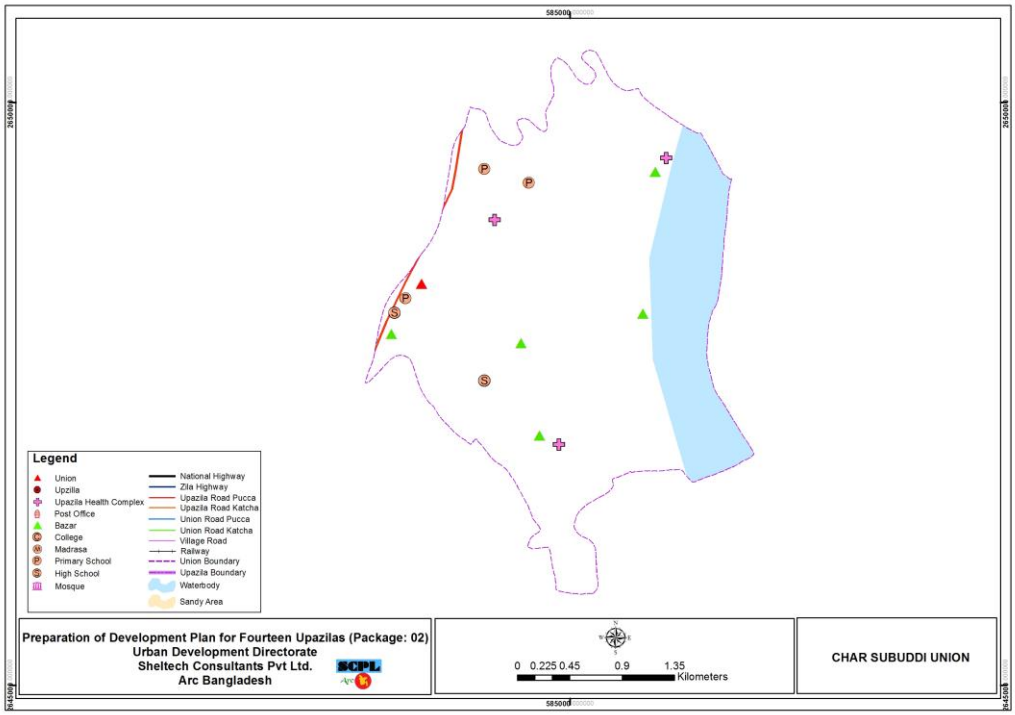
North: On the north side of the study area, Gouripur Upazilla is situated.

West: On the west side of the study area, Amirganj and Banshgari Union are located.

South: On the south side of the study area, Char Madhuya Union is located.

East: On the south side of the study area, Banshgari and Char Madhuya Union are located.

Map 9.1: Char shubuddhi Union

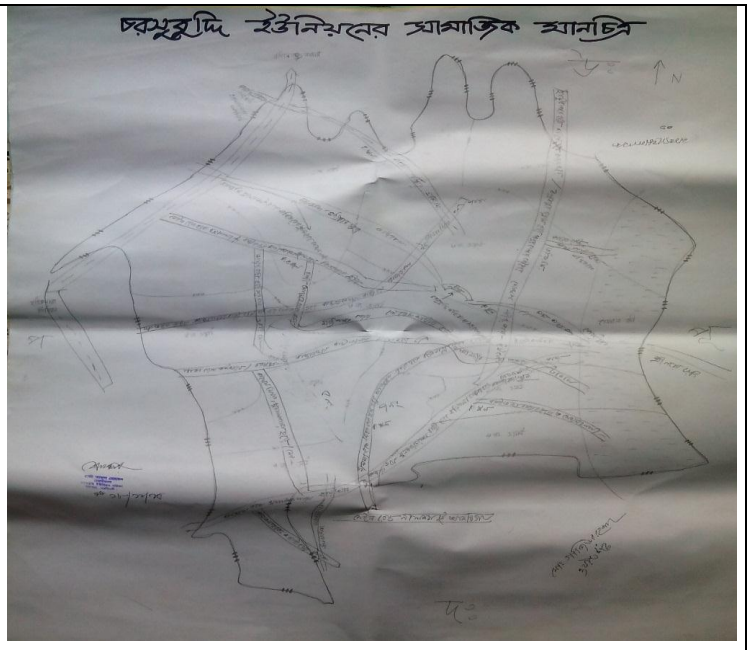


9.2 Spatial Aspects

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.

The Facilitator has selected two or three persons for preparing the social map of Char Shubuddhi Union 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/madrasa, 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 9.1: Preparing Social Map



Photograph 9.2: Social Map of Char shubuddhi Union

9.3 Major Problems and Potentials

9.3.a Problems Identification

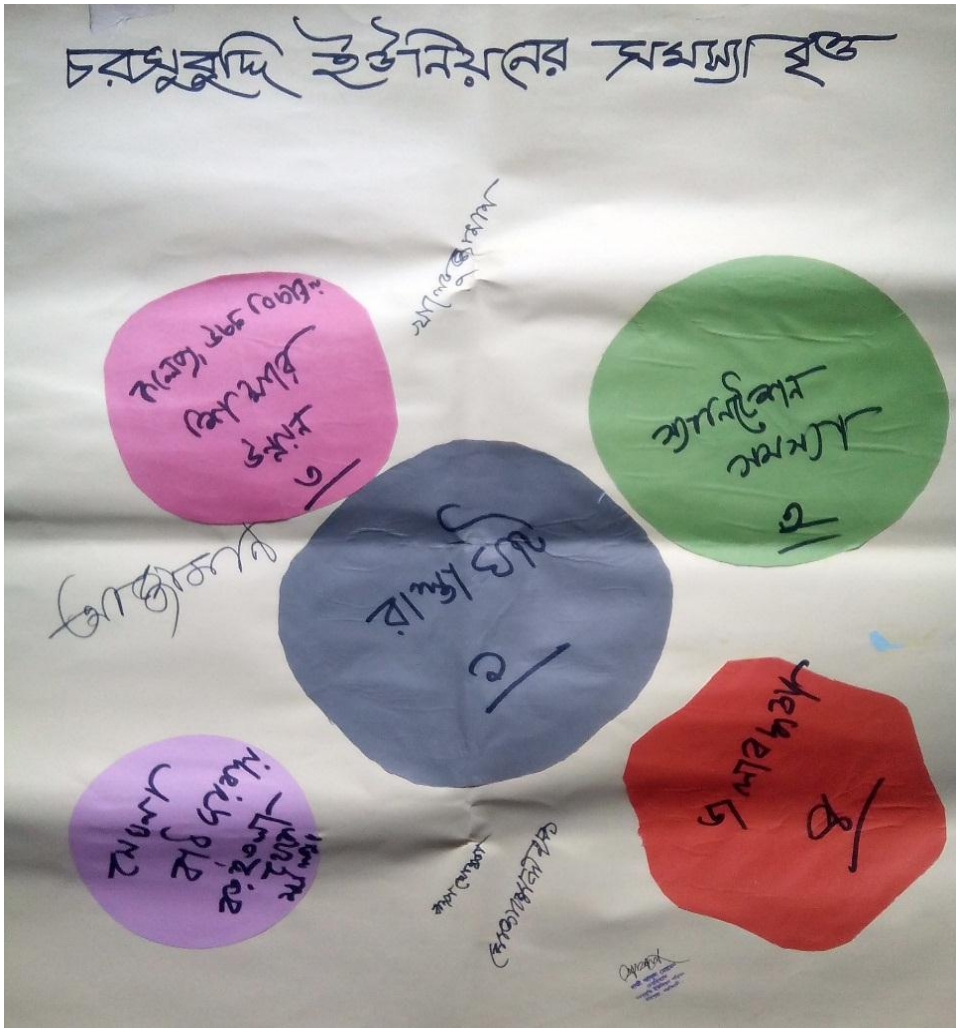
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. The following problems have been identified during PRA which are as follows:

- Lack of teachers and infrastructure
- Communication problem for 10 kilometer
- Roads rep[siring
- No electricity in 25 % area
- Sanitation problem
- Need Meghna River embankment
- Allowance for adult and disabled person
- Repairing eidgah field
- Deep tube-well
- Canal for irrigation
- Unemployment
- Drug addiction
- Play ground
- Water logging
- Cold storage
- Lack of residences for poor people
- Need agricultural consultancy

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. Poor Transportation System
2. Lack of Educational Facilities
3. Lack of Sanitation
4. lack of Embankment
5. Waterlogging



Photograph 9.3: Venn diagram

9.3.c 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;

- Banana
- Fish (pond)
- Agriculture
- Poultry
- River
- Cattle rearing
- Human resource

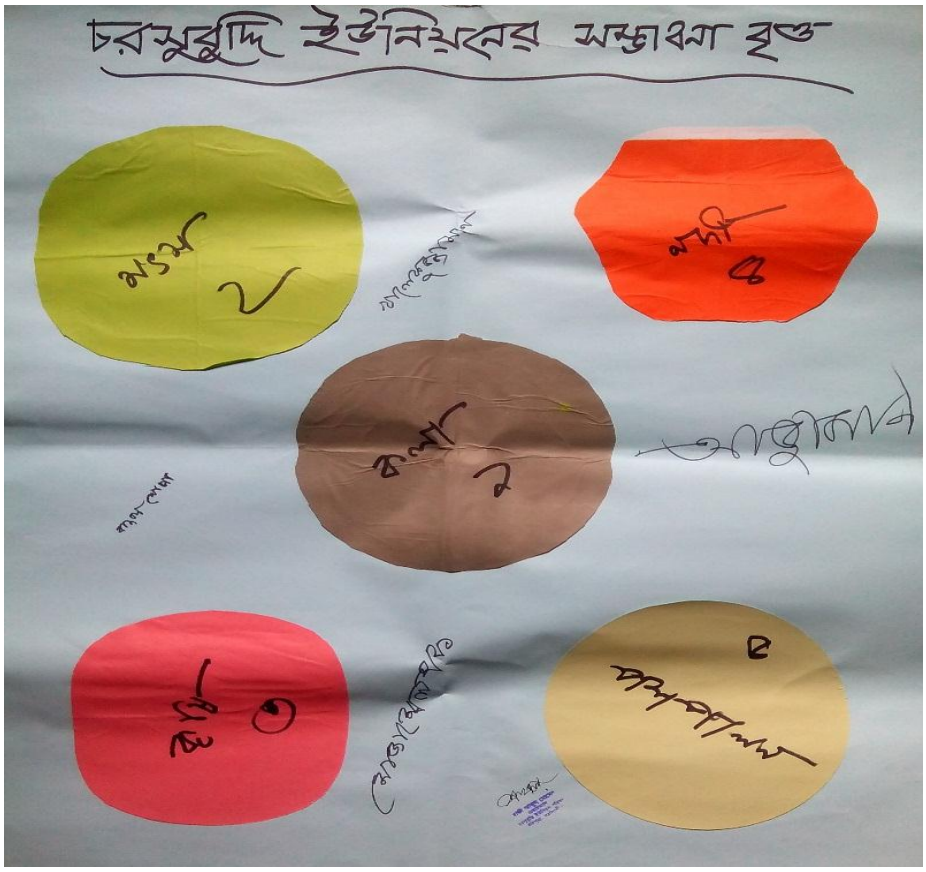


Figure 9.1: Major Five Potentials

9.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 9.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Problem of much rain • Green and brick road but heavy vehicles	• Problem of transportation	• Transport development • Economic development

2.Trouble of sanitation	• Lack of budget	• Disease and virus	• Health development
3.Trouble of education system	• Lack of govt. enterprise	• No educational development is increasing • Institution is far area • Poverty	• Educational development
4.Water drainage problem	• Filled river • Illegal possession	• No agricultural development • Flooded 20 bigha land	• Agricultural development
5.Trouble of embankment	• Lack of budget • Lack of economy	• Baritala river erosion	• To protect erosion

9.4 Perceived Development Priorities for Char Shubuddhi Union under Narshingdi District.

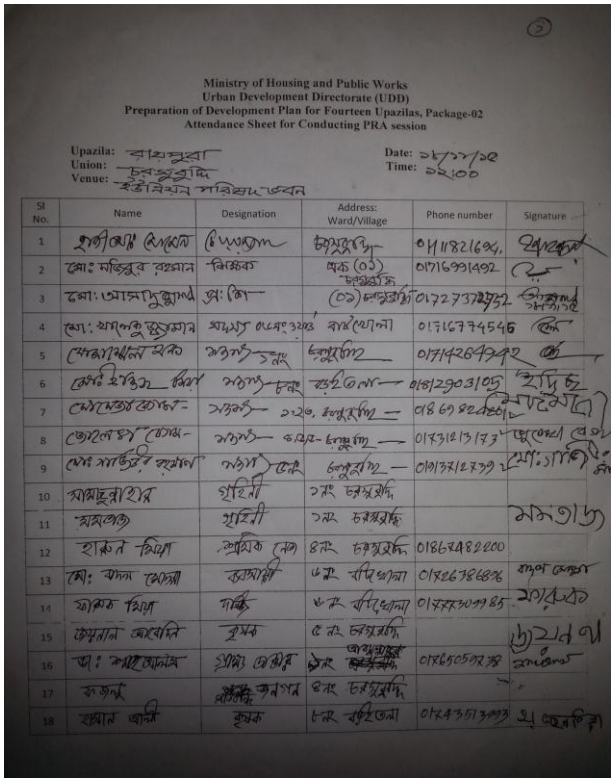
The recommended development priorities for Char shubuddhi Union are as follows:

Table 9.2: Development Priorities for Char Shubuddhi Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of new high school • Demand of college • Demand of teachers • Demand of repair road • Demand of new concrete road • Demand of bridge • Demand of culvert • Demand of guide wall beside road • Demand of drag free Union • Demand of increasing salary of village police • Demand of developed community police • Demand of increasing oldest	• Demand of U.P. complex • Demand of embankment • Demand of preventing river erosion Demand of development of bazar • Demand of developed education system • Demand of development of health services • Demand of development of Entertainment • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system	• Demand of

allowance • Demand of increasing widow allowance • Demand of increasing disabled allowance		

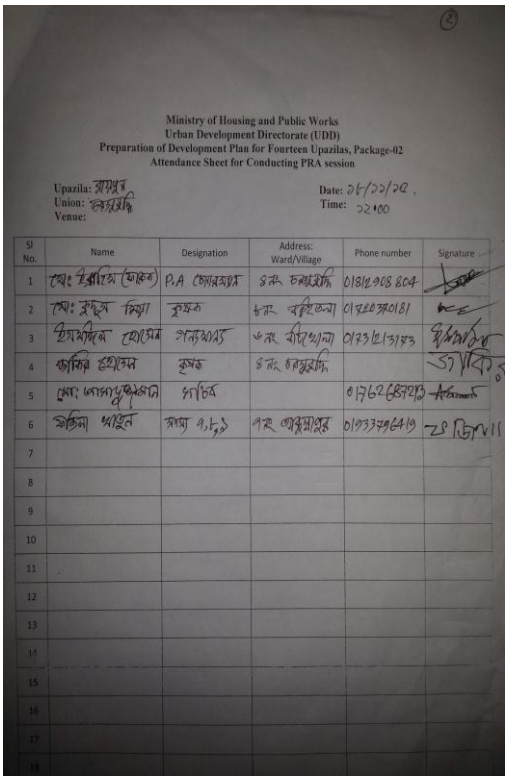
9.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চরসুন্দুরদি
Venue: ইউনিয়ন পরিষদ ভবন
Date: ২৮/১১/১৫
Time: ১২:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible]	চরসুন্দুরদি	01711821604	
2	মোঃ মজিবুর রহমান	বিক্রেতা	ওয়ার্ড (০১)	01716991492	
3	মোঃ আসাদুজ্জামান	প্রঃ শিঃ	(০১) চরসুন্দুরদি	01727372752	
4	মোঃ খাদেমুল ইসলাম	সহকারী প্রকৌশলী	বার্ড রায়পুরা	01716774546	
5	মোঃ মাহবুব [illegible]	সভাপতি	চরসুন্দুরদি	01714264742	
6	মোঃ [illegible]	সভাপতি	[illegible]	01812903105	
7	মোঃ [illegible]	সভাপতি	১২৩, চরসুন্দুরদি	01869824[illegible]	
8	[illegible]	সভাপতি	৬নং চরসুন্দুরদি	01731213173	
9	মোঃ সাইফুর রহমান	সভাপতি	চরসুন্দুরদি	01913712739	
10	সামছুন্নাহার	গৃহিনী	১নং চরসুন্দুরদি		
11	[illegible]	গৃহিনী	১নং চরসুন্দুরদি		
12	হারুন মিয়া	শ্রমিক নেতা	৪নং চরসুন্দুরদি	01867482200	
13	মোঃ [illegible]	[illegible]	৬নং বাঁধখোলা	01826786896	
14	[illegible] মিয়া	[illegible]	৬নং বাঁধখোলা	01[illegible]9985	
15	[illegible]	কৃষক	৫নং চরসুন্দুরদি		
16	ডাঃ [illegible]	[illegible]	৬নং বাঁধখোলা	01865052738	
17	[illegible]	[illegible]	৪নং চরসুন্দুরদি		
18	হাসান আলী	কৃষক	৮নং বাঁধখোলা	01743513993	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চরসুন্দুরদি
Venue:
Date: ২৮/১১/১৫
Time: ১২:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মোঃ ইদ্রিস (মিঠু)	P.A চেয়ারম্যান	৪নং চরসুন্দুরদি	01812908804	
2	মোঃ কুদ্দুস মিয়া	কৃষক	৮নং বাঁধখোলা	01720370181	
3	ইসমাইল হোসেন	গার্মেন্টস	৬নং বাঁধখোলা	01731213173	
4	জাকির হোসেন	কৃষক	৪নং চরসুন্দুরদি		
5	মোঃ আলাউদ্দিন	সচিব		01762687[illegible]	
6	জিল্লা খাইরুল	[illegible]	৭নং আবুমাদুর	01933796419	
7					
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10.0 Daukar Char Union

10.1 Overview (Study Area)

Daukarchar Union under the administrative jurisdiction of Raipura Upazilla in Norshindi District has an area of 14.70 km2. The boundary of the study area is stated below:

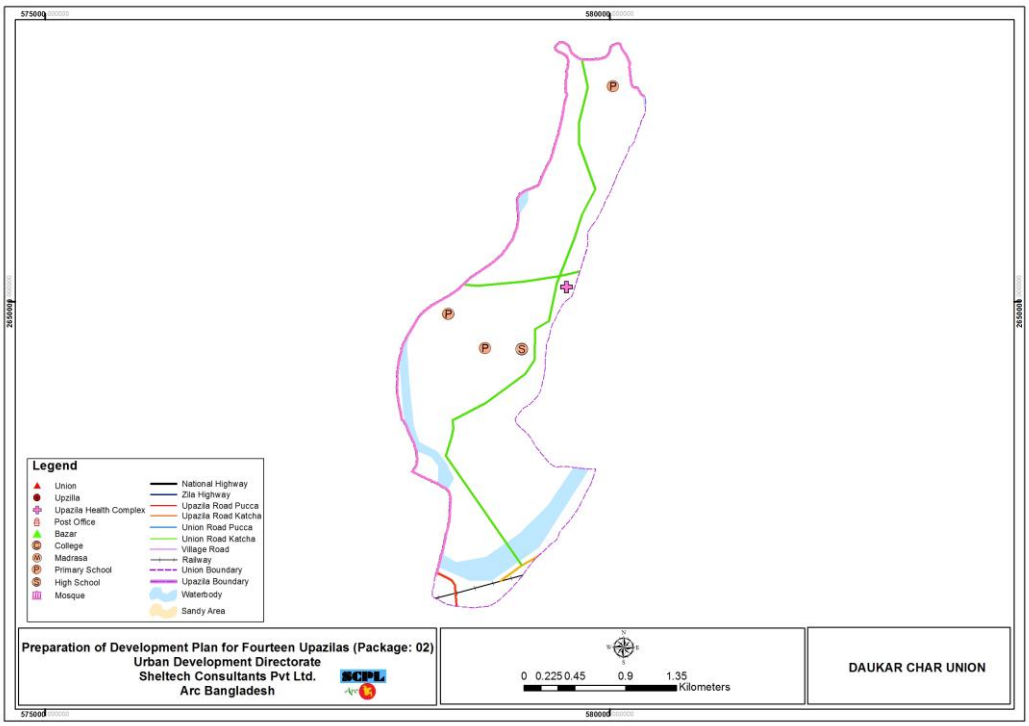
North: On the north side of the study area, Baghab Union is situated

West: On the west side of the study area, Ayubpur Union(Shibpur upazilla) is located

South: On the south side of the study area, Aarialkha and over the river Amirgoan Union are located

East: On the east side of the study area, Aarial kha and over the river Adiabad Union are located.

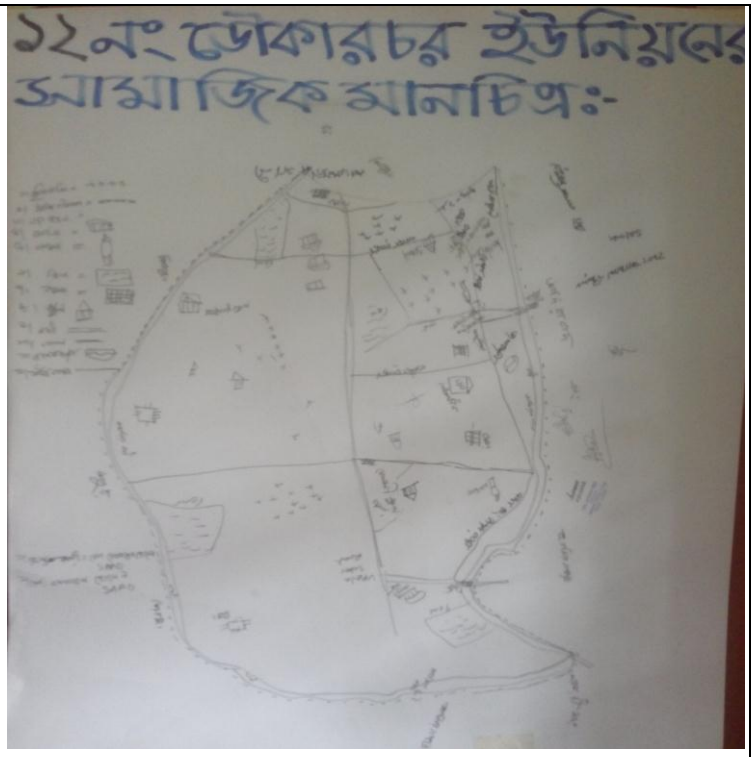
Map 10.1: Daukar Char Union



10.2 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 Daukar Char Union 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/madrasa, 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 10.1: Preparing Social Map	**Photograph 10.2: Social Map of Daukar Char Union**

10.3 Major Problems and Potentials

10.3.a Problems Identification

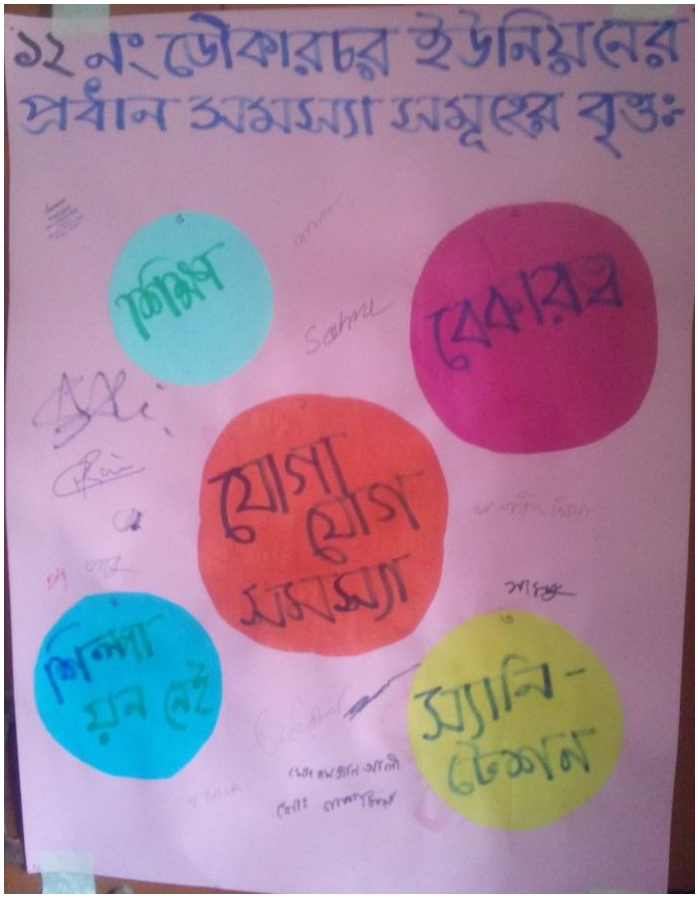
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

- Weak communication system(Earthen road, broken road, bridge culvert)
- Problem of sanitation
- Problem of pure drinking water(contaminated with Arsenic,iron)
- Problem of irrigation and drain
- Unplanned housing
- Problem of water logging(Ward no 3, 1600 decimal land
- Unplanned switch gate 9Ward no 2 and 3)
- Problem of Canal dredging (Ward no 6)
- Problem of river dredging(Paharia River and Arial Kha River)
- Lack of disaster resistant shelter center
- Lack of veterinary health services
- Lack of modern education system(Shortage of college and Primary school)
- Lack of embankment(The river of Arial Kha and Paharia (Ward no 1,2,3 and 4)
- Lack of agricultural extension services center(No sub center, no proper policy of irrigation
- Unplanned plantation (Rain tree over the agricultural land, Wooden tree plantation in homestead, Plantation environment polluted and shortage of plantation fruit trees in homestead)
- Electricity(Load shedding, no electricity, minimum capacity in the electricity line)
- Hampered of internet service (very low speed, no direct line with submarine cable)
- Gas problem
- Unemployment
- Industrialization
- Problem of Union mouza (Area problem, Dawker Char Union land follows and management by Adiabad Union mouza)
- Problem of health services (Shortage of community clinic, doctor and medicine)

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. Poor Transportation System
2. Unemployment
3. Problem of sanitation
4. Lack of Industrialization
5. Lack of modern education services



Photograph 10.3: Major five Problems

10.3.c 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;

- Agricultural land(rice and vegetables)
- Fruit garden(Lemon, Guava and banana)
- Bill(4 bill)
- Foreign remittance
- Fisheries
- Handloom (Ward no 6)
- Poultry
- Hard working people
- River (Paharia and Arial Kha)
- Bazar (Govt. 1 and private 1)

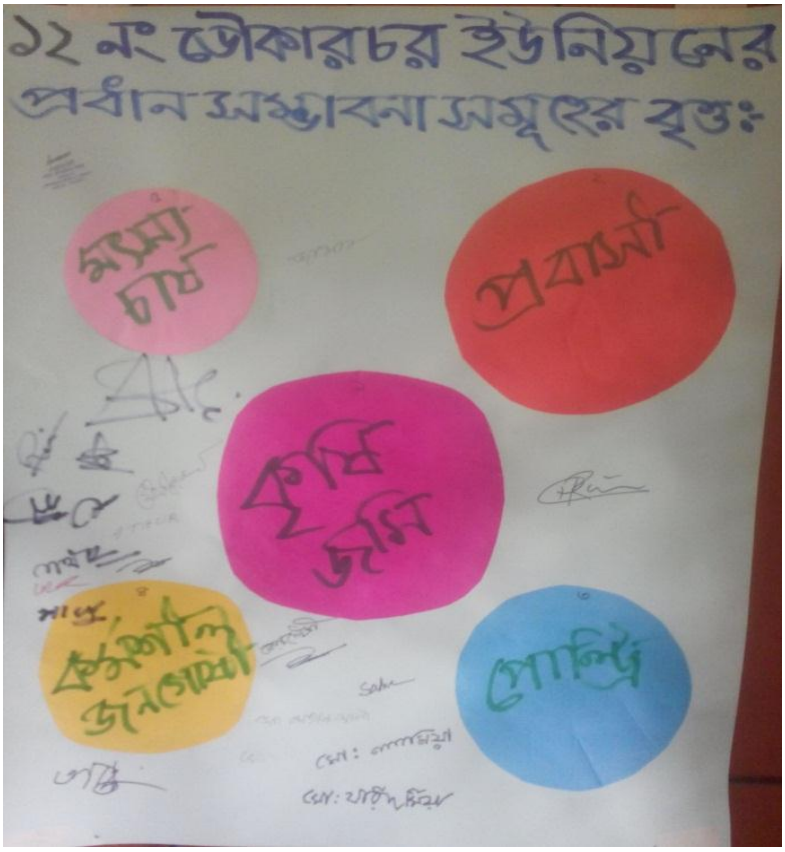


Figure 10.1: Major Five Potential

10.3.d 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, effect/impact and potentials have furnished in the following table;

Table 10.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1. Poor Transportation System	• Earthen roads, broken roads, bridge culverts are broken • Shortage of budget	• Costly transportation • Increase product transport cost • Hampered of children education • More time spending	• Existing necessary land • Hardworking people
2. Unemployment	• Shortage of employment • No industrialization • Lack of vocational education	• Increased poverty. • Hampered economical development • Young forces run away to danger roads	• Sufficient land to established industry in the locality

3.Sanitation	• Total Union no 100% hundred percent hygienic latrine coverage • People are shortage of conscious • Lack of budget • povertyness	• Increase various diseases in the locality • People are using sanitation in open spaces as a result environment are polluted	• More cordial in the local people • Chairman are cordial and taking initiative
4.No Industrialization	• Shortage of gas connection • Not available of electricity connection • Shortage of local entrepreneur	• Not increase to opportunity of employment • Increase unemployment rate • People are facing economical losses	• Sufficient land to established industrialization • Hard working people
5.Education	• Poor Transportation system • No institution to higher education • Shortage o college and primary school • Structural problem	• Decrease of educational rate • Man are not conscious • Development is hampered.	• Hard working and educated people

10.4 Perceived Development Priorities for Daukar Char Union under Narshingdi District.

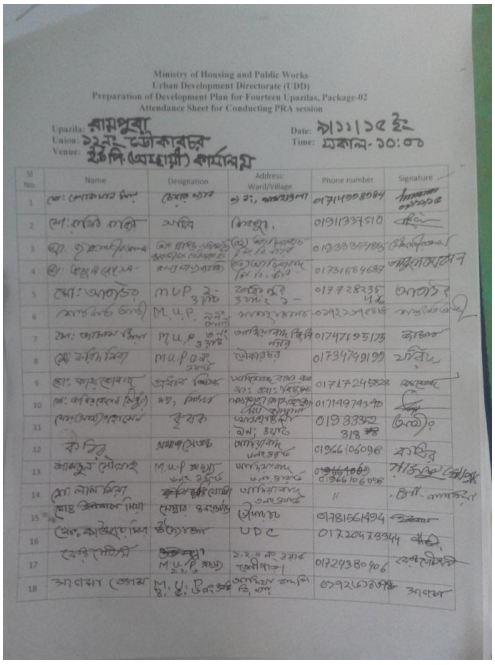
The recommended development priorities for Daukar Char Union is as follows;

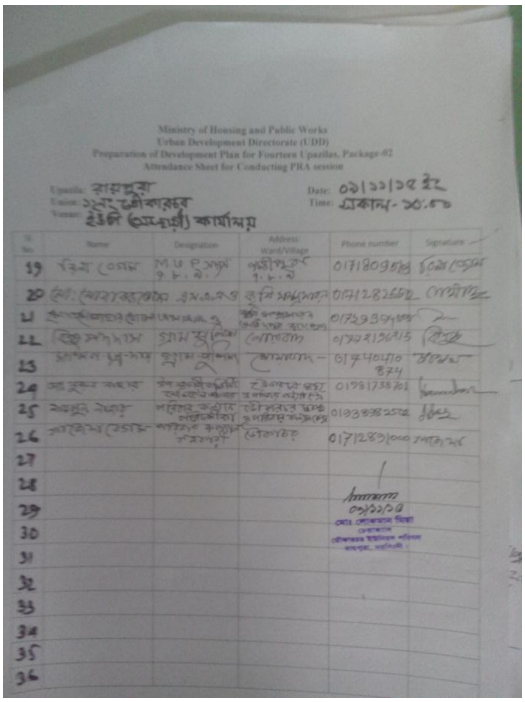
Table 10.2: Development Priorities for Daukar Char Union

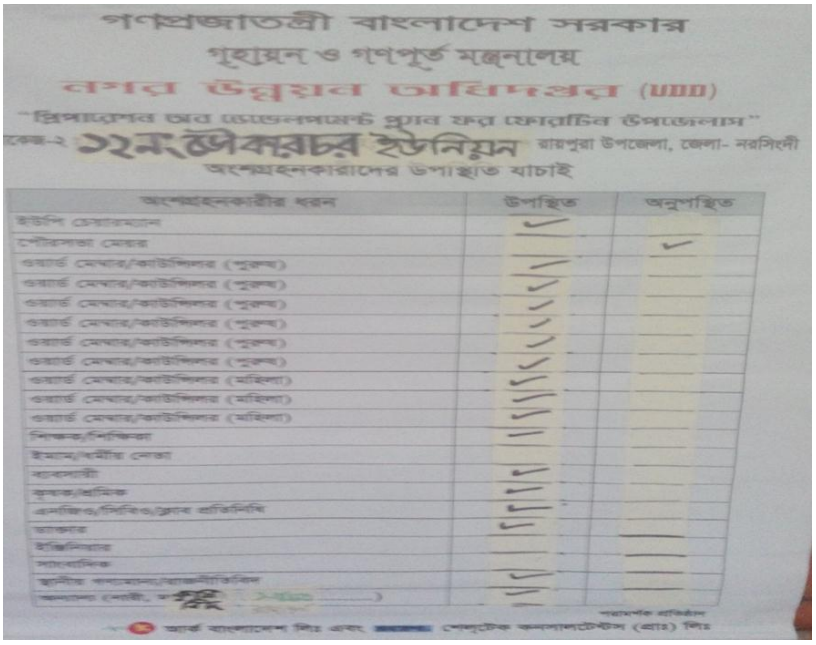
Short term	Midterm	Long term
• Demand of development of transportation. • Developed modern educational system. • Demand of developed modern health services • Demand of electricity • Demand of developed agricultural system • Demand of employment • Demand of Sanitation • Demand of established industrialization • Demand of gas connection • Demand of speedy internet	• Demand of development of transportation. • Developed educational system. • Demand of developed modern health services • Demand of electricity • Demand of employment • Demand of Sanitation • Demand of established industrialization • Demand of gas connection • Demand of freedom fighter building	• Demand of development of transportation. • Developed educational system. • Demand of established industrialization • Demand of employment •

• Demand of freedom fighter building		

10.5 Attendance Sheet of Participants







11.0 Hairmara Union

11.1 Overview (Study Area)

The Hairmara Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows

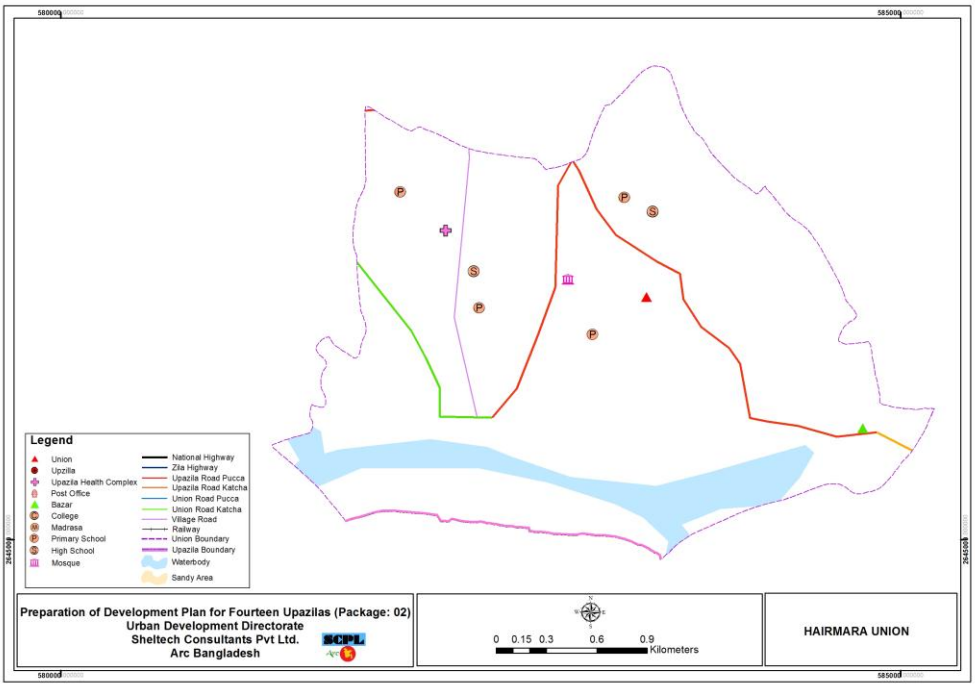
North: On the north side of the study area, Mirzanagar Union is situated.

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

South: On the south side of the study area, Narshingi sadar and Meghna River are located

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

Map 11.1: Hairmara Union

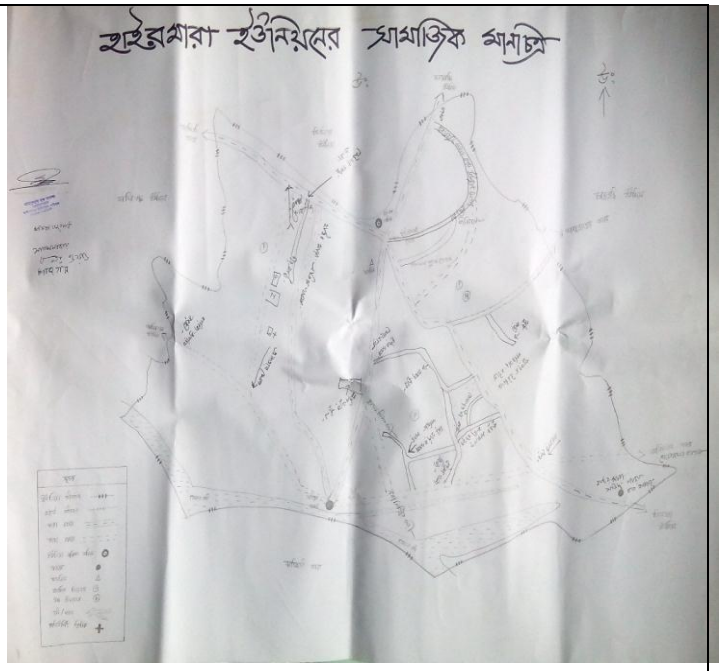


11.2 Spatial Aspects

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 Hairmara Union 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/madrasa, 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 11.1: Hairmara Union



Photograph 11.2: Social Map of Hairmara 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:

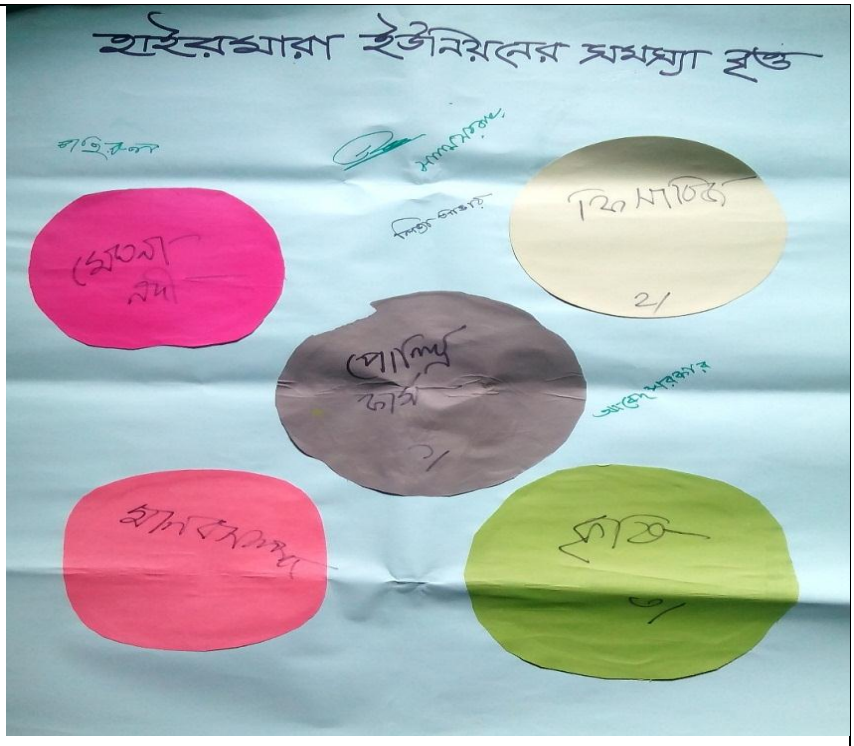
- Road construction
- Electricity fulfillments
- Sanitation
- Unemployment
- Widow, old, handicraft allowance
- Water logging at 4,5 no .word by which 500 acres land affected
- Canal digging
- Calvert making needs 30

- Needs high school and college
- Drain
- Union complex
- Health complex
- Connection of gas
- Orphan institution developments with religious institution
- Making a embankment near Meghna
- Irrigation developments

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. Poor Transportation System
2. Problem of electricity
3. Trouble of education system
4. Problem of health
5. Lack of Vocational Training



Photograph 11.3: Venn diagram

11.3.c 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;

- Agriculture (Vegetables, rice and banana)
- Foreign remittance
- Bazar(Radhaganj)
- River (Arial Kha)
- Fisheries
- Poultry
- Cattle rearing
- Beel (Large size beel)
- Canal (Purbo para)
- Educated people
- Hard working people
- Bamboo and wood
- Small and cottage industry

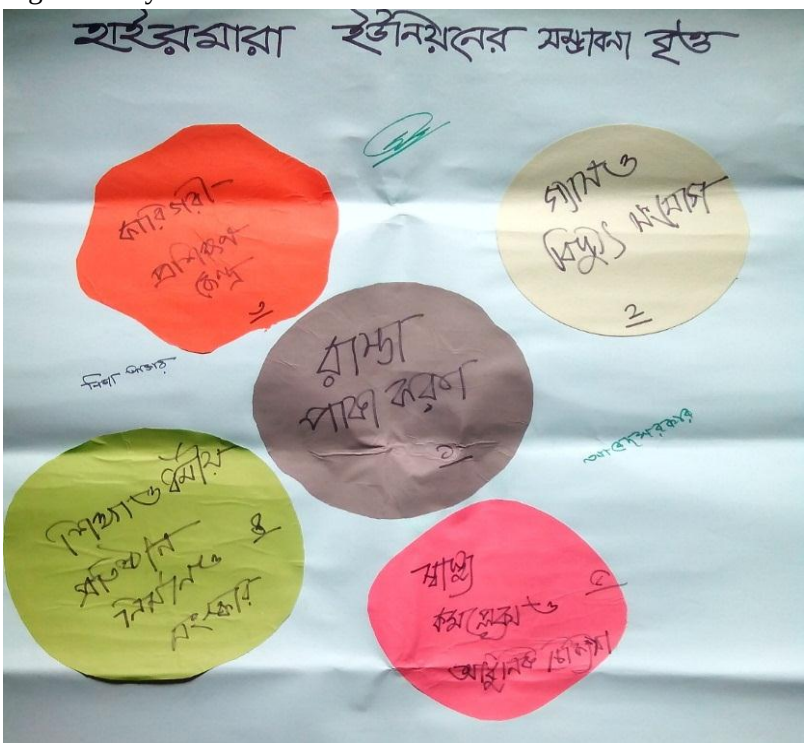


Figure 11.1: Major Five Potentials

11.3.d 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, effect/impact and potentials have furnished in the following table;

Table 11.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Problem of repairing	• Financial loss • Problem of transportation agricultural goods	• Economic development
2.Problem of electricity	• Their limitations supply • Lack of electricity line supply	• Problem of study • Increasing production cost in industry	• Poultry farm • Build industry
3.Trouble of education system	• Lack of teachers • Lack of classroom in the educational institutions • Problem of managing committee	• Decreasing of educational rate • Students are in danger road • Increase early marriage • Increase social chaos	• Enough school and college existing(2high school, one college and five primary school exists • Local conscious people
4.Problem of health	• Doctor doesn't come proper time • Lack of oversight	• People are not getting proper treatment • High cost for treatment	• Patients may die • Health risk is increasing
5.Lack of vocational institution	• Lack of budget	• Unemployment is increasing	• Waste of economy

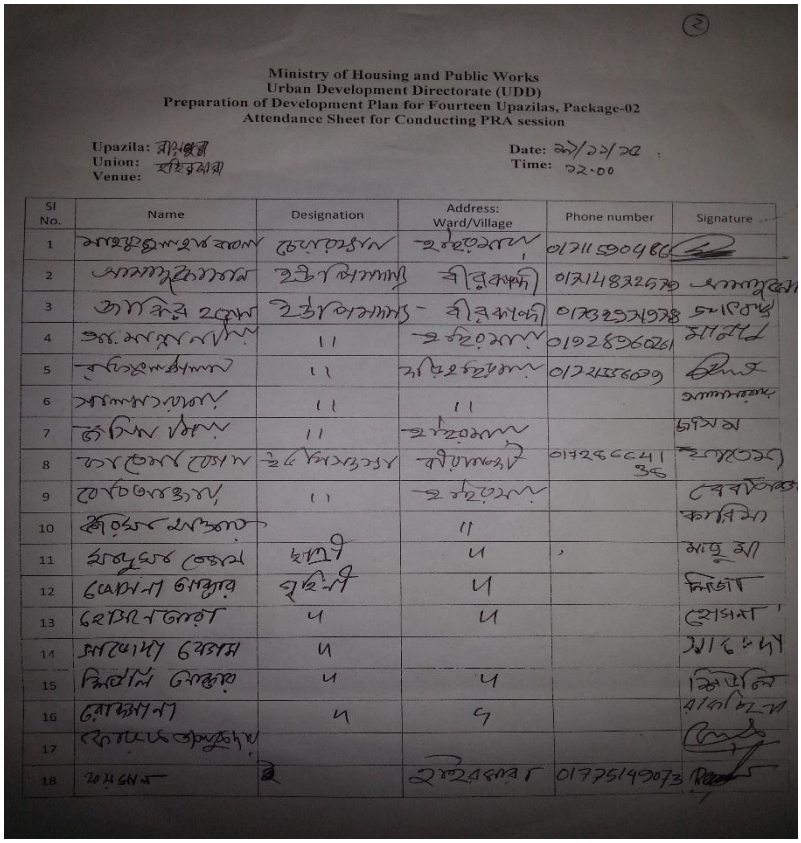
11.4 Perceived Development Priorities for Hairmara Union under Narshingdi District.

The recommended development priorities for Hairmara Union is as follows;

Table 3.11.2: Development Priorities for Hairmara Union

Short term	Midterm	Long term
• Demand of safe water and electricity • Demand of digital post office • Demand of development of bazar • Demand of Employment • Demand of disaster resistant shelter center • Demand of established U.P. complex • Demand of developed education system • Demand of development of transportation system • Demand of development of agriculture and veterinary • Demand of embankment • Demand of modern sanitation system • Demand of developed agricultural irrigation and drainage • Demand of development of Entertainment • Demand of development of health services	• Demand of development of bazar • Demand of developed education system • Demand of development of health services • Demand of development of Entertainment • Demand of embankment • Demand of digital post office • Demand of development of agriculture and veterinary • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system	

11.5 Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union:
Venue: রহিমাবাদ

Date: ২৯/১১/১৫
Time: ১২:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	চেয়ারম্যান	রহিমাবাদ	01711590466	
2	[illegible]	ইউপি সদস্য	বীরকান্দি	01714832679	[illegible]
3	[illegible]	ইউপি সদস্য	বীরকান্দি	01732534938	[illegible]
4	[illegible]	"	রহিমাবাদ	01928396026	[illegible]
5	[illegible]	"	রহিমাবাদ	01724556699	[illegible]
6	[illegible]	"	"		[illegible]
7	[illegible]	"	রহিমাবাদ		[illegible]
8	[illegible]	[illegible]	বীরকান্দি	01726666[illegible]	[illegible]
9	[illegible]	"	রহিমাবাদ		[illegible]
10	[illegible]		"		[illegible]
11	[illegible]	[illegible]	"		[illegible]
12	[illegible]	[illegible]	"		[illegible]
13	[illegible]	"	"		[illegible]
14	[illegible]	"			[illegible]
15	[illegible]	"	"		[illegible]
16	[illegible]	"	"		[illegible]
17	[illegible]				[illegible]
18	[illegible]	[illegible]	রহিমাবাদ	01775149073	[illegible]

12.0 Maheshpur Union

12.1 Overview

The Maheshpur Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows;

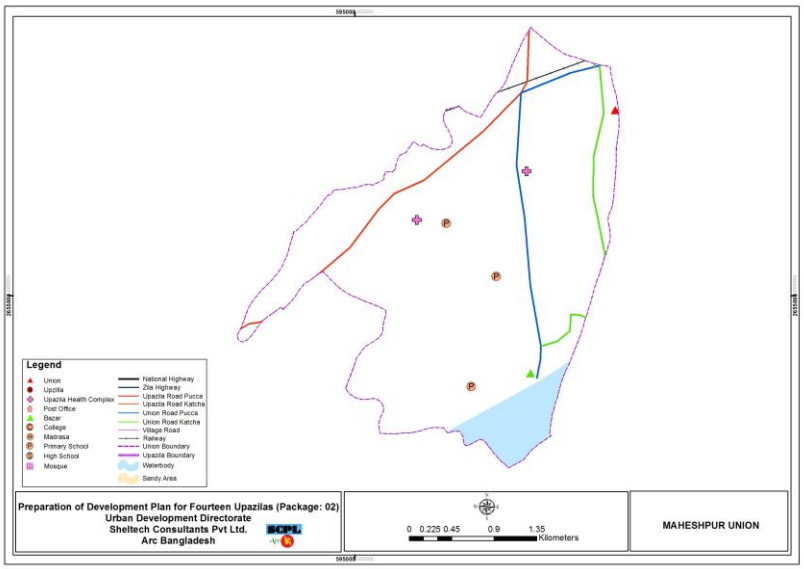
North: On the north side of the study area, Muchhapur Union is situated

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

South: On the south side of the study area, Chandpur Union is located

East: On the east side of the study area, Ashugonj Upazilla is located

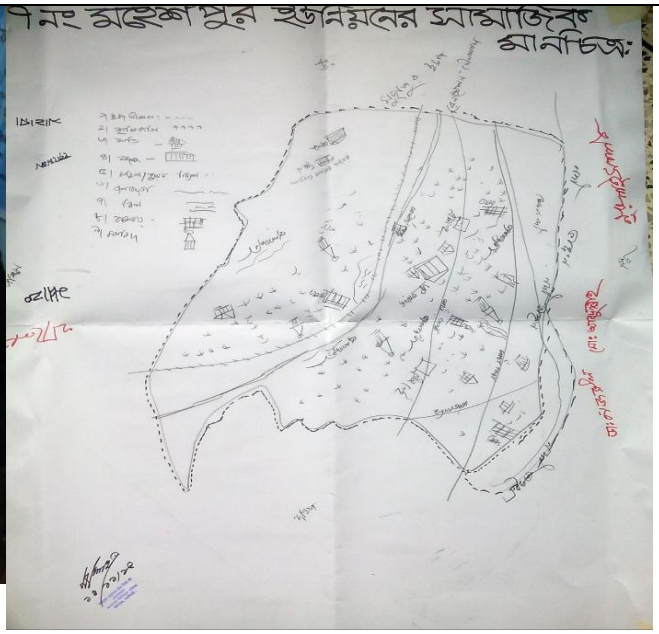
Map 12.1: Maheshpur Union



12.2 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 Maheshpur Union 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/madrasa, 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 12.1:Preparing Social Map	Photograph 12.2: Social Map of Maheshpur Union

12.3 Major Problems and Potentials

12.3.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:

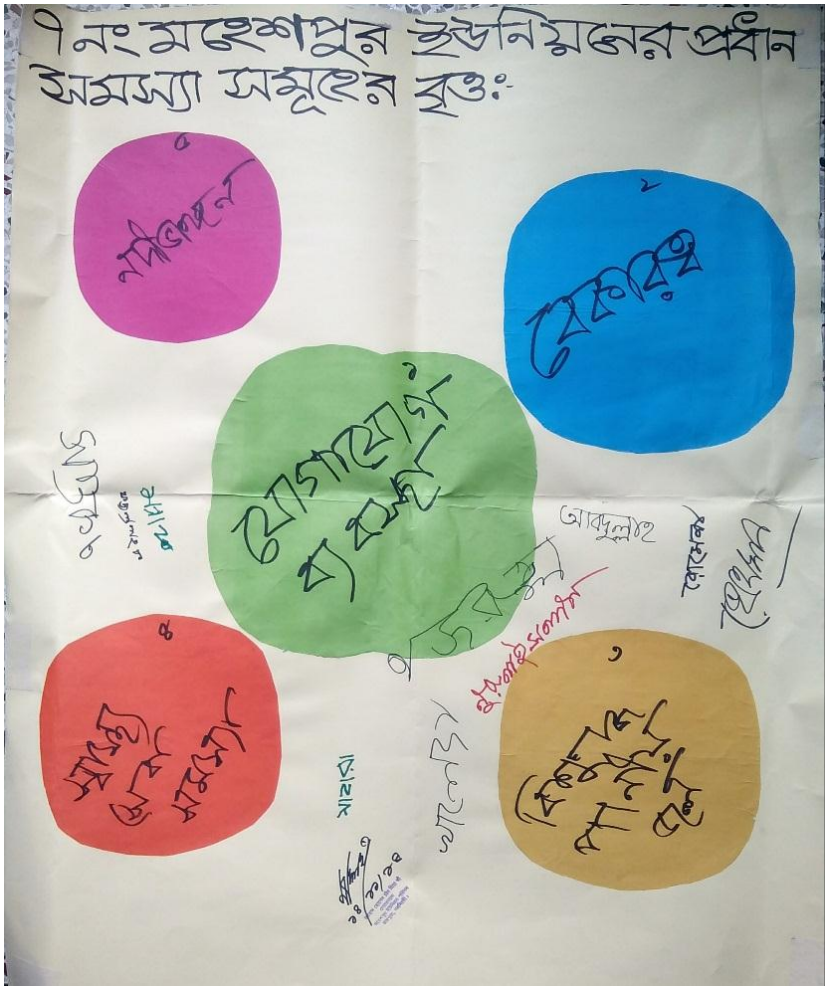
- Poor Transportation (No roads in many areas, Earthen roads , Broken roads, no culvert , no bridge)
- Poverty (Many talented students cannot run their study due to financial problem)
- No Embankment exist (Ward no 5)
- River erosion (Ward no 5,7 and 8)
- Pure drinkable water
- Water logging
- Problem of gas/Fuel
- No Industrialization
- Flood affected area
- Unemployment
- Drug addiction
- Stealing and robbing
- Problem of educational structure (Ward no 8)
- Lack of electricity (Ward no 5)
- No cold storage
- Problem of agricultural product marketing
- Shelter

- Lack of elder, widow and impair card holder
- Lack of sanitation (No public toilet in the market)
- Lack of drainage (Ward no 2,8 and 9)
- Problem of agricultural irrigation
- Problem of emergency health services (No good doctor, no ambulance, problem of transport, no clinic in ward no 7 and 8)

12.3.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. Poor Transportation System
2. Un-employment
3. Lack of Pure drinking water
4. Weak Health Service
5. River Erosion



Photograph 12.3: Venn diagram of Major Five Problems

12.3.c 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;

- Meghna River
- Doulot kandi Rail Station
- Foreign remittance
- Agricultural land
- Catching fish
- NGO (6)
- Branch of industrial bank
- Market (Hat-Bazar 6)
- Agricultural crops (potato, nut, vegetable)
- Bamboo and wood
- Poultry
- Brick industry

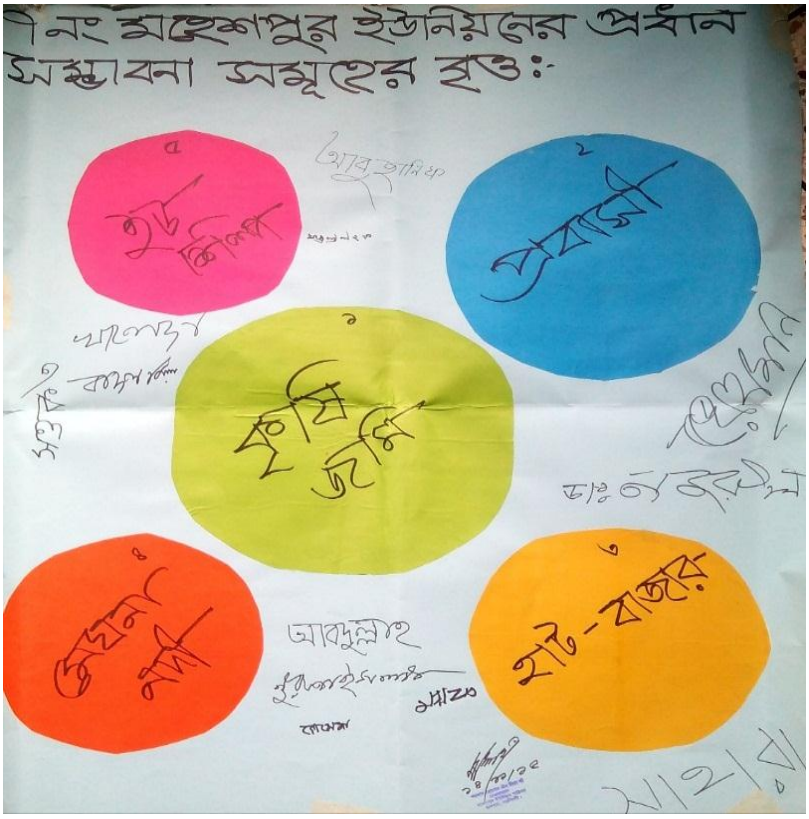


Figure 12.1: Major Five Potentials

12.3.d 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 have furnished in the following table;

Table 12.1: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget	• Financial loss • Problem of transportation • More time spending • Problem for school going children • Difficult for bearing patient	• Existing necessary land for road construction • Many green road are available for construct concrete
2.Unemployment	• No opportunity of employments • Lack of industrialization • Want of proper surveillance of authorizes	• Young people are being imperil • Poverty is increasing day by day • Social anxiety is increasing	• Active people • Enough industrialization is possible because of it is the bank of the Meghna River
3.Lack of safe drinking water	• Arsenic and iron mixed with water • Lack of budget and allotment • Want of deep tube-well in the Union • No good quality doctor • Lack of hospital and community clinic •	• People are drinking unsafe water without getting safe drinking water • Health risk is increasing	• Local agents are enough sincere • Mr. Farhad Hossain Chan Mia the chairman of Mahespur Union is enough sincere

4.Weak health service	• Patient bearing is difficult because of underdeveloped transport system • No well treatment system for pregnancy and delivering woman	• Lot of patient die way of going or underdeveloped situation their • Delivering and pregnancy women are facing difficult problem want of consultant	• 3 community clinic • 1 F.W.C.
5.River erosion	• Lack of budget and allotment • Indifference of local agent	• Lot of the area is vanishing in river • Many area are endanger of erosion • Agricultural land is vanishing • Percent of homeless people are increasing	• Local active people and agents are sincere

12.4 Perceived Development Priorities for Maheshpur Union under Narshingdi District.

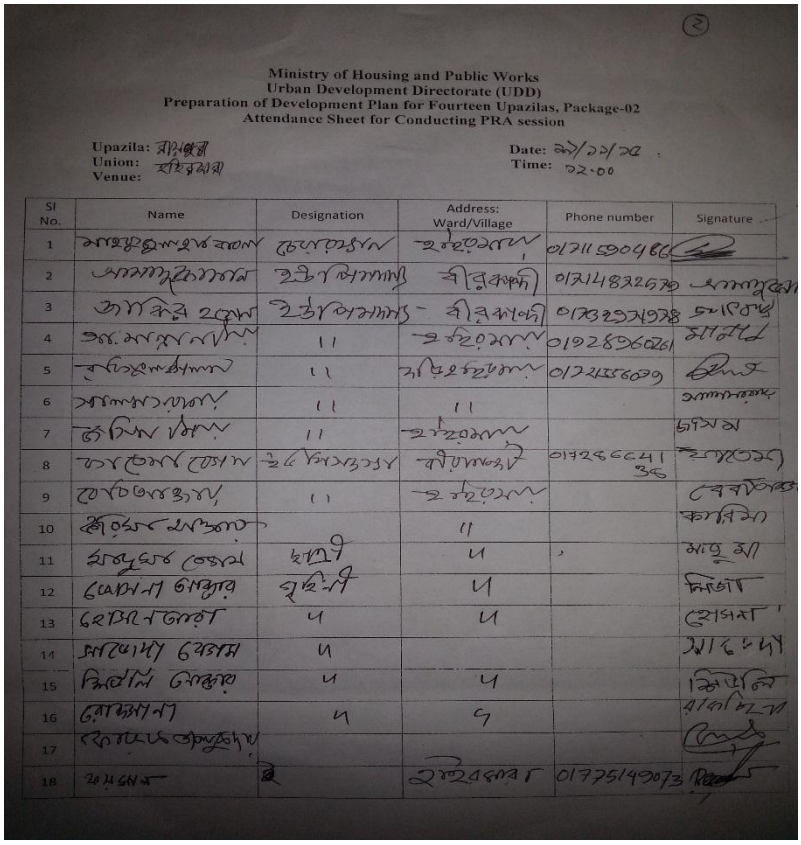
The recommended development priorities of Maheshpur Union are as follows;

Table 12.2: Development Priorities for Maheshpur Union

Short term	Midterm	Long term
• Demand of safe water and electricity • Demand of digital post office • Demand of development of bazar • Demand of Employment • Demand of disaster resistant shelter center • Demand of established U.P. complex • Demand of developed education system • Demand of development of transportation system • Demand of development of agriculture and veterinary • Demand of embankment • Demand of modern sanitation	• Demand of development of bazar • Demand of developed education system • Demand of development of health services • Demand of development of Entertainment • Demand of embankment • Demand of digital post office • Demand of development of agriculture and veterinary • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system	• Demand of development of health services • Demand of digital post office • Demand of development of Entertainment • Demand of Employment • Demand of development of agriculture and veterinary • Demand of disaster resistant shelter center

system • Demand of developed agricultural irrigation and drainage • Demand of development of Entertainment • Demand of development of health services		

12.5: Attendant sheet of participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union:
Venue:

Date:
Time: ১২.০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
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13.0 Marjal Union

13.1 Overview (Study Area)

The Marjal Union is under the administrative jurisdiction of Ishwarganj Upazilla of Narshingdi district. The boundary of the Union is as follows;

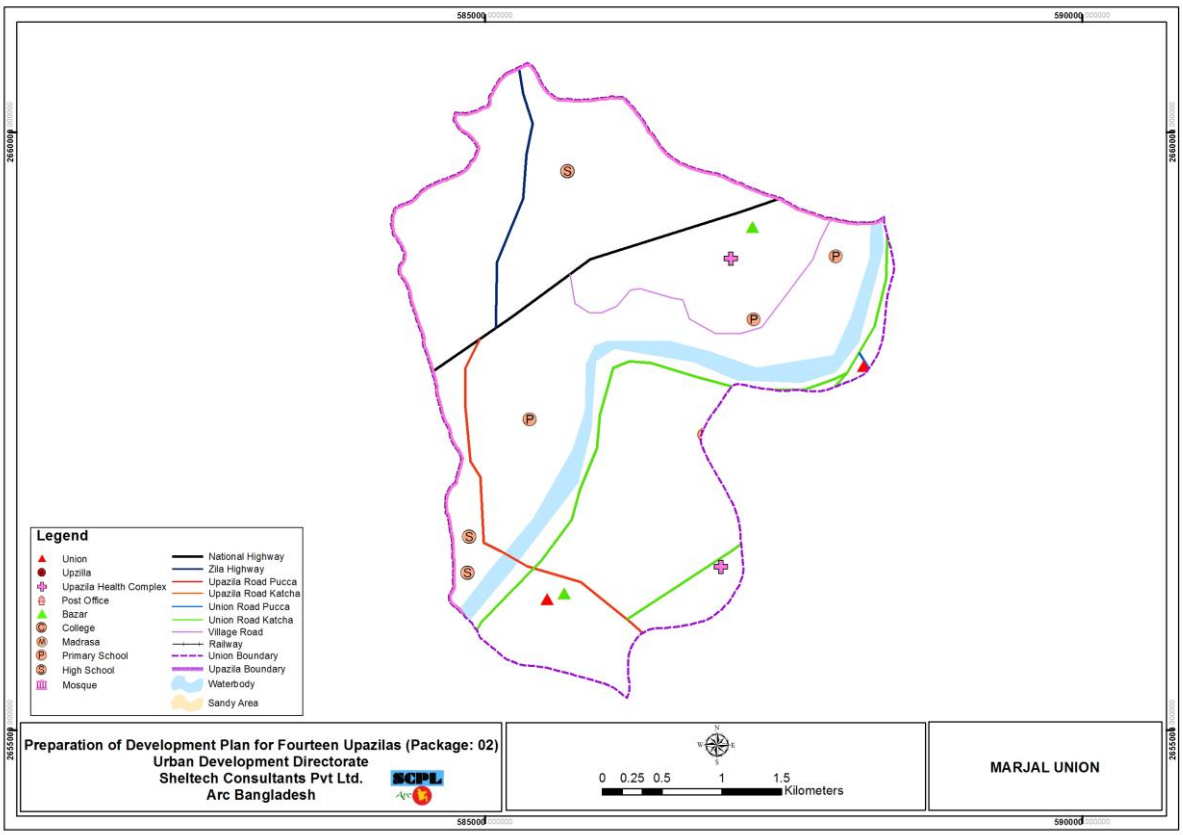
North: On the north side of the study area, Belabo upazilla is situated

West: On the west side of the study area, Shibpur Upazilla is located

South: On the south side of the study area, Polastaly Union is located

East: On the east side of the study area, Olipura Union and Uttar Bakharnagar Union are located

Map 13.1: Marjal Union

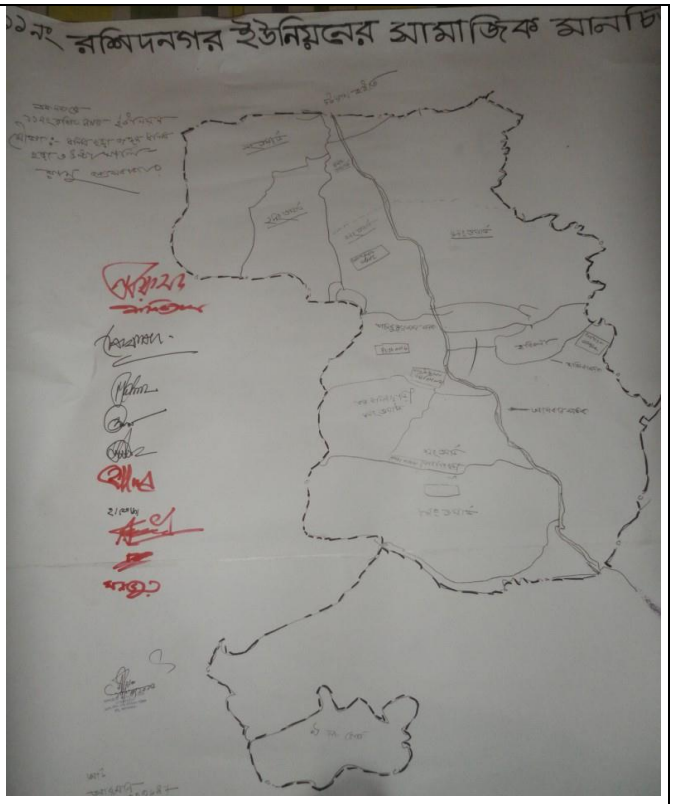


13.2 Spatial Aspects

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 Marjal Union 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/madrasa, 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 13.1: Preparing Social Map



Photograph 13.2: Social Map of Marjal Union

13.3 Major Problems and Potentials

13.3.a Problems Identification

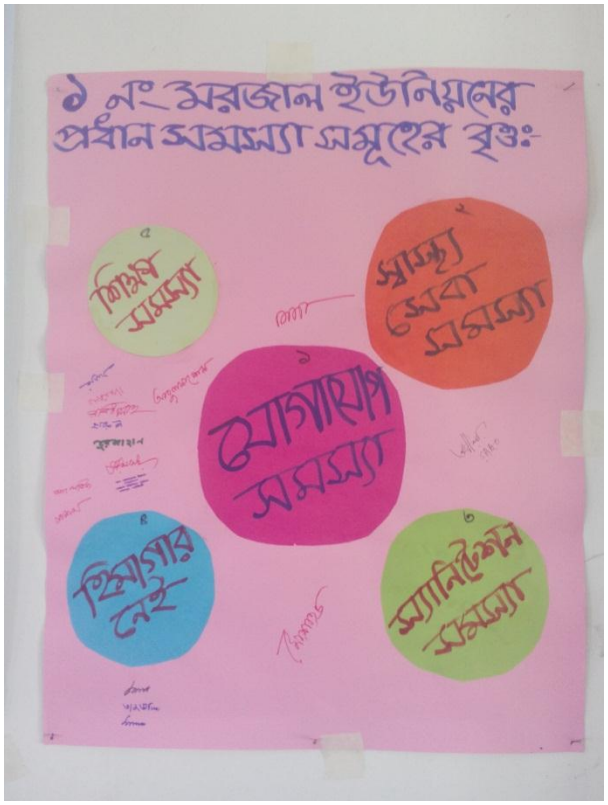
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

- Weak communication system{(Earthen road, broken road,(Ward no 4 and 7)}{lack of bridge(Dookhundir char to CHAR Morjal, Arial kha River)},Broken bridge(Ward no 5)
- Problem of Cold Storage
- Problem of educational system(Shortage of primary school, No college, Risky primary School))
- Problem of product marketing system
- Problem of water logging
- Problem of canal dredging
- Lack of pucca drain for irrigation.
- Problem of guide wall to road side
- No cow hat
- Lack of health services(Doctor, medicine, shortage of hospital)
- Problem of sanitation
- Shortage of tube wells/ pure drinking water (arsenic, iron).
- Shortage of cattle Breeding center and hospital
- Problem of agricultural extension services(Soil test, laboratory, modern high yield seeds)
- No drainage system
- Problem of Unemployment
- Problem of electricity(Load shedding, No electricity connection in maximum area)
- Lack of technical vocational institution
- Drug addiction problem
- Child marriage problem

13.3.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. Poor Transportation System
2. Poor health facilities
3. Lack of Sanitation
4. No Cold Storage
5. Lack Of Education



Photograph 13.3: Venn diagram of Major Five Problems

13.3.c 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;

- Agricultural land(rice and vegetables)
- Fruits garden(Lotkon, Jackfruits and guava)
- Bamboo and wooden trees
- Foreign remittance
- Poultry
- Industry(Including H.B.group, battery Particle board door, Chanachur, Semai ,fish feed and cloth.
- River Arial kha
- Dhaka-Sylhet high way
- Hard working people
- Fisheries

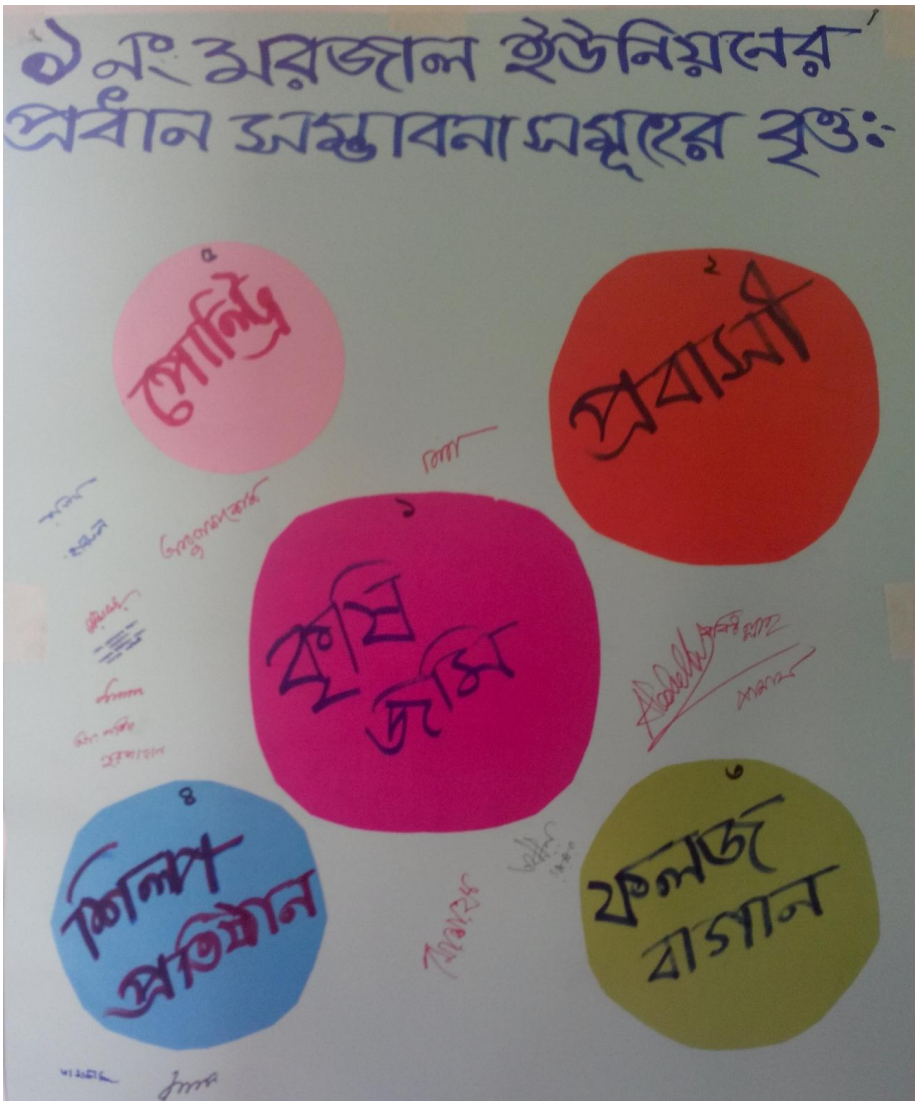


Figure 13.12: Major Five Potential

13.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 13.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Bureaucratic complexity • Shortage of budget • undisciplined budget • As per large Upazilla such 24 Union adapt no proper planning	• Problem of produce product marketing • Children's are facing difficulties to go school • Problem of patient transportation	• Many of earthen road • Repairable roads • Hard working people
2.Problem of health services	• Economical poverty • Shortage of modern hospital and doctor • Shortage of necessary medicine and budget. • Shortage of hospital than manpower	• Union citizen not found emergency health services • Increase mortality of maternal and infant •	• Existing 2 community clinic And 1 F.W.C.
3.Problem of sanitation	• Yet not hygienic latrine more people over the Union • No latrine system • Shortage of budget • People are not well established • Corruption and cheat by N.G.O.s(Collect one thousand taka per household to established hygienic modern sanitary latrine but they did not provide and fled away with bag and baggage)	• As a result people are effected various disease by Passing stool and urine in open spaces	• Existing enough bamboo, wood and sand in the locality

4.No cold storage	• Negligence from top level • Bureaucratic complexity	• Farmers are facing economical losses • Farmers are not found wright price	• Existed enough agricultural land • Where yield lot of vegetables
5.Problem of education system	• Shortage of educational system then students • Problem of structure • Problem of technical vocational institute	• Increase educational cost • Less percentage of education • Students are without getting educational environment students are fall in danger	• Attraction of education and to people and contributor of land in locality • Existing cordial people

13.4 Perceived Development Priorities for Marjal Union under Narshingdi District.

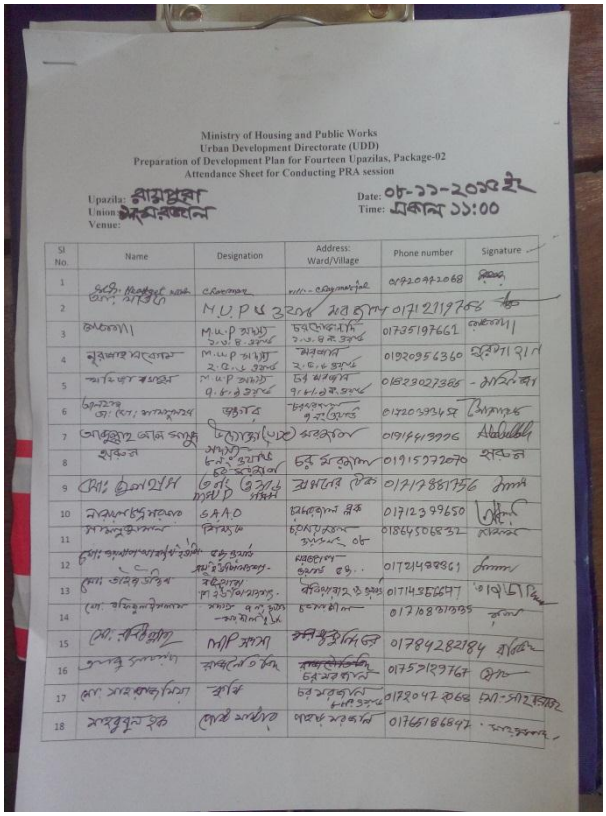
The recommended development priorities of Marjal Union are as follows;

Table 13.2: Identification of Development Plan for Marjal Union

Short term	Midterm	Long term
• Demand of well transportation system. • Demand of cold storage • Demand of Development of established religious institution • Demand of development for poor and unemployed person • Demand of a digital Union • Demand of the solution of electricity problem • Demand of developed modern health services • Demand of developed hygienic sanitation • Demand of tube well • Demand of development of educational institution • Demand of established veterinary hospital • Demand of developed entertainment • Demand of availability of technical vocational education	• Demand of Development of established religious institution • Demand of development of educational institution • Demand of development of bazar • Demand of established veterinary hospital • Demand of well transportation system. • Demand of a digital Union • Demand of industrialization • Demand of agricultural extension center • Demand of development for poor and unemployed person • Demand of availability of technical vocational education • Demand of cold storage	• Demand of established veterinary hospital • Demand of industrialization • Demand of Development of established religious institution • Demand of a digital Union • Demand of development of educational institution • Demand of developed entertainment • Demand of development for poor and unemployed person • Demand of availability of technical vocational education

• Demand of agricultural extension center • Demand of development of bazar • Demand of industrialization		

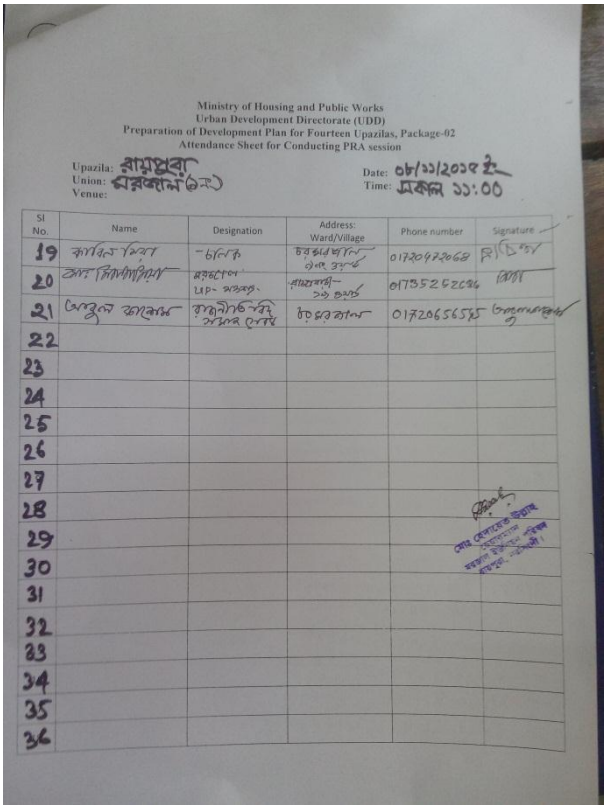
Figure 13.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: চরমরজান
Venue:
Date: ০৮-১১-২০১৫ ইং
Time: সকাল ১১:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1				01720472068	
2		M.U.P সভাপতি	মধ্যচরমজলিস	01712117656	
3		M.U.P সদস্য ২.৩.৪.৫ ওয়ার্ড	চরমজলিস ২.৩.৪.৫ ওয়ার্ড	01735197661	
4		M.U.P সদস্য ২.৩.৪.৫ ওয়ার্ড	মধ্যচর ২.৩.৪.৫ ওয়ার্ড	01920956360	
5		M.U.P সদস্য ৭.৮.৯.১ ওয়ার্ড	চর মজলিস ৭.৮.৯.১ ওয়ার্ড	01823027385	
6				01720539658	
7		উপজেলা (UP)	চরমজলিস	01914139996	
8		সদস্য ৮.৯.১০ ওয়ার্ড	চর মজলিস	01915772070	
9		উপ: ওয়ার্ড সদস্য	মধ্যচর পূর্ব	01717881756	
10		GAAO		01712399650	
11		শিক্ষক	চরমজলিস ৩১৪নং ওয়ার্ড	01866508832	
12				01721492861	
13				01714956647	
14				01768[illegible]	
15		MP সদস্য		01784282184	
16				01752192767	
17			চর মজলিস ৮.৯.১০ ওয়ার্ড	01720472068	
18			পশ্চিম মজলিস	01765186847	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মরজান উঃ
Venue:
Date: ০৮/১১/২০১৫ ইং
Time: সকাল ১১:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19		চালক	চরমজলিস ৭.৮.৯ ওয়ার্ড	01720472068	
20		উপ- সহকা.	মধ্যচর ১১ ওয়ার্ড	01735262026	
21		কৃষিবীজ সহ সরকার	চরমজলিস	01720656585	
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14.0 Mirzanagar Union

14.1 Overview (Study Area)

The Mirzanagar Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi District. The boundary of the Union is as follows;

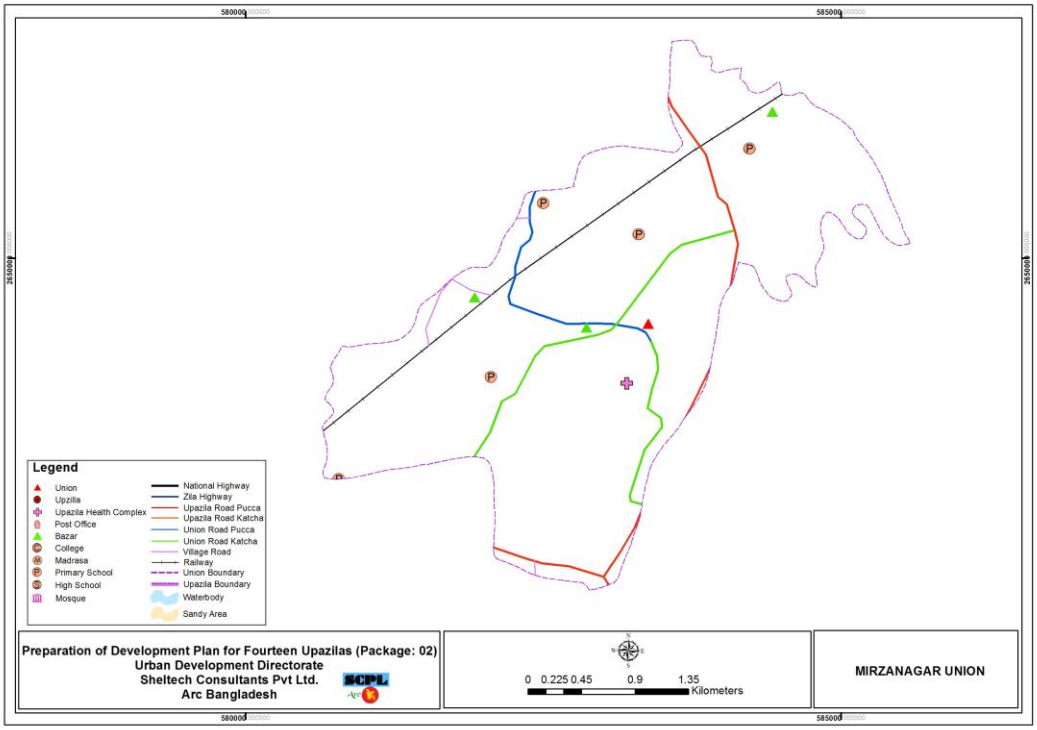
North: On the north side of the study area, Adiabad Union and Polashtaly Union(Raipura Upazilla) are situated

West: On the west side of the study area, Adiyabad Union and Amirganj Union are situated

South: On the south side of the study area, Harinara Union and Amirganj Union are located

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

Map 14.1: Mirzanagar Union

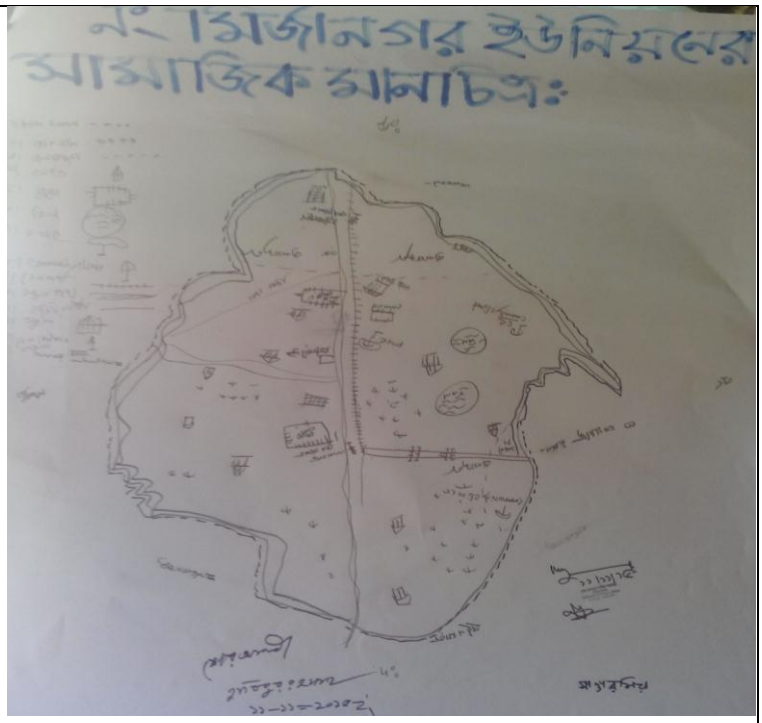


14.2 Spatial Aspects

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 Mirzanagar Union 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/madrasa, 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 14.1: Preparing Social Map



Photograph 14.2: Social Map of Mirzanagar Union

14.3 Major Problems and Potentials

14.3.a 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:

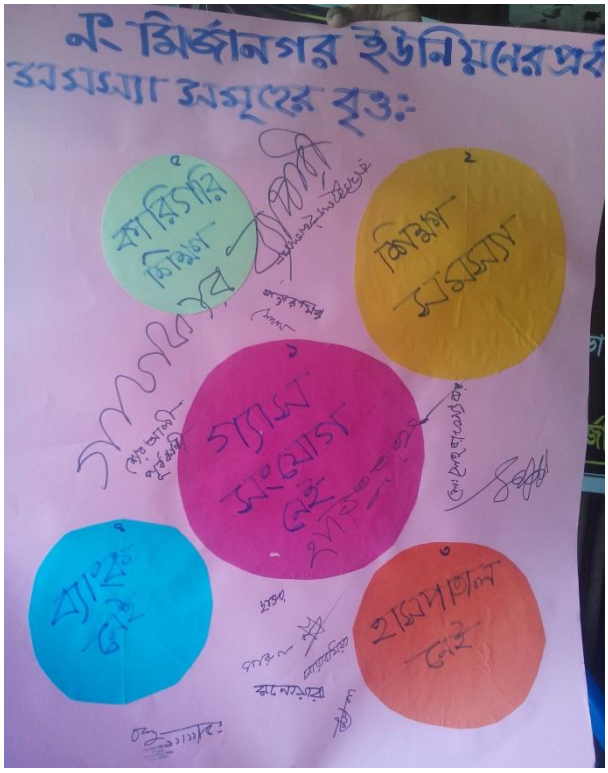
- Lack of large Hospital

- Poor Transportation
- Education system (Lack of school, college and university)
- Disaster resistant shelter center
- Old age home
- Water support
- Vocational and technical education to autism
- No Union parishad complex
- Land office
- Canal/bill dredging
- No Stadium/Entertainment center/ amusement park
- Water logging (All ward but affected in ward no 1 and 2,Water logging in high school field
- Weak law and order
- Drug addiction (Existing 4 spots) earlier 250 spot)
- Eidgah and graveyard
- No central Shahid Minar
- Lack of cadet college
- Commercial bank (Khanabari, Madrasa Bazar and Hatubhanga)
- No Gas line
- Electricity(Load shedding no 100% Electricity
- Unemployment
- No Industrialization (existing small and medium industry, No large industry)
- Bathing problem (lack of space to bathing, Ward no 9)
- Sanitation problem
- No training center for young people
- No vocational technical center

14.3.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. No Gas Connection
2. Education Problem
3. Lack of Large Hospital
4. No Bank
5. Technical Education Problem



Photograph 14.3: Major five Problems

14.3.c 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;

- Two Railway Station(Hatubhanga and Khanabari)
- Bazar(Hatubhanga and Khanabari)
- Poultry
- Cattle rearing(Small scale)
- Fisheries(Large scale)
- Foreign remittance
- Hard working people
- Traditional handloom
- Small and cottage industry
- Business
- Luminaire (Former minister, Secretary and Freedom fighter)

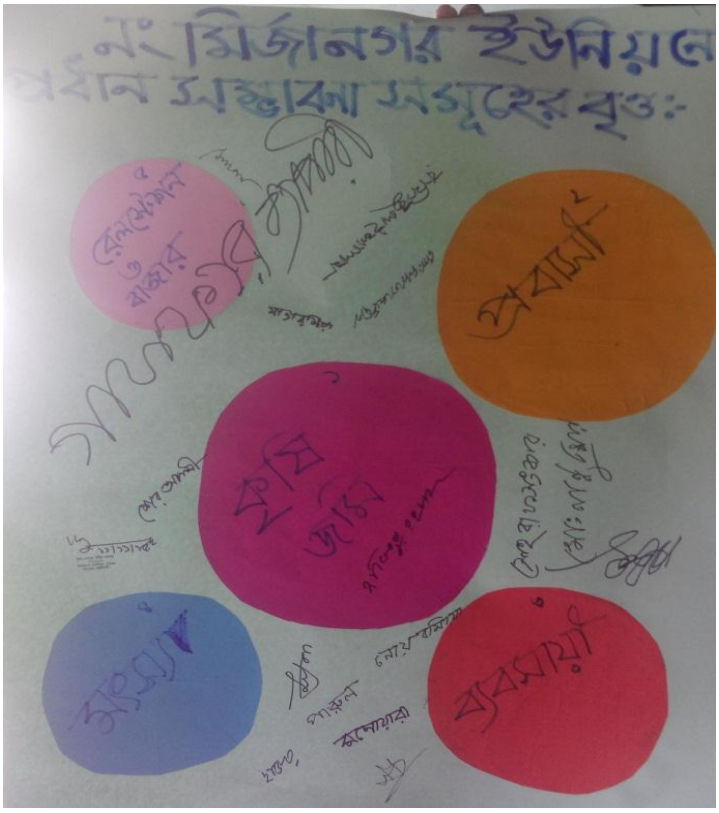


Figure 14.1: Major Five Potentials

14.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 14.1: Problems, Causes, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
3. No gas	• Bureaucratic complexity and negligence of authority	• Increase fuel cost • Finished Trees and forest day by day • Hampered industrialization • Trouble of economical development • Student education fall down	• Gas line supplied in the mid of the Union

2.Trouble of education system	• Various infrastructural problem in industrial area • Bureaucratic complexity • Shortage of college., university and vocational institution	• Day by day weaker education development. • Average drop education Rate.	• Existing High school and primary school and lot of education attraction students.
Lake of Hospital	• Proper top level careless. • Weak and undeveloped transportation system	• People are divesting from emergency health services. • As per shortage of health services emergency patient had died.	• Existing two community clinic and one FWC
4.No Commercial Bank.	• Lack of cordiality of Government and entrepreneur • Various intricacies.	• People are facing many other suffering of transaction. • Money and transaction are not safe. • People are fall in financial security less.	• .Existing two bazar and two railway station.(Hatuvhanga and khanabari)
5.Thechnical education sysrems	• No Technical education Institution. • Lake of Government entrepreneur • Shortage of Budget.	• People are not found vocational education. • Deprive Economical development.	• Existing enough labor and cordial local people • Local people willingness to donate land • Cordial of existing UP chairman Mr Humauyan Kabir.

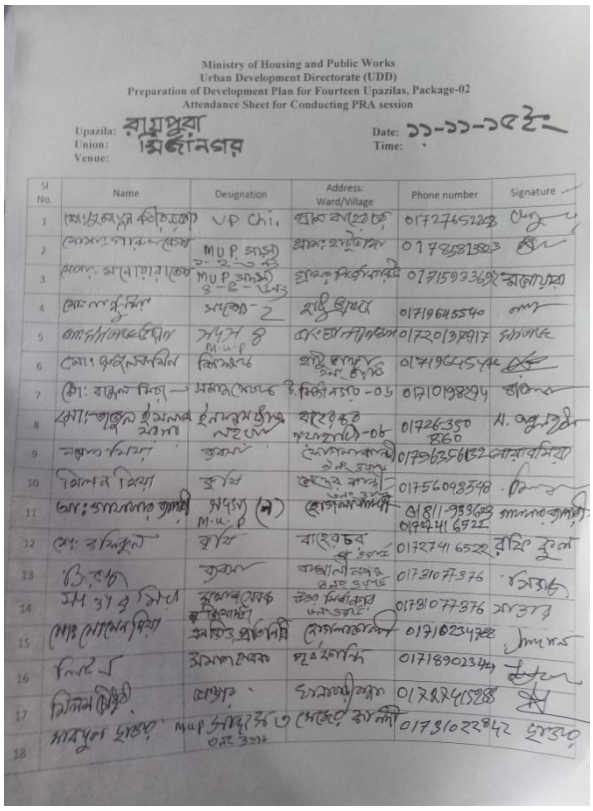
14.4 Perceived Development Priorities for Mirzanagar Union under Narshingdi District.

The recommended development Priorities for Mirzanagar Union are as follows;

Table 14.2: Development Priorities for Mirzanagar Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of gas connection • Demand of development of health services • Demand of solve of unemployment • Demand of build bathing ghat • Demand of Bank • Demand of Agriculture development • Demand of Industrialization • Demand of Stadium • Demand of old home • Demand of water Supply • Demand of Masque and Grave yard development • Demand of free from drug addiction • Demand of Bodybuilding center • Demand of established UP Complex	• Demand of developed education system • Demand of development of health services • Demand of solve of unemployment • Demand of build bathing ghat • Demand of Agriculture development • Demand of Stadium • Demand of Bank • Demand of Industrialization • Demand of old home	• Demand of developed education system • Demand of development of health services • Demand of build bathing ghat • Industrialization • Demand of old home

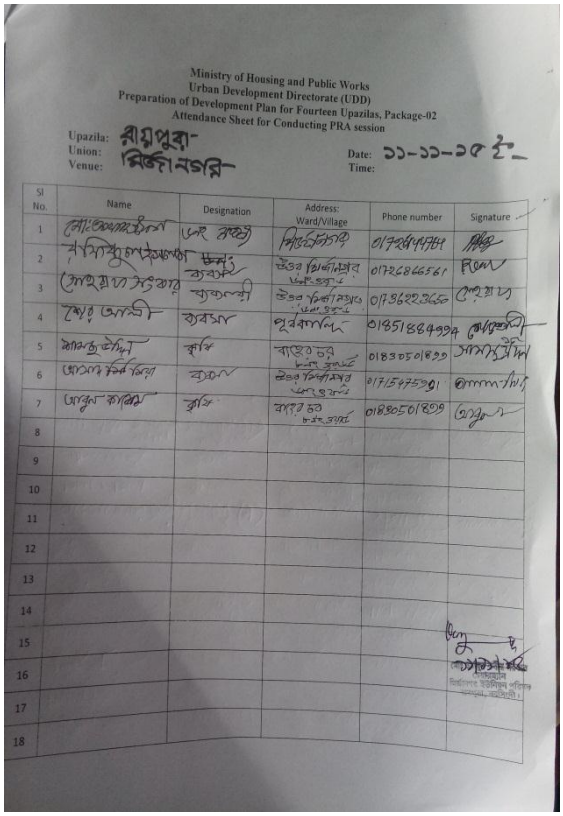
14.5 Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মির্জানগর
Venue:
Date: ১১-১১-১৫ ই:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1		UP Chi.		01727652248	
2		MUP সদস্য		01749383803	
3		MUP সদস্য		01715023692	
4		সদস্য-২		01719645540	
5		সদস্য ৪ M.U.P		01720137917	
6				01741964545	
7				01710198294	
8				01726350860	
9		কৃষক		01796350152	
10		কৃষি		01756093540	
11		সদস্য (ন) M.U.P		01811-933663 01944146721	
12		কৃষি		01727416522	
13		কৃষক		01731077376	
14				01731077376	
15				01710234788	
16				01718902344	
17				01718241588	
18		MUP সদস্য ও সেক্রেট কাউন্সিলর		01731022842	



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Upazila: রায়পুরা
Union:
Venue: মির্জানগর
Date: ১১-১১-১৫ ই:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1				01724844761	
2		ব্যবসায়ী		01726866561	
3		ব্যবসায়ী		01736223656	
4		ব্যবসায়		01351884994	
5		কৃষি		01830501899	
6		ব্যবসা		01715475391	
7		কৃষি		01830501899	
8					
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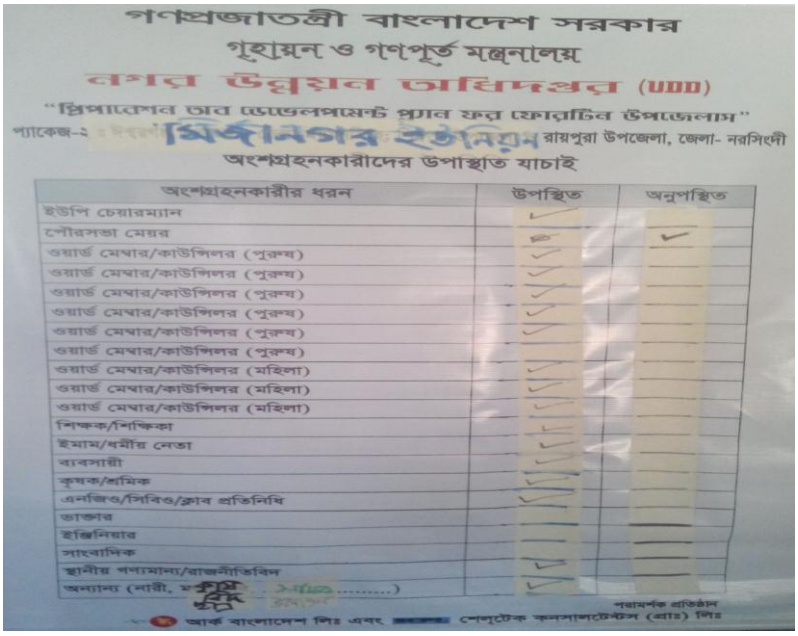


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিন উপজেলাস"
প্যাকেজ-২ মির্জানগর ইউনিয়ন রায়পুরা উপজেলা, জেলা- নরসিংদী
অংশগ্রহনকারীদের উপাস্থিত যাচাই

অংশগ্রহনকারীর ধরন	উপস্থিত	অনুপস্থিত
ইউপি চেয়ারম্যান	✓	
পৌরসভা মেয়র		✓
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
শিক্ষক/শিক্ষিকা	✓	
ইমাম/ধর্মীয় নেতা	✓	
ব্যবসায়ী	✓	
কৃষক/শ্রমিক	✓	
এনজিও/সিবিও/ক্লাব প্রতিনিধি	✓	
ডাক্তার	✓	
ইঞ্জিনিয়ার	✓	
সাংবাদিক	✓	
স্থানীয় গণ্যমান্য/রাজনীতিবিদ	✓	
অন্যান্য (নারী, ম.....	✓	

পরামর্শক প্রতিষ্ঠান
আর্ক বাংলাদেশ লিঃ এবং শেলটেক কনসালটেন্টস (প্রাঃ) লিঃ

15.0 Mirzapur Union

15.1 Overview (Study Area)

The Mirzapur Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi District. The boundary of the Union is as follows;

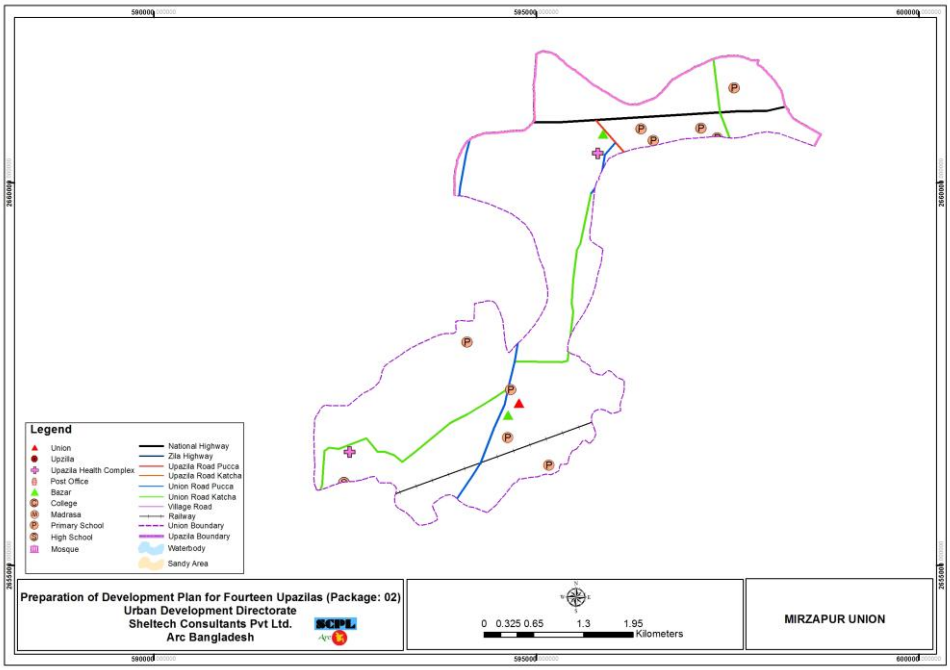
North: On the north side of the study area, Belabo Upazilla is situated

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

South: On the south side of the study area, Chanderkandi Union and Meghna River are located

East: On the east side of the study area, Musapur and Moheshpur Union are located

Map 15.1: Mirzapur Union



15.2 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.

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Figure 15.1: Counselling in preparing Social Map

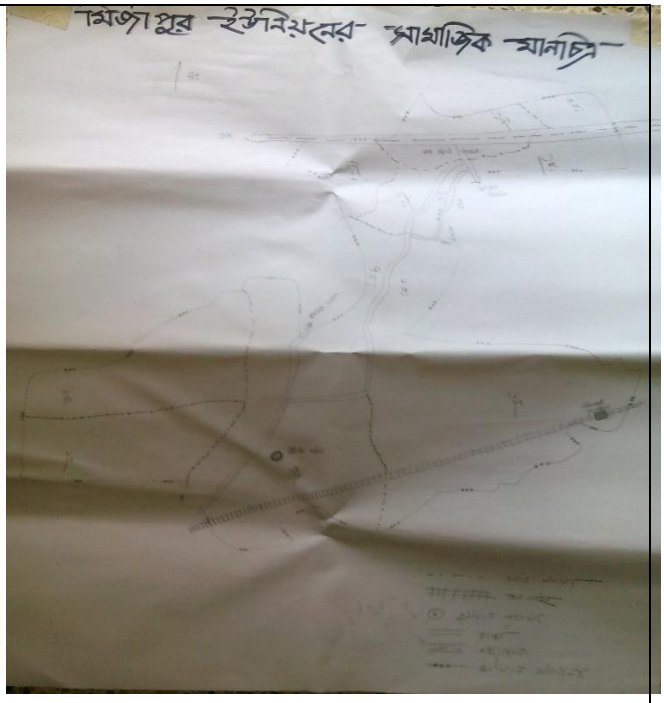


Figure15.2: Social Map of Mirzapur Union

15.3 Major Problems and Potentials

15.3.a Problems Identification

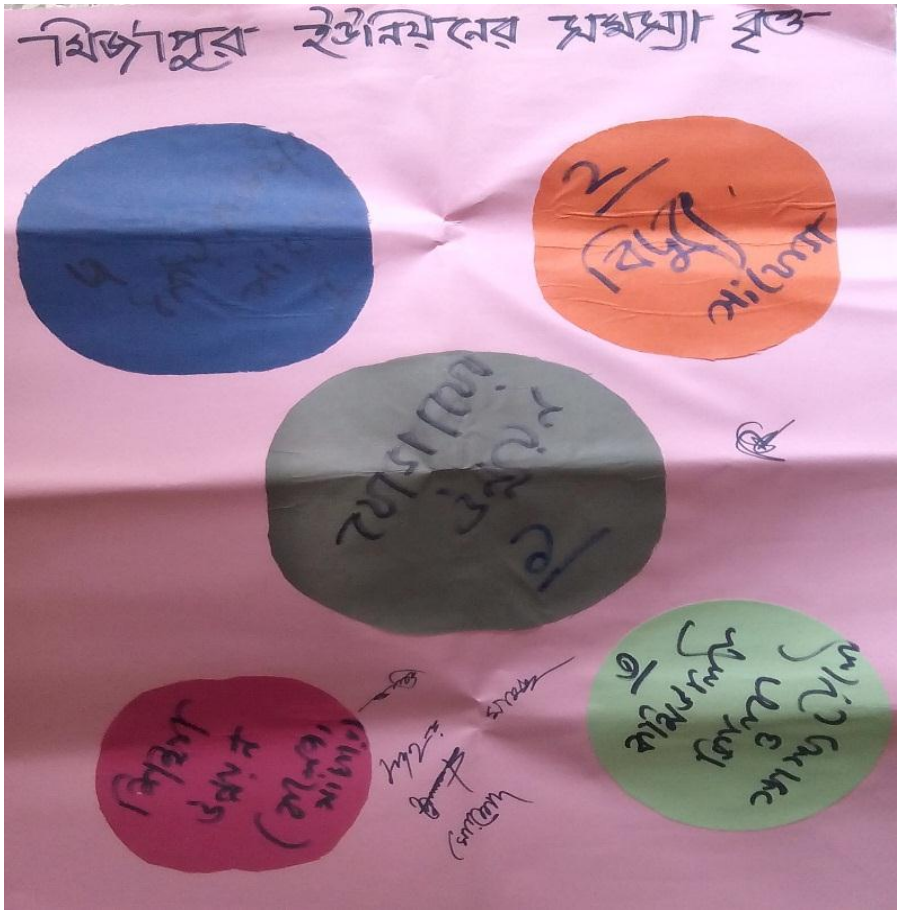
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. The following problems have identified during PRA which are as follows:

- Poor Transportation (No road for going to mosque, madrasa, institution, need culvert, no concrete road from Mirzapur school to ward nine, need concrete road from Nilkuthir Bazar to Purber Char, from Pagla Bazar to Fazlu Mia's house)
- Trouble of education system (Lack of Educational institution structure Such as scarcity of primary school, classroom, teacher and educational materials and no school boundary wall)
- Lack of hospital (No M.B.B.S. doctor, lack of repairing, lack of community clinic, no boundary wall)
- Problem of agriculture, irrigation and drainage
- Lack of Electricity (Load shedding, no 100%electricity connection)
- No gas connection
- No Industrialization
- Scarcity of sanitation
- Problem of broken graveyard
- Lack of good seeds
- No decoy in agriculture
- Lack of employment
- Lack of fertilizer
- Lack of repairing mosque, madrasa, temple.
- Problem of sanitation
- No drainage (in market)
- No vocational institution
- Lack of healthy toilet
- Need repairing Nilkuthi

15.3.b Problems Prioritization through Venn Diagram

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

1. Poor Transportation system
2. Lack of electricity line
3. Lack of community clinic and health problem
4. Lack of religion institution
5. Lack of educational development



Photograph 15.3: Venn diagram of major problems

15.3.c 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 will may be used as resources during planning. The potentials are as follows;

- Agricultural land (Paddy)
- Roads
- Human Resource
- Cattle Rearing
- Fish Cultivation

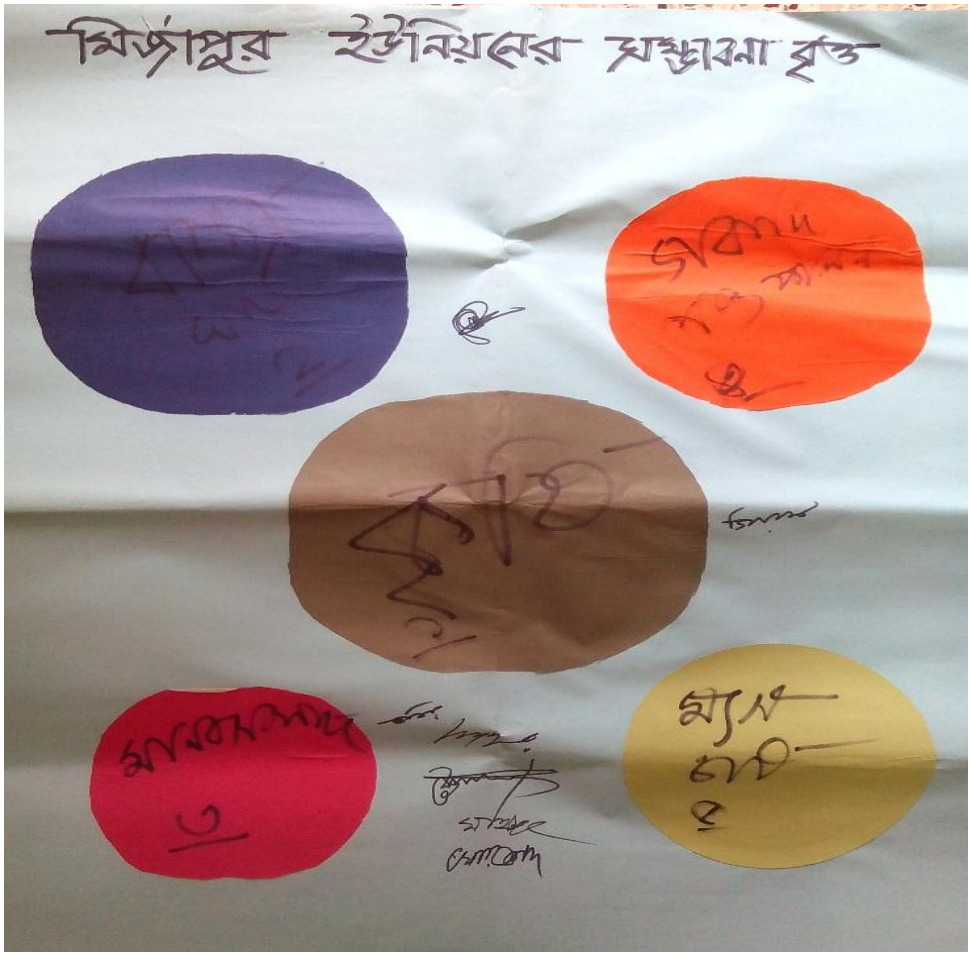


Figure 15.1: Major Five Potentials

15.3.d 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, effect/impact and potentials have furnished in the following table:

Table 15.1: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of govt. budget • Lack of land	• Problem of performing marketing	• Development economy
2.Lack of electricity line	• Lack of budget • Lack of govt. responsibility	• Govt. indifference • Social , economic adversity	• Economic development

3.Trouble of health	• Lack of budget • Lack of land • Economic problem	• Cause of total adversity	• Economic development
4.Trouble of education system	• Institution is far f 10 kilometers from Mirzapur • Lack of budget	• Undesired in study	• Educational development
5.Lack of religion institution	• Lack of budget • Problem of economy	• Social problem	• Social development

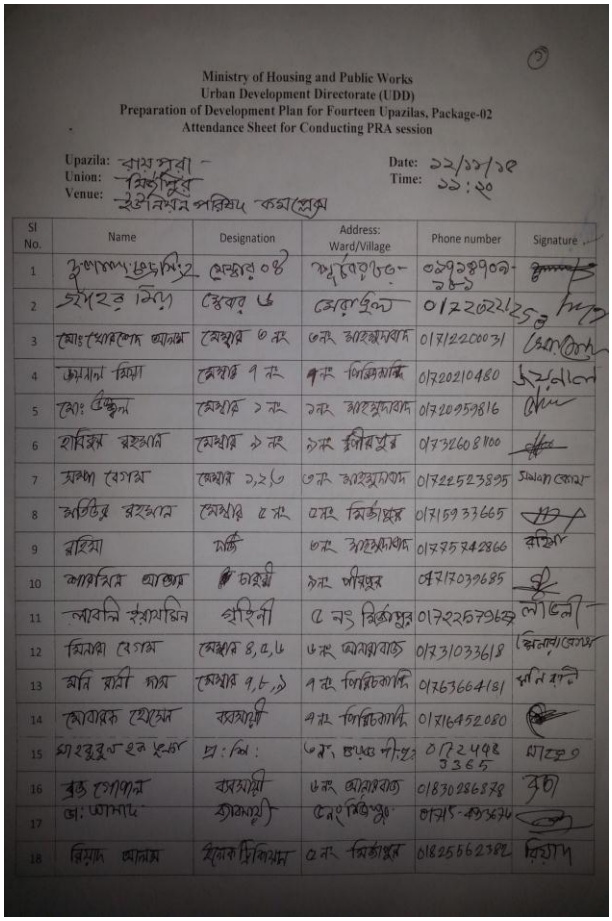
3.15.4 Perceived Development Priorities for Mirzapur Union under Narshingdi District.

The recommended development Priorities for Mirzapur Union is as follows

Table 15.2: Development Priorities for Mirzapur Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of established new school building • Demand of new primary school • Demand of repair road • Demand of new concrete road • Demand of road for market • Demand of developed transport • Demand of hospital • Demand of developed health • Demand of doctor for hospital and CC • Demand of guide boundary for CC hospital • Demand of ambulance • Demand of employment • Demand of new high school • Demand of college • Demand of vocational institution • Demand of religion education institution • Demand of exam center for JSC and SSC in Mirzapur Union	• Demand of college • Demand of vocational institution • Demand of religion education institution • Demand of Employment • Demand of hospital • Demand of repairing of religion institution • Demand of earthen in graveyards • Demand of guide wall for graveyards • Demand of local govt. powerful • Demand of the rule of law • Demand of every village as ideal	

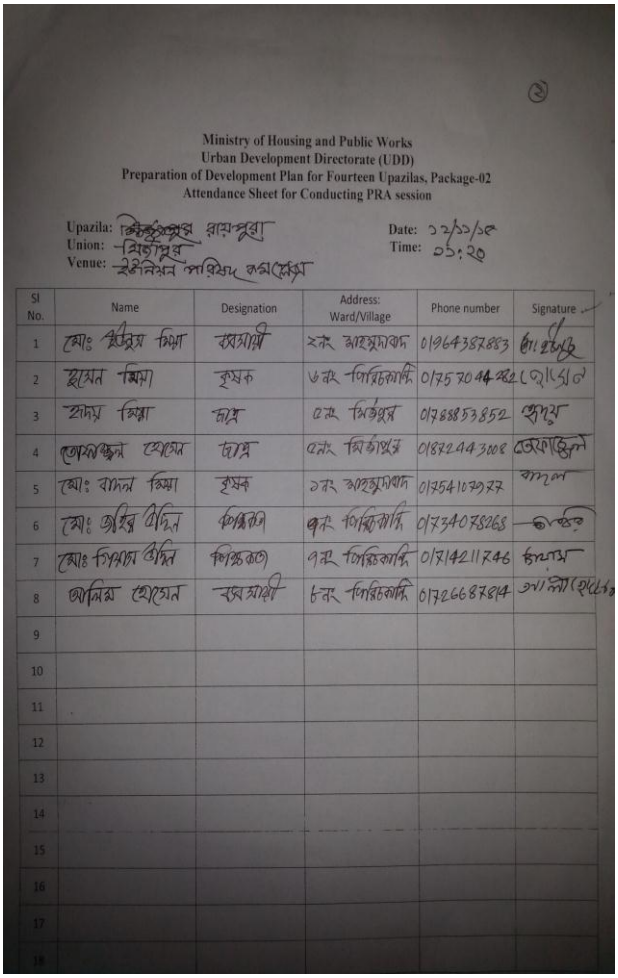
15.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মিরাপুর
Venue: ইউনিয়ন পরিষদ কমপ্লেক্স
Date: ১২/১১/১৫
Time: ১১:২০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	মেম্বার ০৪	পূর্বচরাঞ্চল	[illegible]	
2	হাসেরুর মিয়া	মেম্বার ৬	মেরাগুলি	01722022125	
3	মোঃ খোরশেদ আলম	মেম্বার ৩ নং	৩নং আহমদাবাদ	01712200031	
4	জামাল মিয়া	মেম্বার ৭ নং	৭নং শিবিরকান্দি	01720210480	
5	মোঃ উজ্জল	মেম্বার ২ নং	২নং আহমদাবাদ	01720959816	
6	হাবিবুর রহমান	মেম্বার ৯ নং	৯নং ইলিমপুর	01732608100	
7	সালমা বেগম	মেম্বার ১,২,৩	৩নং আহমদাবাদ	01722523895	Salma Begum
8	মতিউর রহমান	মেম্বার ৫ নং	৫নং মির্জাপুর	01715933665	
9	রহিমা	মহিলা	৩নং আহমদাবাদ	01725742866	
10	আবুবকর আকন্দ	চেয়ারম্যান	৯নং পীরপুর	01717039685	
11	লাবনি ইয়াসমিন	গৃহিনী	৫ নং রিকাবীপুর	01722579639	
12	মিনারা বেগম	মেম্বার ৪,৫,৬	৬নং আমানবাড়	01731033618	
13	মনি রানী দাস	মেম্বার ৭,৮,৯	৭ নং শিবিরকান্দি	01763664131	
14	মোবারক হোসেন	ব্যবসায়ী	৭নং শিবিরকান্দি	01716452080	
15	মাহবুবুল হক মুকুল	চা: বি:	৬নং ছাতক পীর	01722498 3365	
16	বৃজ গোপাল	ব্যবসায়ী	৬নং আমানবাড়	01830286878	
17	জা: আসাদ	ব্যবসায়ী	৫নং মির্জাপুর	01715-493676	
18	রিয়াদ আলম	ইলেকট্রিশিয়ান	৩নং মির্জাপুর	01825662382	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মিরাপুর
Venue: ইউনিয়ন পরিষদ কমপ্লেক্স
Date: ১২/১১/১৫
Time: ০১:২০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মোঃ ইদ্রিস মিয়া	ব্যবসায়ী	২নং আহমদাবাদ	01964387883	
2	হুসেন মিয়া	কৃষক	৬নং শিবিরকান্দি	01757044982	
3	হাদয় মিয়া	ছাত্র	৫নং মির্জাপুর	01788853852	
4	তোফাজ্জল হোসেন	ছাত্র	৫নং মির্জাপুর	01842443008	
5	মোঃ বাদল মিয়া	কৃষক	১নং আহমদাবাদ	01754107977	
6	মোঃ জহির উদ্দিন	ফার্মেসী	৭নং শিবিরকান্দি	01734078268	
7	মোঃ গিয়াস উদ্দিন	শিক্ষক	৭নং শিবিরকান্দি	01714211746	
8	আমির হোসেন	ব্যবসায়ী	৮নং শিবিরকান্দি	01726687814	
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16.0 Mirzarchar Union

16.1 Overview (Study Area)

The Mirzarchar Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi District. The boundary of the Union is as follows;

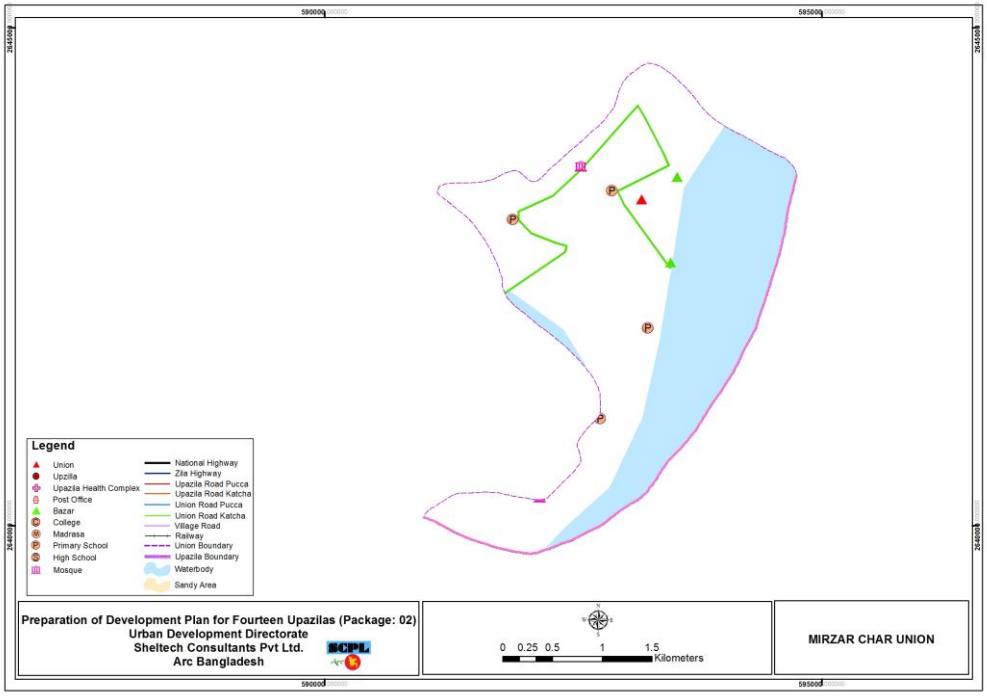
North: On the north side of the study area, Banshgari Union is situated

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

South: On the south side of the study area, part of Meghna River is located

East: On the east side of the study area, MeghnaRiver locate

Map 16.1: Mirzarchar Union

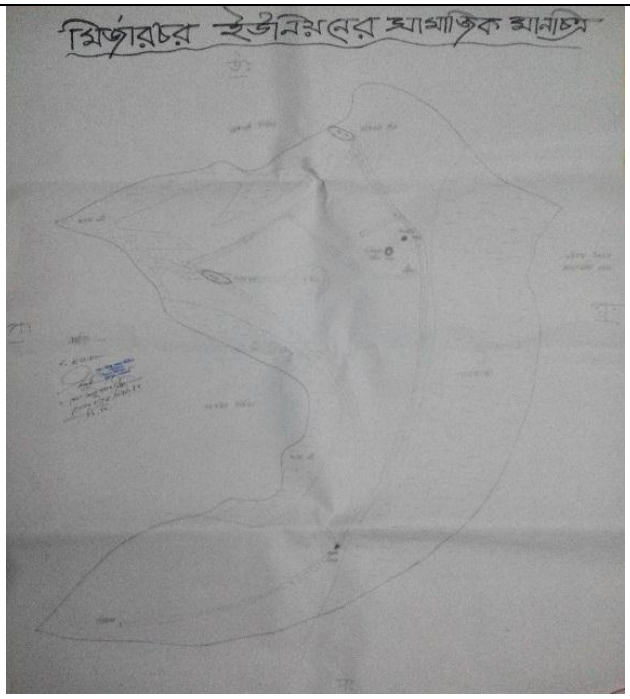


16.2. Spatial Aspects

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 Mirzarchar Union 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/madrasa, 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 16.1: Preparing Social Map



Photograph 16.2: Social Map of Mirzarchar Union

16.3 Major Problems and Potentials

16.3.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 identified during PRA which are as follows:

- No road connecting to Upazilla Sadar.
- No health complex.
- No Union complex.
- River bank erosion.
- Needs river embankment.
- Under developed education system.
- Problems in sanitation.

- Arsenic problem.
- Unemployment problem.
- No electricity connection.
- 5, 6, 7 number being eroded to Meghna River Embankment.
- Unplanned sand extraction form river bed along whole Union.
- Char dispossess.
- Water logging in ward number 3 and 4.
- Needs a govt. bazaar.
- Needs bridge and culvert.
- Repairing of graveyard.
- Needs embankment for saving Ananda Bazar.
- Needs repairing of mosque and madrasa.
- Needs a college.
- Increase the allowance of older, widow and autistic people.

16.3.b Problems Prioritization through Venn Diagram

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

1. Poor Transportation system
2. Lack of Continuous Electricity Supply
3. River erosion
4. Problem of building market
5. Problem of delimitation

Photograph 16.3: Venn diagram of major problems

16.3.c 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 will may be used as resources during planning. The potentials are as follows;

- Fish Cultivation
- Agriculture
- Khal
- Meghna River
- Cattle Rearing

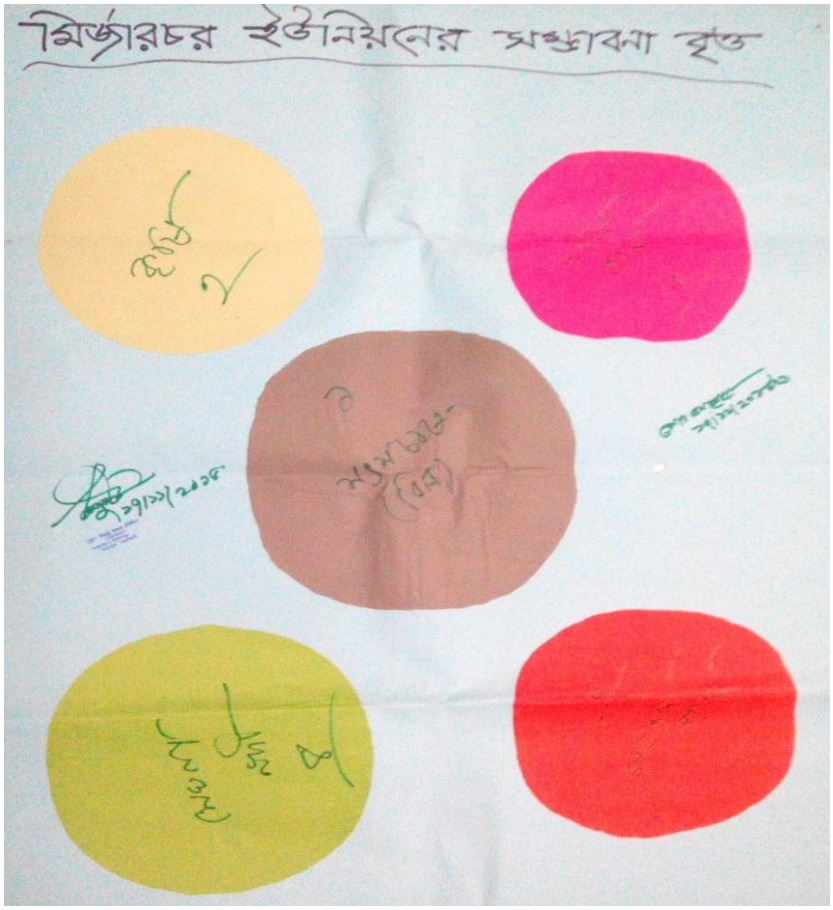


Figure 16.1: Major Five Potentials

16.3.d 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, effect/impact and potentials have furnished in the following table;

Table 16.1: Problems, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Lack of conciseness • Char area	• Transport problem • 14000 people are suffering	• Development of transport

2.Problem of electricity	• Lack of budget • Electricity is 1.5 km far from Bashgari	• People suffering	• Economic development
3.Problem of embankment	• Char of Meghna	• Market • Land erosion	• To protect agricultural land
4.Problem of delimitation	• River erosion • Less awareness	• diminishing agricultural land	• To protect agricultural land
5.Demand of market	• Lack of govt. help	• No extension agricultural market	• Agricultural development • Economically self-reliant

16.4 Perceived Development Priorities for Mirzarchar Union under Narshingdi District.

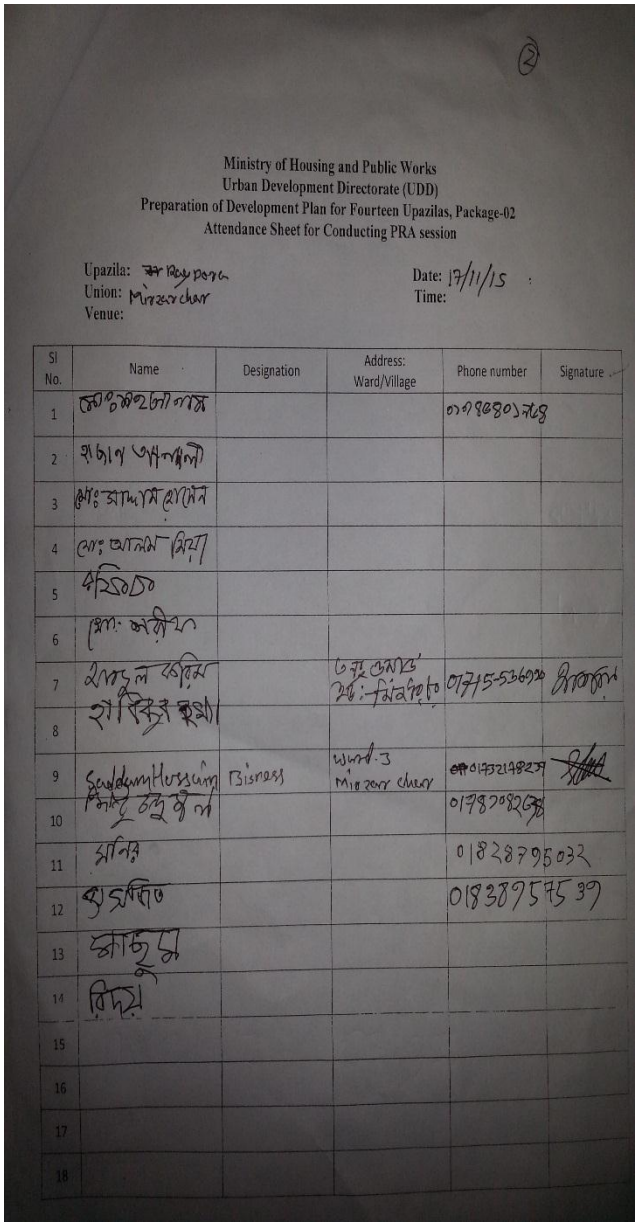
The recommended development Priorities for Mirzarchar Union are as follows:

Table 16.2: Development Priorities for Mirzarchar Union

Short term	Midterm	Long term
• Demand of electricity • Demand of developed transport • Demand of new road (Mirzarchar bazar to Bashgari) • Demand of new concrete road • Demand of hospital • Demand of community clinic • Demand of developed education system • Demand of new madrasa (ward no 2) • Demand of new primary school (ward no 9) • Demand of good qualities teachers • Demand of Shaheed Minar (in Mirzarchar high school) • Demand of M.B.B.S. doctors • Demand of diagnostic center • Demand of ambulance • Demand of repairing religion institution	• Demand of new madrasa (ward no 2) • Demand of new primary school (ward no 9) • Demand of good qualities teachers • Demand of hospital • Demand of community clinic • Demand of M.B.B.S. doctors • Demand of mosque • Demand of temple (mandir)	

• Demand of mosque • Demand of temple (mandir) • Demand of graveyard		

16.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: Raipura
Union: Mirzarchar
Venue:

Date: 17/11/15
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1					
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7				01715-536090	
8					
9	Soulagun Hossain	Bisness	Ward-3 Mirzarchar	01732148234	
10				01787082	
11				01828795032	
12				01838757537	
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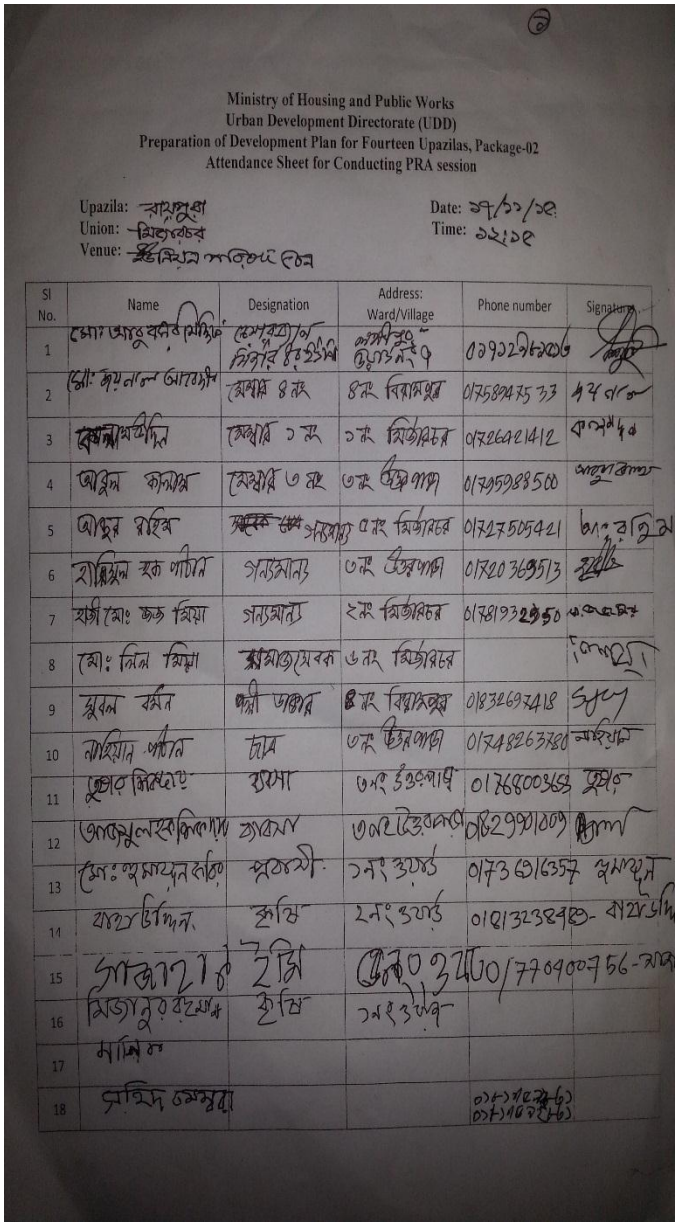

Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মিরজারচর
Venue:

Date: ১৭/১১/১৫
Time: ১২:১৫

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
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17.0 Musapur Union

17.1 Overview (Study Area)

The Musapur Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows;

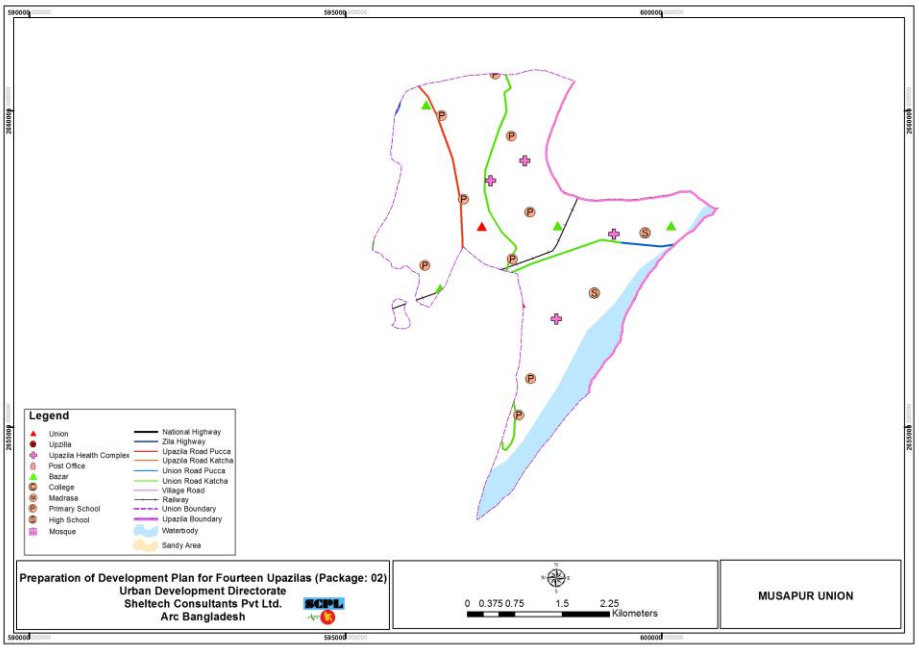
North: On the north side of the study area, Old Brahmaputra River is situated.

West: On the west side of the study area, Radhanagar and Mirjapur Unions are located.

South: On the south side of the study area, Mahershpur Union is located

East: On the east side of the study area, Meghan River is located.

Map 17.1: Musapur Union

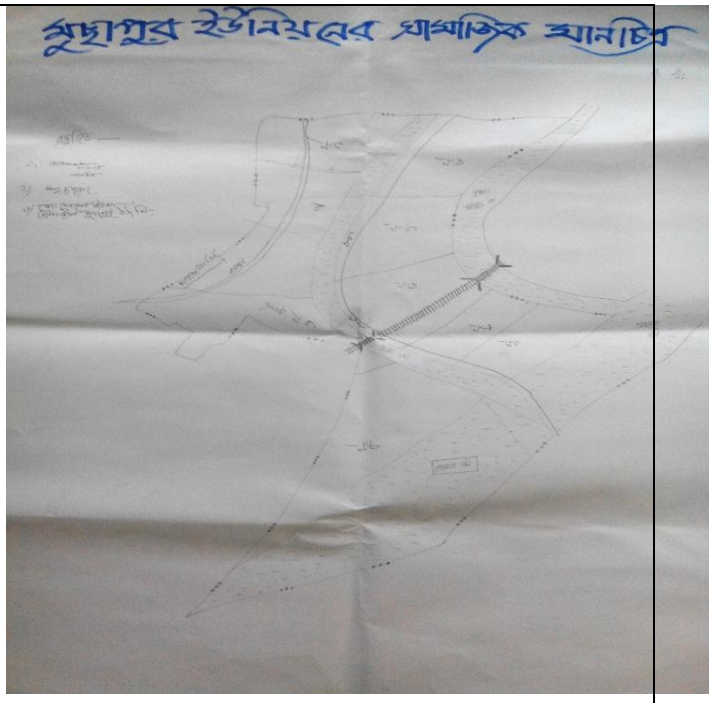


17.2 Spatial Aspects

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 Musapur Union 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/madrasa, 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 17.1: Preparing Social Map



Photograph 17.2: Social Map of Musapur Union

17.3 Major Problems and Potentials

17.3.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:

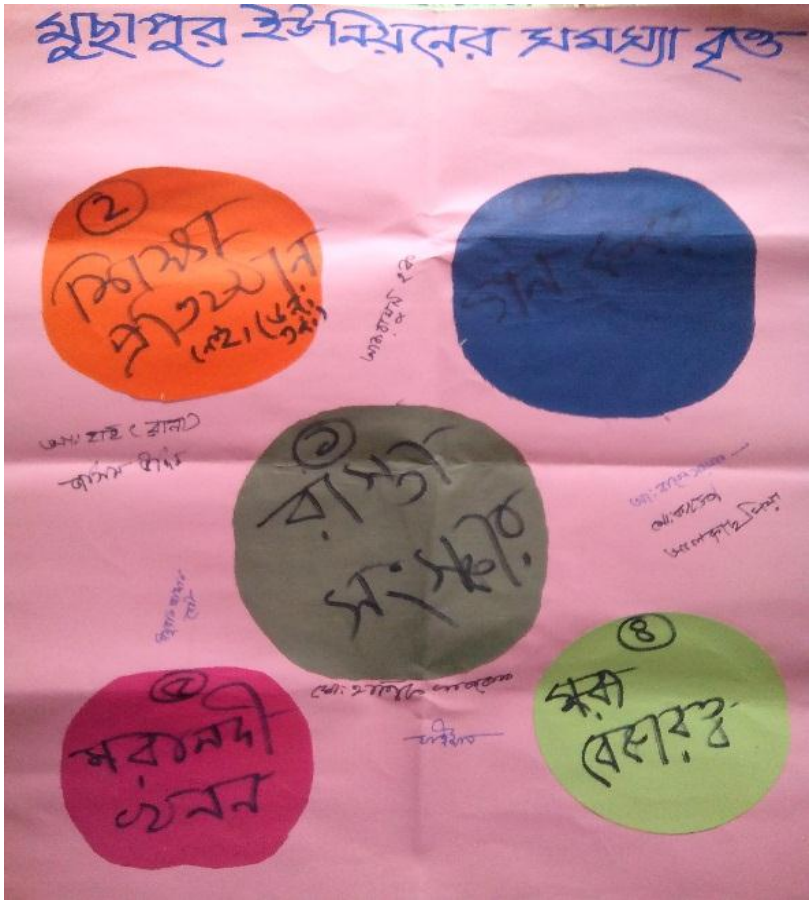
- Pitching and carpeting roads
- Problems of electricity
- Need public toilet

- Repairing of mosques
- Need bridge
- Water logging
- River digging
- Sanitation system
- Need drainage system
- Need primary schools
- Need college
- Need culvert
- Repairing of high schools
- Increase of number and amount of adult and widow allowance
- Vocational training center
- Unemployment
- Eve-teasing
- Drug addiction
- Residential problems of village police

17.3.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. Road repairing problem
2. Lack of educational institution
3. Lack public graveyard
4. Problem of death river digging
5. Unemployment problem



Photograph 3.17.3: Venn diagram of major problems

17.3.c 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;

- Gas
- Open pond
- Moya River
- Agriculture
- Kohinur Industry
- Poultry

Figure 17.1: Major Five Potentials

17.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

After identification of the problems and potentials, the large group has engaged to identify 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 17.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Broken and green road	• Lack of budget • Political problem	• Problem of transportation • Unheeded area	• Developed communication • Direct connection Musapur and Rashnagar
2.Trouble of education	• Lack of budget • Lack of teacher • Unheeded area	• Unemployment • Drag addicted • Increasing illiteracy rate	• Overall educational development

3.Lack of public graveyard	• Lack of budget • Lack of land	• Free from social problem	• Free from social adversity
4.Unemployment problem	• Stop Kohinur Industry	• More than 1600 people are unemployment	• Developed economy • Developed society • Free from unemployment problem
5.River digging problem	• Lack of budget • Indifference	• Ditch problem	• Developed agriculture

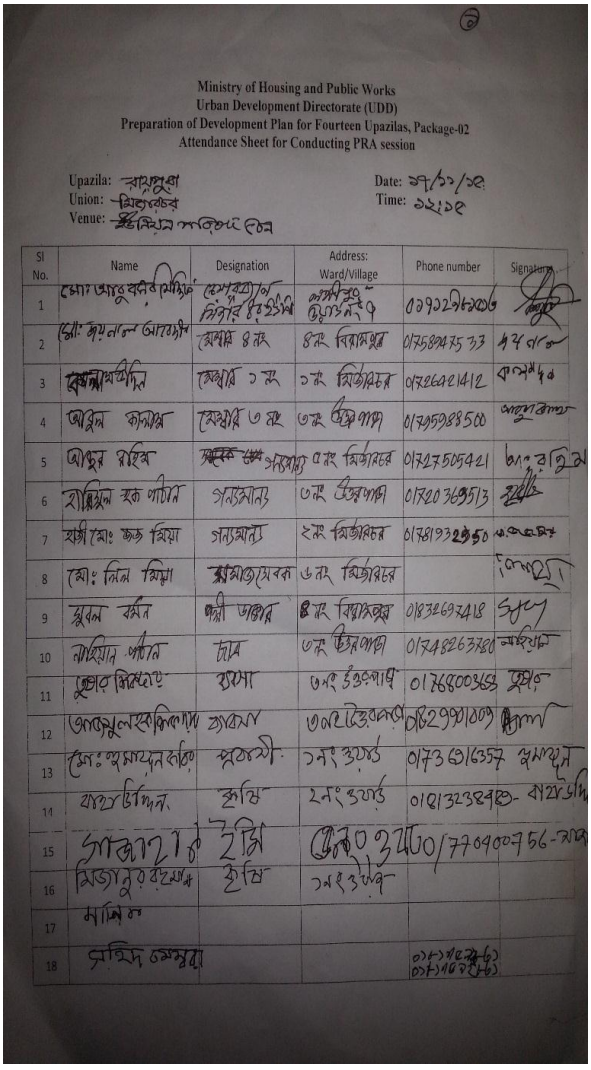
17.4 Perceived Development Priorities for Musapur Union under Narshingdi District.

The recommended development priorities for Musapur Union is as follows:

Table 17.2: Development Priorities of Musapur Union

Short term	Midterm	Long term
• Demand of Bir Srestho MatiurRahman Football Stadium • Demand of Ram Nagar Primary School repairing • Demand of gas line • Demand of to reopen the Kohinur Industry • Demand of stopping dowry • Demand of safe water and electricity • Demand of Employment • Demand of disaster resistant shelter center • Demand of developed education system • Demand of development of transportation system • Demand of modern sanitation system • Demand of developed agricultural irrigation and drainage • Demand of development of Entertainment • Demand of development of health services • Demand of solving unemployment problem	• Demand of developed education system • Demand of development of health services • Demand of development of Entertainment • Demand of digital post office • Demand of safe water and electricity • Demand of Employment • Demand of modern sanitation system • Demand of preventing dowry	• Demand of development of health services • Demand of digital post office • Demand of development of Entertainment • Demand of Employment • Demand of disaster resistant shelter center • Demand of preventing dowry

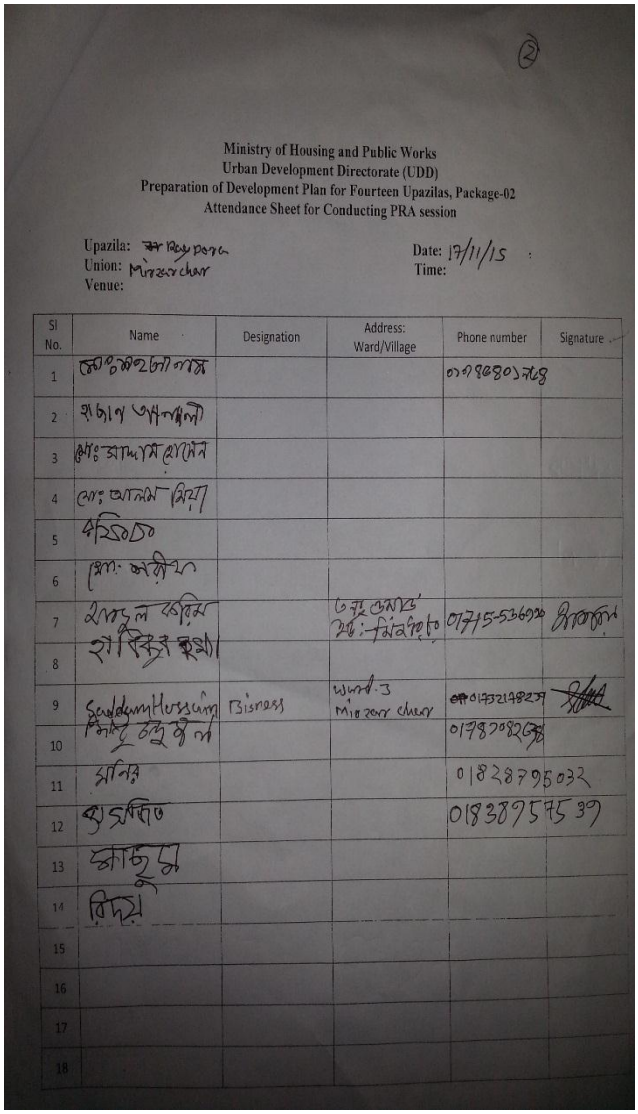
17.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: মিরজারচর
Venue:
Date: ২৭/১১/১৫
Time: ১২:১৫

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মোঃ আবু বকর মিয়াজি	চেয়ারম্যান	মিরজারচর ইউনিয়ন	০১৭১২৭৬২৩০৬	
2	মোঃ নূর নবী আকন্দ	মেম্বার ৪নং	৪নং বিরামপুর	01758947533	
3	রেজাউল করিম	মেম্বার ১নং	১নং মিরজারচর	01726421412	
4	আবুল কালাম	মেম্বার ৩নং	৩নং উত্তরপাড়া	01725988500	
5	আব্দুর রহিম	সদস্য	৫নং মিরজারচর	01727505421	
6	হাফিজুল হক পাটোয়ারী	গণ্যমান্য	৩নং উত্তরপাড়া	01720369513	
7	হাজী মোঃ জজ মিয়া	গণ্যমান্য	২নং মিরজারচর	01781332350	
8	মোঃ নিল মিয়া	সমাজসেবক	৩নং মিরজারচর		
9	সুবল বর্মন	পল্লী ডাক্তার	৪নং বিরামপুর	01832697418	
10	নাছিরুল পাটোয়ারী	চাষী	৩নং উত্তরপাড়া	01748263320	
11	ছোবহান মিয়াজি	কৃষক	৩নং উত্তরপাড়	01768003653	
12	আব্দুল লতিফ কাজী	ব্যবসা	৩নং উত্তরপাড়	01829901009	
13	মোঃ আমানুল হক	প্রবাসী	১নং ওয়ার্ড	01736316357	
14	বাহার উদ্দিন	কৃষি	২নং ওয়ার্ড	01813238483	
15	সাজ্জাদ হোসেন	কৃষি	01703460/17709007 56		
16	মিজানুর রহমান	কৃষি	১নং ওয়ার্ড		
17	মানিক				
18	সাহিদ তালুকদার			01713[illegible] 01713[illegible]	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: Raipura
Union: Mirzarchar
Venue:
Date: 17/11/15
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]			01718680[illegible]	
2	[illegible]				
3	মোঃ আমান হোসেন				
4	মোঃ আমান মিয়া				
5	[illegible]				
6	মোঃ [illegible]				
7	[illegible]		৩নং ওয়ার্ড	01715-536[illegible]	
8	[illegible]				
9	Saddam Hossain	Bisness	Ward-3 Mirzar char	01732148237	
10	[illegible]			01787082[illegible]	
11	সানির			01828795032	
12	[illegible]			01838757537	
13	[illegible]				
14	বিদয়				
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18.0 Nilakhayi Union

3.18.1 Overview (Study Area)

The Nilakhayi is under the administrative jurisdiction of Raipura Upazilla of Narshingdidistrict. The boundary of the Union is as follows;

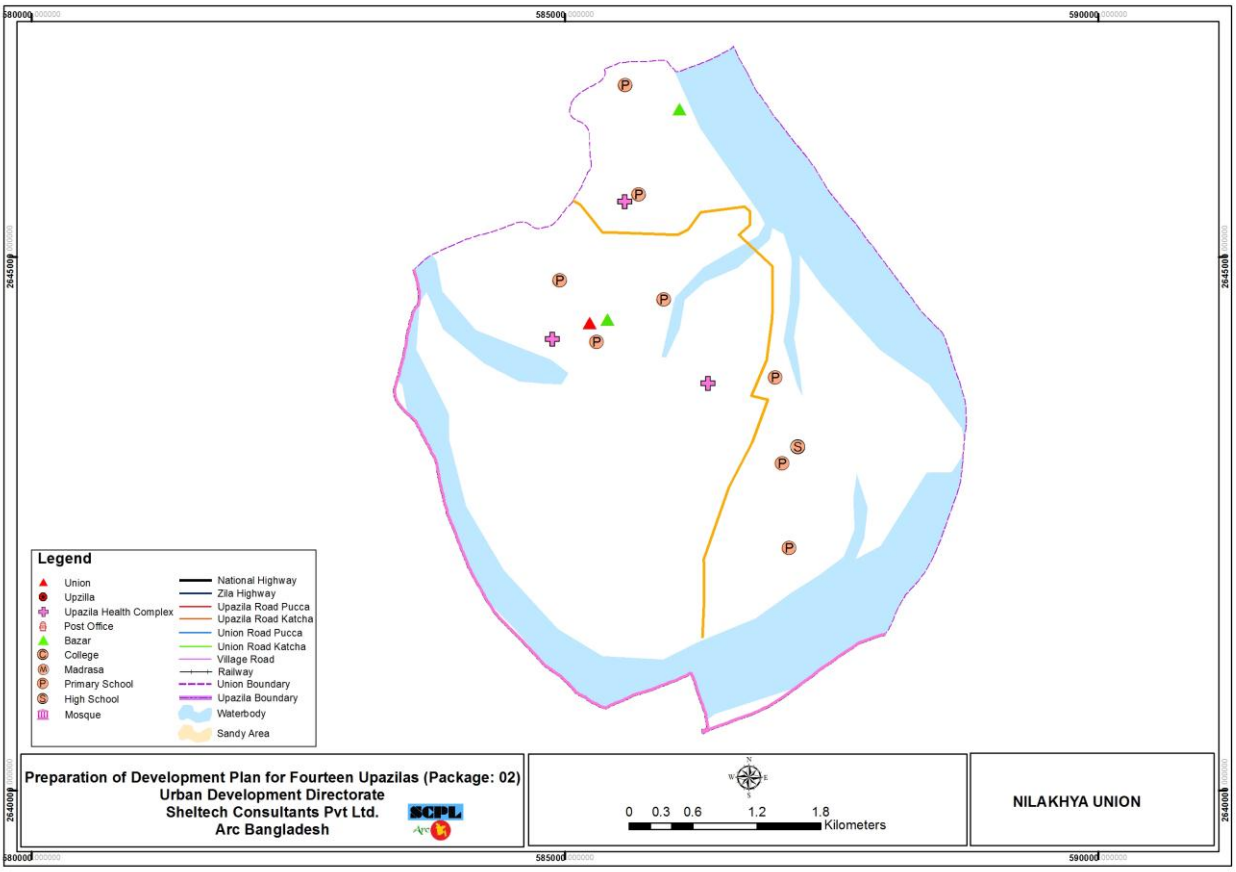
West: On the West side of the study area, Hairmara Union is situated

North: On the North of the study area, Char Shubuddhi Union is located

South: On the south side of the study area, Norsindi Sadar is located

East: On the east side of the study area, Hairmara and Mirzanogor Union are located.

Map 3.18.1: Nilakhayi Union

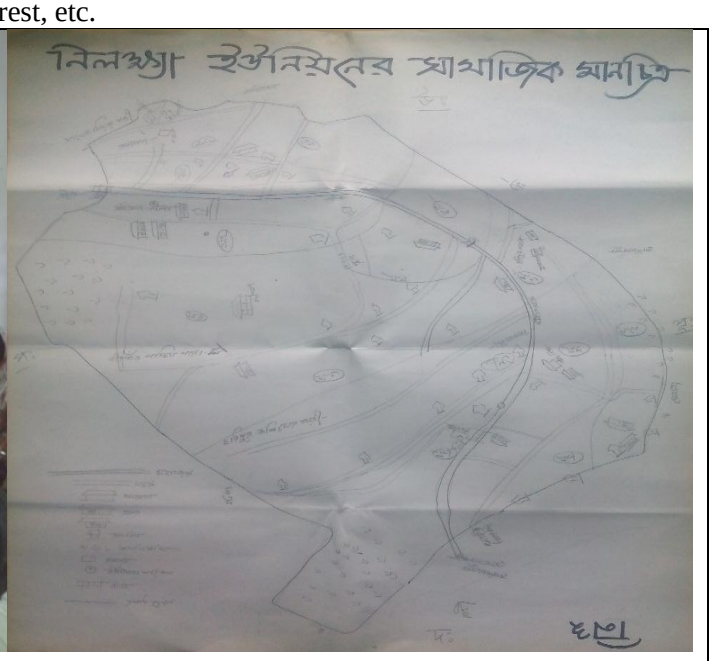


18.2 Spatial Aspects

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 Nilakhayi Union 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/madrasa, 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 18.1: Preparing Social Map



Photograph 18.2: Social Map of Nilakhayi Union

18.3 Major Problems and Potentials

18.3.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:

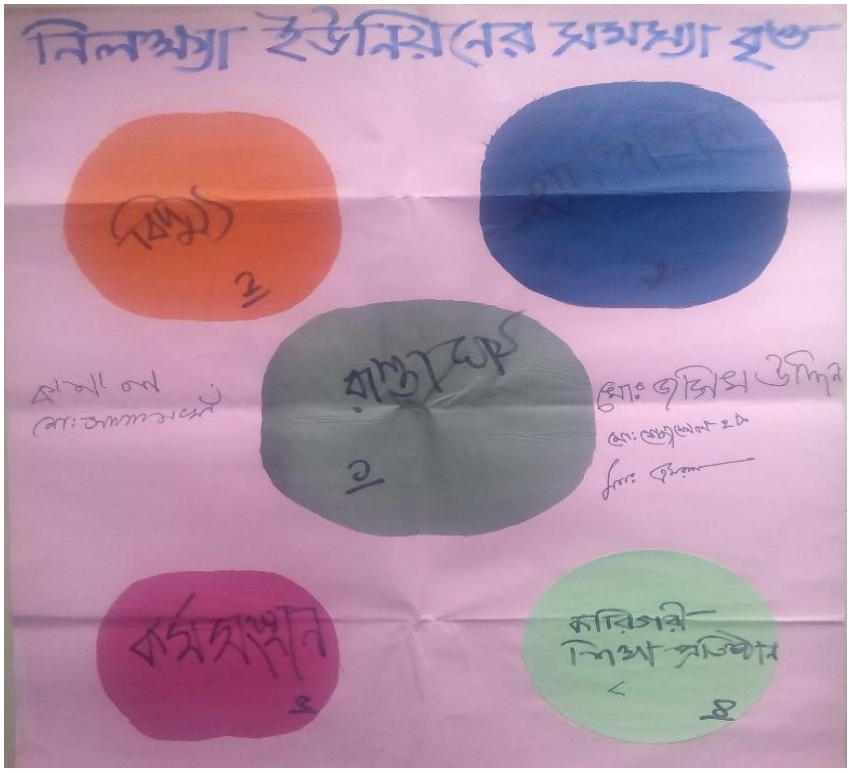
- Roads and Calvert repairing.
- Educational Institutions.
- Health Complex and hospital.
- Electricity.
- Graveyard.
- Mosque and Madrasha.

- Agricultural help.
- Establishment of Bazar/ Market.
- Increasing of honorary of up members.
- River bank erosion.
- Need a Freedom Fighter office.
- Unemployment problem.
- No technical institution.
- Need drainage system in bazaars.
- Need establishment of Union office complex.
- Repairing of Union land office.
- Need Industry along the bank of Meghna River.
- Beel digging.

18.3.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. Poor Transportation system
2. Problem of electricity
3. Lack of medical facilities
4. Lack of vocational institution
5. Lack of employment



Photograph 18.3: Major Five Problems

18.3.c 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;

- Roads
- Electricity
- Vocational institution
- Employment
- Hard working people
- Meghna River
- Tourist palace
- Char territory
- Agriculture

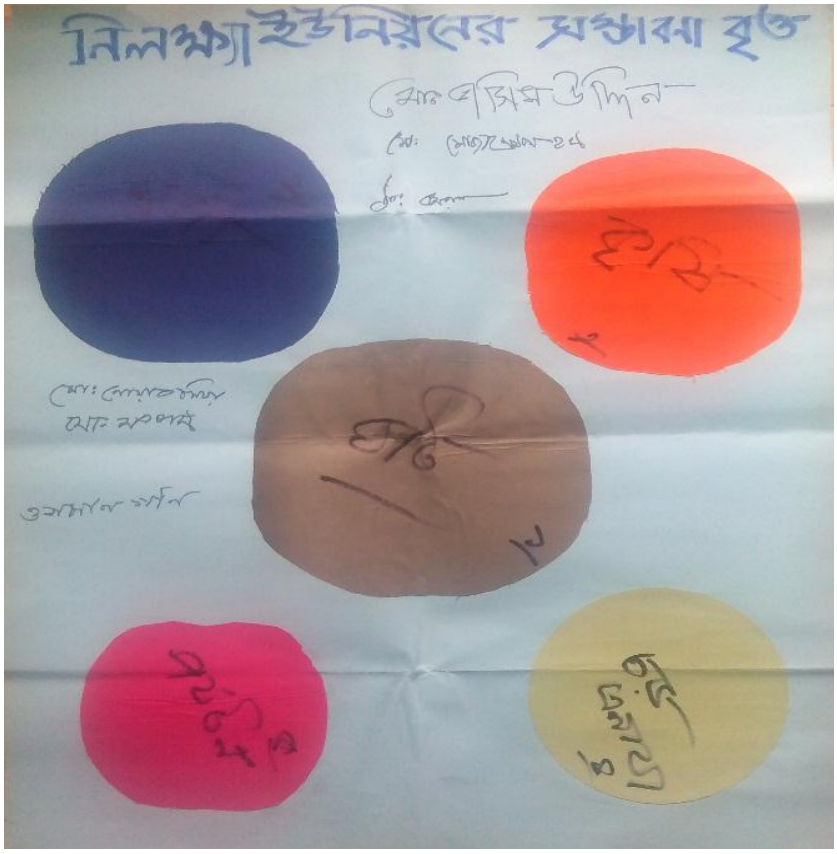


Figure 18.1: Major Five Potentials

18.3.d 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, effect/impact and potentials have furnished in the following table;

Table 18.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Problem of influence • Lack of management	• Financial loss • Problem of transportation (Specially patients) • More time spending	• All of the Unions' various development will be
2. Electricity	• Authorities neglect	• Various social problems of all	• Industry will be built

problem			
3. Trouble of health treatment	• Doctor doesn't come • Authorities neglect	• Area people don't get health treatment • Highly cost of getting treatment going to town	• Good health treatment will be got chip cost
4.Trouble of education system	• Lack of vocational institution • Authorities neglect	• Increasing unemployment problem • Unemployment people are involving various evil activities	• Unemployment problem will be removed • Economic condition of the area people will developed
4.Developd problem of Radhaganj bazar	• No embankment, no bridge, no drainage • No conservancy management • Shortage of government budget • Unplanned parking • No proper planning	• People are not moving frequently and difficulties of bargaining • Trouble of frequently moving in rainy season	• 16 lakh taka collected from leased • Enough manpower for construction
5.No industry	• Authorities neglect • Unconscious people	• Increasing unemployment problem	• Unemployment problem will be removed • Economic condition of the area people will developed

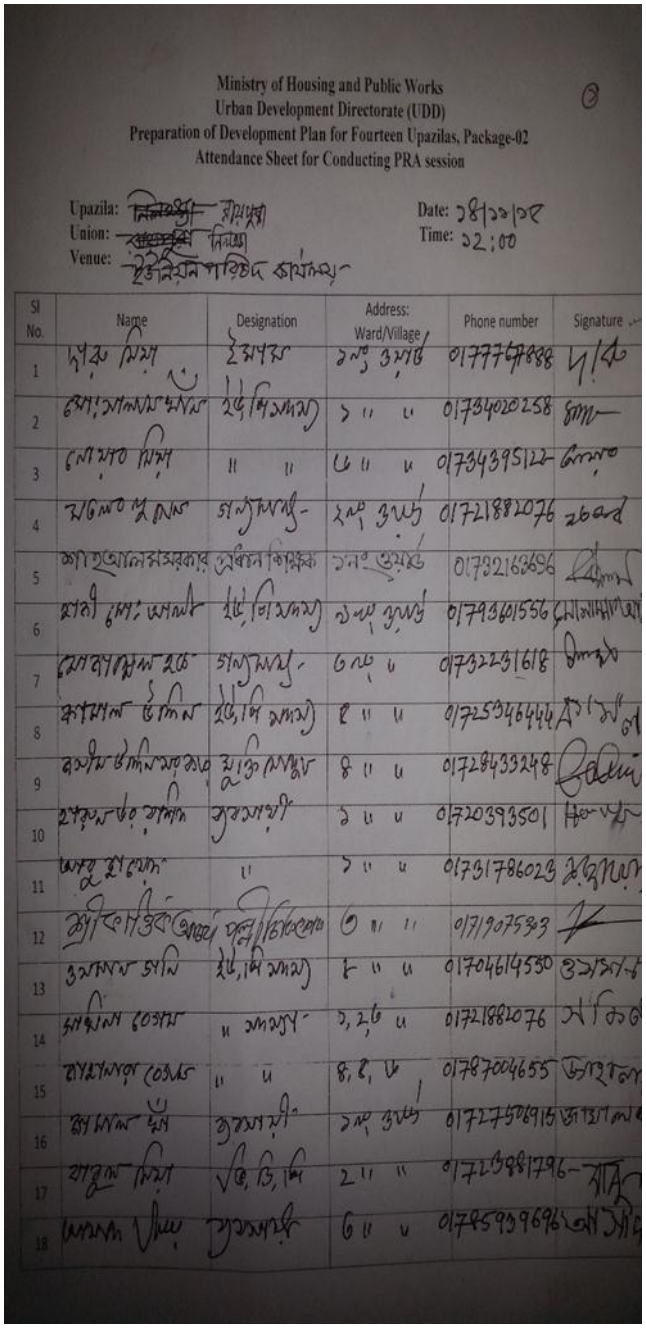
18.4 Perceived Development Priorities for Nilakhayi Union under Narshingdi District

The recommended development priorities for Nilakhayi Union is as follows:

Table 18.2: Development Priorities for Nilakhayi Union

Short term	Midterm	Long term
• Demand of Employment • Demand of road guide wall • Demand of disaster resistant shelter center • Demand of established U.P. complex • Demand of developed education system • Demand of development of transportation system • Demand of developed agricultural irrigation and drainage • Demand of development of Entertainment • Demand of development of health services • Demand of electricity • Demand of gas	• Demand of developed education system • Demand of development of health services • Demand of class room • Demand of teachers • Demand of new school • Demand of shelter	• Demand of development of health services

18.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: নিলক্ষা
Venue: ইউনিয়ন পরিষদ কার্যালয়
Date: ২৪/১১/১৫
Time: ১২:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible]	[illegible]	01777[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	01734020258	[illegible]
3	[illegible]	[illegible]	[illegible]	01734395122	[illegible]
4	[illegible]	[illegible]	[illegible]	01721882076	[illegible]
5	[illegible]	[illegible]	[illegible]	01792162656	[illegible]
6	[illegible]	[illegible]	[illegible]	01793601556	[illegible]
7	[illegible]	[illegible]	[illegible]	01732231618	[illegible]
8	[illegible]	[illegible]	[illegible]	01725946444	[illegible]
9	[illegible]	[illegible]	[illegible]	01728433248	[illegible]
10	[illegible]	[illegible]	[illegible]	01720393501	[illegible]
11	[illegible]	[illegible]	[illegible]	01731786023	[illegible]
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13	[illegible]	[illegible]	[illegible]	01704614550	[illegible]
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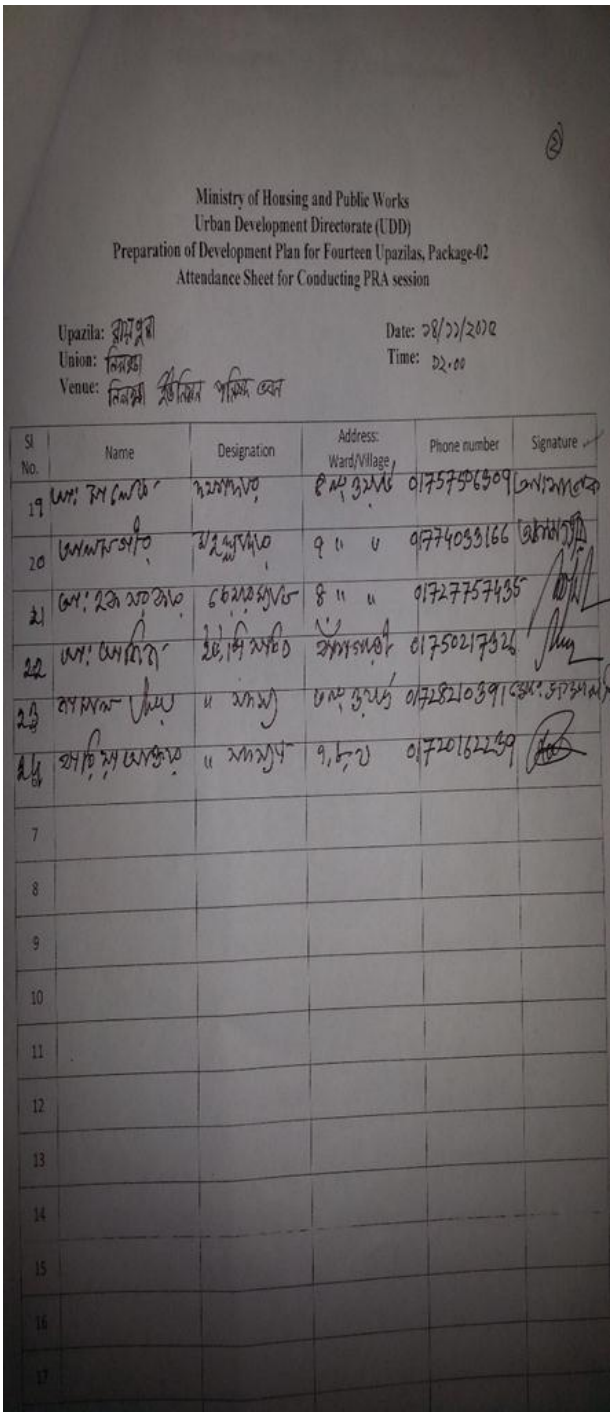
16	[illegible]	[illegible]	[illegible]	01727506915	[illegible]
17	[illegible]	[illegible]	[illegible]	01721988179[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	01785939696	[illegible]



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: নিলক্ষা
Venue: নিলক্ষা ইউনিয়ন পরিষদ ভবন
Date: ২৪/১১/২০১৫
Time: ১২.০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	[illegible]	[illegible]	[illegible]	01757556309	[illegible]
20	[illegible]	[illegible]	[illegible]	01774033166	[illegible]
21	[illegible]	[illegible]	[illegible]	01727757435	[illegible]
22	[illegible]	[illegible]	[illegible]	01750217326	[illegible]
23	[illegible]	[illegible]	[illegible]	01728210391	[illegible]
24	[illegible]	[illegible]	[illegible]	01720162259	[illegible]
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19.0 Paratoli Union

19.1 Overview (Study Area)

The Paratoli Union is under the administrative jurisdiction of Ishwarganj Upazilla of Narshingdi district. The boundary of the Union is as follows;

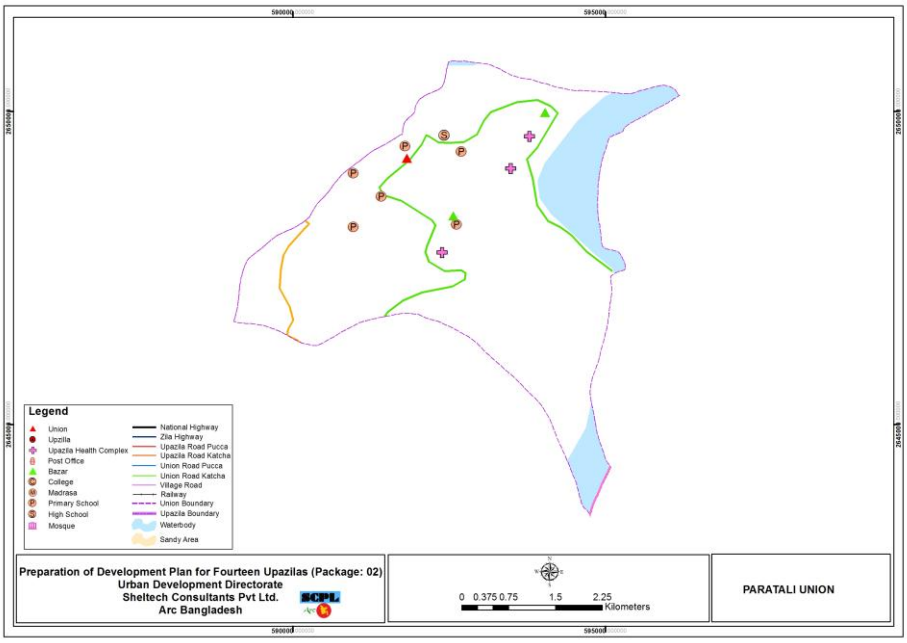
North: On the north & west side of the study area, Srinagar Union is situated.

West: On the west side of the study area, Srinagar Union and part of Busgari Union located.

South: On the south side of the study area, Busgari Union is located.

East: On the East side of study area, Chandpur Union is located.

Map 19.1: Paratoli Union

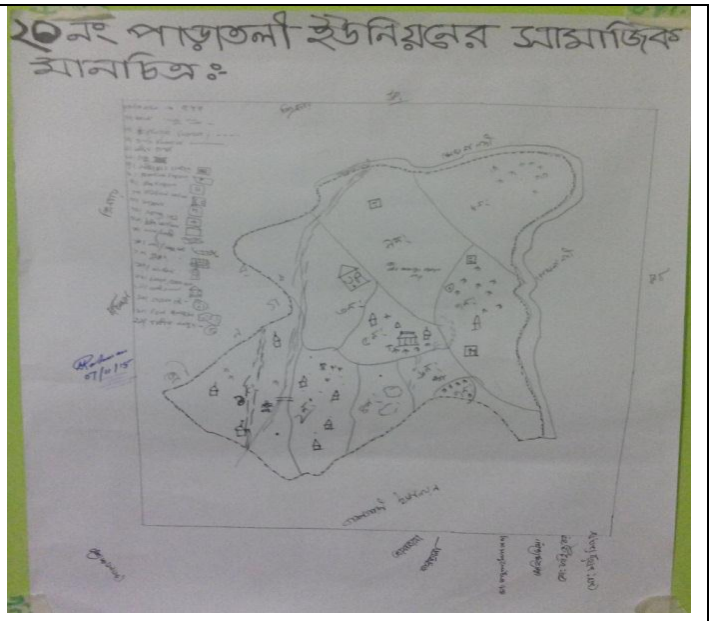


19.2 Spatial Aspects

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 Paratoli Union 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/madrasa, 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 19.1: Preparing Social Map



Photograph 19.2: Social Map of Paratoli Union

19.3 Major Problems and Potentials

19.3.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:

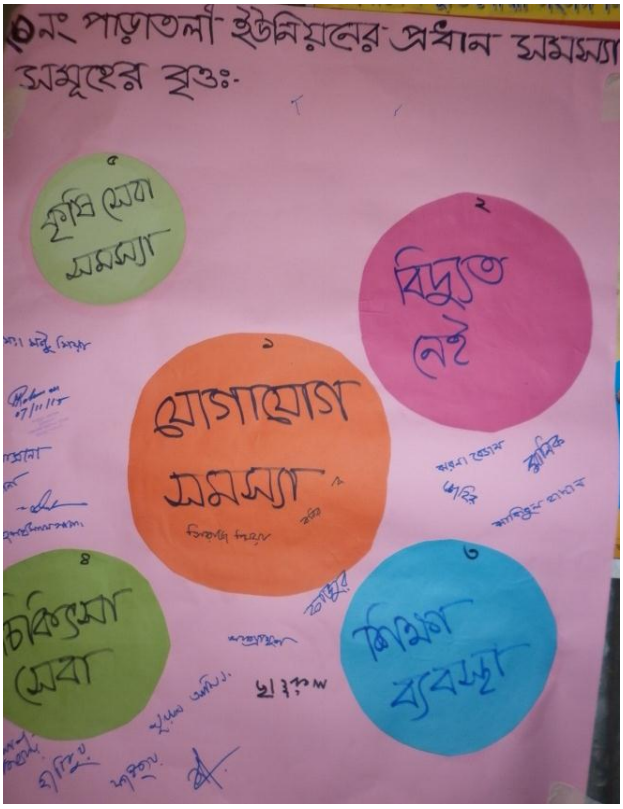
- Weak communication system(Earthen road, broken road)
- Lack of Bridge and ditch
- Lack of health services(Shortage of treatment and medicine)
- Problem of poverty
- Lack of agricultural extension services

- Problem of education system(Lack of structure, High school and college, Shortage of teacher)
- Weak mobile network
- Problem of flood
- Lack of veterinary hospital
- Problem of water logging
- Irrigation problem
- Problem of child marriage
- Problem of product marketing
- Problem of pure drinking water(Arsenic,iron)
- Problem of religious education structure.
- Problem of sanitation
- No electricity
- No bridge (To Kalipurghat to Madhanagar ghat)

19.3.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. Poor Transportation System
2. No Electricity
3. problem of educational system
4. Lack of health services
5. Lack of Agricultural extension services



Photograph 19.3: Major five Problems

19.3.c 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;

- Agricultural land (rice jute, wheat, potato, watermelon, Futit, Nuts, onion, garlic, sweet potato, Pumpkin, fertile land,chili)
- Foreign remittance
- Water body's
- Hardworking People.
- Educated people
- Home of poet Late poet Shamsur Rahman
- River(Mora river, Maddhanager river and Meghna river)
- businessman
- Cattle rearing

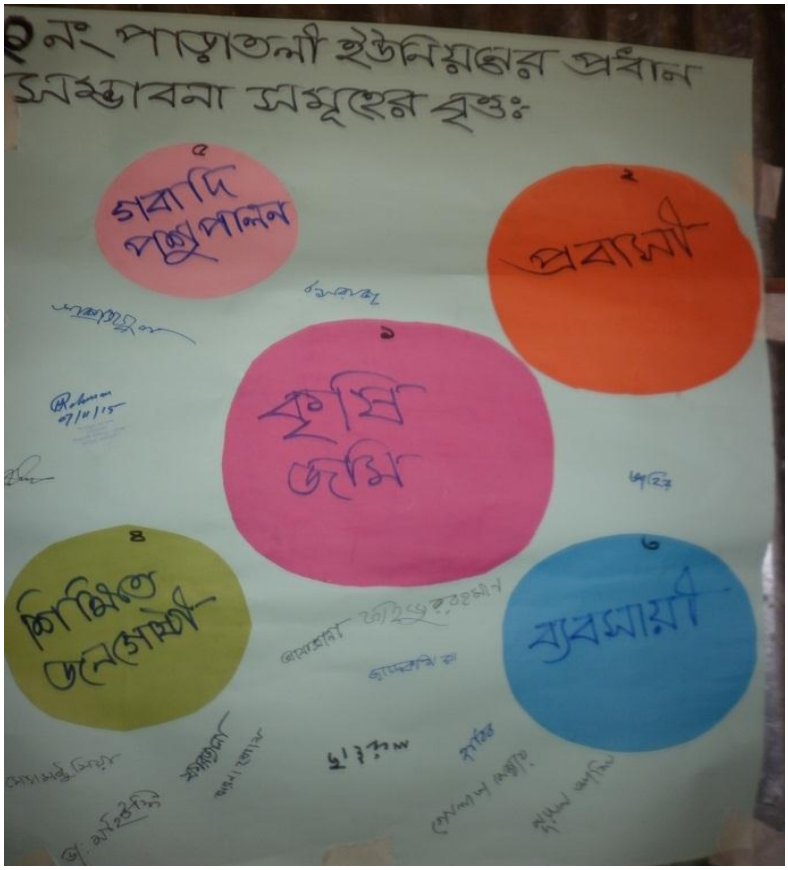


Figure 19.1: Major Five Potentials

19.3.d 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, effect/impact and potentials have furnished in the following table;

Table 19.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• No roads • Only 1 K.M. pucca road in the Union. • No bridge from Kalipur to Maddhanagar	• Costly and time spending to communication with Upazilla sadar • Increase transport cost due to well route • No industrialization • Hampered of children education	• Sand and manpower

		• Not possible to overcoming economical establishment	
2. No Electricity	• Bureaucratic complexity	• No industrialization • Hampered of children education	• Electricity grid line supplied by next to neighbors Busgari Union
3.Education	• Due to Bad condition of transportation system Children are not attracted to condition • No head teacher in many primary schools • No high school and college	• Increase literacy rate and dropping rate • Young people falling to danger • Enough Students interested to education	• Enough Students interested to education
4.Health services	• Shortage of hospital, doctor and medicine • Poor Transportation system	• Hampered health services to Union citizen • Shortage of emergency health services • Increase mortality rate	• One F.W.C. and 3 community clinic
5.lack of agricultural extension	• No agricultural cultivation advice • Lack of agricultural loan • Complexity of agricultural loan • Poor Transportation system • Bureaucratic complexity	• Not possible to development agriculture • Losses of economical development	• Enough agricultural potentiality to local people

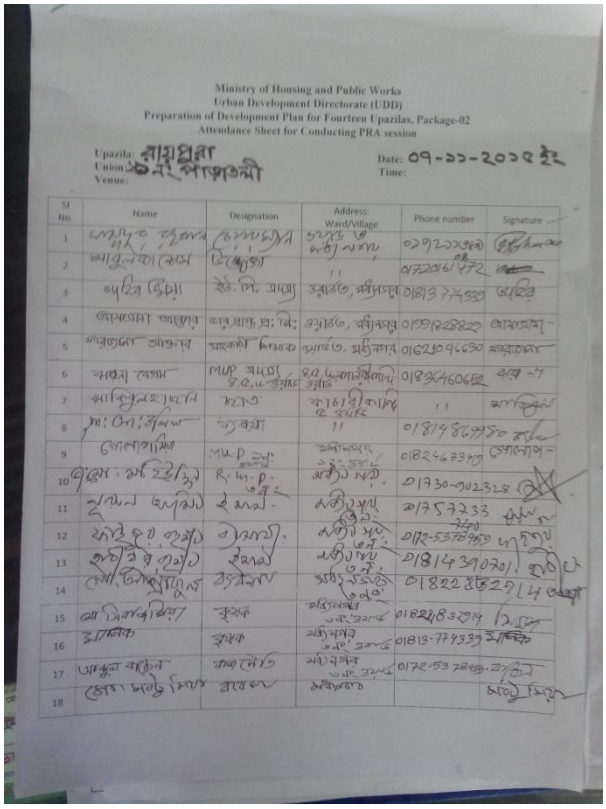
3.19.4 Perceived Development Priorities for Paratoli Union under Narshingdi District.

The recommended development priorities for Paratoli Union is as follows:

Table .19.2: Development Priorities for Paratoli Union

Short term	Midterm	Long term
• Demand of canal dredging • Demand of developed modern health services • Demand of employment • Demand of electricity for all • Demand of developed agricultural system • Demand of established veterinary hospital • Developed educational system. • Demand of development of transportation.	• Demand of established veterinary hospital • Developed educational system. • Demand of employment • Developed educational system. • Demand of developed agricultural system • Demand of canal dredging • Demand of electricity for all	• Demand of established veterinary hospital • Demand of employment • Demand of developed agricultural system • Demand of electricity for all

19.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ৯নং পাঁচগাঁও
Venue:
Date: ০৭-১১-২০১৫ ইং
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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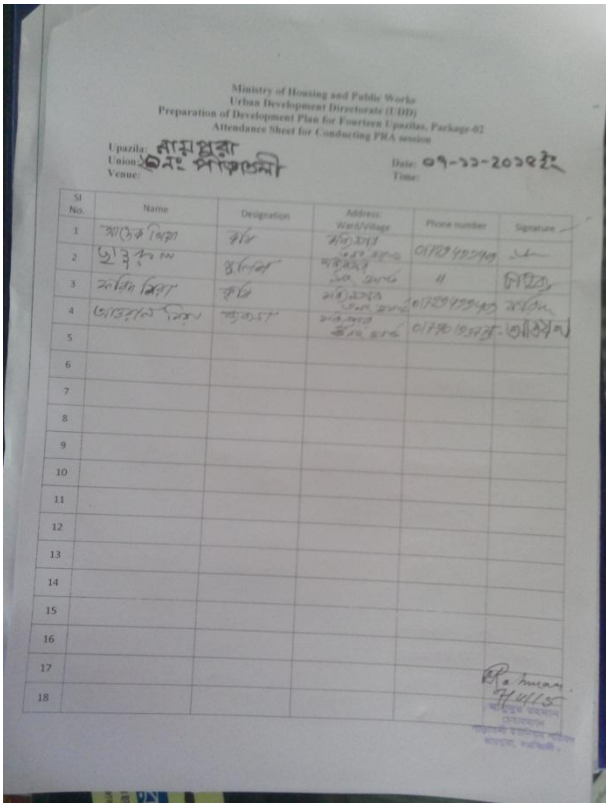

Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ৯নং পাঁচগাঁও
Venue:
Date: ০৭-১১-২০১৫ ইং
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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20.0 Polashtoly Union

20.1 Overview (Study Area)

The Polashtoly Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows;

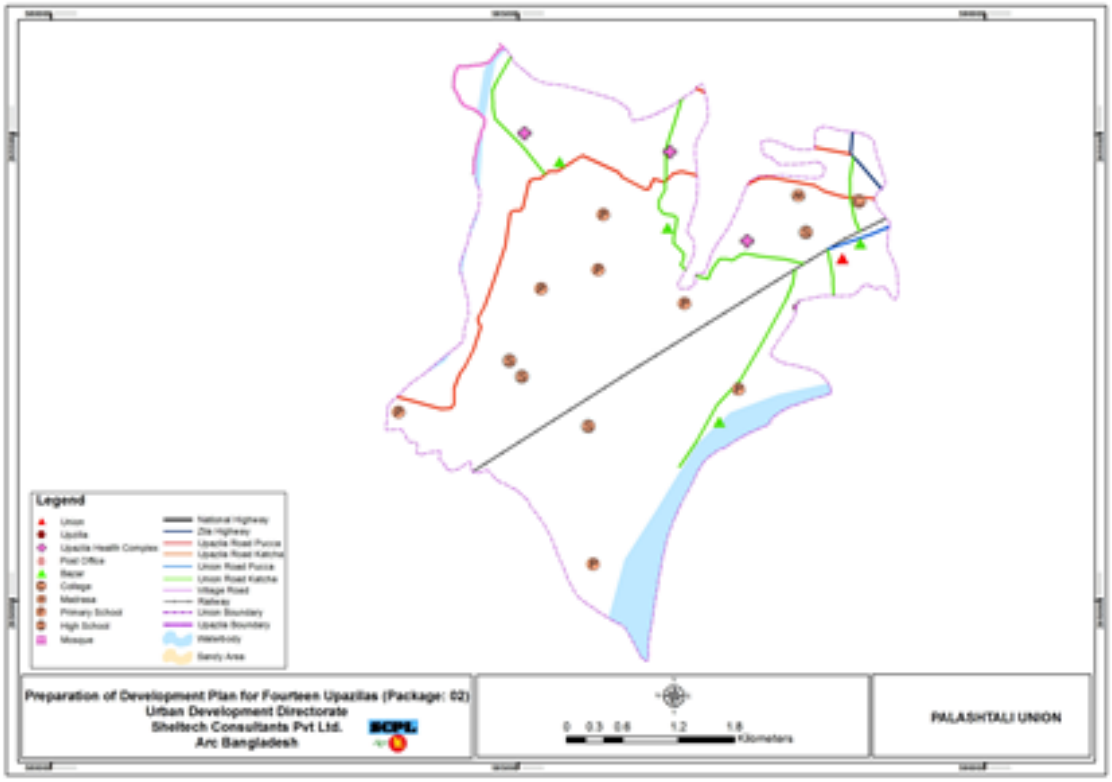
North: On the north side of the study area, Alipura Union and part of Marjal Union are situated.

West: On the west side of the study area, Adiyabad and Mirzanagar Union are located.

South: On the south side of the study area, Meghna river and over the river Srinagar Union are located.

East: On the south side of the study area, Chanderkandi Union is located.

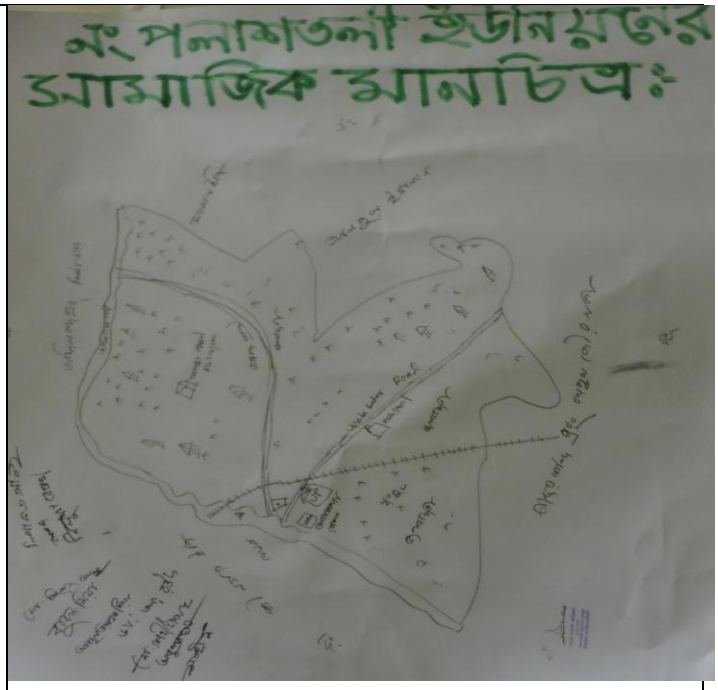
Map 20.1: Polashtoly Union



20.2 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 Polashtoly Union 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/madrasa, 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 20.1: Preparing Social Map	**Photograph 20.2: Social Map of Polashtoly Union**

20.3 Major Problems and Potentials

20.3.a 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:

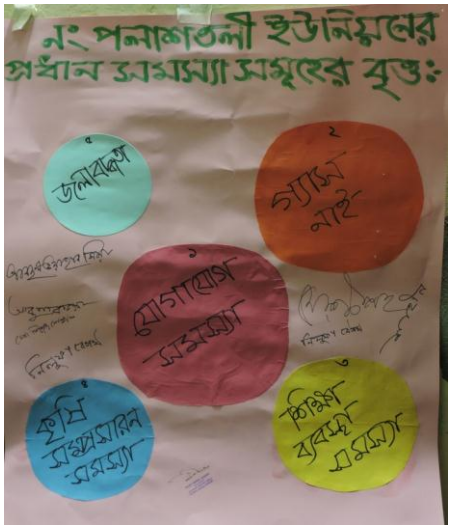
- Electricity(Load shedding)
- Stealing and robbing (Stealing cow)
- Weak communication system(Earthen road, broken road, Shortage of road)

- No industrialization
- Problem of drug addiction
- Eve teasing
- Problem of health services (Need hospital, Shortage of doctor, medicine and ambulance)
- Lack of modern education system(Quality of education in Government school is low,Shortage of teacher and structure, no college)
- No gas
- Lack of agricultural extension services center(problem of serving service/problem of consultancy center/ problem of irrigation)
- Problem of water logging(Ward no 1 and 2, almost 300 bigha land
- Flood
- Attack of insects in crop
- River erosion (Meghna river, Ward no 1,7 and 9)
- Child marriage
- Problem of dowry
- Problem of marketing agricultural product
- Problem of costly agricultural production/Low price of product able product

20.3.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. Poor Transportation System
2. No gas connection
3. problem of educational system
4. Lack of Agricultural extension services
5. Waterlogging



Photograph 20.3: Venn diagram

20.3.c 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;

- Agricultural land(rice, banana and vegetables)
- Fruit garden
- Fisheries
- Poultry
- Cattle rearing
- Meghna river
- Foreign remittance
- Hard working people
- Small entrepreneur
- Bazar(Polash toly)
- Duel gauge rail line
- Methykanda Rail station
- Lot of land for social plantation

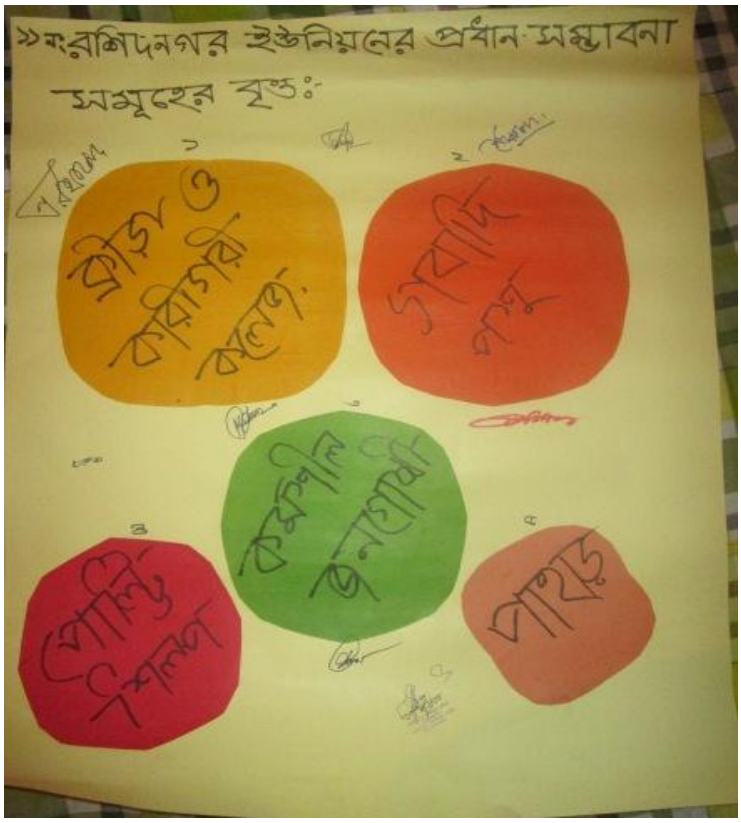


Figure 20.1: Major Five Potentials

20.3.d Identification of Prioritized Problems, Cause, Impact, Potentials

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

Table 20.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Earthen roads, broken roads, Lot of bridge culvert are broken • Demand of culvert • Shortage of many other new road • Bureaucratic complexity and negligence of local authority • Poor Transportation system	• People are not moving for weak transportation • Hampered children's education • Hampered emergency health services	• Existing sand and hard working people • Enough land for established new road
2.No gas	• Bureaucratic complexity and negligence of authority • Weak communication system	• Increase fuel cost • Finished Trees and forest day by day • Increase environmental pollution • Economic losses to people and country	• Existing Methikanda gas sub station
3.Trouble of education system	• Undeveloped and unplanned transportation • Shortage of educational institution structure • No college and no girls high school • Shortage of religious structure	• Decrease the rate of education • Deprived of basic education • Increase backwardness in society • Young people run away to danger • Women are getting more backward	• Enough land exists for educational institution • Lot of students to taking education exists

4.Problem of agriculture	• Lack of agricultural services • Agricultural technology is not up to date • High price of fertilizer, seeds and agrichemicals • Farmers are not found wright advice and proper planning for cultivation • Weak and undeveloped transportation system	• Farmers are deprived from right price to producing product • Farmers are facing economical losses for cost of production	• Existing enough fertile agricultural land • Existing Enough agricultural interested people to cultivation
5.Waterlogging	• Creates waterlogging Lack of canal and bill dragging • Unplanned residence/Dredging/irrigation	• Crops are damaged due to frequent flooding. • Near about 10500 decimal area crops less due to water logging	• Existing enough labor and cordial local people

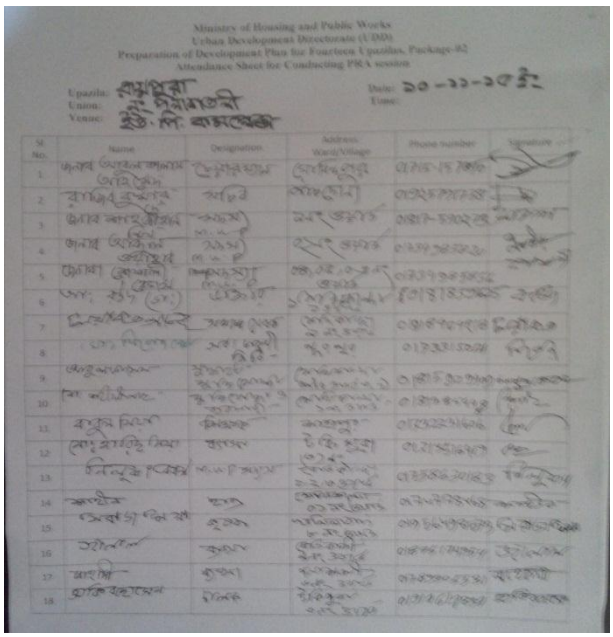
20.4 Perceived Development Priorities for Polashtoly Union under Narshingdi District.

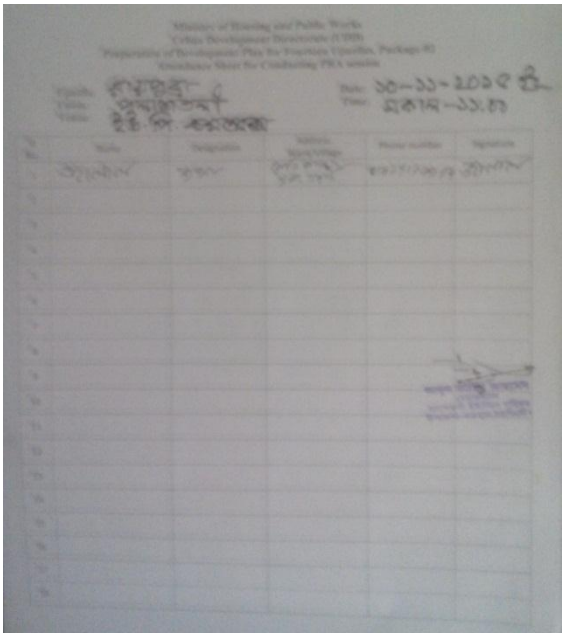
The recommended development priorities for Polashtoly Union are as follows:

Table 20.2: Development Priorities for Polashtoly Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of fisheries • Demand of development of modern agricultural system • Demand of employment • Demand of developed Union parishad • Demand of gas connection • Demand of remove waterlogging • Demand of development of health services • Demand of solve problem of electricity	• Demand of development of transportation system • Demand of development of health services • Demand of employment • Demand of developed education system • Demand of gas connection • Demand of remove waterlogging	• Demand of development of health services • Demand of employment • Demand of development of transportation system • Demand of developed education system

20.5: Attendance Sheet of Participants





21.0 Radhanagar Union

21.1 Overview (Study Area)

The Radhanagar Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows;

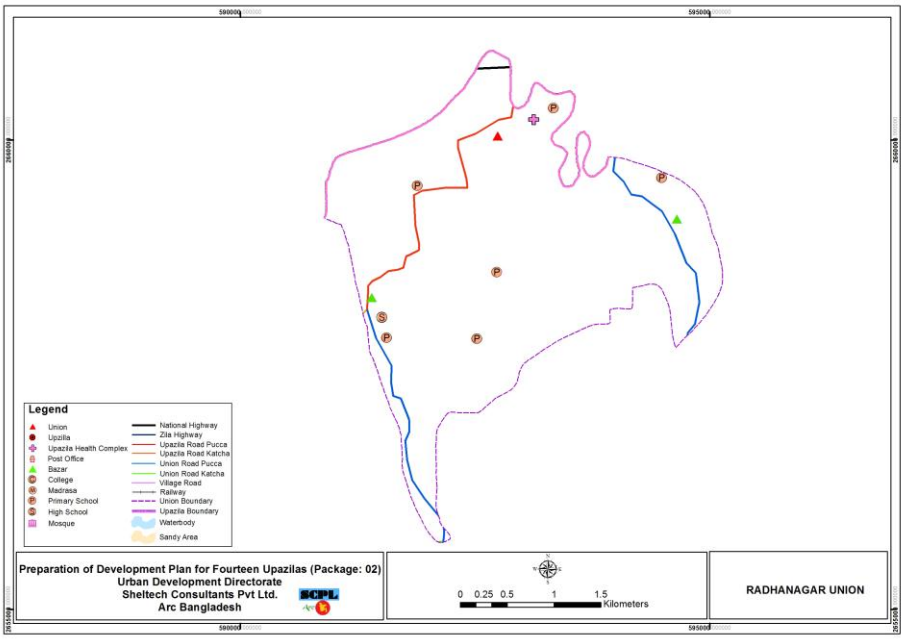
North: On the north side of the study area, Narayanpur U.P. is situated

West: On the west side of the study area, Uttar Bakharnagar and Ulipur are located

South: On the south side of the study area, Mirzapur U.P. is located

East: On the east side of the study area, Mirzapur U.P. is located.

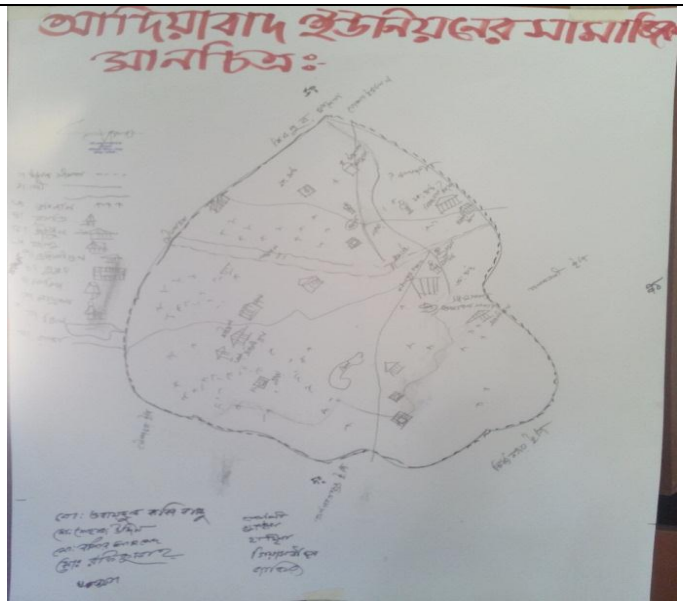
Map 21.1: Radhanagar Union



21.2 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 Radha nagar Union 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/madrasa, 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 21.1: Preparing Social Map	**Photograph 21.2: Social Map of Radhanagar Union**

21.3 Major Problems and Potentials

21.3.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:

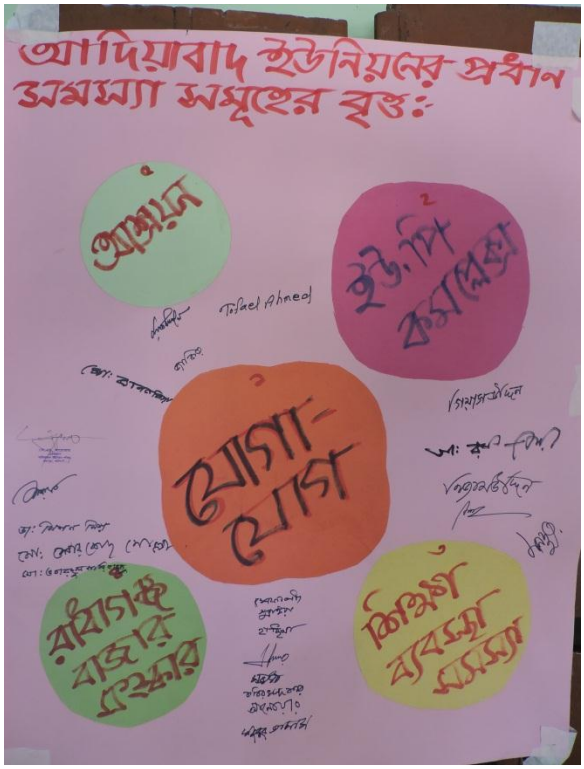
- Water logging (damage crops)
- Problem of Canal excavation (From Halia Bandar to barar char Canal return)

- Poor Transportation (Earthen road from Ward no 1 Kalika barir more to Pir Fateh ali mazar , Broken bridges in front of Kalikabari Earthen road in entire Union ,Road and bridge broken From Bakul nagar to Saheber char Ward no 3,4 and5 to ward no 3 Sirazul islam madrasa
- Trouble of educational structure (50b no govt. primary school Ward no 7 in risk Shortage of classroom than students , problem of build structure , Lack of sudents uniform , Hashem khan madrassa)
- Lack of burning ghat (Shortage of structure)
- No industrialization
- Poverty
- Lack of employment
- Capital problem in small and cottage industry
- Childhood marriage
- Stealing and robing (weak law and order)
- Problem of drug addiction
- Corruption in land office
- Lack of emergency health services (Shortage of medicine ,doctor and hospital , In ward no 7,8 and 9 no clinic , shortage of clinic)
- No police station.
- Lack of sanitation
- Lack of pure drinking water (Shortage of Tubewell , Arsenic and iron)
- Lack of 3g internet
- Agricultural extension services
- Problem of right price in agricultural production
- High price of agricultural element
- Problem of autism allowance
- No commercial bank
- No tubewell

21.3.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. Poor Transportation System
2. Unemployment problem
3. Lack of Agricultural extension services
4. problem of educational system
5. Lack of health services



Photograph 21.3: Major five Problems

21.3.c 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;

- Agriculture (Lemon ,Rice ,wheat, jackfruit)
- Fisheries
- Poultry
- Pond
- Foreign services
- Cattle rearing
- Hardworking people
- Bazar(3 leased 1)
- Post office
- Land office
- Small and cottage industry (Ward no 1)
- Handloom
- Beel (3 deshwari bill , Jasimud din beel and angur chera)
- Dhaka Sylhet Highway

- Factory of embroidery

Figure 3.21.1: Major Five Potentials

21.3.d 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, effect/impact and potentials have furnished in the following table;

Table 21.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Bureaucratic complexity • Many earthen roads and pucca roads are almost broken	• Students are facing educational losses due to communication • Farmers cannot marketing his agricultural product in time and low cost so that he is deprive from right price	• soil available • Hardworking people • sand available • Earthen road available •

2.Unemployment	• No Industrialization • Undeveloped communication system • Lack of structure in educational sector • Lack of technical and workable education • Scope of employment is very low	• Social security condition is very low • Financial condition is not getting good • Poverty is increasing • Many type of unrest is increasing in society	• Dhaka-Sylhet highway is passing through the Union • Hardworking people available • Enough land is available for industrialization
3.Agriculture	• Lack of agricultural extension service • Lack of consultant • Lack of developed and useful machineries • Accurate agricultural consultation is not given to farmers • Lack of irrigation pump • Lack of tractor • Undeveloped communication system	• Poor people day by day going to more poor • Farmers cannot harvest crops according to his labor • Cannot getting right price of agricultural product • Price of Agricultural product is lower than production cost	• Enough agricultural land is available • Enough farmer exists • Union agricultural office exist
4.Education	• Lack of structure in educational sector • Facing problem to teaching because of compare with classroom pupil are much more • Lack of undeveloped communication system Hampered Education for students • No higher educational institute • Lack of technical and workable education	• Though interested students exists Education not getting developed • Literacy rate is decreasing • It seems that Illiterate people are getting liabilities of society	• Al lot of students exist • Seven primary school , one high school and six madrasa exist in the Union
5.Emergency health services	• Undeveloped communication system • No good doctor • Appointed doctor not available in hospital • Shortage of doctor • No ambulance	• People are deprive from basic wright of health service • As per shortage of health services emergency patient had died. • Pregnant and delivery maternal are deprived to right emergency health services	• Two community clinic exist • One F.W.C. exist • Enough land donor for construction of hospital

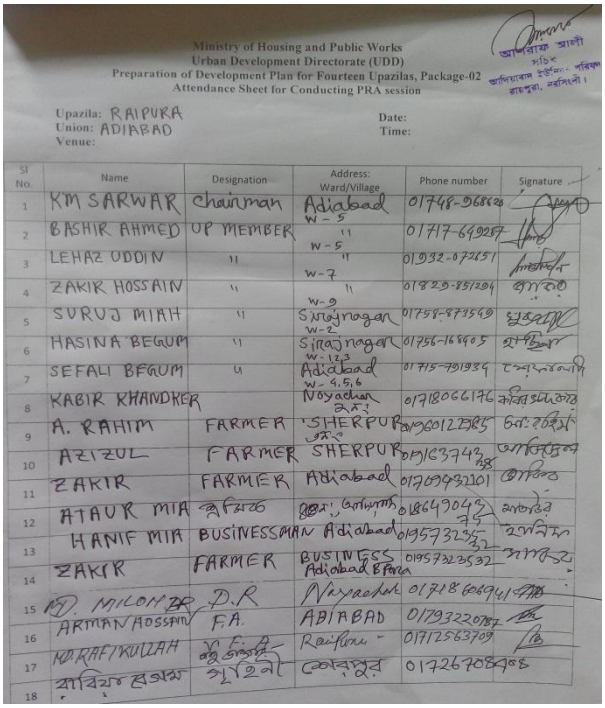
21.4 Perceived Development Priorities for Radhanagar Union under Narshingdi District.

The recommended development priorities for Radhanagar Union is as follows;

Table 21.2: Development Priorities for Radhanagar Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of disaster resistant shelter center • Demand of development of Entertainment • Demand of development of agriculture • Demand of Employment • Demand of stop child marriage • Demand of development of graveyard • Demand of canal excavation • Demand of cold storage • Demand of autism training center • Demand of industrialization • Miscellaneous(Demand of sanitary latrine , Demand of Waterlogging , Demand of cattle rearing ,Demand of fishery project ,Demand of agricultural elements)	• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of disaster resistant shelter center • Demand of development of Entertainment • Demand of development of agriculture • Demand of Employment • Demand of development of graveyard • Demand of canal excavation • Demand of cold storage • Demand of autism training center • Demand of industrialization	• Demand of Employment • Demand of industrialization • Demand of development of Entertainment • Demand of development of health services • Demand of developed education system • Demand of canal excavation • Demand of cold storage • Demand of disaster resistant shelter center • Demand of development of transportation system

21.5 : Attendance Sheet of Participants

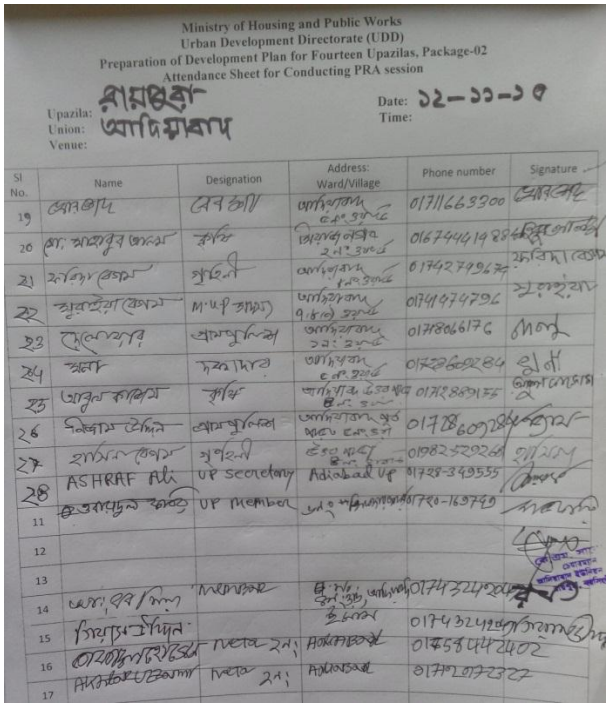


Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: RAIPURA
Union: ADIABAD
Venue:

Date:
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	KM SARWAR	Chairman	Adiabad W-5	01748-968826	
2	BASHIR AHMED	UP MEMBER	" W-5	01717-690287	
3	LEHAZ UDDIN	"	" W-7	01932-072651	
4	ZAKIR HOSSAIN	"	" W-9	01823-851204	
5	SURUJ MIAH	"	Sirajnagar W-2	01758-873569	
6	HASINA BEGUM	"	Sirajnagar W-1,2,3	01756-168605	
7	SEFALI BEGUM	"	Adiabad W-4,5,6	01715-791939	
8	KABIR KHANDKER		Noyachar	01718066176	
9	A. RAHIM	FARMER	SHERPUR	01916012385	
10	AZIZUL	FARMER	SHERPUR	01913374348	
11	ZAKIR	FARMER	Adiabad	01709932101	
12	ATAUR MIA	কৃষিক	[illegible]	01864904375	
13	HANIF MIA	BUSINESSMAN	Adiabad	01957323532	
14	ZAKIR	FARMER	BUSINESS Adiabad Bazar	01957323532	
15	MD. MILON	D.R	Noyachar	01718666941	
16	ARMAN HOSSAIN	F.A.	ABIABAD	01793220187	
17	MD. RAFIKULLAH	[illegible]	Raipura	01712563709	
18	রাকিব হোসেন	ছাত্র	কোরপুর	01726708408	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: আদিয়াবাদ
Venue:

Date: ১২-১১-১৫
Time:

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	[illegible]	[illegible]	[illegible]	01711663900	
20	[illegible]	কৃষি	[illegible]	01674414884	
21	[illegible]	গৃহিণী	[illegible]	01742749637	
22	[illegible]	M.U.P সদস্য	[illegible]	01741474796	
23	[illegible]	[illegible]	[illegible]	01718066176	
24	[illegible]	দফাদার	[illegible]	01726608284	
25	আবুল কাশেম	কৃষি	[illegible]	01728831756	
26	[illegible]	[illegible]	[illegible]	01788607284	
27	[illegible]	গৃহিণী	[illegible]	01982572926	
28	ASHRAF Ali	UP secretary	Adiabad UP	01728-349555	
11	[illegible]	UP MEMBER	[illegible]	01720-163740	
12					
13					
14	[illegible]	[illegible]	[illegible]	01743242[illegible]	
15	[illegible]	[illegible]	[illegible]	01743242[illegible]	
16	[illegible]	Meta ২নং	ADIABAD	01758[illegible]	
17	[illegible]	Meta ২নং	ADIABAD	01712[illegible]	

22.0 Raipura Union

22.1 Overview (Study Area)

The Raipura Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows

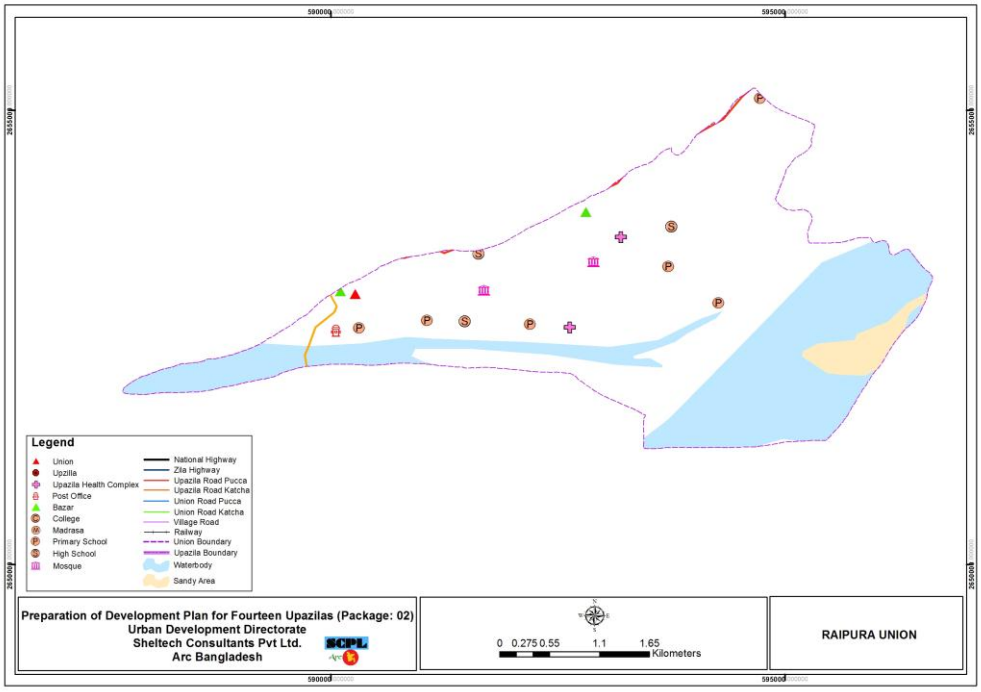
North: On the north side of the study area, Mirzapur and Chanderkani Union are situated.

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

South: On the south side of the study area, Meghna River is located

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

Map 22.1: Raipura Union



22.2 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 Raipura Union 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/madrasa, 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 22.1: Raipura Union

Photograph 22.2: Social Map of Raipura Union

. Major Problems and Potentials

22.3.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:

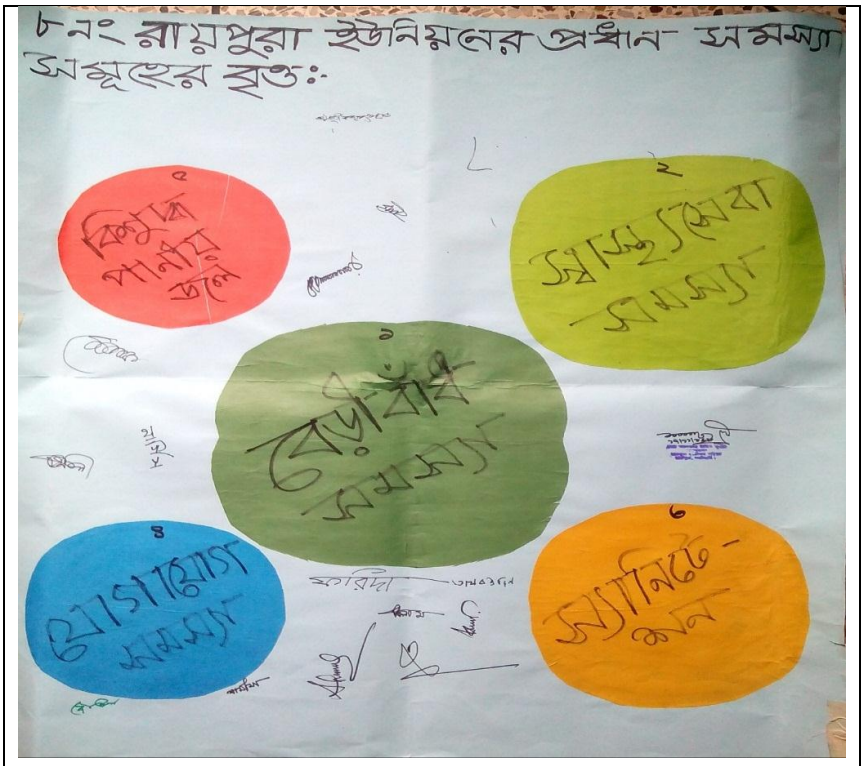
- Transportation problem (Broken and green road, connected road no 7 of word no 5)
- Drainage problem (Ward no 4, 5, 6 & 8)

- Health problem (No hospital, only one C.C, shortage of doctor and medicine)
- No pure drinking water (No Tube-well of word no 6, problem of arsenic and iron mixed with drinking water)
- No disaster resistant shelter center(Problem of disaster resistant shelter center in Ward no 6)
- Scarcity of sanitation
- Trouble of education system (Lack of Educational institution structure Such as no girls school, college, shortage of classroom then students, teacher and educational materials, no school in word no 9)
- Electricity problem (There is no electricity connection in word no 5 and 9)
- River erosion.
- Embankment problem (have to build a Embankement on Kakon River in word no 2 & 9)
- Flooded problem (The road of word no 9 are flooded)
- Unplanned raising silicon. (from the river Meghna)
- Social problem in bunch of villages.
- No bridge (word no 7 & 9)
- Unemployment problem.
- No boundary wall of any school.
- No guide wall
- Waterlogging problem (2000 acre land in danger of word no 2, 3 & 9)
- Woman torturing
- Early marriage problem
- Dowry problem
- No U.P. complex
- No urbanization
- No technical institution
- Agricultural extension problem (No service is getting after taking 2500 agricultural service cards)

22.3.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. Embankment problem
2. Lack of health services
3. Lack of Sanitation
4. Poor Transportation System
5. Lack of safe drinking water.



Photograph 22.3: Venn diagram

22.3.c 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;

- Agriculture (Vegetables, rice, jut, potato and nut)
- Foreign remittance
- Poultry
- Cattle rearing
- Beel (Large size Eid Gah beel)
- Hard working people
- Meghna River
- Disaster resistant shelter center’s pond (govt.)

Figure 22.1: Major Five Potentials

22.3.d 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, effect/impact and potentials have furnished in the following table;

Table 22.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Beri Badh problem	• Lack of budget and allotment • Indifference of local agent • Red tapism	• Road, house, agricultural land are dissolving in river • 2000 acre land of the word no 2, 3, 9 are endanger	• Local conscious people and political leader

2.Health care problem	• There is no F.W.C or hospital only have a community clinic. • No good quality doctor, medicine, ambulance. • Underdeveloped transport system	• People deprive of from health service • Impossible to give proper treatment to emergency patient • Pregnancy and delivery service problem	• There is enough land for building hospital • Enough people for working
3.Trouble of sanitation system	• Lack of budge • Want of people's conscious • Indifference of local agent • Red tapism	• People are living in health danger • Diseases are increasing for using open sanitation	• Conscious and active people in Union parisad
4.Weak transport system	• Broken road, no repairing, most of the places is not bridge and culvert. • Green road, no improvement because of it is bank of the river Meghna • Lack of budget and others difficulties	• Students are facing problem for study • Decreasing rate of literacy • Cost of bearing goods and patients are increasing • Emergency patients aren't getting service timely	• Goods bearing is cheap because of it is the bank of the river Meghna • Lots of commercial people
5.Lack of safe drinking water	• Arsenic and iron mixed with water • Want of deep tube-well • Lack of budget for Union parisad	• People are drinking unsafe water • Affected people in various diseases • People are in health danger of the area	• Local U.P. chairman Mr. Mohammad Alkas Uddin Vuiyan along with the local peoples have cooperative and Intense effort

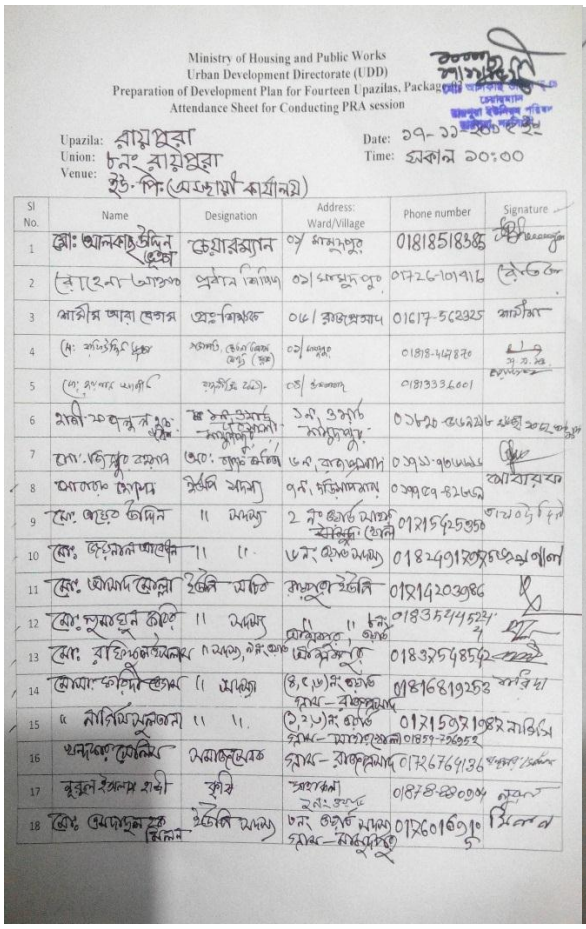
22.4 Perceived Development Priorities for Raipura Union under Narshingdi District.

The recommended development priorities for Raipura Union is as follows;

Table 22.2: Development Priorities for Raipura Union

Short term	Midterm	Long term
• Demand of development of health services • Demand of development of Entertainment • Demand of improvement of educational frameworks • Demand ofdeveloped transport system • Demand ofU.P. complex • Demand ofBeri Badh • Demand ofindustrialization • Demand ofbusiness bank • Demand ofgood governance on woman • Demand ofsalary scale of village police • Demand ofelectricity connection • Demand ofdeveloped sanitation system • Demand ofdeep tube-well • Demand ofdeveloped drainage system • Demand ofthe wall of gravery • Demand ofstopping unplanned raising silicon	• Demand ofdeveloped transport system • Demand ofelectricity connection • Demand ofsalary scale of village police • Demand of developed education system • Demand ofU.P. complex • Demand of development of health services • Demand of development of Entertainment • Demand of Beri Badh • Demand of development of agricultural service • Demand of modern sanitation system • Demand ofgood governance on woman • Demand ofbusiness bank • Demand ofindustrialization	• Demand of development of health services • Demand of development of Entertainment • Demand of improvement of educational frameworks • Demand ofdeveloped transport system • Demand ofU.P. complex • Demand ofBeri Badh • Demand ofindustrialization • Demand ofbusiness bank • Demand ofgood governance on woman

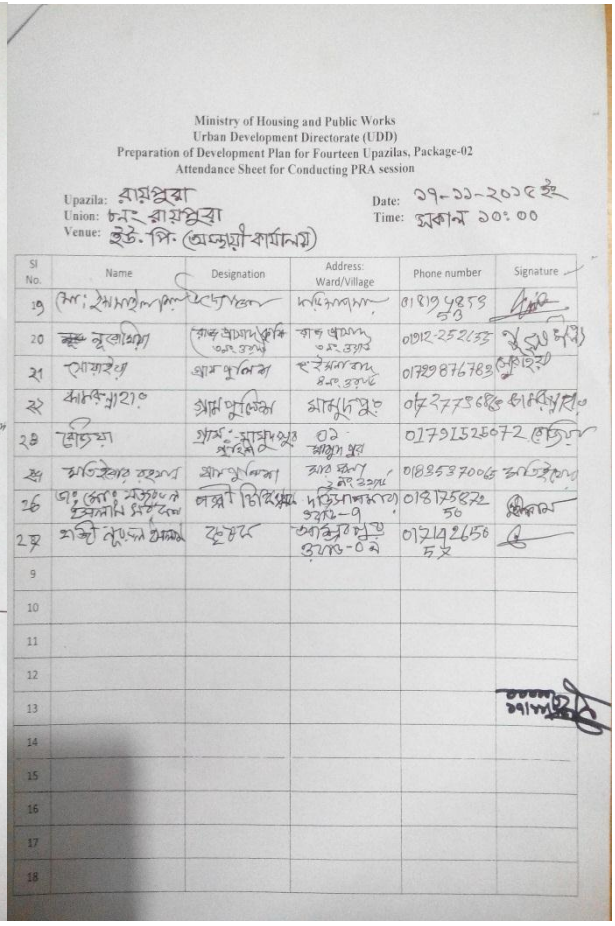
22.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ৮নং রায়পুরা
Venue: ইউ. পি. (অস্থায়ী কার্যালয়)
Date: ১৭-১১-২০১৫ ইং
Time: সকাল ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	মো: আলহাজ উদ্দিন	চেয়ারম্যান	০৭/ মাহমুদপুর	01818518388	
2	মোহেনা আক্তার	প্রকল্প কর্মকর্তা	০১/ মাহমুদপুর	01726-101916	
3	কামরুন আরা বেগম	সহ-শিক্ষক	০৬/ রাজপ্রসাদ	01617-562925	
4	[illegible]	[illegible]	০৭/ মাহমুদপুর	01818-467870	
5	[illegible]	[illegible]	০৩/ [illegible]	01813332001	
6	[illegible]	[illegible]	১নং ওয়ার্ড মাহমুদপুর	[illegible]	
7	[illegible]	[illegible]	৬নং রাজপ্রসাদ	[illegible]	
8	[illegible]	[illegible]	৭নং, দরিয়াদমাদ	[illegible]	কাবারক
9	মো: [illegible]	" সদস্য	2 নং ওয়ার্ড মাহমুদ ইউনিয়ন পরিষদ	01721562 3950	
10	মো: [illegible]	" "	৬নং ওয়ার্ড সদস্য	01824912[illegible]	
11	মো: [illegible]	ইউপি সচিব	রায়পুরা ইউপি	01721203986	
12	মো: [illegible]	" সদস্য	" " ৮নং ওয়ার্ড	01832424524	
13	মো: [illegible]	" সদস্য, ৯নং ওয়ার্ড	[illegible]	01832548542	
14	মোসা: [illegible]	" সদস্য	(৪,৫,৬)নং ওয়ার্ড গ্রাম – রাজপ্রসাদ	01816819268	
15	" নাসিরা সুলতানা	" "	(১,২,৩)নং ওয়ার্ড গ্রাম – মাহমুদপুর	01215032982	নাসিরা
16	খন্দকার [illegible]	সমাজসেবক	গ্রাম – রাজপ্রসাদ	01726764136	
17	বুলবুল ইসলাম হাওলাদার	কৃষি	[illegible] ২নং ওয়ার্ড	01878-[illegible]	
18	মো: [illegible]	ইউপি সদস্য	৮নং ওয়ার্ড সদস্য গ্রাম – মাহমুদপুর	01726016[illegible]	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ৮নং রায়পুরা
Venue: ইউ. পি. (অস্থায়ী কার্যালয়)
Date: ১৭-১১-২০১৫ ইং
Time: সকাল ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	মো: [illegible]	[illegible]	[illegible]	01819 4859	
20	নুরজাহান	[illegible]	[illegible]	01912-252633	
21	[illegible]	গ্রাম পুলিশ	[illegible]	01789876783	
22	[illegible]	গ্রাম পুলিশ	মাহমুদপুর	01727768[illegible]	
23	[illegible]	গ্রাম পুলিশ	[illegible]	01791525072	
24	[illegible]	গ্রাম পুলিশ	[illegible]	01885370065	
25	[illegible]	[illegible]	[illegible]	01817558[illegible]	
26	[illegible]	[illegible]	[illegible]	01721426[illegible]	
27	[illegible]	[illegible]	[illegible]		
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23.0 Sreenagar Union

23.1 Overview (Study Area)

The Sreenagar Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows;

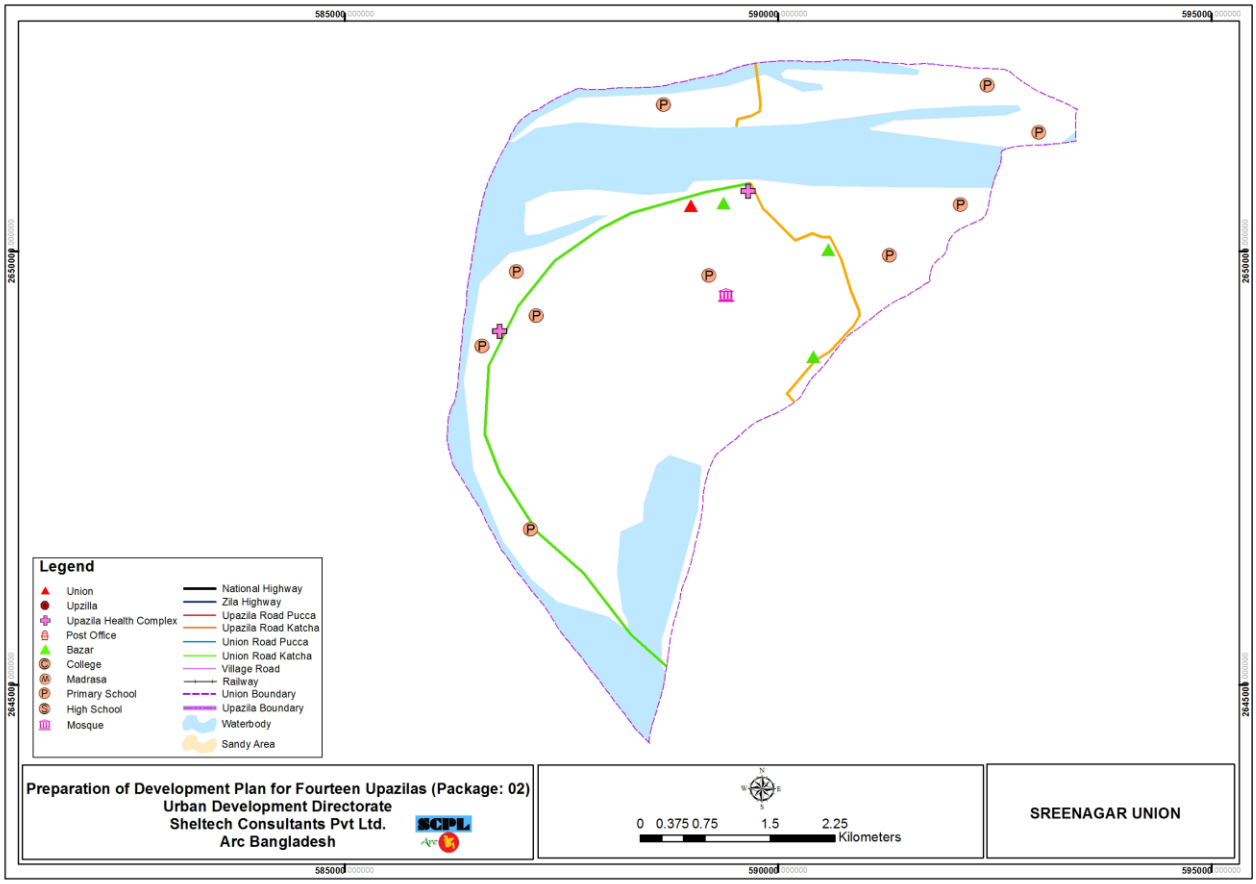
North: On the north side of the study area, Paratoli Union, Polashtoly Union and Raipura Paurashava are situated

West: On the west side of the study area, Uttar Bakharnagar and Ulipur are located

South: On the south side of the study area, River Meghna and over the River Meghna part of Char Nilakhayi and Char Subudhhi located

East: On the east side of the study area, River Meghna and River Mora over the river Paratoli Union, Bashgari Union and Char Madhua located.

Map 23.1: Sreenagar Union

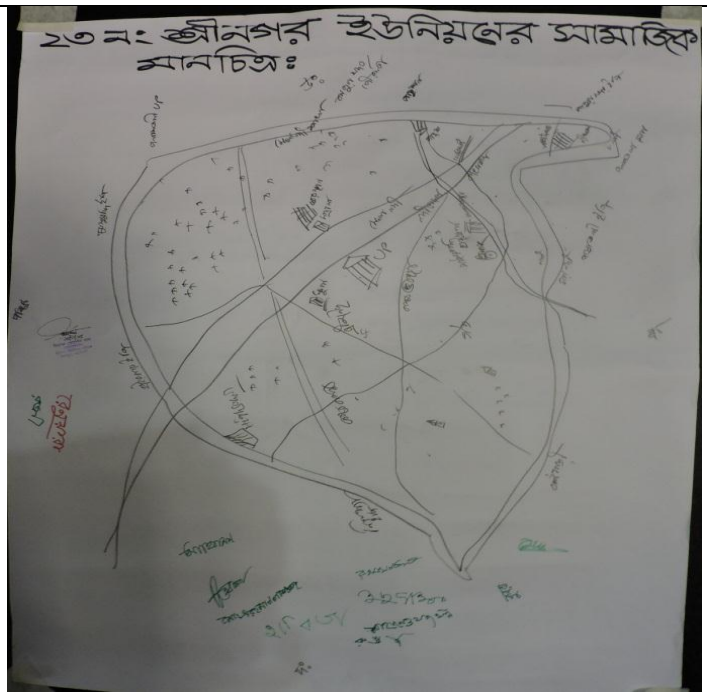


23.2 Spatial Aspects

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 Sreenagar Union 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/madrasa, 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 23.1: Preparing Social Map



Photograph 23.2: Social Map of Sreenagar Union

3.23.3 Major Problems and Potentials

3.23.3.aProblems Identification

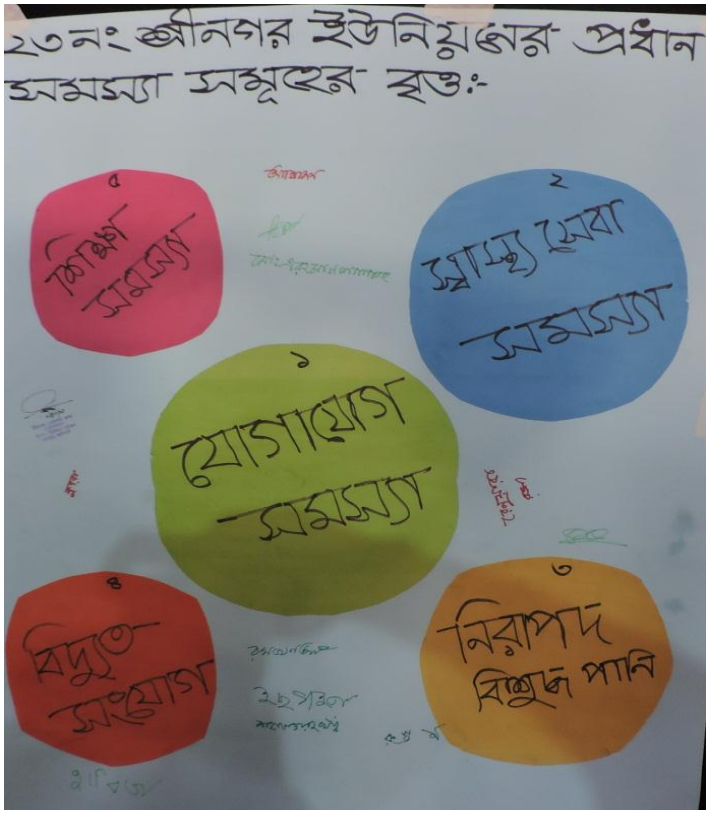
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

- Transportation Problem (Earthen roads, Broken roads , no bridge and culvert)
- Trouble of education system (Lack of Educational institution structure Such as Boundary wall, scarcity of pure drinking water, Shortage of classroom and teacher)
- Problem of health services (No F.W.C. medicine and ambulance , no hospital and unavailability of doctorl)
- Scarcity of sanitation
- Lack of pure drinking water
- Irrigation problem in agriculture
- Lack of canal excavation
- Unemployment
- Drug addiction
- Stealing and robing
- No industrialization
- Lack of Electricity (No connection)
- No gas connection
- River Erosion (Ward no 6 and 9)
- Lack of drainage
- Waterlogging
- Women t repression
- Problem of dowry
- Child marriage
- Lack of agricultural extension services

23.3.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. Poor Transportation System
2. Lack of health services
3. lack of pure drinking water
4. Problem of electricity
5. problem of educational system



Photograph 23.3: Major five Problems

23.3.c 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;

- Agriculture (Rice ,Jute ,potato, ground nut, garlic, wheat, chili, mastered and vegetables)
- Foreign remittance
- River Meghna
- Bazar(No.8 , leased 1)
- Commercial bank (Sonali bank)
- Ferryghat (Leased)
- River bank tourism (River side panthshala)
- Cattle rearing
- Hardworking people
- Post office (Sayedabad)
- Fisherman

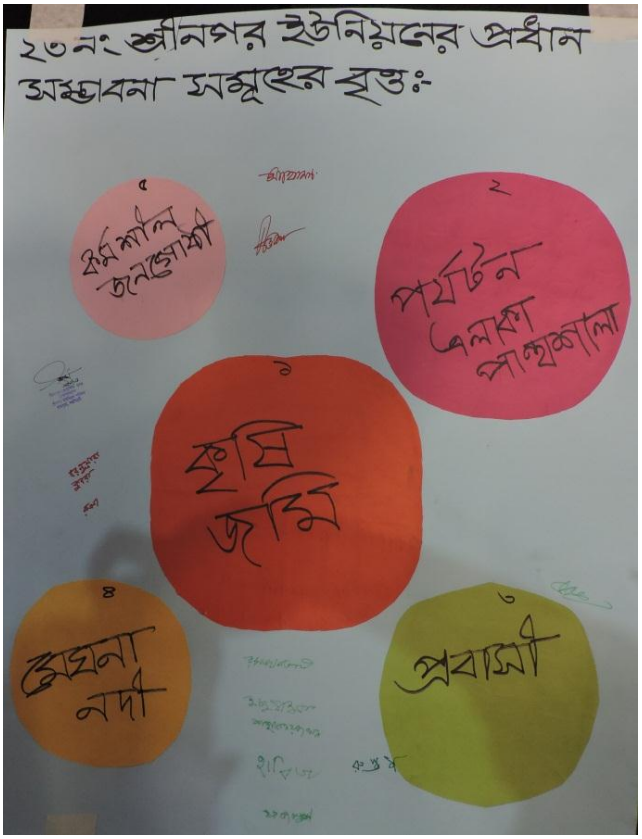


Figure 23.4: Major Five Potentials

23.3.d 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, effect/impact and potentials have furnished in the following table;

Table 23.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Earthen roads and broken roads • Many places has no bridges and culvert • Shortage of budget • Beurocratic complexity	• People are not moving properly as per weak transportation • Deprived basic right from education and emergency health services to the local people	• Hardworking people • Enough places for established road

2.Problem of education system	• There is no primary school in many wards • Shortage of classroom • Shortage of teacher • Shortage of girls school • Shortage of College • Undeveloped communication system	• Study of students are badly effected • Decrease literacy rate • Hampered economic condition	• Exiting enough talented students
3.lack of emergency health services	• No hospital • Shortage of medicine • No ambulance • No doctor • Undeveloped communication system • Top level Lack of watchfulness	• Local people are deprived to proper health services • Pregnant and delivery maternal are deprived to right emergency health services	• Enough land for established hospital • Hard working people
4.No Electricity connection	• Entire Union anywhere no electricity connection • Beurocratic complexity and local top level lack of watchfulness	• No Industrialization • Problem rising for students to study • No social development • People cannot move frequently after eveniniig	• In many area Electricity line is joining • The design of electricity has adopted
5.No U.P.complex	• Undeveloped communication system • As per area of char top level lack of watchfulness • No U.P. complex	• There is not possible to provide facilities for dwellers • People are deprived from Agriculture ,I.T. and other dwellers services	•

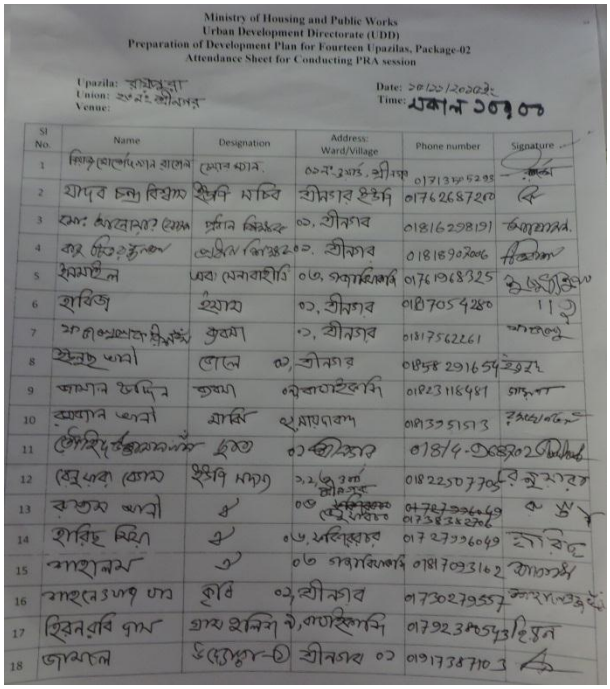
23.4 Perceived Development Priorities for Sreenagar Union under Narshingdi District.

The recommended development priorities for Sreenagar Union is as follows;

Table 23.2: Development Priorities for Sreenagar Union

Short term	Midterm	Long term
• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of electricity connection • Demand of Employment • Demand of stop river erosion • Demand of fuel gas • Demand of Industrialization • Demand of developed religious organization development • Demand of developed Women right and empowerment • Demand of modern sanitation system • Demand of pure drinking water • Demand of development of Entertainment system • Demand of Fisheries • Demand of development of tourism • Demand of Social Plantation	• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of electricity connection • Demand of Employment • Demand of fuel gas • Demand of Industrialization • Demand of developed religious organization development • Demand of stop river erosion • Demand of development of Entertainment system	• Demand of developed education system • Demand of development of transportation system • Demand of development of health services • Demand of Employment • Demand of Industrialization • Demand of developed religious organization • Demand of stop river erosion

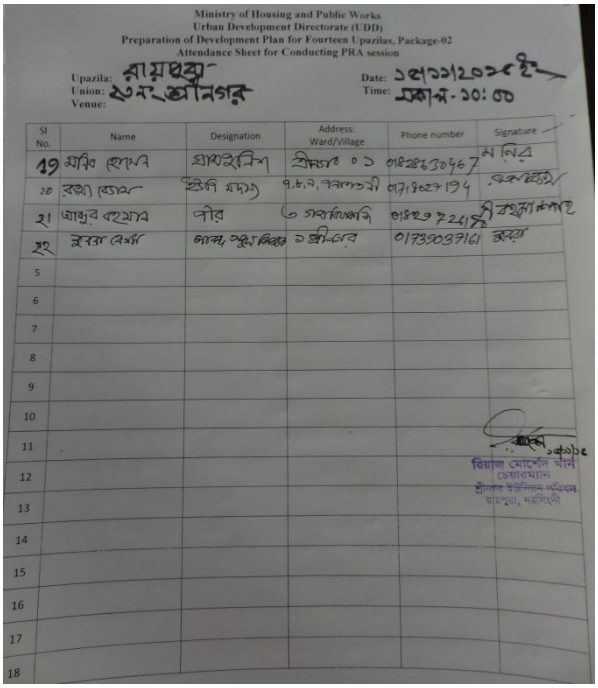
23.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ২৩নং শ্রীনগর
Venue:
Date: ১৫/১১/২০২৫ইং
Time: একাদশ ১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	[illegible]	মেয়র প্যানেল	০২নং ওয়ার্ড, শ্রীনগর	01713[illegible]6298	
2	যাদব চন্দ্র বিশ্বাস	ইউপি সচিব	শ্রীনগর ইউপি	01762687200	
3	মো: [illegible]	প্রধান শিক্ষক	০১, শ্রীনগর	01816298191	
4	[illegible]	[illegible]	০১, শ্রীনগর	01816[illegible]	
5	ইসমাইল	এবা মেনাবাহিনী	০৩, গবাদিপশুপালক	01761968325	
6	হাবিজ	ইমাম	০১, শ্রীনগর	01817054280	
7	[illegible]	কৃষক	০১, শ্রীনগর	01817562261	
8	ইনছ মিয়া	[illegible]	০১, শ্রীনগর	01858291654	
9	আমান উদ্দিন	কৃষক	নীলগাইকান্দি	01823118481	
10	আমান মিয়া	মাঝি	২, মাদারবন্দ	01913951513	
11	[illegible]	[illegible]	০১ শ্রীনগর	01814-[illegible]	
12	[illegible]	ইউপি সদস্য	১,২,৩,৪ শ্রীনগর	01822507705	
13	[illegible]	[illegible]	০৩ [illegible]	01707[illegible]6649 01738[illegible]2262	
14	হারিছ মিয়া	[illegible]	০৬, সবিরহর	01727996649	
15	[illegible]	[illegible]	০৩ গবাদিপশুপালক	01817093162	
16	[illegible]	কৃষি	০২, শ্রীনগর	01730279557	
17	হিরনবরি দাস	গ্রাম পুলিশ	৭, গণ্ডাইকান্দি	01792[illegible]5543	
18	জামাল	উপজেলা-চা	শ্রীনগর ০২	01917387103	



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: ২৩নং শ্রীনগর
Venue:
Date: ১৫/১১/২০২৫ইং
Time: একাদশ-১০:০০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
19	নাবিল হোসেন	গ্রাম পুলিশ	শ্রীনগর ০১	01828630467	
20	রত্না বেগম	ইউপি সদস্য	৭,৮,৯, শ্রীনগর	01718623194	
21	আব্দুর রহমান	পীর	০৩ গবাদিপশুপালক	01890724152	
22	[illegible]	[illegible]	১ শ্রীনগর	01739203716	
5					
6					
7					
8					
9					
10					
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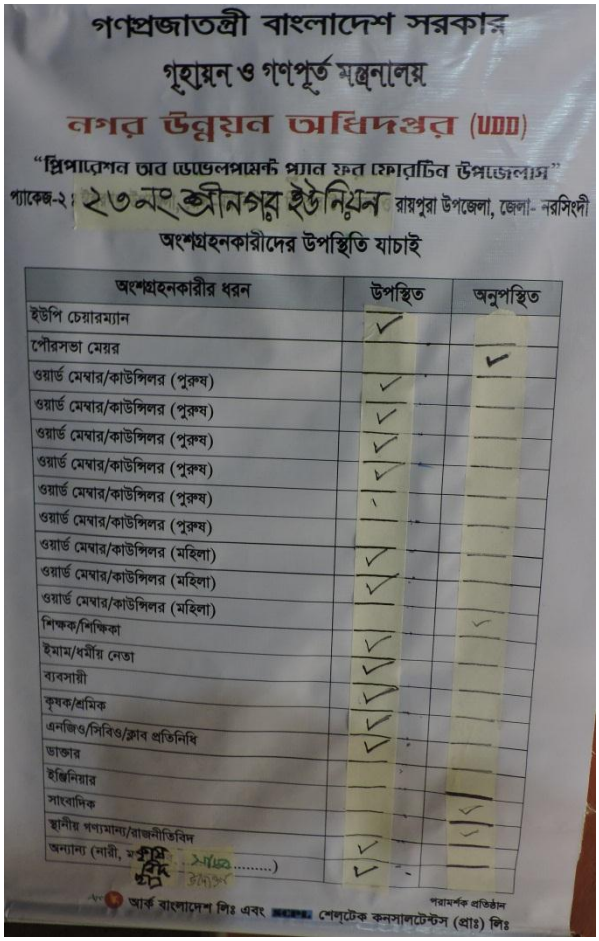
বিমাল মোশেন চৌধুরী
চেয়ারম্যান
শ্রীনগর ইউনিয়ন পরিষদ
রায়পুরা, নরসিংদী



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিন উপজেলাস"
প্যাকেজ-২: ২৩নং শ্রীনগর ইউনিয়ন রায়পুরা উপজেলা, জেলা- নরসিংদী
অংশগ্রহনকারীদের উপস্থিতি যাচাই

অংশগ্রহনকারীর ধরন	উপস্থিত	অনুপস্থিত
ইউপি চেয়ারম্যান	✓	
পৌরসভা মেয়র		✓
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (পুরুষ)		
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)	✓	
ওয়ার্ড মেম্বার/কাউন্সিলর (মহিলা)		
শিক্ষক/শিক্ষিকা		✓
ইমাম/ধর্মীয় নেতা	✓	
ব্যবসায়ী	✓	
কৃষক/শ্রমিক	✓	
এনজিও/সিবিও/ক্লাব প্রতিনিধি	✓	
ডাক্তার		
ইঞ্জিনিয়ার		
সাংবাদিক		✓
স্থানীয় গণ্যমান্য/রাজনীতিবিদ		✓
অন্যান্য (নারী, [illegible].....)	✓	

পরামর্শক প্রতিষ্ঠান
আর্ক বাংলাদেশ লিঃ এবং SCPL শেলটেক কনসালটেন্টস (প্রাঃ) লিঃ

24.0 Uttar Bakhar Nagar Union

24.1 Overview (Study Area)

The Uttar Bakhar Nagar Union is under the administrative jurisdiction of Raipura Upazilla of Narshingdi district. The boundary of the Union is as follows

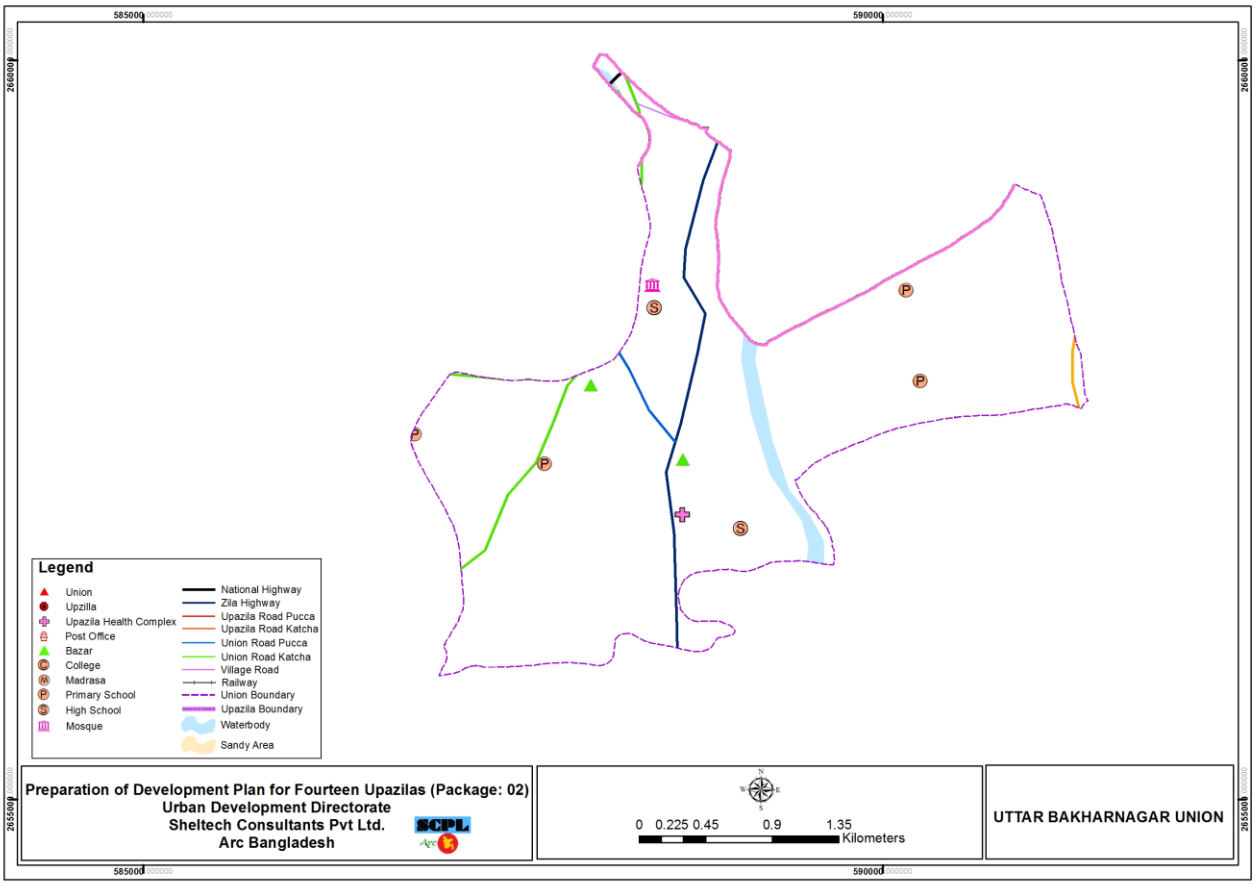
North: On the north side of the study area, Belabo Upazilla is situated.

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

South: On the south side of the study area, Alipura Union is located

East: On the east side of the study area, Alipura and Radhanogor Union are located.

Map 3.24.1: Uttar Bakhar Nagar Union

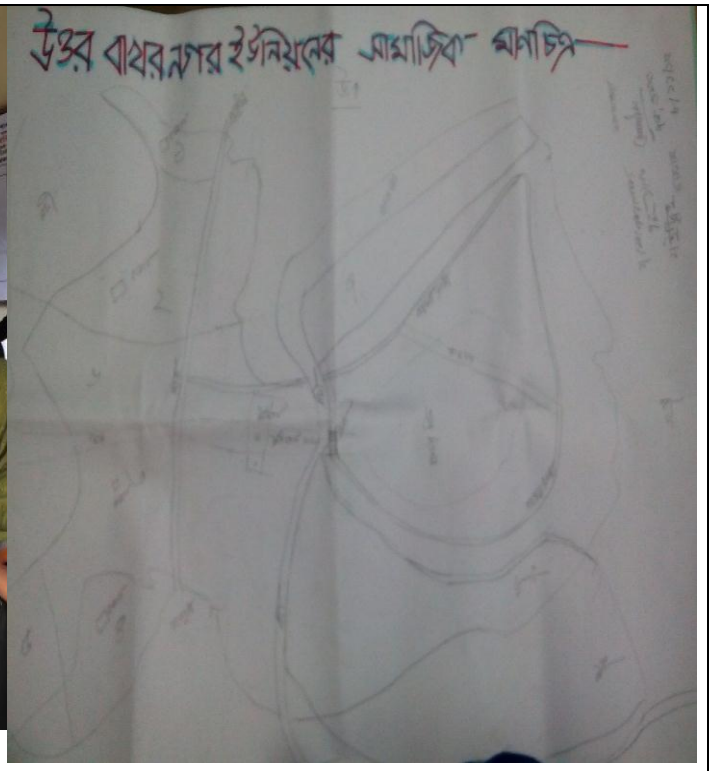


24.2 Spatial Aspects

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 Uttar Bakhar Nagar Union 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/madrasa, 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 24.1: Uttar Bakhar Nagar Union



Photograph 24.2: Social Map of Uttar Bakhar Nagar Union

24.3 Major Problems and Potentials

24.3.a Problems Identification

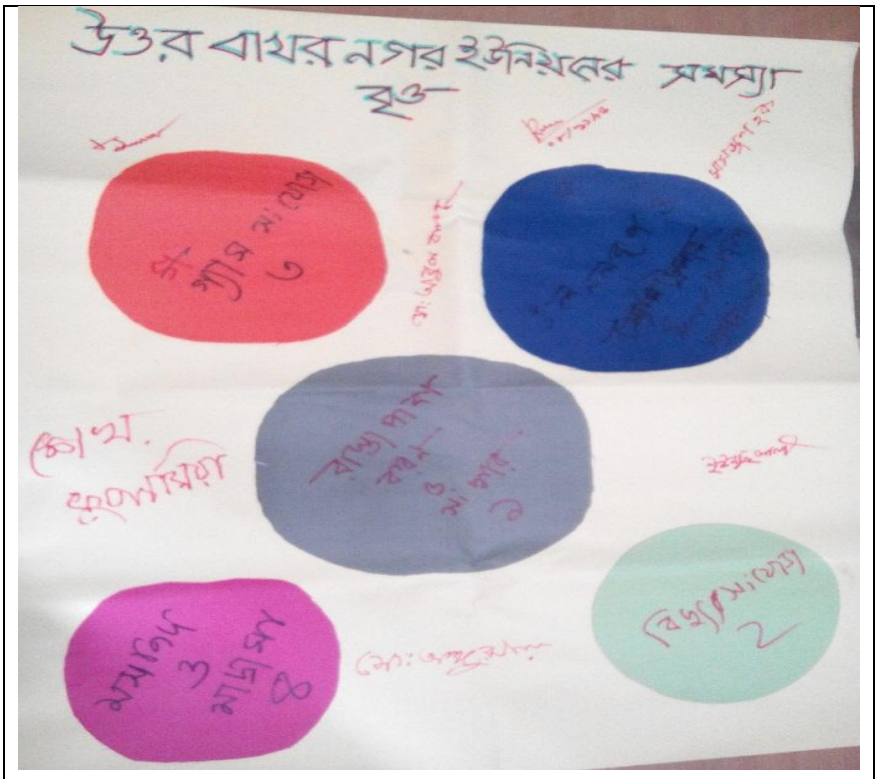
Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. The following problems have been identified during PRA which are as follows:

- Poor Transportation (Lack of road repairing, new road, bridge, culvert)
- Trouble of education system (Lack of Educational institution structure Such as scarcity of primary school, classroom, teacher and educational materials and no school boundary wall)
- Lack of hospital (No M.B.B.S. doctor ,no diagnostic center no 50 bed hospital)
- Problem of agriculture, irrigation and drainage
- Lack of Electricity (Load shedding, no 100%electricity connection)
- No gas connection
- Scarcity of sanitation
- No pure drinking water
- Scarcity of tube well
- Lack of drainage
- Problem of dowry
- No disaster resistant shelter center(Problem of shelter)
- Problem of broken graveyard
- Lack of public toilet by government management
- No Union complex building (Scarcity of land donor)
- Lack of govt. market
- Lack of mosque, madrasha, temple,
- Lack of graveyard
- Problem of ditch
- Problem of canal digging
- No play ground

24.3.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. Poor Transportation System
2. Lack of electricity line
3. No gas connection
4. Lack of mosque and madrasha
5. Lack of deep tube-well and sanitation



Photograph 24.3: Venn diagram

24.3.c 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;

- Road
- Market
- Agriculture
- Pond
- Fisheries
- Gas
- Electricity

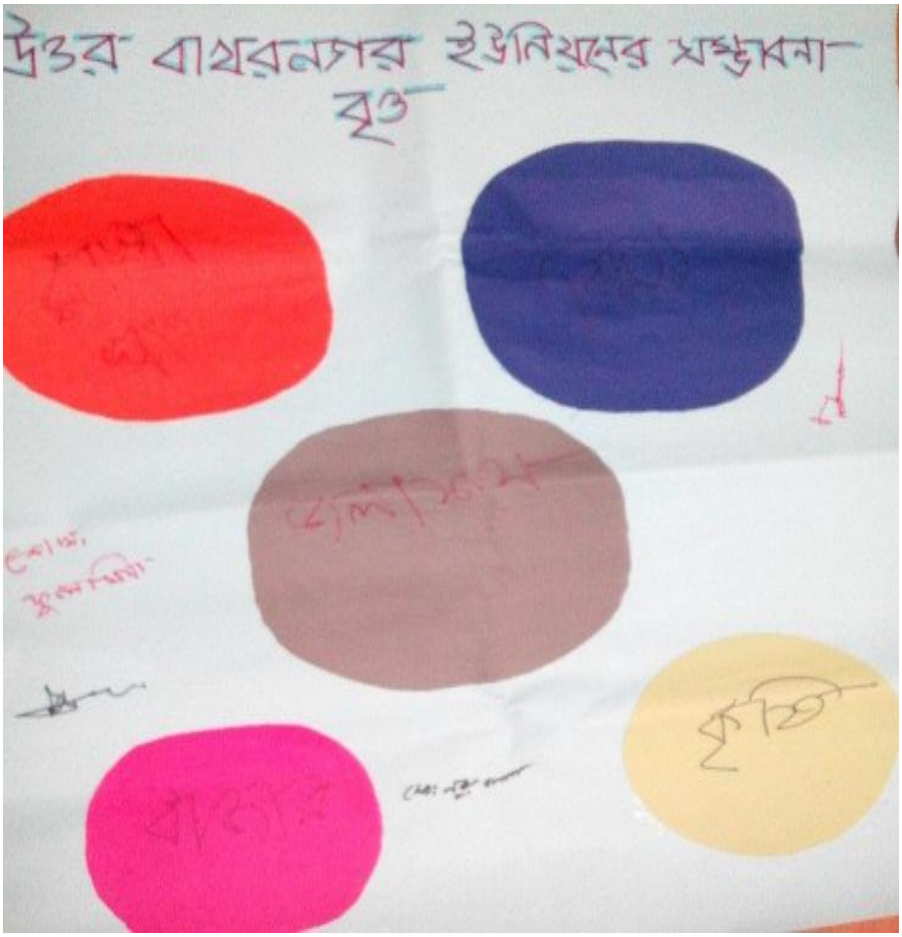


Figure 24.4: Major Five Potentials

24.3.d 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, effect/impact and potentials have furnished in the following table;

Table 3.24.1: Problems, Cause, Impact, Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1.Poor Transportation System	• Lack of budget • Problem of influence • Problem of Union cota for supply of money	• Problem of marketing	• Extension of agriculture
2.Electricity	• Lack of govt. budget • Govt.'s neglecting	• Problem of building industry • Problem of study	• Extension of education

3.Gas line	• Much far area	• Social forest disaster	• Extension social forest • Save forest
4.Developd problem of mosque and madrasha	• Poverty	• Decreasing religion education	• Extension of religion education
5.Lack of deep tube-well and sanitation	• Poverty	• Increasing disease	• Social development

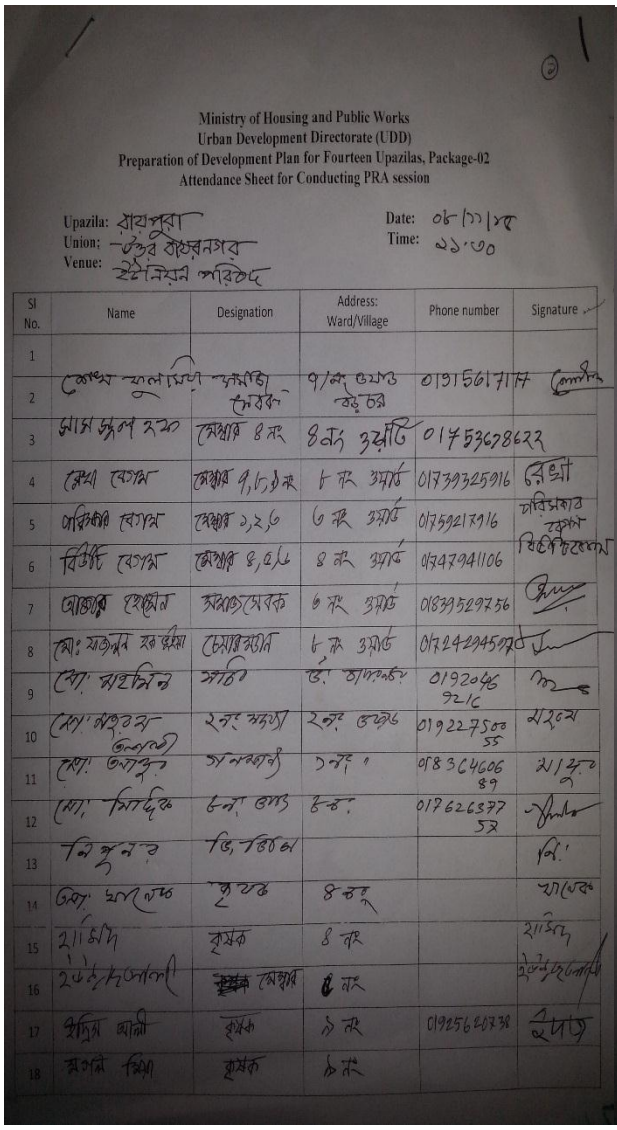
24.4 Perceived Development Priorities for Uttar Bakhar Nagar Union under Narshingdi District.

The recommended development priorities for Uttar Bakhar Nagar Union is as follows;

Table 3.24.2: Development Priorities for Uttar Bakhar Nagar Union

Short term	Midterm	Long term
• Demand of shelter for poor people • Demand of developed education • Demand of digging canal • Demand of sanitation • Demand of electricity • Demand of safe water • Demand of preventing ditch	• Demand of graveyard management • Demand of gas line • Demand of developed agriculture • Demand of new road and bridge	• Demand of preventing dowry and early marriage

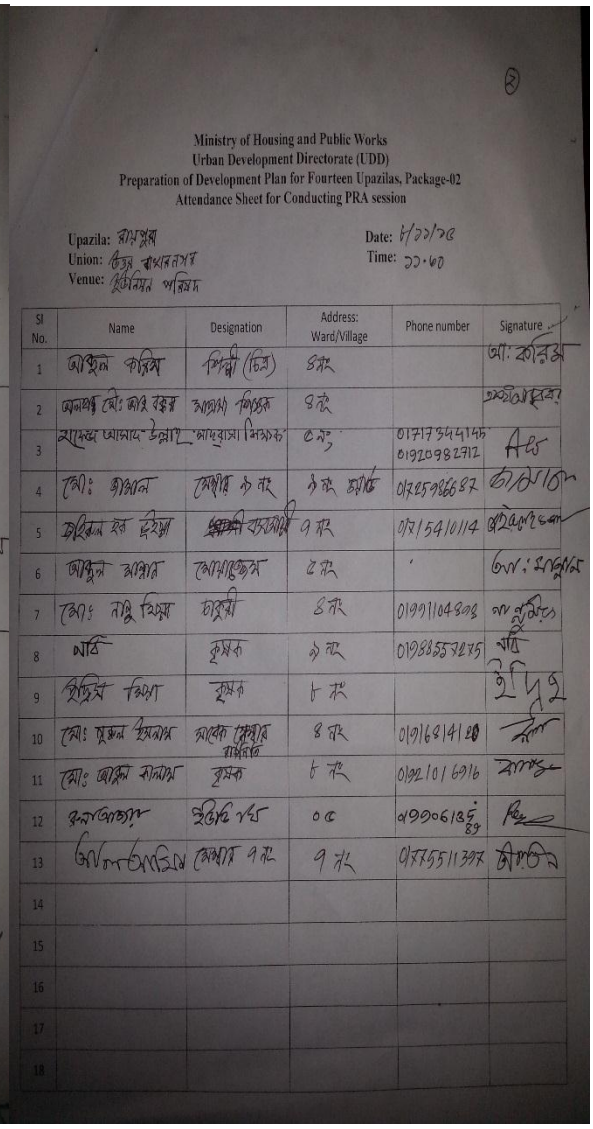
25.5: Attendance Sheet of Participants



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: উত্তর বাখরনগর
Venue: ইউনিয়ন পরিষদ
Date: ০৮/১১/১৫
Time: ১১:৩০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1					
2	[illegible]	সমাজ সেবক	৭/নং ওয়ার্ড বড়চর	01915617117	
3	মাসুদ জুবেল হক	মেম্বার ৪ নং	৪নং ওয়ার্ড	01753678622	
4	মেহেরা বেগম	মেম্বার ৭,৫,৯ নং	৮ নং ওয়ার্ড	01739325916	
5	পারভীন বেগম	মেম্বার ১,২,৬	৬ নং ওয়ার্ড	01759217916	
6	বিউটি বেগম	মেম্বার ৪,৫,৬	৪ নং ওয়ার্ড	01747941106	
7	আক্তার হোসেন	সমাজসেবক	৬ নং ওয়ার্ড	01839529756	
8	মোঃ মজনুর হক ভূঁইয়া	চেয়ারম্যান	৮ নং ওয়ার্ড	01724245970	
9	মো: মাহমিন	সচিব	উ: আদমজী	01920[illegible]9216	
10	মো: নজরুল ইসলাম	২নং সদস্য	২নং ওয়ার্ড	01922750055	
11	মো: আব্দুর [illegible]	সমাজকর্মী	১নং	01836460689	
12	মো: সিদ্দিক	৬নং ওয়ার্ড	৬নং	01762637752	
13	নিলুফার	জি, বিএল			
14	মো: খালেক	কৃষক	৪নং		
15	রাশিদ	কৃষক	৪ নং		
16	[illegible]	মেম্বার	৪ নং		
17	ইদ্রিস আলী	কৃষক	৯ নং	01925602738	
18	মনির মিয়া	কৃষক	৯ নং		



Ministry of Housing and Public Works
Urban Development Directorate (UDD)
Preparation of Development Plan for Fourteen Upazilas, Package-02
Attendance Sheet for Conducting PRA session

Upazila: রায়পুরা
Union: উত্তর বাখরনগর
Venue: ইউনিয়ন পরিষদ
Date: ৮/১১/১৫
Time: ১১:৩০

Sl No.	Name	Designation	Address: Ward/Village	Phone number	Signature
1	আব্দুল করিম	শিল্পী (চিত্র)	৪নং		আ: করিম
2	আলহাজ মোঃ আর রহমান	আহায়ক শিক্ষক	৪নং		
3	সাহেদ আমানে উল্লাহ	আহবায়ক শিক্ষক	৩নং	01717364146 01920982712	
4	মোঃ জামাল	মেম্বার ৯ নং	৯ নং ওয়ার্ড	01759866687	
5	জহিরুল হক ভূঁইয়া	বাচ্চু	৭ নং	01715410114	
6	আব্দুল আমার	মোয়াজ্জেম	৫ নং		মো: মনির
7	মোঃ নান্টু মিয়া	চাকুরী	৪নং	01997104808	
8	নাবি	কৃষক	৯ নং	01983557275	নাবি
9	ইদ্রিস মিয়া	কৃষক	৮ নং		ইদ্রিস
10	মোঃ নুরুল ইসলাম	সাবেক মেম্বার	৪ নং	01916814128	
11	মোঃ আকন মাদবর	কৃষক	৮ নং	01921016916	
12	[illegible]	ইউপি সদস্য	০৫	01990613[illegible]89	
13	[illegible]	মেম্বার ৭ নং	৭ নং	01755511397	
14					
15					
16					
17					
18					

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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Participatory Rural Appraisal (PRA)
of
Ishwarganj Upazila, Mymensingh

August, 2016

Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Geological Survey
of
Raipura Upazila, Narsingdi

August, 2016

Joint Venture of
Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ / Geological Survey Report /Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Geological Survey Report of Raipura Upazila, Narsingdi

Dear Sir,
We are pleased to submit herewith the Final Geological Survey Report of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam nazem)
Team Leader, Package -2

(Mohammad Jamal Uddin)
Geological Expert, Package -2

Encl: As stated.

Copy to:
1. Project Manager, Package-2, 14 Upazila Project, UDD
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
Phone: +880-2-9611171 Fax: +880-2-9611172
Email: scpl.mail@gmail.com

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 02

Survey Report
Geological Survey of RaipuraUpazila

August 2016

Submitted By

Joint Venture of
SHELTECH CONSULTANTS PRIVATE LTD. (SCPL)
ARC BANGLADESH LTD. (ABL)

EXECUTIVE SUMMARY

The subsurface soil condition of the Raipura Upazila has been investigated under the package-2 project titled 'Preparation of Development Plan for Fourteen Upazilas' a initiative of Urban Development Directorate (UDD). Subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment in this development plan. This work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meterological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

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). Laboratory testing of soil samples such as Grain Size Analysis, Natural moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, Triaxial test 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, 17 boreholes with SPT program, five MASW and three PS Logging survey programs have been conducted into the field at Raipura Upazila.

These field and laboratory investigation data will be analyzed and result will be integrated with all information's in a module which can generate geomorphologic map, sub-surface litho-logical 3D model of different layers, engineering geological mapping based on AVS30, Seismic Hazard Assessment Map (risk sensitive micro-zonation maps), soil type map, seismic intensity map,Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map, recommended building height maps for both high rise building and low rise building, liquefaction and Ground Failure Map etc.

Finaly, field investigation and laboratory test data will be analysed; and respective geotechnical and geological map will be produced which will 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 maps, 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.

Abbreviations

ASTM	:	American Society for Testing and Materials
AVS30	:	Average Shear Wave velocity of 30 meter
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

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CHAPTER-01: INTRODUCTION

1.1. Background:

Rapid urban expansion is the common phenomena in Bangladesh due to rapid population and economic growth with increasing life expectance of the peoples. In this consequences, the present trend of planning practice is very much poor, mostly oriented towards planning of major cities and towns in Bangladesh but not in all other towns or growth centers which is belonging district or Upazila urban area because involves of huge amount of financial allocation/grants. Recent policy of Bangladesh 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 for the region. The current 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. Sheltech Consultants Private Ltd. (SCPL) in associate with Arc Bangladesh Ltd. (ABL) has been selected for package-2 (covering Ishwarganj Upazila, Dist: Mymensingh; Raipura, Dist: Narsingdi; and Shibchar Upazila, Dist: Narsingdi) by project evaluation committee of UDD.

The studies of this development plan are subsurface geological and geotechnical investigation which has been considered for a durable and sustainable urban environment. Initially this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meterological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

At Raipura Upazila following investigations and surveys has been carried out into 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 PS logging test (Down-hole seismic test); conducting PS logging test (Down-hole seismic test) and conducting Multi-Channel Analysis of Surface Wave (MASW). Geomorphologic conditions of the study area is mostly covered by floodplain with some low or marshy land. Geologically and structurally the area is not much complex, that's why geotechnical and geophysical investigations are covered along the floodplain area except low or marshy land and almost everywhere soils are resent fluvial type of deposit which are much soft and thicker.

Soil samples such as Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, Triaxial test etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. These field and laboratory data will be analyzed and produce risk sensitive micro-zonation maps of the project area.

1.2. Scope of Work:

a) Preparation of geomorphologic map
b) Preparation of sub-surface lithological 3D model of different layers through geo-technical investigation
c) Preparation of engineering geological mapping based on AVS30
d) Preparation of Seismic Hazard Assessment Map
e) Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map.
f) Liquefaction and Ground Failure Map.
g) Finally intensity map is prepared for high rise and low rise building

1.3. Brief Description of the area:

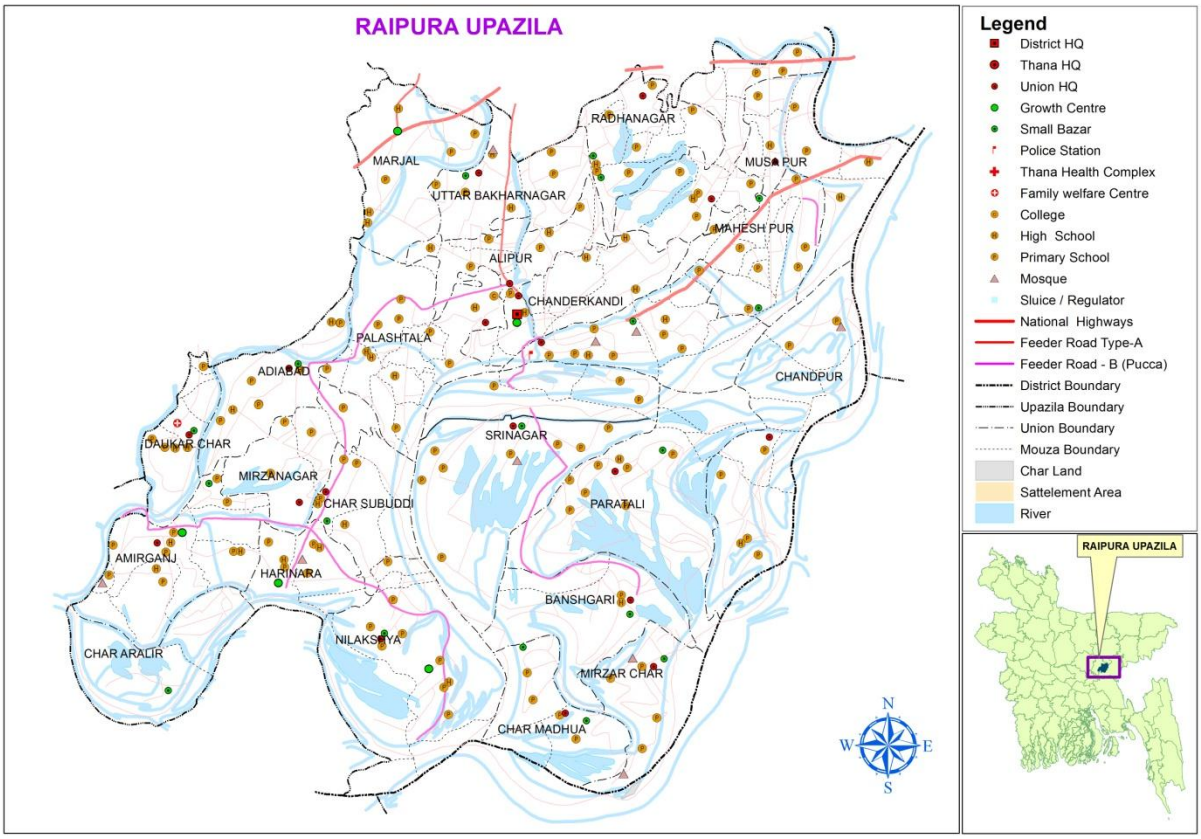
The upazila occupies an area of 312.76 sq. km (BBS 2011). It is located between $23^0 52'$ and $24^0 04'$ north latitudes and between $90^0 44'$ and $90^0 59'$ east longitudes. The upazila is bounded on the north by Belaboupazilas on the east by Nabinagar and Brahmanbaria on the south by Narsingdisadarupazila, Nabinagar and Bancharampur upazilas and on the west by Shibpur and Narsingdisadarupazila. Raipura distance from Dhaka-79 km and from Narsingdi district - 22 Km.

Raipura came into existence in the middle of the nineteenth century. Nothing is definitely known about the origin of the name of the upazila. There is a general belief that in the past this area was under an influential Zamindar of Roy family. The upazila might have been named as Raipura after the name of the Zamindar family. Raipura has historical glory for long time which can be easily understood by the presence of rich heritage sites. There are many heritage sites stands in Raipuraupazila. One of the most important heritage site is Panthosala. It is situated near Meghna River which is main attraction of tourist. Another main historical site is BirsestroShahid Flight Lieutenant MatiurRahman Home and KabiSamsurRahman Home. There is worldwide Red Food in Radhanagar union under RaipuraUpazila.

Raipura is the second largest upazila in Bangladesh. It has a population of 535796. Males constituted 48.34% of the population, and females 51.66%. Raipura had an average literacy rate of 40.5% (7+ years), against the national average of 51.77%. (Source: BBS 2011).

The economy of the project area is agro based dominated by trading of various agro-products. Rice, potato, maize are major cash crop of the area. Potato is cultivated throughout the region and has become very popular as a cash crop. Though other vegetables is taking over potato cultivation, in areas like Raipuraupazila and around vegetables is the major crop. On the other hand paddy and wheat are major cereal crops. In recent times cultivation of maize is becoming popular which generally fetches good income for the cultivators. In the rural settlements of the city, groves of bamboo and betel nut trees are a common picture. The area has potential for production of bamboo materials

The city of Raipura is served by several highways. The main road transport is Dhaka-Sylhet highway and there is also rail transport with the capital city, Dhaka. Mainly three types of roads such as pucca, HBB/ brick soling and kutcha roads connect different parts of the Upazilla. It has 171.44 km of pucca road, semi-pucca road 123 km, mud road 230 km; waterway 28 nautical miles. But among them the Railway is dominated communication system in Raipura. Daily train service connecting Dhaka is by a pair of trains. Raipura is served by Dhaka-Sylhet section of meter gauge line. There are 24.81km railway line and six railway stations in Raipuraupazila.



Source: JV of SCPL and ABL, 2015
N.B: Based on SOB, Map

Map 1: RaipuraUpazila Map

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.

.

Plate1: Downhole Seismic Test data logger

2.2.1. Procedure of Field Work and Analysis

In filed data acquisition, 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.

.

Plate2: Wooden Plank as the Vibration Source

b) Cables are wired from the geophone Plate3and the trigger to the data acquisition unitPlate4. Signals in the vertical, radial and transverse directions are recorded by the data acquisition unit.

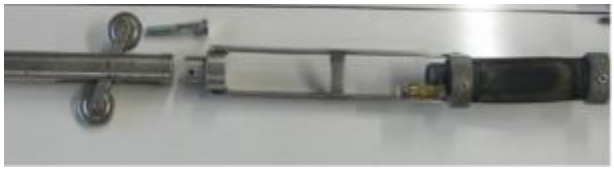


Plate3: Geophone

Plate4: Data Acquisition Unit

c) The geophone is lowered into the borehole as shown inPlate5. Then, air is pumped into the air bag to fix the geophone to the casing (PVC pipe) at 1 m interval in depth basically.

Plate5: Geophone Lowering In the Borehole

d) Excitations are generated by hitting the wooden plank in three directions by the hammer.

Plate6: Direction of Excitations

e) Data is recorded in the data acquisition unit. Figure 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.

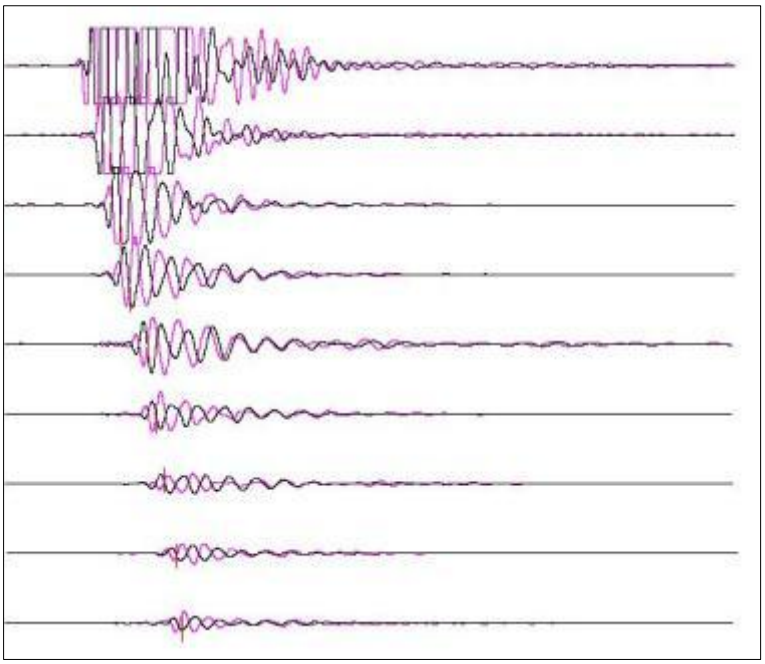
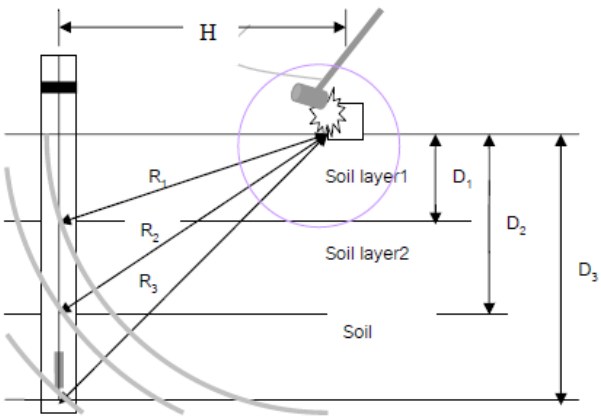


Figure 1: Determination of the Arrival Time of S-Wave

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 an 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 inTable 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 *ρ* (ώ, r) is expressed by Bessel function.

$$\rho(\omega, r) = J_0(\omega r / c(\omega))$$ [*Okada, 2003*]

Where, r is the distance between receivers, ώ is the angular frequency, c (ώ) is phase velocity of waves, J_0 is the first kind of Bessel function. The phase velocity was obtained at

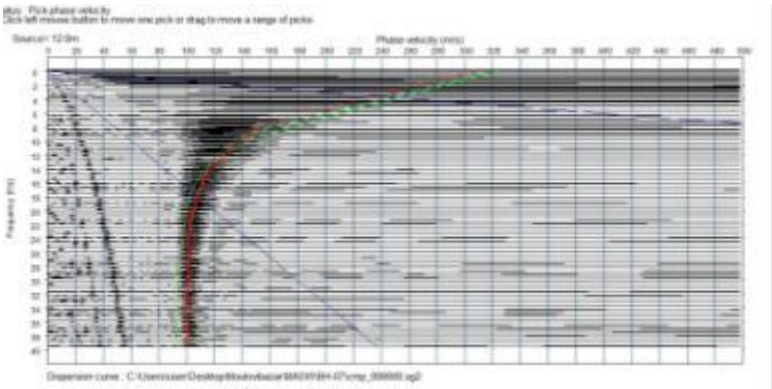
each frequency using equation (2). A one dimensional inversion using a non-linear least square method has been applied to the phase velocity curves. In the inversion, the following relationship between P-wave velocity (Vp) and Vs (Kitsunezaki et. al., 1990):

$$Vp = 1.29 + 1.11Vs$$ [*Kitsunezaki et. al., 1990*]

Where, Vs is S-wave velocity (km/s), Vp 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.

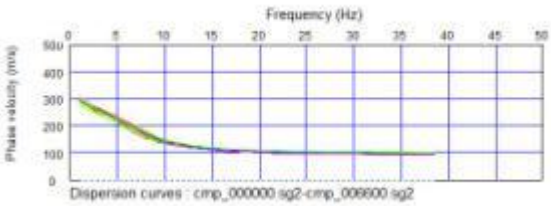
$$\rho = 1.2475 + 0.399Vp - 0.026Vp^2$$ [*Ludwig et al. (1970)]*

These calculations are carried out along the measuring line, and the S-wave velocity distribution section was analyzed.



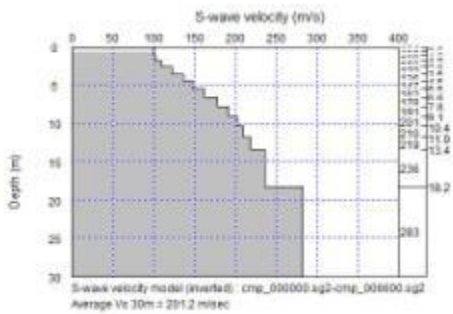
MASW Raw field data

F-K Transform



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, 17 numbers of boreholes have been done at RaipuraUpazila. The borehole logs are enclosed in the Appendix. The boring method has been described in the following section.

2.3.1. Wash Boring

In this method, water is pumped through a string of hollow boring rods and is released under pressure through narrow holes in a chisel attached to the lower end of the rods . The soil is loosened and broken up by the water jets and the up and down movement of the chisel. There is also provision for the manual rotation of the chisel by means of a tiller attached to the boring rods above the surface. The soil particles are washed to the surface between the rods and the side of the borehole and are allowed to settle out in a sump. The rig consists of a derrick, a winch and a water pump. The winch carries a light steel cable which passes through the sheaf of the derrick and is attached to the top of the boring rods. The string of rods is raised and dropped by means of the winch unit, producing the chopping action of the chisel. The borehole is generally cased but the method can be used in uncased holes. Drilling fluid may be used as an alternative to water in the method, eliminating the need for casing.

Wash boring can be used in most types of soil but progress becomes slow if particles of coarse gravel size and larger are present. The accurate identification of soil types is difficult due to particles being broken up by the chisel and to mixing as the material is washed to the surface: in addition, segregation of particles takes place as they settle out in the sump. However, a change in the feel of the boring tool can sometimes be detected, and there may be a change in the color of the water rising to the surface, when the boundaries between different strata are reached. The method is unacceptable as a means of obtaining soil samples. It is used only as a means of advancing a borehole to enable tube samples to be taken or in-situ tests such as Standard Penetration Test (SPT) to be carried out below the bottom of the hole. An advantage of the method is that the soil immediately below the hole remains relatively undisturbed.

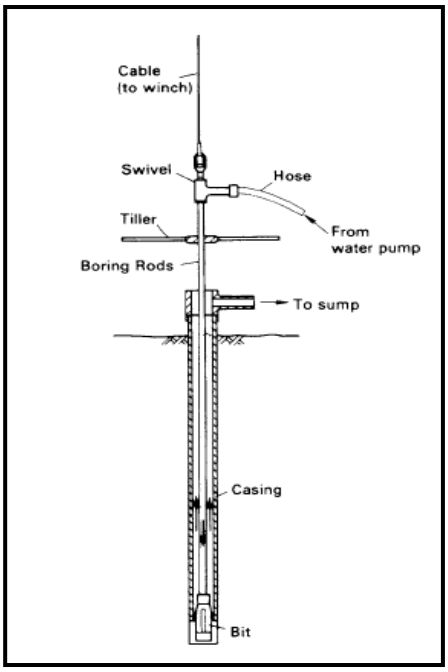


Figure 4: Wash Boring

2.3.2. 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 5a) have been used to collected 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

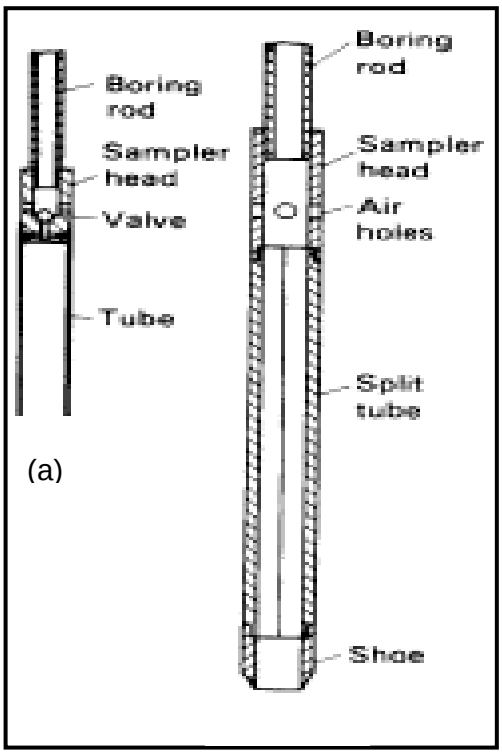


Figure 5: (A) Thin-Walled (Shelby Tube) Sampler, And (B) Split-Spoon Sampler.

Split-spoon sampler

Split-spoon samplers (Figure 5b) 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).

2.3.3. Standard Penetration Test (SPT)

One of the oldest and most common in-situ tests is the Standard Penetration Test (SPT). 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.

The ASTM standard D1586 has been followed to carry out SPT. The procedure is as follows.

1. Drill a 60-200 mm (2.5-8 in) diameter exploratory boring to the depth of the first test.

2. 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 6. It is connected via steel rods to a 63.5 kg (140 lb) hammer, as shown in Figure 7.
3. Using either a rope and cathead arrangement (in case of wash boring used this technique in this investigation) or 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. Stop the test if more than 50 blows are required for any of intervals, or if more than 100 total blows are required. Either of these events is knows as refusal and is so noted on the boring log.
4. 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. Note that the N-value is the same regardless of whether the engineer is using English or SI units.
5. Extract the SPT sampler, then remove and save the soil sample (disturbed sample).
6. Drill the boring to the depth of the next test and repeat steps 2 through 6 as required.

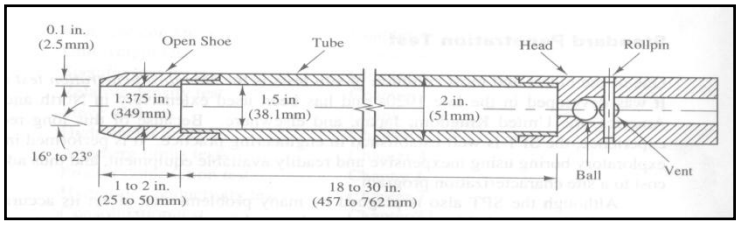


Figure 6: Split-Spoon Sampler.

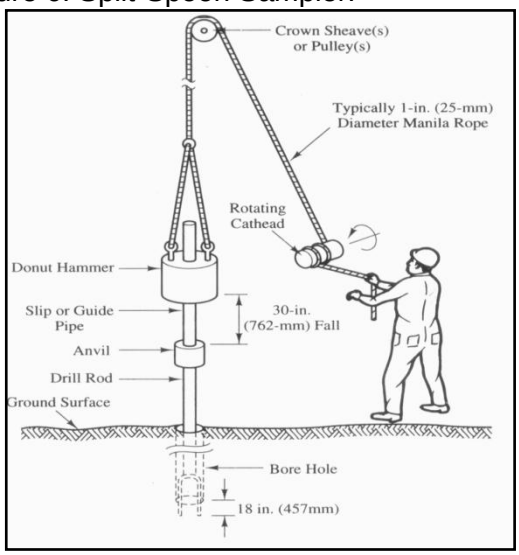


Figure 7: The SPT Sampler In Place In The Boring.

Thus, N-values may be obtained at intervals no closer than 500 mm (20 in). Typically these tests are performed at 1.5 – 5 m (5 – 15 ft) intervals (1.5 m interval in this investigation).
The term consistency of the cohesive soil is generally used on the basis of the SPT values (N) in the following way.

N	…	. ..	0-2	...	...	Very Soft
N	...	...	2-4	...	...	Soft
N	...	...	4-8	...	...	Medium
N	...	...	8-15	...	...	Stiff
N	...	...	15-30	...	...	Very Stiff
N	...	...	30-50	...	...	Hard
N	...	...	>50	...	...	Very Hard

The term relative density for the non-cohesive soil is used on the basis of the SPT values (N) in the following way.

N	…	…	0-4	...	…	Very loose
N	...	...	4-10	...	...	Loose
N	...	...	10-30	...	...	Medium dense
N	...	...	30-50	...	...	Dense
N	...	...	>50	...	...	Very dense

Visual Soil Classification Procedure:

Soils are classified according to grain size distribution and limit tests. Size divisions for various materials are as follows:

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

Description of the Soil Composition:

The following terms have been used in this report for description of soil composition:

Trace	1 to 10%
Little	10 to 25%
With	25 to 35%
Substantial	35 to 50%

(Source: ASTM Standard D1586)

CHAPTER-03: SURVEY RESULT AT RAIPURA 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 Raipura Upazila and described in below.

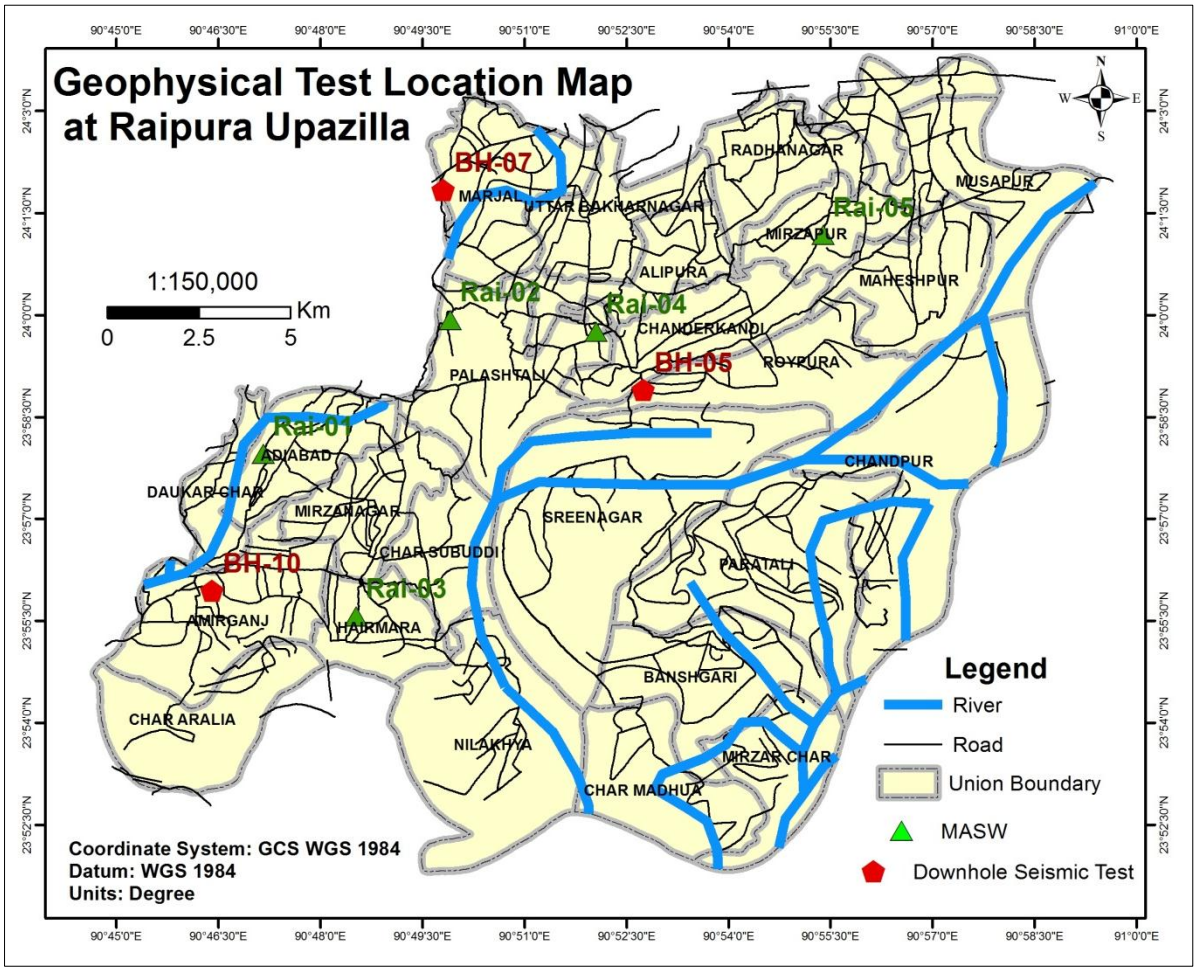
Shear wave velocity profile (Vs profile) in the field were carried out by two geophysical exploration methods namely 1) seismic downhole test and 2) Multichannel Analysis of Surface Wave (MASW).

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 Vs profile at sites. In this project, the seismic downhole and MASW tests were performed at 3 and 5 locations respectively. Locations of seismic downhole test and MASW tests are shown in Map. The GPS coordinate of the test locations are showing in Table 2.

Table 2: PS logging and MASW test locations

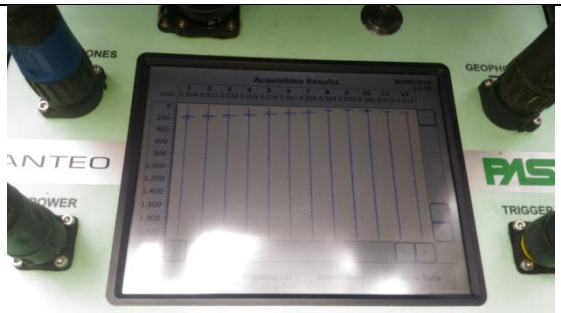
Upazila Name	Test/ Survey Name	ID	Location Name	Coordinate	
				Latitude	Longitude
Raipura	DownholeSeismicTest (PS Logging)	BH-05	Teacher Training College field, RoypuraSadar	23.98141	90.87917
		BH-07	MARJAL Madrasha, MARJAL union	24.03037	90.82973
		BH-11	Hasnabad high school, AMIRGANJ Union	23.93236	90.77338
	Multichannel analysis of surface waves (MASW)	MASW Rai 1	Adiabad Islamic High School and College, Adiabad Union	23.96592	90.78596
		MASW Rai 2	Near Palastoli Union Parishod Offie	23.99877	90.83173
		MASW Rai 3	Monipura Bohumukhi high school field, HAIRMARA Union	23.92615	90.80868
		MASW Rai 4	Raipura College, Palashtoli Union	23.99588	90.86744
		MASW Rai 5	Pirij kandi high School, Mirzapur	24.01959	90.92305

Source: Field Survey, 2016



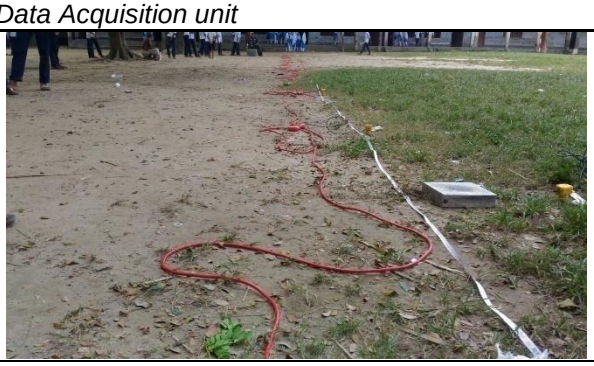
Map 2: Locations Map of the geophysical tests at Raipura Upazila

 *Set receivers along the line at the ground surface and the intervals of each geophone are 3m*	 *Vertical Geophone of 10 Hz capacity*

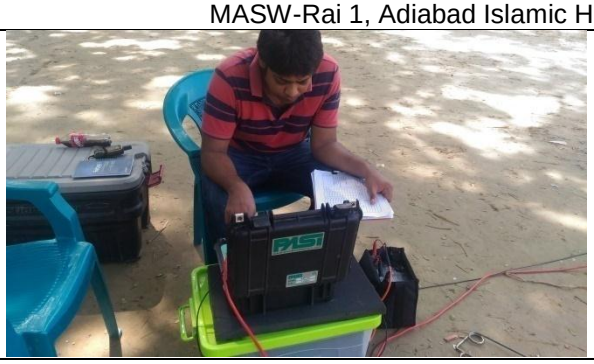


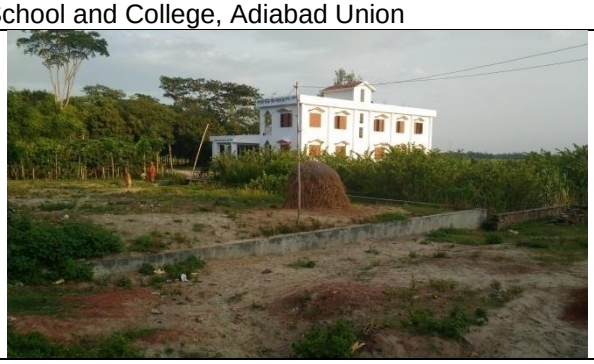
Data Acquisition unit

shoot it vertically by 8kg hammer to generated elastic waves

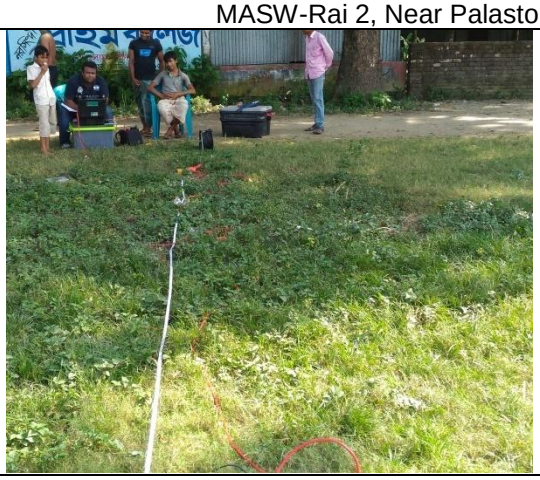


MASW-Rai 1, Adiabad Islamic High School and College, Adiabad Union





MASW-Rai 2, Near Palastoli Union Parishod Offie, Palastoli Union



MASW-Rai 3, Monipura Bohumukhi high school field, Hairmara Union


MASW-Rai 4, Raipura College, Polastoli Union


MASW-Rai 5, Pirijkandi high School, Mirzapur Union

Plate7: MASW Data Acquisitions at Raipura Upazila


BH-10, Hasnabad high school, Amirganj Union


BH-07, MarjalMadrasha, Marjal Union


BH-05, Teacher Training College, RaipuraSadar

Plate8: PS logging Data Acquisitions at Raipura Upazila

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 then 180m/s, it can be say as loose or soft soil. Estimation of shear wave velocity (Vs) / 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 (e.g., Petersen and others, 1997; 1999; Wills and others, 2000). 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.

Downhole seismic test data acquisition has been completed at Raipura Upazilla in three different locations on date 23th August 2016. Field raw data will be processed and interpreted very soon and result shall be included into final report.

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.

MASW test has been completed at five different locations at Raipura Upazilla by 23rd August 2016 and field raw data has also been processed and interpreted. According to MASW test result, the average shear wave velocities at all location are less than 180 m/s. Shear wave velocity of the project area is showing soft to moderate soil condition for foundation. The shear wave velocities at soil layer shows gradually increase from 110m/s to 230m/s. From those soil velocities, it can be saying the upper soils (depth around 15m) are soft soil and soil hardness gradually increases by increasing depth.

Actual subsurface soil condition will be known when all data has been integrated in a single module to produce shear wave velocity map and from which it is possible to interpret hazard condition of sub surface soil environment and seismic behavior of the project area. The MASW survey results are shown in Table 3. Details of MASW data has been shown in below Figure.

Table 4: Summary of MASW Test Results

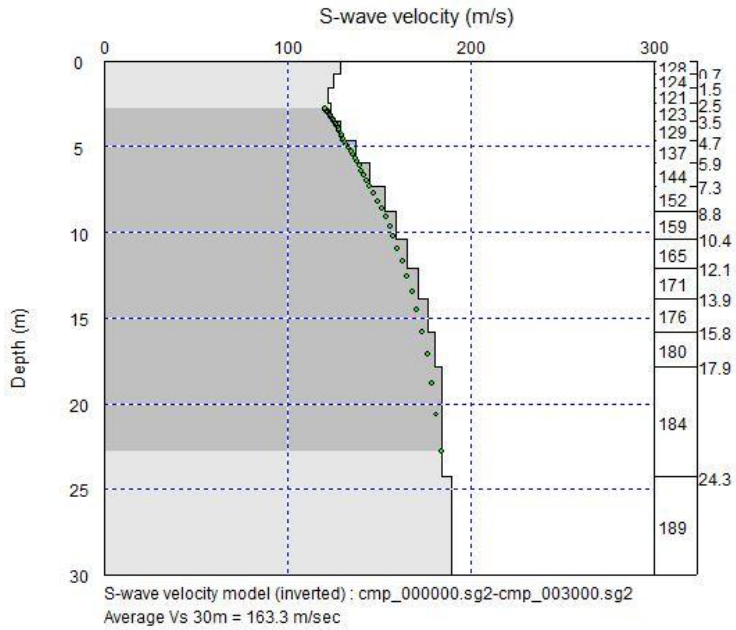
MASW ID	Average Shear Wave Velocity (Vs 30)
MASW Rai 1	163.0 m/s
MASW Rai 2	172.7 m/s
MASW Rai 3	159.8 m/s
MASW Rai 4	155.2 m/s
MASW Rai 5	162.9 m/s

Source: Field survey, 201

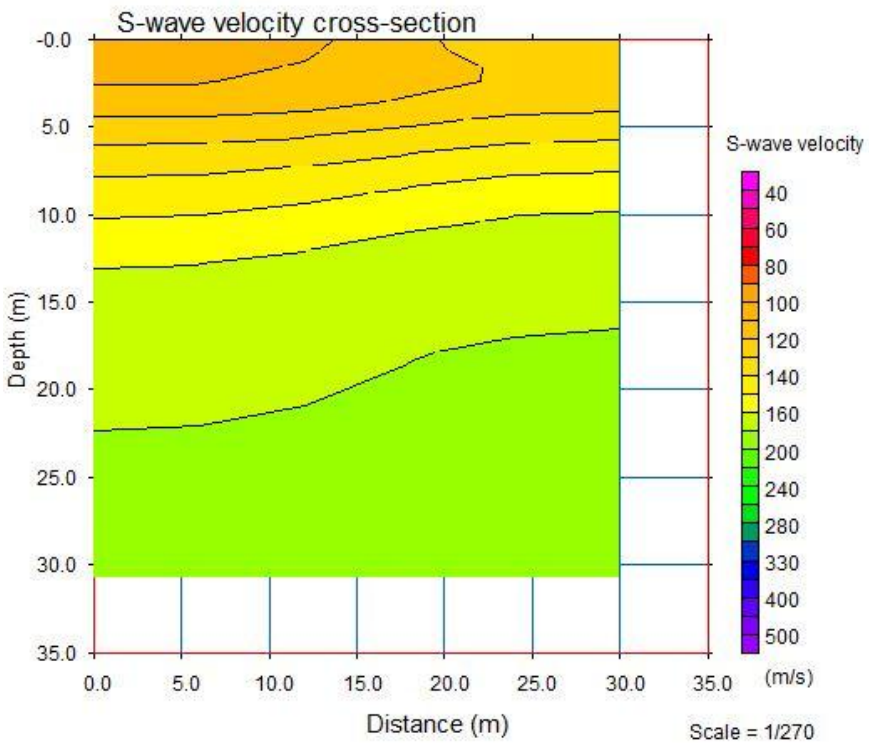
MASW ID:Rai-1Date: 22.08.2016
Coordinate: Lat-23.9659195 Long-90.7859573
Location: Adiabad Islamic High School, Raipura, Narshindhi

Depth	S-Wave Velocity
0.00	128.49
0.71	124.58
1.54	121.96
2.47	123.64
3.52	129.10
4.67	137.04
5.93	144.95
7.31	152.70
8.79	159.35
10.38	165.29
12.09	171.24
13.90	176.67
15.82	180.70
17.86	184.30
24.29	189.22

1D Model



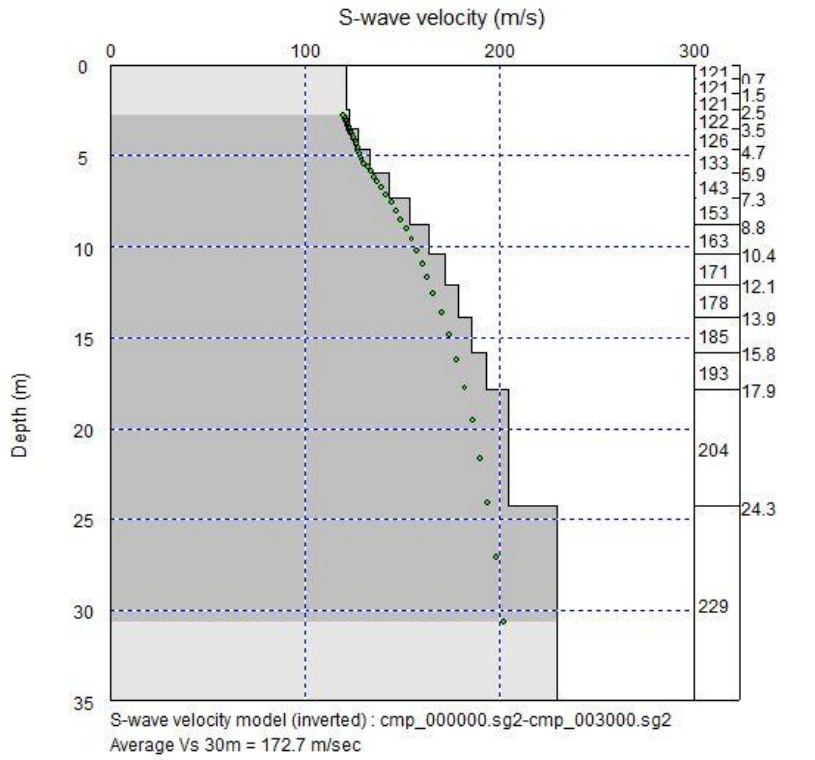
2D Model



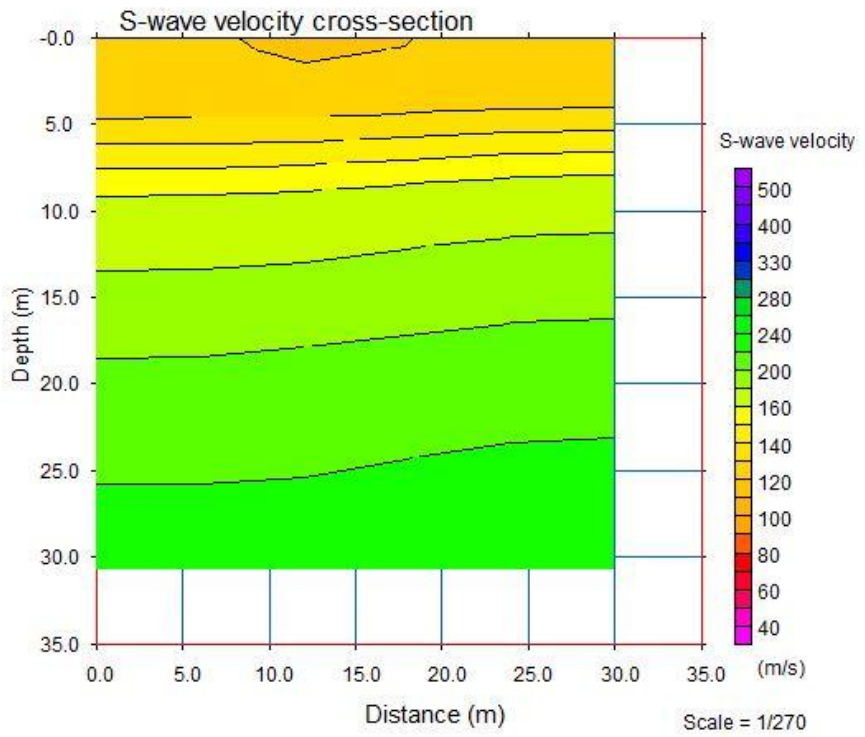
MASW ID: Rai-2 Date: 22.08.2016
Coordinate : Lat-23.99877 Long-90.83173
Location: Near Polashtoli Union Parishad, Raipura, Narshindhi

Depth	S-Wave Velocity
0	121.2839
0.714286	121.1693
1.538462	121.0463
2.472528	122.4547
3.516484	126.9255
4.67033	133.5393
5.934066	143.6482
7.307692	153.8433
8.791209	163.3727
10.38462	171.7835
12.08791	178.8325
13.9011	185.786
15.82418	193.0801
17.85714	204.3781
24.28572	229.9178

1D Model



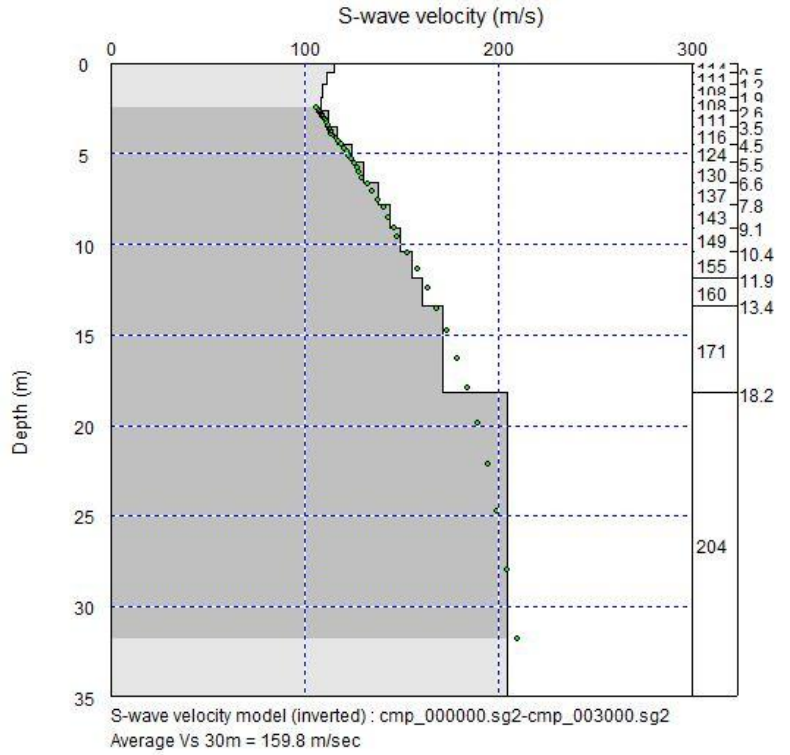
2D Model



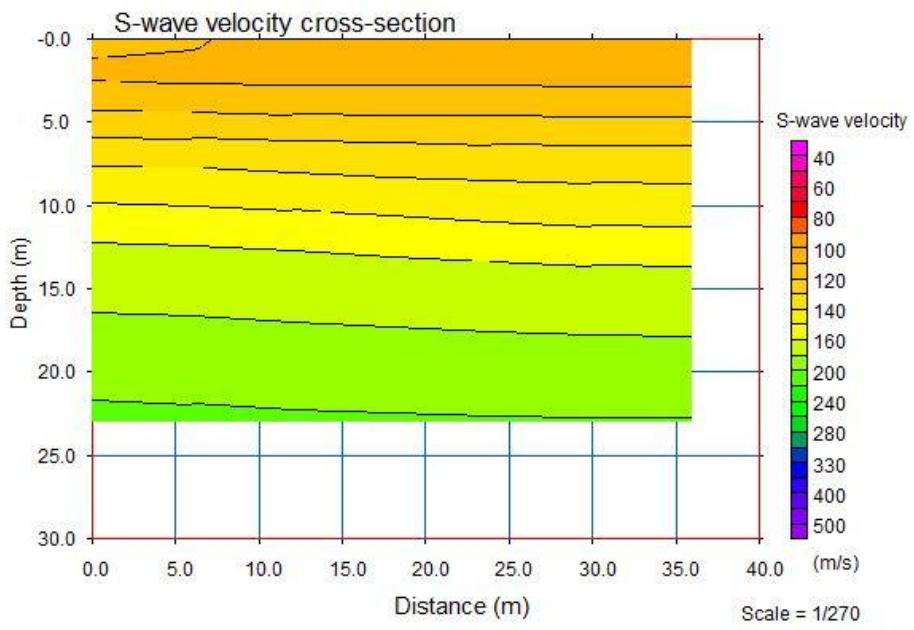
MASW ID: Rai-3 Date: 22.08.2016
Coordinate : Lat-23.92615 Long-90.80868
Location: MonipuraBohumukhi High School, Hairmara Union, Raipura, Narshindhi

Depth	S-Wave Velocity
0	114.8731
0.535714	111.2373
1.153846	108.9056
1.854396	108.4319
2.637363	111.8078
3.502747	116.848
4.450549	124.0966
5.480769	130.4886
6.593406	137.7118
7.788461	143.8239
9.065934	149.1369
10.42582	155.3001
11.86813	160.2213
13.39286	171.5759
18.21429	204.5835

1D Model



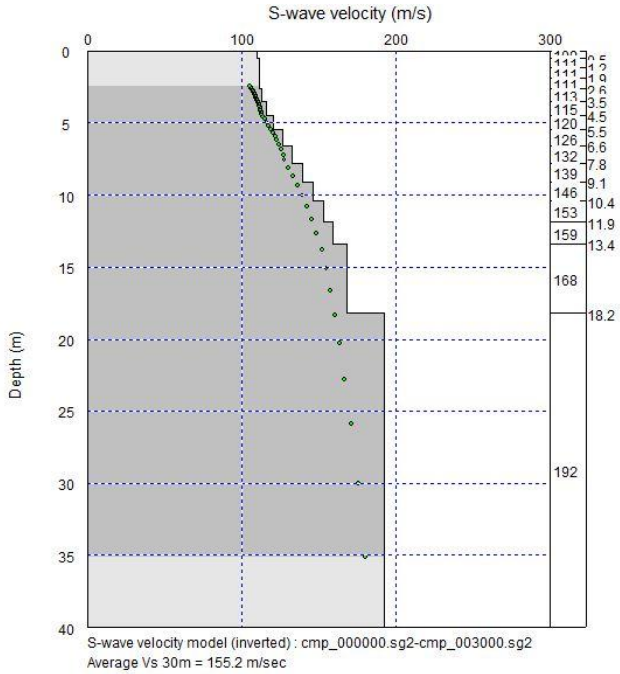
2D Model



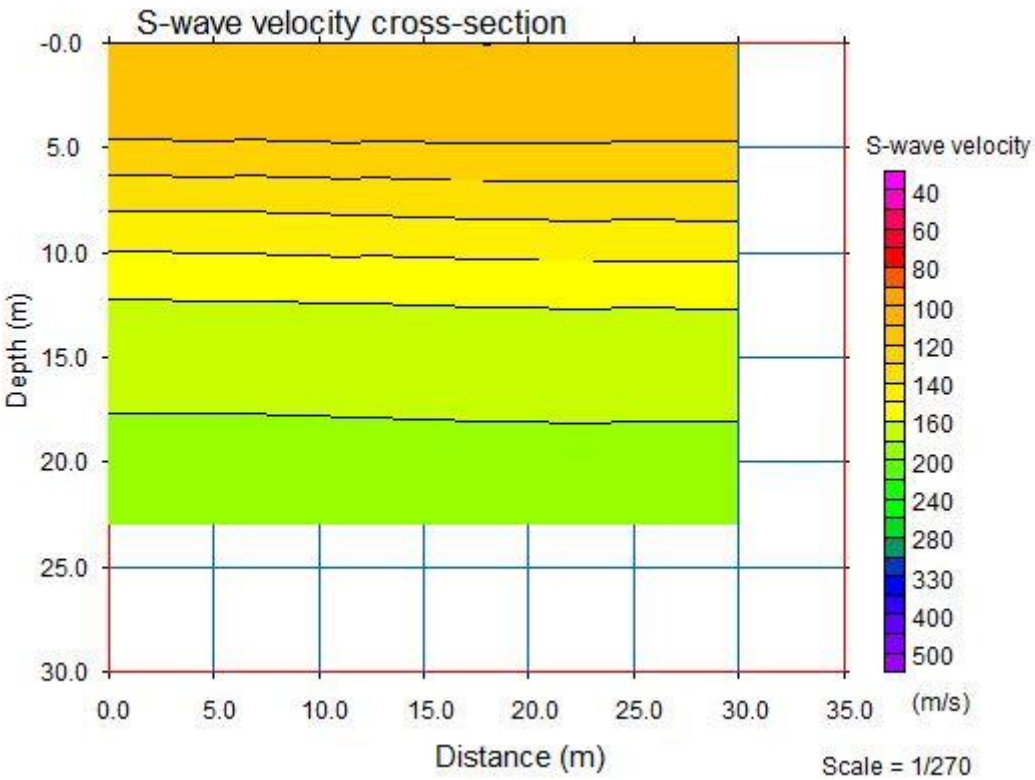
MASW ID: Rai-4 Date: 24.08.2016
Coordinate : Lat-23.99588 Long-90.86744
Location: Raipura College, Raipura, Narshindhi

Depth	S-Wave Velocity
0.00	109.71
0.54	111.21
1.15	111.29
1.85	111.17
2.64	113.03
3.50	115.81
4.45	120.39
5.48	126.74
6.59	132.81
7.79	139.77
9.07	146.63
10.43	153.35
11.87	159.06
13.39	168.02
18.21	192.44

1D Model



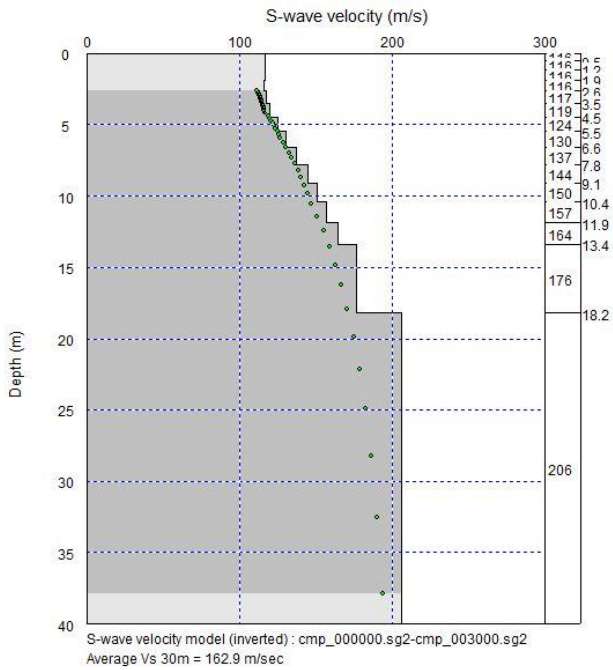
2D Model



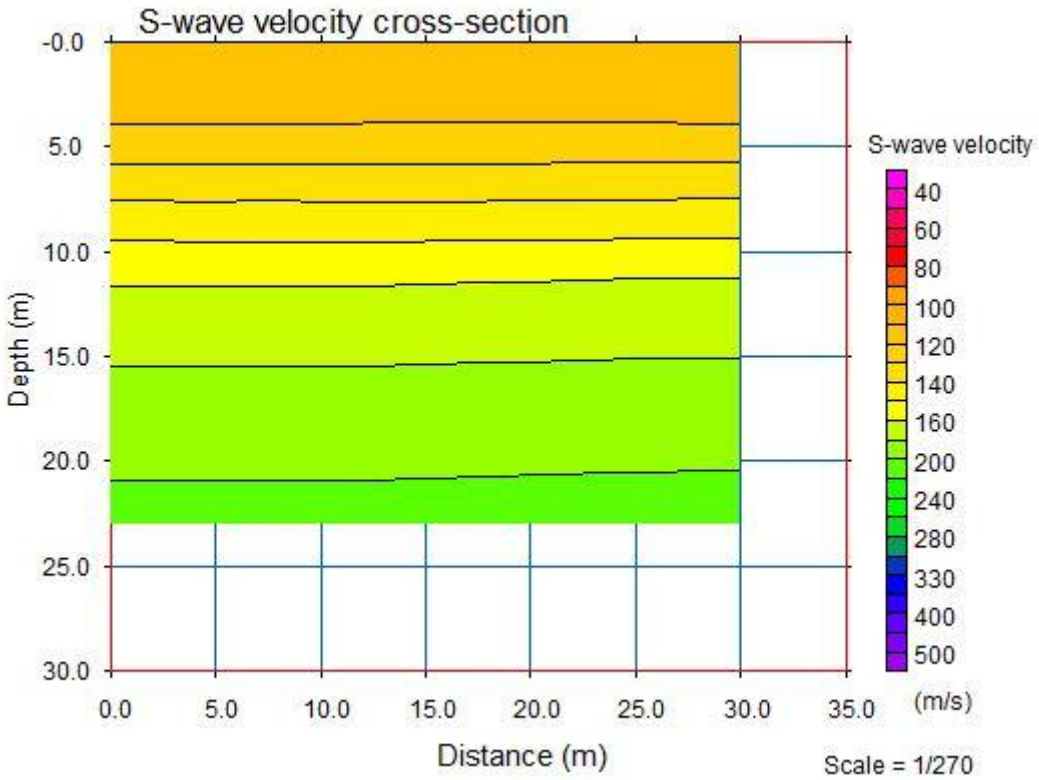
MASW ID: Rai-5 Date: 24.08.2016
Coordinate : Lat-24.01959 Long-90.92305
Location: Pirigkandhi High School, Mirzapur, Raipura, Narshindhi

Depth	S-Wave Velocity
0.00	116.72
0.54	116.98
1.15	116.78
1.85	116.12
2.64	117.17
3.50	119.54
4.45	124.85
5.48	130.64
6.59	137.25
7.79	144.53
9.07	150.59
10.43	157.09
11.87	164.63
13.39	176.94
18.21	206.26

1D Model

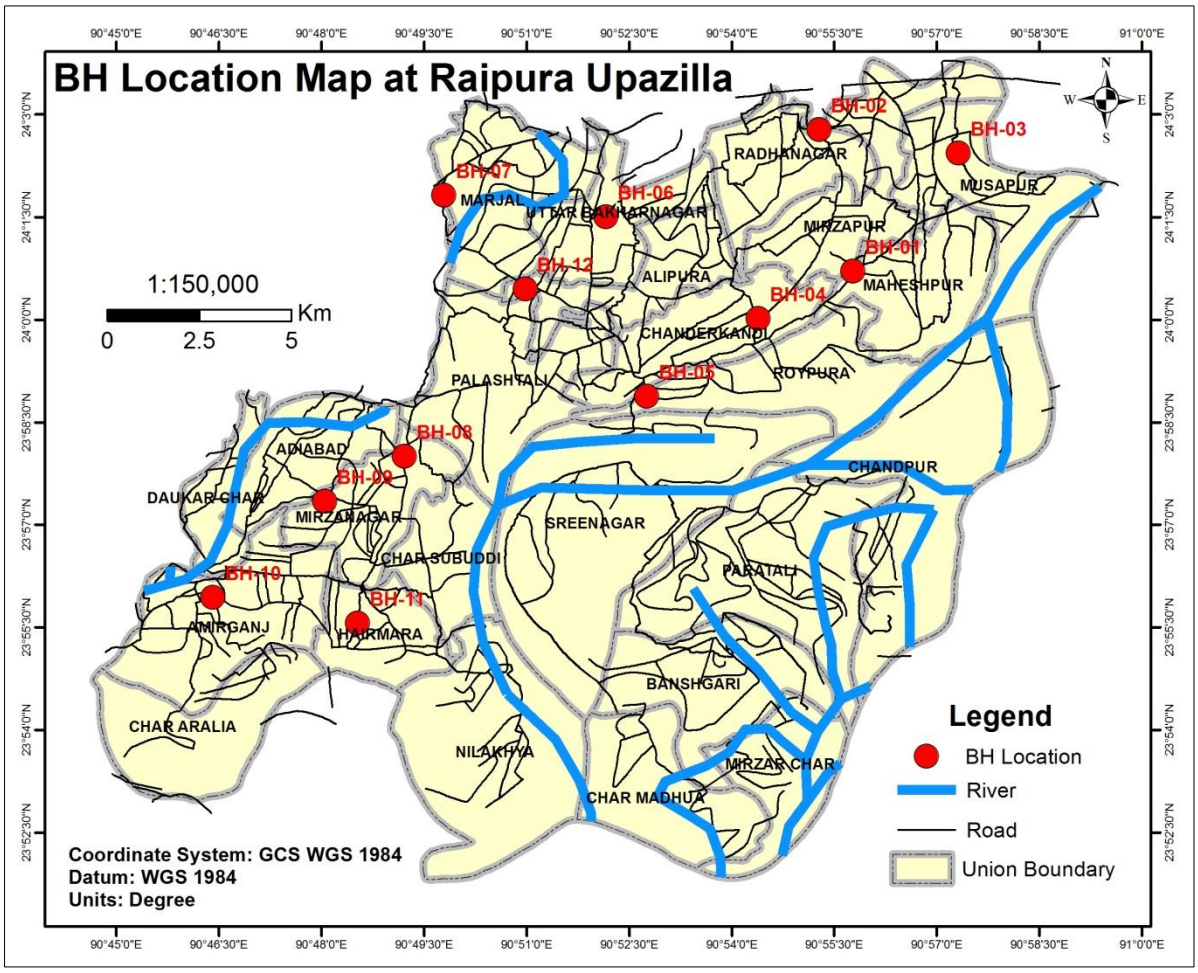


2D Model



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 17 points at Raipura Upazila.



Map3: Locations Map of the Standard Penetration tests (SPT) at Raipura Upazila

3.2.1. Standard Penetration Test (SPT) Log

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. The following table is showing the summary of borehole Location.

Table 5: Bore Hole Information Summary at Raipura Upazila

BH ID	Location	Lat	Long
BM-01	Alhaz Bozlul Haque J M school field, Maheshpur Union	24.0118750	90.9293970
BM-02	Lokkhepur Govt. primary school, Radhanagar Union	24.0463800	90.9211100
BM-03	Ramnagar Uttar para govt. primary school, Musapur Union	24.0406100	90.9550400
BM-04	Shotodalgrils high school, shreenidhi, Chanderkandi union	24.0003000	90.9062700
BM-05	Teacher Training College field, Raipura Sadar	23.9814100	90.8791700
BM-06	38 no. Lochonpur govt. primary school, Lochonpur Dakshinpara, Uttar Bakharnagar Union	24.0250970	90.8691330
BM-07	Marjal Madrasha, Marjal union	24.0303700	90.8297300
BM-08	Hatuvanga govt. primary school field, Hatuvanga Bazar, Mirzanagar Union	23.9667900	90.8200800
BM-09	New Model school, Uttar Mirzanagar Bazar, Adiabad union	23.9558300	90.8006700
BM-10	Hasnabad high school, Amirganj Union	23.9323600	90.7733800
BM-11	Monipura Bohumukhi high school field, Hairmara Union	23.9261500	90.8086800
BM-12	Sahabnagar govt. primary school, Alipura union	24.0075200	90.8495100
BM-13	Palashtoli High School	23.9235632	90.8215643
BM-14	Alipura bazar	23.965312	90.8354631
BM-15	Raypura Govt. Primary School	23.9856123	90.8632115
BM-16	Adibad primary School	24.0123568	90.769532
BM-17	Dukarchar Bazar	24.0014568	90.8654684

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 drilling work of 17 boreholes has been completed at Raipura Upazila by 24th August 2016 and field raw data will be processed and interpreted very soon. Laboratory analysis of soil samples (disturbed and undisturbed) will be analyzed to prepared geotechnical logs which will be included into final report.

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CHAPTER-04: CONCLUSION

Geologically and geo-morphologically Raipura Upazila and its adjoining areas is mostly comprises by monotonous flood plain area except few depression and veryhomogeneous in their soil quality that's why geological, geotechnical and geophysical investigations has been carried out along whole area to cover all morphological unit. 12 boreholes with SPT, 3 PS logging and 5 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. Finally all sorts of 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 (risk sensitive micro-zonation maps), soil type map, seismic intensity map,Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map, recommended building height maps for both high rise building and low rise building, liquefaction and Ground Failure Map etc

From this investigation and their 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.

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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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Geological Survey
of
Raipura Upazila, Narsingdi

August, 2016

Joint Venture of
Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

Government of the People's Republic of Bangladesh
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Preparation of Development Plan for Fourteen Upazilas

Package-02
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DRAFT SURVEY REPORT

Physical feature Survey, Land Use Survey Topographic Survey and Photogrammetry Works of Raipura Upazila, Narsingdi

August, 2016
Joint Venture of
Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ Final Survey Report/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Physical feature, Land Use, Topographic Survey and Photogrammetry Works Draft Survey Report of Raipura Upazila, Narsingdi.

Dear Sir,
We are pleased to submit herewith the Final **Physical feature, Land Use, Topographic Survey and Photogrammetry Works** Draft Survey Report of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)	(Md. Shamim Hasan)	Shahina Akhter)
Team Leader, Package -2	Survey Expert, Package -2	Photo. Expert, Package -2

Encl: As stated.

Copy to:
1. Team Leader, Package-2.
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
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Email: scpl.mail@gmail.com

EXECUTIVE SUMMARY

Raipura is an Upazila of Narsingdi district in the division of Narsingdi, Bnagladesh. The upazila occupies an area of 312.76 sq. km (BBS 2011). The upazila is bounded on the north by Belabo upazilas on the east by Nabinagar and Brahmanbaria on the south by Narsingdi sadar upazila, Nabinagar and Bancharampur upazilas and on the west by Shibpur and Narsingdi sadar upazila. Raipura distance from Dhaka-79 km and from Narsingdi district - 22 Km. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Raipura 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:

1. Physical Feature Survey
2. Land Use Survey
3. Topographic Survey and
4. 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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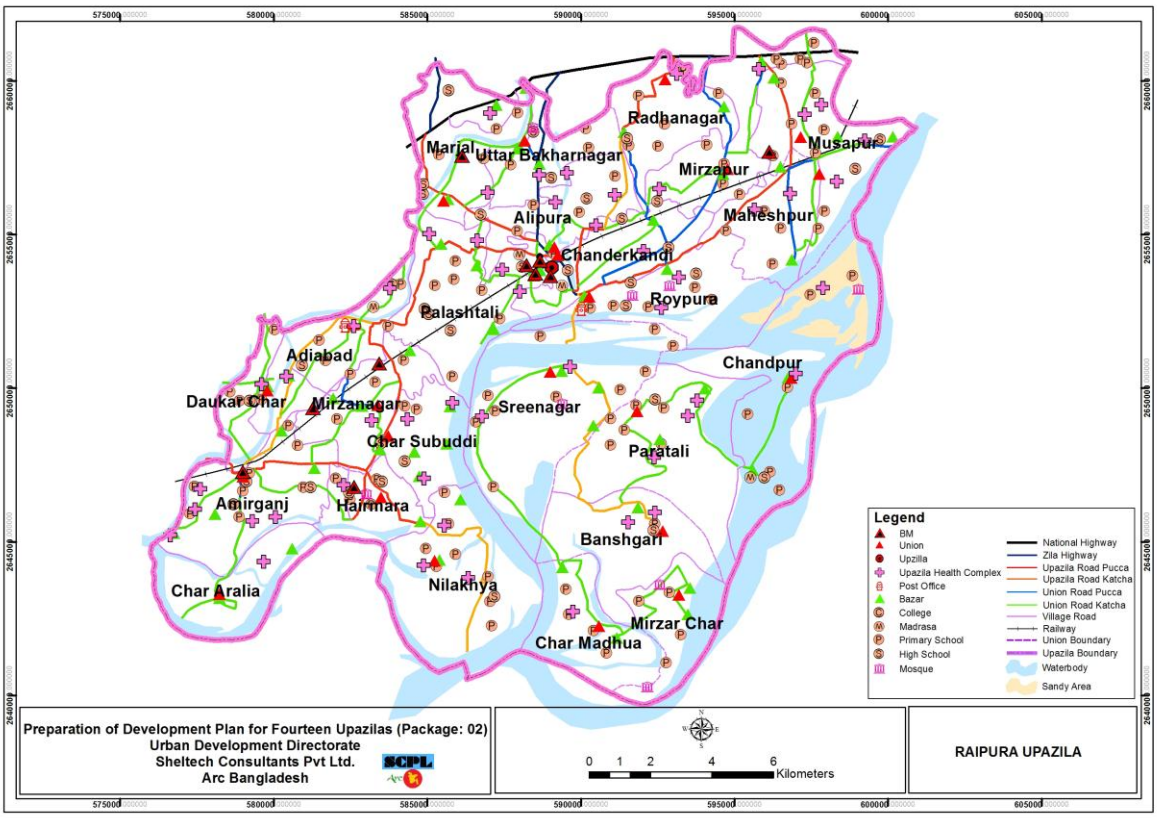
Chapter-01
Introduction

1.0 Background

Raipura is an upazila of Narsingdi district in the division of Dhaka, Bnagladesh. Raipura Upazila (Narsingdi district) area 206.98 sq km, located in between 23°56' and 24°07' north latitudes and in between 90°38' and 90°50' east longitudes. It is bounded by monohardi upazila on the north, Raipura, Narsingdi sadar and Palash upazilas on the south, Belabo and Raipura upazilas on the east, Palash and kapasia upazilas on the west.. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Raipura 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-2, Raipura 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, tend 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 Raipura Upazila

Chapter-02
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 mauza maps have been summarized in the flow diagram as shown in **Figure-2.1**:

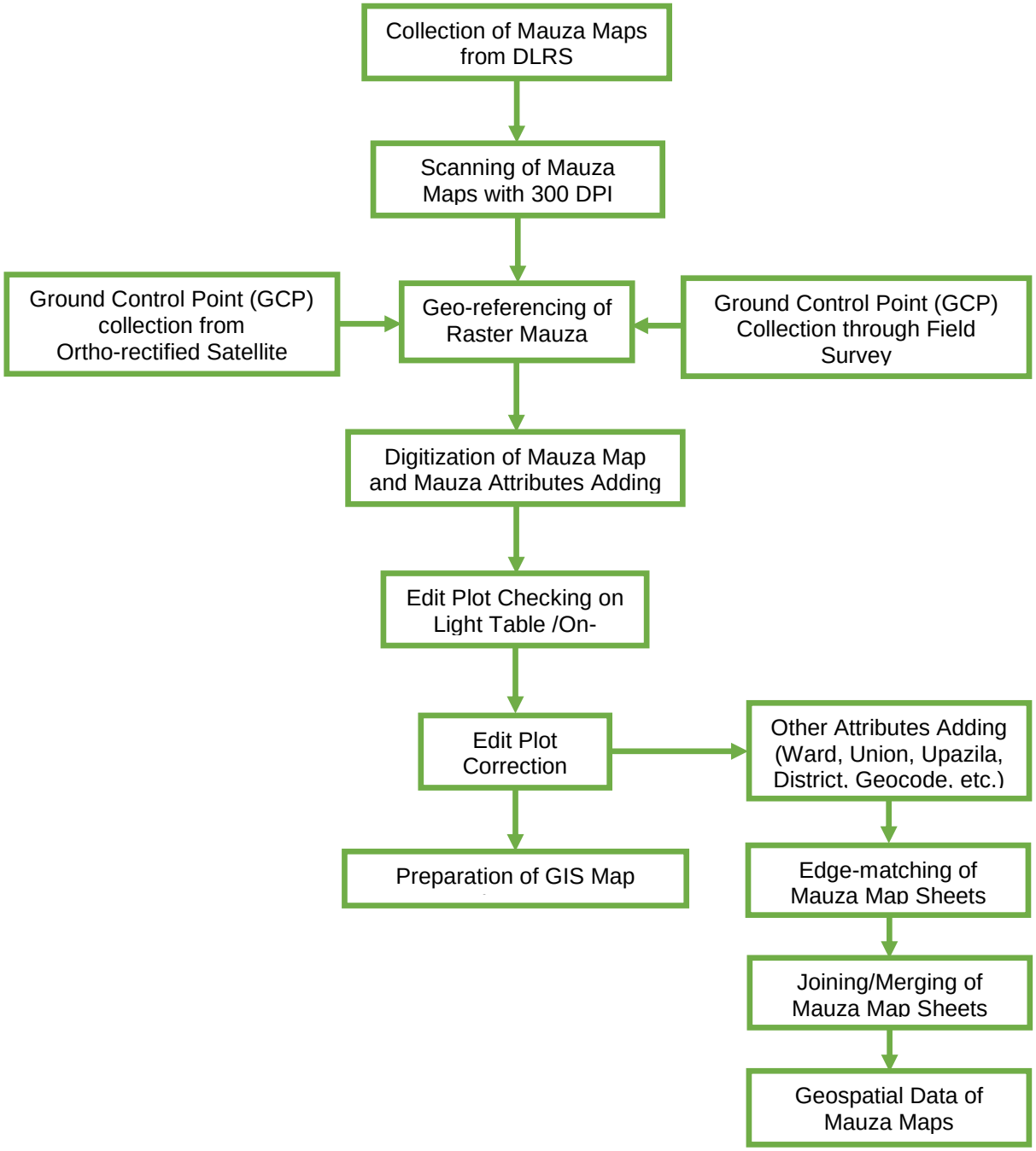


Figure-2.1: Flow Diagram for Preparation of GIS Database using RS Mauza Map

2.1.1 Collection of Mauza Maps

The Consultant has collected all the mauza maps covering the entire project area from DLRS office. The mauza sheets having distortion due to rapping or pasting cloths/tape were avoided during collection of mauza maps. The detail list of Mauza maps are provided in the **Annexure-I**.

Table-2.1: Mauza Maps Collection from DLRS

Upazila	Mauza Version	Mauza Maps		Collection Percentage
		Total No. of Sheet	No of Collected Sheet	
Raipura	RS	246	246	100%

2.1.2 Approval of Collected Mauza Maps for Scanning and Digitization

After collection of mauza maps of Raipura 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 mauza maps in presence of the Consultant. A sample of approved scanned mauza map is shown in **Figure-2.2**.

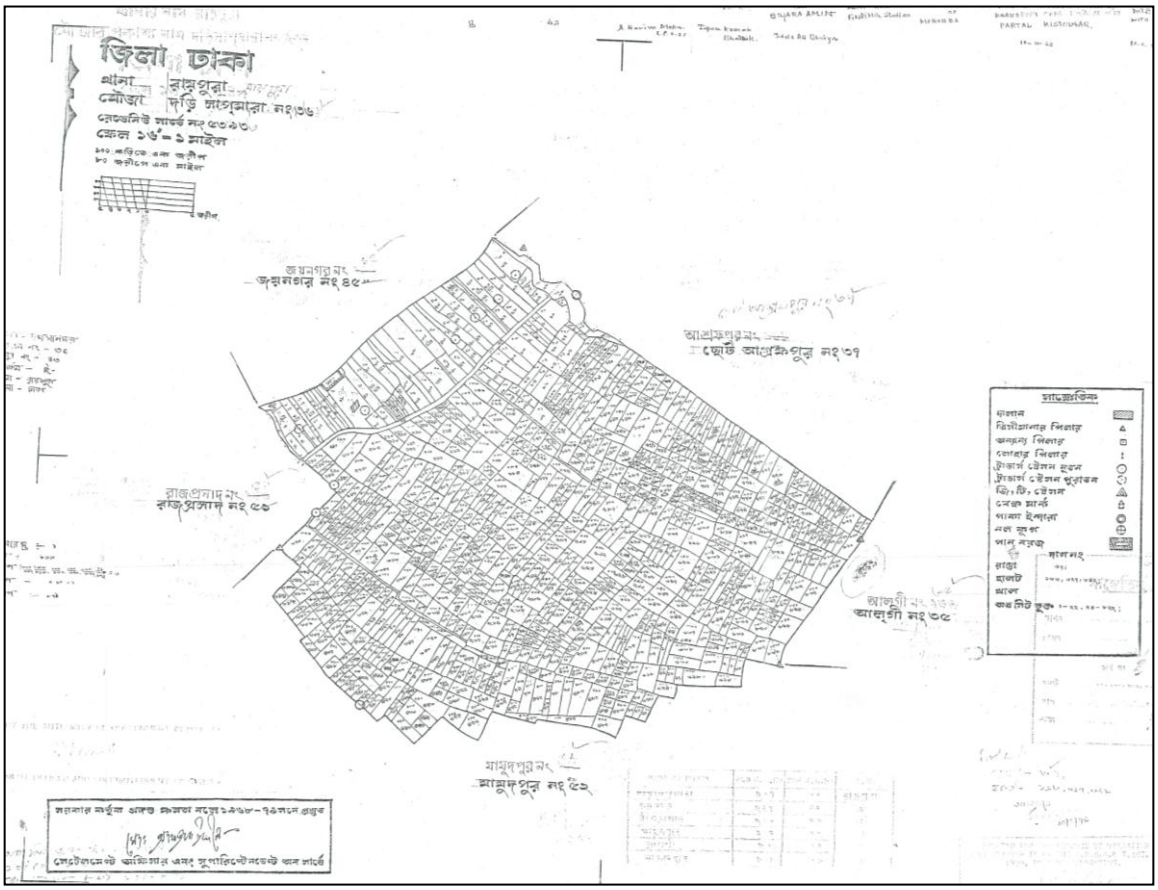


Figure-2.2: Sample of Scanned Mauza Map

2.1.3 Scanning of Mauza Maps

Scanning of all the mauza maps/sheets was started immediately after their approval by PM. As per TOR, scanning of mauza 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 Mauza Maps

Image Type	Grayscale
Image Format	JPEG
Image Resolution	300 dpi

Table 2.3: Specifications of the Scanner used for Scanning of Mauza 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 Mauza Map

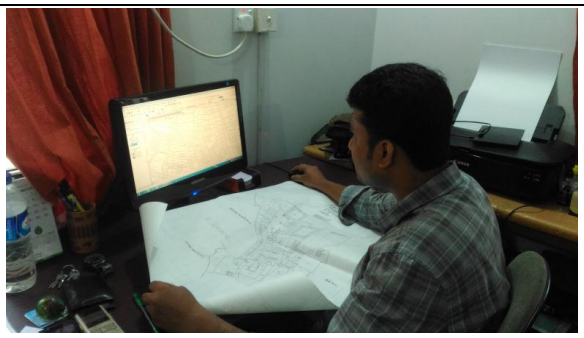
Upazila	Mauza Maps		Scanning Percentage
	Total No. of Hard Copy Sheets	Total No of Scanned Sheets	
Raipura	246	246	100%

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 mauza 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 Mauza Maps

The mauza maps have been digitized through On-screen Digitization process using ArcGIS software. In brief, this process involves adding a scanned mauza 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 mauza 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 mauza map.



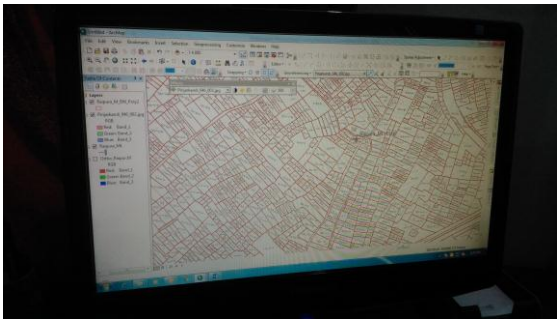


Figure 2.3: On Screen Digitization and Sample Digitized Mauza Map

Table-2.5: Status of Digitizing of Mauza Map

Upazila	Mauza Maps		Digitization Percentage
	Total No. of Mauza Sheets	Total No of Digitized Sheets	
Raipura	246	246	100%

2.1.6 Edit Plot checking of the Digitized Mauza Maps

After digitization of mauza maps edit plots were produced containing all the features in different colors. The digitized mauza maps were checked and verified by superimposing on the original mauza 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 Mauza 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 mauza maps, both soft and hard copies of them have been submitted to Project Director.

2.1.7 Geo-referencing of Raster Mauza Map

Georeferencing 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 georeferencing mauza maps, otho-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 otho-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, orthing) of any point on the ortho-rectified satellite image, geo-referencing of mauza map has been done by using this geometrically corrected satellite image as reference. The process of geo-referencing of mauza map using satellite image is actually parcel (plot) of mauza map matching with respect to the ortho-rectified satellite image. The **Figure 2.4** shows a sample geo-referenced raster mauza map which is overlaid on ortho-rectified satellite image.

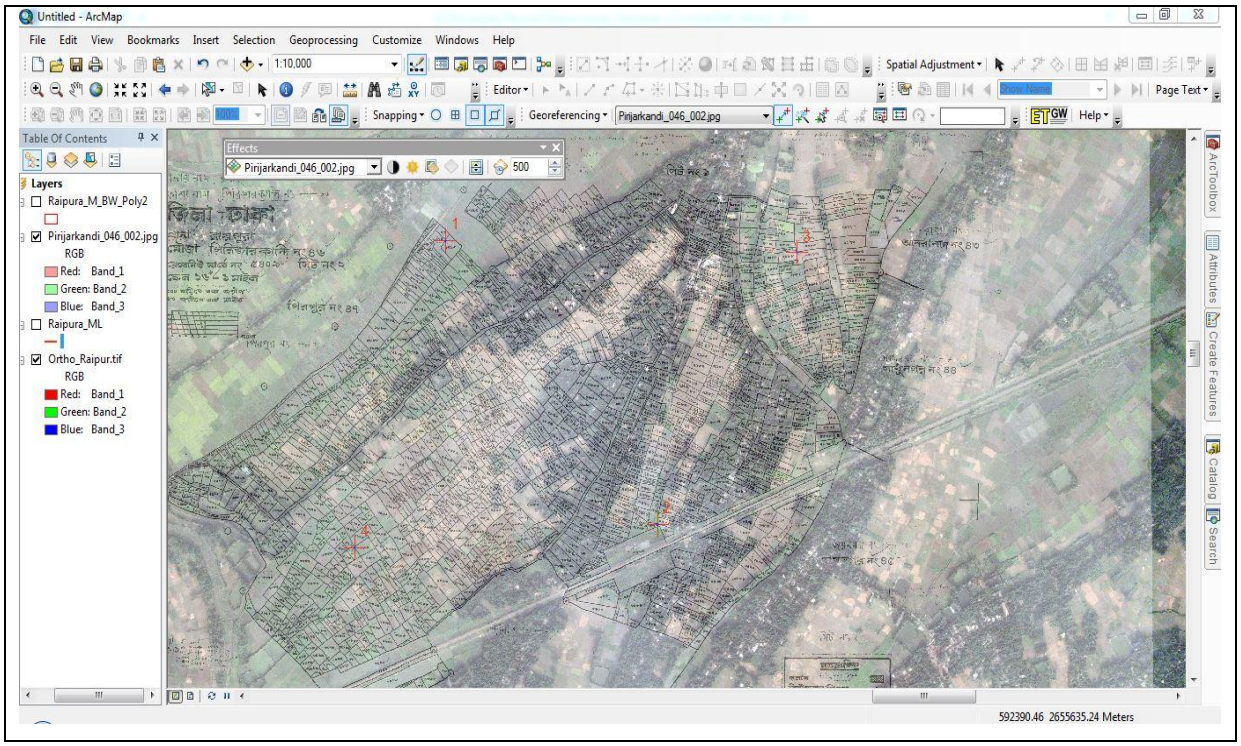


Figure-2.4: Sample Geo-referenced Raster Mauza Map Overlaid on Satellite Image

A suitable number of GCP (minimum 4), preferably plot corners and building corners, has been taken for proper geo-referencing of mauza map depending on its size and 2nd Order Polynomial Transformation wasapplied. 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 mauza maps get properly georeferenced. Finally, permanently georeferenced images of mauza maps have been created by using 'Rectify' tool of ArcMap.

2.1.8 Geo-referencing of Vector Mauza Map

After georeferencing of scanned image of mauza maps (raster mauza maps), georeferencing of vector mauza maps have been done. The vector maps i.e. the shape files of each mauza map sheet have been spatially adjusted to the respective georeferenced raster mauza map sheet. The Spatial Adjustment Tools of ArcMap have been used to do this.

2.1.9 Edge Matching of Mauza 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 mauzas each of which contains one or more than one map sheets. The adjacent mauza maps are coincident and share the same location of coordinates, boundaries, or nodes. The problem is that, in reality, the common boundaries of adjacent Mauza map sheets actually do not match exactly with each other. Hence the edge-matching problem arises. Mauza 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 mauza maps on satellite image the accuracy of the common boundaries with respect to satellite image have been investigated. Then, edge-matching of two adjacent mauza 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 mauza 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.

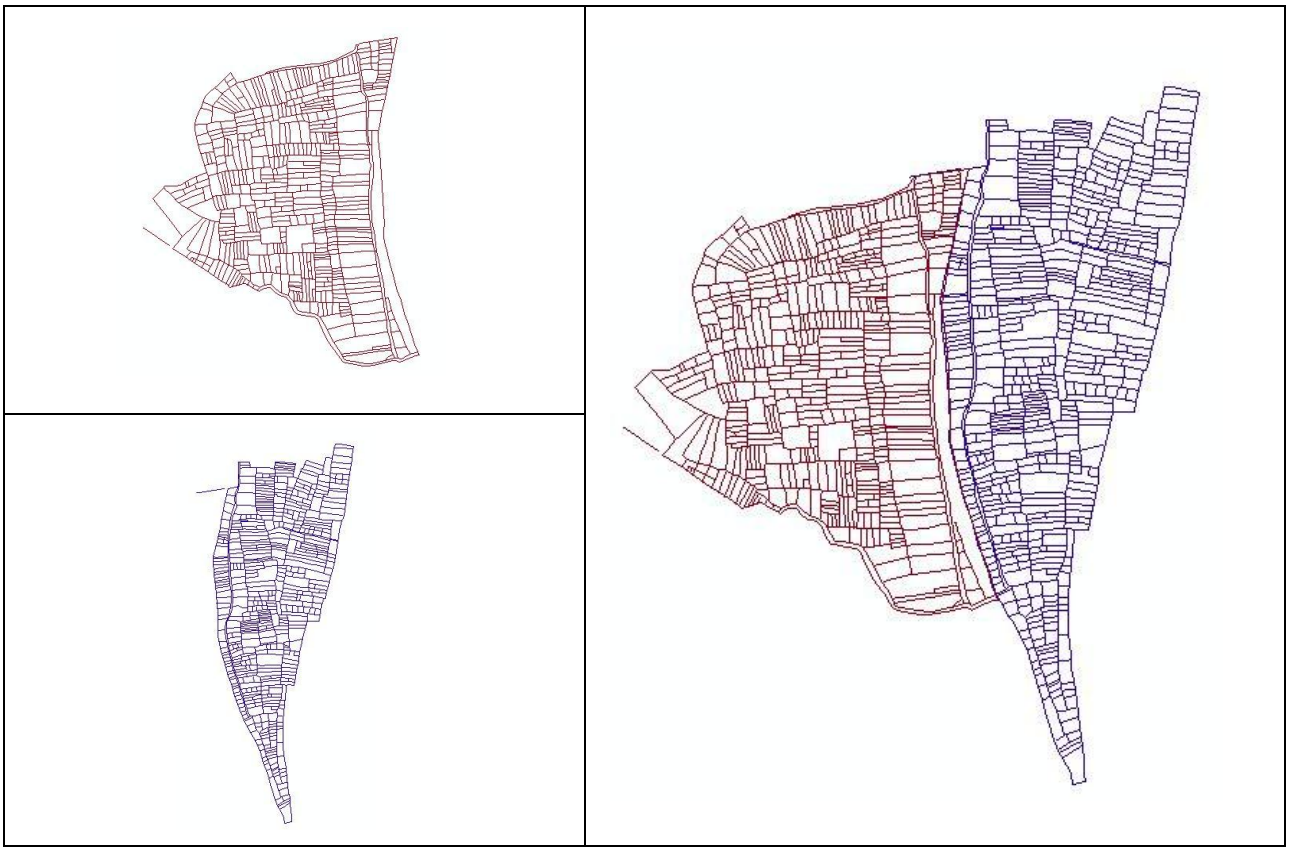


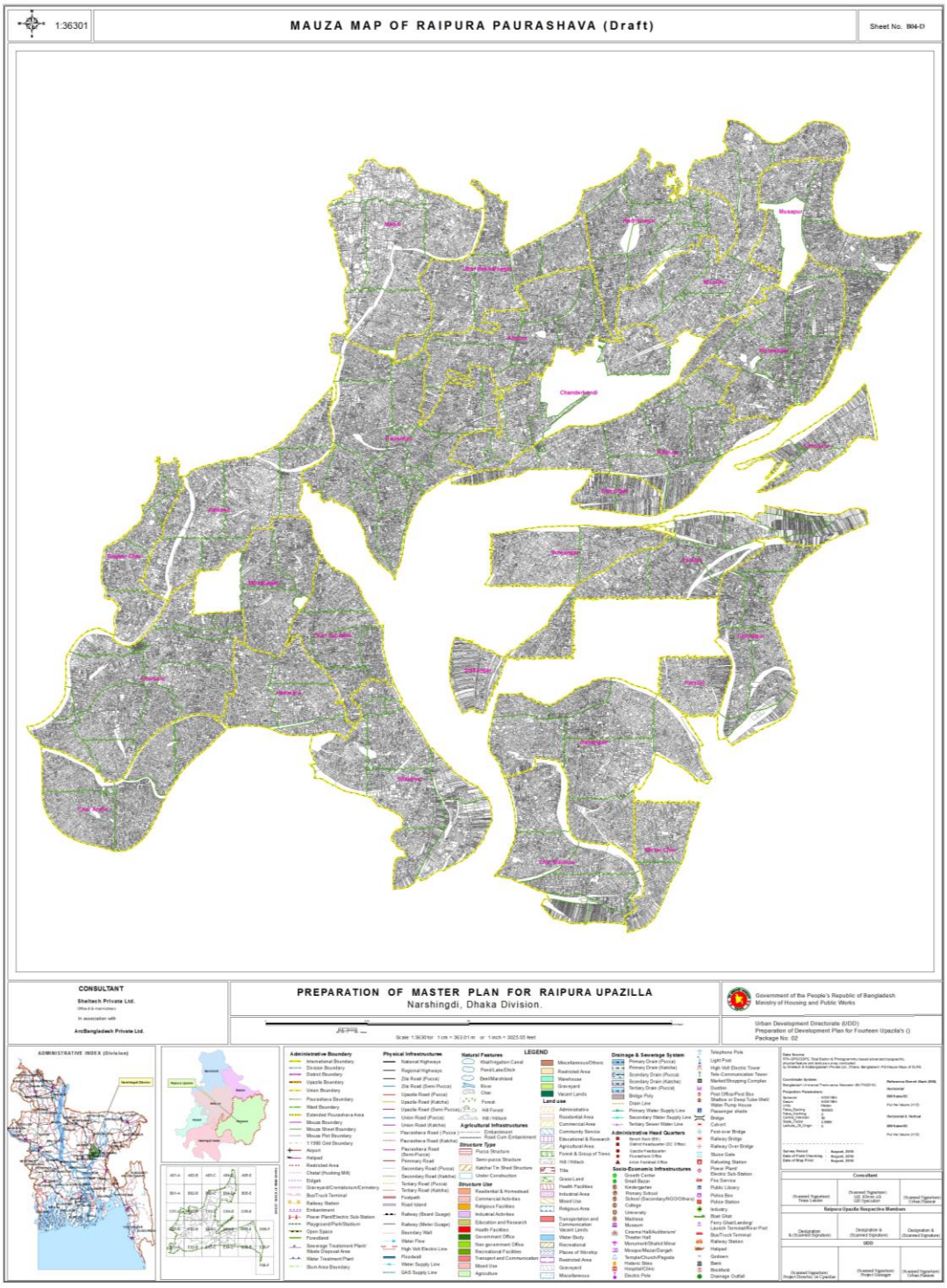
Figure-2.5: Sample Diagram of Edge-matching

2.1.10 Demarcation of the Project Area based on Mauza Maps

Mosaicing of all mauza maps belonged to the Upazila form the actual boundary of the project area. Before mosaicking, edge-matched mauza maps have been made as free of topological errors. Finally plot based mosaic mauza maps of the project area have been created by using 'Merge' tool of ArcGIS. The boundary of this merged mauza map becomes the Project Area Boundary with real world coordinates. Project Area Map of Raipura 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 Mauza 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 mauza map of the project area, the administrative boundaries such as District boundary, Upazila boundary, Union boundary, Mauza boundary and Mauza 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 Raipura 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. 13 BM pillars have been established in Raipura 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.**

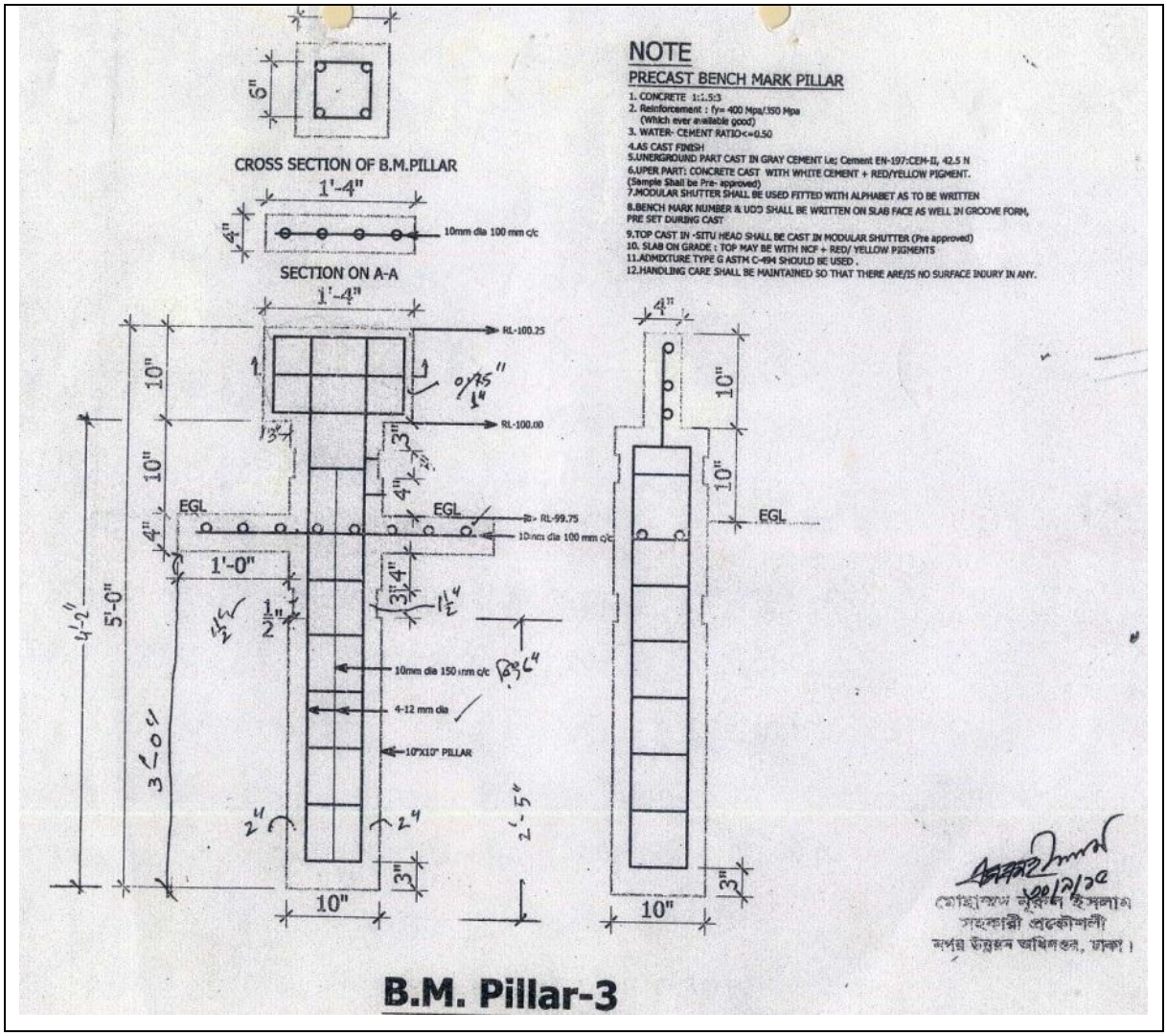


Figure-2.6: Design of BM Pillar

2.2.3 Construction of BM Pillars

Raipura Upazila is covered by 13 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 Raipura Upazila. The information of Reference BM Pillars has been collected from Survey of Bangladesh.

Plate-2: Reference BM Pillar in Raipura 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

Sl No.	Point ID	WGS-84		RL	Location of pillar
		Latitude	Longitude		
1	BM 533	24°01’12.24721’’	90°48’33.95158’’	9.891	The pillar is situated in the palyground of chaitannya high School on Dhaka Narsingdi road. Vill: Chaitannya, Upazila: Raipura, Dist: Narsingdi
2	GPS 2317	24°06’29.99146’’	90°50’58.58477’’	7.6315	The pillar is situated in tha soudth- west of Zila parishad Dak Banglow, 2.8m south-west from tha south- west side boundary wall, 2.6m west from west side wall. Vill: Belabo, Upazila: Belabo, Dist: Narsingdi.
3	GPS 3533	23°53’02.77343’’	90°58’10.38328’’	6.6094	The pillar is situated in Nabingar, pilot High School ground & south side of tha field. It is about 75m West from main roid. Vill: Nabinagar, Upazila: Nabinagar, Dist: Brahmanbari

Source: Survey of Bangladesh (SOB), 2016

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 Descriptions of the BM Pillars

BM No.	R.L (m)	Northing (dd)	Easting (dd)	Location	BM Photo
1	7.3477	24°02'29.84935"N	90°45'02.71778"E	South-West Side of Raipuara Training Institute's Field. Raipura Paurashava	
2	4.429	24°04'35.45457"N	90°44'05.63278"E	North Side of Hatubhanga Govt. Primary School. Along the South Side of Rail line. Union: Mirzanagar	

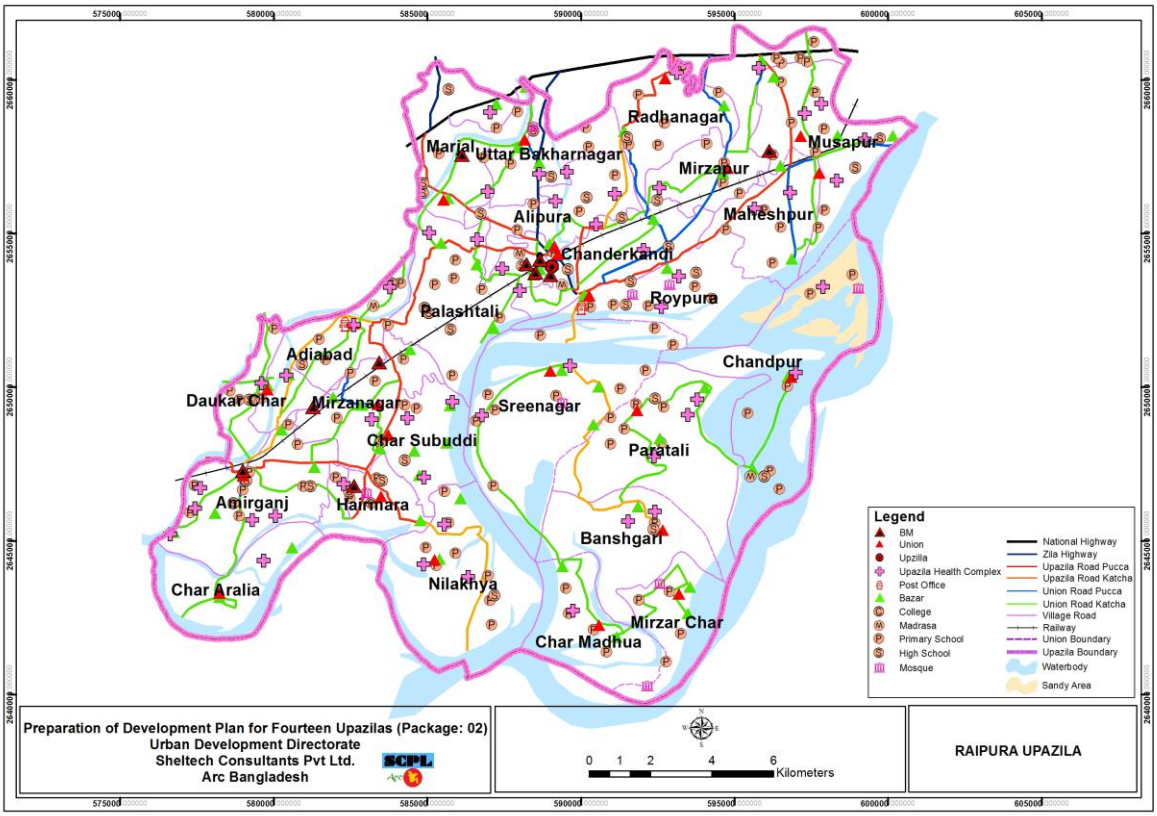
BM No.	R.L (m)	Northing (dd)	Easting (dd)	Location	BM Photo
3	12.423	24°03'49.66408"N	90°48'40.41162"E	North side of Hasnabad Govt. Primary School. Along the Main Road Union: Amirganj	
4	10.265	24°01'12.22778"N	90°48'34.05770"E	West-North side of the New Model Kinder Garden School. Nearest of Khanabari Rail Station Union: Mirzanagar	
5	6.114	24°02"30.22935"N	90°42'43.25060"E	West-North Side of Morjal Union Complex. Along the Link Road. Union: Morjal	
6	6.559	24°02'14.90889"N	90°43'54.32976"E	Behind of Raipura Upazila Complex. Along the Mosque. Raipura Paurashava	
7	12.023	23°55'55.655"N	90°49'14.725"E	South Side to Monipura high School. Along the Field. Union: Hahormara	

BM No.	R.L (m)	Northing (dd)	Easting (dd)	Location	BM Photo
8	4.892	24°01'26.46731"N	90°44'17.15548"E	Inside of Raipura College. North Side of Monument Raipura Paurashava	
9	5.465	23°57'52.77086"N	90°44'00.96761"E	North-East side of Musapur Union Complex. Union: Musapur	
10	7.027	23°58'17.78376"N	90°45'18.57249"E	South Side of Hasimpur Govt. Primary School. Along the link road. Raipura Paurashava	
11	6.779	24°02'30.35605"N	90°44'22.20511"E	North-East Side of Shotodol High School. Union: Chanderkandi	
12	19.815	24°03'30.59321"N	90°41'11.84211"E	South Side of Laskmipur Govt. Primary School. Union: Radhanagar	
13	8.572	24°00'32.381"N	90°42'21.802"E	West Side of Lochonpur Govt. Primary School. Along the link road. Union: Uttor Bakhornagar	

BM No.	R.L (m)	Northing (dd)	Easting (dd)	Location	BM Photo
14	8.422	24°0'46.93"N	90°52'10.602"E	North Side of Shaheb Nagar Govt. Primary School. Union: Alipura	
15	7.124	23°58'36.767" N	90°49'27.285"E	Eest-North Side of Palashtali Govt. Primary School. Along the like road. Union: Palashtali	

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 Raipura 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**.

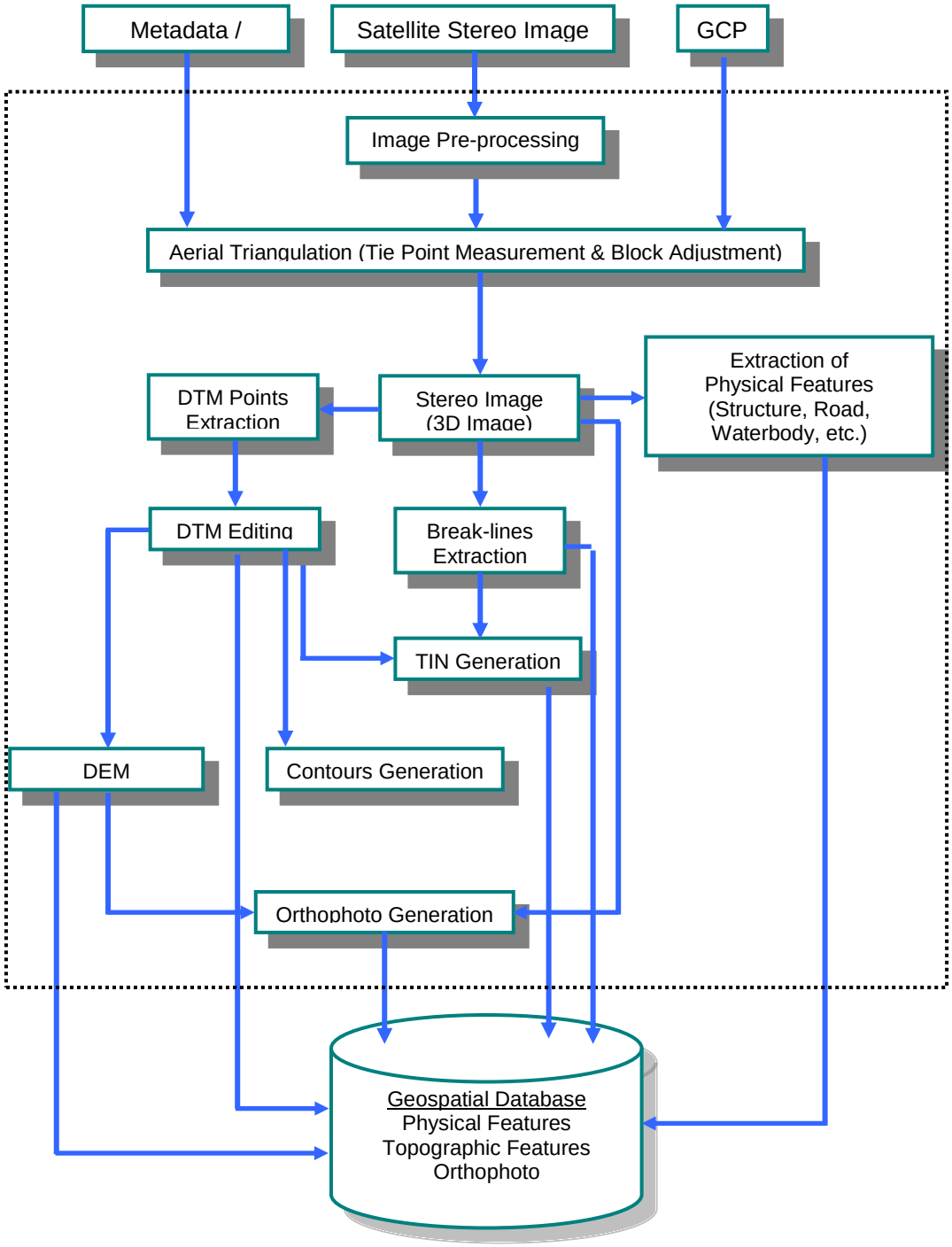


Figure-2.7: Workflow of Stereo Satellite Image Processing and Data Extraction

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 Data Acquisition

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).

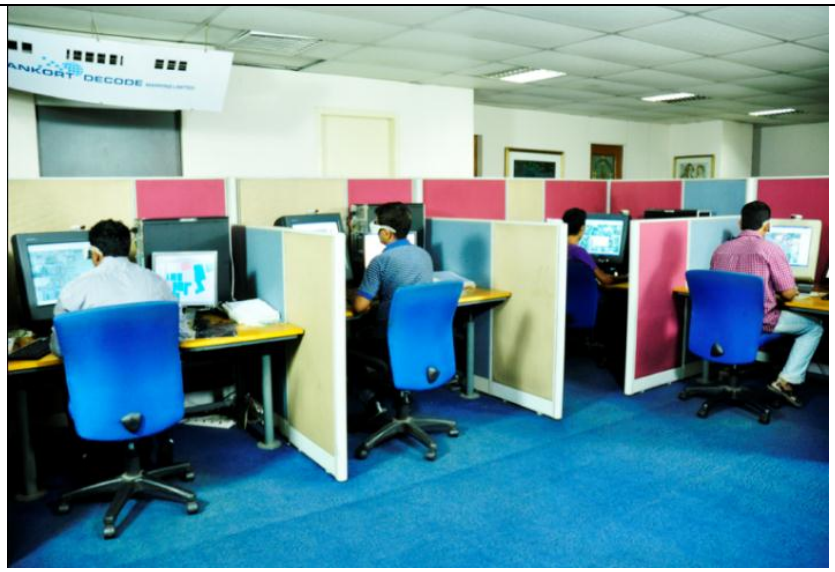


Plate-4: Digitization by Digital Photogrammetry

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 Mauza 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 Mauza map data (e.g. plot no, Mauza 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 Raipura Upazila has been divided into 2362 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 mauza map is shown in **Map-2.4**.

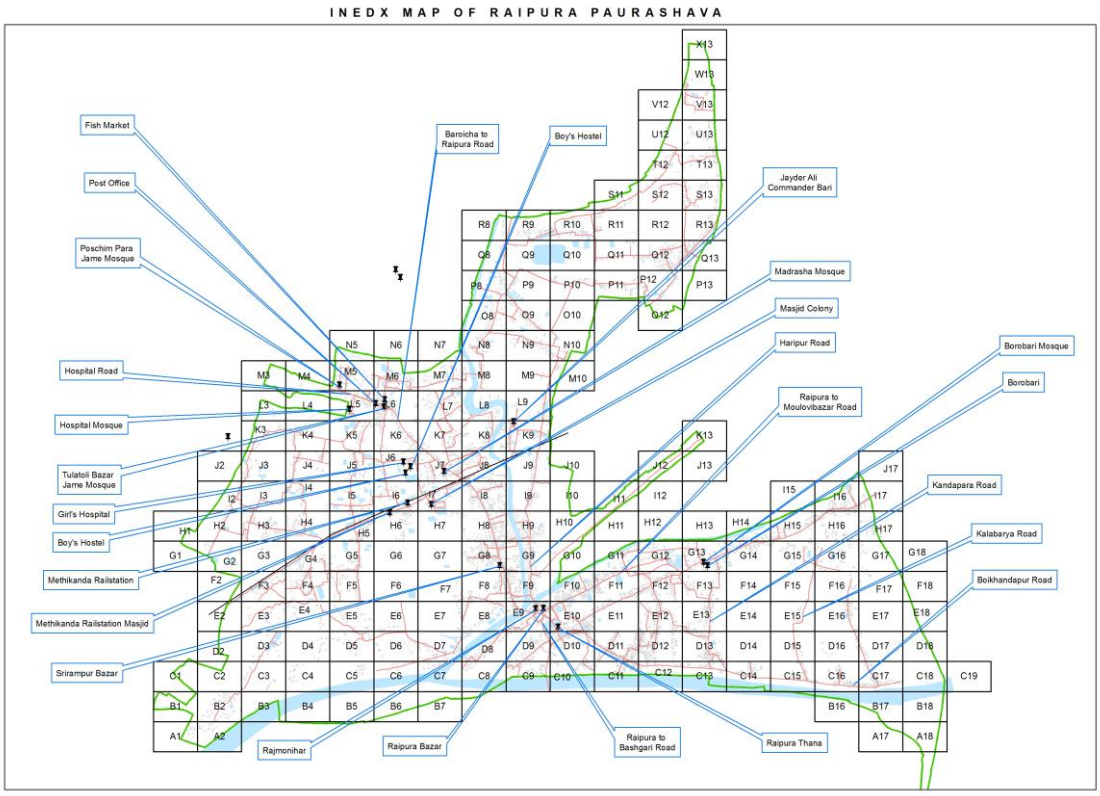


Figure-2.8: Grids for Survey Base Maps of Raipura Upazila (Raipura Paurashava)

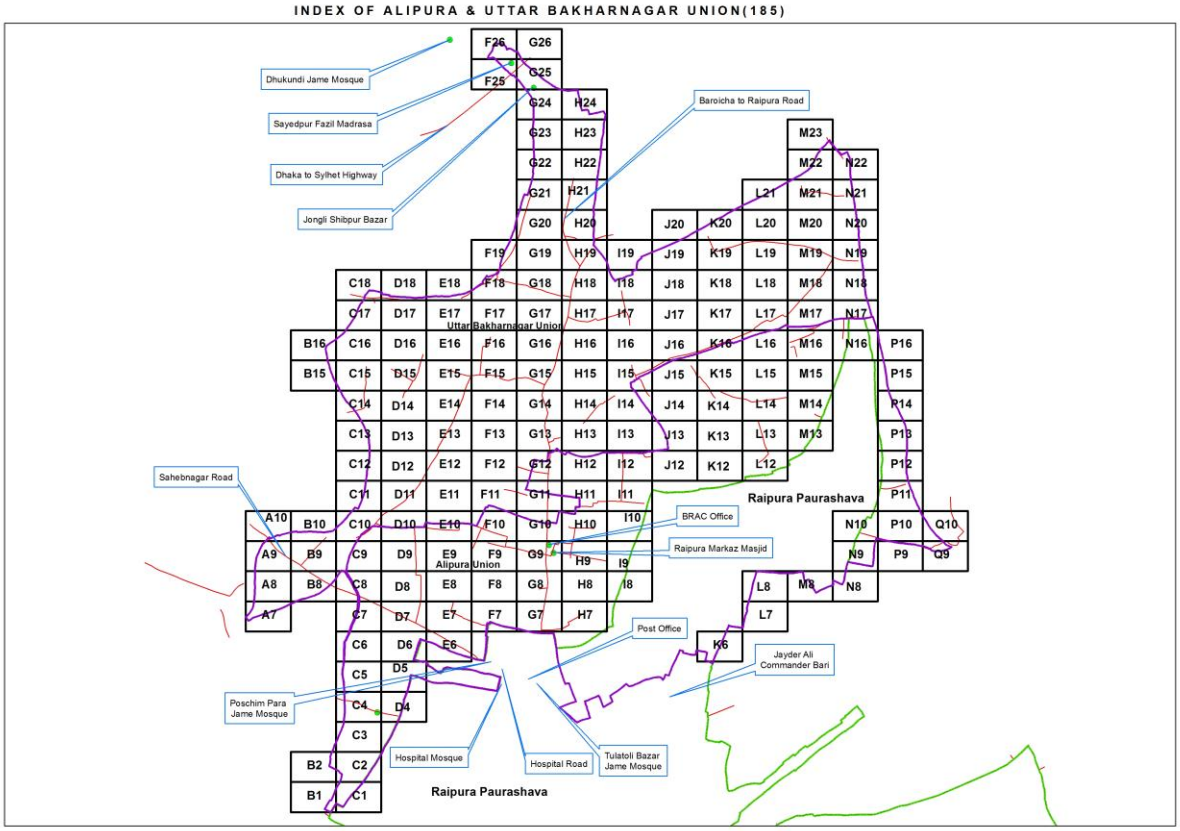
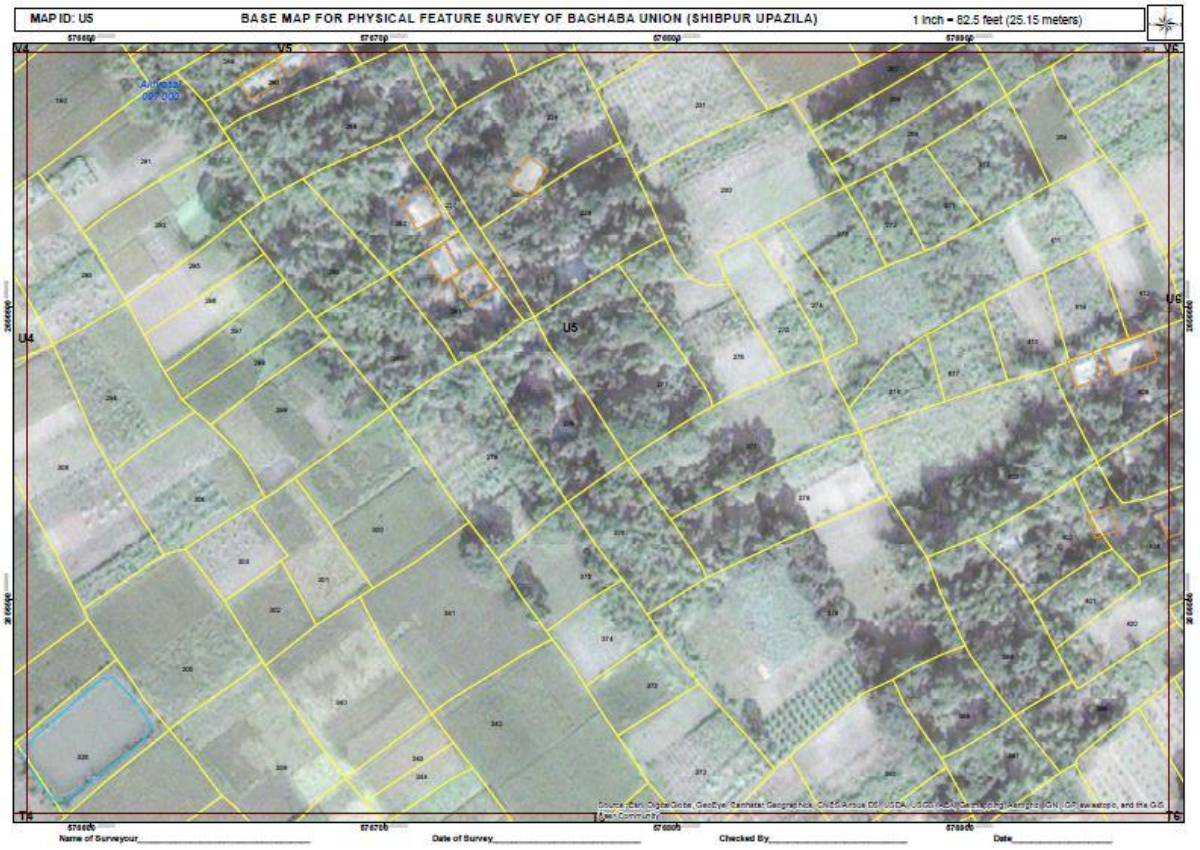


Figure-2.9: Survey Base Maps of Raipura Upazila in Grids (Alipura & Uttar Bakharnagar)

Map 2.3: Sample Survey Base Map comprising Satellite Image and Photogrammetric Data



Map 2.4: Sample Survey Base Map comprising Mauza 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 Mauza name belongs to the structure
- Ward/Union belongs to the structure
- Name of the location

2.4 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**

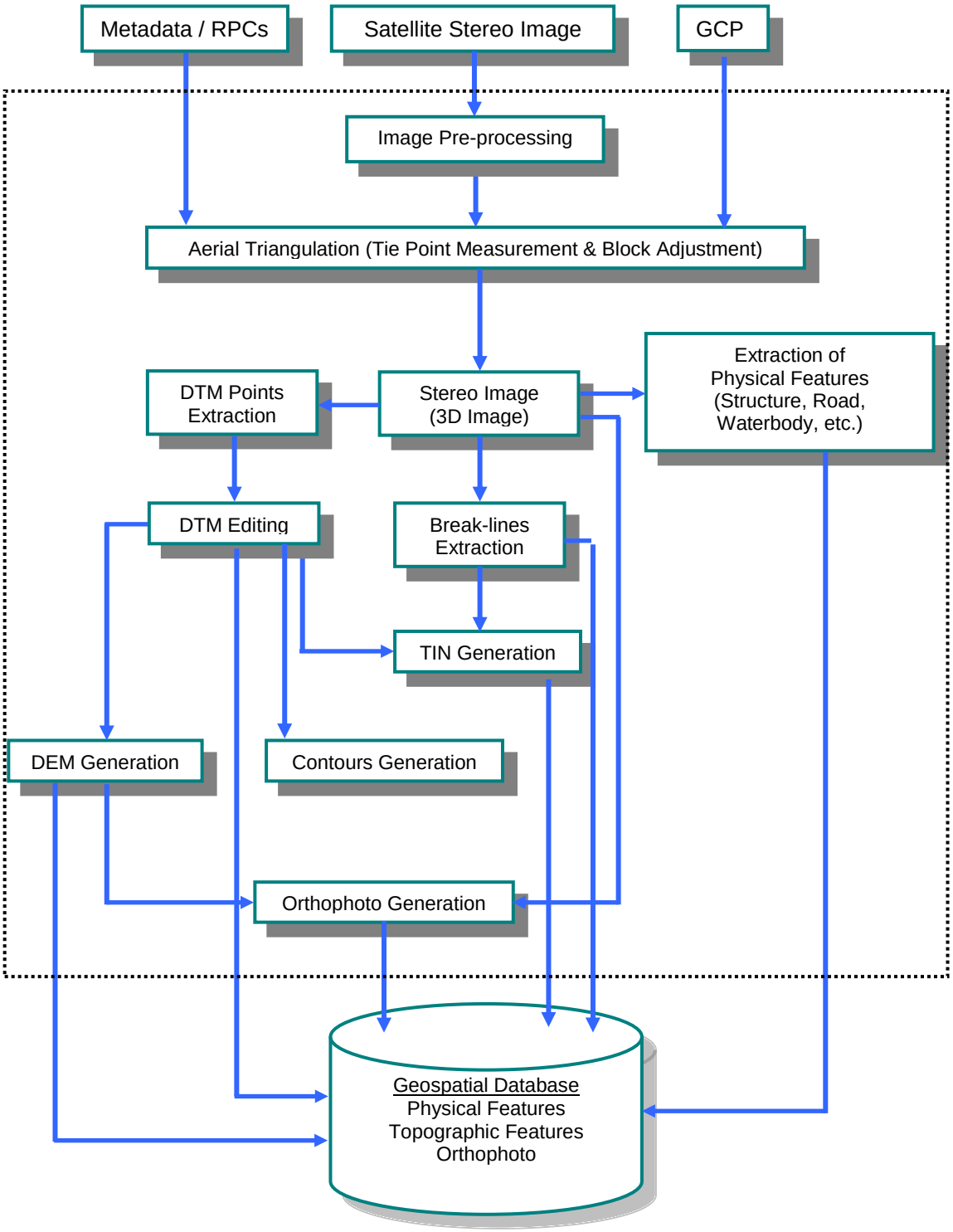


Figure-2.10: Workflow of Stereo Satellite Image Processing and Data Extraction

2.4.1 Image Collection

The satellite image was ordered to The Decode Ltd. the authorized reseller/partner of Digital Globe Inc and Deimos Imaging. The Consultant has purchased 0.5 meter stereo image for Raipura's town area and 1.0 meter stereo image for Raipura's rural area as per ToR. The specifications of the purchased satellite image are as below:

For **Town Area** of Raipura Upazila:

Image Sensor : World View-2
Type : Ortho ready stereo (3D)
Resolution : 0.5m Panchromatic, 2.0 meter Multispectral
Source : New Acquisition, 10th December 2015
Total Area : 100 Sq. km.
Bit Rate : 16 Bit
Company : Airbus Defence and Space.

For **Rural Area** of RaipuraUpazila:

Image Sensor : Deimos-2
Type : Basic stereo (3D)
Resolution : 1.0m Panchromatic, 4.0 meter Multispectral
Source : New Acquisition, 16th November 2015 & 23rd October 2015
Total Area : 219.155 Sq. km.
Bit Rate : 16 Bit
Company : Deimos Imaging, Spain

2.4.2 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

2.4.2.1 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-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

2.4.2.2 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 matric 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.

2.4.3 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.

2.4.4 Aerial Triangulation

Aerial Triangulation is a mathematical process used to determine the position and orientation of each photograph at the moment of exposure.

Table-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.

2.4.5 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.

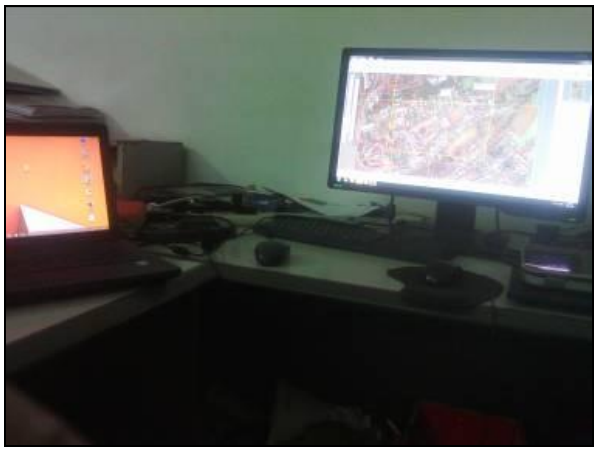


Plate-5: Digital Photogrammetric Workstation (DPW)

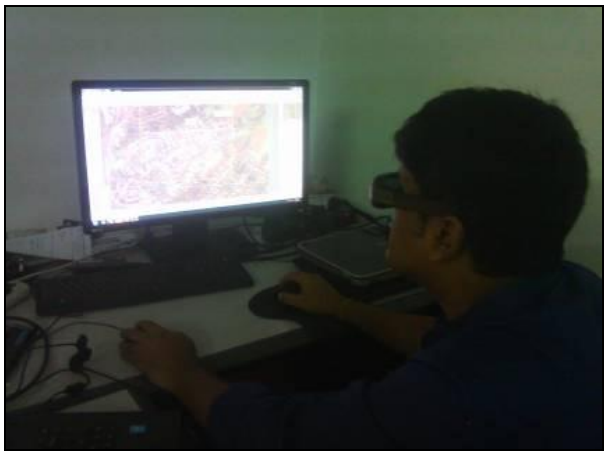


Plate-6: Photogrammetrist Extracting Features in DPW

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-2.16** and **Figure-2.17** shows the extracted features of Raipura Upazila at a glance.

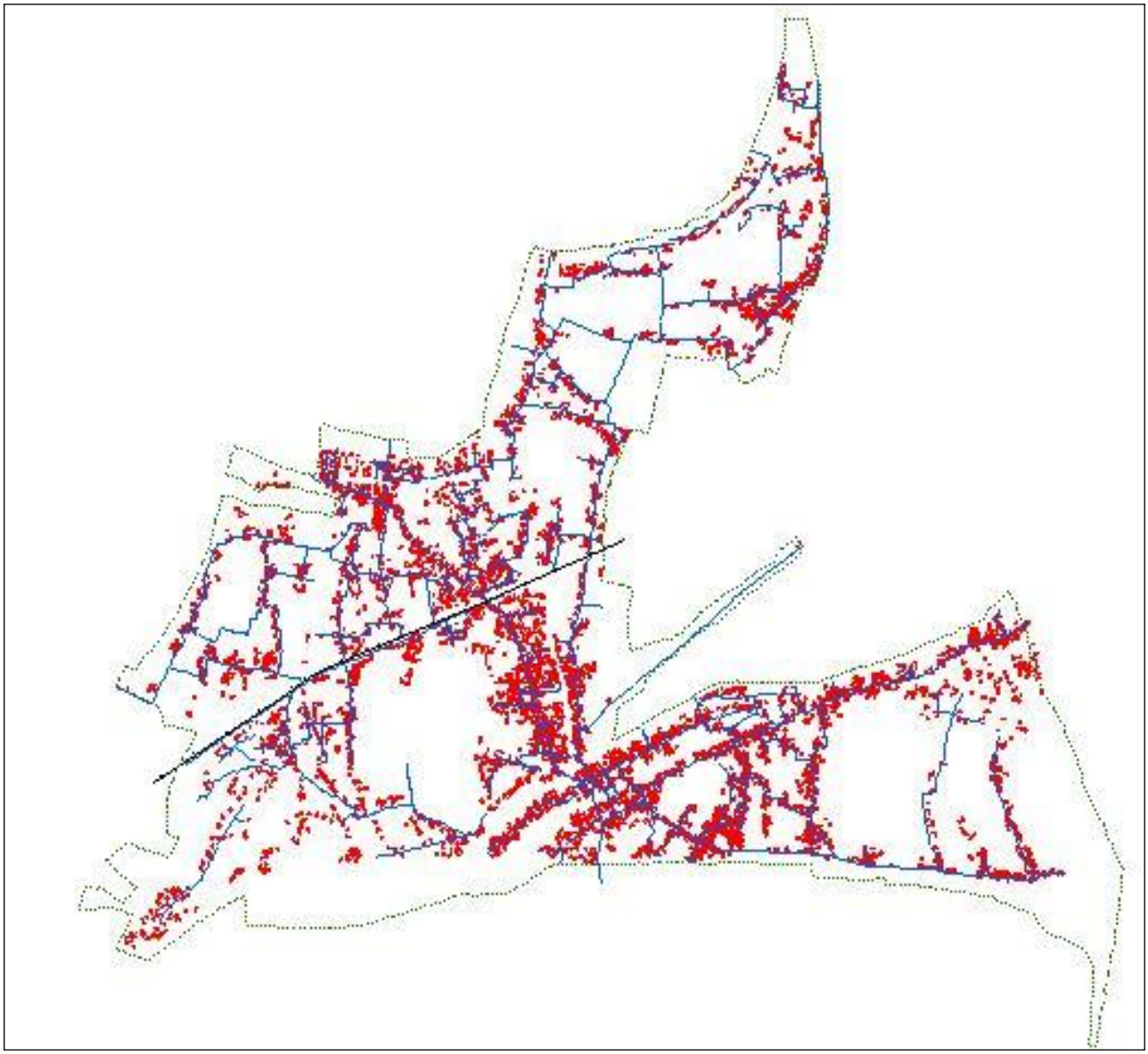


Figure-2.16: Extracted Features of Entire Raipura Upazila by Photogrammetry

Figure 2.17: Enlarged Partial View of Extracted Features of Raipura

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 DTM Points in 20 meter interval in Chakmarkul and Fatekharkul Union of Raipura Upazila. **Figure 2.19** shows the Contour Lines partially at Chakmarkul, Fatekharkul and Rajarkul Union of Raipura 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.

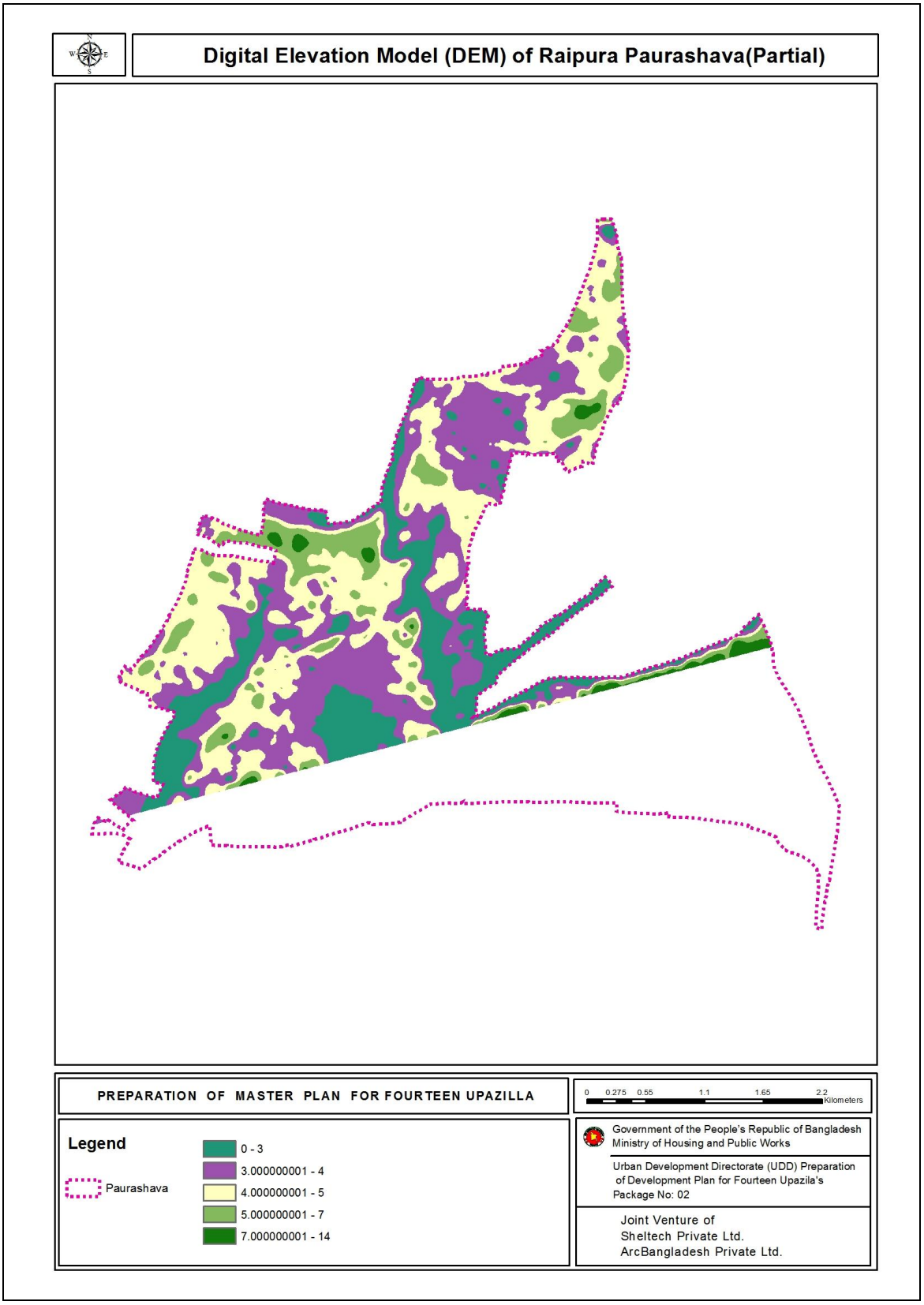


Figure-2.18: Digital Elevation Map (DEM) of Raipura Upazila (Partial)

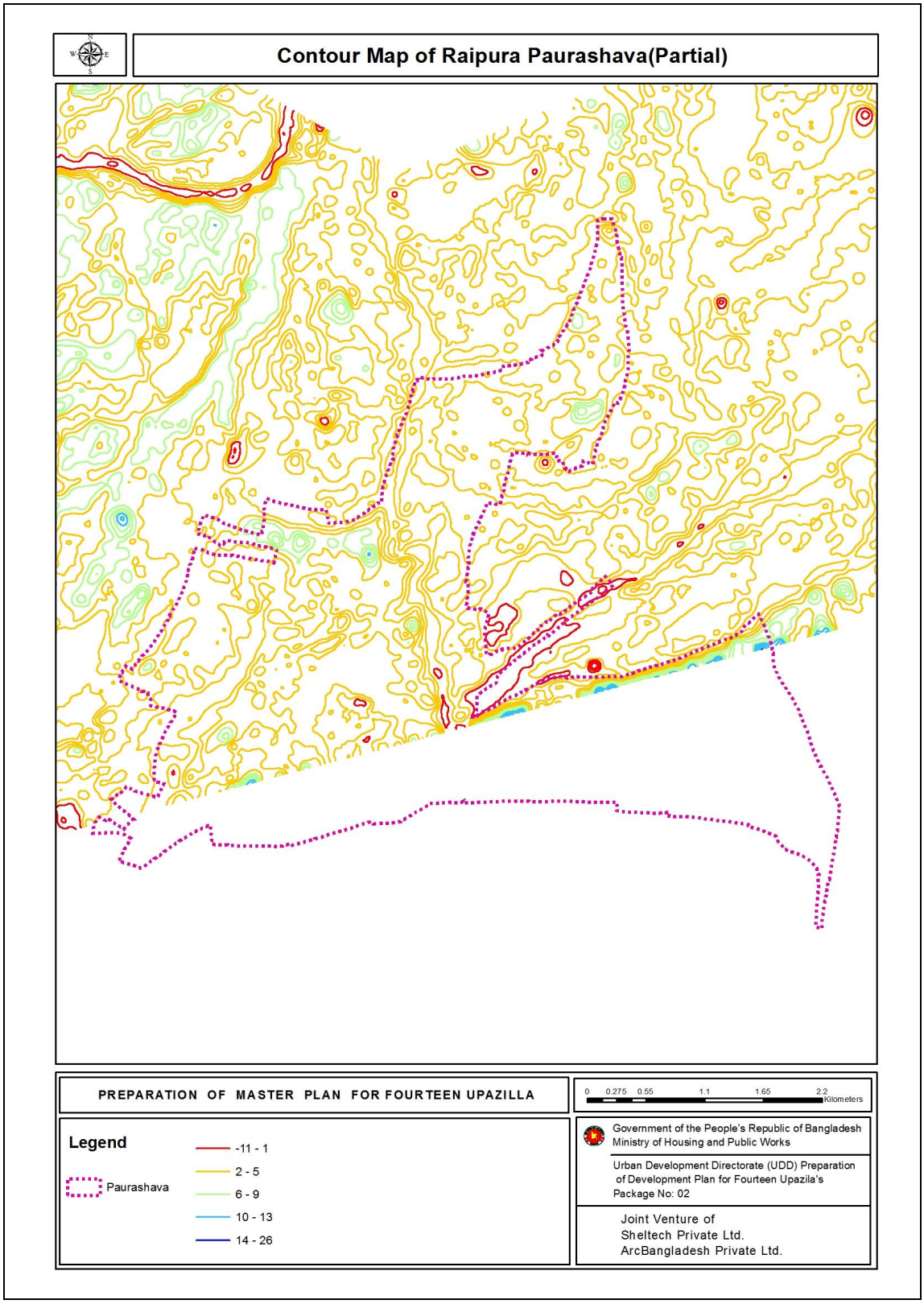


Figure-2.19: Contour Lines of Raipura Upazila (Partial)

2.4.6 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 Raipura Upazila.

Figure 2.20: Ortho-Rectified Image of Raipura Upazila (Partial)

Chapter-03
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 Raipura 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**.

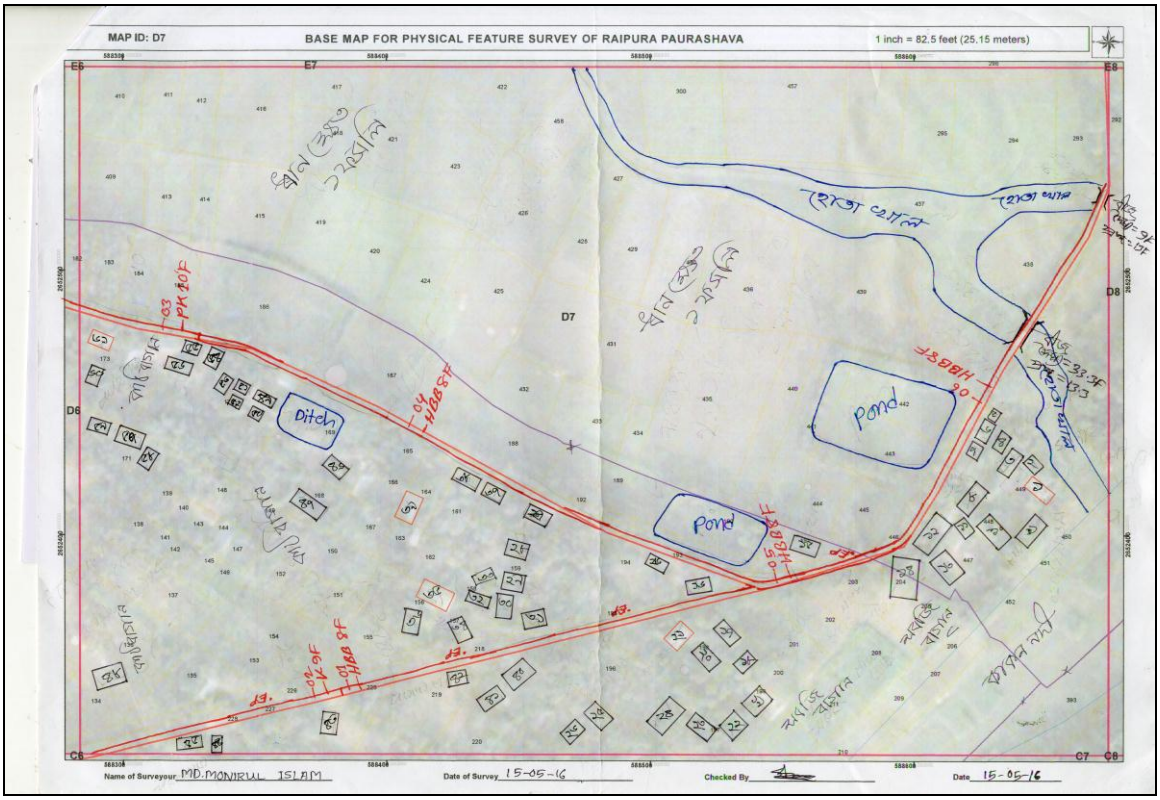


Figure-3.1: Sample Scanned Base Map for Physical Features and Land use Survey

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 Raipura

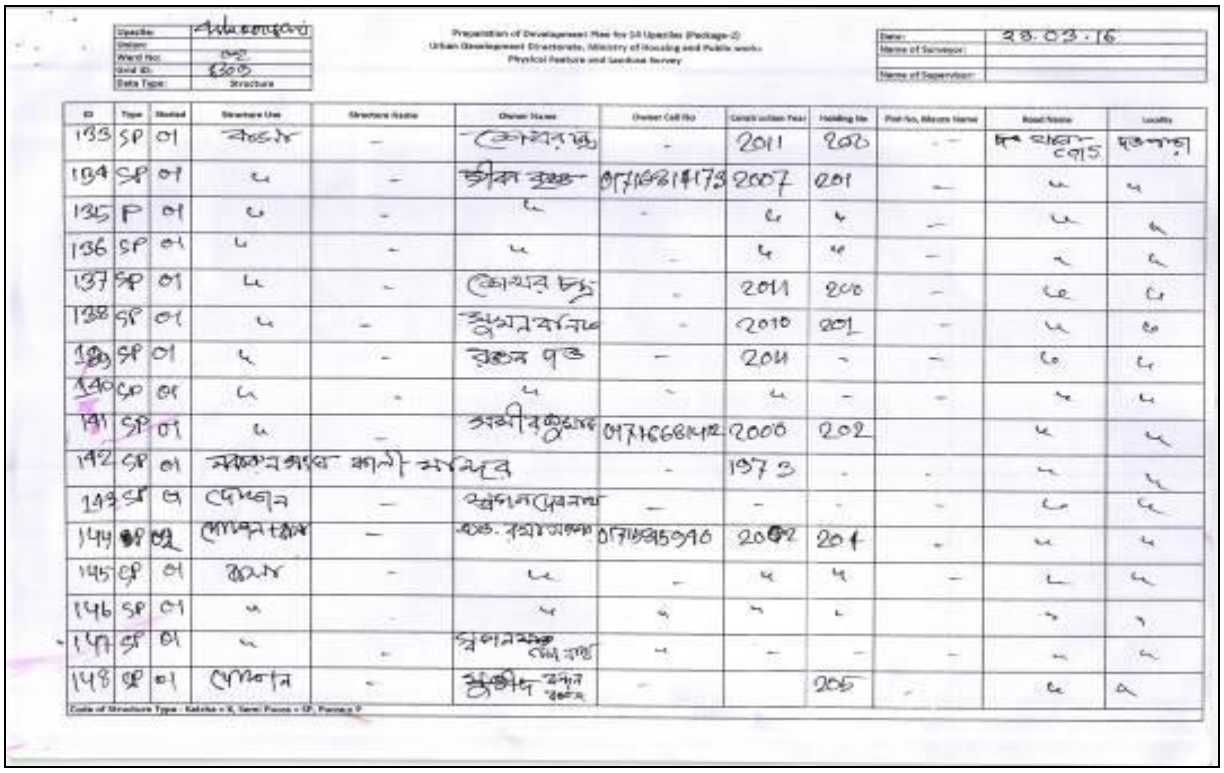


Figure-3.2: Sample Log Book Page with Information Recorded in Field

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.

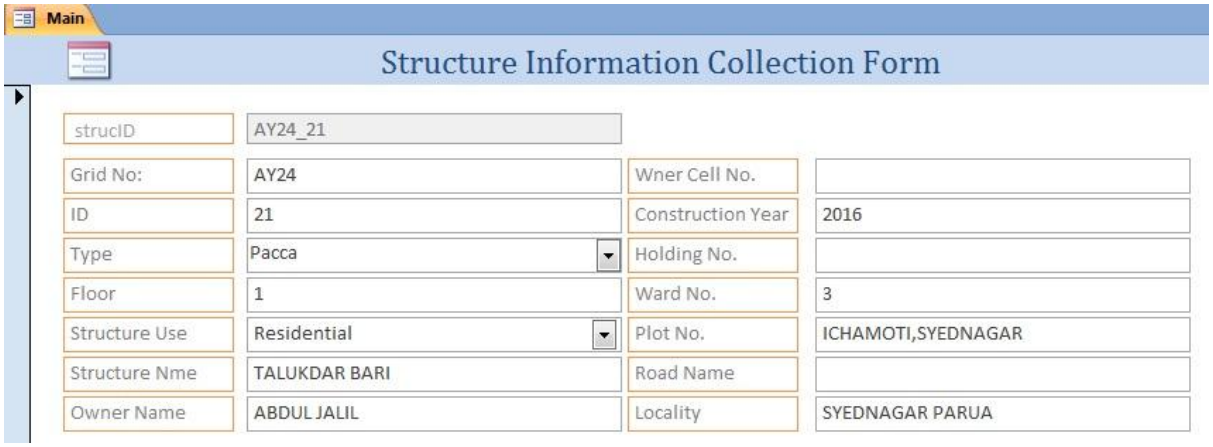
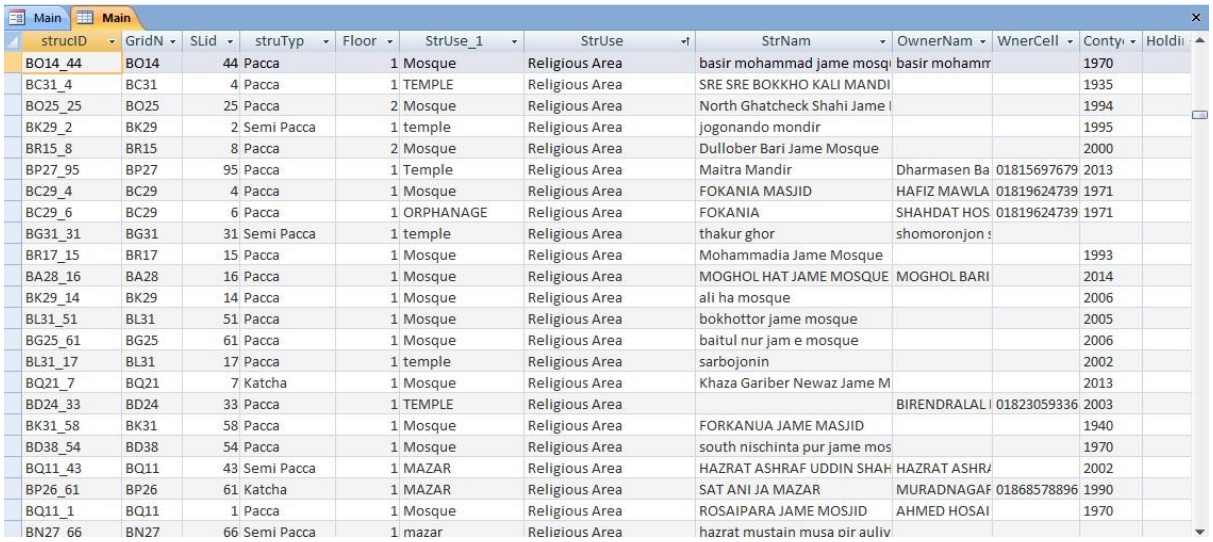


Figure-3.3: Log Book Data Entry Interface in Microsoft Access Software

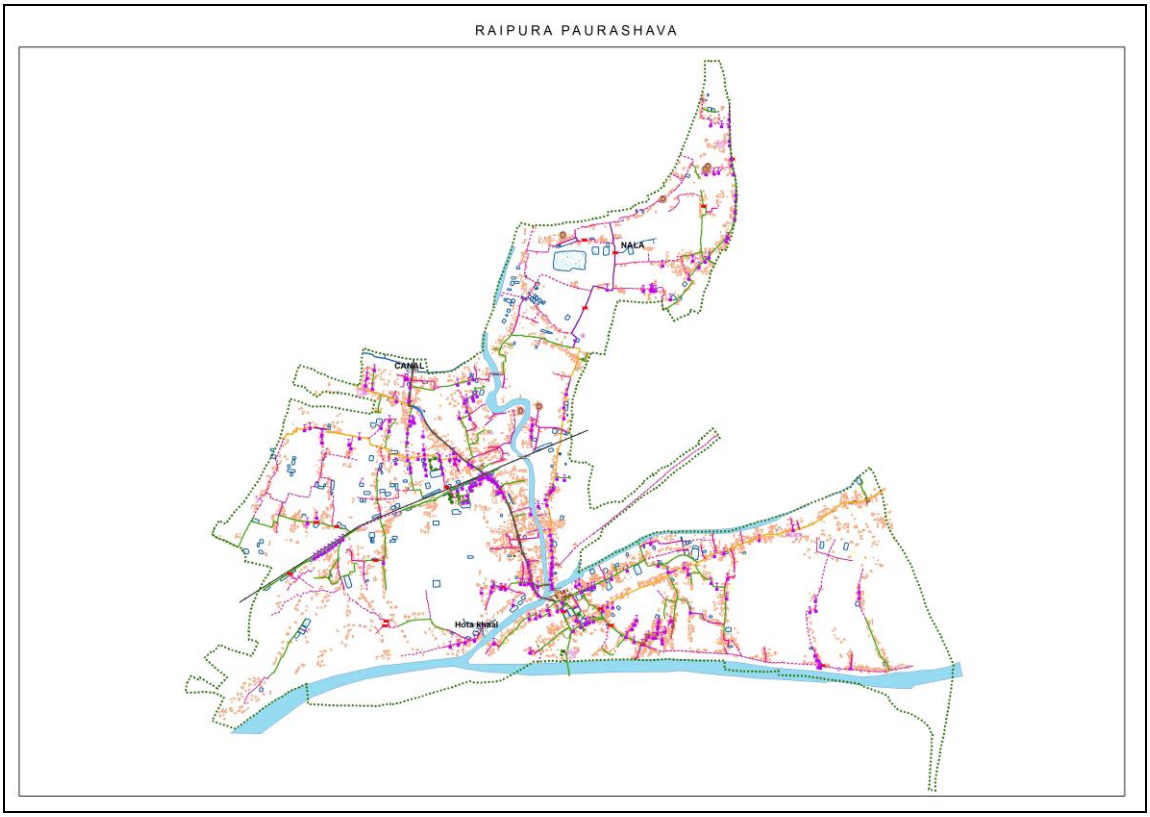


strucID	GridN	SLid	struTyp	Floor	StrUse_1	StrUse	StrNam	OwnerNam	WnerCell	Conty	Holdi
BO14_44	BO14	44	Pacca	1	Mosque	Religious Area	basir mohammad jame mosq	basir mohamm		1970	
BC31_4	BC31	4	Pacca	1	TEMPLE	Religious Area	SRE SRE BOKKHO KALI MANDI			1935	
BO25_25	BO25	25	Pacca	2	Mosque	Religious Area	North Ghatcheck Shahi Jame			1994	
BK29_2	BK29	2	Semi Pacca	1	temple	Religious Area	jogonando mondir			1995	
BR15_8	BR15	8	Pacca	2	Mosque	Religious Area	Dullober Bari Jame Mosque			2000	
BP27_95	BP27	95	Pacca	1	Temple	Religious Area	Maitra Mandir	Dharmasen Ba	01815697679	2013	
BC29_4	BC29	4	Pacca	1	Mosque	Religious Area	FOKANIA MASJID	HAFIZ MAWLA	01819624739	1971	
BC29_6	BC29	6	Pacca	1	ORPHANAGE	Religious Area	FOKANIA	SHAHDAT HOS	01819624739	1971	
BG31_31	BG31	31	Semi Pacca	1	temple	Religious Area	thakur ghor	shomoronjon			
BR17_15	BR17	15	Pacca	1	Mosque	Religious Area	Mohammadia Jame Mosque			1993	
BA28_16	BA28	16	Pacca	1	Mosque	Religious Area	MOGHOL HAT JAME MOSQUE	MOGHOL BARI		2014	
BK29_14	BK29	14	Pacca	1	Mosque	Religious Area	ali ha mosque			2006	
BL31_51	BL31	51	Pacca	1	Mosque	Religious Area	bokhottor jame mosque			2005	
BG25_61	BG25	61	Pacca	1	Mosque	Religious Area	baitul nur jam e mosque			2006	
BL31_17	BL31	17	Pacca	1	temple	Religious Area	sarbojonin			2002	
BQ21_7	BQ21	7	Katcha	1	Mosque	Religious Area	Khaza Gariber Newaz Jame M			2013	
BD24_33	BD24	33	Pacca	1	TEMPLE	Religious Area		BIRENDRALAL	01823059336	2003	
BK31_58	BK31	58	Pacca	1	Mosque	Religious Area	FORKANUA JAME MASJID			1940	
BD38_54	BD38	54	Pacca	1	Mosque	Religious Area	south nischinta pur jame mos			1970	
BQ11_43	BQ11	43	Semi Pacca	1	MAZAR	Religious Area	HAZRAT ASHRAF UDDIN SHAH	HAZRAT ASHRA		2002	
BP26_61	BP26	61	Katcha	1	MAZAR	Religious Area	SAT ANI JA MAZAR	MURADNAGAF	01868578896	1990	
BQ11_1	BQ11	1	Pacca	1	Mosque	Religious Area	ROSAIPARA JAME MOSJID	AHMED HOSAI		1970	
BN27_66	BN27	66	Semi Pacca	1	mazar	Religious Area	hazrat mustain musa pir auliy				

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 Raipura Town Area

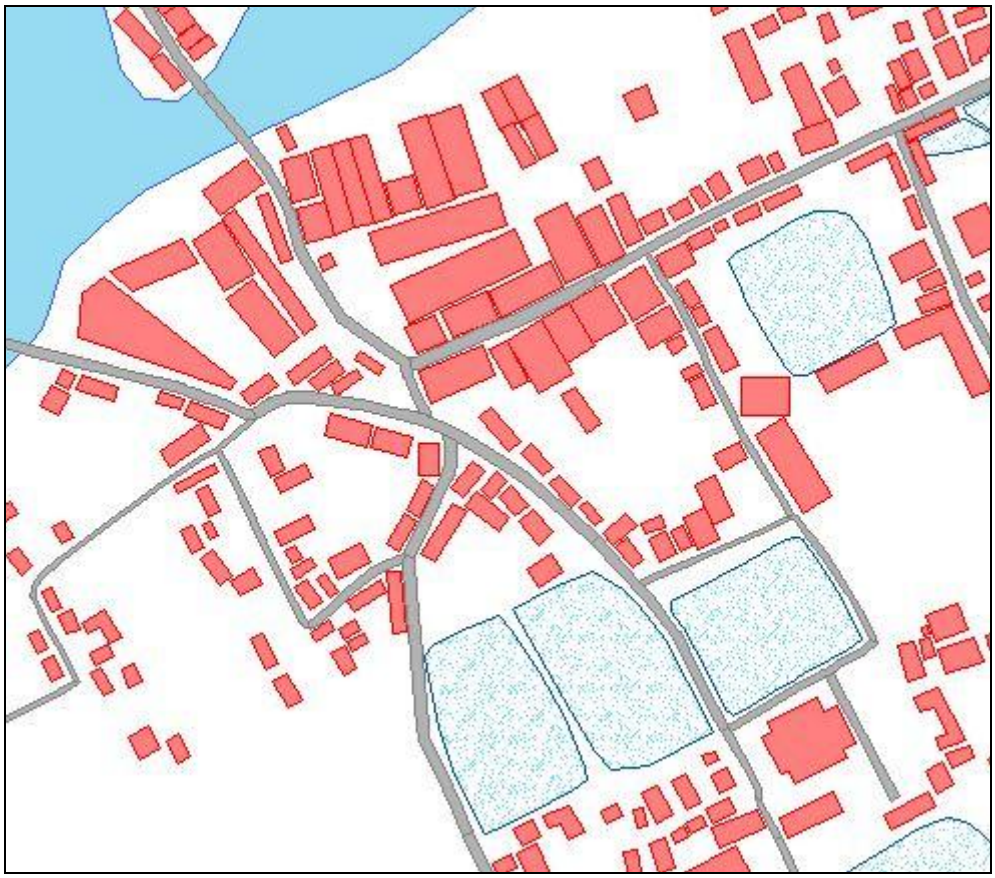
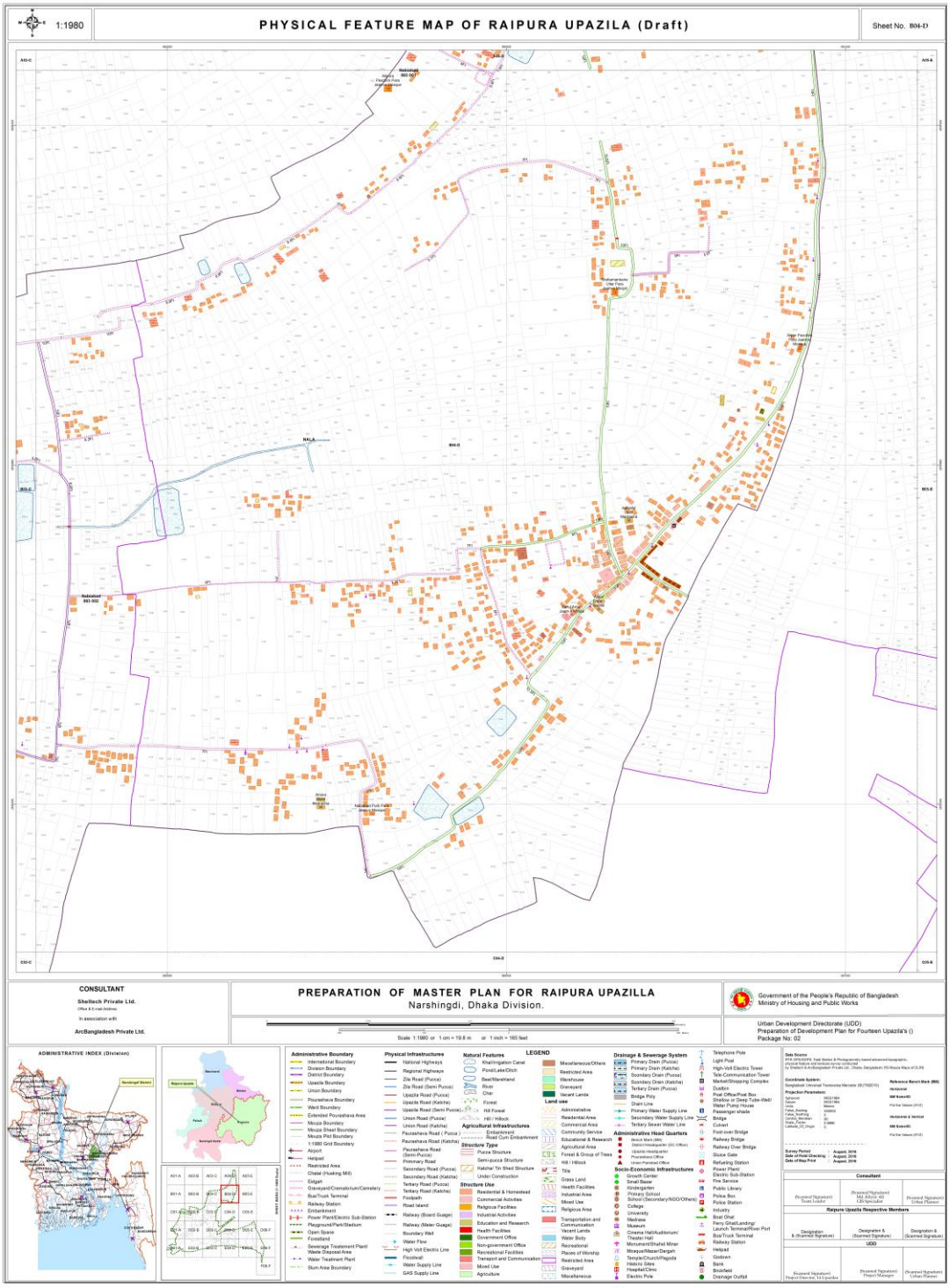


Figure-3.5: 3D Display of Physical Features in Raipura Town Area



Map-3.2: Structure Type and Use in Raipura 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 Mauza 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 Raipura Upazila.

Table

Structure Use

OBJECTID *	Shape *	Str_ID	Struc_ID	Str_Type	Storied	Str_Use1t	Str_Use2t	Str_name	Cons_Year	Struc_Owner	Owner_Cell	Hol
795	Polygon Z	53	BU27_53	Semi Pacca	1	OFFICE	Educational and Research	PROTEST PRIMARY	1984	GOVT	<Null>	<Nul
887	Polygon Z	56	BU26_56	Pacca	2	School	Educational and Research	RAMU PUBLIC KG & HIGH SCHOOL	2008	<Null>	<Null>	<Nul
997	Polygon Z	33	BT29_33	Pacca	2	School	Educational and Research	EVAREST TEACHING INSTITUTE	2004	<Null>	<Null>	<Nul
329	Polygon Z	122	BU28_122	Katcha	1	GARAGE	General Industry	KARNAFULI INDUSTRIES	2008	JANE ALAM	<Null>	<Nul
406	Polygon Z	23	BU28_23	Semi Pacca	1	Commercial	General Industry	MAAYER DOYA RICE FLOOR MILL	<Null>	<Null>	<Null>	<Nul
263	Polygon Z	12	BU26_12	Katcha	1	GARAGE	Mixed Use	<Null>	2015	SHOFIULLAH MONSU	01812944298	<Nul
280	Polygon Z	25	BU26_25	Pacca	2	Commercial, RESIDENTIAL	Mixed Use	ORCHID HOUSE	2011	DR HARUN	0185178360	<Nul
289	Polygon Z	11	BU27_11	Katcha	1	WORKSHIP, GODOWN	Mixed Use	SARUS SALAM COMPLEX	<Null>	ABDUS SALAM	<Null>	<Nul
290	Polygon Z	8	BU27_8	Semi Pacca	1	ABANDONED	Mixed Use	<Null>	<Null>	<Null>	<Null>	<Nul
337	Polygon Z	102	BU28_102	Pacca	5	Commercial, RESIDENTIAL	Mixed Use	<Null>	<Null>	UTPOL BARUA	<Null>	<Nul
351	Polygon Z	140	BU28_140	Pacca	2	Residential, COMMERCIAL	Mixed Use	VICTOR PLAZA	2001	UTPOL BARUA	<Null>	<Nul
373	Polygon Z	31	BU28_31	Katcha	1	ABANDONED	Mixed Use	<Null>	2008	<Null>	<Null>	<Nul
461	Polygon Z	134	BU28_134	Semi Pacca	1	GARAGE	Mixed Use	<Null>	1999	RONOS	<Null>	<Nul

Figure-3.6: Attribute Table of Structure Database of Raipura Upazila

The **Figure-3.7** shows partial view of attribute table of Road Centerline of Raipura Upazila.

Table

Road

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 Dulalpur 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 Raipura Upazila

The **Figure-3.8** shows partial view of attribute table of Mauza Map of Raipura Upazila.

Table

PN_003_002

OBJECTID *	Shape *	Division	District	Upazila	Union	Mouza	JL_No	Sheet_No	Mauza_JL_S	Plot_No	Plot_Type	Scale	MZ_Version	Revenue_No	SV_Period
1	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	401	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
2	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	402	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
3	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	403	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
4	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	404	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
5	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	405	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
6	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	406	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
7	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	407	Road	16 inch= 1 mile	RS	<Null>	1970-1981
8	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	408	Plot	16 inch= 1 mile	RS	<Null>	1970-1981
9	Point	Chittagong	Cox's Bazar	Ramu	<Null>	Gorjonia	003	002	Gorjonia_003_002	409	Plot	16 inch= 1 mile	RS	<Null>	1970-1981

1 (0 out of 289 Selected)

PN_003_002

Figure-3.8: Attribute Table of Mauza Map of Raipura Upazila

The **Figure-3.9** shows partial view of Scanned Mauza Map Files of Raipura Upazila.

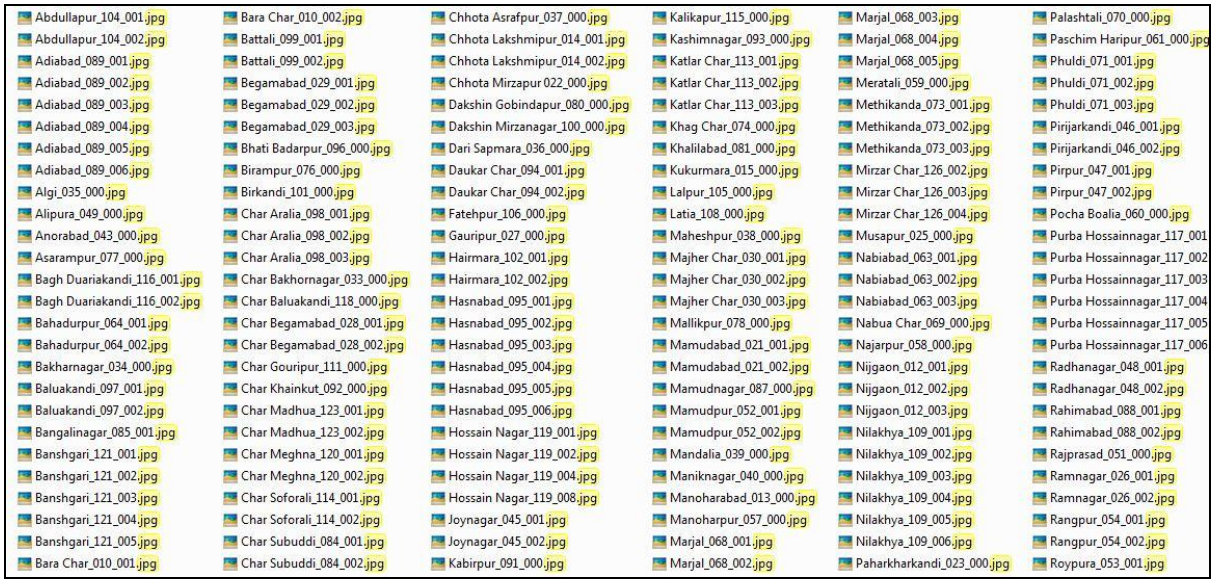


Figure-3.9: Catalog View of Scanned Mauza Map Files of Raipura Upazila

The **Figure-3.10** shows partial view of Geodatabase of Digitized Mauza Maps Files of Raipura Upazila.

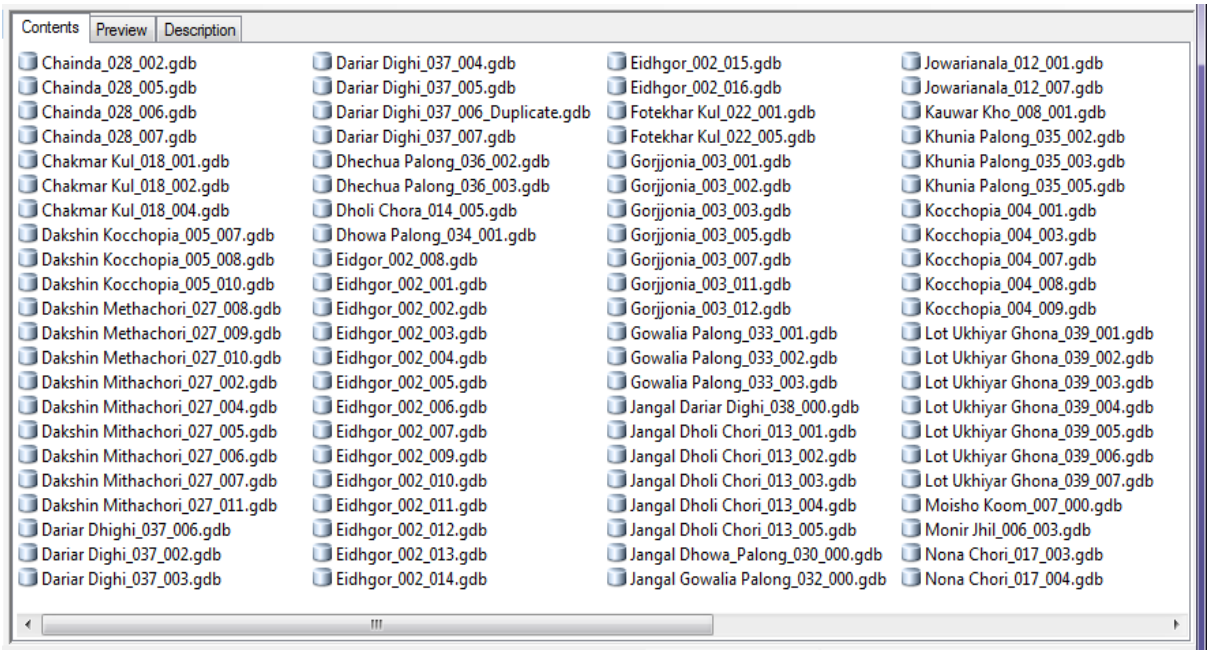


Figure-3.10: Catalog View of Geodatabases of Digitized Mauza Maps of Raipura Upazila

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 Raipura 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 Raipura by UDD and Consulting Firm

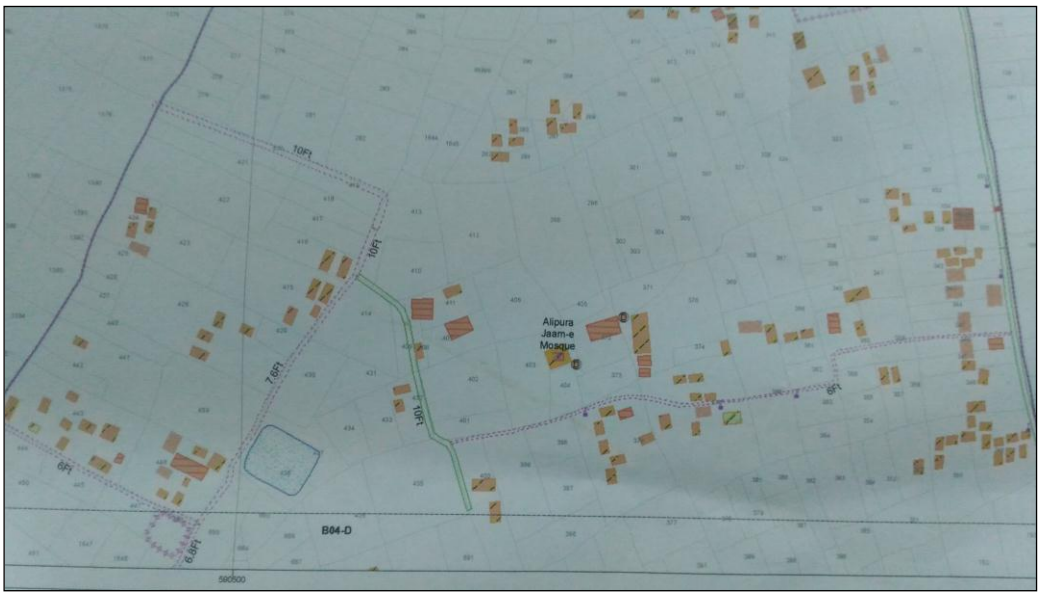


Plate-10: Physical Feature Map for Field Checking in Raipura

Chapter-04

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.

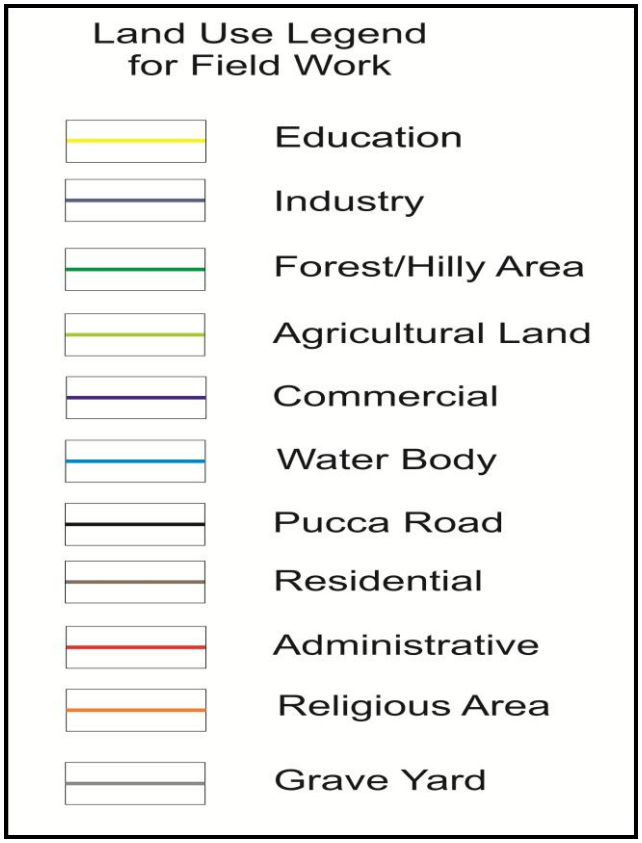


Figure 4.1: Color used by Color pencil for Land Use Demarcation

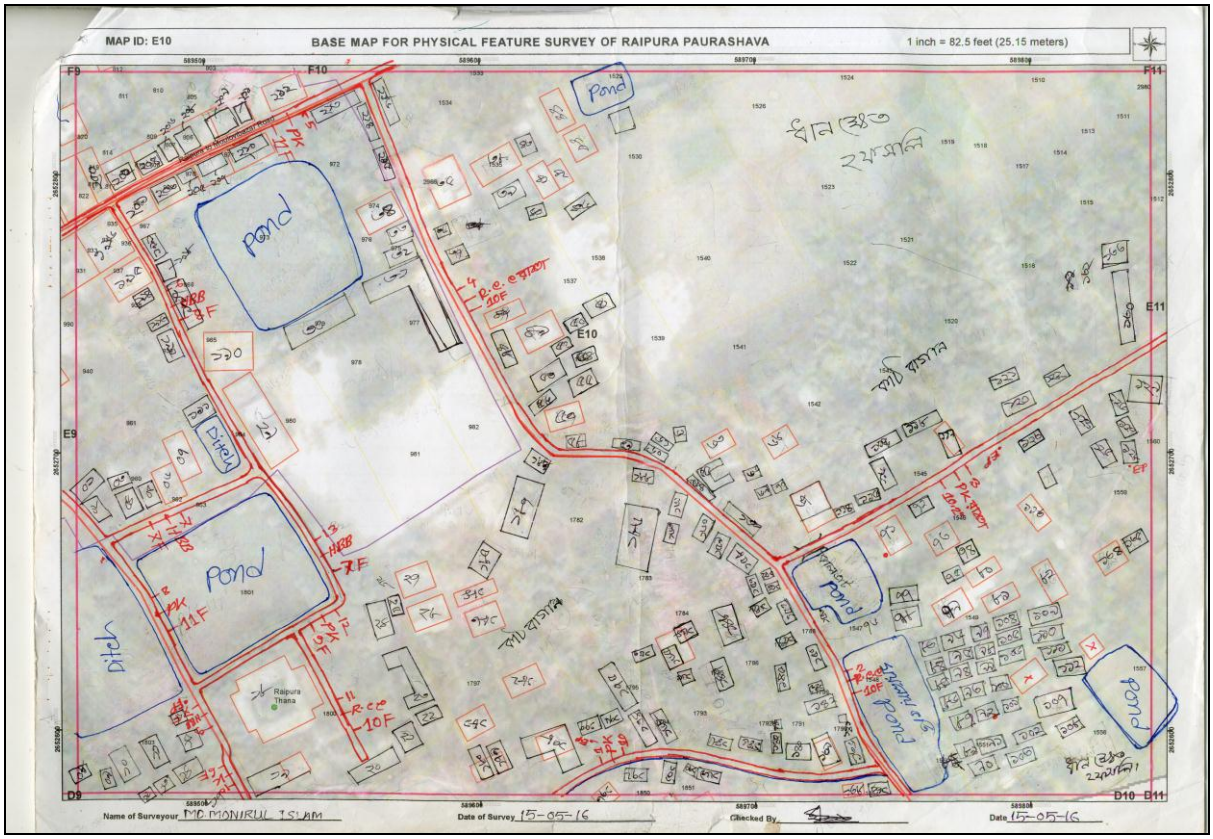


Figure 4.2: Landuse Base Map used in Raipura Upazila

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.

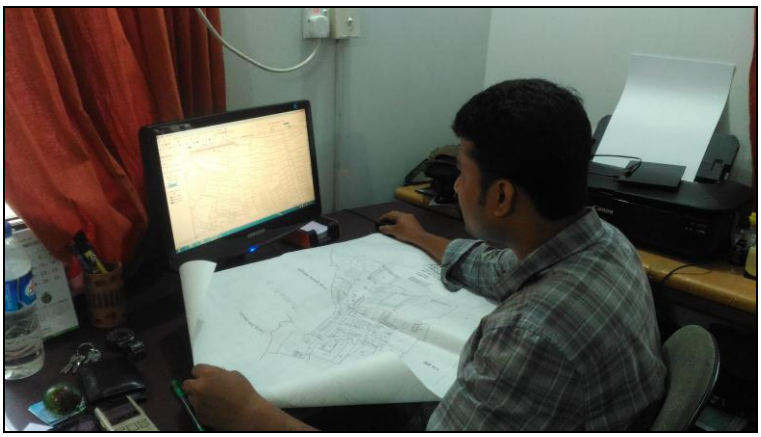
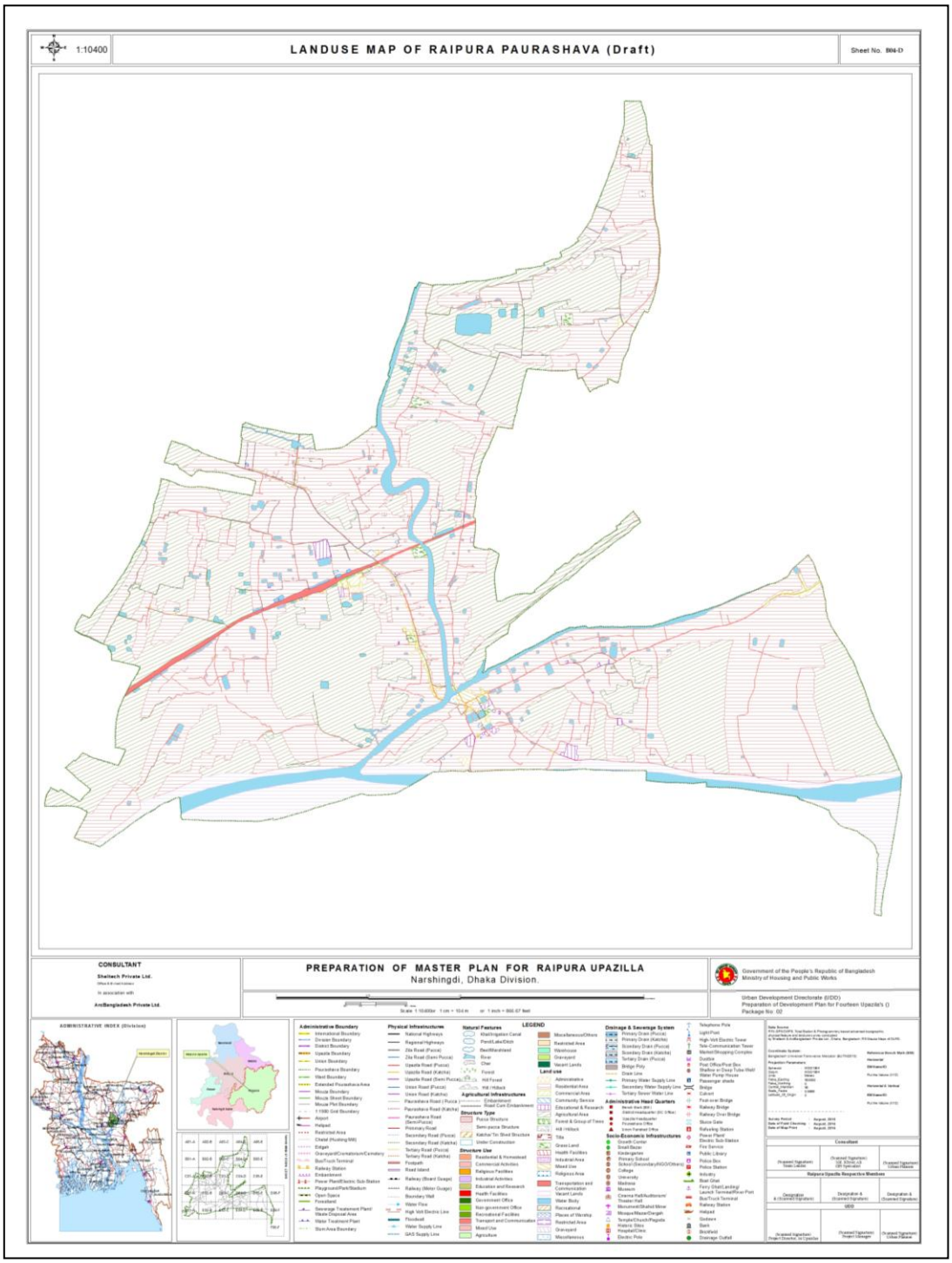


Plate-10: Updating works using Surveyed Map

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 Raipura town area has been presented in Map-4.1.



Map-4.1: Land Use in Raipura 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.
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.

Sl. No.	Land uses	Illustrated
9.	**Educational and Research Zone**	Kindergarten and Nursery, PrimarySchool, 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 Training Institute, Teachers Training College, Computer Training Institute, Dakhil Madrasa, Alim Madrasa, Fazil Madrasa, Kamil Madrasa, HafeziaMadrasa, 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 / Diary Farm, Agricultural Research Area.
11.	**Water body**	Equal or more than 0.25 acre and justification by the consultant and wel 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.

Sl. No.	Land uses	Illustrated
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/ Hillock**	Designated Hilly Area with Tilla.
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

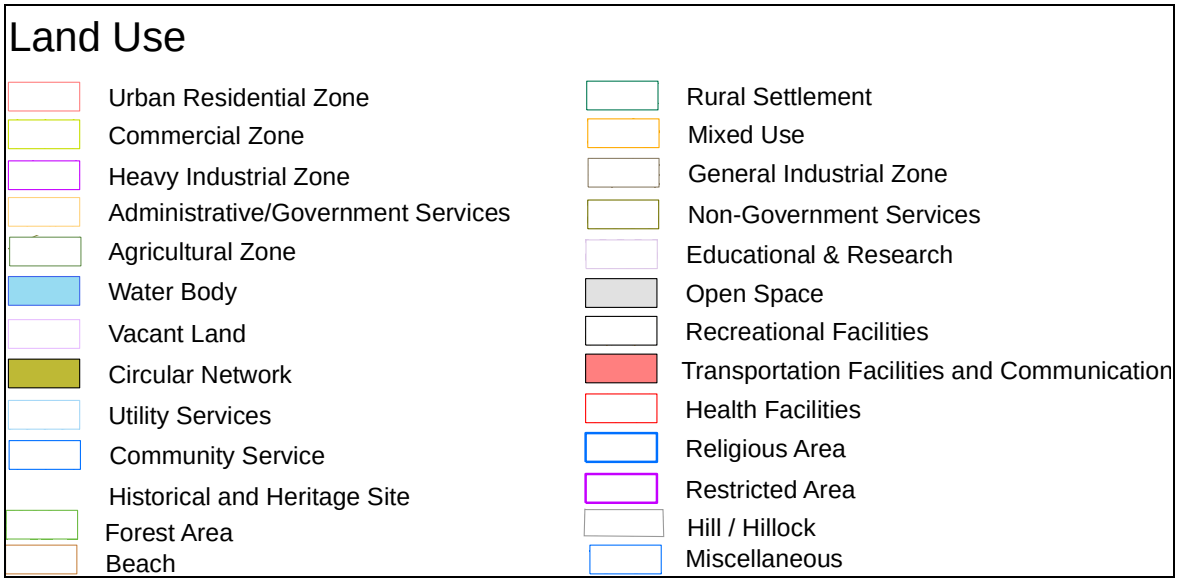


Figure-4.3: Legend for Existing Generalized Landuse

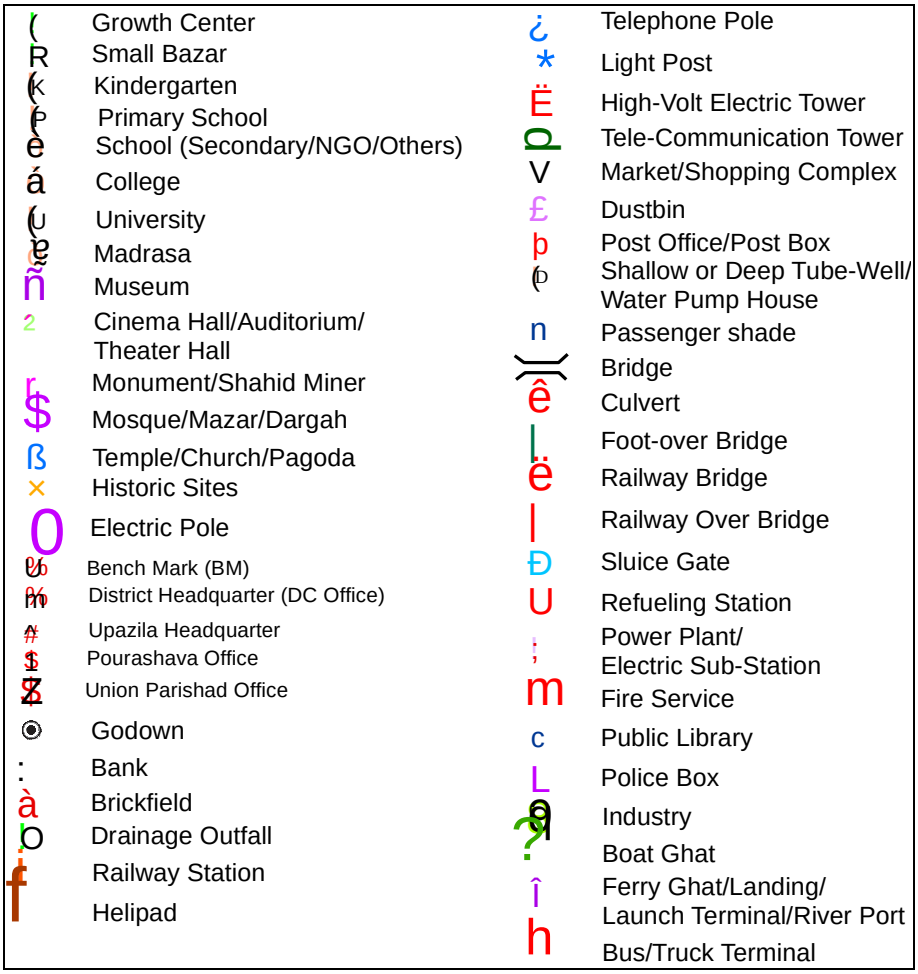


Figure-4.4: Legend for Existing Important Point Feature

Table- 4.3: Generalize Land Use Information of the Project Area (The table below is for Raipura Paurashava)

Sl	LANDUSE	Area (Acre)
1	Administrative	6.017
2	Agricultural Zone	1416.537
3	Commercial Zone	20.644
4	Educational and Research Zone	13.803
5	General Industrial Zone	0.093
6	Health Services/Facilities	0.138
7	Miscellaneous	3.646
8	Mixed Use Zone	10.932
9	Non-Government Services	0.076
10	Open Space	8.717
11	Religious Area/Facilities	1.603
12	Transport Facilities and Communication	73.587
13	Urban Residential Zone	1993.560
14	Vacant Land	216.723
15	Water Body	234.534

Chapter-05
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	Bachelor of Urban & Regional Planning (BURP)	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

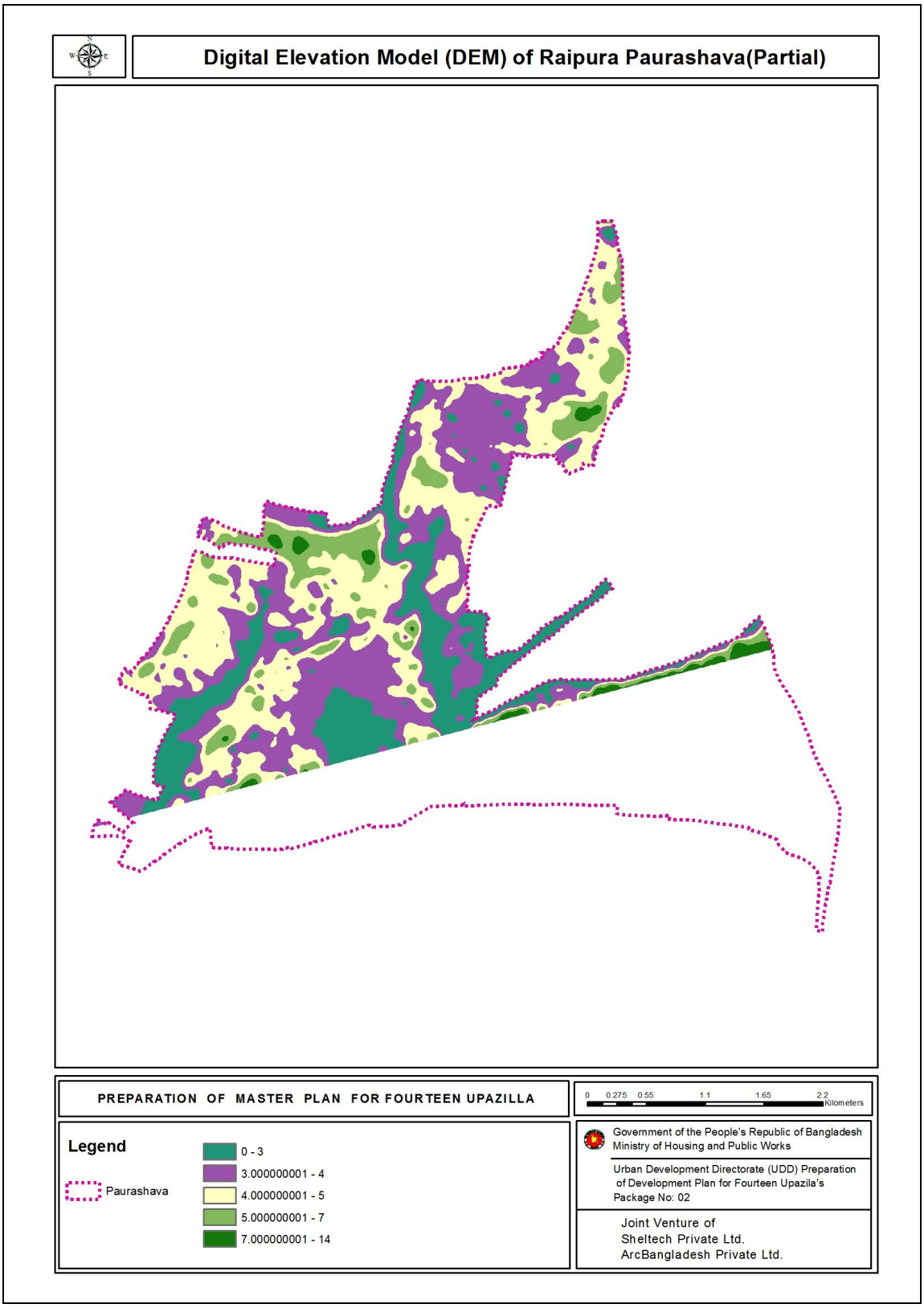
Using the photogrammetric data of DTM Points and the Break-lines Triangulated Irregular Network (TIN) and the Digital Elevation Model (DEM) has been generated. From these derived data the contour lines have been generated with 0.3 meter interval using ArcGIS software. **Map-5.2** shows the DEM of Raipura Upazila and the **Map-5.1** shows the Contour Lines partially at Chakmarkul, Fatekharkul and Rajarkul Union of Raipura Upazila.

5.2.2 General Topography of Raipura Upazila

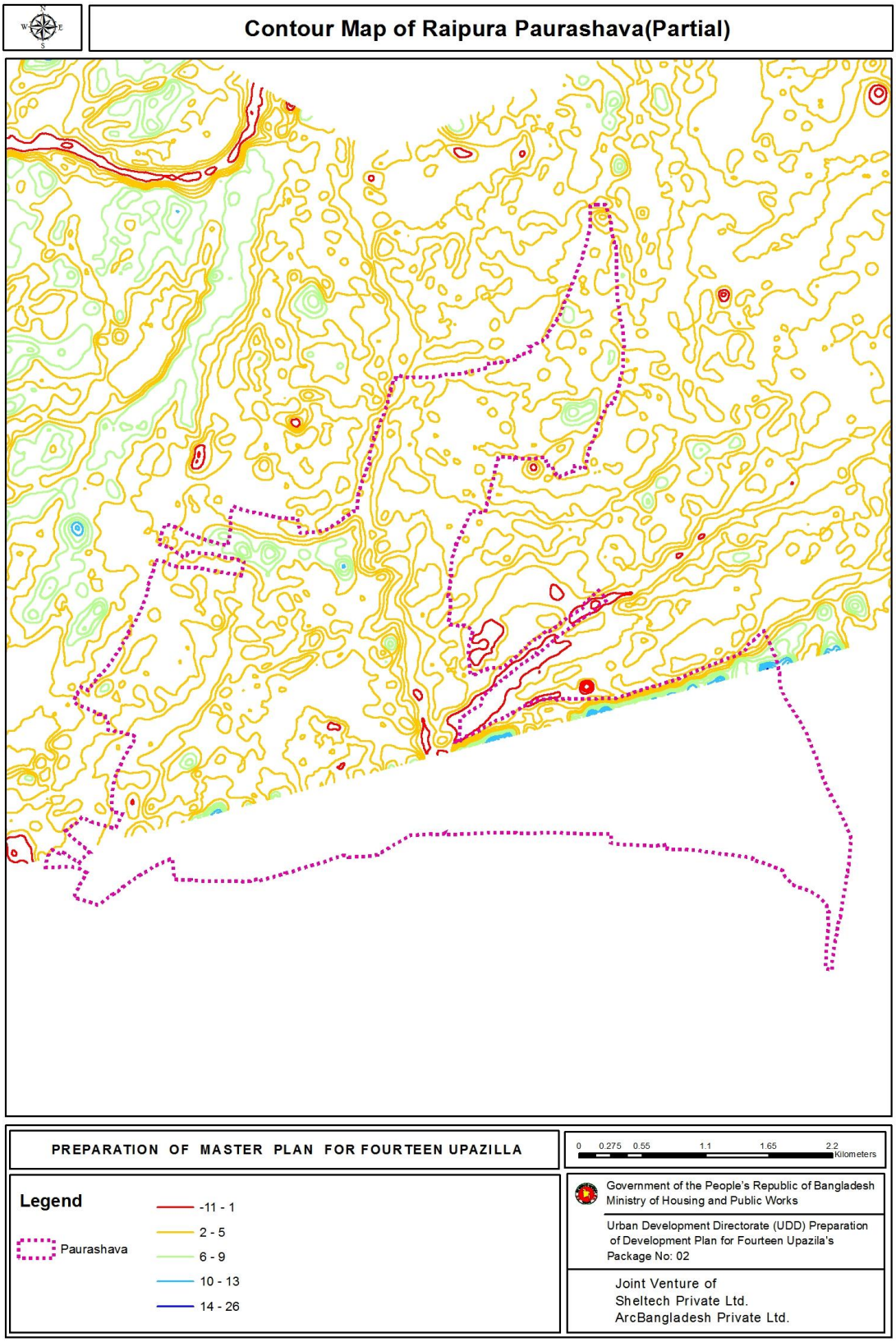
Almost the whole of the Narsingdi with exception of Madhupur Jungle, is level and interested with a number of small rivers and channels. Raipura is no exception. The general topography of the study area is ranges from 3 to 80 meter MSL. The hilly and forest land area mainly high comparatively than the other part of the Upazila.

Table 5.2: General Height Information

Total Project Area	Maximum Height (Meter)	Average Height (Meter)	Minimum Height (Meter)
319.155 sq.km	16.012	8.271	0.531



Map-5.1: Digital Elevation Model of Raipura Upazila



Map-5.2: Contour map of Raipura Upazila (Part)

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 Raipura, two major highways pass through the study area neighboring area like Kishorganj, Bhairab, Narayanganj 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 Raipura

Name of the road	Height of crest level from MSL, in meter		
	Minimum	Maximum	Average
Dhaka to Sylhet Highway	2.012	11.034	6.551
Baroicha to Raipura Road	1.210	11.895	6.458
Sapmara Nilkuthir Road	1.325	8.213	5.455

Source: Topographic survey, 2016

Chapter-06
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**.

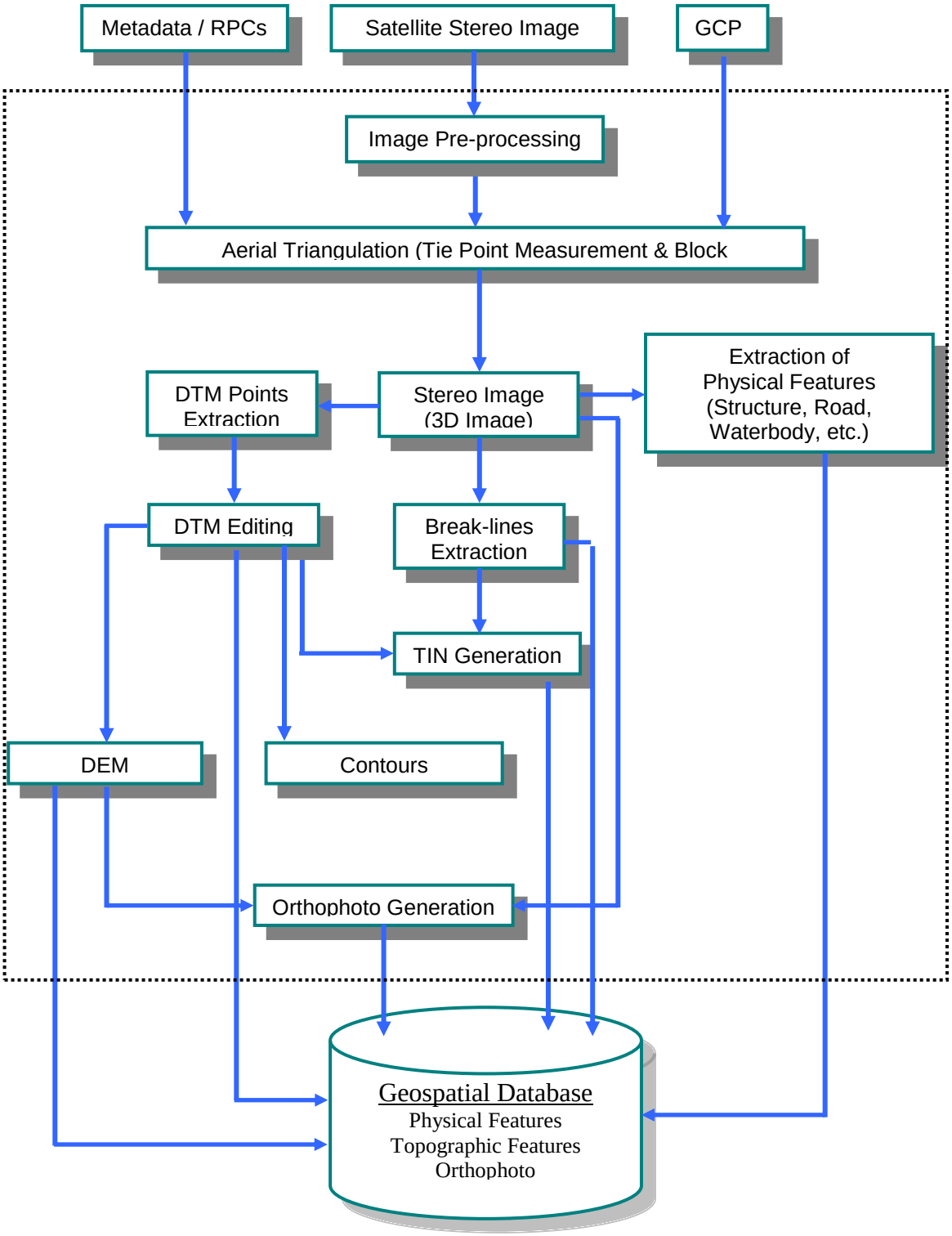


Figure-6.1: Workflow of Stereo Satellite Image Processing and Data Extraction

6.1.1 Image Collection

The satellite image was ordered to The Decode Ltd. the authorized reseller/partner of Digital Globe Inc and Deimos Imaging. The Consultant has purchased 0.5 meter stereo image for Raipura's town area and 1.0 meter stereo image for Raipura's rural area as per ToR. The specifications of the purchased satellite image are as below:

For **Town Area** of Raipura Upazila:

Image Sensor	: World View-2
Type	: Ortho ready stereo (3D)
Resolution	: 0.5m Panchromatic, 2.0 meter Multispectral
Source	: New Acquisition, 10th December 2015
Total Area	: 100 Sq. km.
Bit Rate	: 16 Bit
Company	: Airbus Defence and Space.

For **Rural Area** of RaipuraUpazila:

Image Sensor	: Deimos-2
Type	: Basic stereo (3D)
Resolution	: 1.0m Panchromatic, 4.0 meter Multispectral
Source	: New Acquisition, 16th November 2015 & 23rd October 2015
Total Area	: 219.155 Sq. km.
Bit Rate	: 16 Bit
Company	: Deimos Imaging, Spain

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

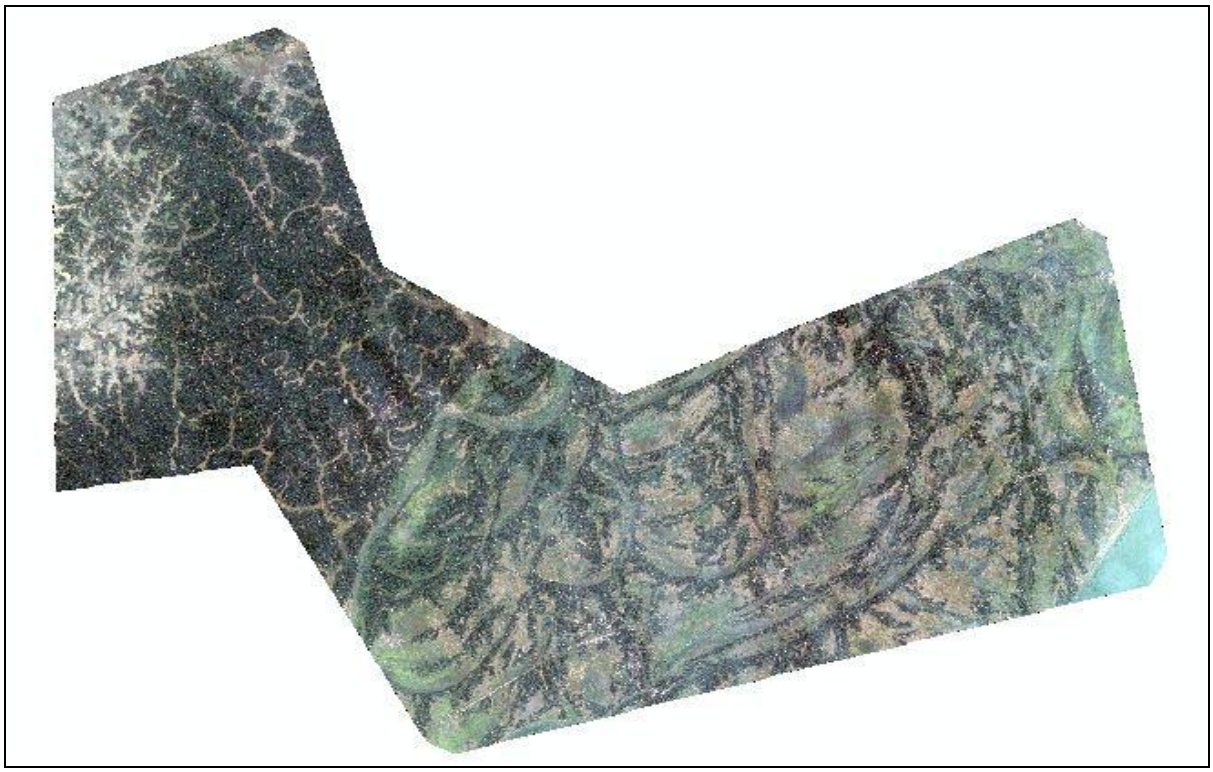


Figure-6.3: Merged satellite image with color and contrast balance

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

6.1.1.2 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 matric 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.

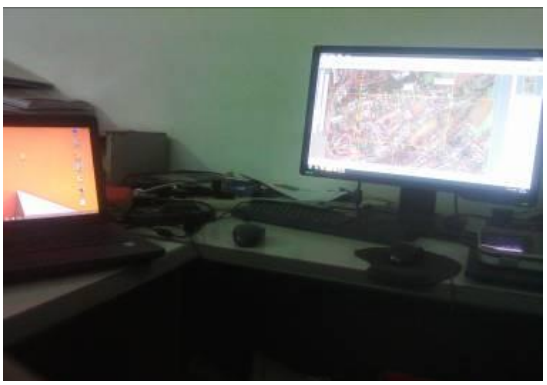


Plate-11: Digital Photogrammetric Workstation (DPW)

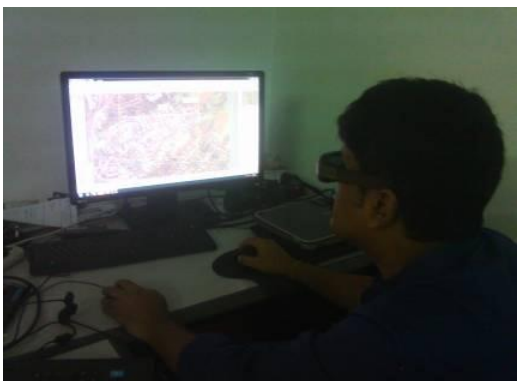


Plate-12: Photogrammetrist Extracting Features in DPW

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 Raipura Upazila at a glance.

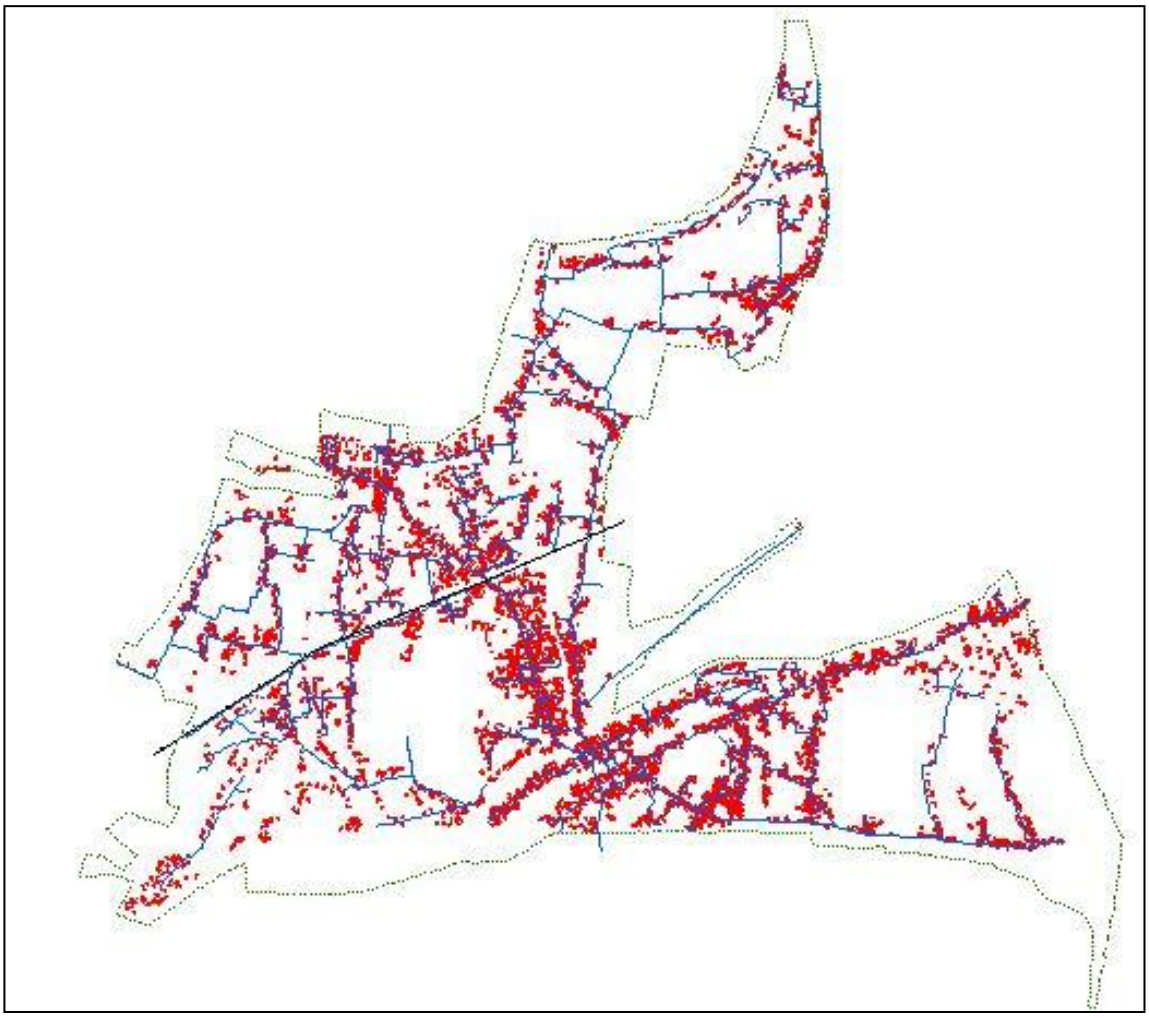


Figure-6.7: Extracted Features of Entire Raipura Upazila by Photogrammetry

Figure 6.8: Enlarged Partial View of Extracted Features of Raipura

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 DTM Points in 20 meter interval of Raipura Upazila. **Figure 6.10** shows the Contour Lines partially at Chakmarkul, Fatekharkul and Rajarkul Union of Raipura 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.

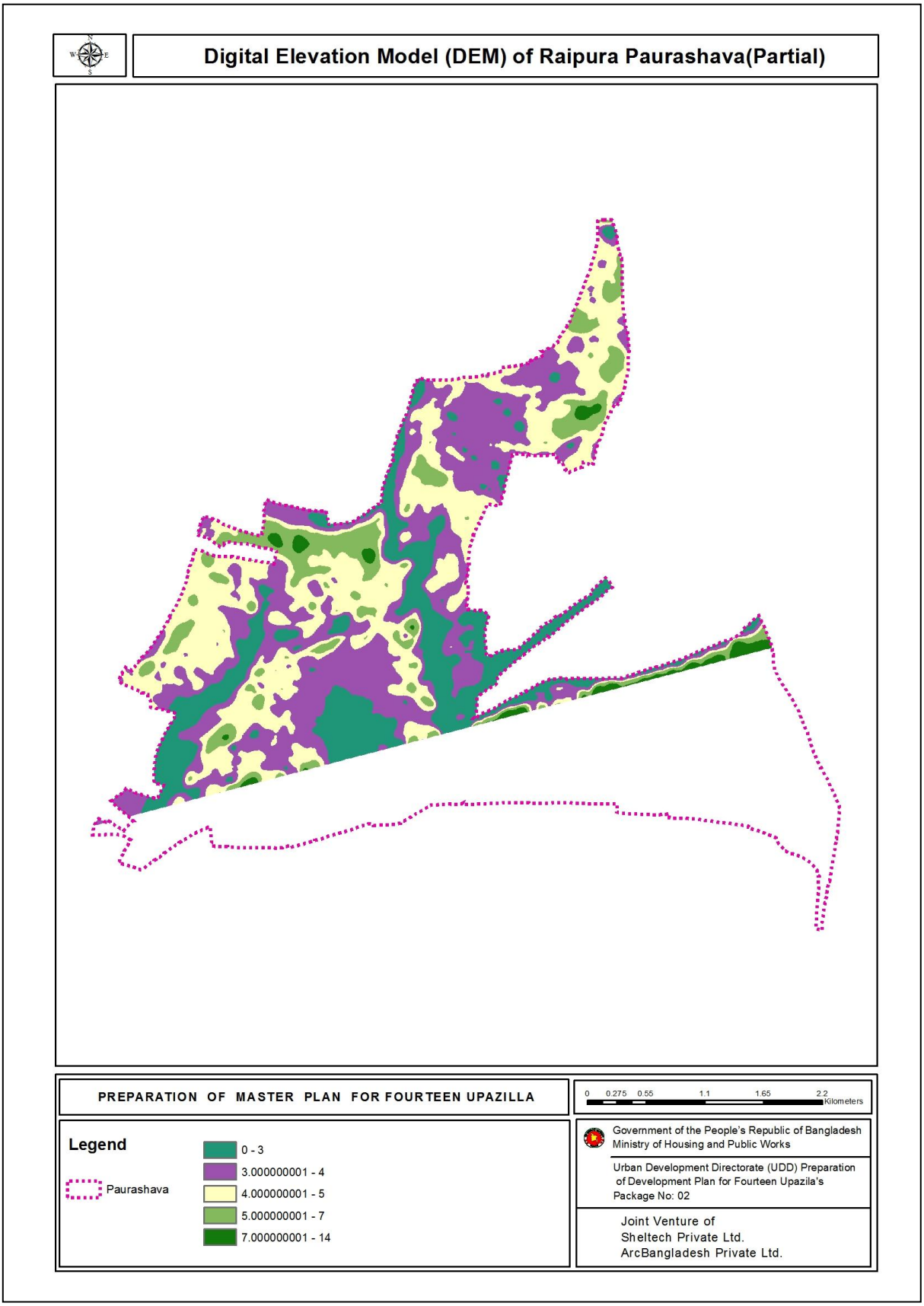


Figure-6.9: Digital Elevation Map (DEM) of Raipura Paurashava (Partial)

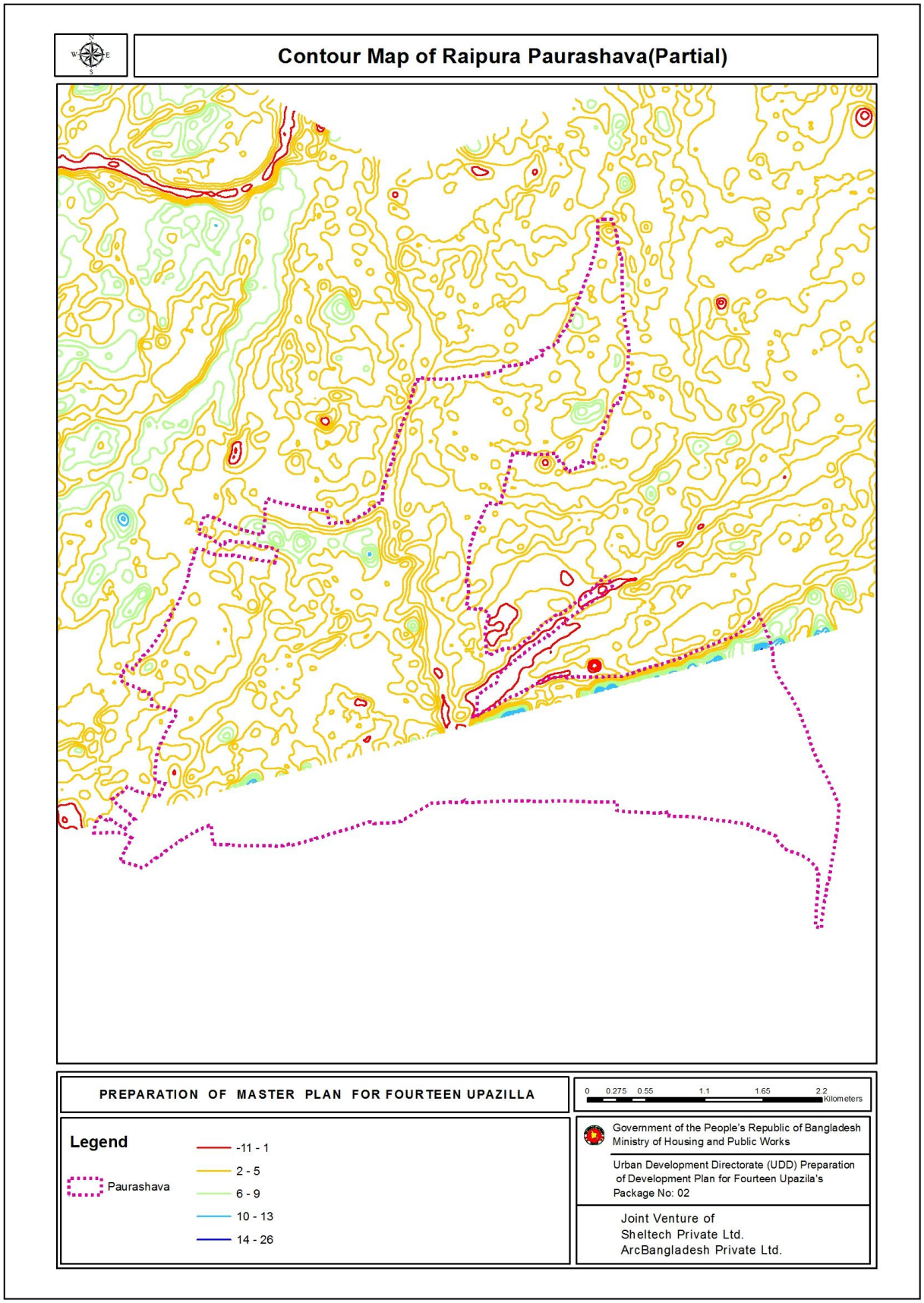


Figure-6.10: Contour Lines of Raipura Paurashava (Partial)

6.1.6 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-6.11 shows a part ortho-rectified satellite image of Raipura Upazila.

Figure 6.11: Ortho-Rectified Image of Raipura Upazila (Partial)

Chapter-07
Conclusion

The land use features of Raipura 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 Raipura 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 Raipura Upazila have been acquired mainly through photogrammtric 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.

ANNEXURES

ANNEXURE-I
RS Mouza List: Raipura Upazila

ANNEXURE-I

RS Mouza List: Raipura Upazila

District	Upazila	Mouza Name	JL No.	Sheet No.
Narsingdi	Raipura	Amlaba	1	1
		Amlaba	1	2
		Purba Amlaba	2	0
		Belaba	3	0
		Char Belaba	4	1
		Char Belaba	4	2
		Char Belaba	4	3
		Char Lakshimpura	5	0
		Purbachar Lakshimpura	6	0
		Joarlakshimpur	7	0
		Uttarkalikaproshad	8	1
		Uttarkalikaproshad	8	2
		Joargobindapur	9	1
		Joargobindapur	9	2
		Joargobindapur	9	3
		Joargobindapur	9	4
		Bara Char	10	1
		Bara Char	10	2
		Sahar Char	11	0
		Nijgaon	12	1
		Nijgaon	12	2
		Nijgaon	12	3
		Manoharabad	13	0
		Chhota Lakshmipur	14	1
		Chhota Lakshmipur	14	2
		Kukurmara	15	O
		Narayanpur	16	1
		Narayanpur	16	2
		Jalalabad	17	0
		Dkshinkslikaraprosad	18	0
		Saralabad	19	1
		Saralabad	19	2
		Saralabad	19	3
		Ibrahimpur	20	1
		Ibrahimpur	20	2
		Mamudabad	21	1
		Mamudabad	21	2
		ChhotaMirjapur	22	0
		Paharkharkandi	23	0
		Purbaharipur	24	0

		Musapur	25	0
		Ramnagar	26	1
		Ramnagar	26	2
		Gauripur	27	0
		Char Begamabad	28	1
		Char Begamabad	28	2
		Begamabad	29	1
		Begamabad	29	2
		Begamabad	29	3
		Majher Char	30	1
		Majher Char	30	2
		Majher Char	30	3
		Majher Char	30	4
		Chandpurdiara	31	0
		Katuarchar	32	0
		Char Bakharnagar	33	0
		Bakharnagar	34	0
		Algi	35	0
		Dari Sapmara	36	0
		Chhota Asrafpur	37	0
		Maheshpur	38	0
		Mandalia	39	0
		Maniknagar	40	0
		Saindhadoba	41	1
		Saindhadoba	41	2
		Sapmara	42	0
		Anwarabad	43	0
		Sadhunagar	44	0
		Joynagar	45	1
		Joynagar	45	2
		Pirajkandi	46	1
		Pirajkandi	46	2
		Pirpur	47	1
		Pirpur	47	2
		Radhanagar	48	1
		Radhanagar	48	2
		Alipura	49	0
		Sreenidhi	50	1
		Sreenidhi	50	2
		Rajprasad	51	0
		Mamudpur	52	1
		Mamudpur	52	2
		Raipura	53	1
		Raipura	53	2

		Raipura	53	3
		Raipura	53	4
		Raipura	53	5
		Rangpur	54	1
		Rangpur	54	2
		Char Sadarland	55	1
		Char Sadarland	55	2
		Fakirer Char	56	1
		Fakirer Char	56	2
		Manoharpur	57	0
		Najirpur	58	0
		Maratali	59	0
		Pachha Boalia	60	0
		Paschim Haripur	61	0
		Chanderkandi	62	0
		Nabiabad	63	1
		Nabiabad	63	2
		Nabiabad	63	3
		Bahadurpur	64	1
		Bahadurpur	64	2
		Uttar Bakharnagar	65	1
		Uttar Bakharnagar	65	2
		Uttar Bakharnagar	65	3
		Purbaujilaba	66	1
		Purbaujilaba	66	2
		Ujilaba	67	1
		Ujilaba	67	2
		Ujilaba	67	3
		Ujilaba	67	4
		Ujilaba	67	5
		Marjal	68	1
		Marjal	68	2
		Marjal	68	3
		Marjal	68	4
		Marjal	68	5
		Marjal	68	6
		Nabuachar	69	0
		Palashtali	70	0
		Phuldi	71	1
		Phuldi	71	2
		Phuldi	71	3
		Tulatuli	72	1
		Tulatuli	72	2
		Methikanda	73	1

		Methikanda	73	2
		Methikanda	73	3
		Khag Char	74	0
		Seoratali	75	0
		Birampur	76	0
		Asarampur	77	0
		Mallikpur	78	0
		Sahapur	79	0
		Dakshin Gobindapur	80	0
		Khalilabad	81	0
		Hatubhanga	82	1
		Hatubhanga	82	2
		Bhaishbar	83	0
		Char Subuddi	84	1
		Char Subuddi	84	2
		Bangalinagar	85	1
		Bangalinagar	85	2
		Uttar Mirzanagar	86	1
		Uttar Mirzanagar	86	2
		Uttar Mirzanagar	86	3
		Mamudnagar	87	0
		Rahimabad	88	1
		Rahimabad	88	2
		Adiabad	89	1
		Adiabad	89	2
		Adiabad	89	3
		Adiabad	89	4
		Adiabad	89	5
		Adiabad	89	6
		Teli Para	90	0
		Kabirpur	91	0
		Char Khainkut (Noabad)	92	0
		Kashimnagar	93	0
		Daukarchar	94	1
		Daukarchar	94	2
		Hasnabad	95	1
		Hasnabad	95	2
		Hasnabad	95	3
		Hasnabad	95	4
		Hasnabad	95	5
		Hasnabad	95	6
		Bhati Badarpur	96	0
		Baluakandi	97	1
		Baluakandi	97	2

		Char Aralia	98	1
		Char Aralia	98	2
		Char Aralia	98	3
		Battali	99	1
		Battali	99	2
		Dakshin Mirzanagar	100	0
		Birkandi	101	0
		Hairmara	102	1
		Hairmara	102	2
		Saudmara	103	0
		Abdullapur	104	1
		Abdullapur	104	2
		Lalpur	105	0
		Fatehpur	106	0
		Sonatala	107	1
		Latia	108	0
		Nilakhya	109	1
		Nilakhya	109	2
		Nilakhya	109	3
		Nilakhya	109	4
		Nilakhya	109	5
		Nilakhya	109	6
		Baluchar	110	0
		Char Gauripur	111	0
		Sreenagar	112	1
		Sreenagar	112	2
		Sreenagar	112	3
		Sreenagar	112	4
		Sreenagar	112	5
		Sreenagar	112	6
		Sreenagar	112	7
		Sreenagar	112	8
		Katlar Char	113	1
		Katlar Char	113	2
		Katlar Char	113	3
		Char Safar Ali	114	1
		Char Safar Ali	114	2
		Kalikapur	115	0
		Bagh Duariakandi	116	1
		Bagh Duariakandi	116	2
		Purba Hossainnagar	117	1
		Purba Hossainnagar	117	2
		Purba Hossainnagar	117	3
		Purba Hossainnagar	117	4
		Purba Hossainnagar	117	5

		Purba Hossainnagar	117	6
		Char Baluakandi	118	0
		Hosennagar	119	1
		Hosennagar	119	2
		Hosennagar	119	3
		Hosennagar	119	4
		Hosennagar	119	5
		Hosennagar	119	6
		Hosennagar	119	7
		Hosennagar	119	8
		Char Meghna	120	1
		Char Meghna	120	2
		Banshgari	121	1
		Banshgari	121	2
		Banshgari	121	3
		Banshgari	121	4
		Banshgari	121	5
		Samibad	122	1
		Samibad	122	2
		Samibad	122	3
		Samibad	122	4
		Char Madhua	123	1
		Char Madhua	123	2
		Samibad Char	124	0
		Chaura Para	125	0
		Mirjar Char	126	1
		Mirjar Char	126	2
		Mirjar Char	126	3
		Mirjar Char	126	4

ANNEXURE- II
Technical Specifications of GIS Data

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 mauza 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 Mauza Map Scanning & Digitization

This section contains the scanning specifications and digitization of mauza maps.

A.1.0 Specifications for Mauza Map Scanning

The scanning specification of mauza 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 Mauza Maps

Directory Structure for systematically storing scanned image files of the Mauza maps may be as follows:

Directory Structure	**D:\GIS_Data\Project name & Package \ Division name\District name\Upazila name(Data Type)\Union name or Ward No** Where, - **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-2_14Upazila** may be the abbreviated name of the project "Preparation of the Development Plan for Fourteen Upazila – Package-02". - **\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 Mauza Maps**, **Georeferenced Raster Mauza 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. Example D:\GIS_Data_UDD\Pkg-2_14Upazila\Dhaka.div\Narsingdi.dis\Raipura.upz****Scanned_Mauza**\.uni\Mirzapur_Union** is the **directory** to store the **scanned Mauza maps of Mirzapur_Union of Raipura_Upazila**.

A.1.2 File Naming Convention for Scanned Mauza Maps

A systematic naming convention must be followed to name the files of the scanned images of the mauza maps.

File Name: **Mauza Name+_+JL no+_+Sheet No.jpg**

Where,

- **Mauza Name** is the name of the Mauza. 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 Mauza. It must be as 3 digit number
- **Sheet No** is the particular sheet number of the Mauza. It must be as 3 digit number

Example:

Mauza Name	JL No	Sheet No	File Name
Alipura	3	5	**Alipura_049_000.jpg**

A.2.0 Specifications for Mauza Maps Digitization

The specifications for digitization of mauza 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	- 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 Mauza Map Digitization

Digitization of Mauza map must be done in five vector layers as the format of Shapefile, Coverage or Geodatabase Featureclass. The Geodatabase is preferable.

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Features of the Mauza Map	**Type of Layer**	**Name of Layer (as Shapefile/Covergae/Featureclass)**
All line features, such as plot boundary, road, waterbody, building, etc.	Polyline	**ML_XXX_XXX** Where, -**ML** represents **Mauza** map's **L**ine features. -XXX represents the JL number of the Mauza map (3 digit). -XXX represents the Sheet number of the Mauza map (3 digit).
Dag number (Plot no)	Point	**PN_XXX_XXX** Where, -**PN** represents **P**lot **N**umber of the Mauza map. -**XXX** represents the **JL number** of the Mauza map (**3 digit**). -**XXX** represents the **Sheet number** of the Mauza map (**3 digit**).
Plot area	Polygon	**MP_XXX_XXX** Where, -**MP** represents **Mauza** map as **P**olygon (area) features. -**XXX** represents the **JL number** of the Mauza map (**3 digit**). -**XXX** represents the **Sheet number** of the Mauza map (**3 digit**).
Point features (except plot no)	Point	**PF_XXX_XXX** Where, -**PF** represents **P**oint **F**eatures of the Mauza map except plot numbers. -**XXX** represents the **JL number** of the Mauza map (**3 digit**). -**XXX** represents the **Sheet number** of the Mauza map (**3 digit**).
Other area features	Polygon	**AF_XXX_XXX** Where, -**AF** represents other **A**rea **F**eatures of the Mauza map -**XXX** represents the **JL number** of the Mauza map (**3 digit**). -**XXX** represents the **Sheet number** of the Mauza map (**3 digit**).

A.2.2 Attribute Structure of the Mauza 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 Mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain *dag* number (plot number)
Plot_Type	String	20	To contain following plot types - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River"
Scale	String	20	To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mauza as District code+Thana code+Union/Ward code+Mauza 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) Laye rname: **ML_XXX_XXX**
Feature Type: **Polyline**

This shape file/Coverage will contain all line features of the mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Scale	String	20	To contain scale of the Mauza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map
SV_Period	String	20	To contain survey period of the Mauza 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 Mauza boundary, Sheet boundary and Plot boundary respectively.
Line_Desc	String	30	To contain the type of plot boundaries and other line features such as - “Mauza 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) Layername: **MP_XXX_XXX**
Feature Type: **Polygon**

This Layer will contain all the plots of the Mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain *dag* number (plot number)
Plot_Type	String	20	To contain following plot types - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River"
Scale	String	20	To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mauza as District code+Thana code+Union/Ward code+Mauza 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 mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Scale	String	20	To contain scale of the Mauza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza 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 mauza map such as “Sheet No. 2”, “Shaktola 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 mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Scale	String	20	To contain scale of the Mauza sheet; e.g. “16 inch = 1 mile” or “32 inch = 1 mile”, etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza 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 Mauza Map Digitization

The following feature codes (Unique ID) must be assigned in appropriate fields for digitization of different features of the mauza 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
Mauza 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 Mauza/Sheet		61
0tier Info		62
Demarcation Pillar		71
Settlement Pillar		72

Feature Type/Item	Layer Name	Feature Code (ID)
Stone		73
Station		74
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	Chittagong	20	Chittagong	15	Rangunia	70
4	Chittagong	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 Narsingdi is 68.
- **Upazila Geocode** is the 2-digit BBS Geocode of the upazila; eg. Geocode of Raipura Upazila is 64.

Example:

Layer Description	Layer name
Administrative Boundary as line features	ADBL306864
Plots of Merged Mauza maps as polygon features	MMP306864
Plots of Merged Mauza maps as polyline features	MML306864
Plot Numbers of Merged Mauza 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 mauza 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” “Mauza 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 Mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain *dag* number (plot number)
Plot_Type	String	20	To contain following plot types - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River"
Scale	String	20	To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mauza as District code+Thana code+Union/Ward code+Mauza 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 - "Administrative" - "Agriculture" - "Commercial" - "Circulation Network" - "Institutional" - "Flood Flow Zone" - "Industrial" - "Mixed Use" - "Recreational" - "Restricted / Special Use"

Field **Name**	Field **Type**	**Width** of the field	**Purpose** of the field
			- "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.

3) Layer name: **MML306864**
Feature Type: **Polyline**

This Layer will contain line features of edge-matched and merged Mauza 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 Mauza polyline ID.
Type	String	20	"Plot Boundary" "Sheet Boundary" "Mauza 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 Mauza 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.
Mauza	String	100	To contain name of the Mauza name
JL_No	String	6	To contain JL Number of the Mauza
Sheet_No	String	6	To contain sheet no the Mauza
Mauza_JL_S	String	100	To contain Mauza name+single space+JLno(3-digits)+single space+sheet no(3-digits)
Plot_No	Long Integer	10	To contain *dag* number (plot number)
Plot_Type	String	20	To contain following plot types - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River"
Scale	String	20	To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc.
MZ_Version	String	20	To contain survey version of the Mauza map; e.g. CS, RS, BS, etc.
Revenue_No	String	100	To contain revenue number of the Mauza map.
SV_Period	String	20	To contain survey period of the Mauza map; e.g 1973-85
M_Geocode	String	9	To contain 9-digit BBS Geocode of Mauza as District code+Thana code+Union/Ward code+Mauza 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 (1st) of the structure. 2. The attributes should be according to the given “Existing_Landuse” categories.
Str_Use2t	String	100	To contain the use (2nd) of the structure.
Str_Use3t	String	100	To contain the use (3rd) 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 Mauza (Mauza_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 (Mauza_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 (Mauza_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" - *- Other if necessary*
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	- "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"

Field **Name**	Field **Type**	**Width** of the field	**Purpose** of the field
			- "Government Primary School" - "Registered Primary School" - "Non-Registered Primary School" - "Sluice gate" - "Temple" - "Theater Hall" - "Truck Terminal" - "Under Pass" - "University" - "Private University" - "Well" - "Culvert" - *Other if necessary*
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.

31) 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 Mauzas 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 Mauza
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 Upazil;a
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 Mauza 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

Structure Attribute Collection Form

ANNEXURE-III

Structure Attribute Collection Form

GRID NO……. **Structure Attribute Collection Form**

ID	Type	Floor	Structure Use	Structure Name	Owner Name	Photo ID	Construction Year	Holding No	Ward No	Plot No Mauza Name	Road Name	Locality

PHYSICAL FEATURE SURVEY

LAND USE SURVEY

TOPOGRAPHIC SURVEY

PHOTOGRAMMETRIC WORKS

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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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Physical feature Survey, Land Use Survey Topographic Survey and Photogrammetry Works of Raipura Upazila, Narsingdi

August, 2016
Joint Venture of
Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

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-02
(Ishwarganj Upazila, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Formal-Informal Economic Survey of Raipura Upazila, Narsingdi

August, 2016

Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ Formal-Informal Economic Survey/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Formal-Informal Economic Survey Report (Final) of Raipura Upazila, Narsingdi.

Dear Sir,
We are pleased to submit herewith the Formal-Informal Economic Survey Report (Final) of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely

(Dr. Nurul Islam Nazem)
Team Leader, Package -2

(Dr. Gulam Murtaza)
Urban Economist

Encl: As stated.

Copy to:
1. Team Leader, Package-2.
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
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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. Raipura Upazila the biggest Upazila of Narsingdi zila. In addition, this 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. However, there are some export oriented poultry and fish feed farms are located here. Moreover, a number small scale and large scale industries are here. And more are waiting for government's help. On the other hand, here it has been found that the upazila needs skilled labor but females are 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

ABL	Arc Bangladesh 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
SCPL	Sheltech Consultants Pvt. Ltd.
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

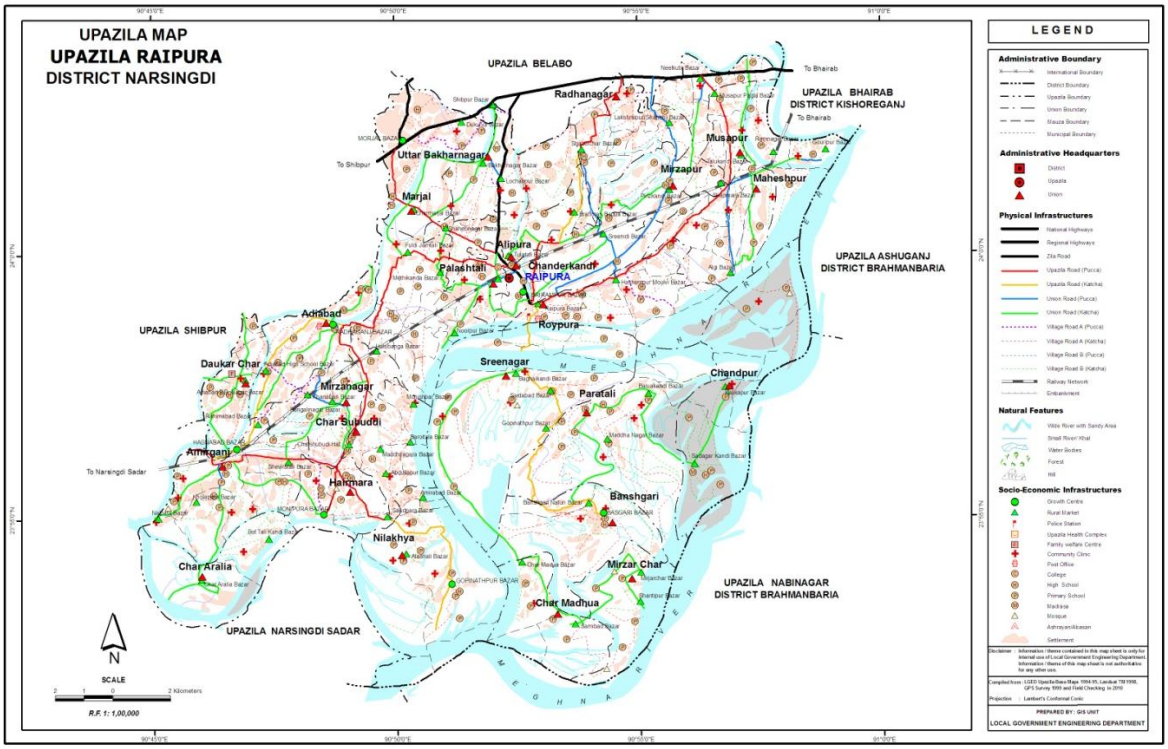
In this context the components of formal economies are, the economic units which have government approval, as they are registered, possess Taxpayer Identification Number (TIN) and give tax to the government. Industries, bank, insurance, NGO, CBOs etc. are the example of formal economic units. On the 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

Raipura, the biggest Upazila of Narsingdi zila in respect of area. It came into existence in the middle of the nineteenth century and upgraded to Upazila in 1984. Raipura Upazila (Narsingdi district) is located in between 23°52' and 24°04' North Latitudes and in between 90°44' and 90°59' East Longitudes. It has an area of 312.76 sq. km. It has 9 Wards, 24

Unions, 107 Mouzas and Mahallas, and 239 villages (BBS, 2011). Bounded on the north by Belabo Upazilas on the east by Nabinagar and Brahmanbaria on the south by Narsingdi sadar Upazila, Nabinagar and Bancharampur Upazilas and on the west by Shibpur and Narsingdi sadar Upazila (please see Figure 1.1). (Banglapedia, 2016).

Map 1.1: Upazila Map, Raipura, Narsingdi (Source: LGED, 2016)



Raipura is the second largest Upazila of Bangladesh. There are 3 important *bazar* in this area named monipura bazar, raypura bazar and Srirampur bazar. Their bid price is BDT 49,00,000; 8,00,000 and 11,00,000 accordingly which are comparatively high within the Upazila. There are also some famous river flows beside the Upazila named The Meghna, The old Brahmaputra, Arial Kha and Kakon. Most of the people of *Char* area of this Upazila lived their life by using the rivers. The Upazila is famous for high percentage of fish cultivated area. Fishes of this Upazila are exported to the various cities like bhairab, kishorganj, Narsingdi, Dhaka etc. *Panthshala* is one of the famous tourist spot of this Upazila.

Raipura upazila of Narsingdi 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 Raipurawith 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, 62 hat/bazars, 565 poultry farms, 144 dairy farms and 5 nurseries. It also has 25 government offices, 13 nationalized bank branches and 37 NGOs. The upazila's famous crop is paddy. It possesses 53,766 total farm holding.

According to Census Report 2011, total 1 jute mill, 250 loom mills and 485 handloom factories have been set up at this upazila. Among 250 loom mills, 143 are operational and rest

of 107 mills are non-operational. Total 83 textile mill establishments also found because of textile mill industrial development at Raipura. Moreover, in this upazila 1150 small scale weaving/handloom industries and 415 handy cottage factories are located. Total 415 bamboo and cane industry has been found here. In addition, 127 wooden furniture based industries, 70 saw mills, 15 flour mills, 9 rice mills and 8 oil mills found here. 8 bakeries, 1 printing presses and 473 tailoring shops are also in here.

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,

$n = Sample\ size$,

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

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

$q = 1 - p$ and

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

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

JV of SCPL-ABL 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 21 members were selected for carrying out the survey work at Raipura 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 JV of SCPL-ABL, the survey team has been sent to the field.

2.3.4 Survey Team Mobilization

The survey started in 12.08.2015 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 Raipura 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 revers 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 Raipura 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 form 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 Raipura 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 Raipura

The above mentioned vision, plan, policies and strategies will be prepared considered for preparation of development plan Raipura 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 Raipura are: 1) Brick Field 2) Ice cream factory 3) Rice and Flour mill 4) Workshop 5) Yarn and Fabrics industry 6) Building materials 7) Cottage 8) Oil mill and 9) Printing Press 10) Jute products. The locations of interviewed economic unit's personnel are given below:

Table 4.1 Type of Industries with Location

	Brick Field	Ice cream factory	Rice and Flour mill	Workshop	Yarn and Fabrics industry	Building materials	Cottage	Oil mill	Printing Press	Food processing	Jute Products	Total
Alipura	1	0	0	0	0	0	0	0	0	0	0	1
Amirgonj	0	0	0	0	4	0	1	0	0	0	0	5
Mirzanagar	0	0	0	0	0	0	0	0	0	1	0	1
Mohashpur	0	0	2	0	0	0	0	0	0	0	0	2
Raipura	0	1	1	2	0	1	2	2	1	3	0	13
Sreerampur	0	0	0	2	0	1	1	1	0	1	0	5
Musapur	0	0	0	0	0	0	0	0	0	0	1	1

Source: Field survey 2015

There are 1 brick fields in this Upazila. It is located at Alpura union which are contributing to develop the local household and infrastructure development functions. Raipura union contains the highest number (13) of industries interviewed. It possesses 1 ice cream factory, 1 rice and flour mill, 2 workshops, 1 building materials industries, 2 cottage industries, 2 oil mills, 1 printing press and 3 food processing industries. Sreerampur and Amirgonj union have 5 industries each on their locality. Amirgonj has 4 yarn & fabrics industries and 1 cottage industry. Cottage industries play vital role to supply local cotton based products. Sreerampur has 2 workshops, 1 building materials, 1 cottage and 1 oil mill. In mirzanagar union only 1 food processing industry is interviewed. And finally Mohashpur union contains 2 rice and flour mills, and Musapur union possesses 1 jute products industries in their locality. It has been seen that there are various types of industries are located varying from brickfields to small workshops in Raipura upazila.

4.2 Ownership Pattern

Most of the formal economic units (about 90%) ownership pattern is private. Rest of them is owned by limited companies and shareholders. 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 is working here (Please see figure 4.1).

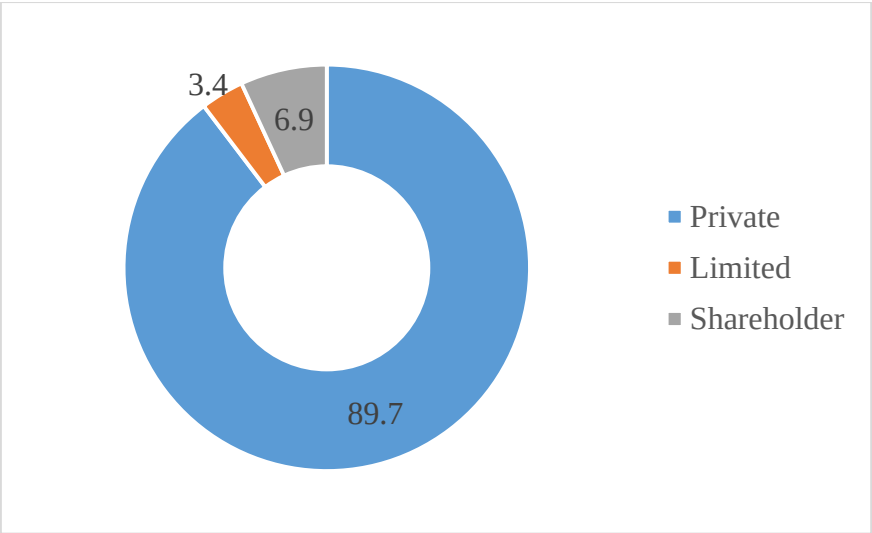


Figure 4.1: Ownership patterns of formal economic units (Source: Field Survey, 2015)

4.3 Area Occupied

It has been found that about three fourth of total formal economic units needs area less than 0.1 acre. About 12 also need more than 0.1 but less than 1 acres. In addition, the jute mills mainly need more land (47 acre) than others (Please see figure 4.2).

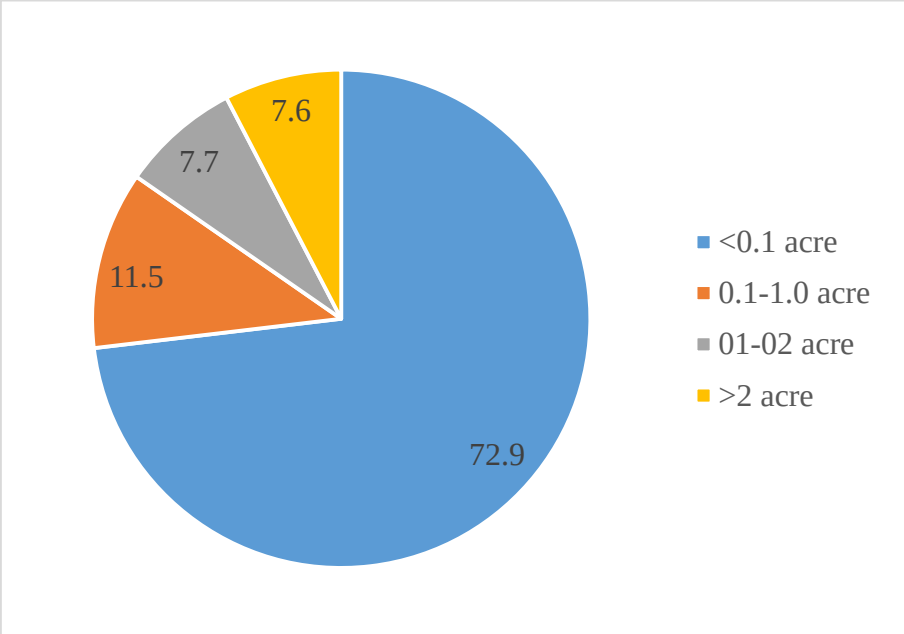


Figure 4.2: Area occupied by formal economic units in acre (Source: Field Survey, 2015)

4.4 Number of Employees

It has been found that almost all of the brick fields need more than 100 people. About almost all of the yarn & fabrics industries need more than 10 and less than 150 people. Jute products industries need more than 100 people to manage their works. On the other hand, rest of the industries need people less than 10. Thus, in this upazila comparatively brick fields and jute product industries 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
Brick Field				100
Ice cream factory	100			
Rice and Flour mill	100			
Workshop	100			
Yarn and Fabrics industry		100		
Jute product	100			100
Building materials	100			
Cottage				
Oil mill	100			
Printing Press	100			
Food processing	40	60		

Source: Field Survey, 2015

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 food processing and building materials industries highest number of female participation has been observed. In that particular types of industries about one third of total employees are female. Rice and flour mills employed the second highest (about one fourth) female employees. In brick fields also about 12% of total employees are found female.

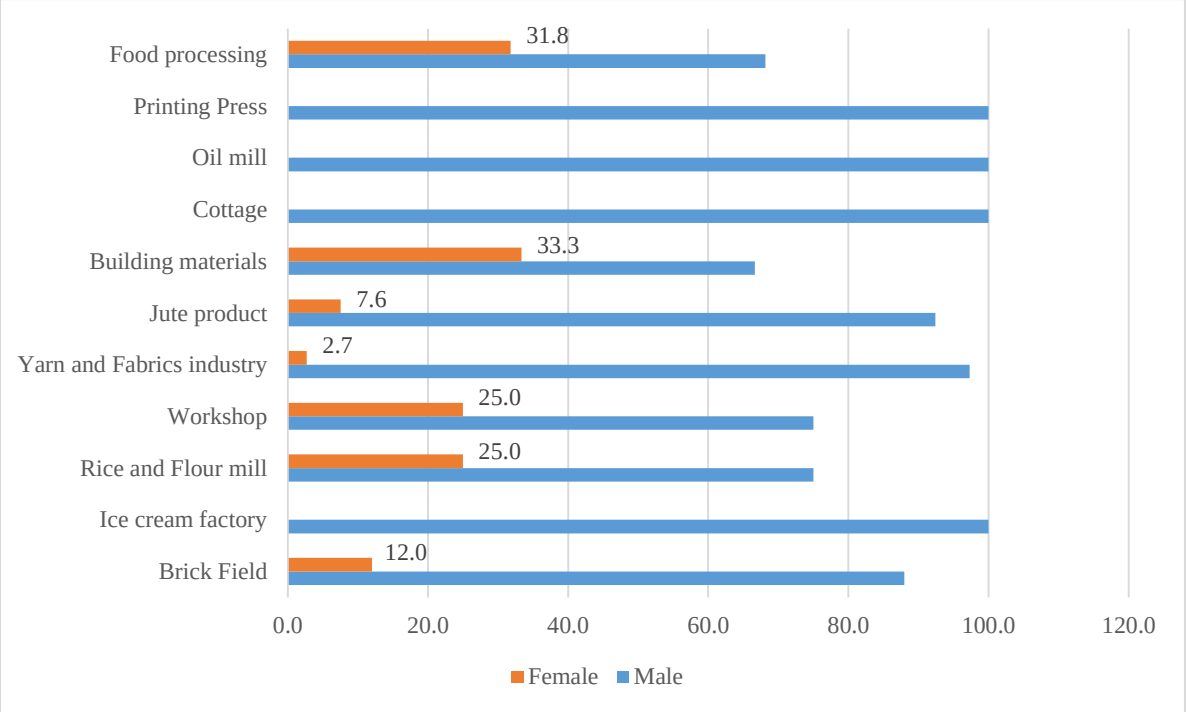


Figure 4.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2015)

4.6 Raw Materials

4.1.1 Major Raw Materials

Major raw materials vary by different types of industries. For instance, major raw material for brick field is soil, whereas Bamboo. Chon, Shola, Wood are the major raw material of cottage industries. Again Water is mentioned as one of the major raw materials for ice cream factories. Agricultural Machineries Parts, Electricity (50) and Rod are the major raw materials for workshop. Moreover, flour is the major raw materials for food processing industries, whereas Oil seed, Paddy and Rice are for rice and 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
Brick Field	Soil
Ice cream factory	Water
Rice and Flour mill	Oil seed, Paddy, Rice (33% of each)
Workshop	Agricultural Machineries Parts (25), Electricity (50), Rod (25)
Yarn and Fabrics industry	Yarn
Jute product	Jute
Building materials	Bamboo, Sack
Cottage	Bamboo. Chon, Shola, Wood (25% of each)
Oil mill	Mastered oil seed (66.67), oil seed (33.33)
Printing Press	Paper
Food processing	Flour (40); Mastered oil seed (20); Milk (20); sodium sulfate, glucose, sugar (20)

Source: Field Survey, 2015

4.7.2 Minor Raw Materials

Apart from the major raw materials, the industries also used some minor raw materials. For example, brick fields also mentioned sand, as their minor raw materials. Moreover, printing press industries mentioned banner, poster, plastic, and ink as their minor raw materials. Again rice and flour mills also used wheat in their industries. Workshops also used Iron as their minor raw materials.

Table 4.4: Minor raw materials (in percentage)

Industries	Minor raw materials
Brick Field	Sand
Ice cream factory	Sugar
Rice and Flour mill	Wheat
Workshop	Iron
Jute product	Oil
Building materials	Rope
Printing Press	banner, poster, plastic, ink

Source: Field Survey, 2015

4.7.3 Other Raw Materials

Building Materials industries also mentioned as color is the other raw materials they used. Brick fields said that, coal is their another raw materials which has been imported from other regions. Whereas, JBO is another raw material used in Jute industries. Ice cream factory also used milk as their raw materials in their industries. Most of the workshop also mentioned screw driver and spray pipe as their other 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
Brick Field	Coal
Ice cream factory	Milk
Rice and Flour mill	Chilly and turmeric
Workshop	Screw driver, spray pipe
Food processing	Ghee, Oil, Wheat
Cottage	Plastic, Tin
Jute product	JBO
Building materials	Color

Source: Field Survey, 2015

4.8 Products and Their Market

It has been seen that jute products along with yarn & fabrics industries exported their products in other markets.. Apart from these, most of the industries' product only supports the local needs.

Table 4.6: Products and Their Market

Industries	Local	Others (%)
Brick Field	100	0
Ice cream factory	100	0
Rice and Flour mill	100	0
Workshop	100	0
Yarn and Fabrics industry	25	75
Jute product	0	100
Building materials	100	0
Cottage	100	0
Oil mill	100	0
Printing Press	100	0
Food processing	100	0

Source: Field Survey, 2015

4.9 Production Amount and Their Yearly Price

It can be seen in Table 4.7 that production of different products in this upazila and their yearly price has been given. Here, yarn and fabrics industries produce on an average 192000-9200000 gauge/meter per year, which yearly price is highest (about BDT 80,64,000) among

other products. Food processing industries produce 22 tons per year, of which yearly price is second highest (about BDT 49,16,500) among other products.

Brick fields produced average 750000 pcs of brick per year. Oil mills positioned in third (BDT 41,60,000) in the perspective of yearly price of production.

Table 4.7: Production amount and their yearly price (Average)

Industries	Amount of Production	Unit	Avg. Price in BDT
Brick Field	750000	pcs in year	41,25,000
Rice and Flour mill	400	tons per year	63,790
Workshop	230	pcs in year	1,57,333
Yarn and Fabrics industry	192000-9200000	gauge/meter per year	80,64,000
Jute product	2190	tons per year	
Building materials	1000	pcs in year	70000
Cottage	19000	pcs in year	2,44,500
Oil mill	485	tons per year	41,60,000
Printing Press	300000	pcs in year	2,40,000
Food processing	22	tons per year	49,16,500

Source: Field Survey, 2015

4.10 Mode of Transportation of Raw Materials

About half of total industries use Van/Rickshaw as their primary mode of transportation for raw materials. This is because, as discussed earlier the major source of raw materials and products produced are the local markets. Moreover, about one third of total industries also used tempo/*nosimon* and pickup as their primary mode of transportation.

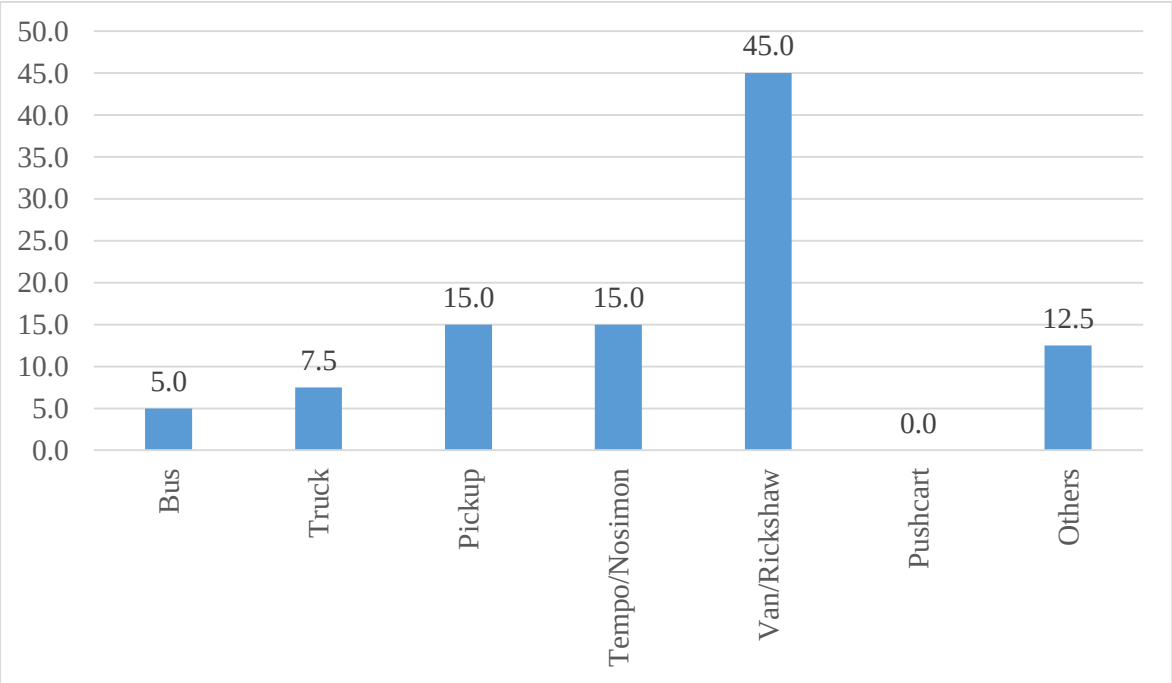


Figure 4.4: Mode of transportation of raw materials (Source: Field Survey, 2015)

4.11 Solid Waste, Management and Environment

a. Waste disposal site

From the survey it has been found that yarn and fabrics industries make highest amount of solid waste. Some of this types of industries produce about more than 2.5 tons of solid waste yearly. And rest of the types of industries produce less than one tons of solid waste. About 86% of total industries dispose the waste into open space. About 10% of total industries also use agricultural land as waste disposal site (please see figure 4.6). Whereas, about 35% of total waste is non-refined.

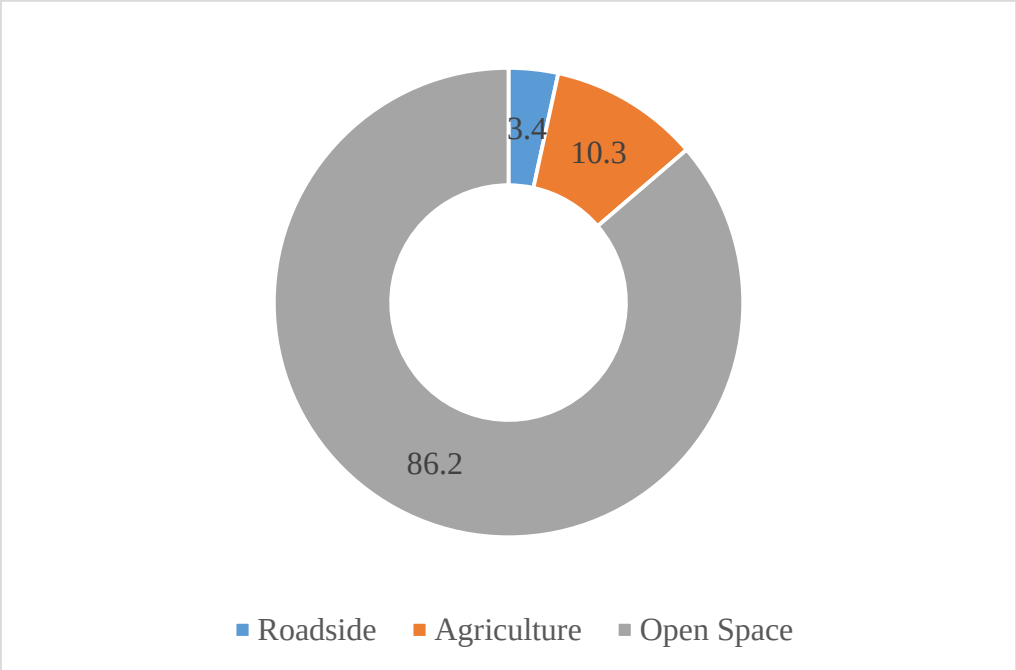


Figure 4.6: Waste disposal site (Source: Field Survey, 2015)

b. Availability of waste treatment system

Moreover, approximately 97% of total industries said they do not have any waste treatment system (please see figure 4.7). Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Necessary steps should be taken regarding these.

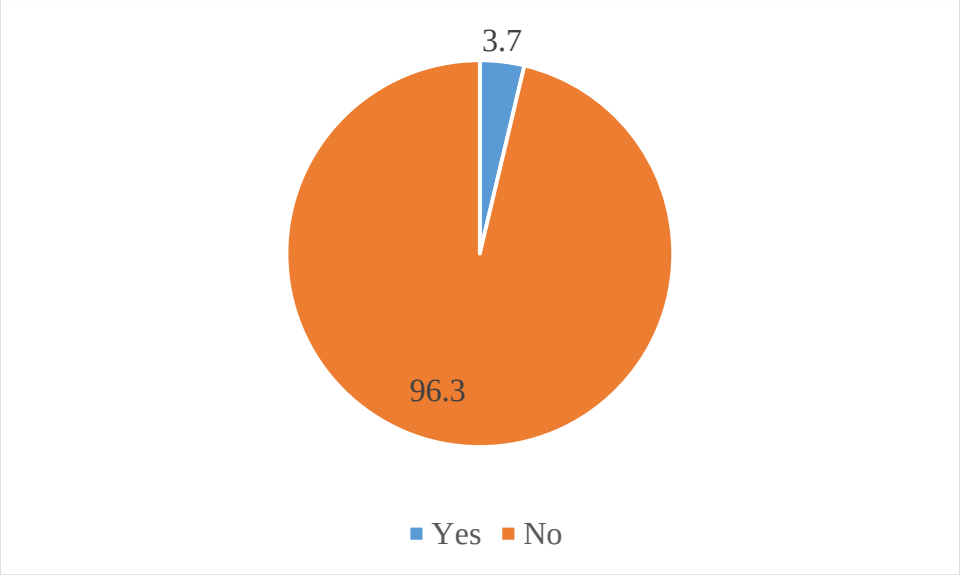


Figure 4.7: Availability of waste treatment system (Source: Field Survey, 2015)

c. Measures taken against pollution

In addition, alarming is that, about more than 93% of total industries mentioned that they do not take any measurements regarding against pollution (please see figure 4.8). About 3.4% of industries (Brick fields) use fix chimney that is free from Environmental Pollution. In addition, not a single industries completed their Environmental Impact Assessment (EIA) report.

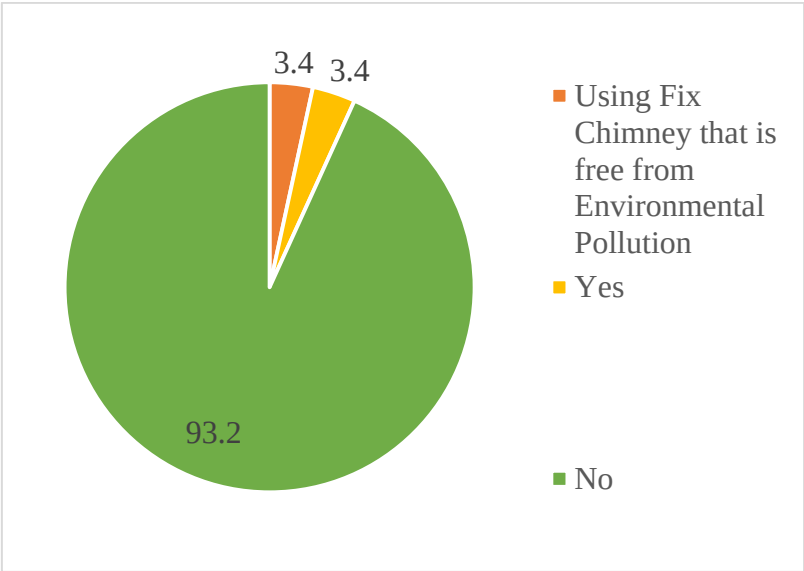


Figure 4.8: Measures taken against pollution (Source: Field Survey, 2015)

4.12 Health Security of the Worker

Most of the workers of industries (about more than half) opinioned that owner pays on health security of the workers. For about more than one fourth industries pay only in working time.

Thus, in this case, workers get their rights of treatment in most of the time (Please see figure 4.9).

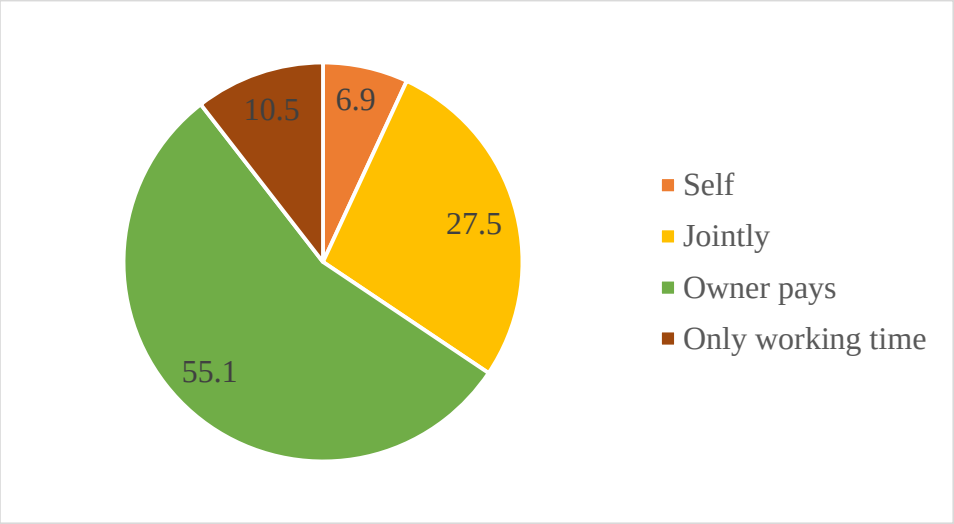


Figure 4.9: Health security of the worker (Source: Field Survey, 2015)

4.13 Problems in the Industries

About more than half (highest) of total industries said that inadequate communication system is their major problems. It includes the road condition and others. Moreover, about more than one fourth of total industries mentioned that their next major problem is lack of energy (electricity etc.). About 17% of total industries also said that, Infrastructures problem is their major problem. Thus lack of enough good conditioned road is mentioned strongly by the industries in this Upazila (Please see figure 4.10).

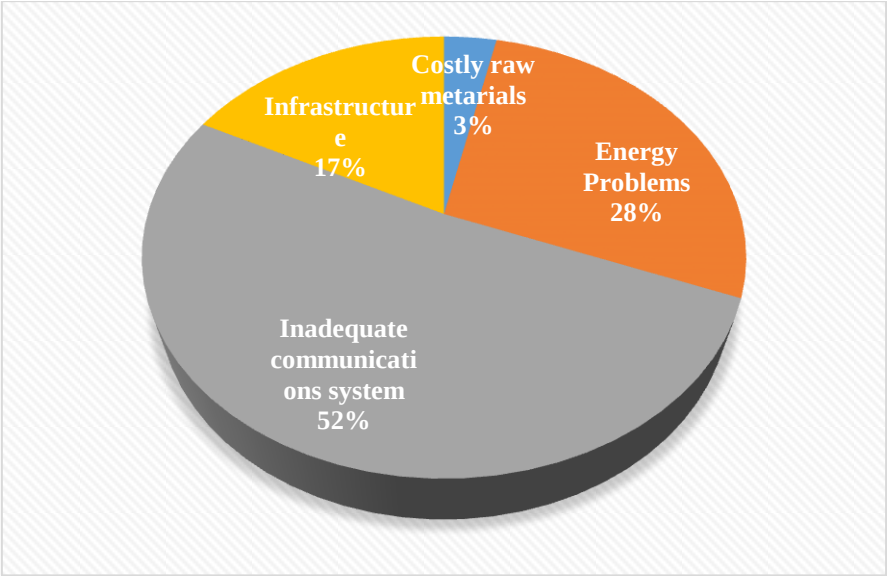
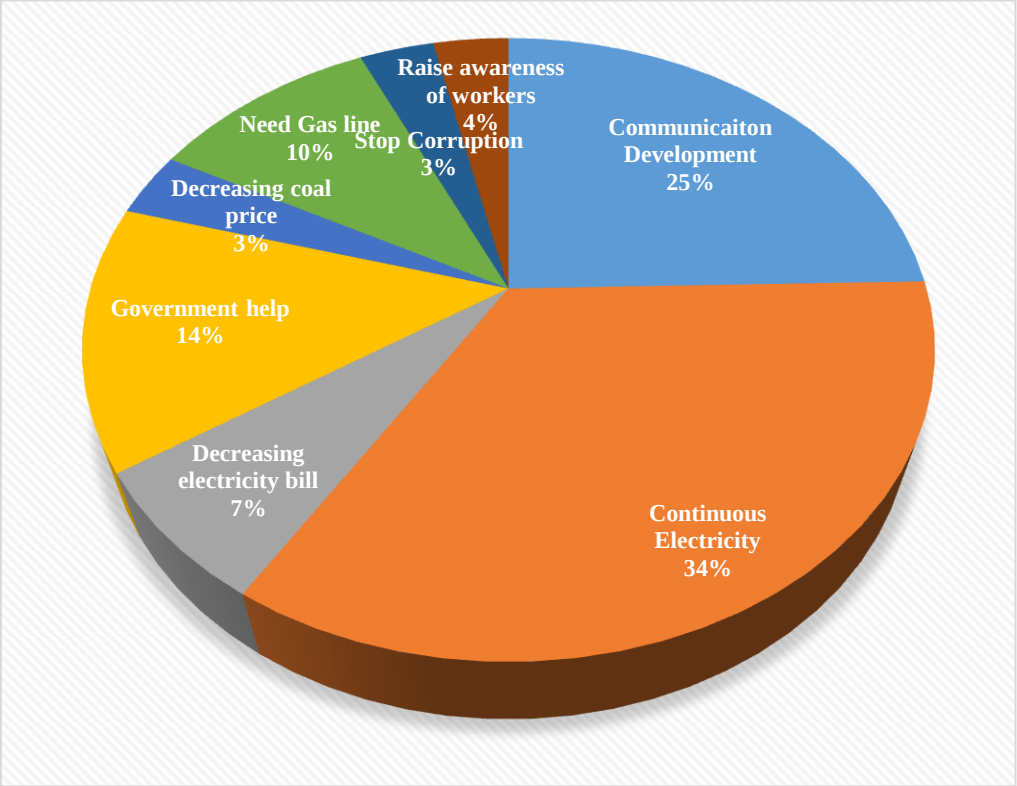


Figure 4.10: Problems in the industry (Source: Field Survey, 2015)

4.14 Suggestions to Solve the Industrial Problems

About one third of total industries notified that the solution of problems is continuous electricity regarding lack of energy problem. Regarding infrastructure problem (road) according to the one fourth of the industries mentioned that, communication development could be a solution. About 14% also said that they need governments help regarding loan in low interest (Please see figure 4.11).

Figure 4.11: Suggestions to solve industrial problems (Source: Field Survey, 2015)



CHAPTER FIVE: INFORMAL ECONOMIC SURVEY

5.1 Introduction

The major informal types of economic activities in Raipura are: (1) Poultry; (2) Saw mills; (3) Dairy farms; (4) Fisheries (5) Furniture making. The locations of interviewed informal economic units are given below:

Table 5.1 Type of Industries with Location

	Fish feed	Poultry	Saw mill	Nursery	Poultry and fish feed	Furniture making
Adiabad	0	0	1	0	0	0
Amirgonj	0	0	1	0	0	0
Mirzanogor	1	1	1	0	1	0
Raipura	0	1	0	1	0	0
Sreerampur	0	0	2	0	0	3

Source: Field survey 2015

1 fish feed economic unit is located in Mirzanogor union. 1 Poultry farm is also located here. Another poultry farm is located in Raipura. Total 5 saw mills are interviewed. Among them 2 is in Sreerampur, 1 is in Adiabad union, 1 is in Amirgonj, and 1 in Mirzanogor union. And 1 nursery is located in Raipura union. Moreover, 1 Poultry and fish feed economic unit in Mirzanogor 3 furniture making unit is located at Sreerampur.

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).

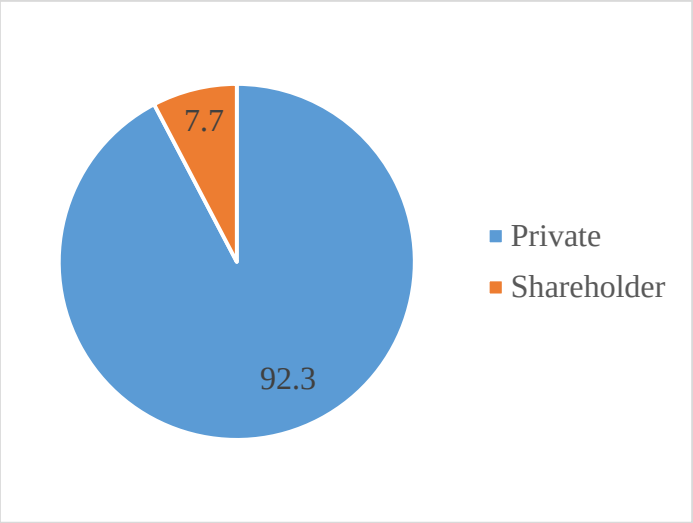


Figure 5.1: Ownership patterns of formal economic units (Source: Field Survey, 2015)

5.3 Area Occupied

It has been found that about one third of (35%) total informal economic units needs area less than 0.05 acre. One fourth of total economic units need more than 0.05 acre but less than 0.1 acre area. About same percentage need area more than 0.3 acre. Some of saw mills along with poultry and fish feed need area more than 0.3 acre.

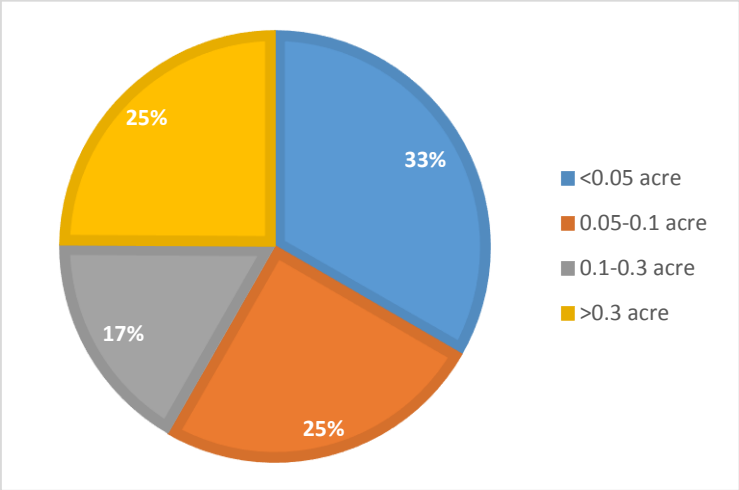


Figure 5.2: Area occupied by formal economic units in acre (Source: Field Survey, 2015)

5.4 Number of Employees

It has been found that except poultry and fish feed, almost all of the informal economic units can manage their business with less than 10 people. Some of furniture making economic units need more than 10 but less than 30 people.

Table 5.2: Distribution of no. of employees (in percentage) by types of industries

	<10 persons	10-30 persons	>30 persons
Fish feed	100	0	0
Poultry	100	0	0
Saw mill	100	0	0
Nursery	100	0	0
Poultry and fish feed	100	0	100
Furniture making	66.67	33.33	0

Source: Field Survey, 2015

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 fish feed, only about 20% female employees have been found. In rest of the informal economic types, no female is present. Thus awareness program or other appropriate steps should be taken regarding these.

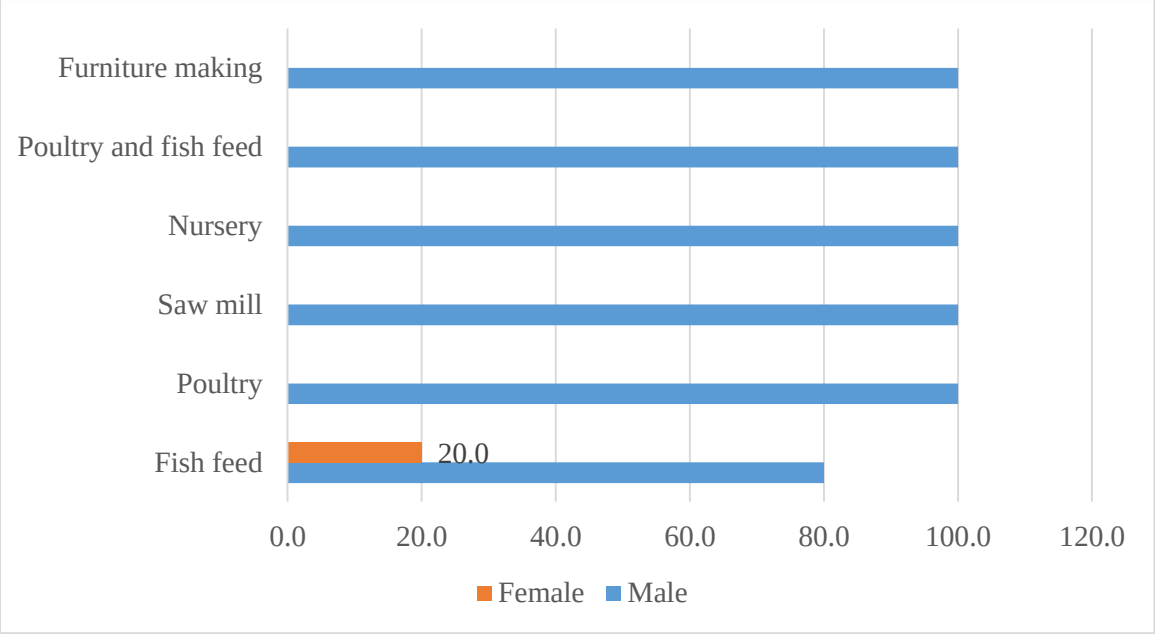


Figure 5.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2015)

5.6 Raw Materials

a. Major Raw Materials

Major raw materials vary by different types of informal industries. For instance, major raw materials for saw mills is tree, whereas Broiler chicken and Maize are the major raw materials for poultry. Again rice polish, rape shed are one of the major raw materials for poultry and fish feed. Poultry and fish feed's source of all kinds of raw materials are local market. Thus local markets are sufficient enough to supply the demands for these informal economies. Some of saw mills, import about half of their raw materials from other regions.

Table 5.3: Major raw materials

	Major raw materials
Fish feed	Dry fish
Poultry	Broiler chicken, Maize
Saw mill	Tree
Nursery	Seed
Poultry and fish feed	Rice polish, rape shed
Furniture making	Still sheet, wood

Source: Field Survey, 2015

b. Minor Raw Materials

Apart from the major raw materials, some of the economic units need some minor raw materials. Fish feed economic units mentioned maize, DORB, meet & bone as their minor raw materials. Some of the saw mills also mentioned diesel and layer as their minor raw materials

Table 5.4: Minor raw materials

	Minor raw materials
Fish feed	Maize, DORB, meet & bone
Poultry	Diesel
Saw mill	Diesel, Layer
Poultry and fish feed	Ripest color

c. Other Raw Materials

Some of the fish feed economic units mentioned soya bean and some of the poultry & fish feed economic units mentioned dry fish, molding habitats, limestone, enzyme, Vit-B, fish premix and Di Calcium phosphate as their less important raw materials needed for their business.

Table 5.5: Other raw materials

	Other raw materials
Fish feed	Soya bean
Poultry	Powder biscuits
Poultry and fish feed	Dry fish, molding habitats, limestone, enzyme, Vit-B, fish premix, Di Calcium phosphate

5.7 Products and Their Market

Products of some saw mills are going outside the upazila area to sell their products after meeting demands of the area. Poultry and fish feed farms exported almost all of their products outside the upazila. Apart from these, other economic units' product only support the local needs.

Table 5.6: Products and Their Market

Types	Local	Others
Fish feed	100	0
Poultry	100	0
Saw mill	90	10
Nursery	100	0
Poultry and fish feed	0	100
Furniture making	100	0

Source: Field Survey, 2015

In below table production of different informal economic units in this upazila and their yearly price has been given. Here, poultry and fish feed produced about 193 tons of their product per year which yearly price is highest (about BDT 23,04,00,000) among other products. Home appliances by furniture makers positioned in second (BDT 5,90,40,000) in the perspective of

yearly price of production. Poultry produced about 2709000 pcs of their product yearly, which yearly production price is the next (1,62,40,000).

Table 5.7: Average production amount and their yearly price

	Production	Units	Yearly price of products in BDT
Fish feed	200	tons per year	64,00,000
Poultry	2709000	Pcs per year	1,62,40,000
Saw mill	10	tons per year	49,79,800
Nursery	12000	Pcs per year	1,14,000
Poultry and fish feed	193.0	tons per year	23,04,00,000
Furniture making	10950	Gauge/meters per year	5,90,40,000

Source: Field Survey, 2015

5.8 Mode of Transportation of Raw Materials

About more than one third 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 truck as their primary mode of transportation. In addition, about 20% of informal economic units also used tempo/ *nosimon* as their primary mode of communication.

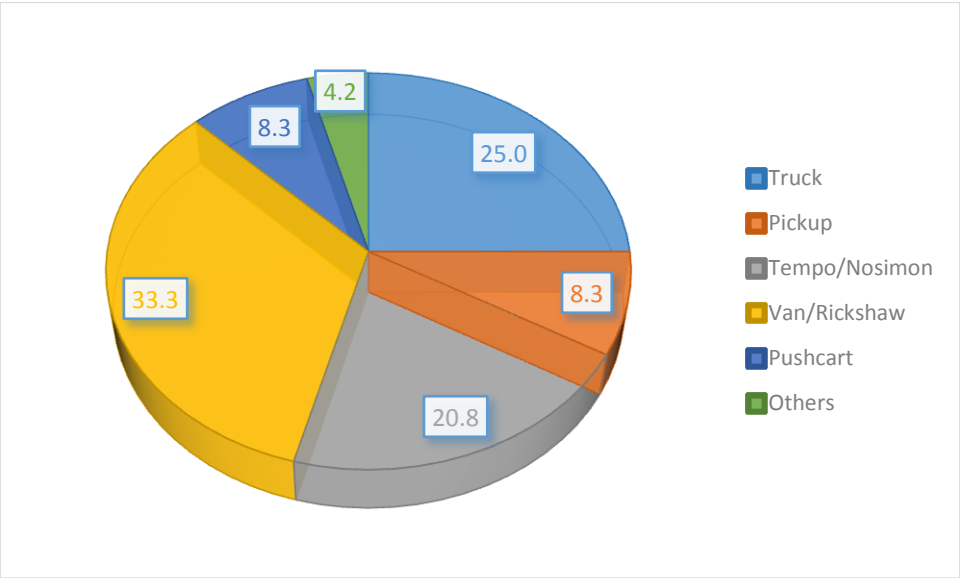


Figure 5.4: Mode of transportation of raw materials (Source: Field Survey, 2015)

5.9 Solid Waste, Management and Environment

From the survey it has been found that saw mill make highest amount (10 tons) of solid waste. And rest of the types of industries produce less than one tons of waste. Some of the poultry farm's waste is fully liquid waste. For rest of the economic units the whole waste is solid waste. About two third of total informal economic units dispose their waste into open

space. But the alarming is that about one third of them also use agricultural land as waste disposal site (please see figure 5.5). Moreover, the waste contained both of refined (30%) and non-refined (70%) waste (please see figure 5.6).

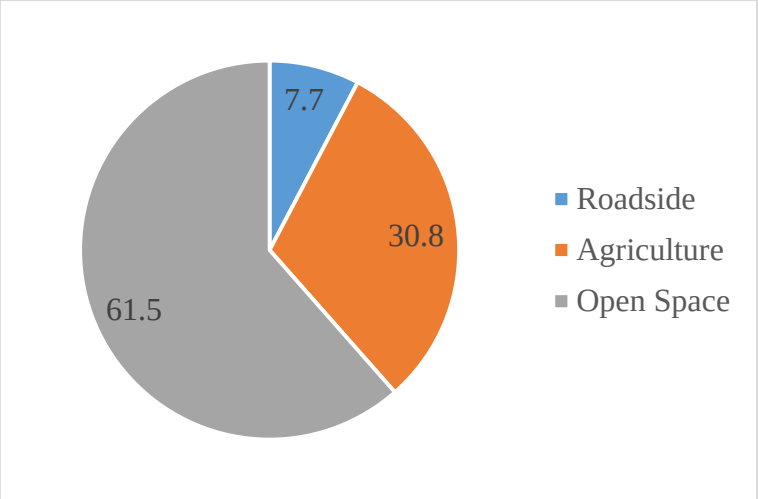


Figure 5.5: Waste disposal site (Source: Field Survey, 2015)

Moreover, almost none of informal economic units have any waste treatment system. Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Necessary steps should be taken regarding these.

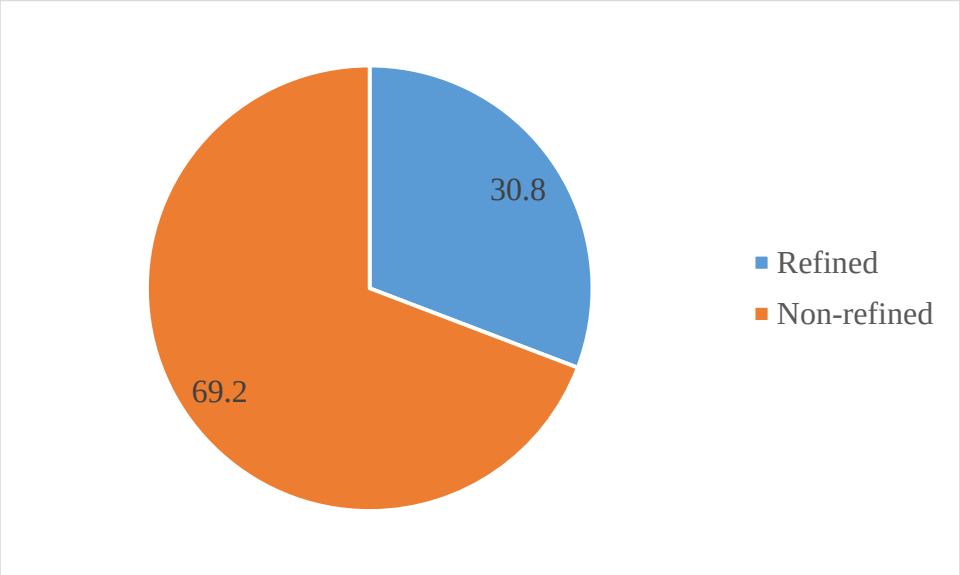


Figure 5.6: Waste type (Source: Field Survey, 2015)

Regarding measures taken against pollution generated by the organization about 8% of informal economic units (poultry farms) mentioned that they dumped the waste under the soil, thus it could produce the biogas.

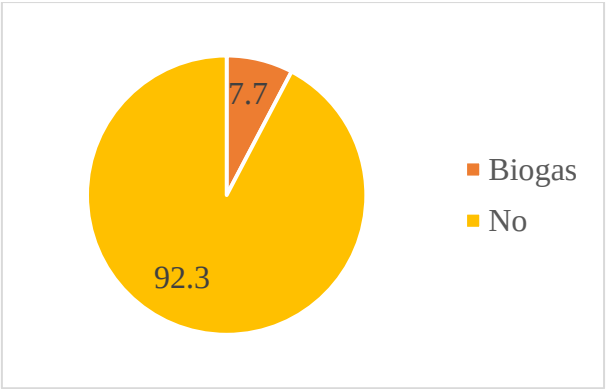


Figure 5.7: Measures taken against pollution (Source: Field Survey, 2015)

But alarming is that, rest 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 5.8)

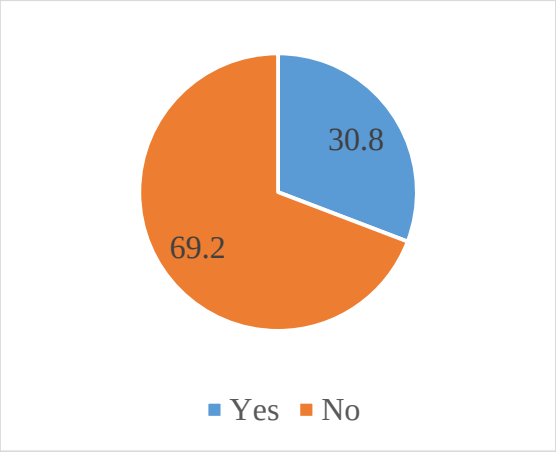


Figure 5.8: Environmental clearance (Source: Field Survey, 2015)

5.10 Health Security of the Worker

Most of the workers of industries (about 40%) owner pays on health security of the workers. And for about one fourth of total cases the organization pay the health expenditures if it happens on working time. Moreover, for one-fourth (self and no) of total economic units did not take any liability on their health security

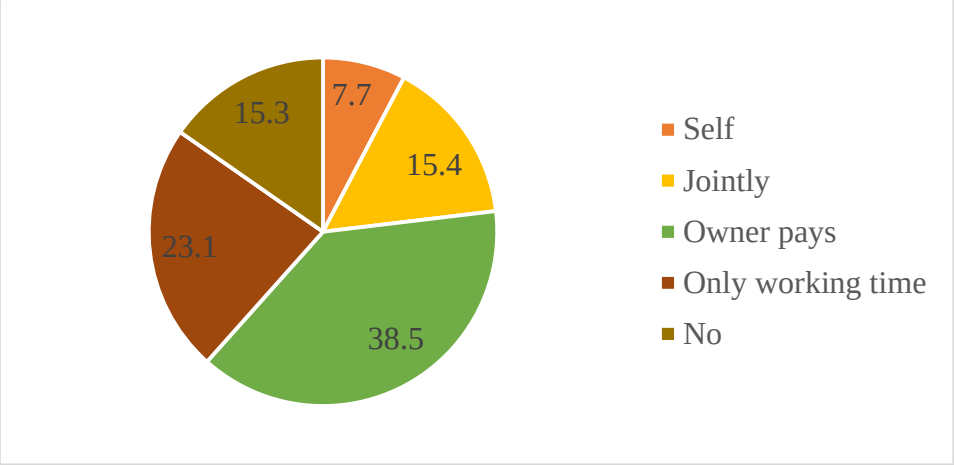


Figure 5.8: Health security of the worker (Source: Field Survey, 2015)

5.11 Problems in the Industries

About half (highest) of total informal economic units said that lack of enough energy (Electricity and others) is there major problem. About one fourth of them also mentioned that their next major problems infrastructure problem. Thus there are lack of enough energy source in this upazila which is mentioned strongly by the industries.

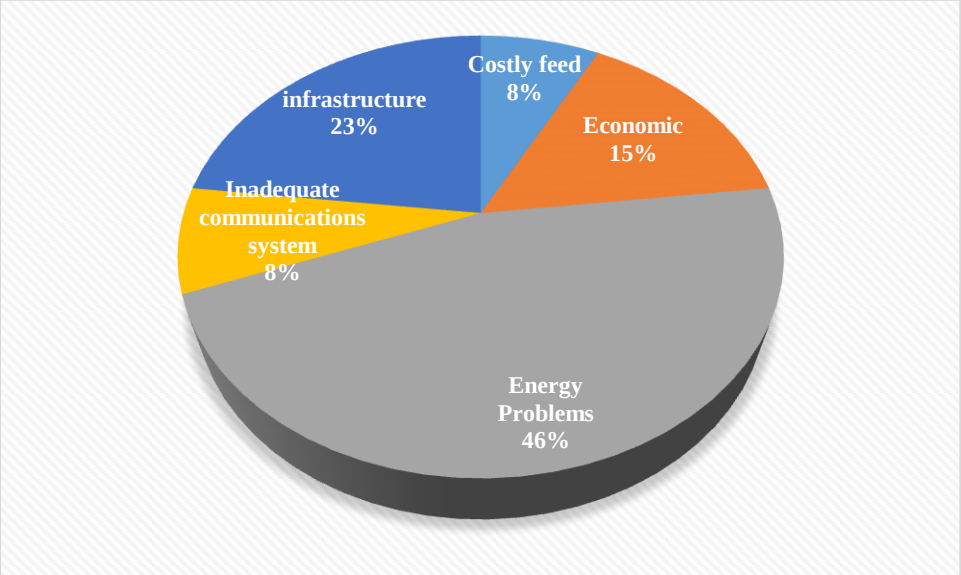


Figure 5.9: Problems in the industry (Source: Field Survey, 2015)

5.12 Suggestions to Solve the Problems

About one fourth of the total economic units notifies that the solution of above mentioned problem could be managing the load-shedding problem. About 15% of them also mentioned that, decreasing diesel price could be also the solution of energy problem. Some of them (7%) also give importance on the provision of loan on easy terms. About 8% of total economic

units also requested to the government to give them permission to build industries on *khas* land which would help them to flourish the economy.

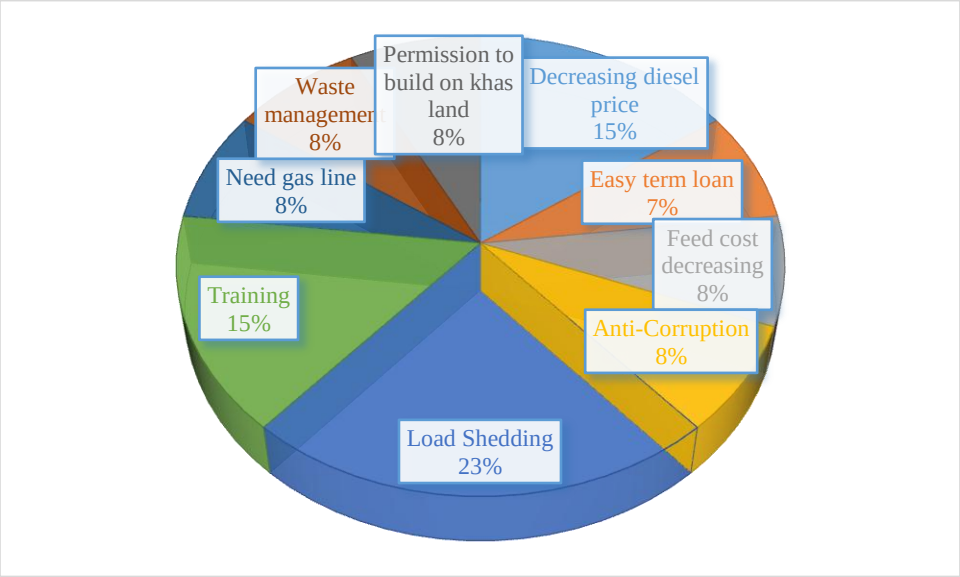


Figure 5.10: Suggestions to solve industrial problems (Source: Field Survey, 2015)

Chapter 6: Conclusion and Policy Framework

Raipura, the biggest Upazila of Narsingdi zila in respect of area. There are some export oriented poultry and fish feed farms are located with other types of industries. However, most of the formal economic units of this area are in private ownership and employ about more than 100 people in their industries. Thus, there are a significant number of large scale industries. And one of the major economic successes of this area is, the local markets are enabled to meet the need of the local economic units for most of the cases. Moreover, the products are going beyond the upazila boundary which contributes an important portion to the GDP. On the other hand, the major problem of economic pattern of this upazila is that there are only a small percentage of female employed in the formal and informal economy. Moreover, very few economic units have consciousness about the management of generated waste and the problems created by these industries. Thus, awareness building program and other necessary steps should be taken regarding these. Inadequate communication system problem has been mentioned as major problems by the formal industries of the area. Whereas, a huge percentage of informal economic unit refers energy problem is their main problem. Some of the industries also wants government's helping hand towards them by providing loan on small interest and infrastructure development specially road. Some of them also requested government to give them permission of building new industries on *khas* land to help the economy of the Upazila. Again, 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.

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Annexure-I

(Sample of Formal-Informal Economic Survey Questionnaire)

গৃহায়ন ও গনপূর্ত মন্ত্রনালয়

নগর উন্নয়ন অধিদপ্তর

প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিন উপজেলাস -প্যাকেজ-০২ এর আওতায়

শিবপুর ও রায়পুরা উপজেলা এবং ঈশ্বরগঞ্জ উপজেলার উন্নয়ন পরিকল্পনা প্রণয়ন কার্যক্রম

পরামর্শক প্রতিষ্ঠান : যৌথভাবে শেল্‌টেক কনসালটেন্ট প্রাঃ লিঃ ও আর্ক বাংলাদেশ লিঃ

আনুষ্ঠানিক -অনানুষ্ঠানিক অর্থনৈতিক জরিপ প্রশ্নমালা-২০১৫

প্রশ্নমালা নংঃ ..... জরিপের তারিখঃ ..... সময়ঃ .....
সাক্ষাৎকার গ্রহণকারীর নামঃ ..... সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর ঃ .....

- **অধ্যায়-৪ঃ <u>শিল্প কারখানা (বৃহৎ, ক্ষুদ্র, মাঝারি ও কুটির)</u>**

৪.১ শিল্প কারখানা / প্রতিষ্ঠানের নাম ঃ

৪.২শিল্প কারখানা / প্রতিষ্ঠানের ঠিকানা ঃ

৪.৩ মালিকানার ধরনঃ ☐ ব্যক্তিগত মালিকানা ☐ লিমিটেড কোম্পানী ☐ অংশীদারী প্রতিষ্ঠান

৪.৪. মালিক/ব্যবস্থাপনা পরিচালক/ অংশীদারের নামঃ

৪.৫ প্রতিষ্ঠানের ধরন ঃ

☐ নির্মাণ সামগ্রী	☐ দুগ্ধ খামার	☐ মৎস্য প্রক্রিয়াকরণ	☐ ওয়ার্কসপ
☐ রাসায়নিক দ্রব্যাদি	☐ ট্রেডিং হাউস	☐ করাত কল	☐ আটা মিল
☐ সুতা ও বস্ত্র শিল্প	☐ ব্যাংক	☐ নারিকেলের খোসার আঁশ ভিত্তিক শিল্প প্রতিষ্ঠান	☐ চামড়াজাত শিল্প
☐ কুটির শিল্প	☐ বীমা	☐ হস্ত শিল্প	☐ সিমেন্ট কারখানা
☐ গ্যাস	☐ চিংড়ি ঘের	☐ ইট ভাটা	☐ ওয়ারহাউস
☐ খাদ্য প্রক্রিয়াজাতকরণ	☐ রাইস মিল	☐ বরফ কল	☐ পাটজাত দ্রব্য প্রক্রিয়াকরণ
☐ পোল্ট্রি	☐ দোকান	☐ গার্মেন্টস	☐ মৎস খামার
☐ আসবাবপত্র প্রস্তুতকরণ	☐ প্রিন্টিং প্রেস	☐ প্লাস্টিক ইন্ডাস্ট্রি	☐ অন্যান্য

৪.৬ আয়তন (একর)ঃ

৪.৭ কর্মকর্তা ও কর্মচারীর সংখ্যা ঃ

(ক) সর্বমোট সংখ্যা ঃ পুরুষঃ .... মহিলা ঃ .....

(খ) প্রশাসনিক কর্মকর্তা ও কর্মচারীর সংখ্যা ঃ

(গ) শ্রমিক ও অন্যান্য কর্মচারীর সংখ্যা ঃ

৪.৮ কাঁচামাল সংক্রান্ত তথ্য ঃ

ক্রমিক নং	ব্যবহৃত কাঁচামাল	কাঁচামালের উৎস	
		স্থানীয় (%)	আমদানীকৃত (%)

৪.৯. উৎপাদিত পণ্য ঃ

(ক) উৎপাদিত পণ্যের প্রকার ঃ

- ☐ কুটির শিল্প
- ☐ ইট ভাটা
- ☐ বোতলকৃত তরল প্রাকৃতিক গ্যাস
- ☐ 'স' মিল
- ☐ প্রক্রিয়াজাত সাদা মাছ
- ☐ পাটজাত দ্রব্য
- ☐ ডিম
- ☐ দুধ ও দুগ্ধজাত খাবার
- ☐ প্যাকেটজাত খাবার
- ☐ সুতা ও বস্ত্র
- ☐ গৃহস্থালির পণ্যসামগ্রী
- ☐ প্লাস্টিকের পণ্য
- ☐ অন্যান্য (উল্লেখ করুন) ঃ

(খ) উৎপাদিত পণ্য বাজারজাতকরণ ঃ

বিবরণ	পরিমাণ (%)
স্থানীয় বাজার	
সারা দেশ	
রপ্তানীর জন্য স্থানীয় রপ্তানীকারককে সরবরাহ	
সরাসরি রপ্তানী *(দেশের নাম)*	

৪.১০. কাঁচামাল ও উৎপাদিত পণ্য বাজারজাতকরণে ব্যবহৃত পরিবহন ঃ

সড়ক	রেলপথ	জলপথ
১. ট্রাক/ আচ্ছাদিত ট্রাক/ট্রেইলার	বাংলাদেশ রেলওয়ে	১. কার্গো
২. বাস		২. ট্রলার
৩. পিকআপ		৩. নৌকা
৪. মাইক্রোবাস/ কার		৪. অন্যান্য
৫. টেম্পু/ বেবিট্যাক্সি		
৬. ভ্যান/ রিক্সা		
৭. ঠেলাগাড়ী		
৮. অন্যান্য		

৪.১১. বর্জ্য ব্যবস্থাপনা ঃ

(ক) দৈনিক বর্জ্য উৎপাদনের পরিমাণ ও ধরন ঃ ☐ টন

সলিড _____ % লিকুইড _____ %

(খ) বর্জ্য অপসারণঃ ☐ পরিশোধিত ☐ অপরিশোধিত

(গ) বর্জ্য অপসারণের স্থানঃ

☐ রাস্তার পাশে ☐ খোলা মাঠ ☐ খাল ☐ নদী ☐ কৃষিজমি

(গ) বর্জ্য অপসারণ স্থানের মালিকানাঃ

☐ নিজস্ব ডাম্পিং গ্রাউন্ড ☐ সরকারি স্থান ☐ বেসরকারি মালিকানাধীন জায়গা

৪.১২. বর্জ্য পরিশোধন ব্যবস্থা আছে কি না? ☐ হ্যাঁ ☐ না

৪.১৩. প্রতিষ্ঠান থেকে সৃষ্ট পরিবেশ দূষণ রোধের ব্যবস্থার বিবরণঃ

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৪.১৪. EIA (এনভায়রনমেন্টাল ইমপ্যাক্ট এসেসমেন্ট) করেছেন কি না? ☐ হ্যাঁ ☐ না

৪.১৫. শিল্প কারখানার শ্রমিকদের পেশাগত স্বাস্থ্য নিরাপত্তা ব্যবস্থার বিবরণ ঃ

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৪.১৬. শিল্প কারখানার পরিবেশ বিষয়ক ছাড়পত্র আছে কিনা (বিবরণসহ) ঃ

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.....

৪.১৭. কর্মকর্তা / কর্মচারীদের বাসস্থান সম্পর্কিত তথ্যঃ ☐ নিজস্ব ☐ ভাড়াবাড়ী ☐ অন্যান্য

৪.১৮. প্রতিষ্ঠানে উৎপাদিত পণ্যের পরিমাণ (বাৎসরিক) ঃ

..... পিস
..... টন
..... গজ / মিটার

৪.১৯. উৎপাদিত পণ্যের মূল্য (বাৎসরিক) ঃ ..... টাকা

৪.২০. শিল্প কারখানার সমস্যা ঃ

☐ অবকাঠামোগত সমস্যা ☐ অপ্রতুল যোগাযোগ ব্যবস্থা ☐ জ্বালানি সংকট ☐ দক্ষ শ্রমিকের অভাব
☐ বর্জ্য অপসারণ সমস্যা ☐ চাঁদাবাজি ☐ দূনীতি ☐ শ্রমিক অসন্তোষ

৪.২১. সমস্যা সমাধানের পরামর্শ থাকলে তার বিবরণ ঃ

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Annexure-II: List of Surveyors

SL.	Name	Designation	Date Start	Date End
1	Tarek Khan	Supervisor	12/08/2015	11/09/2015
2	Rubaiat Islam	Supervisor	12/08/2015	11/09/2015
3	Ahmed Riyadh	Supervisor	12/08/2015	11/09/2015
4	Kawsar Hamid	Supervisor	12/08/2015	11/09/2015
5	Layes Mia	Surveyor	12/08/2015	11/09/2015

Annexure-III: List of Photographs

Plate-1: Industrial data collection at Raipura Upazila

Plate-2: Informal activities at Raipura Upazila

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-02
(Ishwarganj Upazila, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Formal-Informal Economic Survey of Raipura Upazila, Narsingdi

August, 2016
Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

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-02
(Ishwarganj Upazila, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Transportation Survey
of
Raipura Upazila, Narsingdi

August, 2016

Joint Venture
of
Sheltech Consultants Pvt. Ltd
and
ARC Bangladesh Ltd

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/Transportation Final Survey Report/ Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Transportation Final Survey Report of Raipura Upazila, Narsingdi

Dear Sir,
We are pleased to submit herewith the Transportation Final Survey Report of **Raipura Upazila, Narsingdi** for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul IslamNazem)
Team Leader, Package -2

(Dr. ShahidMamun)
TransportationExpert, Package -2

Encl: As stated.

Copy to:
1. Project Manager, Package-2, UDD
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
Phone: +880-2-9611171 Fax: +880-2-9611172
Email: scpl.mail@gmail.com

Executive Summary

Raipura is well connected with the communication network of the country. The national Highway from Dhaka to Sylhet has passes over at northern part of the Upazila. It is well connected by National and Regional Highway originating from different Districts/Upazilas like NarsingdiSadar, Belabo, and Shibpur and Bhairab Upazila of Kishorganj district. At present the national and regional highways are playing very important role in communication network. Besides the number of Zila roads and internal local roads are also providing regional connectivity.Communication facilities of Raipura Upazila exists: Pucca road 171.44 km, semi-pucca road 123 km, mud road 230 km, railway 27 km; waterway 28 nautical miles.

The survey reveals that no public or private bus service is available for intra-city movement. CNG, Easy bike, Rickshaw/van, bicycle and motorcycles are common prime modes for intra city movement. Water transport network has also significant importance in carrying out both passenger and goods Raipura Upazila. There are 27km railway line in the study area and five rail stationsnamely Methikanda, Srinidi, Amirganj, KhanaBari andHathubangapass through the Upazila**.**

Though there is no significant traffic congestion within the Upazila but the consultants identified some important places for traffic congestion. These are Railcrossing moor near Upazila Complex and Raipura Bus Stand. In Raipura, three intersections and two important links were surveyed. Within all links the highest PCU passing through the link on Hat Day andnon-Hat Day are 967.13 PCU and 957.50 PCU respectively at Marjal-Narsingdi link and the lowest on Hat Day and non-Hat Day are 268.25 PCU and 224.63 PCU respectively at Radhaganj moor-Mirjanagar link.

All the trips passes over the Upazila have originated and distributed within Raipura, Bhairab BazarBrahmanbaria and the rest of the trips go to other places likeDhaka and NarsingdiSadar Upazila. Around 98% of the trip are generating for work purpose, 2% for social purposes such as visiting relatives, social programs etc. From passenger survey, it was found that 37.19% travel less than 5 km which is the highest among the other distances. To travel more than 50km 20 passengers pay less than 80 Tk and which percentage is 21.49%.

From survey, it was found that pedestrian movement is higher at Rail crossing intersection which is more 3 persons per minute at every link. Raipura Bus Stand is also indicated the same scenario of pedestrian movement. And the pedestrian movements are 2 persons per minute in other intersections. But the main thing is that there no footpath at Bazar area or foot-over bridge at any of the six surveyed road intersections in the Upazila.

From survey, it was found that there are six categories of opinions for the improvement of current situation which are roads have to be repaired or improved, traffic jam should be reduced, gas station should be available,security should be increased, maintenance of vehicle is needed and the rest one is no comments. The outcome shows that mostly passengers are pointing that roads have to be repaired.

Finally, it could be concluded that good network of roads and other transportation mode coupled with an efficient transport management system will make a substantial contribution to the "working efficiency" of the road network and enables it to become catalysts for social and economic developmentfor both urban and rural areasof Raipura Upazila.

Abbreviation/Acronyms

BR - Bangladesh Railway
DC - District Commissioner
LGED - Local Government Engineering Department
OD - Origin and Destination
PCE - Passenger Car Equivalent
PCU - Passenger Car Unit
PRA - Participatory Rural Appraisal
RHD - Roads and Highway Department
TAZ - Traffic Analysis Zone
TOR - Terms of Reference
UDD - Urban Development Directorate

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The role of transportation in the development of civilization is inevitable. Transportation is a non-separable part of any development. It showcases a very intense relation to the style of life, the range and location of activities and the goods and services which will be available for consumption. Transportation plays different roles in the up gradation of a civilization. None of its role can be neglected. The future progress of a city depends mostly how the transportation of that area functions. In master plan transportation planning is the main element around which other facilities and development revolves. In the preparation of Development plan for Raipura Upazila, the consultant has done transportation survey which has great implications on the Development Plan.

To analyze the present scenario of traffic and depict the future traffic demand and forecast, several relevant survey has done in the study area which will analyze the traffic trends.

1.2 Understanding the Existing Road Infrastructures and Facilities

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 form LGED, RHD and Upazila Parishad. The following data will be focused on this traffic study:

Road Geometrics

- ✓ Curves and grades (if significant enough to affect capacity or traffic operations);
- ✓ Number of lanes, lane usage, and presence and type of medians;
- ✓ Lane, median, and shoulder widths;

Traffic Control

- ✓ Traffic signals and phasing;
- ✓ Traffic signs (particularly regulatory signs and posted speed limits);
- ✓ Marked and unmarked crosswalk locations;

Traffic

- ✓ Presence and needs of children, elderly persons, disabled, transportation disadvantaged, pedestrians, and bicyclists;
- ✓ Sidewalks, bicycle lanes, and multi-use paths;
- ✓ Transit stop locations and amenities, transit schedules, and types of transit vehicles in service;
- ✓ Travel times (e.g., queues at intersections);

Land Use/Access

- ✓ Driveways for major vehicle generators or truck generators (collect the same information as would be collected for side streets);
- ✓ Adjacent land use, density, and occupancy;

Others

- ✓ Pavement conditions;
- ✓ Presence and type of on-street parking and parking regulations

1.3 Methodology of Traffic and Transportation Survey

Authentic and viable road infrastructure and vehicle volume information is vital for planning of road infrastructures and policies. The traffic and transportation survey has subdivided into following surveys:

1. Traffic Volume Count Survey
2. Origin and Destination(O-D) Survey
3. Passenger Interview Survey
4. Regional Transportation Network Survey

1.3.1 Reconnaissance Survey

Before performing traffic and transportation survey, a reconnaissance survey has been carried out to identify where the above mentioned surveys will be done. According to the judgment and local knowledge, survey locations points have been selected. For this study, survey has been done on the basis of Hat Day and Non Hat Day.

1.3.2 Sample Size Determination

Sample Size determination is important task on which the study's time frame, outputs depend. In transportation survey, the consultant has to determine how many questionnaire surveys will be done. In Raipura Upazila, the number of households is 1,10,520. Sample size is calculated by taking confidence interval 15% and confidence level 95%. The following sampling equation has been applied:

$$n = \frac{z^2 p(1-p)}{c^2}$$

(Cochran, 1963)

Z = Z value
p = percentage picking a choice, expressed as decimal
c = confidence interval, expressed as decimal

These sample size was adjusted by using the following formula:

$$n = \frac{n_0}{1 + \frac{n_0}{N}}$$

Where nis requiring sample size and N is no. of Household of Upazila. So, the required sample size is 43 for O D Survey, Passenger Interview and Regional Transportation Survey.

1.3.3 Conducting Traffic and Transportation Survey

- ✓ **Traffic Volume Count**

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, four major intersections have been identified. The intersections are: Raipura Bus Stand, Marjal Bus Stand, Radhaganj Moor and SreerampurRail Crossing Moor. In addition, survey has been also carried out in two roadway segments respectively Sapmara Bazar, Musapurand Hasnabad, Amirganj. (Please see **Map 1.1 &Map 1.2**) Hat Day and Non Hat Day has been taken into consideration for each intersection and roadway segment. Peak hour and off peak hour have been varied in each intersection and roadway segment 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) by using certain equivalency factors. The flow is then expressed as PCE per hour or PCE per day.The Table 1.1 and Table 1.2 representrespectively the Survey Schedule for Traffic Volume Count Survey and PCE value for the traffic volume calculation.

Table 1.1: Traffic Volume Count Survey Schedule

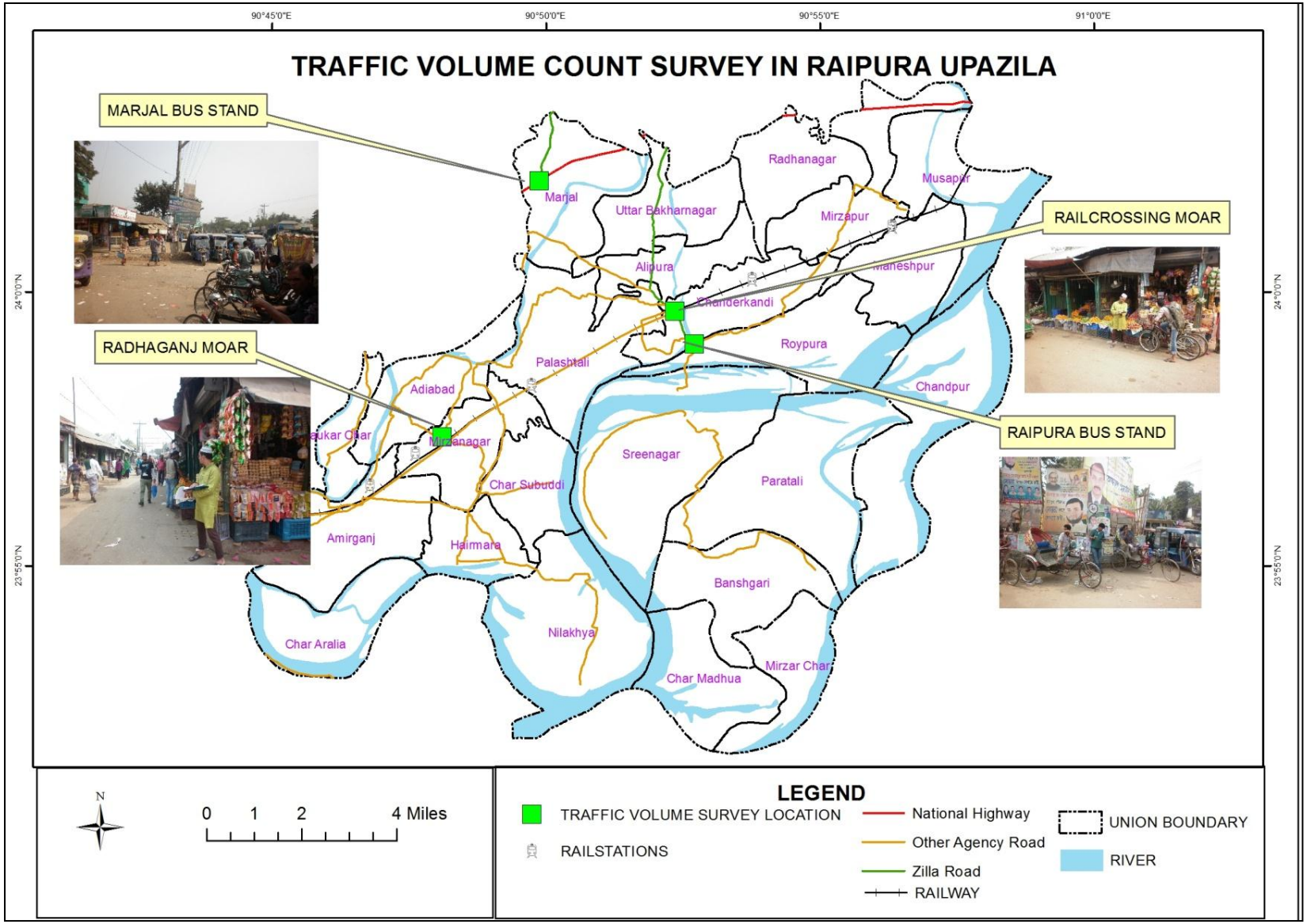
Intersection/ Segment Name		Working days
Intersections	Raipura Bus Stand	16/02/2016& 21/02/2016
	Marjal Bus Stand	17/02/2016& 22/02/2016
	Rail Crossing Moor, Srirampur	18/02/2016& 20/02/2016
	Radhaganj Moor	19/02/2016& 23/02/2016
Roadway Segments	Sapmara Bazar,Musapur	18/02/2016
	Hasnabad, Amirganj	19/02/2016

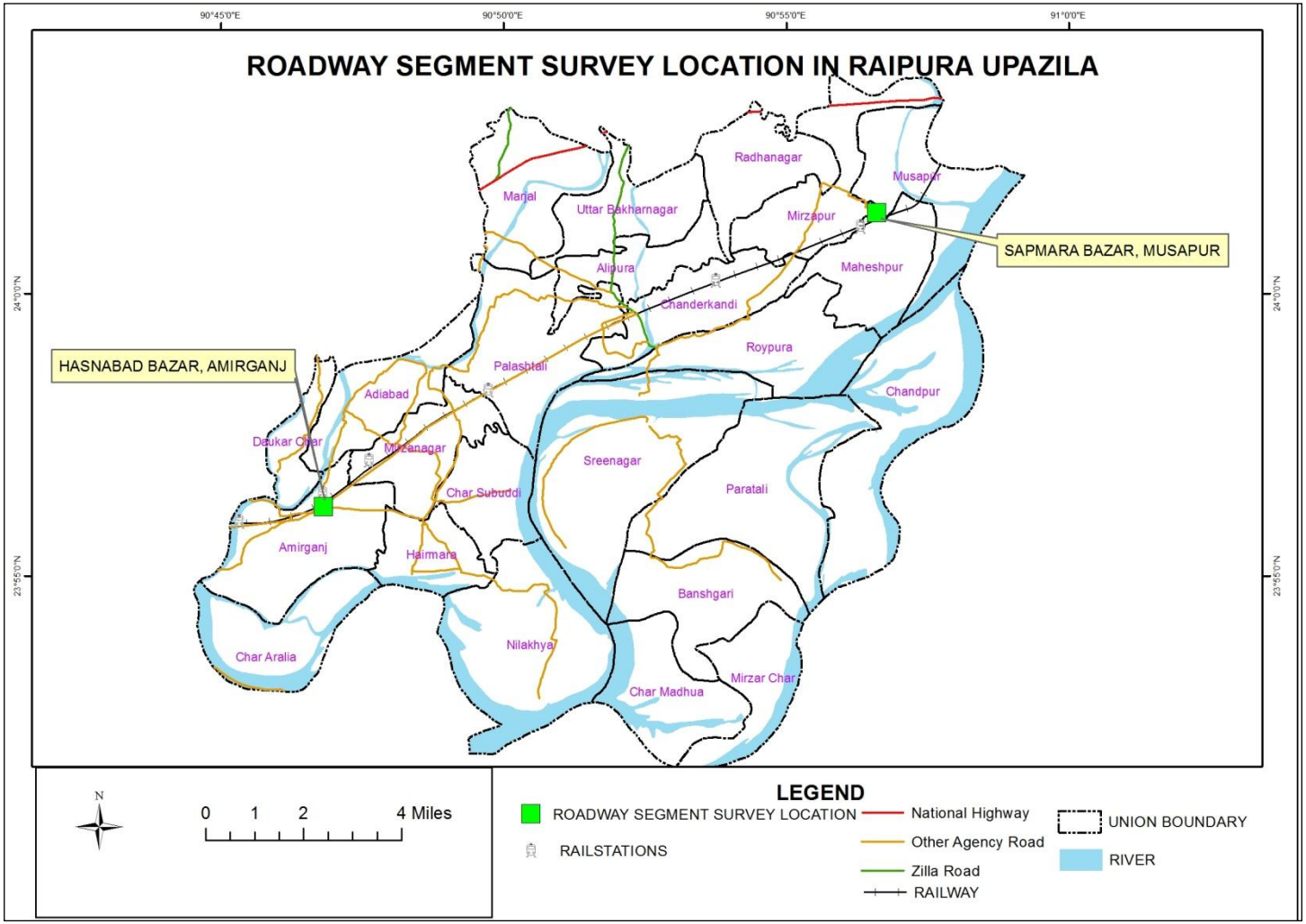
Table 1.2: Considered List of PCE value for various vehicles

Sl. No.	Vehicle Categories	PCE
1	Passenger Car	1.00
2	Light Goods Vehicle	1.00
3	Truck	3.00
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.

Map 1.1: Four Major Intersections for Traffic Volume Count Survey at Raipura upazila





Map 1.2: Roadway Segment Surveyed at Raipura upazila

✓ Origin and Destination (O D) Survey

Origin Destination (O-D) survey provides a detailed picture of the trip patterns and travel choices ofa 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.Origin Destination (O-D) Survey has been conducted using the standard format incessantly for 1 day (February16, 2016). The survey was accomplished by enumerators who were locally recruited and adequately oriented and trained by experienced supervisors. Three independent shifts having 2 enumerators and 1 supervisor each had given the responsibility to carry out the origin destination survey at some selected locations such as Raipura Bus Stand, Marjal Bus Stand, Rail Crossing moar, Srirampur etc. (Please see **Map 1.3**) The survey has carried out through random questionnaire according to the sample size.

✓ 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.Bus Passenger Interview Survey has been conducted using the standard format incessantly for 2 days at Marjal Bus stand, Raipura Bus station, Mill Ghat, Musapur and AlgiGhat,Methikanda Railway station, Raju ghat. The survey was accomplished by enumerators who were locally recruited and adequately oriented and trained by experienced supervisors.(Please see **Map 1.4**)

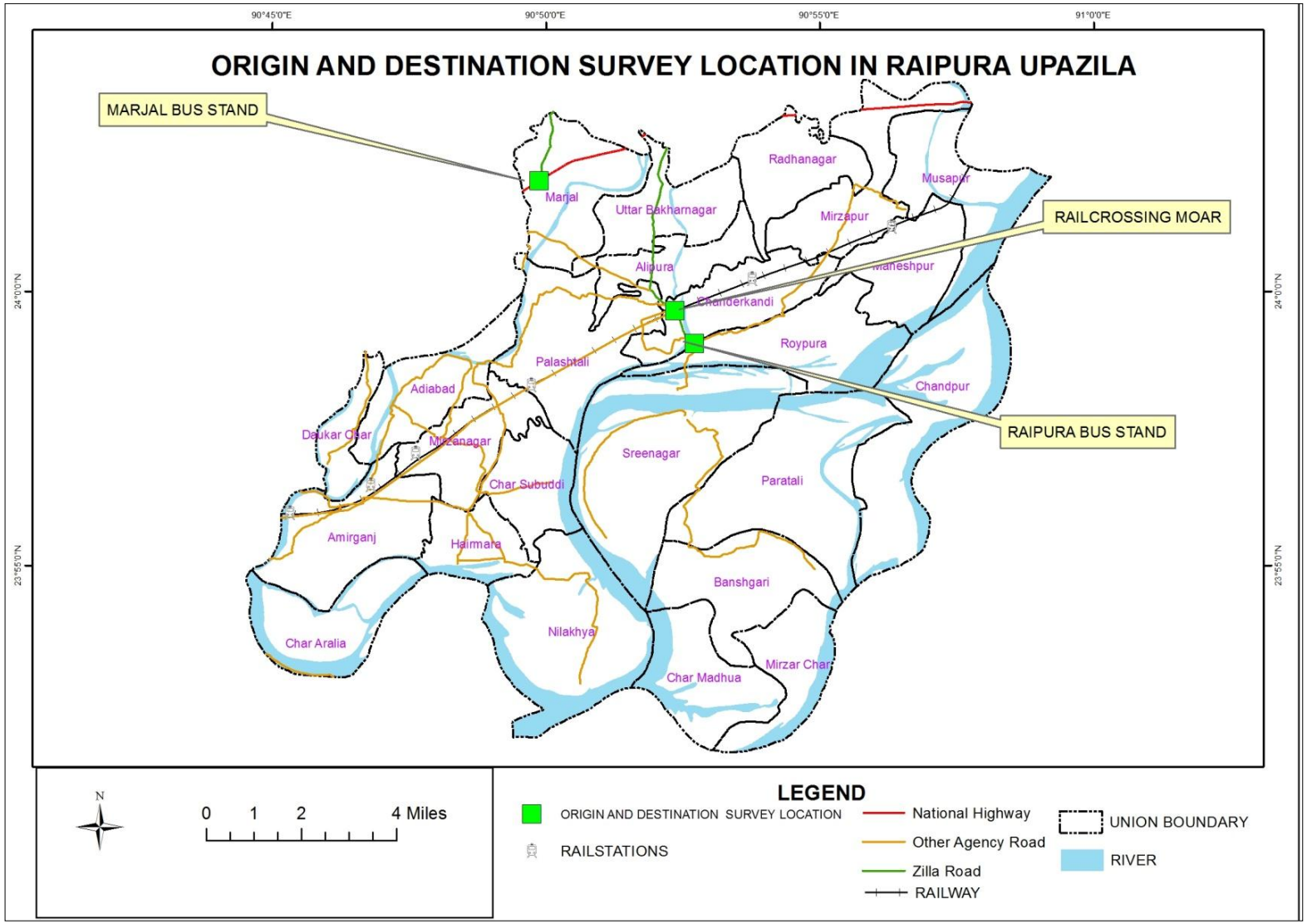
✓ Regional Transportation Network Survey

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:Marjal Bus stand, RaipuraBus station, Methikanda Railway stationand random questionnaire survey has been applied. (Please see **Map 1.5**)

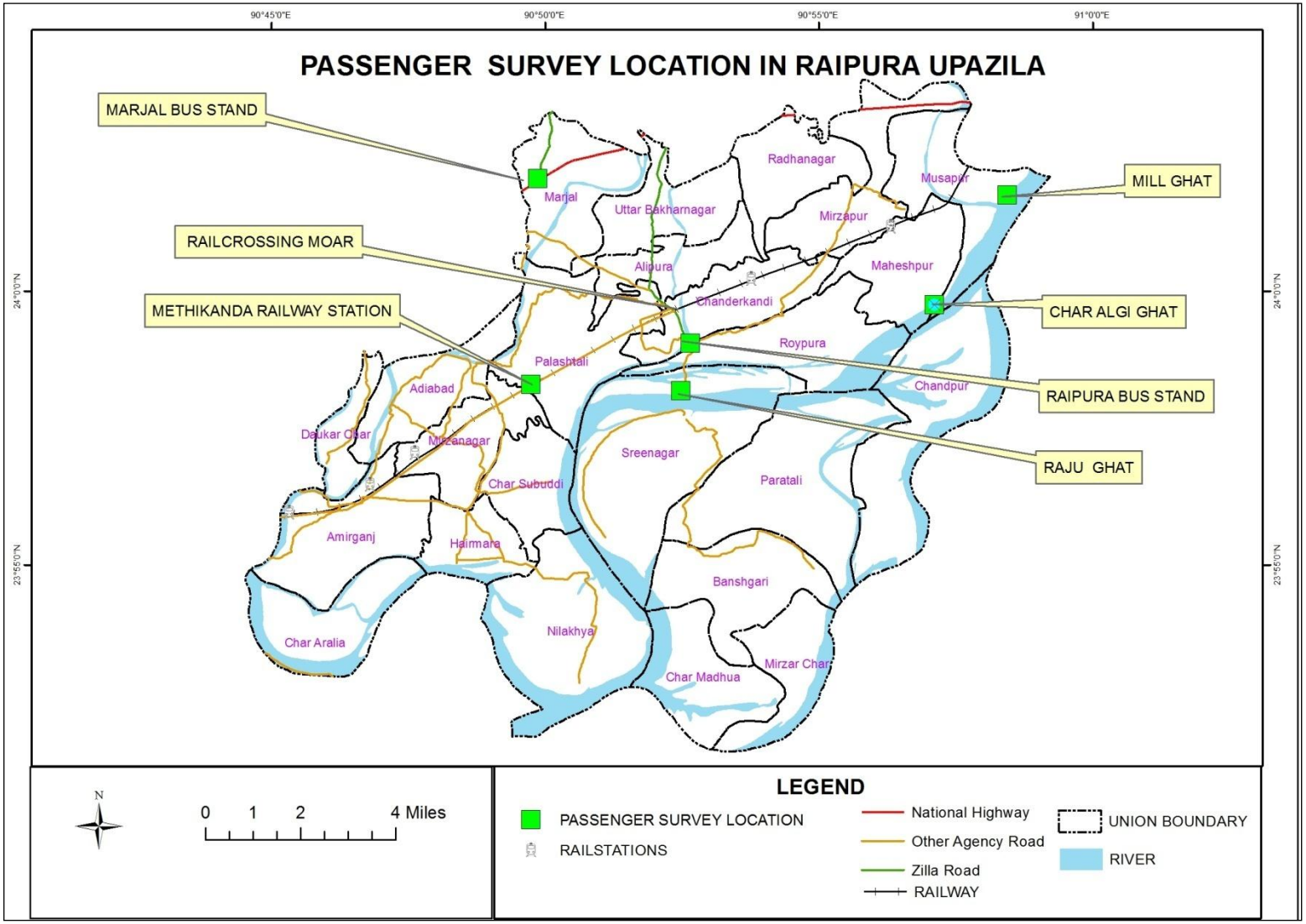
Table 1.3: Output and methodology of the conducted survey

Survey	Data	Methodology
Traffic Volume Count	Details of vehicle classification, fluctuation of flow, specific vehicular movements, road features, no. of vehicle per hour.	• Manual counting method • Hat Day and Non Hat Day • Peak Hour and Off Peak Hour
O-D survey	Origin zones, destination zones, internal and external origin and destinations.	• Simple Random Survey after determining the sample size. • Before conducting the interview, the questionnaire prepared for interviewing the travelers which is approved by UDD.

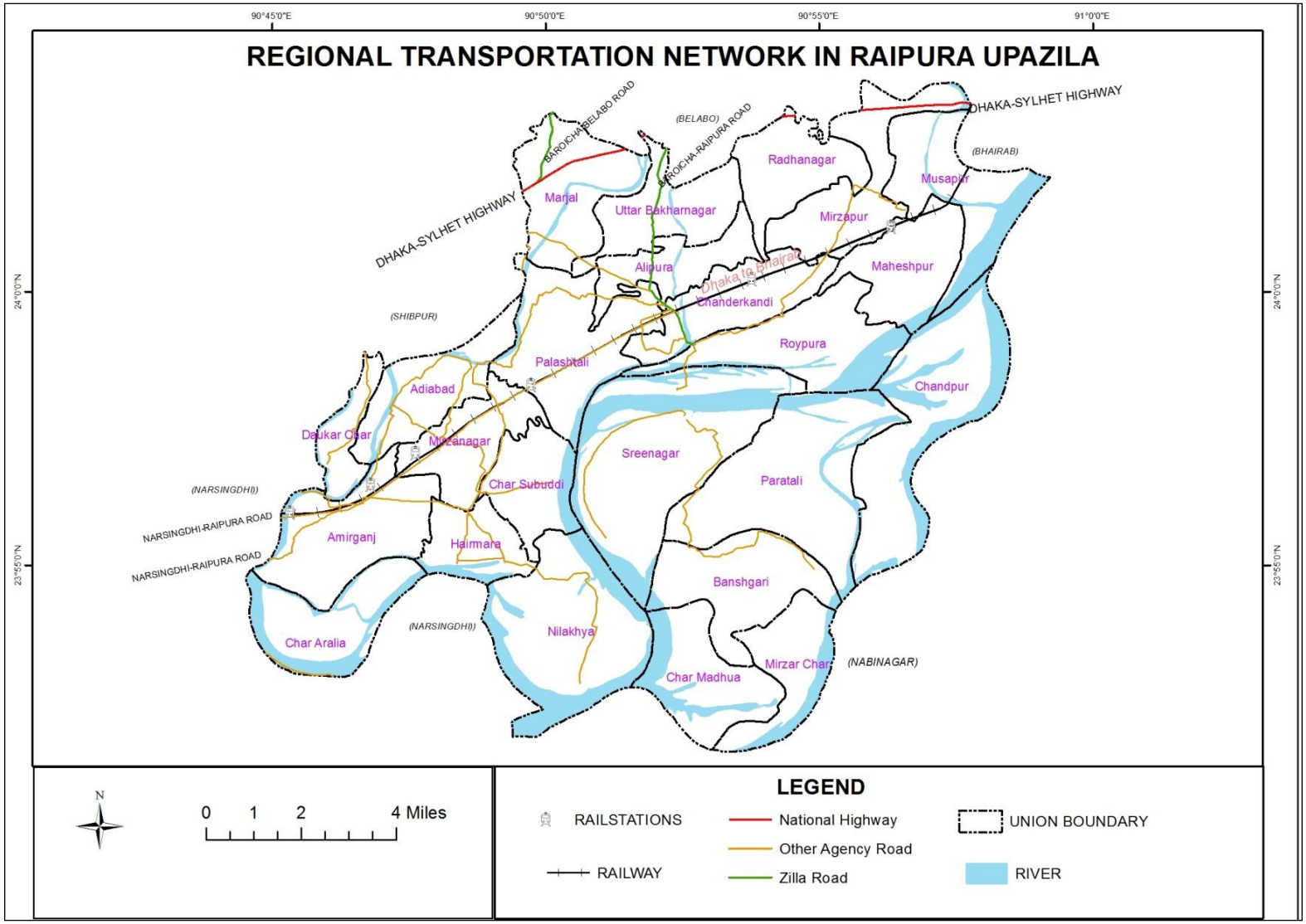
Passenger Interview Survey	Trip destination, trip purpose, mode of transport, cost, distance etc.	• Simple Random Survey • At first, the questionnaire has been prepared to cover all information required for the survey according to the TOR. • The questionnaire has been approved by UDD and finally a sample 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.	• Simple Random Survey after determining sample size through approved questionnaire. (Please see **Appendix-C** for approved Questionnaire Format of all transport Surveys)



Map 1.3: Origin and Destination (O-D) Survey



Map 1.4: Passenger Interview Survey



Map 1.5: Regional Transportation Network Survey

1.4 Formulation and Mobilization of Survey Team

1.4.1 Orientation &Meeting

In order to carry out various surveys related with traffic and transportation, at first an orientation program was held at RaipuraUpazila Office (16th February 2016) for giving a clear concept about the objectives of the project and different type of surveys. The Transport expert has attended the orientation program and Mr. UdaySankar Das (Senior Planner, UDD) was present on that orientation program on the behalf of UDD.

1.4.2 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 formats, time schedule of conducting survey, location of conducting survey etc.

1.4.3 Selectionof 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, Pedestrian, Passenger Survey etc. Major intersections, Major Roads, Bus Terminal and Railway Station have been identified for conducting different types of Survey. Details of survey locations have been given in corresponding type of survey.

1.4.4 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 RaipuraUpazila.

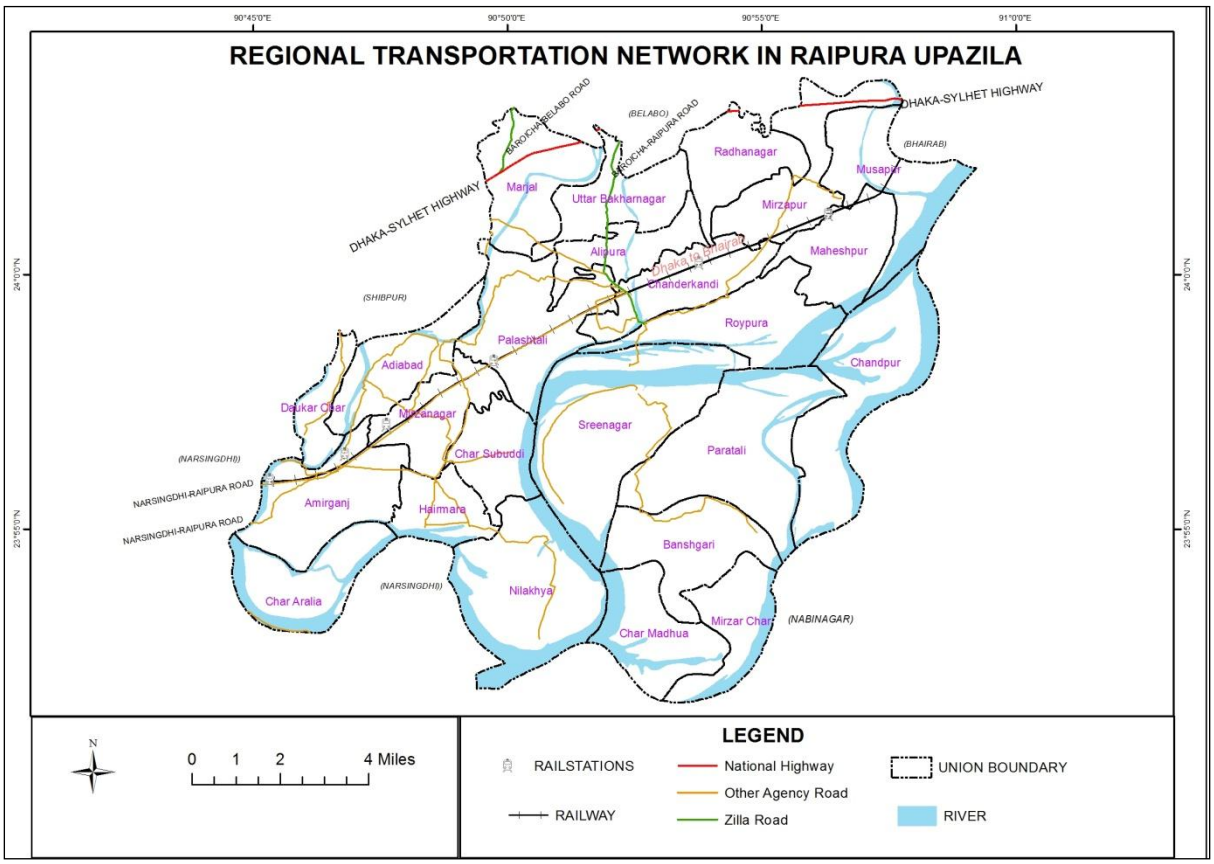
Table 1.4: List of members in Traffic and Transportation Survey

Sl. No.	Name	No.	Activities
1	**Transport Expert** Dr. Md. ShahidMamun	1	Planning, preparation of questionnaire and overall supervision of the survey activities and subsequent report preparation.
2	**Planner** K. M Abul Bashar	1	Training and supervision of field level activities.
3	Mustaq Ahmed & Md. Halim	2	Data base format preparation and supervision of data entry activities.
4	**Survey Supervisor** Md. RubayetHossain, Md. Tarek Khan, K. M Kawser Hamid &Ahmed Riyad	4	Inspection of Field Survey.
5	**Enumerators**	16	Field Survey
6	**Data Entry Operators**	10	Data Entry in Excel, Analysis and presentation in tabular format.

CHAPTER 2: EXISTING CIRCULATION NETWORK AND INFRASTRUCTURE

2.1 Regional Connectivity

RaipuraUpazila under the jurisdiction of NarsingdiDistrict occupies an area of 312.76sq. km. which is located between 23°52' and 24°04' north latitudes and between 90º44' and 90º59' east longitudes. The upazila is bounded on the north by Belaboupazilas on the east by Nabinagar and Brahmanbaria on the south by Narsingdisadarupazila, Nabinagar and Bancharampurupazilas and on the west by Shibpur and Narsingdisadarupazila. (BBS, 2012) The National Highway N-02 from Katchpur to Sylhet has passes over at northern part of the Upazila. It is well connected by National and Regional Highway originating from different Districts/Upazilas like Narsingdi, Bhairab, Palash, Ashuganj, Gazipur, Brahmanbaria etc. At present the national and regional highways are playing very important role in communication network. Besides the number of Zila roads and internal local roads are also providing regional connectivity. (Please see **Map 2.1**)

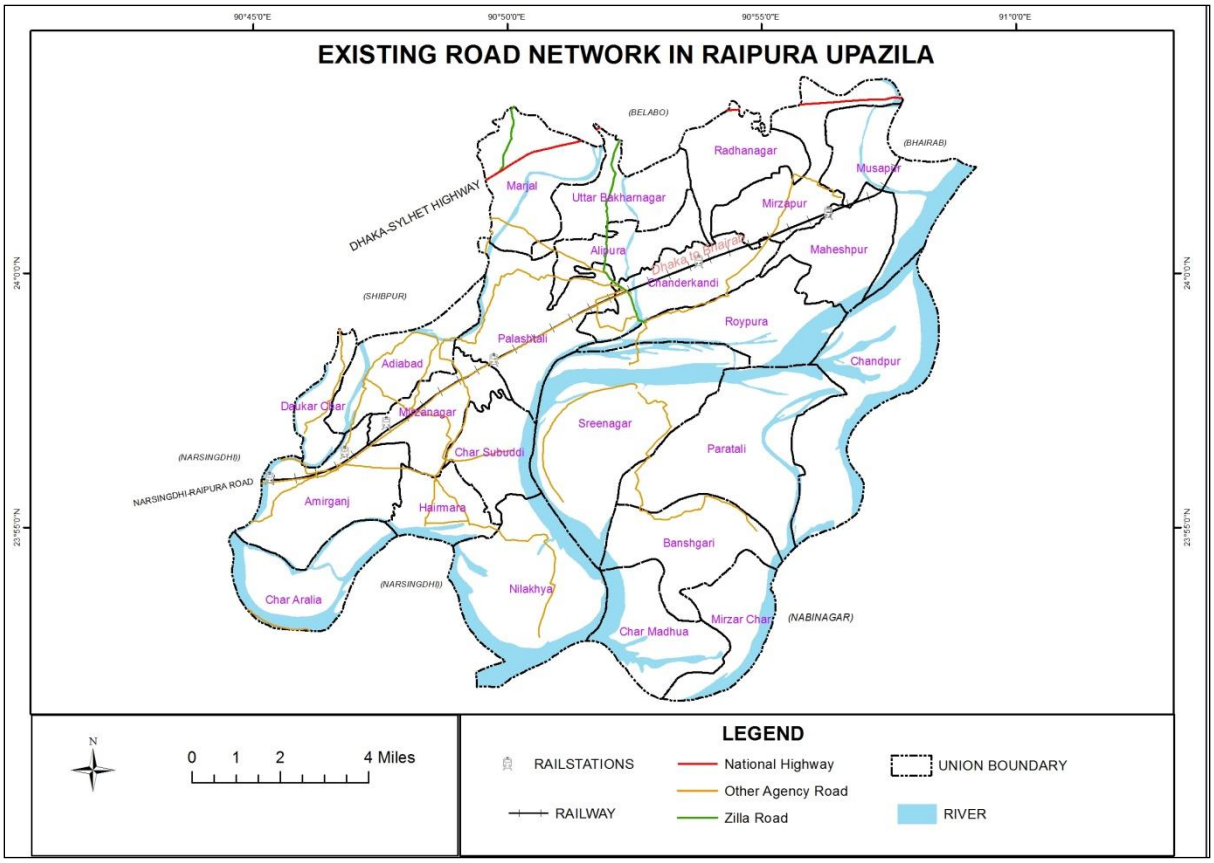


Map 2.1: Regional Connectivity

2.2 Road Network

2.2.1 Existing Road Network

Raipura Upazila has great significance in the context of road network. Regional Highway and Railway has gone through it which makes the Upazila Center more viable. The detailed road network has shown in **Map 2.2**. Which has been further updated by physical feature survey and shown in Table 2.1 and Table 2.2.



Map 2.2: Existing Road Network

Table 2.1: Road Length of RaipuraUpazila

Road	Length
Pucca Road	171.44 km
Semi Pucca Road	123 km
Mud Road	230 km
Railway	27 km
Waterway	28 nautical miles

Source: Physical Survey, 2016.

Table 2.2: Existing Road Infrastructure of RaipuraUpazila

Road Type	Earthen Road (km)	Pavement Road (km)	Total Length (km)
Upazila Road	10.15	80.09	90.24
Union Road	70.94	76.68	147.61
Village Road-A	331.73	67.70	399.42
Village Road-B	199.89	8.48	208.36

Source: Physical Survey, 2016.

2.2.2 Functional Classification of Road

Considering the significance of road function, the road will be classified into primary, secondary, collector and access road which will be revealed after the physical feature survey. Each category of road has its particular functions to perform. Access road carries traffic from buildings to the collector

road and collector road carry traffic to the major road and vice versa. In reality, however, it is almost impossible to maintain this hierarchical use of roads except in an entirely planned area.

2.2.3 Major Road Inventory of Raipura Upazila

The Regional Highway and several Zila Road has passed through RaipuraUpazila. The major roads of Raipura Upazila have shown in Table 2.3.

Table 2.3: Major Roads of RaipuraUpazila

Road ID	Name of the Road	Length of Road (km)
R114	Nayapur-Araihazar-Narsingdi-Raipura Road	55
Z3710	Netrokona-Bishiura-Raipura Road	27
Z8004	Munshiganj(Hatimara)-Kunderbazr-Srinagar (Sanbari) Road	20

Source: RHD, 2016.

2.3 Waterway Network

The main rivers are Meghna, Arial Khan and Old Brahmaputra flow through the upazila, but the water way is not viable in this Upazila.

2.4 Railway Network

Raipuraupazila is connected with the railway network. Daily train service connecting different Upazilas/ Districts to Narsingdiis available in RaipuraUpazila. There are 27km railway line and the name of stations are Methikanda, Amirganj, Khana Bari, Hathubanga rail station

2.5 Air Network

Raipura has no provision of air service.

CHAPTER 3: ANALYSIS OF SURVEY FINDINGS

3.1 Traffic Volume Count Survey

Traffic volume count survey has been done in four important intersections and two road way segments in RaipuraUpazila. As different areas have different impacts, the peak time and off peak time vary according to its activities. In study area, Monday and Friday (Please correct it) has marked as Hat Day. So, traffic volume count survey has been taken for two working days including Hat Day and Non Hat Day. The surveyed locations are given below:

- Raipura Bus Stand (Saturday and Tuesday)
- Marjal Bus Stand (Busy Intersection)
- Rail Crossing Moor, Srirampur (Saturday and Tuesday)
- Radhaganj Moor, (Tuesday)
- Sapmara Bazar,Musapur (Sunday, Monday, and Tuesday)
- Hasnabad, Amirganj (Wednesday)

3.2 Origin and Destination Findings

Origin and Destination Survey has been reflected different desired issues such as types of mode used in study area, origin and destination pattern, behavior etc. The output of the O-D Survey has been depicted in below paragraphs.

3.2.1 Trip Distribution Pattern

The number of O-D survey has been carried out 43 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 tables 3.1 represent the trip distribution pattern of RaipuraUpazila respectively within Unions and other Upazilas/Districts.

Table 3.1: Origin Destination Matrix within Unions of Raipura Upazila

Origin \ Destination	Alipura	Chanderkandi	Morjal	Palashtoli	Paurashava	Raipura	Adiabad	Total
Alipurai	0	0	1	0	0	0	0	1
Chanderkandi	0	0	0	4	1	1	0	6
Morjal	0	0	0	0	1	1	0	2
Palashtoli	0	0	0	0	1	0	0	1
Paurashava	1	1	0	0	0	2	2	6
Raipura	0	0	0	1	3	0	0	4
Adiabad	0	1	0	0	0	0	0	1
Total	1	2	1	5	6	4	2	21

Source: Traffic and Transportation Survey, 2016.

From the above table, it has been seen that people travel main center of the Upazila from almost every union. On the survey day, People from Chanderkandi Union travel most at the selected survey locations. People are commuting most in Paurahsava and Palashtoli which reflects that Paurashava is marked as Origin and Destination most numerically 6. And Raipura Union has also same importance in case of Origin and Destination Point.

Table 3.2: Origin Destination Matrix surrounding Upazilas/Districts of Raipura Upazila

Origin \ Destination	Bhairab	Brahmanbaria	Dhaka	Narayanganj	Narsingdi	Netrokona	Habiganj	Kendua	Kishoreganj	Mymensingh	Sylhet	Total
Bhairab	0	0	3	1	1	0	0	0	0	0	0	5
Brahmanbaria	0	0	0	0	0	0	0	0	0	0	0	0
Dhaka	0	1	0	0	0	1	0	0	0	0	1	3
Narayanganj	0	0	2	0	0	0	0	0	0	0	0	2
Narsingdi	0	0	0	0	0	0	0	0	0	0	0	0
Netrokona	0	0	0	0	0	0	0	1	0	0	0	1
Habiganj	0	0	1	0	0	0	0	0	1	0	0	2
Kendua	0	0	1	0	0	0	0	0	0	1	0	2
Kishoreganj	0	0	1	0	0	0	0	0	0	0	0	1
Mymensingh	0	0	1	0	0	0	0	0	0	0	0	1
Sylhet	0	0	1	0	0	0	0	0	0	0	0	1
Total	0	1	10	1	1	1	0	1	1	1	1	18

Source: Traffic and Transportation Survey, 2016.

The above matrix Table 3.2 represents that Dhaka has marked as Destination in most cases and people are using these Upazila to go their desired places. But people go different destinations from different origin points where Bhairab, Narsingdi, Narayanganj has origin frequency respectively 5, 2 & 2.

3.2.2 Mode Choice

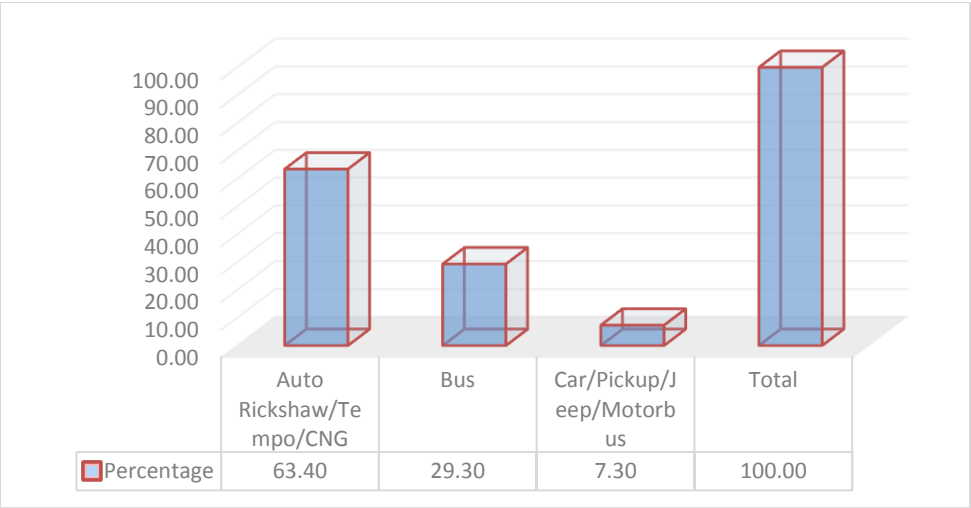


Figure 3.1: Types of Mode

Source: Traffic and Transportation Survey, 2016.

The above bar chart depicts the scenario of mode choices. From the Fig 3.1 it is visible that most of the people travel by auto Auto-Rickshaw/Tempo/CNG and the percentage is 63.40%. This percentage is the highest among others. Second most popular mode is Bus. About 29.30% people choose bus for travelling. Whereas the percentage of car/pickup/jeep/motorbus is very few which percentage is 7.30.

3.2.3 Purpose of Trip

Fig 3.2 displays the trip purpose. From the data it is visible that 98% passengers travel for work/commute purpose, whereas only 2% people travel for social purpose. The most significant purpose of trip is work/commute.

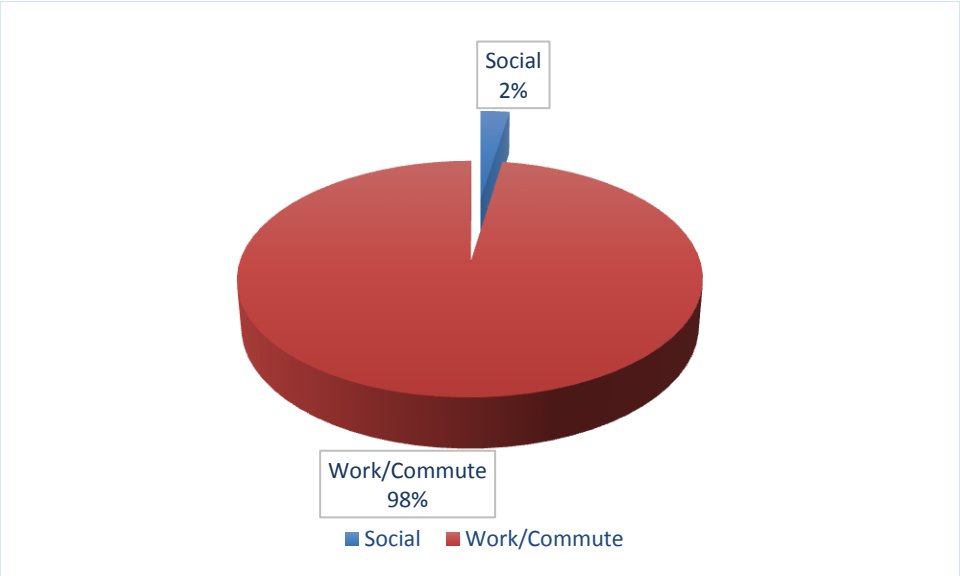


Figure 3.2: Trip purposes of surveyed respondents

Source: Traffic and Transportation Survey, 2016.

3.2.4 Origin Destination Behavior

Table 3.3: Mode Accessibility in Origin

Mode \ Origin Type			Type of Origin			Total
			Residence	Shopping	Workplace	
Vehicle Type	Auto Rickshaw/Tempo/CNG	Frequency	18	0	8	26
		Percent	69.20%	0.00%	30.80%	100.00%
	Bus	Frequency	200.00%	0.00%	1000.00%	1200.00%
		Percent	16.70%	0.00%	83.30%	100.00%
	Car/Pickup/Jeep/Motorbus	Frequency	200.00%	100.00%	0.00%	300.00%
		Percent	66.70%	33.30%	0.00%	100.00%
	Total	Frequency	2200.00%	100.00%	1800.00%	4100.00%
		Percent	53.70%	2.40%	43.90%	100.00%

Source: Traffic and Transportation Survey, 2016

From the survey, it has been shown that Auto-Rickshaw or CNG or Tempo has the highest demand which is 63.40% (Figure-3.1) where people using these vehicles to go their residence and workplace respectively 69.20 % and 30.80%. Bus is mainly used to go work place where 83.30% of total uses of bus are used for work place commuting and shown in Table 3.3.

Table 3.4: Mode accessibility in Destination

Mode \ Destination Type			Type of Destination			Total
			Residence	Shopping	Workplace	
Vehicle Type	Auto Rickshaw /Tempo/ CNG	Frequency	10	1	15	26
		Percent	38.50%	3.80%	57.70%	100.00%
	Bus	Frequency	0	0	12	12
		Percent	0.00%	0.00%	100.00%	100.00%
	Car/Pick up/Jeep/ Motorbus	Frequency	2	0	1	3
		Percent	66.70%	0.00%	33.30%	100.00%
	Total	Frequency	12	1	28	41
		Percent	29.30%	2.40%	68.30%	100.00%

Source: Traffic and Transportation Survey, 2016

From the above table 3.4, is can depict that Auto-Rickshaw or CNG or Tempo is used from the destination purpose of work place about 57.70%. And Car or Motorbus is used mostly for Residence purpose.

Table 3.5: Purposes of Trips by Origin Places

Origin	Work/Commute	Social	Total
Within Upazila	63.41	0	63.41
Within District	4.88	0	4.88
Outside District	29.27	2.44	31.71
Total	97.57	2.44	100

Source: Traffic and Transportation Survey, 2016

From the table 3.5, it has been seen that origin points are mostly located within Upazila where they used it for work purpose about 63.41%. Fewer travel in District about 4.88%. And outside of the Upazila, origin points are marked for work and social purposes respectively 29.27% and 2.44%.

Table 3.6: Purposes of Trips by Destination Places

Origin	Work/Commute	Social	Total
Within Upazila	53.66	0	53.66
Within District	24.40	0	24.39
Outside District	19.51	2.44	21.95
Total	97.56	2.44	100

Source: Traffic and Transportation Survey, 2016

From the table 3.6, it has been seen that destination points are fluctuated as same as Origin points. And People go their destination within Upazila most where they used it for work purpose about 53.66%. The others travel in district and outside of the Upazila respectively 24.39% and 21.95%.

3.2.5 Passengers Occupancy in different vehicle mode

Table 3.7: Passengers Occupancy according to the Mode

Mode \ Passengers Occupancy			No. of Passengers in a vehicle									Total
			Within 5 persons	6 to 10 persons	11 to 15 persons	16 to 20 persons	21 to 25 persons	26 to 30 persons	31 to 35 persons	36 to 40 persons	Above 40 persons	
Types of Mode	Auto Rickshaw/Tempo/CNG	Frequency	1	6	5	4	7	2	1	0	0	26
		Percent	3.80%	23.10%	19.20%	15.40%	26.90%	7.70%	3.80%	0.00%	0.00%	100.00%
	Bus	Frequency	0	0	1	0	0	1	1	7	2	12
		Percent	0.00%	0.00%	8.30%	0.00%	0.00%	8.30%	8.30%	58.30%	16.70%	100.00%
	Car/Pickup/Jeep/Motorbus	Frequency	0	1	1	0	1	0	0	0	0	3
		Percent	0.00%	33.30%	33.30%	0.00%	33.30%	0.00%	0.00%	0.00%	0.00%	100.00%
	Total	Frequency	1	7	7	4	8	3	2	7	2	41
		Percent	2.40%	17.10%	17.10%	9.80%	19.50%	7.30%	4.90%	17.10%	4.90%	100.00%

Source: Traffic and Transportation Survey, 2016.

The graph shows that passengers mostly choose those vehicles which can hold a medium number of passengers. Table3.7 shows that 6 to 10 persons are willingly to travel and the percentage is 33.3%. 22.2% people travel by those vehicles which can hold above 40 persons.

3.2.6 Major Prioritized Problems

The Fig 3.3 depicts the opinion of passengers related to the problems faced by them during travel. First of all, there are six categories of opinions for the improvement of current situation which are roads have to be repaired or improved, traffic jam should be reduced, gas station should be available,

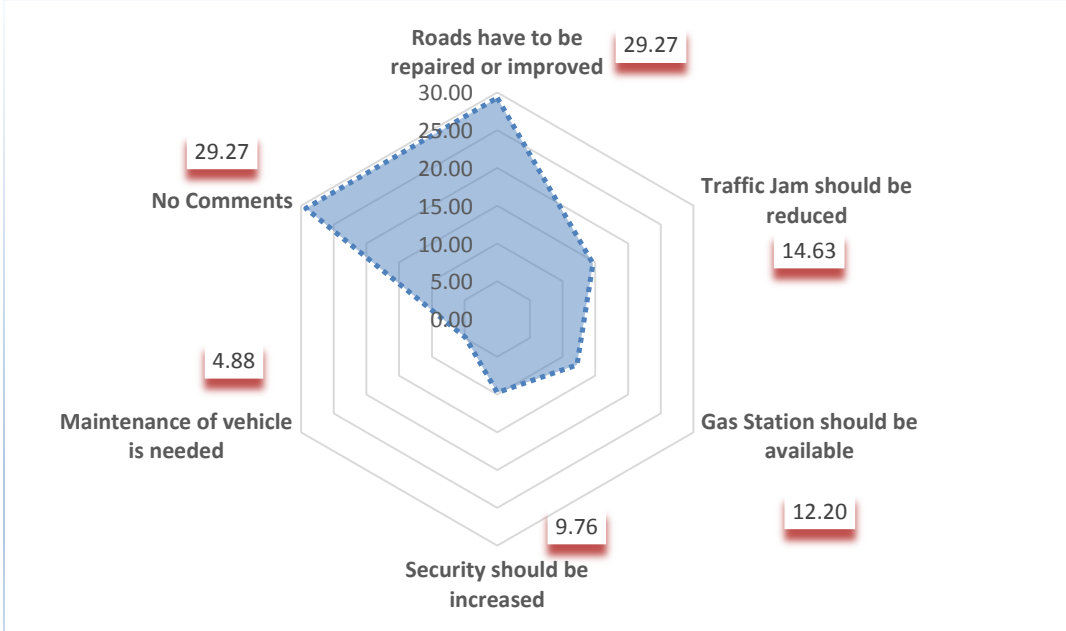


Figure 3.3: Identifications of Problems

Source: Traffic and Transportation Survey, 2016.

security should be increased, maintenance of vehicle is needed and the rest one is no comments. The outcome shows that mostly passengers are pointing that roads have to be repaired which percentage is 29.27%. At the same time 29.27% people remain silent.14.63% people think that traffic jam should be reduced.12.20% are in the support of availability of gas station, 9.76% are supporting security should be increased.4.88% people think that vehicles should be maintained properly.

3.3 Passenger Interview Survey Findings

Passenger's Interview Survey has been conducted for Bus, Boat and Train. As people mostly travel by bus, the findings reflect the about the transport communication through bus. The findings are when people prefer buses, travel cost, travel distance, types of modes for getting into buses through Bus terminal or bus stoppages.

3.3.1 Age group according to the Gender

From the Table 3.8, it has been shown that survey has been covered different age groups of male and female. As male persons commute regularly they have been achieved large percentage where male are surveyed about 80%. And 21 to 40 aged male persons have been surveyed more than 65%.

Table3.8 :Age Sex Structure of the Respondents

Age (years)	Sex				Total	
	Male		Female			
	Number	%	Number	%	Number	Percent
Below 15	1	1.03	0	0	1	0.83
16-20	10	10.31	3	12.5	13	10.74
21-30	37	38.14	6	25	43	35.54
31-40	28	28.87	6	25	34	28.11
41-50	12	12.37	5	20.83	17	14.05
Above 51	9	9.28	4	16.67	13	10.74
Total	97	100	24	100	121	100
Percent	80.12		19.88		100	

Source: Traffic and Transportation Survey, 2016.

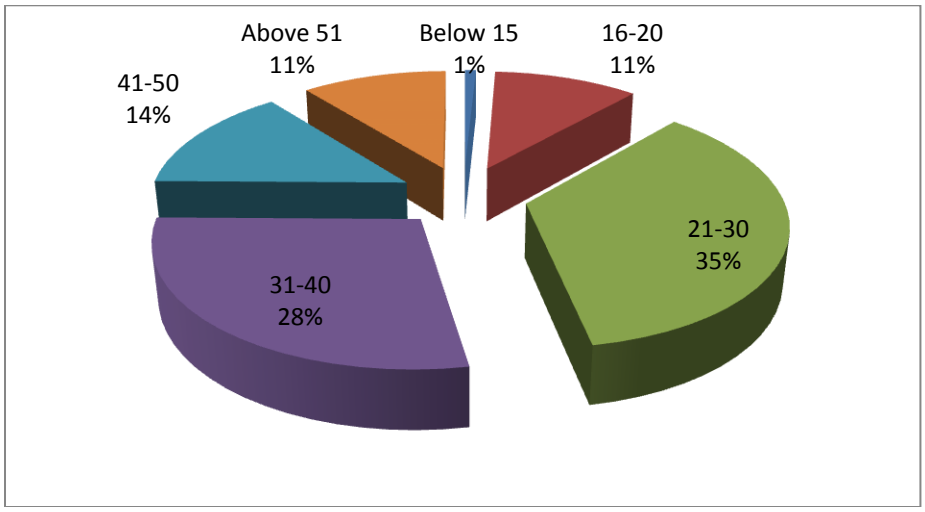


Figure 3.4: Percentages of Age Groups

Source: Traffic and Transportation Survey, 2016.

The Pie chart (Fig 3.4) shows that the survey has been covered a significant age level. The survey has covered more than 60% in age group of 20 to 40. But in the group of 20 to 30 aged people they have surveyed 35%. As below 15 aged youngsters do not convey sufficient data, they have surveyed fewer percentages.

3.3.1 Trip Purpose

The chart displays the trip purpose. From the Table 3.9 it is visible that 38.84% passengers travel for Work purpose, 20.66% for Business and 19.83% for Social. The percentages of these three purposes are significant than the others such as education, treatment and recreation. And more people travel every day. From the table, more than 50% people are made 6 trips per week. In total, more than 70 % trips per week made by people have been come from more than 3 trips.

Table 3.9: Trip Purposes according to the Trip Frequency

Trip Purposes	No. of Trips in a Week						Total	
	1 trip	2 trips	3 trips	4 trips	5 trips	6 trips	Frequency	%
Work/commute	1	1	1	3	5	36	**47**	**38.84**
Business related	5	2	3	3	4	8	**25**	**20.66**
Shopping	1	2	1	1	1	3	**9**	**7.44**
Education	1	0	2	1	1	1	**6**	**4.96**
Social	1	1	1	4	5	12	**24**	**19.83**
Hospital	0	1	0	0	0	0	**1**	**0.83**
Recreation	7	2	0	0	0	0	**9**	**7.44**
Total	**16**	**9**	**8**	**12**	**16**	**62**	**121**	**100**
Percentage	**13.22**	**7.44**	**6.61**	**9.92**	**13.22**	**51.24**	**100**	

Source: Traffic and Transportation Survey, 2016.

3.3.2 Types of Mode

The chart represents the types of modes that are used by the passengers. From the Fig 3.5 it is visible that people most frequently travel by rickshaw and which frequency is 38. The second vehicle which is frequently used by passengers is boat and third one is by bus. (Please see **Appendix-B**)

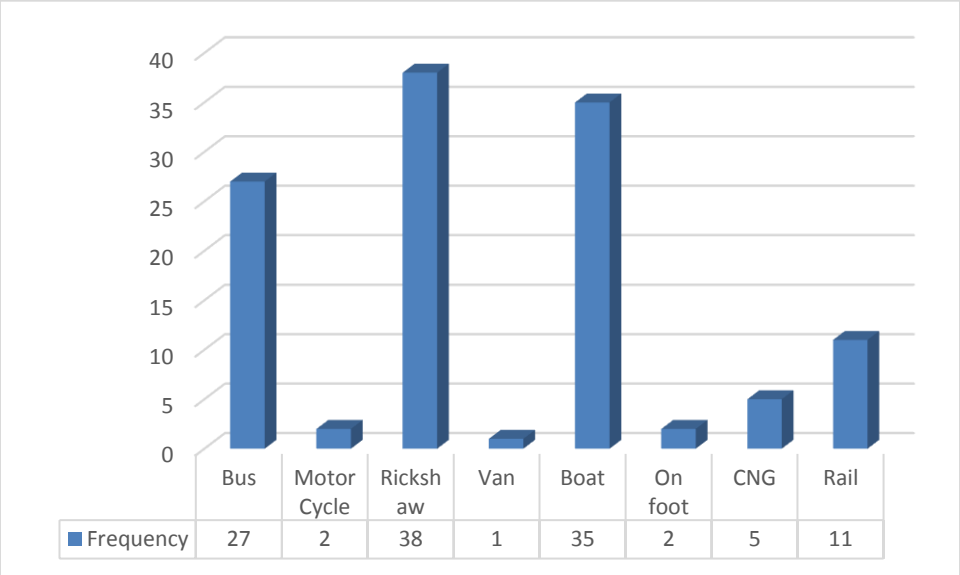


Figure 3.5: Types of Mode

Source: Traffic and Transportation Survey, 2016.

3.3.3 Trip Distribution by Passengers

The above chart represents the percentage of trips per day, month and year by the passengers. From the Fig 3.6, it has been seen that people travel for their purposes irregularly. Few people travel everyday which is 19% of the respondents. 19% people travel more than 3 times per day. 12% travel randomly in one month and 5% travel randomly in year.

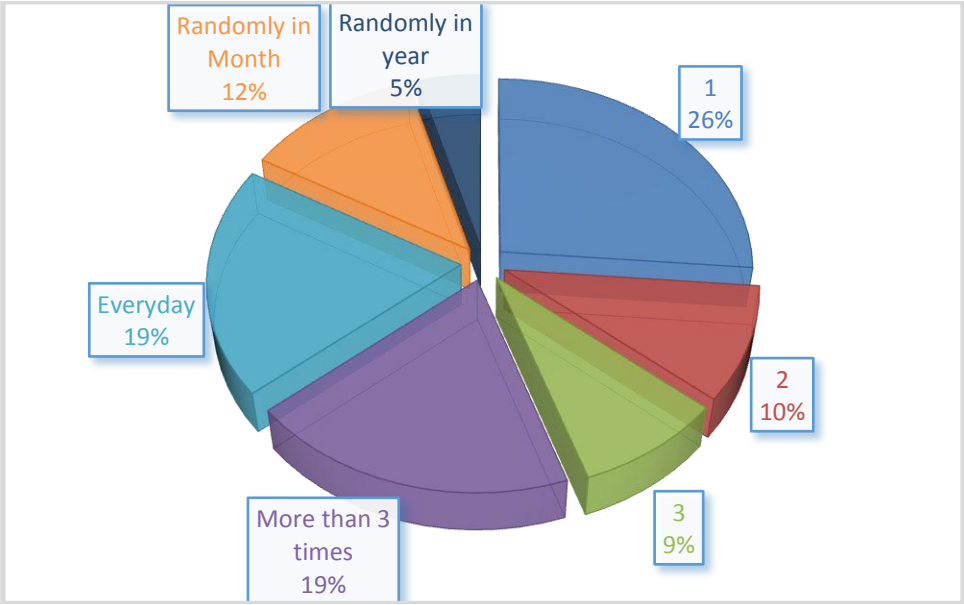


Figure 3.6: Trip Frequency

Source: Traffic and Transportation Survey, 2016.

3.3.4 Trip Purpose according to the Age Group

The people travel places for different purposes. Their trip purposes are varied according to their age range. From the cross Table 3.10, it is clear that where and what types of aging people mostly involve in travelling. It is seen that 16-20 year's age group travel due to education which percentage is 50% and only 16.70% of this age group travel for business related and social purposes respectively.21-30 age group 59.10% people travel for work. It is significant that only this age group travel for work with this huge percentage.31-40 age group travel for business purposes which percentage is 28.60 and 25.70% people travel for social and work purposes respectively. 41-50 age group people travel for business purpose which is 26.70%. Above 51 year's people travel for recreation, social and work purposes. 57.10% of this age group travel for work purposes which is mostly significant in this age group.

Table 3.10: Trip Purpose according to the Age pattern

Age \ Trip Purpose			Business related	Education	Hospital	Recreation	Shopping	Social	Work/Commute	Total
Age pattern	16-20 Years	Frequency	2	6	0	0	1	2	1	12
		Percentage	16.70%	50.00%	0.00%	0.00%	8.30%	16.70%	8.30%	100.00%
	21-30 Years	Frequency	5	2	0	2	3	6	26	44
		Percentage	11.40%	4.50%	0.00%	4.50%	6.80%	13.60%	59.10%	100.00%
	31-40 Years	Frequency	10	0	1	2	4	9	9	35
		Percentage	28.60%	0.00%	2.90%	5.70%	11.40%	25.70%	25.70%	100.00%
	41-50 Years	Frequency	4	0	0	2	0	5	4	15
		Percentage	26.70%	0.00%	0.00%	13.30%	0.00%	33.30%	26.70%	100.00%
	Above 51 years	Frequency	1	0	0	3	0	2	8	14
		Percentage	7.10%	0.00%	0.00%	21.40%	0.00%	14.30%	57.10%	100.00%
	Below 15 Years	Frequency	0	0	0	0	1	0	0	1
		Percentage	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
	Total	Frequency	21	8	1	9	9	24	48	121
		Percentage	17.40%	6.60%	0.80%	7.40%	7.40%	19.80%	39.70%	100.00%

Source: Traffic and Transportation Survey, 2016.

3.3.5 Travel Cost according to the Distance

Table 3.11: Travel Distance with Travel Cost

Travel Distance (km)	Travel Cost in Taka					Total	
	< 20	20 to 40	41 to 60	61 to 80	> 80	Frequency	Percent
Less than 5	26	12	7			45	37.19
5 to 15	4	13	10	1	7	35	28.93
16 to 30		1	4		5	10	8.26
31 to 50			5			5	4.13
More than 50	1	3	1	1	20	26	21.49
Total	31	29	27	2	32	121	100
Percent	25.62	23.97	22.31	1.65	26.45	100.00	

Source: Traffic and Transportation Survey, 2016.

There is a relation between travel distance and travel cost. 26 passengers pay less than20 takas to travel less than 5 km and 12 passengers pay 20 to 40 tk. The table also represents that 37.19% travel less than 5 km which is the highest among the other distances. To travel more than 50km 20 passengers pay less than 80 Tk and which percentage is 21.49%. Form the table 3.11 it can be summarized that most of people travel less than 5 km.

3.3.6 Gender and trip productions per week

Table 3.12: Travel Distance with Travel Time

Travel Distance (km)	Travel Time in Hour					Total	
	< 0.45	0.45-1.30	1.31-2.30	2.31-3.30	> 3.30	Frequency	Percent
Less than 5	36	9	1	1		47	**38.84**
5 to 15	13	19		3		35	**28.93**
16 to 30	2	5	2	1		10	**8.26**
31 to 50			2	1		3	**2.48**
More than 50	1	4	2	6	13	26	**21.49**
Total	**52**	**37**	**7**	**12**	**13**	**121**	**100.00**
Percent	**42.98**	**30.58**	**5.79**	**9.92**	**10.74**	**100.00**	

Source: Traffic and Transportation Survey, 2016.

The data of the table 3.12 depicts that people generally travel to nearest places which takes less time. In case of less than 5km distance 38.84% people travel and which takes time less than 0.45 hour. In case of 5 to 15 km distance 28.93% people travel and their travel time is less than 045 hour and .45-1.30 hour respectively. When people travel to more than 50km distant places the travel time varies.

3.3.7 Frequency of Modes

The table 3.13 represents the data of using different types of modes with frequency and percentage. To finish a trip, the passengers may use more than one mode. 25.62% passengers use 1 mode to reach to their destination, 41.32% and 33.06% passengers use 2 and 3 modes respectively.

Table 3.13: No of Modes Used to Complete a Trip

No. of Modes	Frequency	Percentage
1	31	25.62
2	50	41.32
3	40	33.06
Total	121	100

Source: Traffic and Transportation Survey, 2016.

3.3.8 Problems in respect of Bus Passengers

The Table shows the different opinions of different people. Most of passengers think that they are facing problems during travelling due to narrow roads and their percentage is 33.88%. 11.57% people support that local and slow bus service is the probles.14.05% people think that ghat condition should be good. 12.40% passengers support that their problems can be solved if vehicle fare can be reduced.5.79% think lack of infrastructure and traffic jam are the problems. According to the priority list if those problems can be solved the passengers may get a better service.

Table 3.14: Major Problems in Transportation

Comments	Number	Percentage
Narrow road	41	33.88
Local and slow bus service	14	11.57
Lack of infrastructure (bridge, culvert, etc.)	7	5.79
Traffic jam	7	5.79
Ghat Condition should be good	17	14.05
Vehicle fare should be reduced	15	12.40
No Comments	20	16.53
Total	121	100

Source: Traffic and Transportation Survey, 2016.

3.4 Regional Transport Survey

Regional transport network survey has been done for Buses, Trucks and Trains 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.

Regional Bus Survey has been carried out in Marjal Bus Stand. Most of the buses has more than 35 persons carrying capacity. Buses are originating and commuting in different areas. Trucks are coming into study area or going out form study area for goods carrying purposes such as vegetables, agricultural products like paddy; departmental products etc. (Please see **Appendix-B**)

Train service has been applied in schedule basis at RaipuraUpazila. Several trainsare available in RaipuraUpazila. These trains are creating 1 trip per day. People travel the designated places according to the train schedule. (Please see **Appendix-B**)

CHAPTER 4: FINDINGS FROM PRA AND SOCIO ECONOMIC ABOUT TRANSPORTATION

4.1 Findings from Socioeconomic survey

4.1.1Mode of Communication

As there are very limited number of waterways are available almost all of the households' main mode of communication is road. Some of the rural people also traveled using waterways, whereas about no urban people use it (please see Figure: 4.1).

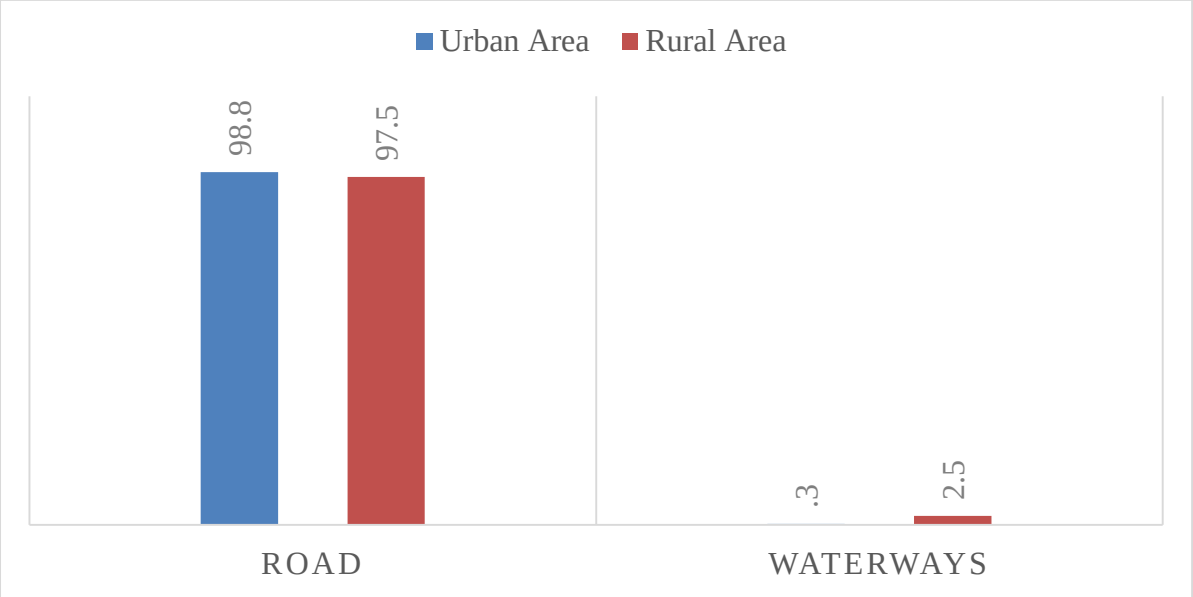


Figure 4.1: Mode of Communication (Source: Field Survey, 2015)

4.1.2Types of Road

In urban area about more than half (54%) of total road is bituminous road. Approximately one fourth of total urban road are also made with concrete. On the other hand, about half of total rural road are katcha. Percentage of road made with bituminous or concrete is also significantly low than urban area. In rural area a significant percentage of roads are katcha that represents the fact that some steps could be taken for the development of these road. Overall, road condition of this Upazila is not satisfactory, and the rural road condition is far worse than urban road (please see Figure: 4.2).

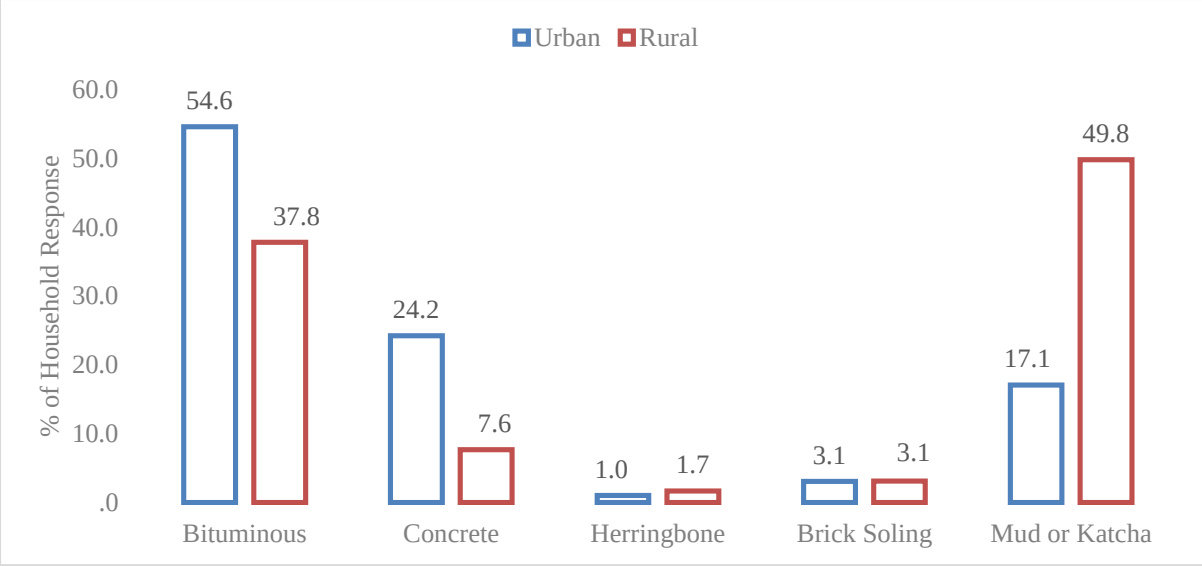


Figure 4.2 :Types of Road (Source: Field Survey, 2015)

4.1.3 Mode of Access to Main Road

It has been found that about two third of total households in urban and rural area got access to main road through narrow footpath, and the percentage is about the same for both of areas. In rural and urban area approximately one fourth of the total households went to main road by *Halot* and in urban area, more people used it to get access to main road than rural area.. (please see Figure: 4.3).

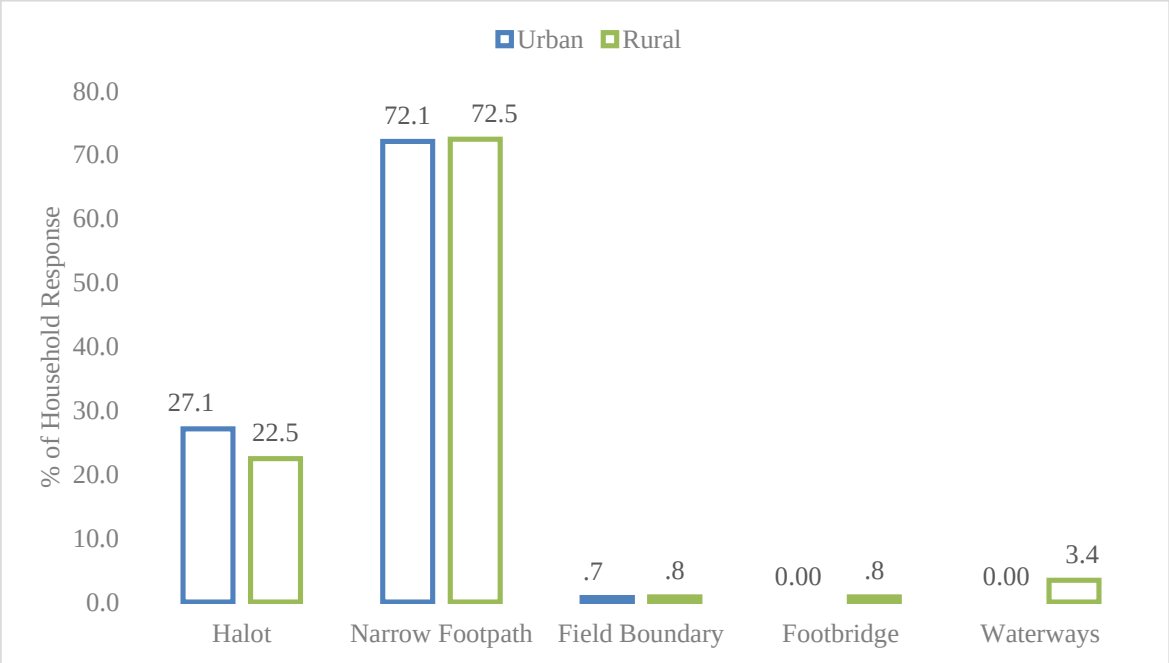


Figure 4.3 : Mode of Access to Main Road (Source: Field Survey, 2015)

4.1.4 Condition of Road

In urban area of this Upazila roads are seem to be in good position than urban area. About half of total urban households said that the roads are in good position, though among rest of the roads about 40% are deteriorated and about 7% are destroyed. On the other hand in rural area more than half (about 57%) of total roads are in deteriorating position. Though one-fourth of total urban roads are in good

position, the percentage is very low regarding total amount of road. Again, there are higher percentage of roads having waterlogging related problem than urban area. About more than 15% of rural roads are facing waterlogging related problem, whereas for this problem, the percentage for urban area is about the half of rural. This represents the situation that there is not enough maintenance for urban roads.In a nutshell, it can be easily understood that enough maintenance of road is not present in both of rural and urban area. But the condition in rural area is worse than urban area (please see Figure: 4.4).

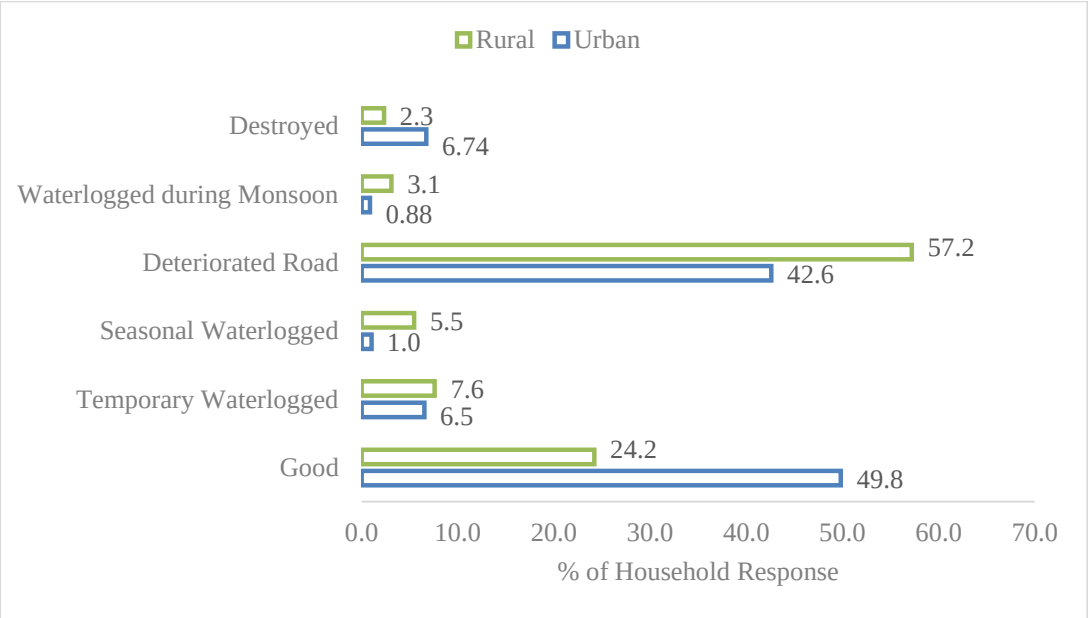


Figure 4.4: Condition of Road Source: Field Survey, 2015

4.1.5 Maintenance of Road

As from the previous section discussion, it has been proved that enough road maintenance has not been carried out in both of urban and rural area, the below Figure: 4.5 again proved that. Only for about 10% roads get maintenance annually. For more than about 80% of roads get irregular maintenance or get maintenance after extremely damaged. The percentage is almost same for both of urban and rural area which states the fact that both of urban and rural area, roads are not enough maintained. Thus, it can be said that effective regular maintenance should be carried out in both of urban and rural area by the responsible authorities

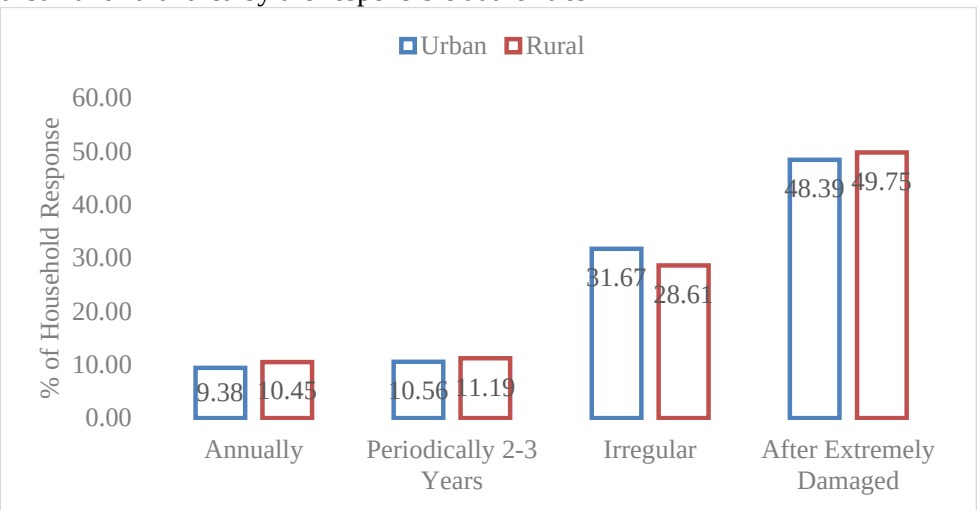


Figure 4.5 : Maintenance of Road (Source: Field Survey, 2015)

4.2.0 Findings from PRA

PRA (Participatory Rural Appraisal) is an innovative approach to empower the people by sharing information and making decisions regarding the Development Project and 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. In the PRA Session, different types of problems have identified where transportation problem was significant.

The findings related to traffic and transportation of the PRA Session of Raipura Upazila are summarized below:

- Weak Transportation system (broken road)
- No Road light
- Good Rail line
- Demand of development of transportation system
- Poor transportation

CHAPTER 5: CONCLUSION

The findings from transport and traffic management survey are of vital issue in preparing master plan for the study area. The survey reveals that no public or private bus service is available for intra-city movement. Rickshaw/van, bicycle and motorcycles are common prime modes for intra city movement. Water transport network has no significant importance in carrying out both passenger and goods in Raipura. The survey results of the Transportation and Traffic Management has become the basis for further analysis and interpretation in the process of preparing master plan for Raipura Upazila. In future, care should be taken not only to the conditions of the roads and vehicles but also to the traffic management. Transport study provides special attention to urban transportation planning as it greatly influences the location decisions and travel behavior of people, goods and services. Transportation is critical for the efficiency of towns contributing to their productivity and economic growth. A good network of roads and other transportation mode coupled with an efficient transport management system makes a substantial contribution to the "working efficiency" of cities and towns and enables them to become catalysts for social and economic development. On the other hand, the impact of a poorly designed urban transport system is manifested in terms of traffic congestion, delays, accidents, high energy consumption, high pollution of the environment and inequitable access to services. A well-planned transportation system results in orderly urban growth, greater use of urban public transport, lower vehicular pollution, and shorter auto trips. A comprehensive transportation study is undertaken to investigate the existing transportation infrastructure, transportation modes and modal share scenario of Raipura Upazila. Accordingly, the transportation study is conducted to determine the present travel patterns and the characteristics of existing transportation facilities to forecast the future travel demand and develop a transportation plan.

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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

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
(PAGKAGE-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: From ……to……. 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: From ……to…….

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: …… Name of Supervisor: …….
Signature of Enumerator: …… Signature of Supervisor: ……...

JV of SCPL-ABL

Urban Development Directorate

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS (PACKAGE: 02): UDD

Pedestrian 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. Total distances of the trip? ..... (In k.m.)

H. Any comments on transportation? .....

Name of Enumerator: ..... Name of Supervisor: .....…….

Signature of Enumerator: …….. Signature of Supervisor: ....……

TRAFFIC VOLUME CALCULATION

A) Morjal Bus Stand (Intersection)

Table A-1: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Sylhetlink on Non Hat Day, 17thFebruary, 2016at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Sylhet-Narsingdi	Narsingdi-Sylhet	Sylhet-Belabo	Belabo-Sylhet			
MV	Bus/Minibus	3	56	69	0	0	125	375	23.36
	Heavy Truck/Light Truck	3	26	18	0	1	45	135	8.41
	Pickup Van	1	26	40	0	1	67	67	12.52
	Car/ Micro Bus/Jeep	1	51	58	0	2	111	111	20.75
	Lorry/Trolly	1	0	0	2	0	2	2	0.37
	Tempo	0.75	27	9	3	3	42	31.5	7.85
	Auto Rickshaw	0.75	14	2	1	4	21	15.75	3.93
	Motorcycle	0.75	25	31	9	9	74	55.5	13.83
	Total MV						**487**	**792.75**	**91.03**
NMV	Rickshaw/Van	2	15	2	7	2	26	52	4.86
	Bicycle	0.5	9	4	4	5	22	11	4.11
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**48**	**63**	**8.97**
Grand Total							**535**	**855.75**	**100.00**

Table A-2: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Sylhetlink on Non Hat Day, 17th February, 2016 at 2.45 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Sylhet-Narsingdi	Narsingdi-Sylhet	Sylhet-Belabo	Belabo-Sylhet			
MV	Bus/Minibus	3	73	50	0	0	123	369	22.36
	Heavy Truck/Light Truck	3	22	28	0	0	50	150	9.09
	Pickup Van	1	38	31	5	0	74	74	13.45
	Car/ Micro Bus/Jeep	1	86	62	1	1	150	150	27.27
	Lorry/Trolly	1	3	1	2	1	7	7	1.27
	Tempo	0.75	19	13	2	4	38	28.5	6.91
	Auto Rickshaw	0.75	9	2	0	1	12	9	2.18
	Motorcycle	0.75	41	12	2	8	63	47.25	11.45
	Total MV						**517**	**834.75**	**94.00**
NMV	Rickshaw/Van	2	12	3	2	0	17	34	3.09
	Bicycle	0.5	9	1	1	5	16	8	2.91
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**33**	**42**	**6.00**
Grand Total							**550**	**876.75**	**100.00**

Table A-3: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Sylhetlink on Hat Day, 22th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Sylhet-Narsingdi	Narsingdi-Sylhet	Sylhet-Belabo	Belabo-Sylhet			
MV	Bus/Minibus	3	60	65	0	0	125	375	22.73
	Heavy Truck/Light Truck	3	23	19	0	2	44	132	8.00
	Pickup Van	1	27	41	0	3	71	71	12.91
	Car/ Micro Bus/Jeep	1	49	54	0	1	104	104	18.91
	Lorry/Trolly	1	0	0	1	0	1	1	0.18
	Tempo	0.75	28	11	4	4	47	35.25	8.55
	Auto Rickshaw	0.75	17	3	2	6	28	21	5.09
	Motorcycle	0.75	28	33	8	11	80	60	14.55
	Total MV						**500**	**799.25**	**90.91**
NMV	Rickshaw/Van	2	13	3	10	3	29	58	5.27
	Bicycle	0.5	8	6	3	4	21	10.5	3.82
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**50**	**68.5**	**9.09**
Grand Total							**550**	**867.75**	**100.00**

Table A-4: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Sylhetlink on Hat Day, 22th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Sylhet-Narsingdi	Narsingdi-Sylhet	Sylhet-Belabo	Belabo-Sylhet			
MV	Bus/Minibus	3	69	53	0	0	122	366	21.29
	Heavy Truck/Light Truck	3	24	25	0	0	49	147	8.55
	Pickup Van	1	40	33	0	4	77	77	13.44
	Car/ Micro Bus/Jeep	1	88	65	2	2	157	157	27.40
	Lorry/Trolly	1	2	2	1	1	6	6	1.05
	Tempo	0.75	17	14	3	3	37	27.75	6.46
	Auto Rickshaw	0.75	13	3	2	0	18	13.5	3.14
	Motorcycle	0.75	43	15	7	1	66	49.5	11.52
	Total MV						**532**	**843.75**	**92.84**
NMV	Rickshaw/Van	2	11	2		4	17	34	2.97
	Bicycle	0.5	14	4	4	2	24	12	4.19
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**41**	**46**	**7.16**
Grand Total							**573**	**889.75**	**100.00**

Table A-5: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Narsingdilink on Non Hat Day, 17th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Sylhet	Sylhet-Narsingdi	Narsingdi-Belabo	Belabo-Narsingdi			
MV	Bus/Minibus	3	69	56	0	0	125	375	21.33
	Heavy Truck/Light Truck	3	18	26		1	45	135	7.68
	Pickup Van	1	40	26	4	1	71	71	12.12
	Car/ Micro Bus/Jeep	1	58	51	2	2	113	113	19.28
	Lorry/Trolly	1	0	0	1	0	1	1	0.17
	Tempo	0.75	9	27	8	8	52	39	8.87
	Auto Rickshaw	0.75	2	14	3	5	24	18	4.10
	Motorcycle	0.75	31	25	9	15	80	60	13.65
	Total MV						**511**	**812**	**87.20**
NMV	Rickshaw/Van	2	2	15	18	17	52	104	8.87
	Bicycle	0.5	4	9	5	5	23	11.5	3.92
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**75**	**115.5**	**12.80**
Grand Total							**586**	**927.5**	**100.00**

Table A-6: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Narsingdilink on Non Hat Day, 17th February, 2016 at 2.45 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Sylhet	Sylhet-Narsingdi	Narsingdi-Belabo	Belabo-Narsingdi			
MV	Bus/Minibus	3	50	73	0	0	123	369	19.40
	Heavy Truck/Light Truck	3	28	22	4	1	55	165	8.68
	Pickup Van	1	31	38	3	2	74	74	11.67
	Car/ Micro Bus/Jeep	1	62	86	5	6	159	159	25.08
	Lorry/Trolly	1	1	3	2	4	10	10	1.58
	Tempo	0.75	13	19	13	17	62	46.5	9.78
	Auto Rickshaw	0.75	2	9	3	7	21	15.75	3.31
	Motorcycle	0.75	12	41	7	9	69	51.75	10.88
	Total MV						**573**	**891**	**90.38**
NMV	Rickshaw/Van	2	3	12	11	18	44	88	6.94
	Bicycle	0.5	1	9	1	6	17	8.5	2.68
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**61**	**96.5**	**9.62**
Grand Total							**634**	**987.5**	**100.00**

Table A-7: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Narsingdilink on Hat Day, 22th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Sylhet	Sylhet-Narsingdi	Narsingdi-Belabo	Belabo-Narsingdi			
MV	Bus/Minibus	3	65	60	0	0	125	375	20.90
	Heavy Truck/Light Truck	3	19	23	0	1	43	129	7.19
	Pickup Van	1	41	27	3	2	73	73	12.21
	Car/ Micro Bus/Jeep	1	54	49	4	3	110	110	18.39
	Lorry/Trolly	1	0	0	2	0	2	2	0.33
	Tempo	0.75	11	28	10	7	56	42	9.36
	Auto Rickshaw	0.75	3	17	2	6	28	21	4.68
	Motorcycle	0.75	33	28	11	13	85	63.75	14.21
	Total MV						**522**	**815.75**	**87.29**
NMV	Rickshaw/Van	2	3	13	22	14	52	104	8.70
	Bicycle	0.5	6	8	4	6	24	12	4.01
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**76**	**116**	**12.71**
Grand Total							**598**	**931.75**	**100.00**

Table A-8: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Narsingdilink on Hat Day, 22th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Sylhet	Sylhet-Narsingdi	Narsingdi-Belabo	Belabo-Narsingdi			
MV	Bus/Minibus	3	53	69	0	0	122	366	18.54
	Heavy Truck/Light Truck	3	25	24	3	2	54	162	8.21
	Pickup Van	1	33	40	4	1	78	78	11.85
	Car/ Micro Bus/Jeep	1	65	88	6	4	163	163	24.77
	Lorry/Trolly	1	2	2	3	3	10	10	1.52
	Tempo	0.75	14	17	14	19	64	48	9.73
	Auto Rickshaw	0.75	3	13	2	6	24	18	3.65
	Motorcycle	0.75	15	43	9	7	74	55.5	11.25
	Total MV						**589**	**900.5**	**89.51**
NMV	Rickshaw/Van	2	2	11	10	22	45	90	6.84
	Bicycle	0.5	4	14	2	4	24	12	3.65
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**69**	**102**	**10.49**
Grand Total							**658**	**1002.5**	**100.00**

Table A-9: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Belabolink on Non Hat Day, 17th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Belabo-Sylhet	Sylhet-Belabo	Belabo-Narsingdi	Narsingdi-Belabo			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	0	1	0	2	6	1.27
	Pickup Van	1	1	0	1	4	6	6	3.82
	Car/ Micro Bus/Jeep	1	2	0	2	2	6	6	3.82
	Lorry/Trolly	1	0	2	0	1	3	3	1.91
	Tempo	0.75	3	3	8	8	22	16.5	14.01
	Auto Rickshaw	0.75	4	1	5	3	13	9.75	8.28
	Motorcycle	0.75	9	9	15	9	42	31.5	26.75
	Total MV						**94**	**78.75**	**59.87**
NMV	Rickshaw/Van	2	2	7	17	18	44	88	28.03
	Bicycle	0.5	5	4	5	5	19	9.5	12.10
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**63**	**97.5**	**40.13**
Grand Total							**157**	**176.25**	**100.00**

Table A-10: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Belabolink on Non Hat Day, 17th February, 2016 at 2.45 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Belabo-Sylhet	Sylhet-Belabo	Belabo-Narsingdi	Narsingdi-Belabo			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	1	4	5	15	3.25
	Pickup Van	1	0	5	2	3	10	10	6.49
	Car/ Micro Bus/Jeep	1	1	1	6	5	13	13	8.44
	Lorry/Trolly	1	1	2	4	2	9	9	5.84
	Tempo	0.75	4	2	17	13	36	27	23.38
	Auto Rickshaw	0.75	1		7	3	11	8.25	7.14
	Motorcycle	0.75	8	2	9	7	26	19.5	16.88
	Total MV						**110**	**101.75**	**71.43**
NMV	Rickshaw/Van	2	0	2	18	11	31	62	20.13
	Bicycle	0.5	5	1	6	1	13	6.5	8.44
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**44**	**68.5**	**28.57**
Grand Total							**154**	**170.25**	**100.00**

Table A-11: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Belabolink on Hat Day, 22th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Belabo-Sylhet	Sylhet-Belabo	Belabo-Narsingdi	Narsingdi-Belabo			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	0	1		3	9	1.74
	Pickup Van	1	3	0	2	3	8	8	4.65
	Car/ Micro Bus/Jeep	1	1	0	3	4	8	8	4.65
	Lorry/Trolly	1	0	1		2	3	3	1.74
	Tempo	0.75	4	4	7	10	25	18.75	14.53
	Auto Rickshaw	0.75	6	2	6	2	16	12	9.30
	Motorcycle	0.75	11	8	13	11	43	32.25	25.00
	Total MV						**106**	**91**	**61.63**
NMV	Rickshaw/Van	2	3	10	14	22	49	98	28.49
	Bicycle	0.5	4	3	6	4	17	8.5	9.88
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**66**	**106.5**	**38.37**
Grand Total							**172**	**197.5**	**100.00**

Table A-12: Hourly Traffic Volume according to the Vehicle Types for Morjal Bus Stand-Belabolink on Hat Day, 22th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Belabo-Sylhet	Sylhet-Belabo	Belabo-Narsingdi	Narsingdi-Belabo			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	2	3	5	15	3.18
	Pickup Van	1	4	0	1	4	9	9	5.73
	Car/ Micro Bus/Jeep	1	2	2	4	6	14	14	8.92
	Lorry/Trolly	1	1	1	3	3	8	8	5.10
	Tempo	0.75	3	3	19	14	39	29.25	24.84
	Auto Rickshaw	0.75	0	2	6	2	10	7.5	6.37
	Motorcycle	0.75	1	7	7	9	24	18	15.29
	Total MV						**109**	**100.75**	**69.43**
NMV	Rickshaw/Van	2	4	0	22	10	36	72	22.93
	Bicycle	0.5	2	4	4	2	12	6	7.64
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**48**	**78**	**30.57**
Grand Total							**157**	**178.75**	**100.00**

B) RadhaganjMoar (Intersection)

Table B-1: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Narsingdilink on Non Hat Day, 19th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Raipura	Raipura-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Narsingdi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	1	1	2	6	0.63
	Pickup Van	1	0	2	2	3	7	7	2.20
	Car/ Micro Bus/Jeep	1	2	1	0	2	5	5	1.57
	Lorry/Trolly	1	1	1	3	1	6	6	1.89
	Tempo	0.75	40	37	9	10	96	72	30.19
	Auto Rickshaw	0.75	3	5	21	17	46	34.5	14.47
	Motorcycle	0.75	12	10	7	7	36	27	11.32
	Total MV						**198**	**157.5**	**62.26**
NMV	Rickshaw/Van	2	12	18	38	33	101	202	31.76
	Bicycle	0.5	4	1	5	9	19	9.5	5.97
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**120**	**211.5**	**37.74**
Grand Total							**318**	**369**	**100.00**

Table B-2: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Narsingdilink on Non Hat Day, 19th February, 2016 at 4.40 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Raipura	Raipura-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Narsingdi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	2	0	2	6	0.69
	Pickup Van	1	1	1	0	2	4	4	1.39
	Car/ Micro Bus/Jeep	1	2	0	0	0	2	2	0.69
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	30	22	9	13	74	55.5	25.69
	Auto Rickshaw	0.75	3	3	12	15	33	24.75	11.46
	Motorcycle	0.75	13	11	7	7	38	28.5	13.19
	Total MV						**153**	**120.75**	**53.13**
NMV	Rickshaw/Van	2	23	19	28	26	96	192	33.33
	Bicycle	0.5	8	5	11	15	39	19.5	13.54
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**135**	**211.5**	**46.88**
Grand Total							**288**	**332.25**	**100.00**

Table B-3:Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Narsingdilink on Hat Day, 23th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Raipura	Raipura-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Narsingdi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	1	2	3	9	0.81
	Pickup Van	1	0	3	3	4	10	10	2.69
	Car/ Micro Bus/Jeep	1	3	1	0	3	7	7	1.88
	Lorry/Trolly	1	2	3	4	2	11	11	2.96
	Tempo	0.75	45	40	10	11	106	79.5	28.49
	Auto Rickshaw	0.75	5	8	23	16	52	39	13.98
	Motorcycle	0.75	15	12	6	9	42	31.5	11.29
	Total MV						**231**	**187**	**62.10**
NMV	Rickshaw/Van	2	16	22	40	35	113	226	30.38
	Bicycle	0.5	6	3	7	12	28	14	7.53
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**141**	**240**	**37.90**
Grand Total							**372**	**427**	**100.00**

Table B-4: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Narsingdilink on Hat Day, 23th February, 2016 at 4.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Narsingdi-Raipura	Raipura-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Narsingdi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	3	0	3	9	0.90
	Pickup Van	1	2	0	1	3	6	6	1.80
	Car/ Micro Bus/Jeep	1	3	0	0	0	3	3	0.90
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	32	20	10	15	77	57.75	23.12
	Auto Rickshaw	0.75	5	4	13	18	40	30	12.01
	Motorcycle	0.75	15	13	9	9	46	34.5	13.81
	Total MV						**175**	**140.25**	**52.55**
NMV	Rickshaw/Van	2	25	23	30	30	108	216	32.43
	Bicycle	0.5	10	8	15	17	50	25	15.02
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**158**	**241**	**47.45**
Grand Total							**333**	**381.25**	**100.00**

Table B-5: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Raipuralink on Non Hat Day, 19th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Narsingdi	Narsingdi-Raipura	Raipura-Mirzanagar	Mirzanagar-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	2	0	0	1	3	3	1.29
	Car/ Micro Bus/Jeep	1	1	2	1	3	7	7	3.02
	Lorry/Trolly	1	1	1	1	0	3	3	1.29
	Tempo	0.75	37	40	10	13	100	75	43.10
	Auto Rickshaw	0.75	5	3	15	10	33	24.75	14.22
	Motorcycle	0.75	10	12	7	9	38	28.5	16.38
	Total MV						**184**	**141.25**	**79.31**
NMV	Rickshaw/Van	2	18	12	9	2	41	82	17.67
	Bicycle	0.5	1	4	1	1	7	3.5	3.02
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**48**	**85.5**	**20.69**
Grand Total							**232**	**226.75**	**100.00**

Table B-6: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Raipuralink on Non Hat Day, 19th February, 2016 at 4.40 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Narsingdi	Narsingdi-Raipura	Raipura-Mirzanagar	Mirzanagar-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	1	1	3	0.48
	Pickup Van	1	1	1	1	0	3	3	1.43
	Car/ Micro Bus/Jeep	1	0	2	0	0	2	2	0.95
	Lorry/Trolly	1	0	0	0	2	2	2	0.95
	Tempo	0.75	22	30	7	5	64	48	30.48
	Auto Rickshaw	0.75	3	3	15	4	25	18.75	11.90
	Motorcycle	0.75	11	13	11	10	45	33.75	21.43
	Total MV						**142**	**110.5**	**67.62**
NMV	Rickshaw/Van	2	19	23	6	4	52	104	24.76
	Bicycle	0.5	5	8	1	2	16	8	7.62
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**68**	**112**	**32.38**
Grand Total							**210**	**222.5**	**100.00**

Table B-7: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Raipuralink on Hat Day, 23th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Narsingdi	Narsingdi-Raipura	Raipura-Mirzanagar	Mirzanagar-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3					0	0	0.00
	Pickup Van	1	3			2	5	5	1.81
	Car/ Micro Bus/Jeep	1	1	3	2	4	10	10	3.62
	Lorry/Trolly	1	3	2	2		7	7	2.54
	Tempo	0.75	40	45	8	15	108	81	39.13
	Auto Rickshaw	0.75	8	5	18	9	40	30	14.49
	Motorcycle	0.75	12	15	5	7	39	29.25	14.13
	Total MV						**209**	**162.25**	**75.72**
NMV	Rickshaw/Van	2	22	16	12	4	54	108	19.57
	Bicycle	0.5	3	6	2	2	13	6.5	4.71
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**67**	**114.5**	**24.28**
Grand Total							**276**	**276.75**	**100.00**

Table B-8: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Raipuralink on Hat Day, 23th February, 2016 at 4.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Narsingdi	Narsingdi-Raipura	Raipura-Mirzanagar	Mirzanagar-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	2	2	6	0.82
	Pickup Van	1	0	2	2	0	4	4	1.64
	Car/ Micro Bus/Jeep	1	0	3	0	0	3	3	1.23
	Lorry/Trolly	1	0	0	0	1	1	1	0.41
	Tempo	0.75	20	32	9	7	68	51	27.87
	Auto Rickshaw	0.75	4	5	14	3	26	19.5	10.66
	Motorcycle	0.75	13	15	13	8	49	36.75	20.08
	Total MV						**153**	**121.25**	**62.70**
NMV	Rickshaw/Van	2	23	25	8	6	62	124	25.41
	Bicycle	0.5	8	10	8	3	29	14.5	11.89
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**91**	**138.5**	**37.30**
Grand Total							**244**	**259.75**	**100.00**

Table B-9 Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Mirzanagarlink on Non Hat Day, 19th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Mirzanagar-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Raipura	Raipura-Mirzanagar			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	1			2	6	0.79
	Pickup Van	1	3	2	1		6	6	2.38
	Car/ Micro Bus/Jeep	1	2		3	1	6	6	2.38
	Lorry/Trolly	1	1	3		1	5	5	1.98
	Tempo	0.75	10	9	13	10	42	31.5	16.67
	Auto Rickshaw	0.75	17	21	10	15	63	47.25	25.00
	Motorcycle	0.75	7	7	9	7	30	22.5	11.90
	Total MV						**154**	**124.25**	**61.11**
NMV	Rickshaw/Van	2	33	38	2	9	82	164	32.54
	Bicycle	0.5	9	5	1	1	16	8	6.35
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**98**	**172**	**38.89**
Grand Total							**252**	**296.25**	**100.00**

Table B-10: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Mirzanagarlink on Non Hat Day, 19th February, 2016 at 4.40 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Mirzanagar-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Raipura	Raipura-Mirzanagar			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	2	1	0	3	9	1.39
	Pickup Van	1	2	0	0	1	3	3	1.39
	Car/ Micro Bus/Jeep	1	0	0	0	0	0	0	0.00
	Lorry/Trolly	1	0	0	2	0	2	2	0.93
	Tempo	0.75	13	9	5	7	34	25.5	15.74
	Auto Rickshaw	0.75	15	12	4	15	46	34.5	21.30
	Motorcycle	0.75	7	7	10	11	35	26.25	16.20
	Total MV						**123**	**100.25**	**56.94**
NMV	Rickshaw/Van	2	26	28	4	6	64	128	29.63
	Bicycle	0.5	15	11	2	1	29	14.5	13.43
	Animal Cart/Push Cart	4	0	1	0	0	1	4	0.12
	Total NMV						**93**	**142.5**	**43.06**
Grand Total							**216**	**242.75**	**100.00**

Table B-11: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Mirzanagarlink on Hat Day, 23th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Mirzanagar-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Raipura	Raipura-Mirzanagar			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	1	0	0	3	9	1.07
	Pickup Van	1	4	3	2	0	9	9	3.21
	Car/ Micro Bus/Jeep	1	3	0	4	2	9	9	3.21
	Lorry/Trolly	1	2	4	0	2	8	8	2.86
	Tempo	0.75	11	10	15	8	44	33	15.71
	Auto Rickshaw	0.75	16	23	9	18	66	49.5	23.57
	Motorcycle	0.75	9	6	7	5	27	20.25	9.64
	Total MV						**166**	**137.75**	**59.29**
NMV	Rickshaw/Van	2	35	40	4	12	91	182	32.50
	Bicycle	0.5	12	7	2	2	23	11.5	8.21
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**114**	**193.5**	**40.71**
Grand Total							**280**	**331.25**	**100.00**

Table B-12: Hourly Traffic Volume according to the Vehicle Types for RadhaganjMoar-Mirzanagarlink on Hat Day, 23th February, 2016 at 4.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Mirzanagar-Narsingdi	Narsingdi-Mirzanagar	Mirzanagar-Raipura	Raipura-Mirzanagar			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	3	2	0	5	15	1.95
	Pickup Van	1	3	1	0	2	6	6	2.33
	Car/ Micro Bus/Jeep	1	0	0	0	0	0	0	0.00
	Lorry/Trolly	1	0	0	1	0	1	1	0.39
	Tempo	0.75	15	10	7	9	41	30.75	15.95
	Auto Rickshaw	0.75	18	13	3	14	48	36	18.68
	Motorcycle	0.75	9	9	8	13	39	29.25	15.18
	Total MV						**140**	**118**	**54.47**
NMV	Rickshaw/Van	2	30	30	6	8	74	148	28.79
	Bicycle	0.5	17	15	3	8	43	21.5	16.73
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**117**	**169.5**	**45.53**
Grand Total							**257**	**287.5**	**100.00**

C) Raipura Bus Stand Intersection

Table C-1: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Non Hat Day, 16th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala-Algi	Algi-Panthosala	Panthosala-Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	8	6	14	14	2.77
	Car/ Micro Bus/Jeep	1	0	0	0	3	3	3	0.59
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	0	2	41	100	143	107.25	28.32
	Auto Rickshaw	0.75	2	9	21	71	103	77.25	20.40
	Motorcycle	0.75	1	2	25	35	63	47.25	12.48
	Total MV						**326**	**248.75**	**64.55**
NMV	Rickshaw/Van	2	32	37	47	28	144	288	28.51
	Bicycle	0.5	2	2	15	16	35	17.5	6.93
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**179**	**305.5**	**35.45**
Grand Total							**505**	**554.25**	**100.00**

Table C-2: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Non Hat Day, 16th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala -Algi	Algi-Panthosala	Panthosala -Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	8	6	14	14	2.81
	Car/ Micro Bus/Jeep	1	0	0	0	3	3	3	0.60
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	1	1	41	100	143	107.25	28.71
	Auto Rickshaw	0.75	1	8	21	71	101	75.75	20.28
	Motorcycle	0.75	2	1	25	35	63	47.25	12.65
	Total MV						**324**	**247.25**	**65.06**
NMV	Rickshaw/Van	2	30	35	47	28	140	280	28.11
	Bicycle	0.5	1	2	15	16	34	17	6.83
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**174**	**297**	**34.94**
Grand Total							**498**	**544.25**	**100.00**

Table C-3: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Non Hat Day, 16th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala-Algi	Algi-Panthosala	Panthosala-Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	3	5	8	24	1.66
	Pickup Van	1	1	0	4	0	5	5	1.04
	Car/ Micro Bus/Jeep	1	0	0	5	7	12	12	2.48
	Lorry/Trolly	1	0	1	3	7	11	11	2.28
	Tempo	0.75	3	5	60	102	170	127.5	35.20
	Auto Rickshaw	0.75	2	5	50	65	122	91.5	25.26
	Motorcycle	0.75	6	5	20	20	51	38.25	10.56
	Total MV						**379**	**309.25**	**78.47**
NMV	Rickshaw/Van	2	16	18	20	20	74	148	15.32
	Bicycle	0.5	3	6	9	11	29	14.5	6.00
	Animal Cart/Push Cart	4	0	0	0	1	1	4	0.21
	Total NMV						**104**	**166.5**	**21.53**
Grand Total							**483**	**475.75**	**100.00**

Table C-4: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Hat Day, 21th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala-Algi	Algi-Panthosala	Panthosala-Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	2	0	2	6	0.37
	Pickup Van	1	0	0	9	7	16	16	2.93
	Car/ Micro Bus/Jeep	1	0	0	1	4	5	5	0.92
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	0	3	38	95	136	102	24.91
	Auto Rickshaw	0.75	4	12	25	78	119	89.25	21.79
	Motorcycle	0.75	3	1	27	38	69	51.75	12.64
	Total MV						**347**	**270**	**63.55**
NMV	Rickshaw/Van	2	36	40	49	32	157	314	28.75
	Bicycle	0.5	5	3	16	18	42	21	7.69
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**199**	**335**	**36.45**
Grand Total							**546**	**605**	**100.00**

Table C-5: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Hat Day, 21th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala-Algi	Algi-Panthosala	Panthosala-Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	8	6	14	14	2.80
	Car/ Micro Bus/Jeep	1	0	0	2	3	5	5	1.00
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	2	2	39	98	141	105.75	28.20
	Auto Rickshaw	0.75	1	10	19	68	98	73.5	19.60
	Motorcycle	0.75	3	2	24	33	62	46.5	12.40
	Total MV						**320**	**244.75**	**64.00**
NMV	Rickshaw/Van	2	32	37	47	27	143	286	28.60
	Bicycle	0.5	2	3	16	16	37	18.5	7.40
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**180**	**304.5**	**36.00**
Grand Total							**500**	**549.25**	**100.00**

Table C-6: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Panthosala link on Hat Day, 21th February, 2016 at 3.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala-Algi	Algi-Panthosala	Panthosala-Baroicha	Baroicha-Panthosala			
MV	Bus/Minibus	3	0	0	6	2	8	24	1.45
	Heavy Truck/Light Truck	3	0	0	4	6	10	30	1.81
	Pickup Van	1	2	0	5	3	10	10	1.81
	Car/ Micro Bus/Jeep	1	0	0	6	9	15	15	2.71
	Lorry/Trolly	1	0	2	5	9	16	16	2.89
	Tempo	0.75	5	7	62	105	179	134.25	32.37
	Auto Rickshaw	0.75	4	8	48	68	128	96	23.15
	Motorcycle	0.75	7	6	25	23	61	45.75	11.03
	Total MV						**427**	**371**	**77.22**
NMV	Rickshaw/Van	2	17	19	23	25	84	168	15.19
	Bicycle	0.5	4	9	11	14	38	19	6.87
	Animal Cart/Push Cart	4	0	0	2	2	4	16	0.72
	Total NMV						**126**	**203**	**22.78**
Grand Total							**553**	**574**	**100.00**

Table C-7: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Algi link on Non Hat Day, 16th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	1	2	3	3	0.98
	Car/ Micro Bus/Jeep	1	0	0	1	00	1	1	0.33
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	2	0	19	22	43	32.25	14.10
	Auto Rickshaw	0.75	9	2	27	31	69	51.75	22.62
	Motorcycle	0.75	2	1	20	22	45	33.75	14.75
	Total MV						**161**	**121.75**	**52.79**
NMV	Rickshaw/Van	2	37	32	32	25	126	252	41.31
	Bicycle	0.5	2	2	9	5	18	9	5.90
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**144**	**261**	**47.21**
Grand Total							**305**	**382.75**	**100.00**

Table C-8: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Algi link on Non Hat Day, 16th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Algi-Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	2	1	3	3	1.12
	Car/ Micro Bus/Jeep	1	0	0	1	1	2	2	0.74
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	1	1	16	20	38	28.5	14.13
	Auto Rickshaw	0.75	8	1	25	28	62	46.5	23.05
	Motorcycle	0.75	1	2	18	20	41	30.75	15.24
	Total MV						**146**	**110.75**	**54.28**
NMV	Rickshaw/Van	2	35	30	30	12	107	214	39.78
	Bicycle	0.5	2	1	10	3	16	8	5.95
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**123**	**222**	**45.72**
Grand Total							**269**	**332.75**	**100.00**

Table C-9: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Algi link on Non Hat Day, 16th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Algi-Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	1	1	2	6	1.14
	Pickup Van	1	0	1	3	4	8	8	4.57
	Car/ Micro Bus/Jeep	1	0	0	1	0	1	1	0.57
	Lorry/Trolly	1	1	0	0	0	1	1	0.57
	Tempo	0.75	5	3	15	12	35	26.25	20.00
	Auto Rickshaw	0.75	5	2	14	15	36	27	20.57
	Motorcycle	0.75	5	6	5	11	27	20.25	15.43
	Total MV						**110**	**89.5**	**62.86**
NMV	Rickshaw/Van	2	18	16	6	7	47	94	26.86
	Bicycle	0.5	6	3	3	6	18	9	10.29
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**65**	**103**	**37.14**
Grand Total							**175**	**192.5**	**100.00**

Table C-10: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Algi link on Hat Day, 21th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Algi-Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	2	3	5	5	1.44
	Car/ Micro Bus/Jeep	1	0	0	1	1	2	2	0.58
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	3	0	22	25	50	37.5	14.41
	Auto Rickshaw	0.75	12	4	29	33	78	58.5	22.48
	Motorcycle	0.75	1	3	23	25	52	39	14.99
	Total MV						**187**	**142**	**53.89**
NMV	Rickshaw/Van	2	40	36	30	28	134	268	38.62
	Bicycle	0.5	3	5	12	6	26	13	7.49
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**160**	**281**	**46.11**
Grand Total							**347**	**423**	**100.00**

Table C-11: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Algi link on Hat Day, 21th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Algi-Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	3	2	5	5	1.64
	Car/ Micro Bus/Jeep	1	0	0	2	1	3	3	0.99
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	2	2	17	22	43	32.25	14.14
	Auto Rickshaw	0.75	10	1	28	32	71	53.25	23.36
	Motorcycle	0.75	2	3	20	23	48	36	15.79
	Total MV						**170**	**129.5**	**55.92**
NMV	Rickshaw/Van	2	37	32	32	13	114	228	37.50
	Bicycle	0.5	3	2	11	4	20	10	6.58
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**134**	**238**	**44.08**
Grand Total							**304**	**367.5**	**100.00**

Table C-12: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Alg link on Hat Day, 21th February, 2016 at 3.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Algi-Panthosala	Panthosala-Algi	Algi-Baroicha	Baroicha-Algi			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3			3	2	5	15	2.35
	Pickup Van	1		2	4	5	11	11	5.16
	Car/ Micro Bus/Jeep	1			2		2	2	0.94
	Lorry/Trolly	1	2				2	2	0.94
	Tempo	0.75	7	5	17	14	43	32.25	20.19
	Auto Rickshaw	0.75	8	4	12	17	41	30.75	19.25
	Motorcycle	0.75	6	7	8	12	33	24.75	15.49
	Total MV						**137**	**117.75**	**64.32**
NMV	Rickshaw/Van	2	19	17	7	8	51	102	23.94
	Bicycle	0.5	9	4	5	7	25	12.5	11.74
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**76**	**114.5**	**35.68**
Grand Total							**213**	**232.25**	**100.00**

Table C-13: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroicha link on Non Hat Day, 16th February, 2016 at 9.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	6	8	2	1	17	17	2.69
	Car/ Micro Bus/Jeep	1	3	0	0	1	4	4	0.63
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	100	41	22	19	182	136.5	28.80
	Auto Rickshaw	0.75	71	21	31	27	150	112.5	23.73
	Motorcycle	0.75	35	25	22	20	102	76.5	16.14
	Total MV						**455**	**346.5**	**71.99**
NMV	Rickshaw/Van	2	28	47	25	32	132	264	20.89
	Bicycle	0.5	16	15	5	9	45	22.5	7.12
	Animal Cart/Push Cart	4	28	47	25	32	132	264	20.89
	Total NMV						**177**	**286.5**	**28.01**
Grand Total							**632**	**633**	**100.00**

Table C-14: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroicha link on Non Hat Day, 16th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	6	8	1	2	17	17	2.82
	Car/ Micro Bus/Jeep	1	3	0	0	0	0	5	0.83
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	100	41	20	16	177	132.75	29.35
	Auto Rickshaw	0.75	71	21	28	25	145	108.75	24.05
	Motorcycle	0.75	35	25	20	18	98	73.5	16.25
	Total MV						**442**	**337**	**73.30**
NMV	Rickshaw/Van	2	28	47	12	30	117	234	19.40
	Bicycle	0.5	16	15	3	10	44	22	7.30
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**161**	**256**	**26.70**
Grand Total							**603**	**593**	**100.00**

Table C-15: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroicha link on Non Hat Day, 16th February, 2016 at 3.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	5	3	1	1	10	30	1.94
	Pickup Van	1	0	4	4	3	11	11	2.13
	Car/ Micro Bus/Jeep	1	7	5	0	1	13	13	2.52
	Lorry/Trolly	1	7	3	0	0	10	10	1.94
	Tempo	0.75	102	60	12	15	189	141.75	36.63
	Auto Rickshaw	0.75	65	50	15	14	144	108	27.91
	Motorcycle	0.75	20	20	11	5	56	42	10.85
	Total MV						**433**	**355.75**	**83.91**
NMV	Rickshaw/Van	2	20	20	7	6	53	106	10.27
	Bicycle	0.5	11	9	6	3	29	14.5	5.62
	Animal Cart/Push Cart	4	1	0	0	0	1	4	0.19
	Total NMV						**83**	**124.5**	**16.09**
Grand Total							**516**	**480.25**	**100.00**

Table C-16: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroicha link on Hat Day, 21th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	2	6	0.29
	Pickup Van	1	7	9	3	2	21	21	3.09
	Car/ Micro Bus/Jeep	1	4	1	1	1	7	7	1.03
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	95	38	25	22	180	135	26.51
	Auto Rickshaw	0.75	78	25	33	29	165	123.75	24.30
	Motorcycle	0.75	38	27	25	23	113	84.75	16.64
	Total MV						**488**	**377.5**	**71.87**
NMV	Rickshaw/Van	2	32	49	28	30	139	278	20.47
	Bicycle	0.5	18	16	6	12	52	26	7.66
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**191**	**304**	**28.13**
Grand Total							**679**	**681.5**	**100.00**

Table C-17: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroicha link on Hat Day, 21th February, 2016 at 1.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	6	8	2	3	19	19	3.08
	Car/ Micro Bus/Jeep	1	3	2	1	2	8	8	1.30
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	98	39	22	17	176	132	28.57
	Auto Rickshaw	0.75	68	19	32	28	147	110.25	23.86
	Motorcycle	0.75	33	24	23	20	100	75	16.23
	Total MV						**450**	**344.25**	**73.05**
NMV	Rickshaw/Van	2	27	47	13	32	119	238	19.32
	Bicycle	0.5	16	16	4	11	47	23.5	7.63
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**166**	**261.5**	**26.95**
Grand Total							**616**	**605.75**	**100.00**

Table C-18: Hourly Traffic Volume according to the Vehicle Types for Raipura Bus Stand-Baroichalink on Hat Day, 21th February, 2016 at 3.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Panthosala	Panthosala-Baroicha	Baroicha-Algi	Algi-Baroicha			
MV	Bus/Minibus	3	2	6	0	0	8	24	1.37
	Heavy Truck/Light Truck	3	6	4	2	3	15	45	2.56
	Pickup Van	1	3	5	5	4	17	17	2.90
	Car/ Micro Bus/Jeep	1	9	6	0	2	17	17	2.90
	Lorry/Trolly	1	9	5	0	0	14	14	2.39
	Tempo	0.75	105	62	14	17	198	148.5	33.79
	Auto Rickshaw	0.75	68	48	17	12	145	108.75	24.74
	Motorcycle	0.75	23	25	12	8	68	51	11.60
	Total MV						**482**	**425.25**	**82.25**
NMV	Rickshaw/Van	2	25	23	8	7	63	126	10.75
	Bicycle	0.5	14	11	7	5	37	18.5	6.31
	Animal Cart/Push Cart	4	2	2	0	0	4	16	0.68
	Total NMV						**104**	**160.5**	**17.75**
Grand Total							**586**	**585.75**	**100.00**

D) Rail Crossing Moar (Intersection)

Table D-1: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Raipura link on Hat Day, 18th February, 2016at 11.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Methikanda	Methikanda-Raipura	Raipura-Baroicha	Baroicha-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	1	0	5	8	14	14	1.71
	Car/ Micro Bus/Jeep	1	1	0	6	6	13	13	1.59
	Lorry/Trolly	1	0	0	0	0	13	13	1.59
	Tempo	0.75	27	21	114	110	272	204	33.17
	Auto Rickshaw	0.75	93	65	60	76	294	220.5	35.85
	Motorcycle	0.75	12	9	28	39	88	66	10.73
	Total MV						**694**	**530.5**	**84.63**
NMV	Rickshaw/Van	2	30	32	11	11	84	168	10.24
	Bicycle	0.5	15	5	10	12	42	21	5.12
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**126**	**189**	**15.37**
Grand Total							**820**	**719.5**	**100.00**

Table D-2: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Raipura link on Hat Day, 18th February, 2016 at 4.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Methikanda	Methikanda-Raipura	Raipura-Baroicha	Baroicha-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	5	6	11	11	1.44
	Car/ Micro Bus/Jeep	1	1	1	0	0	0	0	1.18
	Lorry/Trolly	1	0	0	0	1	1	1	0.13
	Tempo	0.75	6	9	129	136	280	210	36.75
	Auto Rickshaw	0.75	64	87	31	40	222	166.5	29.13
	Motorcycle	0.75	12	12	19	30	73	54.75	9.58
	Total MV						**596**	**452.25**	**78.22**
NMV	Rickshaw/Van	2	22	47	8	9	86	172	11.29
	Bicycle	0.5	17	21	12	30	80	40	10.50
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**166**	**212**	**21.78**
Grand Total							**762**	**664.25**	**100.00**

Table D-3: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Raipura link on Non-Hat Day, 20th February, 2016 at 10.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Methikanda	Methikanda-Raipura	Raipura-Baroicha	Baroicha-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0
	Pickup Van	1	2	0	3	6	11	11	1.38
	Car/ Micro Bus/Jeep	1	3	0	7	5	15	15	1.88
	Lorry/Trolly	1	0	1	3	4	8	8	1.01
	Tempo	0.75	25	23	120	105	273	204.75	34.30
	Auto Rickshaw	0.75	98	62	40	80	280	210	35.18
	Motorcycle	0.75	15	7	26	35	83	62.25	10.43
	Total MV						**670**	**511**	**84.17**
NMV	Rickshaw/Van	2	32	34	9	12	87	174	10.93
	Bicycle	0.5	13	3	8	15	39	19.5	4.90
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**126**	**193.5**	**15.83**
Grand Total							**796**	**704.5**	**100.00**

Table D-4: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Raipura link on Non-Hat Day, 20th February, 2016 at 3.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Raipura-Methikanda	Methikanda-Raipura	Raipura-Baroicha	Baroicha-Raipura			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	4	8	12	12	1.62
	Car/ Micro Bus/Jeep	1	2	3	2	5	12	12	1.62
	Lorry/Trolly	1	0	0	0	1	1	1	0.13
	Tempo	0.75	4	5	125	132	266	199.5	35.80
	Auto Rickshaw	0.75	60	80	34	42	216	162	29.07
	Motorcycle	0.75	11	16	17	34	78	58.5	10.50
	Total MV						**585**	**445**	**78.73**
NMV	Rickshaw/Van	2	23	44	6	12	85	170	11.44
	Bicycle	0.5	13	22	15	23	73	36.5	9.83
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**158**	**206.5**	**21.27**
Grand Total							**743**	**651.5**	**100.00**

Table D-5: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Methikanda link on Hat Day, 18th February, 2016 at 11.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Methikanda -Raipura	Raipura-Methikanda	Methikanda -Baroicha	Baroicha-Methikanda			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	1	1	2	4	4	1.08
	Car/ Micro Bus/Jeep	1	0	1	1	1	3	3	0.81
	Lorry/Trolly	1	2	0	0	0	2	2	0.54
	Tempo	0.75	21	27	3	2	53	39.75	14.32
	Auto Rickshaw	0.75	65	93	8	3	169	126.75	45.68
	Motorcycle	0.75	9	12	12	15	48	36	12.97
	Total MV						**279**	**211.5**	**75.41**
NMV	Rickshaw/Van	2	32	30	5	1	68	136	18.38
	Bicycle	0.5	5	15	1	1	22	11	5.95
	Animal Cart/Push Cart	4	0	0	1	0	1	4	0.27
	Total NMV						**91**	**151**	**24.59**
Grand Total							**370**	**362.5**	**100.00**

Table D-6: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Methikanda link on Hat Day, 18th February, 2016 at 4.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Methikanda -Raipura	Raipura-Methikanda	Methikanda -Baroicha	Baroicha-Methikanda			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	1	0	1	1	0.29
	Car/ Micro Bus/Jeep	1	1	1	0	0	2	2	0.58
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	9	6	5	1	21	15.75	6.07
	Auto Rickshaw	0.75	87	64	11	4	166	124.5	47.98
	Motorcycle	0.75	12	12	8	5	37	27.75	10.69
	Total MV						**227**	**171**	**65.61**
NMV	Rickshaw/Van	2	47	22	4	4	77	154	22.25
	Bicycle	0.5	21	17	2	2	42	21	12.14
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**119**	**175**	**34.39**
Grand Total							**346**	**346**	**100.00**

Table D-7: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Methikanda link on Non-Hat Day, 20th February, 2016 at 10.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Methikanda-Raipura	Raipura-Methikanda	Methikanda-Baroicha	Baroicha-Methikanda			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	2	2	1	5	5	1.32
	Car/ Micro Bus/Jeep	1	0	3	3	1	7	7	1.84
	Lorry/Trolly	1	1	0	0	0	1	1	0.26
	Tempo	0.75	23	25	5	3	56	42	14.74
	Auto Rickshaw	0.75	62	98	6	4	170	127.5	44.74
	Motorcycle	0.75	7	15	10	14	46	34.5	12.11
	Total MV						**285**	**217**	**75.00**
NMV	Rickshaw/Van	2	34	32	4	2	72	144	18.95
	Bicycle	0.5	3	13	2	3	21	10.5	5.53
	Animal Cart/Push Cart	4	0	0	2	0	2	8	0.53
	Total NMV						**95**	**162.5**	**25.00**
Grand Total							**380**	**379.5**	**100.00**

Table D-8: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Methikanda link on Non-Hat Day, 20th February, 2016 at 3.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Methikanda-Raipura	Raipura-Methikanda	Methikanda-Baroicha	Baroicha-Methikanda			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	0	0	3	2	5	5	1.49
	Car/ Micro Bus/Jeep	1	3	2	1	3	9	9	2.69
	Lorry/Trolly	1	0	0	0	0	0	0	0.00
	Tempo	0.75	5	4	0	1	10	7.5	2.99
	Auto Rickshaw	0.75	80	60	9	5	154	115.5	45.97
	Motorcycle	0.75	16	11	6	7	40	30	11.94
	Total MV						**218**	**167**	**65.07**
NMV	Rickshaw/Van	2	44	23	4	1	72	144	21.49
	Bicycle	0.5	22	13	2	8	45	22.5	13.43
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**117**	**166.5**	**34.93**
Grand Total							**335**	**333.5**	**100.00**

Table D-9: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Baroicha link on Hat Day, 18th February, 2016 at 11.30 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Raipura	Raipura-Baroicha	Baroicha-Methikanda	Methikanda-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	8	5	2	1	16	16	2.84
	Car/ Micro Bus/Jeep	1	6	6	1	1	14	14	2.48
	Lorry/Trolly	1	6	5	0	0	11	11	1.95
	Tempo	0.75	110	114	2	3	229	171.75	40.60
	Auto Rickshaw	0.75	76	60	3	8	147	110.25	26.06
	Motorcycle	0.75	39	28	15	12	94	70.5	16.67
	Total MV						**511**	**393.5**	**90.60**
NMV	Rickshaw/Van	2	11	11	1	5	28	56	4.96
	Bicycle	0.5	12	10	1	1	24	12	4.26
	Animal Cart/Push Cart	4	0	0	0	1	1	4	0.18
	Total NMV						**53**	**72**	**9.40**
Grand Total							**564**	**465.5**	**100.00**

Table D-10: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Baroicha link on Hat Day, 18th February, 2016 at 4.30 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Raipura	Raipura-Baroicha	Baroicha-Methikanda	Methikanda-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	6	5		1	12	12	2.35
	Car/ Micro Bus/Jeep	1	7	0	0	0	7	7	1.37
	Lorry/Trolly	1	1	0	0	0	1	1	0.20
	Tempo	0.75	136	129	1	5	271	203.25	53.14
	Auto Rickshaw	0.75	40	31	4	11	86	64.5	16.86
	Motorcycle	0.75	30	19	5	8	62	46.5	12.16
	Total MV						**439**	**334.25**	**86.08**
NMV	Rickshaw/Van	2	9	8	4	4	25	50	4.90
	Bicycle	0.5	30	12	2	2	46	23	9.02
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**71**	**73**	**13.92**
Grand Total							**510**	**407.25**	**100.00**

Table D-11: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Baroicha link on Non-Hat Day, 20th February, 2016 at 10.00 AM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Raipura	Raipura-Baroicha	Methikanda	Methikanda-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	6	3	1	2	12	12	2.22
	Car/ Micro Bus/Jeep	1	5	7	1	3	16	16	2.96
	Lorry/Trolly	1	4	3	0	0	7	7	1.30
	Tempo	0.75	105	120	3	5	233	174.75	43.15
	Auto Rickshaw	0.75	80	40	4	6	130	97.5	24.07
	Motorcycle	0.75	35	26	14	10	85	63.75	15.74
	Total MV						**483**	**371**	**89.44**
NMV	Rickshaw/Van	2	12	9	2	4	27	54	5.00
	Bicycle	0.5	15	8	3	2	28	14	5.19
	Animal Cart/Push Cart	4	0	0	0	2	2	8	0.37
	Total NMV						**57**	**76**	**10.56**
Grand Total							**540**	**447**	**100.00**

Table D-12: Hourly Traffic Volume according to the Vehicle Types for Rail Crossing Moar- Baroicha link on Non-Hat Day, 20th February, 2016 at 3.00 PM.

Mode of Transport		PCU	Direction Name				Total Vehicle	Total PCU	Percentage
			Baroicha-Raipura	Raipura-Baroicha	Baroicha-Methikanda	Methikanda-Baroicha			
MV	Bus/Minibus	3	0	0	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0	0	0.00
	Pickup Van	1	8	4	2	3	17	17	3.32
	Car/ Micro Bus/Jeep	1	5	2	3	1	11	11	2.15
	Lorry/Trolly	1	1	0	0	0	1	1	0.20
	Tempo	0.75	132	125	1	0	258	193.5	50.39
	Auto Rickshaw	0.75	42	34	5	9	90	67.5	17.58
	Motorcycle	0.75	34	17	7	6	64	48	12.50
	Total MV						**441**	**338**	**86.13**
NMV	Rickshaw/Van	2	12	6	1	4	23	46	4.49
	Bicycle	0.5	23	15	8	2	48	24	9.38
	Animal Cart/Push Cart	4	0	0	0	0	0	0	0.00
	Total NMV						**71**	**70**	**13.87**
Grand Total							**512**	**408**	**100.00**

E) Sapmara Bazar, Musapur (Roadway Segment)

Table E-1: Hourly Traffic Volume according to the Vehicle Types for Sapmara-Nilkuthi Bazar link on 18th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Sapmara-Nilkuthi Bazar	Bazar-Sapmara			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	3	5	15	2.00
	Pickup Van	1	4	1	5	5	2.00
	Car/ Micro Bus/Jeep	1	1	0	1	1	0.40
	Lorry/Trolly	1	4	1	5	5	2.00
	Tempo	0.75	88	3	91	68.25	36.40
	Auto Rickshaw	0.75	35	12	47	35.25	18.80
	Motorcycle	0.75	14	8	22	16.5	8.80
	Total MV				**176**	**146**	**70.40**
NMV	Rickshaw/Van	2	11	36	47	94	18.80
	Bicycle	0.5	14	13	27	13.5	10.80
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**74**	**107.5**	**29.60**
Grand Total					**250**	**253.5**	**100.00**

Table E-2: Hourly Traffic Volume according to the Vehicle Types for Sapmara-Nilkuthi Bazar link on 18th February, 2016 at 11.00 AM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Sapmara-Nilkuthi Bazar	Bazar-Sapmara			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	1	2	6	0.88
	Pickup Van	1	3	2	5	5	2.19
	Car/ Micro Bus/Jeep	1	2	1	3	3	1.32
	Lorry/Trolly	1	5	2	7	7	3.07
	Tempo	0.75	73	2	75	56.25	32.89
	Auto Rickshaw	0.75	30	9	39	29.25	17.11
	Motorcycle	0.75	12	7	19	14.25	8.33
	Total MV				**150**	**120.75**	**65.79**
NMV	Rickshaw/Van	2	8	33	41	82	17.98
	Bicycle	0.5	21	16	37	18.5	16.23
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**78**	**100.5**	**34.21**
Grand Total					**228**	**221.25**	**100.00**

Table E-3: Hourly Traffic Volume according to the Vehicle Types for Sapmara-Nilkuthi Bazar link on 18th February, 2016 at 4.14 PM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Sapmara-Nilkuthi Bazar	Nilkuthi Bazar-Sapmara			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	2	2	6	0.66
	Pickup Van	1	5	0	5	5	1.65
	Car/ Micro Bus/Jeep	1	0	1	1	1	0.33
	Lorry/Trolly	1	3	4	7	7	2.31
	Tempo	0.75	90	70	160	120	52.81
	Auto Rickshaw	0.75	30	1	31	23.25	10.23
	Motorcycle	0.75	20	6	26	19.5	8.58
	Total MV				**232**	**181.75**	**76.57**
NMV	Rickshaw/Van	2	4	31	35	70	11.55
	Bicycle	0.5	25	11	36	18	11.88
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**71**	**88**	**23.43**
Grand Total					**303**	**269.75**	**100.00**

F) Hasnabad, Amirganj(Roadway Segment)

Table F-1: Hourly Traffic Volume according to the Vehicle Types for Hasnabad-Radhaganj link on 19th February, 2016 at 9.00 AM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Hasnabad-Radhaganj	Radhaganj-Hasnabad			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	1	3	9	0.76
	Pickup Van	1	1	1	2	2	0.51
	Car/ Micro Bus/Jeep	1	0	4	4	4	1.01
	Lorry/Trolly	1	0	0	0	0	0.00
	Tempo	0.75	70	102	172	129	43.43
	Auto Rickshaw	0.75	43	95	138	103.5	34.85
	Motorcycle	0.75	16	15	31	23.25	7.83
	Total MV				**350**	**270.75**	**88.38**
NMV	Rickshaw/Van	2	17	13	30	60	7.58
	Bicycle	0.5	4	12	16	8	4.04
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**46**	**68**	**11.62**
Grand Total					**396**	**338.75**	**100.00**

Table F-2: Hourly Traffic Volume according to the Vehicle Types for Hasnabad-Radhaganj link on 19th February, 2016 at 12.00 PM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Hasnabad-Radhaganj	Radhaganj-Hasnabad			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	1	2	6	0.54
	Pickup Van	1	0	0	0	0	0.00
	Car/ Micro Bus/Jeep	1	1	3	4	4	1.08
	Lorry/Trolly	1	0	0	0	0	0.00
	Tempo	0.75	65	97	162	121.5	43.90
	Auto Rickshaw	0.75	41	89	130	97.5	35.23
	Motorcycle	0.75	14	13	27	20.25	7.32
	Total MV				**325**	**249.25**	**88.08**
NMV	Rickshaw/Van	2	14	18	32	64	8.67
	Bicycle	0.5	2	10	12	6	3.25
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**44**	**70**	**11.92**
Grand Total					**369**	**319.25**	**100.00**

Table F-3: Hourly Traffic Volume according to the Vehicle Types for Hasnabad-Radhaganj link on 19th February, 2016 at 4.00 PM.

Mode of Transport		PCU	Direction Name		Total Vehicle	Total PCU	Percentage
			Hasnabad-Radhaganj	Radhaganj-Hasnabad			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	2	2	6	0.54
	Pickup Van	1	1	0	1	1	0.27
	Car/ Micro Bus/Jeep	1	1	4	5	5	1.36
	Lorry/Trolly	1	0	0	0	0	0.00
	Tempo	0.75	58	76	134	100.5	36.41
	Auto Rickshaw	0.75	50	74	124	93	33.70
	Motorcycle	0.75	15	18	33	24.75	8.97
	Total MV				**299**	**230.25**	**81.25**
NMV	Rickshaw/Van	2	27	14	41	82	11.14
	Bicycle	0.5	11	17	28	14	7.61
	Animal Cart/Push Cart	4	0	0	0	0	0.00
	Total NMV				**69**	**96**	**18.75**
Grand Total					**368**	**326.25**	**100.00**

ORIGIN AND DESTINATION SURVEY

Table B-1: Choice of Mode

Type of Mode	Frequency	Percentage
Auto Rickshaw/Tempo/CNG	26	63.40
Bus	12	29.30
Car/Pickup/Jeep/Motorbus	3	7.30
Total	41	100.00

Table B-2: Purpose of Trip

Purpose of Trip	Frequency	Percent
Social	1	2.40
Work/Commute	40	97.60
Total	41	100.00

Table B-3: Nature of Origin

Type of Origin	Frequency	Percent
Residence	22	53.70
Shopping	1	2.40
Workplace	18	43.90
Total	41	100.00

Table B-4: Nature of Destination

Type of Destination	Frequency	Percent
Residence	12	29.30
Shopping	1	2.40
Workplace	28	68.30
Total	41	100.00

Table B-5: Frequency of Passengers Occupancy

No. of people in vehicle	Percent
Within 5 persons	2.4
6 to 10 persons	17.1
11 to 15 persons	17.1
16 to 20 persons	9.8
21 to 25 persons	19.5
26 to 30 persons	7.3
31 to 35 persons	4.9
36 to 40 persons	17.1
Above 40 persons	4.9
Total	100

Table B-6: Passengers Occupancy according to the Mode

Mode \ Passengers Occupancy			No. of Passengers in a vehicle									Total
			Within 5 persons	6 to 10 persons	11 to 15 persons	16 to 20 persons	21 to 25 persons	26 to 30 persons	31 to 35 persons	36 to 40 persons	Above 40 persons	
Types of Mode	Auto Rickshaw/Tempo/CNG	Frequency	1	6	5	4	7	2	1	0	0	26
		Percent	3.80%	23.10%	19.20%	15.40%	26.90%	7.70%	3.80%	0.00%	0.00%	100.00%
	Bus	Frequency	0	0	1	0	0	1	1	7	2	12
		Percent	0.00%	0.00%	8.30%	0.00%	0.00%	8.30%	8.30%	58.30%	16.70%	100.00%
	Car/Pick up/Jeep/ Motorbus	Frequency	0	1	1	0	1	0	0	0	0	3
		Percent	0.00%	33.30%	33.30%	0.00%	33.30%	0.00%	0.00%	0.00%	0.00%	100.00%
	Total	Frequency	1	7	7	4	8	3	2	7	2	41
		Percent	2.40%	17.10%	17.10%	9.80%	19.50%	7.30%	4.90%	17.10%	4.90%	100.00%

Table B-7: Mode Accessibility in Origin

Mode \ Origin Type			Type of Origin			Total
			Residence	Shopping	Workplace	
Vehicle Type	Auto Rickshaw/Tempo/CNG	Frequency	18	0	8	26
		Percent	69.20%	0.00%	30.80%	100.00%
	Bus	Frequency	200.00%	0.00%	1000.00%	1200.00%
		Percent	16.70%	0.00%	83.30%	100.00%
	Car/Pickup/Jeep/Motorbus	Frequency	200.00%	100.00%	0.00%	300.00%
		Percent	66.70%	33.30%	0.00%	100.00%
	Total	Frequency	2200.00%	100.00%	1800.00%	4100.00%
		Percent	53.70%	2.40%	43.90%	100.00%

Table B-8: Mode Accessibility in Destination

Mode \ Destination Type			Type of Destination: Residence	Shopping	Workplace	Total
Vehicle Type	Auto Rickshaw/ Tempo/CNG	Frequency	10	1	15	26
		Percent	38.50%	3.80%	57.70%	100.00%
	Bus	Frequency	0	0	12	12
		Percent	0.00%	0.00%	100.00%	100.00%
	Car/Pickup /Jeep/Motorbus	Frequency	2	0	1	3
		Percent	66.70%	0.00%	33.30%	100.00%
	Total	Frequency	12	1	28	41
		Percent	29.30%	2.40%	68.30%	100.00%

Table B-9: Origin and Destination Matrix within Upazila

Origin \ Destination	Alipura	Chanderkandi	Morjal	Palashtoli	Paurashava	Raipura	Adiabad	Total
Alipurai	0	0	1	0	0	0	0	1
Chanderkandi	0	0	0	4	1	1	0	6
Morjal	0	0	0	0	1	1	0	2
Palashtoli	0	0	0	0	1	0	0	1
Paurashava	1	1	0	0	0	2	2	6
Raipura	0	0	0	1	3	0	0	4
Adiabad	0	1	0	0	0	0	0	1
Total	1	2	1	5	6	4	2	21

Table B-10: Origin and Destination Matrix with others Upazilas/Dsitricts

Origin \ Destination	Bhairab	Brahmanbaria	Dhaka	Narayanganj	Narsingdi	Netrokona	Habiganj	Kendua	Kishoreganj	Mymensingh	Sylhet	Total
Bhairab	0	0	3	1	1	0	0	0	0	0	0	5
Brahmanbaria	0	0	0	0	0	0	0	0	0	0	0	0
Dhaka	0	1	0	0	0	1	0	0	0	0	1	3
Narayanganj	0	0	2	0	0	0	0	0	0	0	0	2
Narsingdi	0	0	0	0	0	0	0	0	0	0	0	0
Netrokona	0	0	0	0	0	0	0	1	0	0	0	1
Habiganj	0	0	1	0	0	0	0	0	1	0	0	2
Kendua	0	0	1	0	0	0	0	0	0	1	0	2
Kishoreganj	0	0	1	0	0	0	0	0	0	0	0	1
Mymensingh	0	0	1	0	0	0	0	0	0	0	0	1
Sylhet	0	0	1	0	0	0	0	0	0	0	0	1
Total	0	1	10	1	1	1	0	1	1	1	1	18

Table B-11: Purposes of Trips by Origin Places

Origin	Work/Commute	Social	Total
Within Upazila	63.41	0	63.41
Within District	4.88	0	4.88
Outside District	29.27	2.44	31.71
Total	97.57	2.44	100

Table B-12: Purposes of Trips by Destination Places

Origin	Work/Commute	Social	Total
Within Upazila	53.66	0	53.66
Within District	24.40	0	24.39
Outside District	19.51	2.44	21.95
Total	97.56	2.44	100

Table B-13: Suggestions of the Respondents

Suggestions	Frequency	Percent
Roads have to be repaired and improved	12	29.27
Traffic Jam should be reduced	6	14.63
Gas Station should be available	5	12.20
Security should be increased	4	9.76
Maintenance of vehicle is needed	2	4.88
No Comments	12	29.27
Total	**41**	100.00

PASSENGERS INTERVIEW SURVEY

Table B-14: Age Sex Structure of the Respondents

Age	Sex				Total	
	Male		Female			
	Numebr	%	Number	%	Number	%
Below 15	1	1.030927835	0	0	1	0.826446
16-20	10	10.30927835	3	12.5	13	10.7438
21-30	37	38.1443299	6	25	43	35.53719
31-40	28	28.86597938	6	25	34	28.09917
41-50	12	12.37113402	5	20.83333	17	14.04959
Above 51	9	9.278350515	4	16.66667	13	10.7438
Total	97	100	24	100	121	100
%	80.1652893		19.83471074		100	

Table B-15: Trip Purpose of Bus Passengers

	No. of Trips in a Week						**Total**	
Trip Purposes	**1 trip**	**2 trips**	**3 trips**	**4 trips**	**5 trips**	**6 trips**	**Frequency**	**%**
Work/commute	1	1	1	3	5	36	**47**	**38.84**
Business related	5	2	3	3	4	8	**25**	**20.66**
Shopping	1	2	1	1	1	3	**9**	**7.44**
Education	1	0	2	1	1	1	**6**	**4.96**
Social	1	1	1	4	5	12	**24**	**19.83**
Hospital	0	1	0	0	0	0	**1**	**0.83**
Recreation	7	2	0	0	0	0	**9**	**7.44**
Total	**16**	**9**	**8**	**12**	**16**	**62**	**121**	**100**
Percentage	**13.22**	**7.44**	**6.61**	**9.92**	**13.22**	**51.24**	**100**	

Table B-16 Modes used by Bus Passengers

Types of Modes	Number	Percentage
Bus	27	22.31
Motor Cycle	2	1.65
Rickshaw	38	31.40
Van	1	0.83
Boat	35	28.93
On foot	2	1.65
CNG	5	4.13
Rail	11	9.09
Total	121	100

Table B-17: Frequency of Travelling

Trips per week	Frequency	Percent
1 trip	30	26
2 trips	11	10
3 trips	10	9
More than 3 times	22	19
Everyday	22	19
Randomly in Month	14	12
Randomly in year	5	5
Total	114	100

Table B-18: Travel Cost for Bus Passengers

Travel Cost	Frequency	Percent
Within 50 taka	30	38
51 to 100 taka	22	27.8
101 to 150 taka	12	15.2
151 to 200 taka	2	2.5
201 to 250 taka	4	5.1
251 to 300 taka	5	6.3
More than 300 taka	4	5.1
Total	79	100

Table B-19: Travel Distance by Bus Passengers

Total Distance	Frequency	Percent
Within 5 km	2	2.6
6 to 10 km	2	2.6
11 to 15 km	2	2.6
16 to 20 km	3	3.8
21 to 30 km	10	12.8
31 to 40 km	14	17.9
41 to 50 km	12	15.4
More than 51 km	33	42.3
Total	78	100

Table B-20: Frequency of Travelling

Trip per week	Frequency	Percent
1 time	11	13.9
2 times	6	7.6
3 times	4	5.1
More than 3 times	6	7.6
Everyday	4	5.1
Randomly in Month	23	29.1
Randomly in year	25	31.6
Total	79	100

Table B-21: Age pattern of Respondents

Age	Frequency	Percent
16-20 Years	11	13.9
21-30 Years	31	39.2
31-40 Years	11	13.9
41-50 Years	10	12.7
Above 51 years	15	19
Below 15 Years	1	1.3
Total	79	100

Table B-22: Trip Purpose according to the Age pattern

Age \ Trip Purpose			Business related	Education	Hospital	Recreation	Shopping	Social	Work/Commute	Total
Age pattern	16-20 Years	Frequency	2	6	0	0	1	2	1	12
		Percentage	16.70 %	50.00 %	0.00 %	0.00%	8.30 %	16.70 %	8.30 %	100.00 %
	21-30 Years	Frequency	5	2	0	2	3	6	26	44
		Percentage	11.40 %	4.50 %	0.00 %	4.50%	6.80 %	13.60 %	59.10%	100.00 %
	31-40 Years	Frequency	10	0	1	2	4	9	9	35
		Percentage	28.60 %	0.00 %	2.90 %	5.70%	11.40 %	25.70 %	25.70%	100.00 %
	41-50 Years	Frequency	4	0	0	2	0	5	4	15
		Percentage	26.70 %	0.00 %	0.00 %	13.30 %	0.00 %	33.30 %	26.70%	100.00 %
	Above 51 years	Frequency	1	0	0	3	0	2	8	14
		Percentage	7.10 %	0.00 %	0.00 %	21.40 %	0.00 %	14.30 %	57.10%	100.00 %
	Below 15 Years	Frequency	0	0	0	0	1	0	0	1
		Percentage	0.00 %	0.00 %	0.00 %	0.00%	100.00%	0.00%	0.00 %	100.00 %
	Total	Frequency	21	8	1	9	9	24	48	121
		Percentage	17.40 %	6.60 %	0.80 %	7.40%	7.40 %	19.80 %	39.70%	100.00 %

Table B-23: Travel Distance with Travel Cost

Travel Distance (km)	Travel Cost in Taka					Total	
	< 20	20 to 40	41 to 60	61 to 80	> 80	Frequency	Percent
Less than 5	26	12	7			45	37.19
5 to 15	4	13	10	1	7	35	28.93
16 to 30		1	4		5	10	8.26
31 to 50			5			5	4.13
More than 50	1	3	1	1	20	26	21.49
Total	31	29	27	2	32	121	100
Percent	25.62	23.97	22.31	1.65	26.45	100.00	

Table B-24: Travel Distance with Travel Time

Travel Distance (km)	Travel Time in Hour					Total	
	< 0.45	0.45-1.30	1.31-2.30	2.31-3.30	> 3.30	Frequency	Percent
Less than 5	36	9	1	1		47	**38.84**
5 to 15	13	19		3		35	**28.93**
16 to 30	2	5	2	1		10	**8.26**
31 to 50			2	1		3	**2.48**
More than 50	1	4	2	6	13	26	**21.49**
Total	**52**	**37**	**7**	**12**	**13**	**121**	**100.00**
Percent	**42.98**	**30.58**	**5.79**	**9.92**	**10.74**	**100.00**	

Table B-25: No of Modes Used to Complete a Trip

No. of Modes	Frequency	Percentage
1	31	25.62
2	50	41.32
3	40	33.06
Total	121	100

Table B-26: Problems in Bus Transportation

Comments	Number	Percentage
Narrow road	41	33.88
Local and slow bus service	14	11.57
Lack of infrastructure (bridge , culvert, etc)	7	5.79
Traffic jam	7	5.79
GhatCondtinshoud be good	17	14.05
Vehicle fare should be reduced	15	12.40
No Comments	20	16.53
Total	121	100

REGIONAL TRANSPORT SURVEY

Table B-27 : Regional Bus Survey

Survey location	Company/Agency name	Type of mode	Destination points	Origin points	No. of passenger	Major stoppage area inside the Upazila	Remarks/ comments
Marjal Bus Stand		Bus	Rajshahi &Natore	Bhairab	50	Marjal	Passenger & goods
Marjal Bus Stand	Chalanbeel	Bus	Savar, Dhaka	Bhairab	35	Marjal	Only Passenger
Marjal Bus Stand	Titas	Bus	Bhairab& B. Baria	Dhaka	40	Marjal	Only Passenger
Marjal Bus Stand	Chalanbeel	Bus	Savar, Dhaka	Bhairab	35	Marjal	Only Passenger

Table B-28: Train Survey

Survey location	Company/Agency name	Type of mode	No. of trips	Destination points	Origin points	Major stoppage area inside the Upazila	Remarks/ comments
Methikanda Rail Station	Kishoreganj Express	Train	1	Chittagong	Dhaka	Daulatkandi&Methikanda	Off day Friday
Methikanda Rail Station	Kishoreganj Express	Train	1	Dhaka	Chittagong	Daulatkandi&Methikanda	Off day Friday
Methikanda Rail Station	Isha Khan Express	Train	1	Dhaka	Mymensingh	Daulatkandi&Methikanda	
Methikanda Rail Station	Isha Khan Express	Train	1	Mymensingh	Dhaka	Daulatkandi&Methikanda	
Methikanda Rail Station	Comilla Commuter(Demo)	Train	1	Dhaka	Comilla	Daulatkandi&Methikanda	Off day Tuesday
Methikanda Rail Station	Comilla Commuter(Demo)	Train	1	Comilla	Dhaka	Daulatkandi&Methikanda	Off day Tuesday
Methikanda Rail Station	Titas Commuter	Train	1	Dhaka	Brahmanbaria	Daulatkandi&Methikanda	
Methikanda Rail Station	Titas Commuter	Train	1	Brahmanbaria	Dhaka	Daulatkandi&Methikanda	
Methikanda Rail Station	Noakhali Express	Train	1	Dhaka	Chittagong	Daulatkandi&Methikanda	
Methikanda Rail Station	Noakhali Express	Train	1	Chittagong	Dhaka	Daulatkandi&Methikanda	
Methikanda Rail Station	Surma Mail	Train	1	Dhaka	Sylhet	Daulatkandi&Methikanda	
Methikanda Rail Station	Surma Mail	Train	1	Sylhet	Dhaka	Daulatkandi&Methikanda	

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

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-02
(Ishwarganj Upazila, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Socio-economic Survey of Raipura Upazila, Narsingdi

August, 2016

Joint Venture

of

Sheltech Consultants Pvt. Ltd

and

ARC Bangladesh Ltd

JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ Socio-economic Final Survey Report/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Socio-economic Draft Survey Report of Raipura Upazila, Narsingdi.

Dear Sir,
We are pleased to submit herewith the Final Socio-economic Draft Survey Report of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)
Team Leader, Package -2

(Md. Azibar Rahman)
Socio-economic Expert, Package -2

Encl: As stated.

Copy to:
1. Team Leader, Package-2.
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

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Executive Summary

This report aims to explore the socioeconomic condition of Raipura Upazila, Narsingdi. 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. Raipura Upazila, Narsingdi has some important *hat/bazars* like monipura bazar, raypura bazar and Srirampur bazar etc. There are also some famous river flows beside the Upazila named the Meghna, the old Brahmaputra, Arial Kha and Kakon.etc. Most of the people of *Char* area of this Upazila lived their life by using the rivers. The upazila shows high potentialities of entering in "Demographic Bonus" window soon. Like others area of Bangladesh, here is also lived high percentage of middle income people. Who are attracted to the urban facilities of urban portion of this upazila, which leads them to make new settlement here, as the land price is also rising. Both of rural and urban area is 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 has been occurred regarding roads. Load-shedding problem is also one of the major problem of this Upazila. But the alarming is about this Upazilas education quality. It is deteriorating day by day because of lack of enough qualified teacher and high student-teacher ratio. Moreover, there are not enough provision for qualified doctors. Thus, the health treatment facilities also not yet up to the mark. So necessary steps should be taken by concerned authorities regarding these problems.

Abbreviation/Acronyms

BDT	*Bangladesh Taka*
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
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
SCPL	Sheltech Consultants Pvt. Ltd.
SRS	Simple Random Sampling
ToR	Terms of Reference
TL	Team Leader
UDD	Urban Development Directorate

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Chapter 1: Introduction

1.1 Background

This report aims to explore the socioeconomic condition of Raipura Upazila, Narsingdi. 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. Here the phenomena that lie at the intersection of the social and economic spheres of society are being studied. Moreover, while planning an area, there is a need for information about the level of socio-economic development, the population's quality of life (urban, rural, etc.), local problems, and the peculiarities of people's economic behavior. The main source of such information is intricate and comprehensive social research. Studies are directed towards the analysis of complicated social processes in an area and examine the spectrum of problems concerning changes in social structure and the configuration of social consciousness. 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

Raipura, the biggest Upazila of Narsingdi zila in respect of area. It came into existence in the middle of the nineteenth century and upgraded to Upazila in 1984. Nothing is definitely known about the origin of the name of the Upazila. There is a general belief that in the past this area was under an influential Zamindar of Roy family. The Upazila might have been named as Raipura after the name of the Zamindar family. Raipura Upazila (Narsingdi district) is located in between 23°52' and 24°04' North Latitudes and in between 90°44' and 90°59' East Longitudes. It has an area of 312.76 sq. km. It has 9 Wards, 24 Unions, 107 Mouzas and Mahallas, and 239 villages (BBS, 2011). Bounded on the north by Belabo Upazilas on the east by Nabinagar and Brahmanbaria on the south by Narsingdi sadar Upazila, Nabinagar and Bancharampur Upazilas and on the west by Shibpur and Narsingdi sadar Upazila (please see Figure 1.1).

1.3 Importance in the Regional Context

Raipura is the second largest Upazila of Bangladesh. There are 3 important *bazar* in this area named monipura bazar, raypura bazar and Srirampur bazar. Their bid price is BDT 49,00,000; 8,00,000 and 11,00,000 accordingly which are comparatively high within the Upazila. There are also some famous river flows beside the Upazila named The Meghna, The old Brahmaputra, Arial Kha and Kakon. Most of the people of *Char* area of this Upazila lived their life by using the rivers. The Upazila is famous for high percentage of fish cultivated area. Fishes of this Upazila are exported to the various cities like bhairab, kishorganj, Narsingdi, Dhaka etc. *Panthshala* is one of the famous tourist spot of this Upazila.

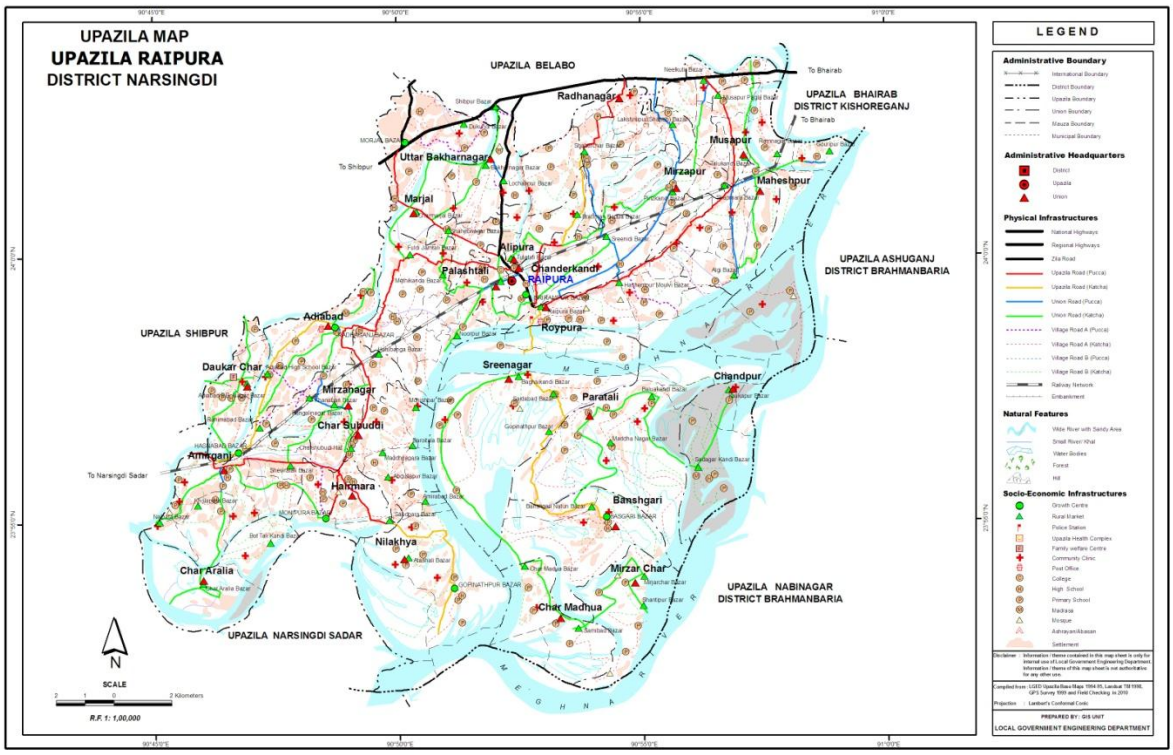

Figure 1.1 Upazila Map, Raipura, Narsingdi (Source: LGED, 2016)

1.4 Social Information

According to BBS (2011), there are total 110520 households at Raipura Upazila and average size of households is 4.82. Total number of population is 5,35,796 where the number of male is about 2,58,993 and number of female is 2,79,803. Density of this area is about 1,713 per sq. km. More than half of the population is literate and the percentage has increased than 2001. It has 1 teachers training institute, 5 colleges, 43 secondary schools, 213 primary schools, 51 madrasas. Noted educational institutions: Primary Teachers Training Institute, Raipura Degree College, Raipura Government Technical Vocational Institute, Adarsha Technical Training College, Adiabad Islamia High School and College (1912), Raipura RKRM High School (1903), Pirijkandi High School (1924), Sirajnagar MA Pilot High School (1947), RM High School, Khidirpur High School, Raipura Pilot Girls' High School, Daulatkandi Mohiuddin High School, Abdullapur High School, Char Subuddi Junior High School, Veluar Char Nimna Secondary School, Raipura Upazila Dakhil Madrasa, Char Subuddi Dakhil Madrasa, Islampur Hamidia Dakhil Madrasa.

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 RaipuraUpazila, Narsingdi.

Specific objectives

The specific objectives of this report were:

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

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 RaipuraUpazila total household number is 110520. Whereas 102202are rural and 9318are 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,

$n = Sample\ size$,

$z = Statistical$ certainty $chosen$,

$p =$ Coverage rate/estimated prevalence ,

$q = 1 - p$ and

$d =$ precision desired : 0.05

Considering 97% Confidence Interval

Let, $p = .5\ and\ z = 1.96$

$$\Rightarrow n = \frac{1.96^2}{0.03^2} \times .5 \times (1 - .5)$$

Or,n = 1067

Considering Finite Population Correction (FPC), the adjusted the sample size for the field level administration is as follows.

For Urban area of Raipura Upazila

$$n^1 = \frac{n}{1 + (\frac{n}{N})}$$

$$\Rightarrow n^1 = \frac{384}{1 + (\frac{384}{9318})}$$

$$\Rightarrow n^1 \cong 298$$

For Rural area of Raipura Upazila

$$n^1 = \frac{n}{1 + (\frac{n}{N})}$$

$$\Rightarrow n^1 = \frac{384}{1+(\frac{384}{102202})}$$

$$\Rightarrow n^1 \cong 529$$

So, using 95% confidence interval and ±3% precision level total no of surveys are calculated. Distribution of sample for RaipuraUpalizais given below:

Sl. No	Urban	Rural	Total Sample
1	298	529	827

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 Raipura Upazila. For each unions then random sampling technique is used to select the households for survey using Microsoft excel.The selected samples from total sample of households of Shibpur is illustrating by a table 2.1 below:

Table 2.1: Selected Samples for Socio-economic Survey

District	*Upazila Name*	*Paurashava/ Union Name*	*House hold*	Population			*Sampling HH*
				Male	*Female*	*Total*	
Narsingdi	*Raipura*	Ward-01	753	1755	1900	3655	30
		Ward-02	844	1997	2123	4120	30
		Ward-03	888	2089	2258	4347	30
		Ward-04	812	1820	1991	3811	29
		Ward-05	566	1306	1458	2764	26
		Ward-06	646	1399	1546	2945	30
		Ward-07	995	2257	2441	4698	30
		Ward-08	914	2157	2332	4489	31
		Ward-09	864	1999	2076	4075	30
		Amirganj Union	7885	19305	19298	38603	21
		Adiabad Union	4407	9692	10667	20359	22
		Alipura Union	3624	8055	8679	16734	20
		Banshgari Union	3227	8353	8852	17205	22

		Chanderkandi Union	3156	7424	8132	15556	20
		Chandpur Union	4548	11964	12237	24201	20
		Char Aralia Union	2839	6874	7171	14045	20
		Char Madhua Union	1920	4585	5324	9909	20
		Char Subuddi Union	4413	10283	11155	21438	20
		Daukar Char Union	2323	5085	5470	10555	22
		Hairmara Union	3287	7668	8137	15805	20
		Maheshpur Union	5391	12419	13798	26217	20
		Marjal Union	5257	11728	12177	23905	19
		Mirzanagar Union	4529	10368	11290	21658	19
		Mirzapur Union	5304	12077	12229	24306	20
		Mirzar Char Union	1710	4208	4632	8840	20
		Musapur Union	5807	14197	14924	29121	21
		Nilakhya Union	4854	11458	12518	23976	18
		Palashtali Union	7099	15317	16998	32315	23
		Paratali Union	5506	13275	14429	27704	20
		Radhanagar Union	3658	8329	8901	17230	18
		Roypura Union	2373	5398	6026	11424	18
		Sreenagar Union	5354	13292	14211	27503	20
		Uttar Bakharnagar Union	4767	10860	11423	22283	18
		Total	***110520***	***258993***	***276803***	***535796***	***747***

2.4Tools 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

2.4.1Preparation 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 Raipura Upazila.

Table 2.2: 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)

2.4.2Pre-testing

The questionnaires were pretested in urban and rural areas with participation of survey team (Survey supervisors, Enumerators) and members of Project managementteam. 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.

2.4.3Training of Enumerators and Survey Supervisors

JV of SCPL-ABL 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 Raipura 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 JV of SCPL-ABL, 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.

2.6Quality 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, 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.

2.7Database 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 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.

2.8Limitation 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 Introduction

This chapter describes the survey findings of different socio-economic factors in both urban and rural areas of Raipura. Here, urban areas mean data gathered in 9 Wards of Raipura Municipality/Pourashava and rural areas means data gathered from 24 Unions of this Upazila. The socio-economic factors are: age, sex, marital status, religious status, level of education, types of occupation, monthly income and expenditure of households, migration, housing status, land value, transport, utility services, medical facility, recreation facility, education facility, law and order situation, available services in Raipura Upazila, problems of the area, traditional cultural festival of the area, people's aspiration about the development of the Upazila. The following factors are described below.

3.2 Age Sex Structure of Household Members

When the respondents are categorized into different ages, it has been seen that, about more than half of total respondents are between 18-59 age group and about one-fourth of total respondents are between 5-14 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 (please see Figure 3.1).

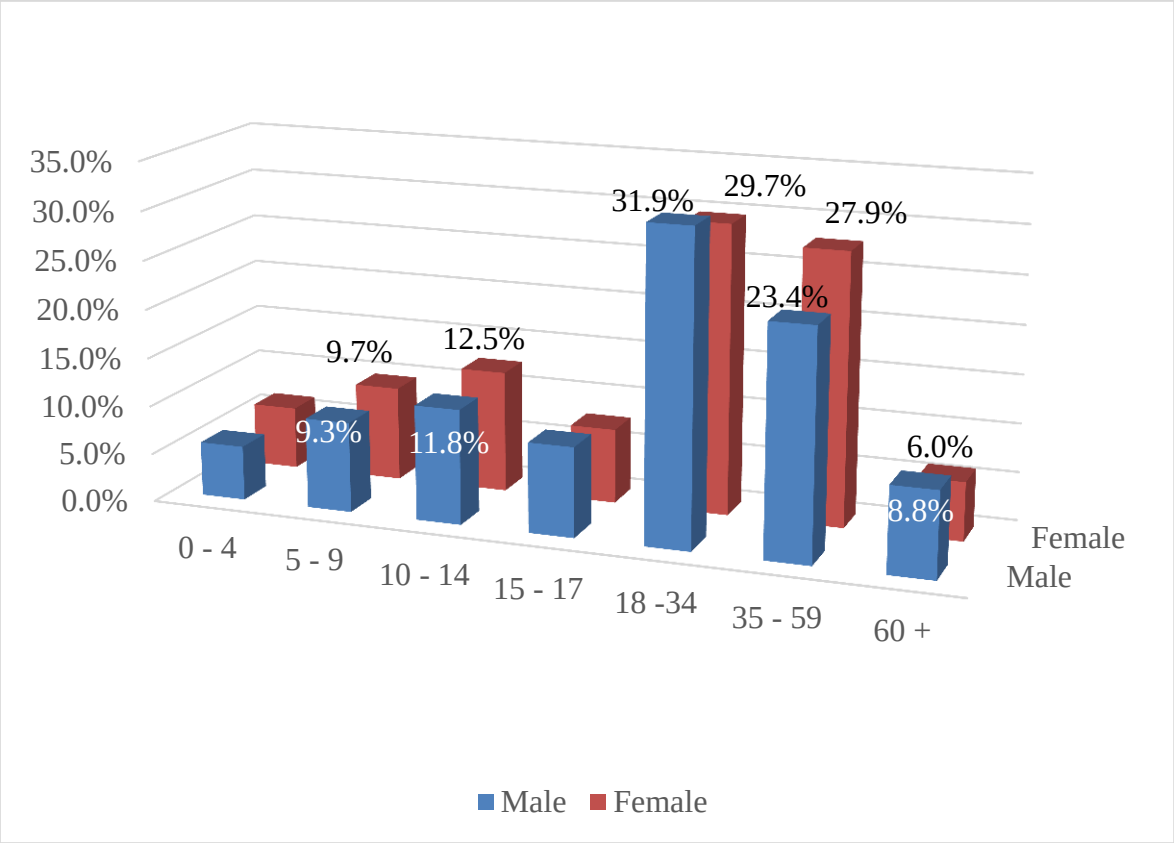

Figure 3.1: Age and Sex Structure of Households at Raipura(Source: Field Survey, 2015)

The pyramid shows dependent and working age population by urban and rural area in Raipura Upazila. In urban area, 29 percent population were below 18 years of age and they are depended group of people. At the working age level, age between 18 and 59 about 64 percent people are found. While in rural areas of Raipura, the corresponding figures were almost the similar (29 % and 65 % respectively). Please see Figure 3.2 and 3.3 below:

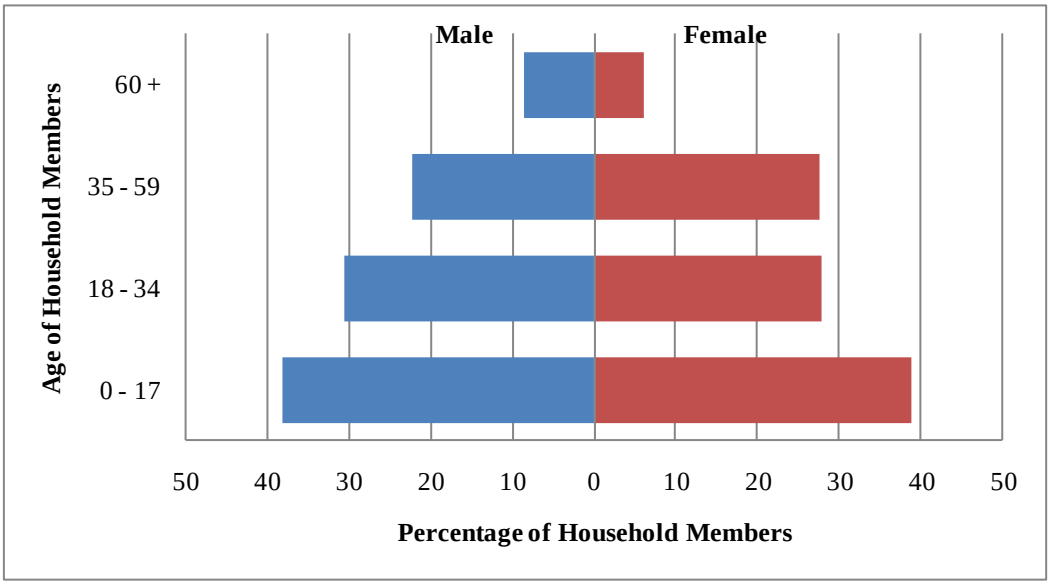

Figure 3.2: Age and Sex Pyramid of Urban Population (Source: Field Survey, 2015)

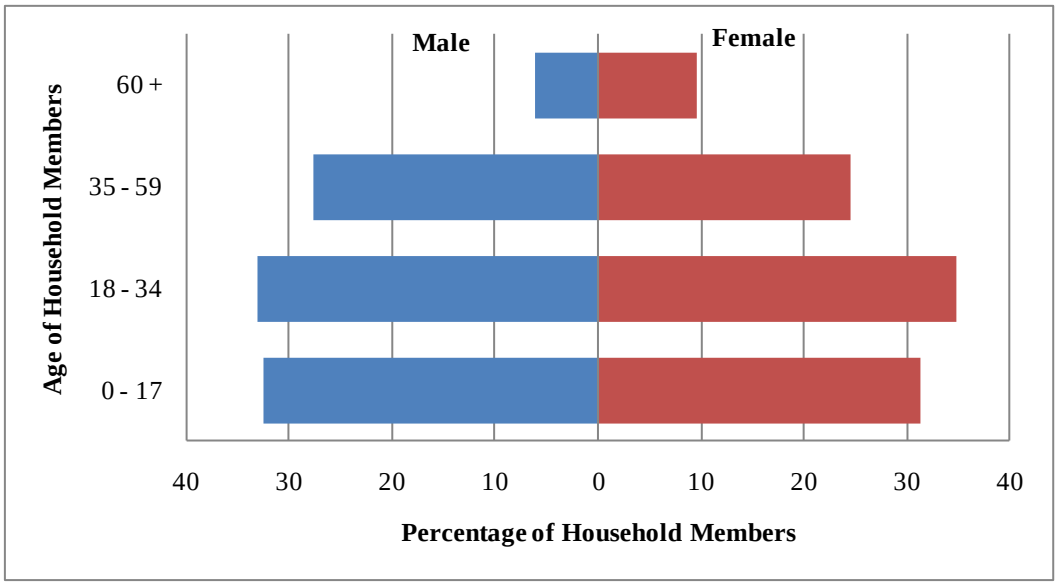

Figure 3.3: Age-sex Pyramid of Rural Population (Source: Field Survey, 2015)

Again the age sex pyramid of urban and rural area also represents almost the same condition (please see Figure 3.2 & 3.3). 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 theUpazila to enter into the window of ‘Demographic Bonus’.

3.3 Sex

In the surveys, about half of the total respondents are found as male and the rest are female both in urban and rural area (please see Figure 3.4). Thus the male-female ratio in urban and rural area is the same.

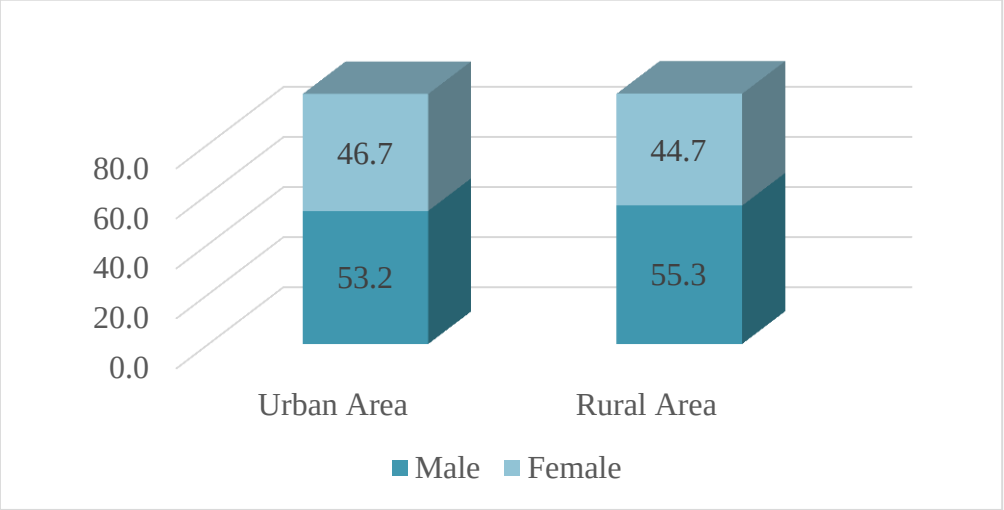

Figure 3.4: Male-Female Ratio in Urban and Rural Area(Source: Field Survey, 2015)

From Figure 3.4, it has also been seen that both in urban and rural area the male percentage is slightly higher than female percentage.

3.4 Marital Status

It has been found in the 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 higher in rural area than urban area. Apart from these, some of them also found as widow (about 2%)(Please see Figure: 3.5).

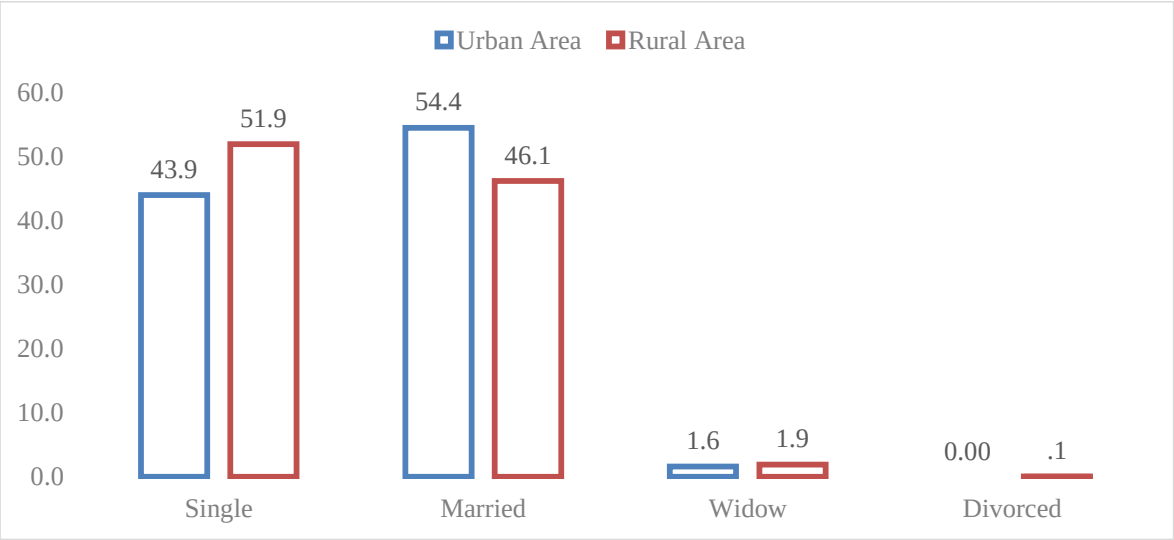

Figure 3.5: Marital Status(Source: Field Survey, 2015)

3.5 Level of Education

In the Upazila, it has been found that irrespective of rural or urban area more than about half of the respondents are below the primary level of education. Both of urban and rural area the percentage of completing SSC level of education is about the same. Though in urban area there are higher percentage of people completing more than SSC level of education. As, about more than half of the total population is from below primary school level, some initiatives should be taken to increase the percentages of level of higher education (please see Figure 3.6)

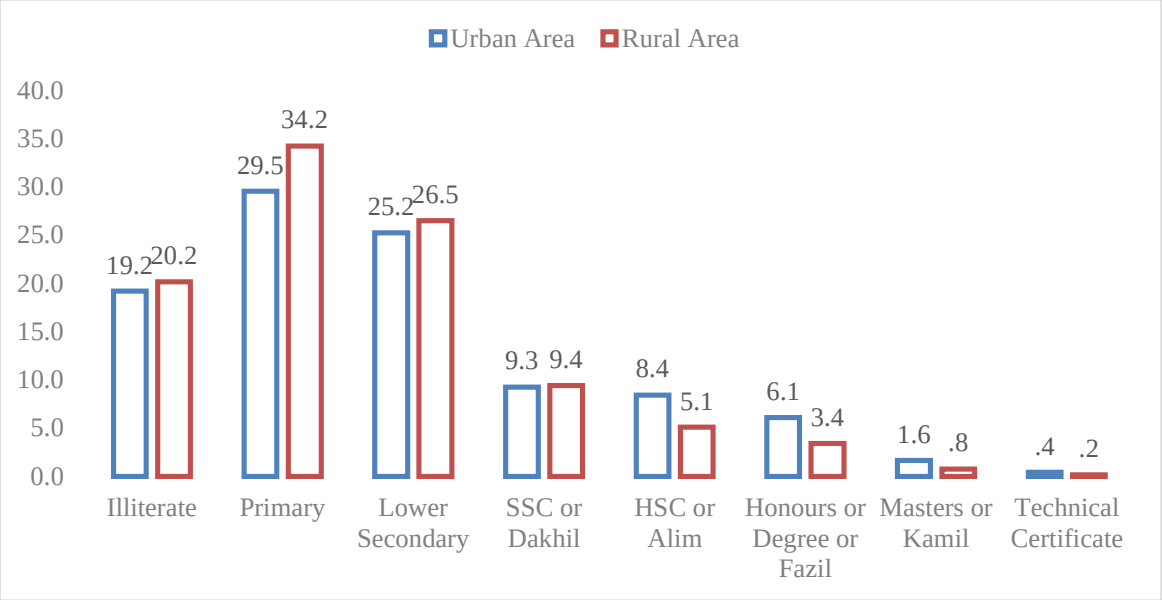

Figure 3.6: Level of Education (Source: Field Survey, 2015)

3.6 Types of Occupation

In this Upazila about 40% of total respondents worked as labour both of urban and rural area. Moreover, about one fourth of total respondents also worked in their own business in both of rural and urban area. About more than one fourth of total respondents also engaged in their job as occupation. Thus the percentage of engagement in different types of occupation is about the same for both of urban and rural area (please see Figure 3.7).

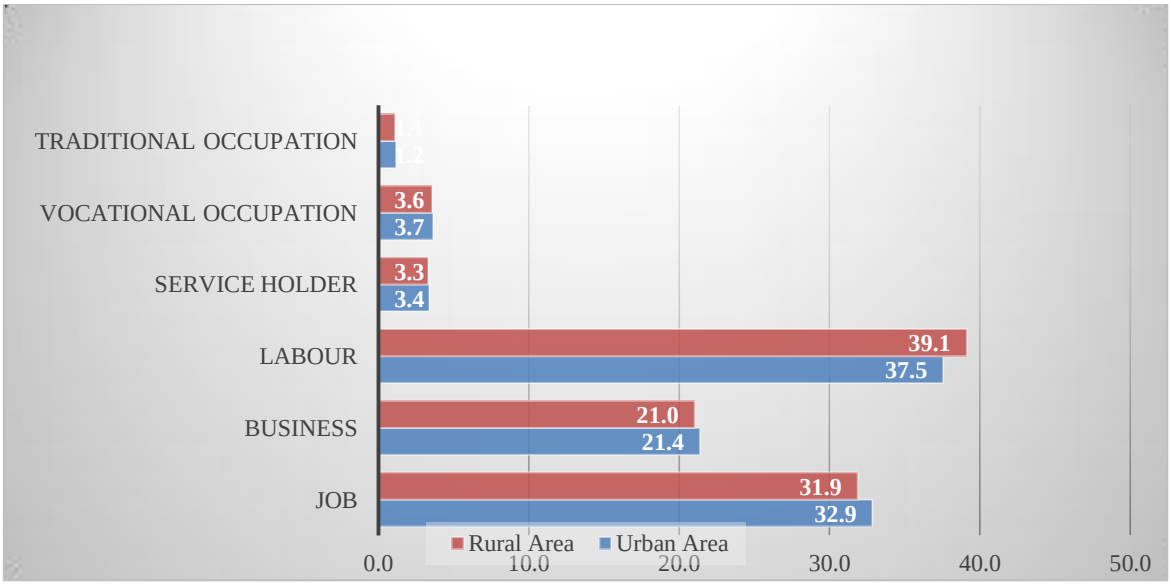

Figure 3.7: Occupation in Urban and Rural Area (Source: Field Survey, 2015)

The relations also have been studied between education level and occupation pattern in urban and rural area. In urban areas, it has been found that about half of the illiterate respondents engaged in labour types of work. About one fourth of them also engaged in business. Though the ratio is about the same for those who completed primary level of education, some of them also engaged in job sector, thus the percentage has increased for completing primary level of education than illiterate. Those who studied in high school but did not complete SSC, about half of them get engaged in job types of work. About more than one fourth of them also lead their life by engaging in business. Those, who completed SSC or HSC, most of them are either engaged in business or job. The engagement percentage in jobs has increased significantly for those who completed more than HSC level of education. (please see Table 3.1).

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

	Job	Business	Labour	Service Holder	Vocational Occupation	Traditional Occupation
Illiterate	14.9	25.7	44.6	2.0	7.9	5.0
Primary	21.9	24.2	39.8	1.6	8.6	3.9
Lower Secondary	47.4	31.9	12.1	.9	5.2	2.6
SSC or Dakhil	43.8	41.7	8.3	2.1	4.2	
HSC or Alim	39.3	35.7	7.1	14.3	3.6	
Honours or Degree or Fazil	64.5	29.0		6.5		
Masters or Kamil	76.9	7.7		15.4		
Technical Certificate	100.0					

Source: Field Survey, 2015

On the other hand, in rural areas, respondents who has technical certificate all of them are engaged in jobs. Respondents who completed Masters level of education about two third of them are engaged in same category as previous. The rest are in either government service holder or in business. Like in urban area, the percentage of engaging in jobs also increased in rural area for those who completed their education level HSC. Respondents from below HSC level of education most of them started engaging in labor types of works like construction labor, transport labor, service labor and day labor. The percentage of engaging in small entrepreneurship islower in rural area than urban, which represents urban area's economy provide more option to conduct business for small entrepreneurs than rural area.

Table 3.2: Education and Occupation Pattern in Rural Area(In Percentage)

	Job	Business	Labour	Service Holder	Vocational Occupation	Traditional Occupation
Illiterate	18.2	19.3	57.4	.6	4.0	.6
Primary	24.9	21.9	44.7	1.3	5.1	2.1
Lower Secondary	41.5	23.8	30.1	1.0	2.6	1.0
SSC or Dakhil	50.6	18.5	14.8	9.9	4.9	1.2
HSC or Alim	41.0	25.6	17.9	15.4		
Honours or Degree or Fazil	52.0	24.0	12.0	12.0		
Masters or Kamil	72.7	9.1		18.2		
Technical Certificate	100.0					

Source: Field Survey, 2015

3.7 Monthly Income and Expenditure of Households

3.7.1 Income Status

In rural area, about half of total respondents' income source is either agriculture or labor. On the other hand, in urban area more than half of the households' income source is either from labor types of works or business. In addition, about more than one fourth of total households of rural area's income is from agriculture (highest), whereas the percentage is significantly low in urban area (second highest). In urban area, the maximum percentage of people's income source is business. Again, some of the households leads their life from pension money. In rural area about one fourth of total respondents' income source is either foreign remittance or poultry. Thus, in rural area a significant number of people are engaged in poultry industry, which is low in urban area. On the other hand, more people has foreign remittance than in rural area (please see Figure: 3.8).

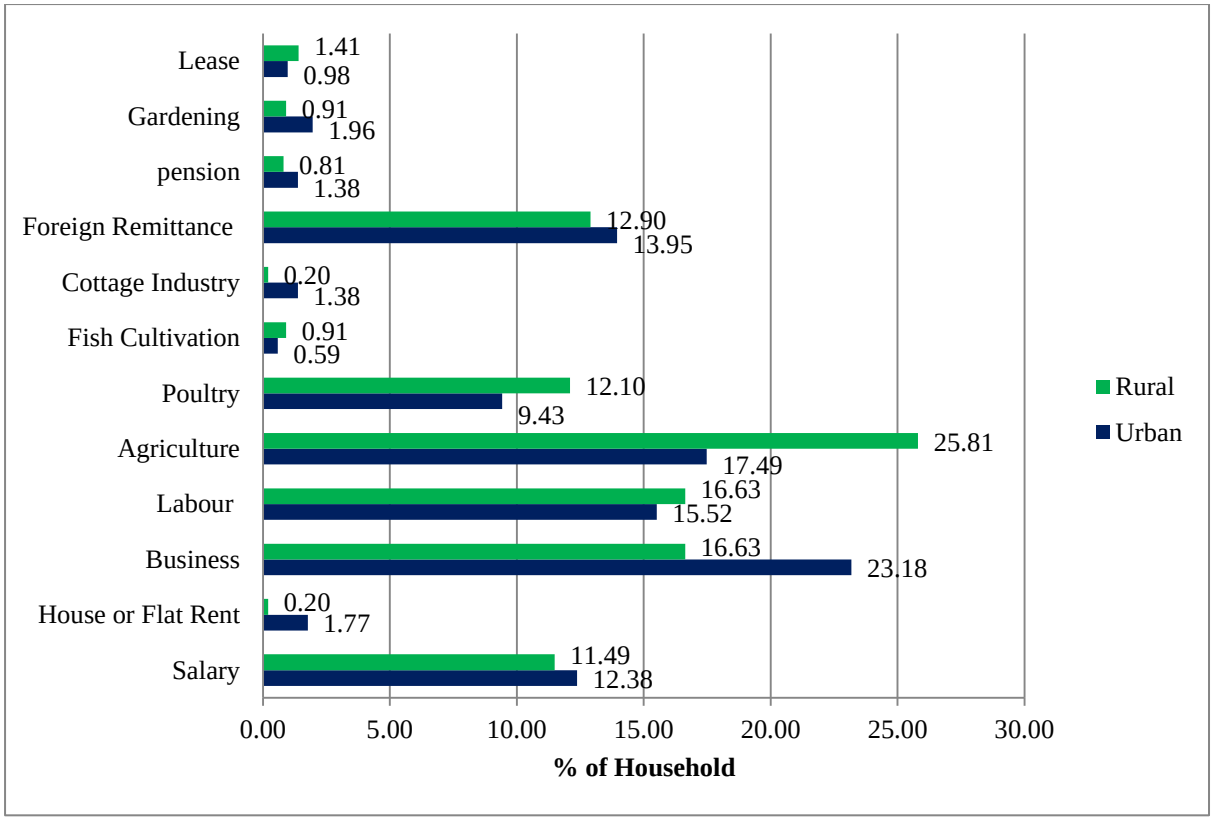

Figure 3.8: Income Source Note: Multiple Response Counted (Source: Field Survey, 2015)

Again, from the below figure it has been seen that the highest percentage of urban and rural people's (about 40%) income lies between 10000-20000 range. In rural area, about more than two third of household's income is less than 20000. Whereas in urban area the percentage is slightly lower for the same income range.The percentage is always higher in urban area than rural, whose household income is more than 20000. Except the income range between 30 and 40 thousand (please see Figure: 3.9). Thus, it has been observed that, there are significant difference of monthly income between monthly rural and urban area. And sometimes rural people's income found higher than urban people.

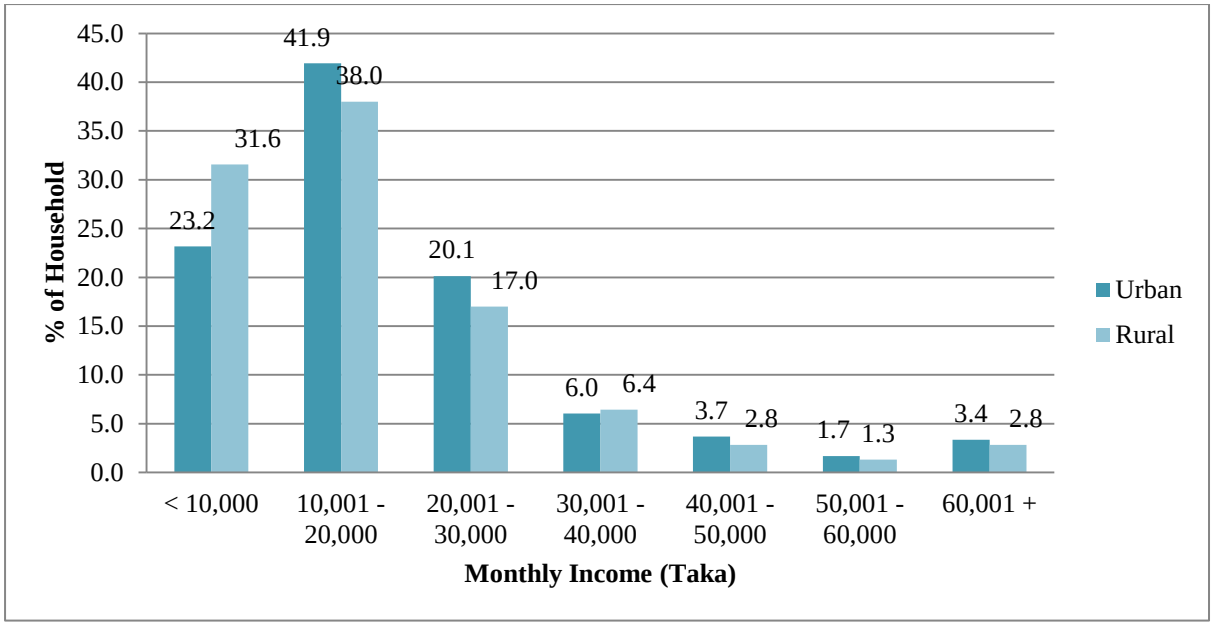

Figure 3.9: Monthly Income (Source: Field Survey, 2015)

3.8 Monthly Expenditure

About more than three fourth of total household's monthly expenditure in rural and urban area is below 20000. More than 40% of total rural household's monthly expenditure is between 10 and 20 thousands whereas about the half of the total urban respondents expenditure is in the same range. On the other hand, the percentage of households expending below 10000 in urban area is about 30% which is lower than rural area. Thus, expenditure in urban area is comparatively higher than rural area (please see Figure: 3.10).

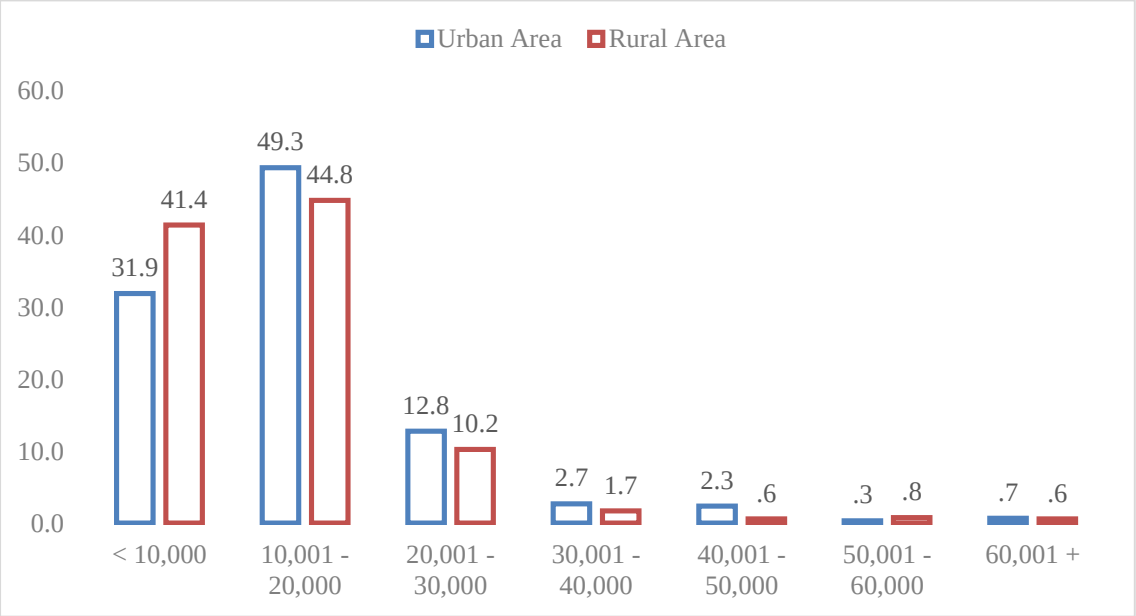

Figure 3.10: Monthly Expenditure (Source: Field Survey, 2015)

For about half of the total households of urban and rural area's expenditure on food is within 3000-6000. The percentage of households whose expenditure on food is less than 3000 is slightly higher in urban area than rural area. Whereas the percentage of household expending more than 6000 but less than 12000 on food islowerin urban area than rural area. On the other hand, expenditure more than 12000 is always higher in urban area than rural. Thus, expenditure on food is comparatively high in urban area than rural (please see Figure 3.11)

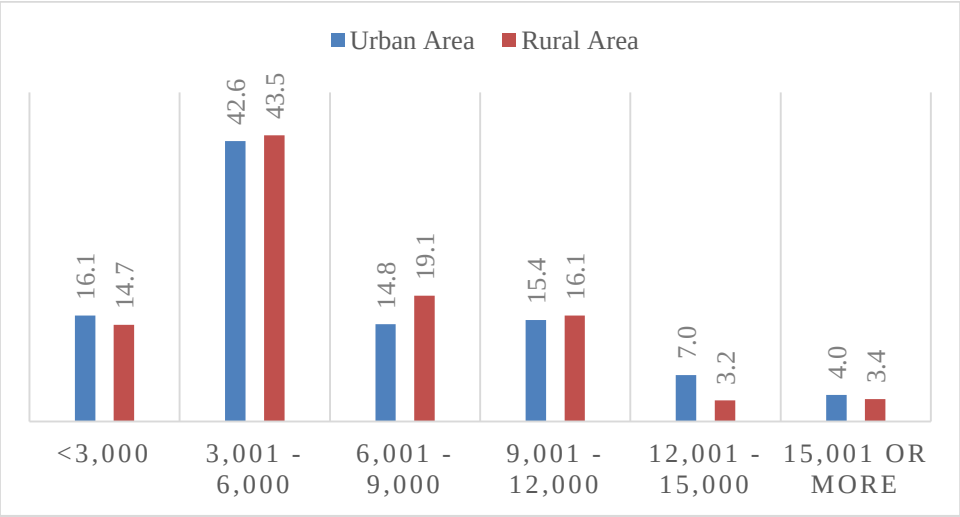

Figure 3.11: Monthly Expenditure on Food (Source: Field Survey, 2015)

The percentage of food cost per month is a vital indicator of socioeconomic situation of household. About 31 percent households' food cost within 61 to 90 percent those are poor people. About 26 percent households food cost within 40 percent of monthly expenditure those households have more option to spend money at other sectors. Thus, the percentage of food cost at total monthly expenditure is comparatively high at rural area (please see Figure)

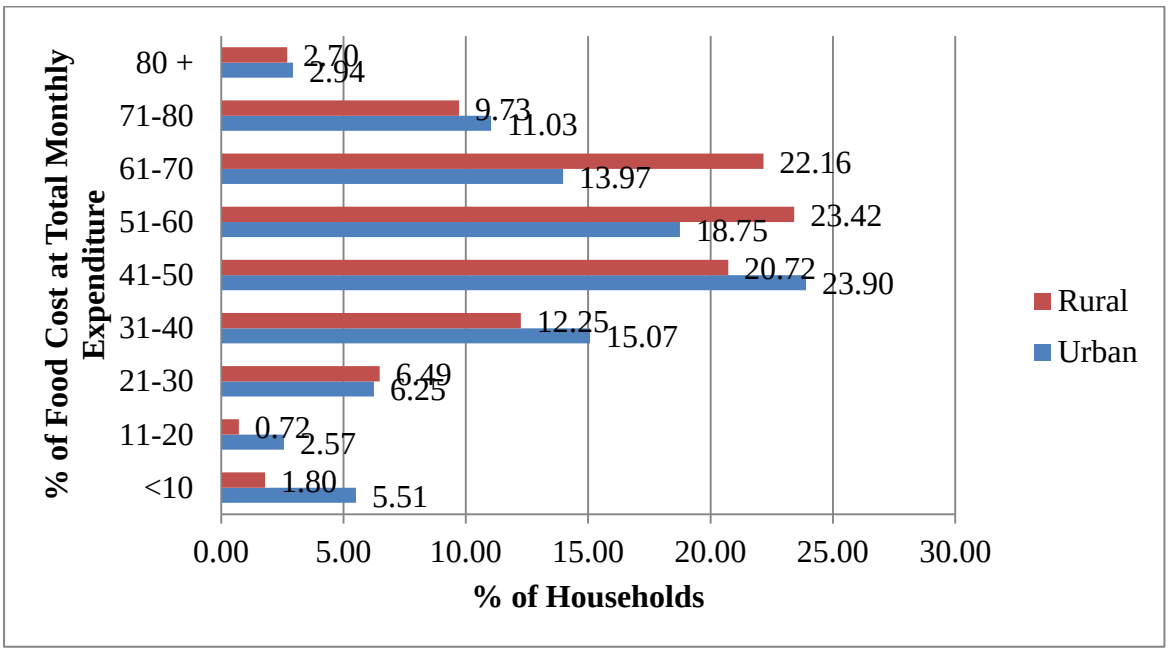

Figure: Percentage of Food Cost at Total Monthly Expenditure (Source: Field Survey, 2015)

Moreover, expenditure on education is about the same in rural and urban area. Though about most of the rural and urban households' monthly expenditure on education is less than 3000, the percentage of households is higher in rural area. Most of the households who are expending more than 3000 per month on education lived in urban area. Thus, urban people is expending more on education than rural (please see Figure 3.12)

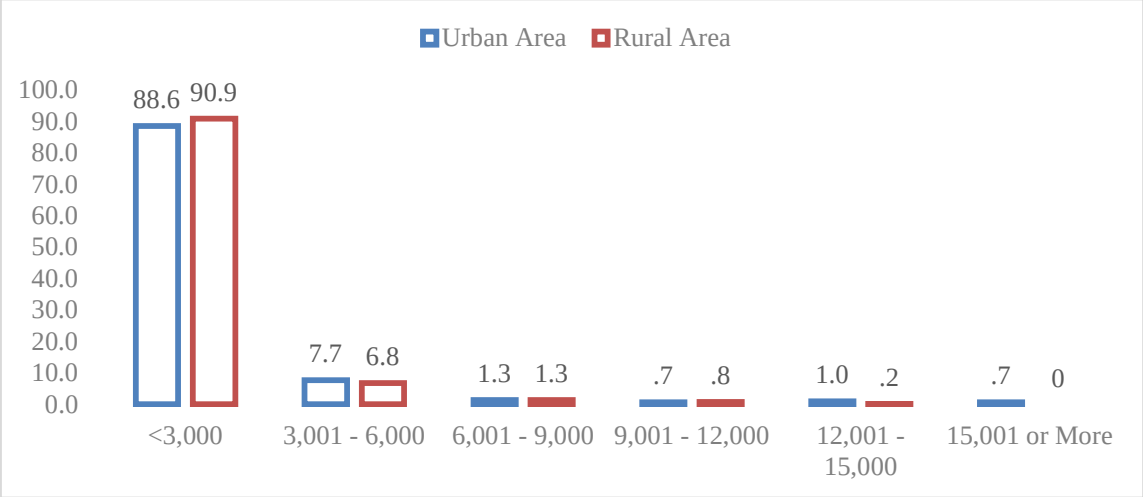

Figure 3.12: Monthly Expenditure on Education (Source: Field Survey, 2015)

3.9 Migration

Almost all of the households of rural area is non-migrant, lived in here from their birth. About 95% of urban households are non-migrant. The urban migrants came here because of job or environmental reasons. The environmental reasons are most of the cases found for occurrence of river erosionof their previous residence (please see Figure: 3.13).

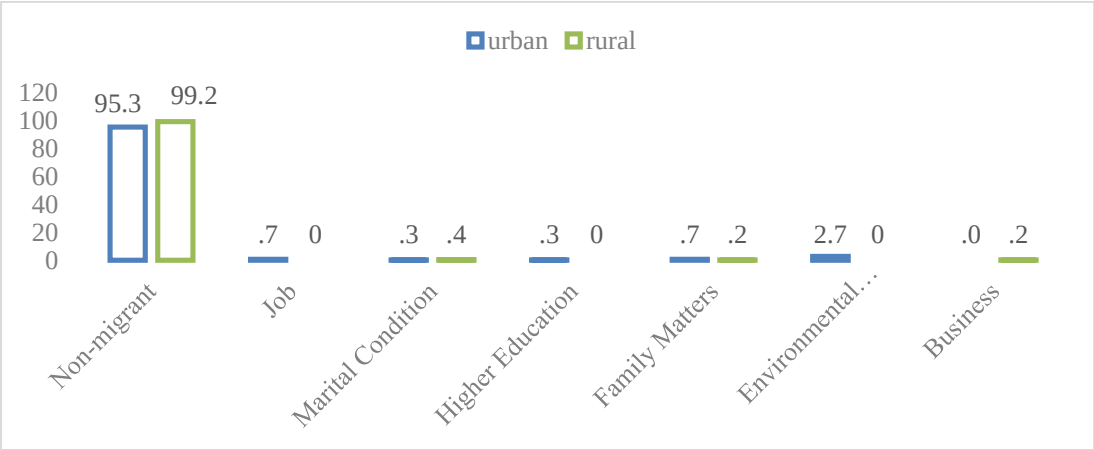

Figure3.13: Causes of Migration (in percentage) Source: Field Survey, 2015

3.10 Housing Status

3.10.1 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. The families are living at the area for long time as migration rate also

found very low. Thus, most of the people of this Upazila are there by their inheritance. The percentage of joint ownership of household is slightly lower in rural area, thus most of the households are living in their own house in extended family here. These households own their household land with other members of their families. Very small percentage of people lived in rent house in urban area (please see Figure:3.14).

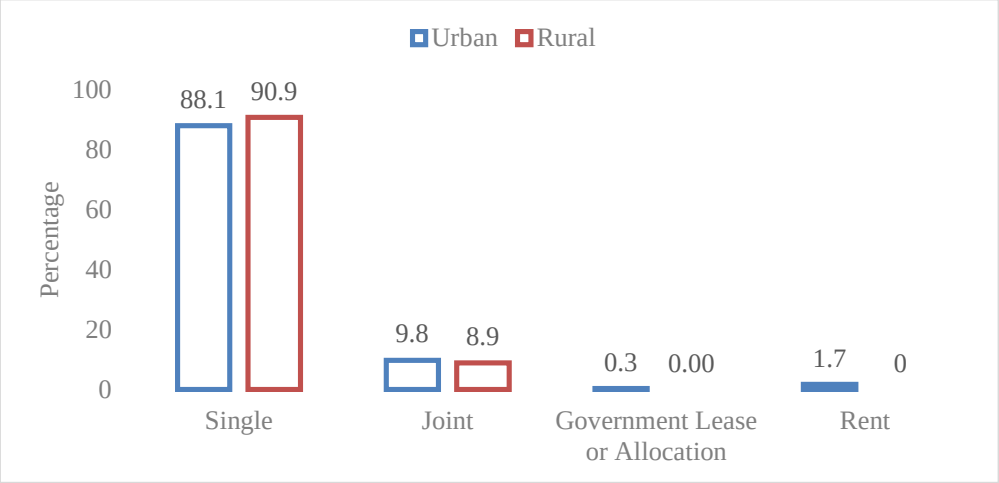

Figure 3.14: Pattern of Household Land Ownership (Source: Field Survey, 2015)

3.10.2 Types of House Structure

In rural area about more than half of the total respondents lived in Katcha house. About one fourth of total rural households also lived in semi-pucca house. Whereas about same percentage of urban households lived in urban households. The percentage for living in pucca house is about the half of urban households than in rural. Again more people is living in semi pucca house in urban area than rural area. Thus, living condition is better in urban area than rural area (please see Figure 3.15).

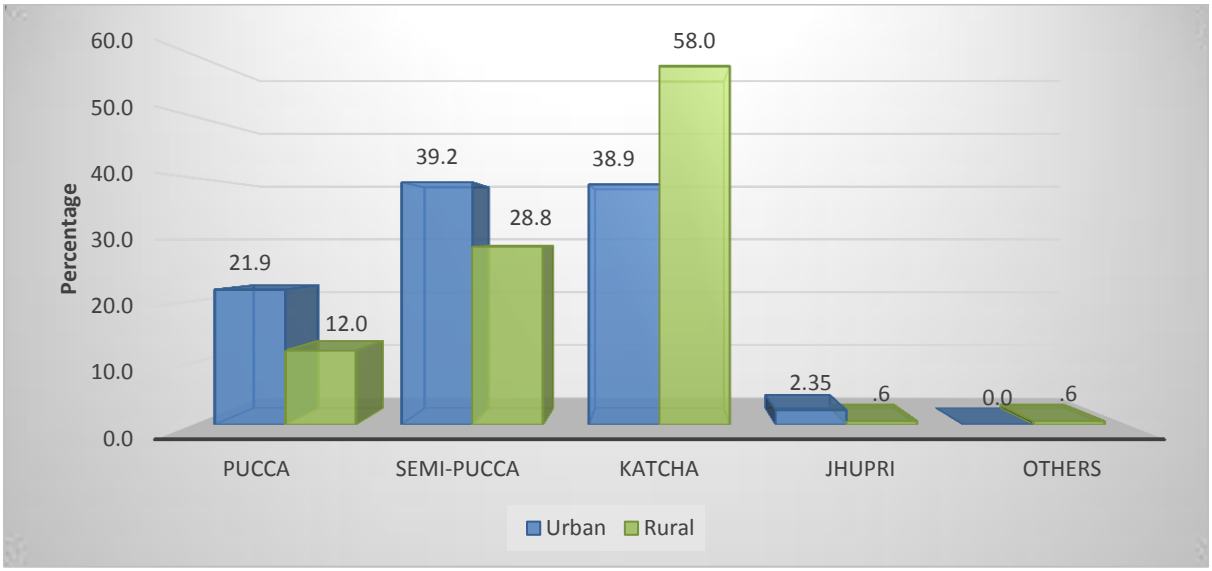

Figure 3.15: Type of Household Structure (Source: Field Survey, 2015)

3.10.3 Source of Land Ownership and Duration of Living

Both in urban and rural area most of the households owned their land by inheritance.And the percentage is lower in urban area than rural area. In urban area land owned by purchasing are the second highest as the urban facility attracted people to purchase land at urban area and live with modern facilities (please see Figure: 3.16).

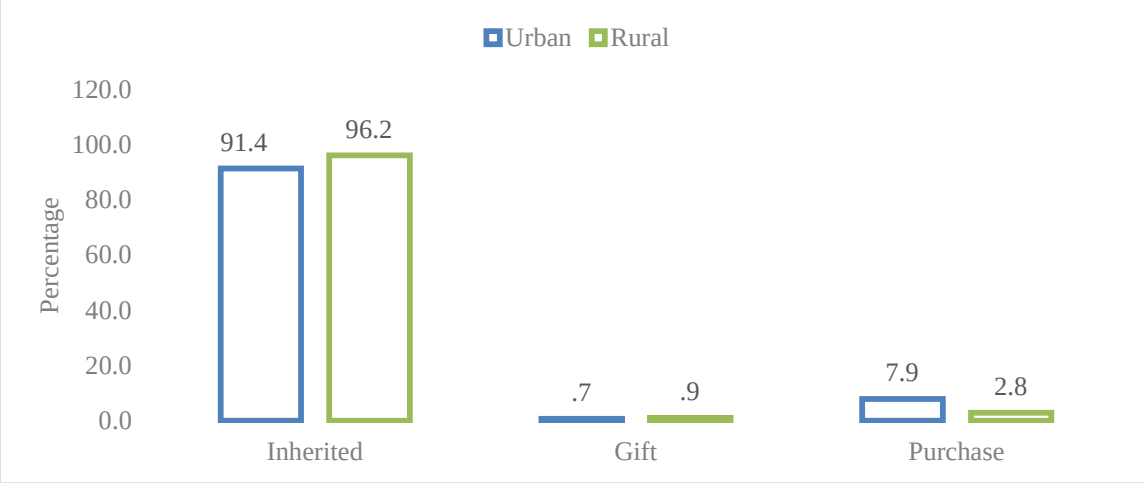

Figure3.16: Source of Household Land Ownership (Source: Field Survey, 2015)

3.11 Land Value

Land price highly varied with locations. It has been found that in rural area almost all of the land's price is below BDT 1 lakh, where as in urban area less than half of land's price is in the same range. As land price varies with location in urban area also about half urban land's price varies from BDT1to 5 lakhs. About 20% urban land's value is within 1 and 2 lakhs bdt. Whereas the percentage is about the half in rural area for the same income range. (please see Figure:3.17). Thus the urban facilities have highly influence on land value.

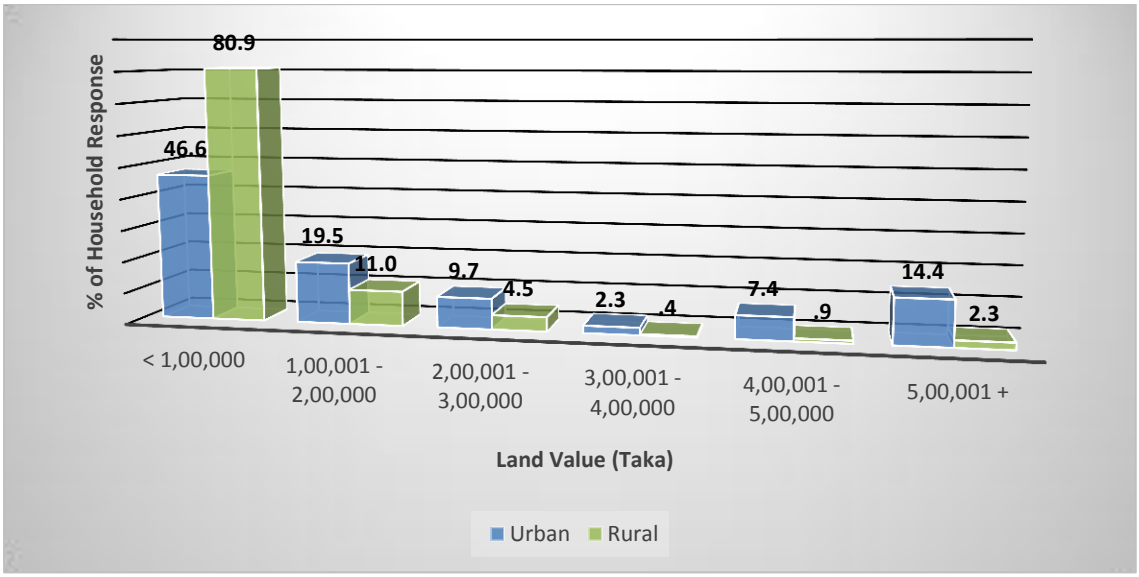

Figure 3.17: Price of Present Household Land in 2015 (Source: Field Survey, 2015)

3.12 Transport

3.12.1 Mode of Communication

As there are very limited number of waterways are available almost all of the households' main mode of communication is road. Some of the rural people also traveled using waterways, whereas about no urban people use it (please see Figure:3.18).

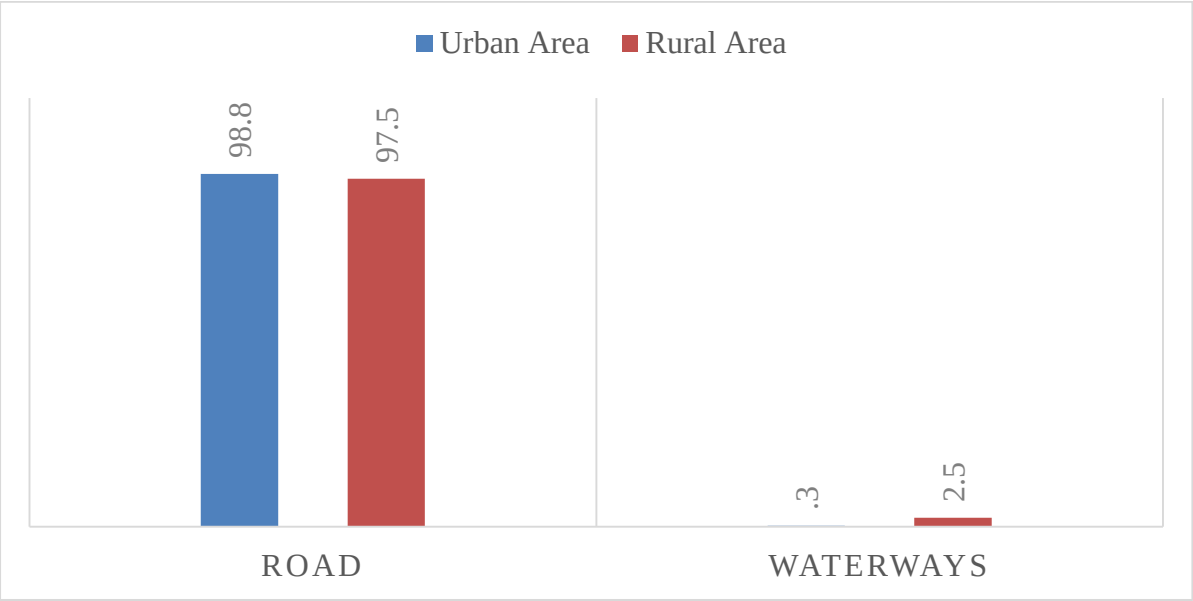

Figure 3.18: Mode of Communication (Source: Field Survey, 2015)

3.12.2 Types of Road

In urbanarea about more than half(54%) of total road is bituminous road. Approximately one fourth of total urban road are also made with concrete. On the other hand, about half of total rural road are katcha. Percentage of road made with bituminous or concrete is also significantly low than urban area. In rural area a significant percentage of roads are katcha that represents the fact that some steps could be taken for the development of these road. Overall, road condition of this Upazila is not satisfactory, and the rural road condition is far worse than urban road (please see Figure: 3.19).

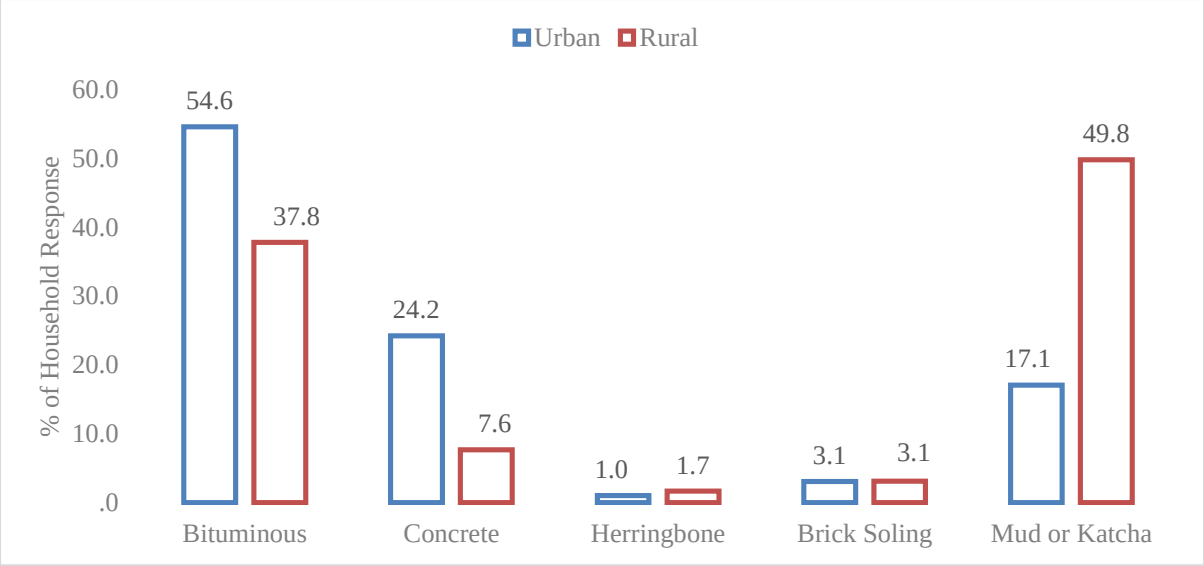

Figure 3.19: Types of Road(Source: Field Survey, 2015)

3.12.3 Mode of Access to Main Road

It has been found that about two third of total households in urban and rural area got access to main road through narrow footpath, and the percentage is about the same for both of areas. In rural and urban area approximately one fourth of the total households went to main road by *Halot* and in urban area, more people used it to get access to main road than rural area..(please see Figure: 3.20).

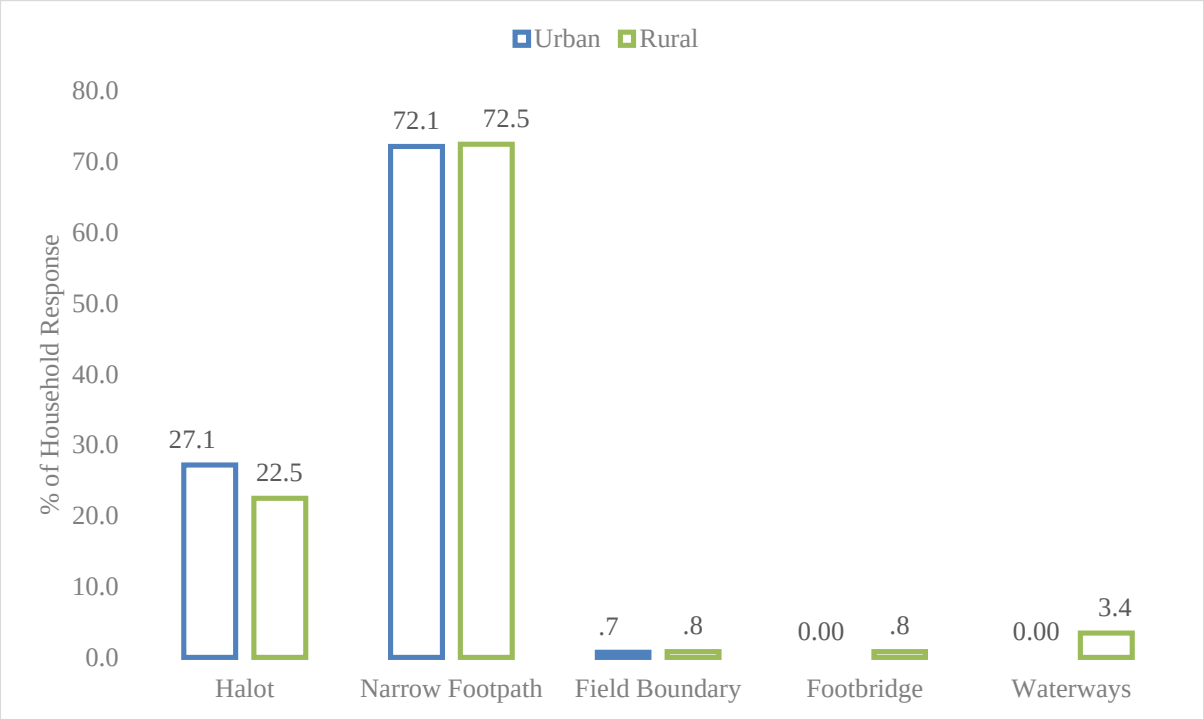

Figure 3.20: Mode of Access to Main Road (Source: Field Survey, 2015)

3.12.4 Condition of Road

In urban area of this upazila roads are seem to be in good position than urban area. About half of total urban households said that the roads are in good position, though among rest of the roads about 40% are deteriorated and about 7% are destroyed. On the other hand in rural area more than half (about 57%) of total roads are in deteriorating position. Though one-fourth of total urban roads are in good position, the percentage is very low regarding total amount of road. Again, there are higher percentage of roads having waterlogging related problem than urban area. About more than 15% of rural roads are facing waterlogging related problem, whereas for this problem, the percentage for urban area is about the half of rural. This represents the situation that there is not enough maintenance for urban roads.In a nutshell, it can be easily understood that enough maintenance of road is not present in both of rural and urban area. But the condition in rural area is worse than urban area (please see Figure:3.21).

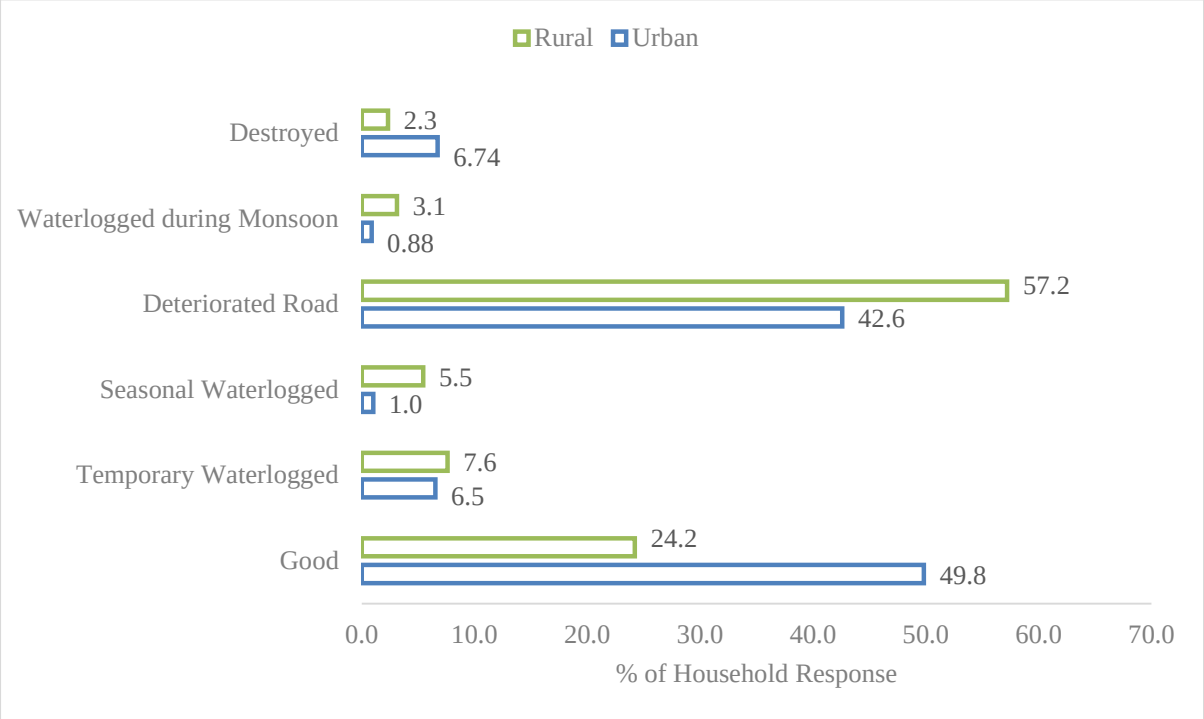

Figure 3.21: Condition of RoadSource: Field Survey, 2015

3.12.5 Maintenance of Road

As from the previous section discussion, it has been proved that enough road maintenance has not been carried out in both of urban and rural area, the below Figure:3.22again proved that.Only for about 10% roads get maintenance annually. For more than about 80% of roads get irregular maintenance or get maintenance after extremely damaged. The percentage is almost same for both of urban and rural area which states the fact that both of urban and rural area, roads are not enough maintained. Thus, it can be said that effective regular maintenance should be carried out in both of urban and rural area by the responsible authorities

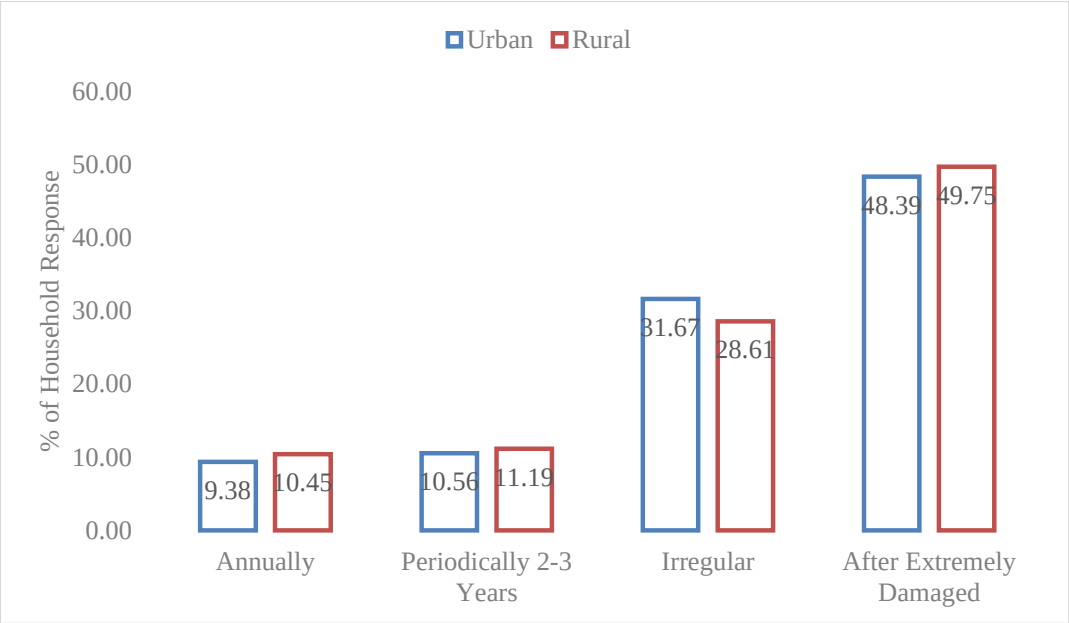

Figure 3.22: Maintenance of Road (Source: Field Survey, 2015)

3.13 Utility Service

3.13.1 Drinking Water

a. Source of Drinking Water

In this Upazila, almost all of the households (about 90%) use their own tube-well for source of drinking water. As most of them lived in their own house, the percentage of having own tube-well is quite higher both in urban and rural areas. Though in urban areas a significant number of households (about 8%) use pipe line services for drinking water, generally those are the new households living in urban area. There are also a significant number of households in rural area who used public tube-well (please see Figure: 3.23).

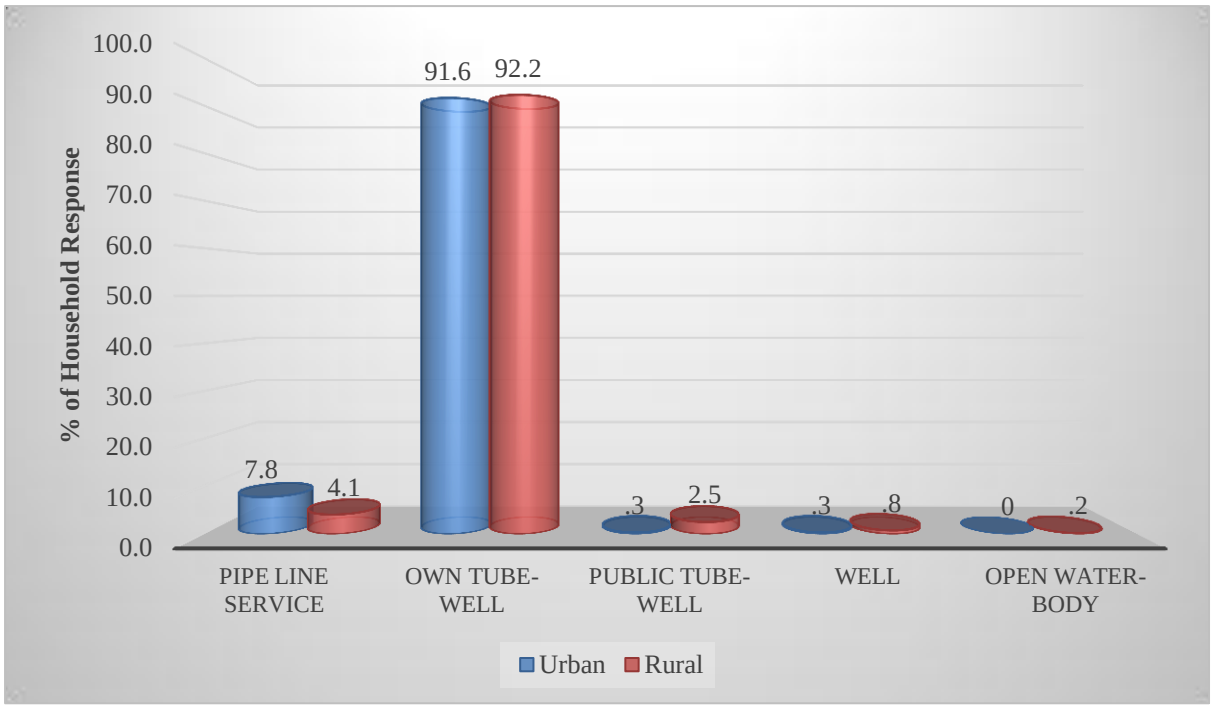

Figure 3.23: Source of Drinking Water (Source: Field Survey, 2015)

b. drinking Water Quality

Overall drinking water quality at both urban and rural areas at Raipura is satisfactory. About 80% of total households in urban area said that they are satisfied or highly satisfied with the quality of drinking water. On the other hand, in rural area about double percentage (17%) of households than urban area (8.5%), mentioned that, they get acceptable drinking water quality. On the other hand, in rural area some of the households (13%) also said that they are not satisfied with the drinking water quality. About same percentage (11%) of urban households also holds the same thought like rural that they are not satisfied with the drinking water quality. Most of them have no own tube-well and they have to use water from adjacent ponds or other sources of water(please see Figure: 3.24).

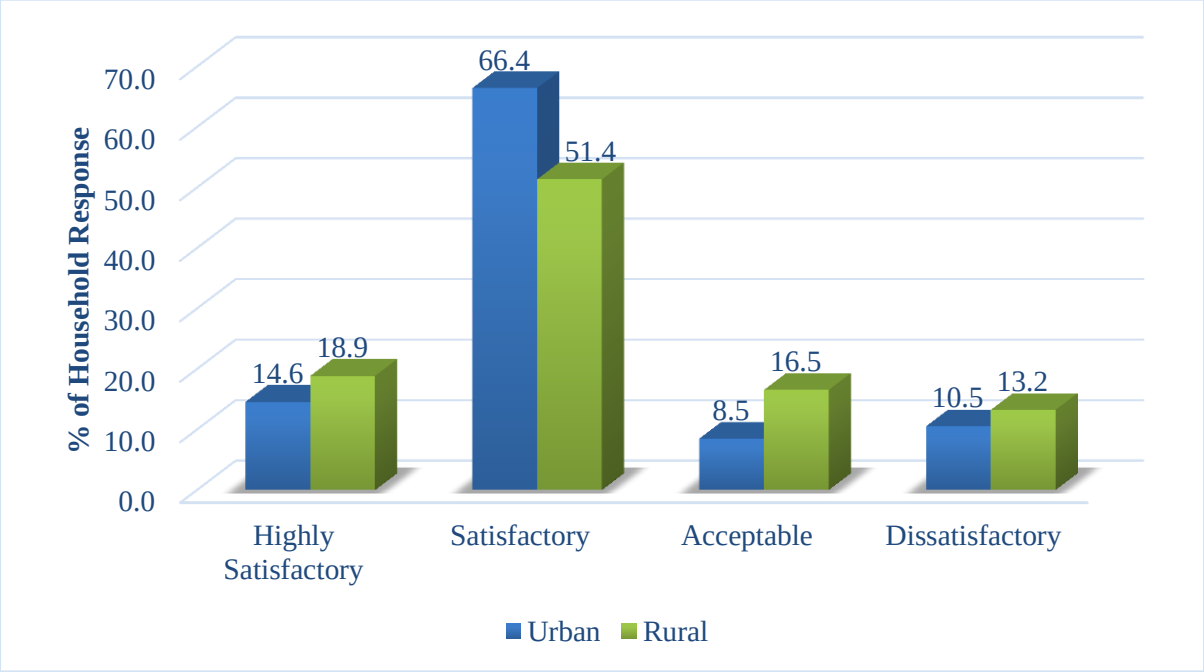

Figure3.24: Drinking Water Quality(Source: Field Survey, 2015)

c. Distance of Water Source

Moreover, almost all of the households collect water from 0.5 km of water source. Among them, about 90% of total households are within .25 km radius of water source. So the basic right of having enough potable water within walking reach is being maintained here (please see Figure: 3.25).

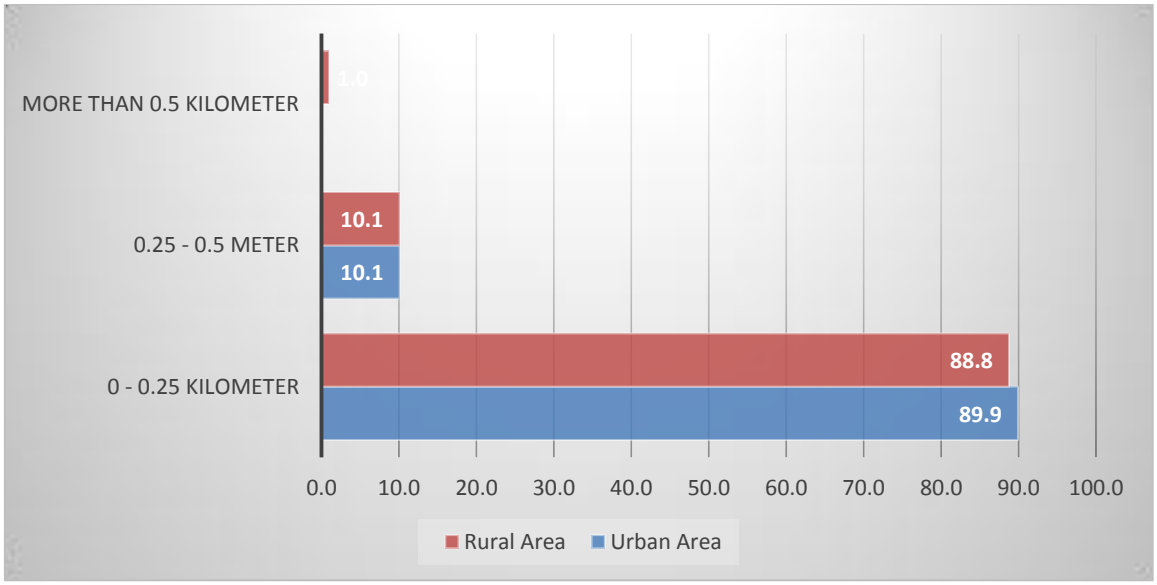

Figure 3.25: Distance of Water Source(Source: Field Survey, 2015)

3.13.2 Sanitation

Percentage of using pit latrine is satisfactory in both of urban and rural area. About 90% of the total households use commode or pit latrine. Only a small percentage of households do not maintain healthy sanitation facilities and use open toilet. The percentage of using open toilet is about double in rural area than urban area, thus awareness building program can be carried out in rural area about using healthy sanitation systems (please see Figure: 3.26).

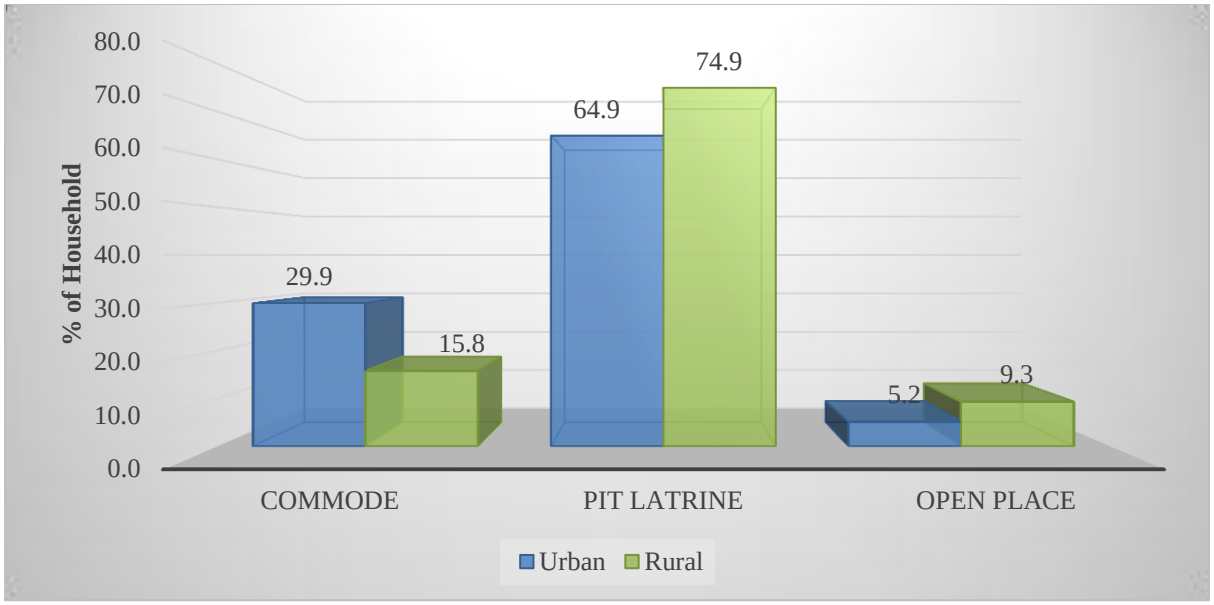

Figure 3.26: Sanitation System (Source: Field Survey, 2015)

About half of the urban households used absorbed well. Whereas in rural area approximately more than 60% used it. On the other hand, about 30% urban households used septic tank, whereas the percentage is slightly low for the rural households. About one fourth of total rural respondents used septic tank sanitation system though the system's installation cost is

comparatively high. Thus, there are significant differences in using sanitation system between urban and rural areas. (please see Figure: 3.27).

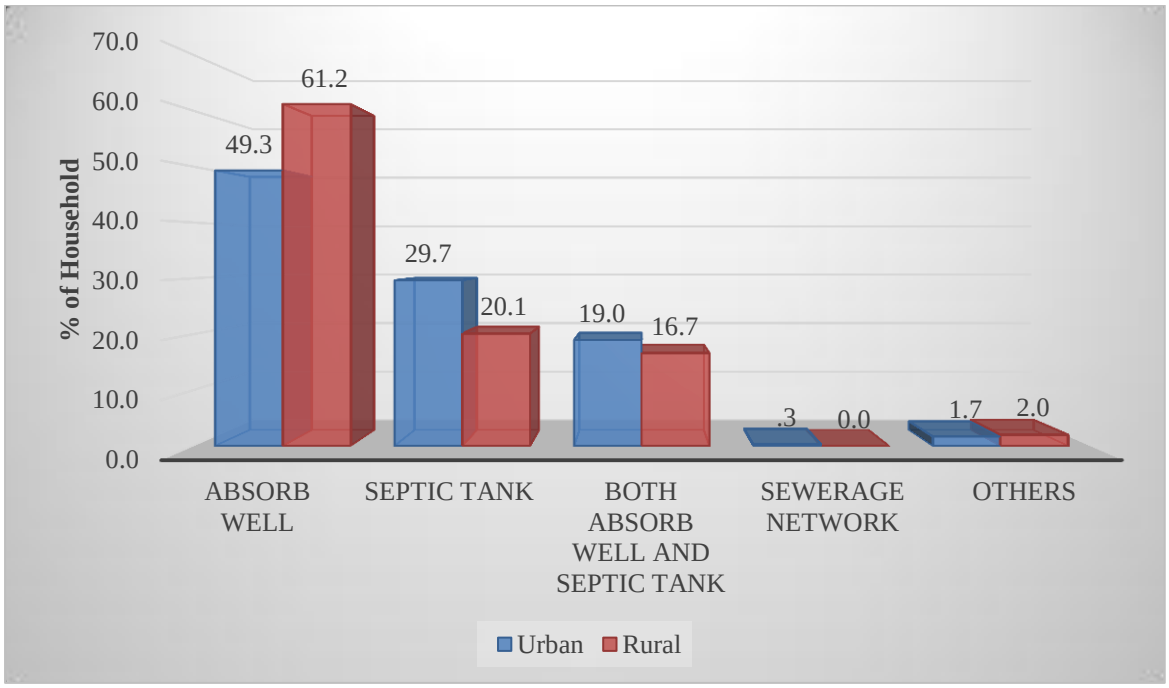

Figure 3.27: Type of Sanitation Management System (Source: Field Survey, 2015)

3.13.3 Waste Management

a. Waste Management System

From table 3.3, it is found that, in this Upazila, most of the households manage their waste through their own management. Among them, about half of total rural households use hole within yard for this purpose. Whereas, the percentage is about 40% for urban area. In urban area about more than half of them use lowland besides their house. Whereas about 45% of rural households used it. Only small percentage (about 2%) of rural households use canal or river or small water-body or beside the road which is not environment friendly. The small percentage can also be lessened down by creating awareness about waste management system.

Table 3.3: Distribution of Waste Management System (In percentage)

Waste Management	Urban	Rural
Door to Door Collection	1	1
Own Management	99.0	99
Dustbin	2.8	2.5
Hole Within Yard	41.5	50.6
Lowland Beside House	55.0	45.0

Canal or River or Small Water-body	0	1.4
Beside Road	0.7	.2
Total	775	100.0

Source: Field Survey, 2015

b. Distance to Waste Disposal Place

Again the distance from waste disposal place to households is within 50m for almost all of the households (please see Figure: 3.28). So, it can be seen as advantages for the households as they can put away their waste easily. But the less distance also keeps them in vulnerable position as several diseases can easily be spread out from the waste disposal place.

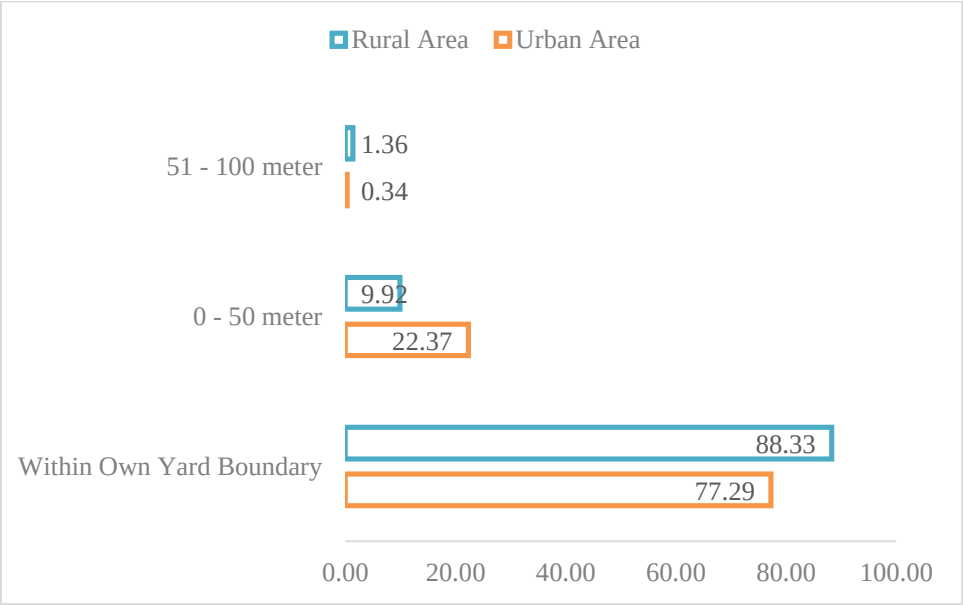

Figure 3.28: Distance to Waste Disposal Place (Source: Field Survey, 2015)

3.14 Medical Facility

In this Upazila,about three-fourth of total households agreed that, most common disease is fever in both urban and rural area. The percentage is a little higher in rural area than urban. Moreover, the second highly common disease is flux/cough both in urban and rural area. And the percentage of affecting with this disease is higher in urban area than rural area. Thus the environmental condition is about the same in both of rural and urban area (please see Figure 3.29).

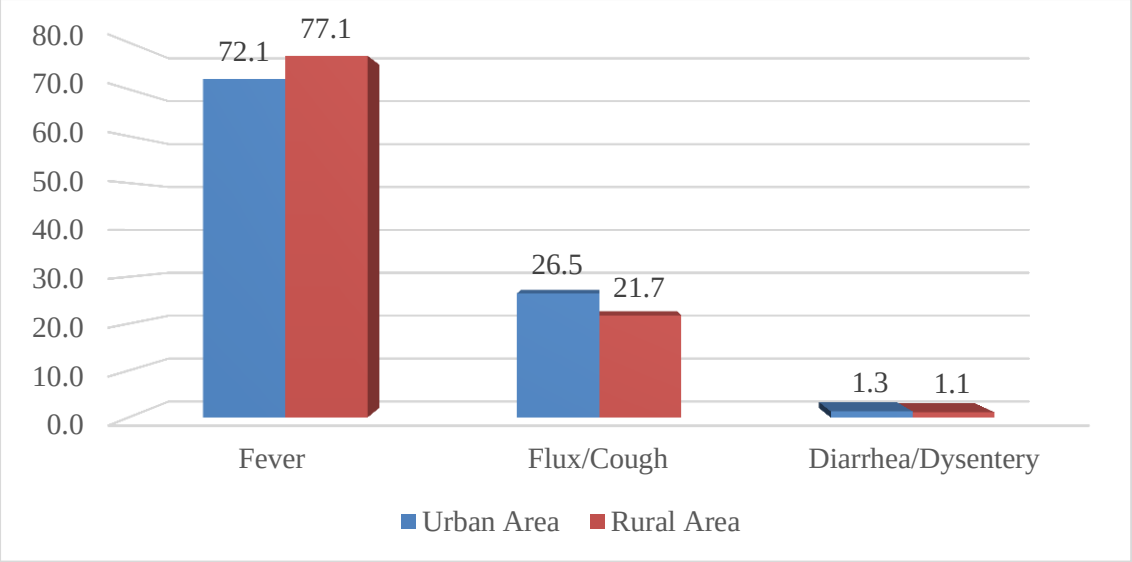

Figure 3.29: Type of Sickness (Source: Field Survey, 2015)

In urban area, according to Figure 3.30, it is found that abouthalf of the total urban households said that they go to private clinic for treatment, whereas the percentage is about 31 for rural households. About same percentage (36%) of households go to the government hospital. About more than double percentage (21%) of rural households than urban go to doctor's chamber for the treatment. In rural area about 10% also go to charity clinic or community clinic, whereas the percentage is very low (about half) for urban households. Thus rural households tend to go to the government hospital or doctor's chamber or private clinic, and urban households, to private clinic or government hospitals. Thus the governments' hospitals served the households of both rural and urban is very well.

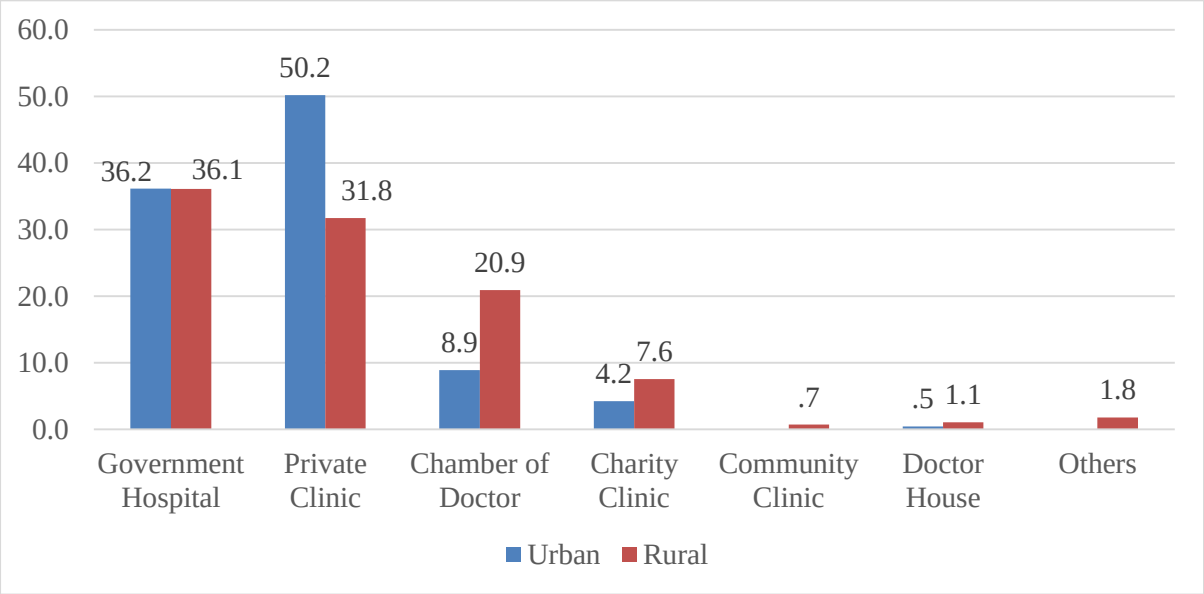

Figure 3.30: Type of Treatment Facility (Source: Field Survey, 2015)

Apart from these positive situations of treatment facilities of this Upazila, according to about half of the total urban households anticipated that, the most important drawbacks in urban area of this upazila is lacking of necessary medicine, government provided medicine and free medical service (please see Figure: 3.31). On the other hand, in rural area, about half of total rural households said that, the same reasons as urban area are the most important drawbacks of treatment facility, Moreover, there is also lack of enough free medical center services. About 10% of rural and urban households also identified that lack of community clinic is one of the important drawbacks. 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.

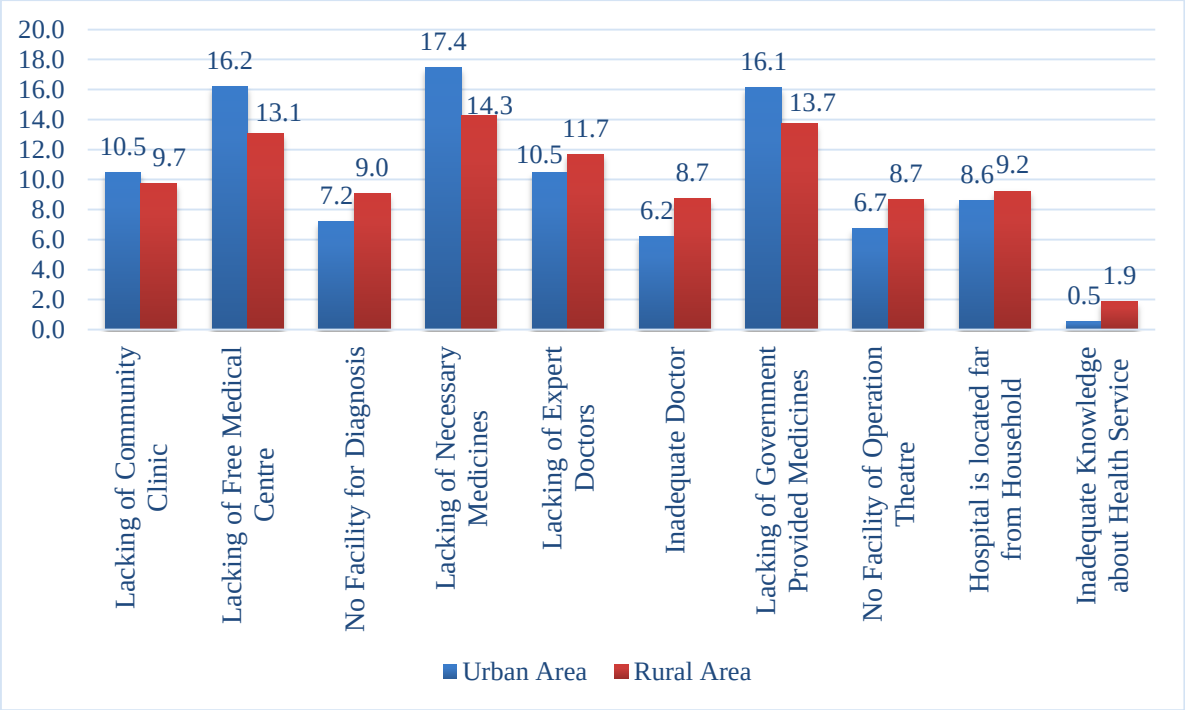

Figure 3.31: Drawbacks of Treatment Facility (Source: Field Survey, 2015)

3.15 Educational Facility

In this Upazila, it has been found that there is not enough qualified teacher. The dearth of this problem is more in rural area than urban area. Moreover, the number of student against teacher is too high, which deteriorates the quality of education. In addition, lacking of laboratory and library also hinders the quality education of this Upazila (please see Figure: 3.32).

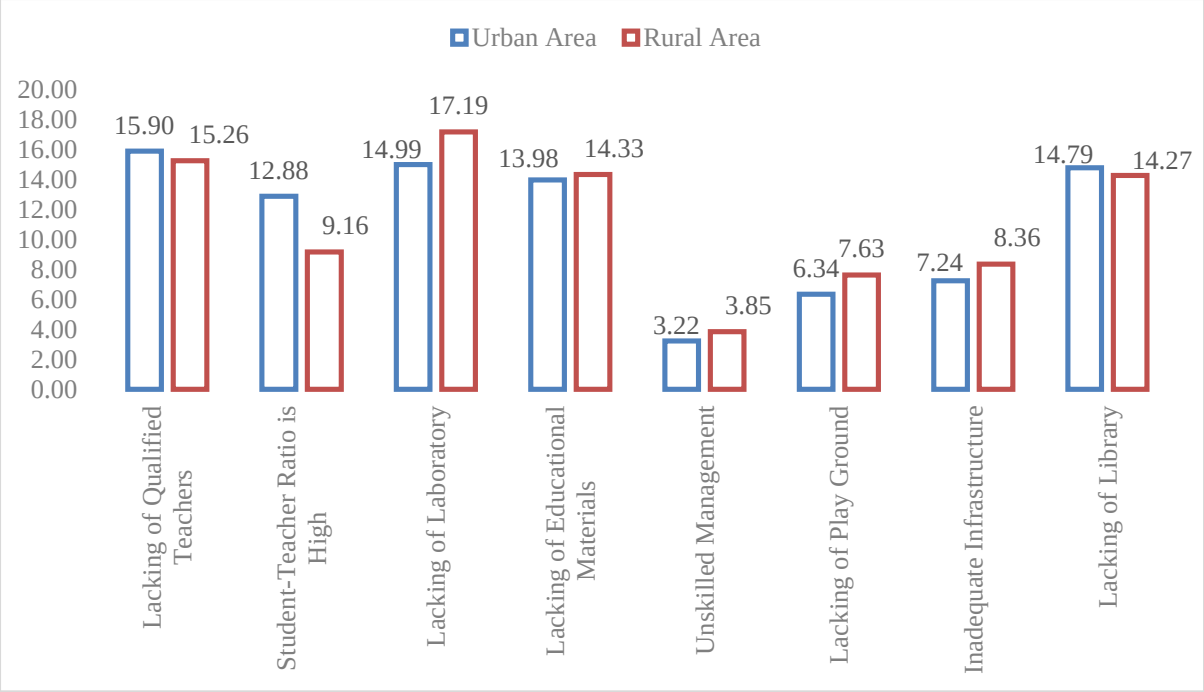

Figure 3.32: Problems of Educational Service (Source: Field Survey, 2015)

3.16 Recreational Facility

In thisUpazila about half of total households' source of outdoor recreation is either sports/playing in the field or watching plays. A significant number of urban households also said that "Fishing"is one of the main source of their outdoor recreation. On the other hand in rural area playing (maximum percentage), watching plays and visiting open spaces are some of the main source of outdoor recreational facility (please see Figure: 3.33).

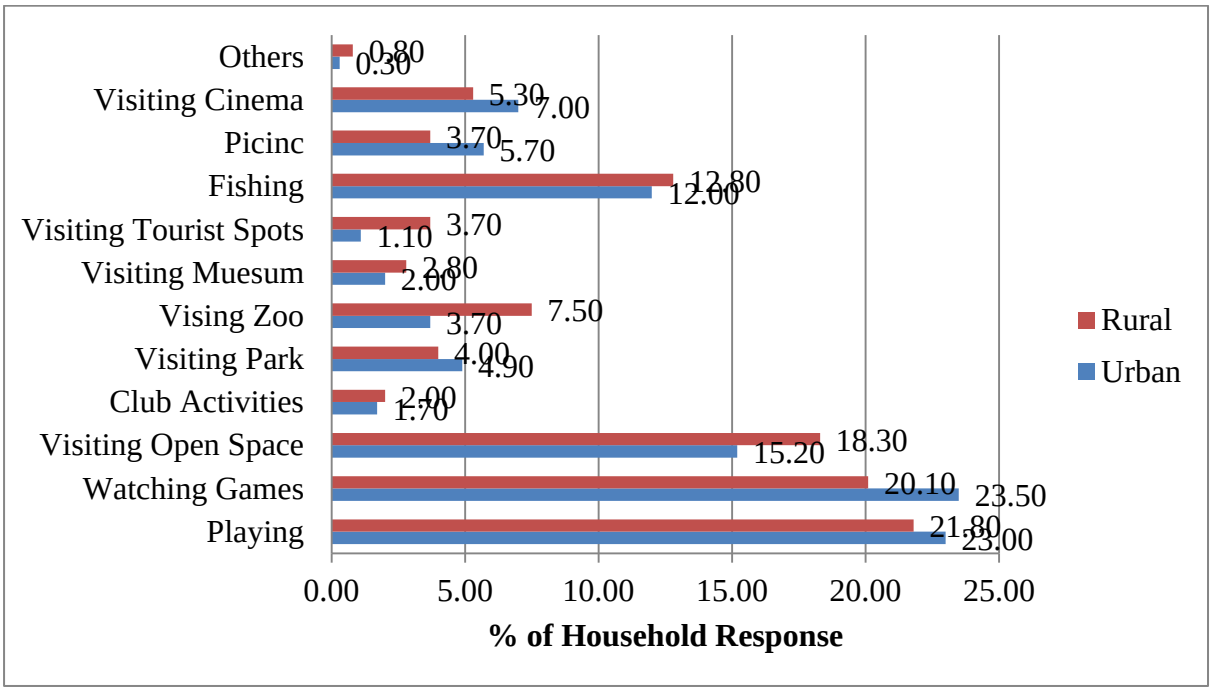

Figure 3.33: Out-Door Recreation (Source: Field Survey, 2015)

It is evident from Figure 3.34 that about one third of total households in both of urban and rural area anticipated that there are not enough recreational facilities in their area. It occurred in the urban area less than rural area. In urban area maximum percentage (20%) of households anticipated that, lacking of recreational instruments is main drawbacks of recreational facilities. Besides, about same percentage (15%) of households also said that inadequate recreation, management problem and lack of expected recreational facilities are some of the main drawbacks for outdoor recreational facilities. On the other hand, economic insolvency is one of the important reasons for hindering outdoor reaction for maximum percentage (18%) of households of rural area. Moreover, lacking of playground, safety and lacking of recreational instruments are mentioned asthe prime drawbacks of recreational facilities by about same percentage (14%) of rural households.

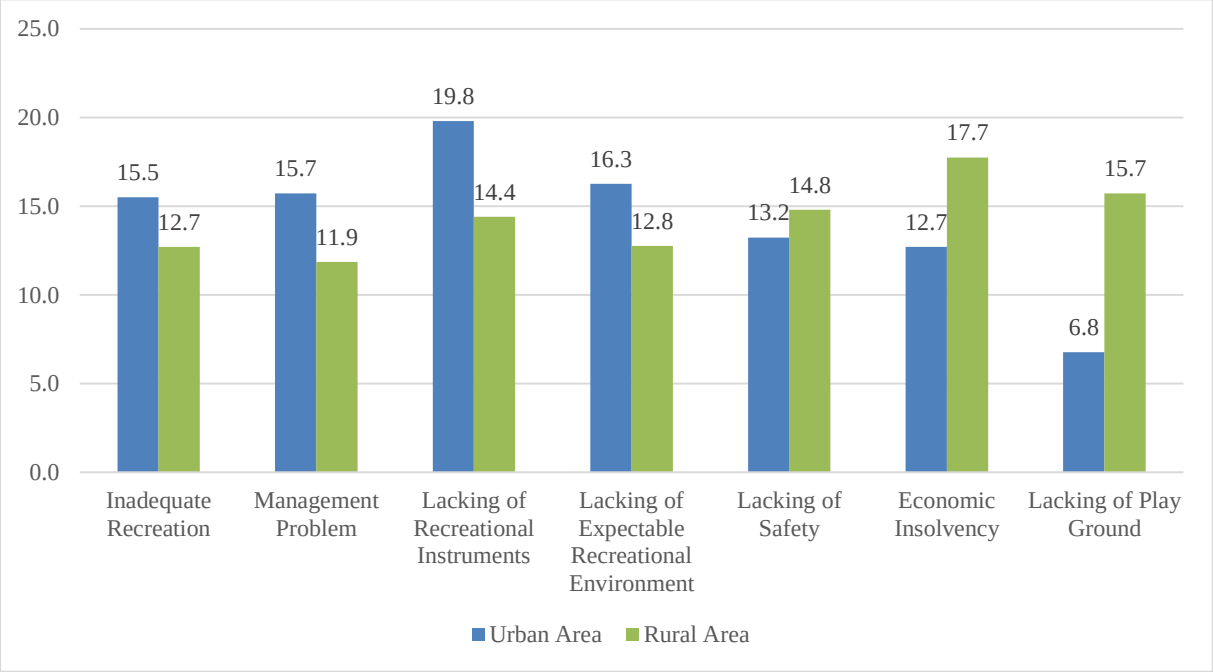

Figure 3.34: Drawbacks of Recreation Facilities(Source: Field Survey, 2015)

3.17 Law and Order Situation

Sneaking is the most common crime in this Upazila both in rural and urban area. In urban area the percentage (21%) is lower than rural area (about 22%). Crimes likeburgling, drugs, riot, extortion and killing occurs more in rural area than urban area. On the other hand, drugs, acid terrorism, robbery, snatching and land or resource grabbingoccurred in urban area more frequently than rural area (please see Figure: 3.35).Moreover, occurrence of eve-teasing and rape is about double in urban area than rural. Thus, law enforcing agency should take necessary steps regarding this.

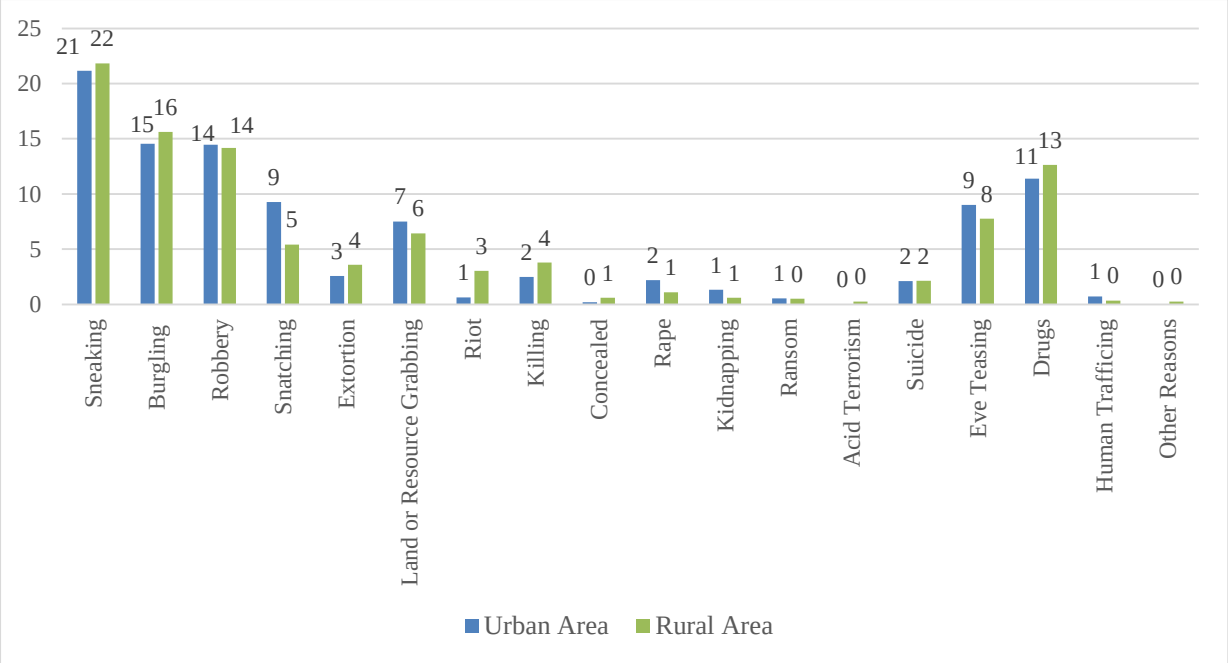

Figure 3.35: Types of Crimes (in percentage) (Source: Field Survey, 2015)

3.18 Available Services in RaipuraUpazila

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

3.18.1 Service Quality of Retail Market

The service of retail markets is easily available by most of the households as the distance is not too far. Also, both in urban and rural area more than about two third of total households (85%) said that they are highly satisfied with the service of it. The percentage is higher in urban area. The rest of the households said that, they are moderately satisfied by the service of retail market. Thus the service of retail market is satisfactory(please see Figure: 3.36).

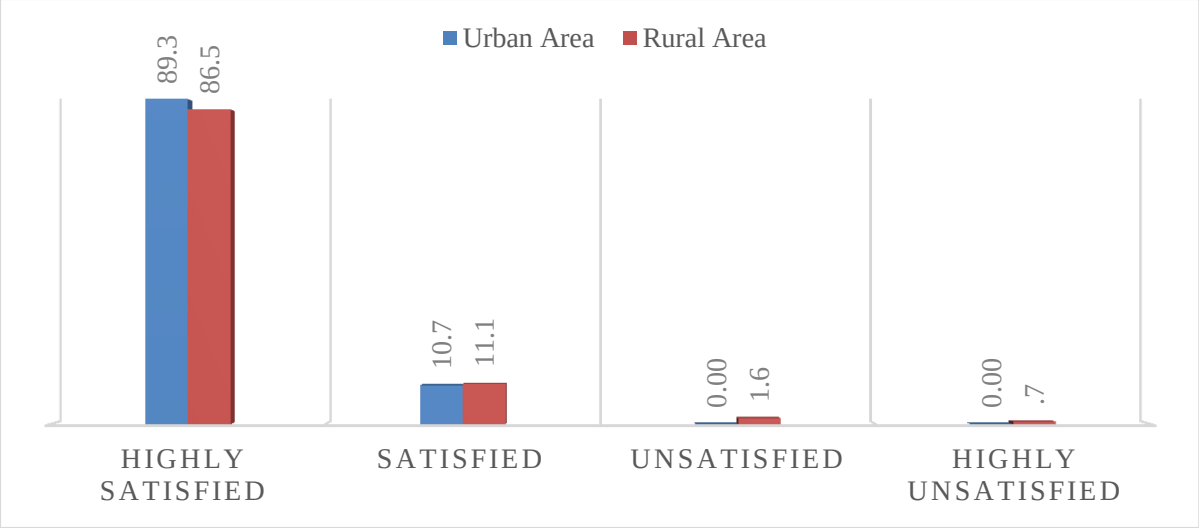

Figure 3.36: Service Quality of Retail Market(Source: Field Survey, 2015)

3.18.2 Distance and Service Quality of Post Office

Again, there are1 post offices in this Upazila. In urban and rural area,almost all of the households (90%)anticipated that they are either satisfied or highly satisfied with the service quality of Post Office (please see Figure: 3.37). But the percentage highly varied with the regions, thus the service facilities also highly varied with the regions. In urban area, the percentage ofthose, who are unsatisfied with the service of post office or highly unsatisfied with the service, is significantly higher (about 9%) than in rural area (about 5%). Thus, appropriate steps should be taken to improve the service facilities in urban area.

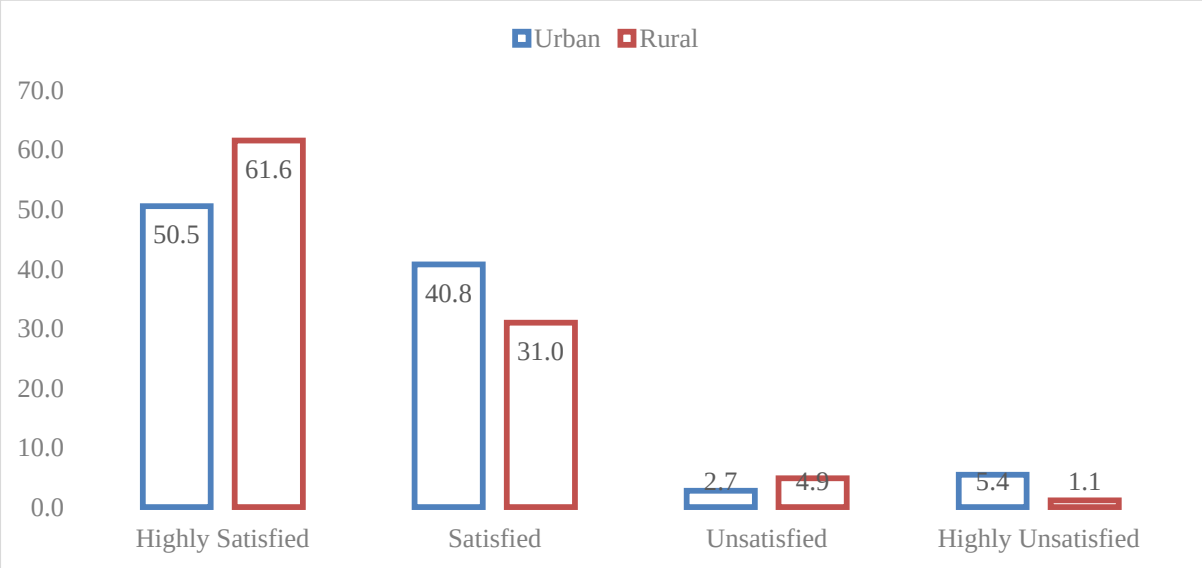

Figure 3.37: Service Quality of Post Office(Source: Field Survey, 2015)

3.18.3 Distance and Service Quality of Fire Service Station

There is no fire service station in this Upazila (BBS, 2011).In spite of having no fire station in this upazila both in urban and rural area about more than two third (70%) of total households mentioned that they are either satisfied or highly satisfied with the service of fire station. Though the percentage for highly satisfied is about more than double in urban area than rural area (please see Figure: 3.38). On the other hand, about one fourth of total rural households (about 25%) said that they are unsatisfied or do not even know about the service of fire station. The percentage is quite lower in urban area for this types of households. Thus, fire service station gives more priority for urban area and rural area. Moreover, necessary steps should be taken to establish a new fire station in this upazila, as it does not have one.

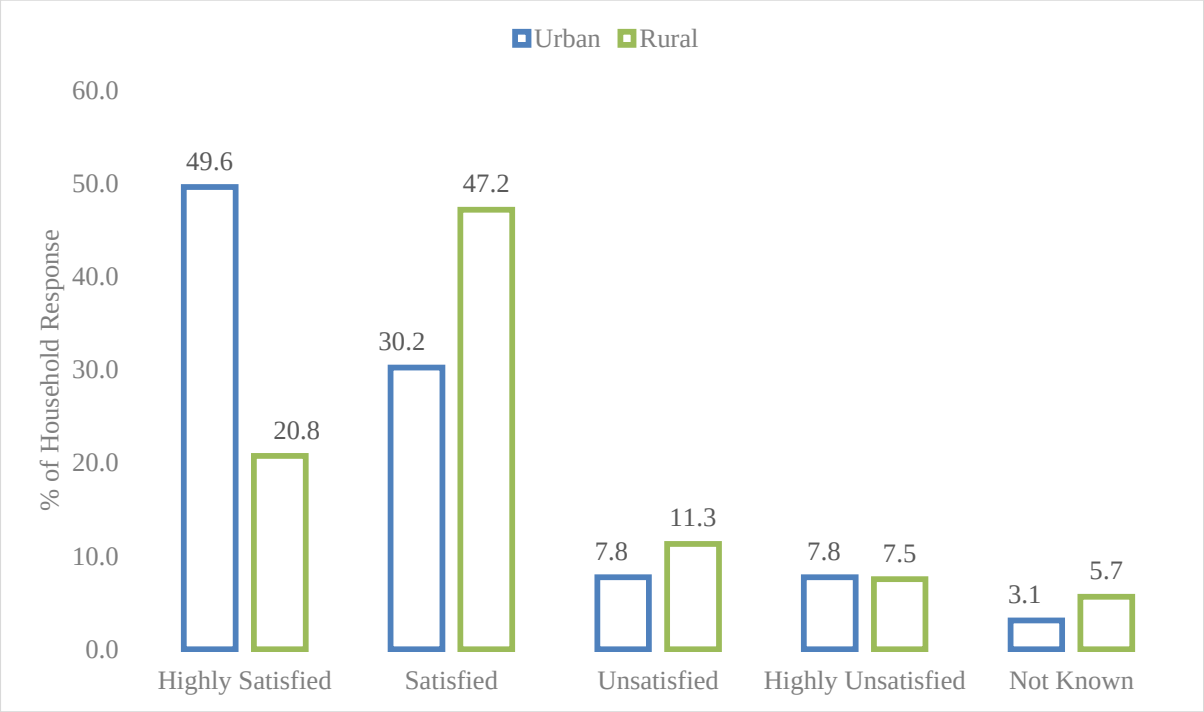

Figure 3.38: Service Quality of Fire Service(Source: Field Survey, 2015)

3.18.4 Service Quality of Playground

Almost all of the respondents are satisfied or highly satisfied with their playground. So, it can be said that in this Upazila there are sufficient number of playgrounds for the households and they are well maintained. But because of agglomeration of urbanization and lack of proper planning, there are insufficiency in urban area for playground, thus about 10% of urban households said that they are not satisfied with the service quality of this upazila(please see Figure: 3.39).

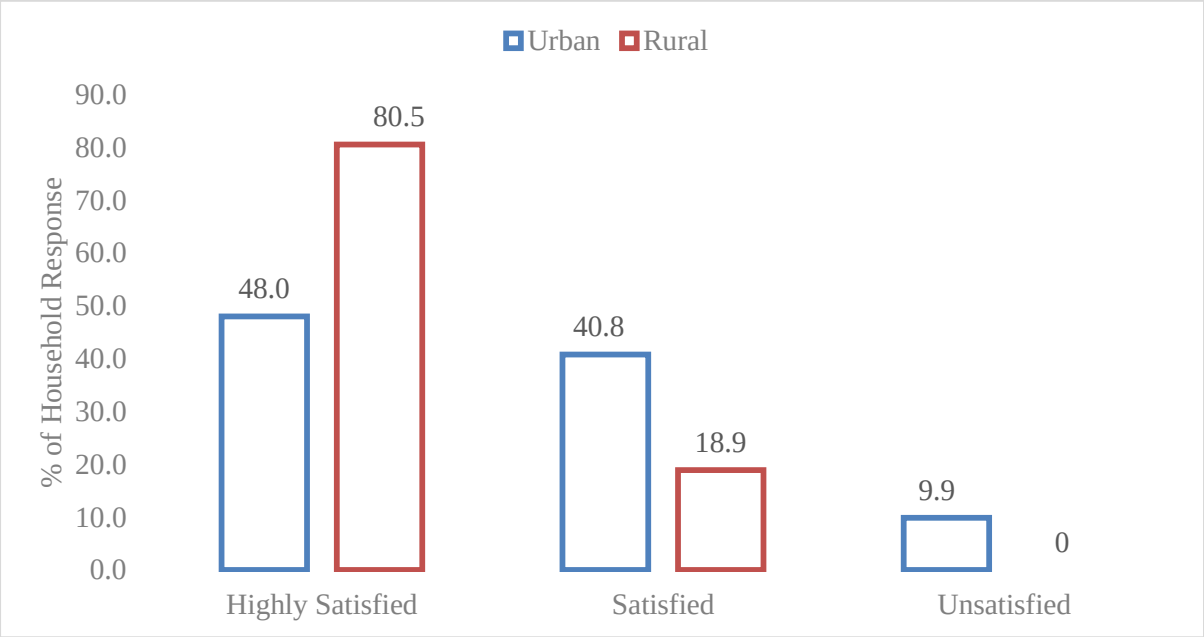

Figure 3.39: Service Quality of Play Ground (Source: Field Survey, 2015)

3.19 Problems of the Area

As discussed in the earlier section of this chapter, load shedding and road problemare the top problem in both of urban and rural area, which is generated from imbalance situation of demand and supply of electricity and lack of enough necessary steps of concerned road authority. In urban area, the maximum percentage (about 21%) of households said that road based problem is their main problem. Altogether about 40% of urban households also said that, their main problem is load-shedding and water logging. On the other hand, the far worse electricity condition in rural area expressed by the about more than 40% of households. About 42% households said that their main problem is load-shedding. And as discussed earlier the second highest main problem is road-based problem. Moreover, in rural area drinking water based problem and flood are also significant. The alarming finding is, in both of rural and urban area one of the top problem is domestic violence on female which needs to be addressed. Thus the authority should give enough importance to these prioritized problems (please see Figure: 3.40).

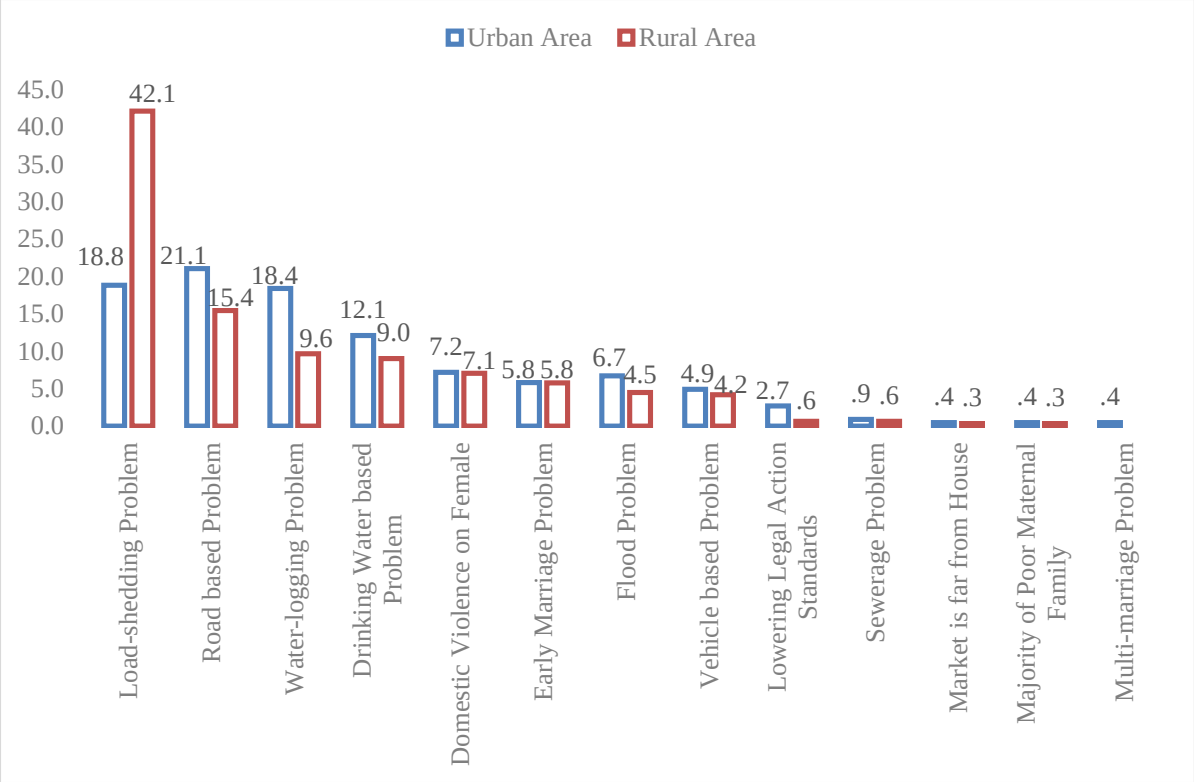

Figure3.40: Problems of the Area(Source: Field Survey, 2015)

3.20 Traditional Cultural Festival of the Area

The traditional cultural festivals data of the area collected from multiple ranks method. From Figure: 3.41, it is found that in urban area of this Upazila, about more than one third of total respondents celebrate “International Mother Language Day” as their first choice of traditional culture festival. About one fourth of total urban respondents also described “literature and cultural competitions” as most important traditional cultural festival activities. On the other hand, in rural area about more than one fourth (28%) households celebrate “International Mother Language Day” as their first choice of traditional culture festival which is lower than urban area. Moreover, about 20% responded that “literature and cultural competitions” as most important traditional cultural festival activities, which is also lower than urban area. This is because the a significant percentage of rural households mentioned that Annual Drama and Village fair are their first choice of traditional culture festival, whereas the percentage is lower in urban area.

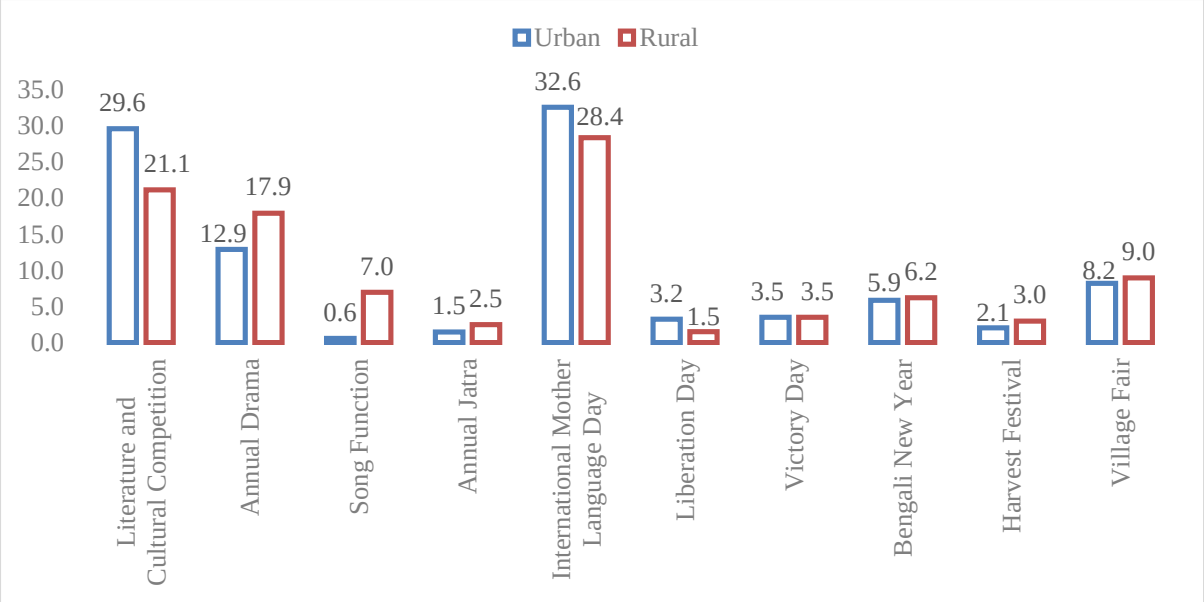

Figure3.41: Traditional Cultural Festival of the Area (Source: Field Survey, 2015)

3.21 People's Aspiration about the Development of the Upazila

The people's aspiration about the development of the area has also been collected from the respondents through multiple rank method. It plays a vital role to represent the importance of different people's aspiration about the development of the area. About more than half of urban and rural households want improvement of their road condition and the percentage is lower (about one third) in urban area. As in rural area the road condition is far wors than urban area as discussed earlier. In urban area, more people (about one fourth) want the improvement of electricity supply than rural area (about 15%).About 10% rural people also want to improve their health services as its condition is also mentionable and discussed in the earlier section. Whereas urban households' next priority is toincrease number of educational institutions with facilities, improve drainage system along with law and order situation of the community (please see Figure: 3.42).

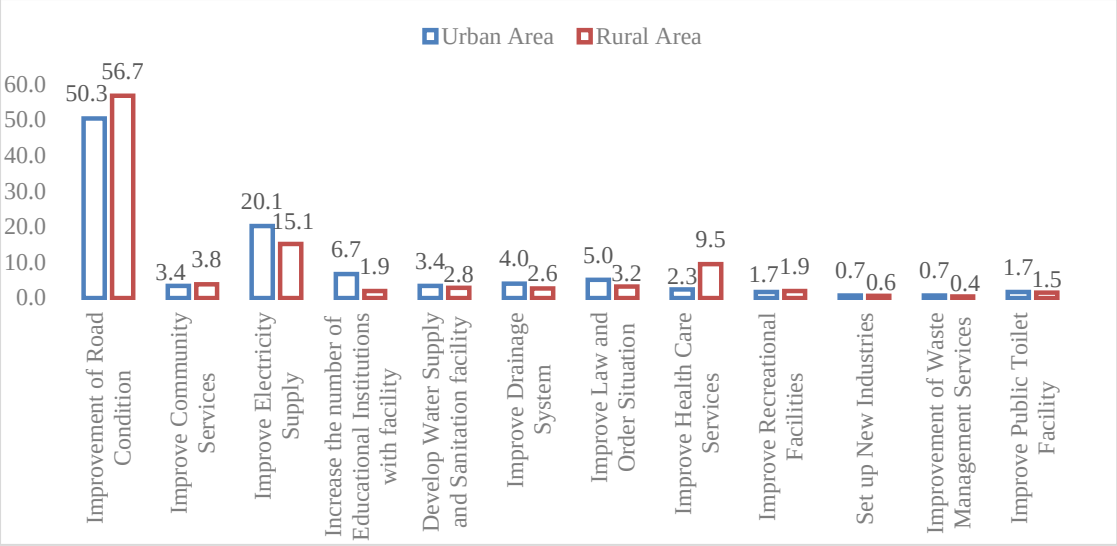

Figure3.42: Prioritization of Development Works (Source: Field Survey, 2015)

Chapter 4: Conclusion and Policy Framework

Raipura Upazila is on the edge of entering in "Demographic Bonus" window within the coming years as the percentage of working people for both male and female is high and will increase in the near future. So, there is immense need to build skilled and educated youth generation. But it has been found that the level of education of this area is not satisfactory. And the condition is worse in rural area. Moreover, there is not enough vocational and youth training centers, library, laboratory and educational materials. Moreover, the very high student-teacher ratio and lacking of qualified teachers makes the situation worse. So, concerned authorities should pay attention to the issues of the Upazila. Moreover, the Upazila's main mode of communication is road, but the condition of road is not yet up to the satisfaction because of lack of enough bituminous road construction. Moreover, because of lack of regular maintenance both rural and urban roads are deteriorating day by day. So, road authorities should take some necessary steps regarding it. In addition, electricity supply condition in this area is one of the main problems expressed by the most of the households both in rural area, so Bangladesh Rural Electrification Board (BREB) and Bangladesh Power Development Board (BPDB) should take some necessary steps. It should bear in mind that development goes hand in hand with development of roads and electrification. Moreover, concerned authority should consider taking some steps regarding improvement of maternal and child health. Treatment facility is also not yet up to the mark. In addition most of the households lived in Katcha house which is notion of weak economic condition of this area. Apart from these, this Upazila is in good condition regarding recreational facilities, sanitation, law and order situation, retail markets etc.

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Annex-I

গৃহায়ন ও গনপূর্ত মন্ত্রনালয়
নগর উন্নয়ন অধিদপ্তর (ইউ ডি ডি)
প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিন উপজেলাস -প্যাকেজ-০২ এর আওতায় শিবপুর ও রায়পুরা উপজেলা এবং ঈশ্বরগঞ্জ উপজেলার উন্নয়ন পরিকল্পনা প্রণয়ন কার্যক্রম
পরামর্শক প্রতিষ্ঠান : যৌথভাবে শেল্‌টেক কনসালটেন্ট প্রাঃ লিঃ ও আর্ক বাংলাদেশ লিঃ
আর্থ সামাজিক জরিপ প্রশ্নমালা-২০১৫

প্রশ্নমালা নংঃ ..... জরিপের তারিখঃ ..... সময়ঃ ... .

সাক্ষাৎকার গ্রহণকারীর নামঃ ..... সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর ঃ
.....

অধ্যায়-১ঃ খানার তথ্যঃ

১.১ অবস্থানঃ

ওয়ার্ড নংঃ ..... মহল্লা/ঃ ..... রোড নংঃ ..... হোল্ডিং নংঃ .....

মৌজাঃ ..... ঃ

অধ্যায়-২ঃ তথ্যপ্রদানকারীর পারিবারিক তথ্যঃ

২.১ তথ্যপ্রদানকারীর নাম ঃ ..... ২.২ তথ্যপ্রদানকারীর মোবাইল নম্বরঃ
.....

২.৩ খানা/পরিবার প্রধানের নাম ঃ
.....[1.].....[2.].....

২.৪ খানা প্রধানের পৈত্রিক বাড়ী এই এলাকায় কিনা? (ইউনিয়ন/ওয়ার্ডে)ঃ হ্যাঁ না; ২.৫ 'না' হলে কোথায়ঃ
.....

২.৬ কত বছর যাবৎ খানা প্রধান এখানে বসবাস করেনঃ .....

২.৭ এখানে চলে আসার কারণ (কোড)ঃ [ ] , [ ] , [ ] , [ ] ২.৭.১ অন্যান্য ঃ
.....

কোড ২.৭ ঃ এখানে চলে আসার কারণ

১. চাকরি/কর্মস্থল	*২. বেকারত্ব*	*৩. দারিদ্র*	*৪. বৈবাহিক কারণ*	*৫. উচ্চ শিক্ষা*
৬. সামাজিক অস্থিরতা	*৭. ব্যবসা*	*৮. পারিবারিক কারণ*	*৯. পরিবেশগত কারণ*	*১০. অন্যান্য (উল্লেখ করুন)*

২.৮ বসতবাড়ির ধরণ (কোড):

কোড ২.৮ঃ বসতবাড়ির ধরণ

১.পাকা	*২. আধা-পাকা*	*৩. কাঁচা(টিন)*	*৪. ঝুপড়ি*	*৫. অন্যান্য:*

২. ৯ মালিকানার ধরন (কোড)ঃ ..... ২.৯.১ অন্যান্যঃ .....

কোড ২.৯: মালিকানার ধরন

১. একক	*২. যৌথ*	*৩. সরকারি*	*৪. ভাড়া (মালিকানাহীন)*

২.১০ মালিকানার উৎস (কোড)ঃ ..... ২.১০.১ অন্যান্যঃ .....

কোড ২.১০: মালিকানার উৎস

১.উত্তরাধিকার	*২. দান*	*৩. সরকারি লিজ/বরাদ্দ*	*৪. ক্রয়*

২.১১ বসবাসের মেয়াদকাল (কোড)ঃ .....

কোড ২.১১: বসবাসের মেয়াদকাল

১. ০-৫	*২. ৬-১০*	*৩. ১১-১৫*	*৪. ১৬-২০*	*৫) ২০ এর অধিক*

২.১২ নিজস্ব জমির পরিমান (একরে)ঃ..... ২.১২.১ বসত বাড়ীর জমির পরিমান (একরে)ঃ..... ২.১২.২ কৃষি জমির পরিমান (একরে)ঃ.....

২.১২.৩ অন্যান্য(বাগান,পুকুর) জমির পরিমান (একরে)ঃ.....

২.১৩ ভূমিহীন হলে কি ভাবে থাকে?ঃ.....

২.১৪ নিচে উল্লিখিত বছরগুলোতে বর্তমান বসবাসস্থানের জমির দাম প্রতি শতকে কেমন ছিল?

২০০৭ [২.১৪.১]	২০০৯ [২.১৪.২]	২০১১ [২.১৪.৩]	২০১৩ [২.১৪.৪]	২০১৫ [২.১৪.৫]

২.১৫ খানার সদস্যদের জনমিতিক তথ্যঃ

সদস্য নং	*খানা প্রধানের সাথে সম্পর্ক (কোড)*	*বয়স (বছর)*	*লিঙ্গ (কোড)*	*বৈবাহিক অবস্থা (কোড)*	*শিক্ষা (কোড)*	*বৃত্তি / পেশা (কোড)*
	২.১৫.*.১	২.১৫.*.২	২.১৫.*.৩	২.১৫.*.৪	২.১৫.*.৫	২.১৫.*.৬
১						
২						
৩						
৪						
৫						
৬						
৭						
৮						
৯						
১০						

নোটঃ তথ্যপ্রদানকারীর সদস্য নম্বর ও খানা প্রধান চিহ্নিত করুন

কোড ২.১৫.*.১ ঃ খানা প্রধানের সাথে সম্পর্ক

১. খানা প্রধান	*২. স্ত্রী/ স্বামী*	*৩. পুত্র/কন্যা*	*৪. পিতা/মাতা*	*৫. ভাই/বোন*
৬. ভাতিজা/ভাতিজি	*৭. ভাগ্নে/ভাগ্নি*	*৮. নাতি/নাত্নি*	*৯. পুত্রবধূ/জামাতা*	*১০. অন্যান্য*

কোড ২.১৪.*.৩ ঃ লিঙ্গ

১. পুরুষ	*২. মহিলা*	*৩. হিজড়া*

কোড ২.১৫.*.৪ ঃ বৈবাহিক অবস্থা

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

কোড ২.১৫.*.৫ ঃ শিক্ষা

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

*(উল্লেখ করুনঃ প্রকৌশলী/ডাক্তার/কৃষিবিদ/এডভোকেট/নগর পরিকল্পনাবিদ, প্রভৃতি)

কোড ২.১৫.*.৬ ঃ বৃত্তি /পেশা

১. ছাত্র	*২.গৃহিণী*	*৩.কর্মজীবী*	*৪. অবসর প্রাপ্ত*	*৫. বেকার*	*৬. অন্যান্য*

অধ্যায়-৩ঃ পেশা ও আয়-ব্যায় সম্পর্কিত তথ্য

পেশা ও উপার্জনের তথ্য (শুধুমাত্র কোড এ বৃত্তির মান ৩ এর জন্য প্রযোজ্য)

সদস্য নং	প্রধান পেশা					সহায়ক পেশা - ১ঃ নিয়মিত					সহায়ক পেশা - ২ঃ ঋতুভিত্তিক				
	পেশা		উপার্জন		কর্মস্থলের দুরত্ব	পেশা		উপার্জন		কর্মস্থলের দুরত্ব	পেশা		উপার্জন		কর্মস্থলের দুরত্ব
	কোড	নাম	ধরন	পরিমাণ		কোড	নাম	ধরন	পরিমাণ		কোড	নাম	ধরন	পরিমাণ	
	৩.১*.১	৩.১*.২	৩.১*.৩	৩.১*.৪	৩.১*.৫	৩.১*.৬	৩.১*.৭	৩.১*.৮	৩.১*.৯	৩.১*.১০	৩.১*.১১	৩.১*.১২	৩.১*.১৩	৩.১*.১৪	৩.১*.১৫

কোড ৩.১*.১, ৩.১*.৬, ৩.১.*.১১ ঃ পেশা

১. চাকরি	*২.৫. বৃহৎ ব্যবসায়ী*	*৫.কারিগরি পেশা*	*৬. ঐতিহ্যগত পেশা*
১.১. সরকারি/স্বায়ত্বশাসিত সংস্থায়	*৩. শ্রমিক*	*৫.১. বিদ্যুৎ মিস্ত্রি*	*৬.১. কামার*
১.২. বেসরকারি অফিসের কর্মী	*৩.১. কৃষি কাজে নিয়োজিত*	*৫.২. রাজ মিস্ত্রি*	*৬.২. কুমার*
১.৩. পরিবার পর্যায়ে নিয়োজিত কর্মী	*৩.২. শিল্প কারখানায় নিয়োজিত*	*৫.৩. রড মিস্ত্রি*	*৬.৩. জেলে*
২. ব্যবসা	*৩.৩. নির্মাণ কাজে নিয়োজিত*	*৫.৪. স্যানিটারি মিস্ত্রি*	*৬.৪. তাঁতি*
২.১. ফেরিওয়ালা	*৩.৪. পরিবহন কাজে নিয়োজিত*	*৫.৫. কাঠমিস্ত্রি*	*৬.৫. ঘরামি*
২.২. ক্ষুদ্র ব্যবসায়ী	*৩.৫. সেবাখাত শ্রমিক*	*৫.৬. রং মিস্ত্রি*	*৬.৬. বাঁশের দ্রব্যাদি*
২.৩. দোকান ব্যবসায়ী	*৩.৬. দিন মজুর*	*৫.৭. ফ্রিজ/এসি মিস্ত্রি*	*৬.৭. বেত মিস্ত্রি*
২.৪. মাঝারি ব্যবসায়ী	*৪. পেশাজীবী*	*৫.৮. ইলেকট্রনিক যন্ত্রপাতি*	*৬.৮. গাছি*

কোড ৩.১*.৩, ৩.১*.৮, ৩.১*.১৩ ঃ উপার্জনের ধরন

১. মাসিক বেতন	*২. দৈনিক মজুরী*	*৩. কাজ অনুযায়ী মূল্য*	*৪. নিজস্ব প্রতিষ্ঠানে কর্মরত*	*৫. বিনা বেতনে কর্মরত*	*৬. অন্যান্য*

কোড ৩.১*.৪, ৩.১*.৯, ৩.১*.১৪ ঃ উপার্জনের পরিমান

১. ৫০০০ এর কম	*২. ৫০০০-১০০০০*	*৩. ১০০০১-১৫০০০*	*৪. ১৫০০১-২০০০০*	*৫. ২০০০১-২৫০০০*	*৬. ২৫০০১-৩০০০০*	*৭. ৩০০০০ এর বেশি*

কোড ৩.১*.৫, ৩.১*.১০, ৩.১*.১৫ ঃ কর্মস্থলের দুরত্ব

১. আবাসস্থল	*২. ০.৫ কি.মি এর কম*	*৩. ০.৫ কি.মি-১ কি.মি*	*৪. ১ কি.মি-২ কি.মি*	*৫. ২ কি.মি-৫ কি.মি*	*৬. ৫ কি.মি.র অধিক*

৩.২.১১ পারিবারিক আয়ের তথ্যঃ

৩.২.১ আয়ের উৎস (কোড)ঃ ☐ , ☐ , ☐ , ☐ ৩.২.১ অন্যান্য ঃ .....

কোড ৩.২.১ ঃ আয়ের উৎস

১. বেতন	*২. বাড়ি /ফ্ল্যাট ভাড়া*	*৩. ব্যবসা*	*৪. মজুরী*	*৫. কৃষি*	*৬. হাঁস, মুরগী, গরু, ছাগল পালন*	
৭. মৎস্য চাষ	*৮. কুটির শিল্প*	*৯. রেমিট্যান্স (বৈদেশিক আয়)*	*১০. অবসর ভাতা*	*১১. বাগান*	*১২. লিজ*	*১৩. অন্যান্য*

৩.২.২ মাসিক আয়ঃ

উৎস	৩.২.২.১	৩.২.২.২	৩.২.২.৩	৩.২.২.৪	৩.২.২.৫	৩.২.২.৬	৩.২.২.৭	৩.২.২.৮	৩.২.২.৯	৩.২.২.১০	৩.২.২.১১	৩.২.২.১২	৩.২.২.১৩	মোট
মাসিক আয়														

৩.৩ পারিবারিক ব্যয়ের তথ্যঃ

৩.৩.১ ব্যয়ের খাত (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐ , জ☐ ৩.৩.২ অন্যান্য ঃ .....

কোড ৩.৩.১ ঃ ব্যয়ের খাত

১. নিজস্ব বাড়ি রক্ষণাবেক্ষণ	*২. বাড়ি ভাড়া (সার্ভিস চার্জসহ)*	*৩. ইউটিলিটি*	*৪. সংবাদপত্র , সাহায্যকারীর বেতন ইত্যাদি*		*৫. খাদ্য*	
৬. যাতায়াত	*৭. পরিচ্ছদ*	*৮. শিক্ষা*	*৯. স্বাস্থ্য*	*১০. উৎসব*	*১১. বিনোদন*	*১২. কিস্তি পরিশোধ*	*১৩. অন্যান্য*

ধর্মীয় অনুষ্ঠানঃ যেমন ঈদ, পূজা, বড় দিন. বৌদ্ধ পূর্ণিমা ইত্যাদি

৩.৩.২ মাসিক ব্যয়ঃ

খাত	৩.৩.২.১	৩.৩.২.২	৩.৩.২.৩	৩.৩.২.৪	৩.৩.২.৫	৩.৩.২.৬	৩.৩.২.৭	৩.৩.২.৮	৩.৩.২.৯	৩.৩.২.১০	৩.৩.২.১১	৩.৩.২.১২	৩.৩.২.১৩	মোট
মাসিক ব্যায়														

৩.৩.৩ বিনিয়োগ করেন কিনা? ☐ হ্যা ☐ না ৩.৩.৩.১ উত্তর হ্যা হলে বিনিয়োগের পরিমান(টাকায়)ঃ

৩.৩.৪ সঞ্চয় করেন কিনা? ? ☐ হ্যা ☐ না ৩.৩.৪.১ উত্তর হ্যা হলে সঞ্চয়ের পরিমান বৎসরে(টাকায়)ঃ

অধ্যায় ৪ঃ প্রাকৃতিক দুর্যোগ বিষয়ক প্রশ্নাবলী

৪.১ প্রাকৃতিক দুর্যোগের নাম (কোড)ঃ ☐ ☐ ☐ ☐ ☐ ☐ , , , , , ৪.১.১ অন্যান্যঃ.....

কোডঃ ৪.১ঃ প্রাকৃতিক দুর্যোগের নাম

১.বন্যা	*২. খরা*	*৩. অতিবৃষ্টি*	*৪. অনাবৃষ্টি*	*৫. মঙ্গা*	*৬. ঘূর্ণিঝড়*	*৭. টর্নেডো*	*৮.*	*৯. অন্যান্য*

৪.১.২ প্রাকৃতিক দুর্যোগের ধরণঃ

দুর্যোগ	৪.১.২.১	৪.১.২.২	৪.১.২.৩	৪.১.২.৪	৪.১.২.৫	৪.১.২.৬	৪.১.২.৭	৪.১.২.৮	মোট
কত দিন পর পর									

হয়									

৪.২ সর্বশেষ দুর্যোগের বছর (সাল):

৪.৩ দুর্যোগে কোন ক্ষয়ক্ষতি হয়েছে কি না? ☐ **হ্যাঁ** ☐ **না**

৪.৩.১ উত্তর হ্যাঁ হলে ক্ষয়ক্ষতির পরিমাণ (টাকায়):

অধ্যায়-৫ঃ অবকাঠামোগত সুবিধাদি

৫.১ যাতায়াত সুবিধাদির তথ্যঃ

৫.১.১ বাসস্থানের নিকটতম যাতায়াত মাধ্যমঃ 1. সড়কপথ 2. জলপথ 3. রেলপথ

৫.১.১.১ উত্তর সড়কপথ হলে, রাস্তার ধরন (কোড)ঃ .....

১. বিটুমিনাস	*২. ঢালাই*	*৩. হেরিংবোন*	*৪. ব্রিকসোলিং*	*৫. কাঁচা*

৫.১.১.২ রাস্তার নামঃ .....

৫.১.১.৩ উত্তর জলপথ হলে, পথের ধরন (কোড)ঃ ..... কোড ৫.১.১.৩ ঃ জলপথের ধরন

১. বছরব্যপি নাব্য নদী/খাল	*২. ঋতুভিত্তিক নাব্য নদী/খাল*	*৩. বদ্ধজলাশয়/বিল*

৫.১.১.৪ জলপথের নামঃ .....

৫.১.২ বাসস্থান হতে নিকটতম পথে যাতায়াতের সংযোগ (কোড)ঃ ..... কোড ৫.১.২ ঃ যাতায়াতের সংযোগ

১. সরাসরি	*২. হালট*	*৩. সরু হাটাপথ*	*৪. ক্ষেতের আইল*	*৫. সাঁকো*	*৬. নৌ-পথ*

৫.১.৩ রাস্তার অবস্থা (কোড)ঃ ..... কোড ৫.১.৩ ঃ রাস্তার অবস্থা

১. ভালো	*২. সাময়িক জলমগ্ন*	*৩. ঋতুভিত্তিক জলমগ্ন*	*৪.ভাঙ্গাচোরা*	*৫. বৃষ্টি-গর্তবহুল*	*৬. ধ্বসবহুল*

৫.১.৪ মেরামতের সময়কাল (কোড)ঃ ..... কোড ৫.১.৪ ঃ মেরামতের সময়কাল

১. প্রতিবছর	*২. দুই তিন বছর পর পর*	*৩. অনিয়মিত*	*৪. চরম দূরবস্থায় পৌছালে*

অত্যাবশ্যকীয় ইউটিলিটি সার্ভিস সমূহের তথ্যঃ

৫.২ উহবৎম্ম/শক্তির উৎস/তথ্যঃ

৫.২.১ জ্বালানির উৎস (কোড)ঃ ..... ৫.২.১.১ অন্যান্যঃ ..... কোড ৫.২.১ ঃ জ্বালানির উৎস

১. সিলিন্ডার গ্যাস	*২. বায়োগ্যাস*	*৩. কেরোসিন*	*৪. বৈদ্যুতিক হিটার*	*৫. লাকড়ি/ভূষি*	*৬. গোবর*	*৭. অন্যান্য*

৫.২.২ আলোর উৎস (কোড)ঃ ..... ৫.২.২.১ অন্যান্যঃ ..... কোড ৫.২.২ ঃ আলোর উৎস

১. বিদ্যুৎ	*২. কেরোসিন বাতি*	*৩. মোমবাতি*	*৪. জেনারেটর*	*৫. বায়োগ্যাস বাতি*	*৬. সৌরশক্তি*	*৭. অন্যান্য*

৫.২.৩ উত্তর বিদ্যুৎ হলে, বিদ্যুৎ প্রাপ্যতা (কোড)ঃ ..... ৫.২.৩.১ অন্যান্য ..... কোড ৫.২.৩ ঃ বিদ্যুৎ প্রাপ্যতা

১. নিরবচ্ছিন্ন	*২. রুটিন লোডশেডিং*	*৩. অনিয়মিত*	*৪. চরম অপ্রাপ্যতা*

৫.৩ খাবার পানির তথ্যঃ

৫.৩.১ খাবার পানির উৎস (কোড)ঃ ..... ৫.৩.১.১ অন্যান্য ..... কোড ৫.৩.১ ঃ খাবার পানির উৎস

১. পাইপ লাইন সরবরাহ	*২. নিজস্ব চাপকল*	*৩. গণ চাপকল*	*৪. গণ কল ব্যবস্থা*	*৫. কুয়া*	*৬. খোলা জলাশয়*

৫.৩.২ খাবার পানির মান (কোড)ঃ ..... কোড ৫.৩.২ ঃ খাবার পানির মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক

৫.৩.৩ উত্তর অসন্তোষজনক হলে (কোড)ঃ ..... কোড ৫.৩.৩ ঃ অসন্তোষের কারণ

১. আর্সেনিক	*২. আয়রন/লৌহ*	*৩ দুর্গন্ধ*	*৪. জীবাণু/ প্রাণী*	*৫. জৈব যৌগ*	*৬. রাসায়নিক দ্রব্য*	*৭.অদ্রবনীয় দ্রব্য*

৫.৩.৪ পানির উৎসের দূরত্ব (কোড)ঃ ..... কোড ৫.৩.৪ ঃ পানির উৎসের দূরত্ব

১. ০-০.২৫ কি.মি	*২. ০.২৫-০.৫ কি.মি*	*৩. ০.৫ কি.মি এর অধিক*

৫.৪ পয়নিষ্কাশন তথ্যঃ

৫.৪.১ পয়নিষ্কাশন ব্যবস্থা (কোড)ঃ ..... কোড ৫.৪.১ ঃ পয়নিষ্কাশন ব্যবস্থা

১. জলাবদ্ধ পায়খানা	*২. পিট ল্যাট্রিন*	*৩. খোলা জায়গা*

৫.৪.২ পয়বর্জ্য শোধনঃ 1. শোধিত 2. অশোধিত

৫.৪.৩ উত্তর শোধিত হলে, শোধন ব্যবস্থার ধরন (কোড)ঃ ..... অন্যান্যঃ ..... কোড ৫.৪.৩ ঃ শোধন ব্যবস্থার ধরন

১. শোষণ কূপ	*২. সেপটিক ট্যাংক*	*৩. সেপটিক ট্যাংক ও শোষণ কূপ*	*৪. স্যুয়ারেজ নেটওয়ার্ক*	*৫. অন্যান্য*

৫.৪.৪ উত্তর অশোধিত হলে,
ধরন (কোড)ঃ ..... 1. অন্যান্যঃ ..... 2. কোড ৫.৪.৪ ঃ ধরন

১.চাক কুয়া	*২. কাঁচা কুয়া*	*৩. উন্মুক্তস্থল*	*৪. উন্মুক্ত জলাশয়*	*৫. অন্যান্য*

৫.৫ আবর্জনা ব্যবস্থাপনা তথ্যঃ

৫.৫.১ আবর্জনা অপসারণ ব্যবস্থাঃ বাড়ি থেকে সংগ্রহ নিজস্ব ব্যবস্থাপনা

৫.৫.২ নিজস্ব ব্যবস্থাপনা হলে, ময়লা ফেলার স্থান (কোড)ঃ ..... ৫.৫.৩ অন্যান্যঃ ..... কোড ৫.৫.২ ঃ ময়লা ফেলার স্থান

১. নির্দিষ্ট ডাষ্টবিন	*২. বাড়ির সীমানায় মাটির গর্ত*	*৩. বাড়ির আশে পাশের নীচু জমি*	*৪. খাল/নদী/ডোবা*	*৫. রাস্তার ধার*	*৬. অন্যান্য*

৫.৫.৪ বাড়ি থেকে সংগৃহীত হলে, আবর্জনা সংগ্রহের সময়সূচী (কোড)ঃ ..... ৬.৫.৫ অন্যান্যঃ ..... কোড ৫.৫.৪ ঃ সংগ্রহের সময়

১. প্রতি দিন	*২. প্রতি ২ দিন পর পর*	*৩. অনিয়মিত*	*৪. অন্যান্য*

৫.৫.৬ আবর্জনা ফেলার স্থানের দূরত্ব (কোড) ঃ ..... কোড ৫.৫.৬ ঃ আবর্জনা ফেলার স্থানের দূরত্ব

১. নিজ বাড়ির সীমানায়	*২. ০-৫০ মিঃ*	*৩. ৫১-১০০ মিঃ*	*৫. ১০০ মিঃ এর উপরে*

অধ্যায়-৬ঃ সামাজিক সুবিধাদি

স্বাস্থ্য বিষয়ক তথ্যঃ

৬.১ গত ৬ মাসে আপনার পরিবারের কেউ অসুস্থ হয়েছিল কি? 1. হ্যাঁ 2. না 3. অবগত নন

৬.২ 'হ্যাঁ' হলে,

সদস্য (ওউ)	অসুস্থতা (কোড)	চিকিৎসা নিয়েছিলেন কি? হ্যাঁ = ১; না = ২	হ্যাঁ হলে কোথায় গিয়েছিলেন (কোড)	না হলে কেন যাননি (কোড)
৬.২.*.১	৬.২.*.২	৬.২.*.৩	৬.২.*.৪	৬.২.*.৫

কোড ৬.২.*.২ ঃ অসুস্থতা

১. জ্বর	*২. সর্দি/কাশি*	*৩. ডাইরিয়া/আমাশয়*	*৪. জন্ডিস*	*৫. টাইফয়েড*	*৬. নিউমোনিয়া*	
৭. হাম	*৮. পোলিও*	*৯. ম্যালেরিয়া*	*১০. জল বসন্ত*	*১১. ডেঙ্গু জ্বর*	*১২. হৃদরোগ*	

১৩. ধনুস্টংকার	*১৪. কৃমিরোগ*	*১৫. বাত জ্বর*	*১৬. হাপানী/শ্বাস কষ্ট*	*১৭. যৌন রোগ*	*১৮. গলগন্ড*
১৯. হাড় ক্ষয় রোগ	*২০. ডায়াবেটিস*	*২১. চর্মরোগ/ চুলকানি/পাঁচড়া*	*২২. স্ত্রীরোগ*	*২৩. জলাতঙ্ক*	*২৪. অন্যান্য*

কোড ৬.২.*.৪ ঃ চিকিৎসার জন্য কোথায় যান

১. ডিগ্রিধারী ডাক্তার	*২. প্রাইভেট ক্লিনিক*	*৩. সরকারি হাসপাতাল*	*৪. কমিউনিটি ক্লিনিক*	*৫. উপজেলা স্বাস্থ্য কেন্দ্র*
৬. গ্রাম্য চিকিৎসক	*৭. হোমিও ডাক্তার*	*৮. হেকিম/কবিরাজ*	*৯. দাতব্য চিকিৎসালয়*	*১০. ওঝা/ ফকির*
১১. রাস্তার দেশীয় ঔষধ বিক্রেতা	*১২. অন্যান্য (উল্লেখ করুন)ঃ*			

কোড ৬.২.*.৫ ঃ চিকিৎসা কেন্দ্রে না যাওয়ার কারণ

১. অর্থনৈতিক অসামর্থ	*২. প্রয়োজনবোধ করেননি*	*৩. ঔষধালয় থেকে ঔষধ কিনে খেয়েছেন*	*৪. চিকিৎসা কেন্দ্রের দূরত্ব বেশি*	*৫. অন্যান্য*

৬.৩ চিকিৎসালয়ের তথ্য (বিস্তারিত হাসপাতাল থেকে)

ধরন (কোড)	অবস্থান	দূরত্ব	সেবাসমূহ (কোড)	সেবার মান (কোড)	স্থান সংকুলান (কোড)
৬.৩.*.১	৬.৩.*.২	৬.৩.*.৩	৬.৩.*.৪	৬.৩.*.৫	৬.৩.*.৬

কোড ৬.৩.*.১ ঃ চিকিৎসালয়ের ধরন

১. সরকারি হাসপাতাল	*২. প্রাইভেট ক্লিনিক*	*৩. ডাক্তারের চেম্বার*	*৪. দাতব্য চিকিৎসালয়*	*৫. কমিউনিটি ক্লিনিক*	*৬. কবিরাজ ঘর*	*৭. অন্যান্য*

কোড ৬.৩.*.৪ ঃ চিকিৎসালয়ের সেবাসমূহ

১. সাধারণ চিকিৎসা	*২. বিশেষজ্ঞ চিকিৎসা (উ.ক)*	*৩. প্রসূতি ও নবজাতক*	*৪. মাতৃ স্বাস্থ্য*	*৫. শিশু স্বাস্থ্য*	*৬. অন্যান্য*

কোড ৬.৩.*.৫ ঃ সেবার মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক	৫. হতাশাজনক

কোড ৬.৩.*.৬ ঃ স্থান সংকুলান

১. পর্যাপ্ত	২. কার্যোপযোগী	৩. অপ্রতুল	৪. অত্যন্ত অপ্রতুল

৬.৪ চিকিৎসা প্রাপ্তির সমস্যাসমূহ (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐ কোড ৬.৪ ঃ চিকিৎসা প্রাপ্তির

১.কমিউনিটি ক্লিনিক এর অভাব	২. ফ্রি চিকিৎসা কেন্দ্র নাই	৩.প্রয়োজনীয় ঔষধ পত্রের অভাব	৪. সরকারি ঔষধ পাওয়া যায় না	৫. ডাক্তার অপ্রতুল
৬. বিশেষজ্ঞ ডাক্তারের অভাব	৭. রোগ নির্ণয়ের সুবিধা নাই	৮. অপারেশন কক্ষ নাই	৯. হাসপাতাল দূরে	১০. চিকিৎসা বিষয়ক অজ্ঞানতা
১১. অন্যান্য (উল্লেখ করুন)ঃ				

৬.৫ চিকিৎসালয়ের অবকাঠামোর ধরন (কোড) ঃ

কোড ৬.৫ ঃ অবকাঠামোর ধরন

১. পাকা	২. সেমি-পাকা	৩. টিনের ছাদ/ টিনের বেড়া	৪. টিনের চাল বাঁশ/খড়ি/মাটির বেড়া	৪. ছন/বেড়ার চাল খড়ি/বাঁশ/ছনের বেড়া

৬.৬ চিকিৎসালয়ের অবকাঠামোর অবস্থা (কোড) ঃ

কোড ৬.৬ ঃ অবকাঠামোর অবস্থা

১. চমৎকার	২. ভালো	৩. পুরাতন	৪. ধবংসম্মুখ

শিক্ষা বিষয়ক তথ্যঃ

৬.৭ পরিবারের সদস্যদের শিক্ষা ব্যবস্থাঃ

সদস্য (ওউ)	শ্রেণী	শিক্ষা প্রতিষ্ঠান		বাসস্থান থেকে দূরত্ব	যাওয়ার মাধ্যম (কোড)
		সরকারি (কোড)	বেসরকারি (কোড)		
	৬.৭.*.১	৬.৭.*.২	৬.৭.*.৩	৬.৭.*.৪	৬.৭.*.৫

কোড ৬.৭.*.২, ৬.৭.*.৩ ঃ শিক্ষা প্রতিষ্ঠান

১. কিন্ডার গার্টেন	২. প্রাইমারি স্কুল	৩. হাই স্কুল/দাখিল মাদ্রাসা	৪. কলেজ/আলিম	৫. বিশ্ববিদ্যালয় কলেজ
৬. ডিগ্রি/ফাজিল মাদ্রাসা	৭. বিশ্ববিদ্যালয়/	৮.কারিগরি শিক্ষা প্রতিষ্ঠান	৯. প্রশিক্ষণ কেন্দ্র	

কোড ৬.৭.*.৫ ঃ যাওয়ার মাধ্যম

১. পায়ে হাটা	২. সাইকেল	৩. রিক্সা	৪. ভ্যান	৫. ভটভটি
৬. ইজিবাইক	৭. অটো রিক্সা	৮. টেম্পু/হিউম্যান হলার	৯. বাস	১০. অন্যান্য

৬.৮ শিক্ষা প্রতিষ্ঠানের সমস্যা (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐ , ☐

কোড ৬.৮ ঃ শিক্ষা প্রতিষ্ঠানের সমস্যা

১. দক্ষ শিক্ষকের অভাব	২. উচ্চ ছাত্র শিক্ষক অনুপাত	৩. শিক্ষা উপকরণের অভাব	৪. বিজ্ঞানাগার নেই
৫. লাইব্রেরি নাই	৬. খেলার মাঠ নেই	৭. অপর্যাপ্ত অবকাঠামো	৮. জরাজীর্ণ- অবকাঠামো

৯. আসবাবপত্রের অভাব	*১০. অদক্ষ পরিচালনা*	*১১. অন্যান্য (উল্লেখ করুন)ঃ* .....

৬.৯ প্রাথমিক বিদ্যালয় গমনের উপযোগী বয়সের ছেলেমেয়ের বিদ্যালয় না যাওয়ার কারণ (কোড)ঃ ☐ , ☐ , ☐

কোড ৬.৯ ঃ বিদ্যালয় না যাওয়ার কারণ

১. আর্থিক অসচ্ছলতা	*২. পরিবারের জন্যে রোজগার*	*৩. শিক্ষায় পরিবারের অনীহা*	*৪. অন্যান্যঃ* .....

৬.১০ প্রাথমিক/মাধ্যমিক ছাত্র-ছাত্রীদের ঝরে পড়ার কারণ (কোড) ☐ , ☐ , ☐

কোড ৬.১০ ঃ ঝরে পড়ার কারণ

১. আর্থিক অসচ্ছলতা	*২. পরিবারের জন্যে রোজগার*	*৩. পড়তে অনীহা*	*৪. বাল্য বিবাহ*	*৫. অন্যান্যঃ* .....

অধ্যায়-৭ঃ সেবা ও এলাকার সমস্যাসমূহ

৭.১ বিনোদনের তথ্যঃ

৭.১.১ ঘরোয়া বিনোদনের উপকরণ কী (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ ৭.১.১.১অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.১.১ ঃ ঘরোয়া বিনোদনের উপকরণ

১. রেডিও	*২.ক্যাসেট/ সিডি প্লেয়ার*	*৩. টেলিভিশন*	*৪. ঘরোয়া খেলার উপকরণ*	*৫. বই*	*৬. অন্যান্য*

৭.১.২ ঘরোয়া বিনোদনের জন্য কি করেন (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ ৭.১.২.১ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.১.২ ঃ ঘরোয়া বিনোদন

১. টেলিভিশন/রেডিও এর অনুষ্ঠান উপভোগ করেন	*২. ঘরোয়া খেলা*	*৩. বই পড়া*	*৪. গান শোনা*	*৫. অন্যান্য*

৭.১.৩ বহির্বিনোদনের জন্য কি করেন (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐ ৭.১.৩.১ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.১.৩ ঃ বহির্বিনোদন

১. খেলাধুলা	*২. খেলা উপভোগ*	*৩. খোলা জায়গায় ভ্রমণ*	*৪. ক্লাব*	*৫. পার্ক*	*৬. চিড়িয়াখানা*
৭. যাদুঘর	*৮. পর্যটন স্থান*	*৯. মাছ ধরা*	*১০. বনভোজন*	*১১. সিনেমা*	*১২. অন্যান্য*

৭.১.৪ বর্হিবিনোদনের সমস্যাসমূহ (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐ ৭.১.৪.১ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.১.৪ ঃ বর্হিবিনোদনের সমস্যাসমূহ

১.অপ্রতুল চিত্ত বিনোদন ব্যবস্থা	*২. রক্ষণাবেক্ষণ সমস্যা*	*৩. বিনোদন সরঞ্জামের অভাব*	*৪. কাঙ্খিত বিনোদন পরিবেশের অভাব*
৫.নিরাপত্তার অভাব	*৬.অর্থনৈতিক অসামর্থ*	*৭. অন্যান্য*	

৭.১.৫ খেলার মাঠ ও পার্ক এলাকায় কোন সমস্যা আছে কী? 1. হ্যাঁ 2. না

৭.১.৬ সমস্যা থাকলে সেগুলো কি কি ? কোডঃ ৭.১.৬ ঃ খেলার মাঠের সমস্যা

১. মাঠের পরিবেশ ভাল না	*২. ময়লা আবর্জনা মাঠে জমা থাকে*	*৩. মাঠের আংশিক পুকুরে পরিণত হয়েছে*
৪. মাস্তানদের দখলে	*৫. চাঁদাবাজদের উপদ্রব*	*৬. মাঠ/পার্ক রক্ষণাবেক্ষণ করা হয় না*
৭. প্রভাবশালীরা গরু চড়ায়	*৮. আংশিক বেদখল হয়ে গেছে*	*৯. অন্যান্য*

৭.২ প্রয়োজনীয় সেবাসমূহের তথ্যঃ

অন্যান্য প্রয়োজনীয় সেবাসমূহের দূরত্ব (বাড়ি থেকে) ও মান ঃ

ক্রম নং	সেবা সমূহ	দূরত্ব (কি.মি)	সেবার মান (কোড)
		৭.২.*.১	৭.২.*.২
৭.২.১	কাঁচা বাজার		
৭.২.২	বিপণি কেন্দ্র		
৭.২.৩	উপাসনালয় (মসজিদ/ মন্দির/গীর্জা)		
৭.২.৪	পাঠাগার		
৭.২.৫	কমিউনিটি সেন্টার		
৭.২.৬	স্বাস্থ্সেবা কেন্দ্র		
৭.২.৭	পোস্ট অফিস		
৭.২.৮	ফায়ার সার্ভিস		
৭.২.৯	পুলিশ ফাঁড়ি/পুলিশ বক্স		
৭.২.১০	বাস/ টেম্পো স্ট্যান্ড		
৭.২.১১	পাবলিক টয়লেট		
৭.২.১২	ঈদগাহ		
৭.২.১৩	কবরস্থান/ শ্মশান		
৭.২.১৪	মোবাইল/ফোন/ফ্যাক্স/ই-মেইলের দোকান		
৭.২.১৫	মিলনায়তন		
৭.২.১৬	সিনেমা হল		
৭.২.১৭	ব্যায়ামাগার		
৭.২.১৮	যুব সংগঠন /		
৭.২.১৯	মহিলাদের ক্লাব		
৭.২.২০	যাদুঘর		

৭.২.২১	খেলার মাঠ		
৭.২.২২	অন্যান্য (উল্লেখ করুন)		

কোড ৭.২.*.২ ঃ সেবার মান

১. সন্তোষজনক	২. মোটামুটি	৩. সন্তোষজনক নয়	৪. হতাশাজনক	৫. জানা নাই

৭.৩ বিদ্যমান আইন-শৃঙ্খলা ও অপ-প্রথার তথ্য ঃ

৭.৩.১ প্রবনতা ক্রমান্বয়ে এলাকার আইন-শৃঙ্খলার হুমকিসমূহ (কোড)ঃ ☐, ☐, ☐, ☐, ☐, ☐ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.৩.১ ঃ আইন-শৃঙ্খলার হুমকিসমূহ

১. ছিচকে চুরি	*২. সিধেল চুরি*	*৩. ডাকাতি*	*৪. ছিনতাই*	*৫. চাঁদাবাজি*	*৬. জমি/সম্পদ দখল*	*৭. দাঙ্গা*	*৮. খুন*
৯. গুম	*১০. ধর্ষণ*	*১১. অপহরণ*	*১২. মুক্তিপণ দাবী*	*১৩. এসিড সন্ত্রাস*	*১৪. আত্মহত্যা*	*১৫. অন্যান্য*	

৭.৩.২ এলাকায় প্রচলিত অপ-প্রথাসমূহ (কোড)ঃ ☐, ☐, ☐, ☐, ☐, ☐ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৭.৩.২ ঃ অপ-প্রথাসমূহ

১. বাল্য বিবাহ	*২.পুত্রের আশায় পুনঃ বিবাহ*	*৩. যৌতুক*	*৪. নারী নির্যাতন*	*৫. ঝাড়ফুঁক/ তাবিজ দিয়ে চিকিৎসা*
৬. পুরুষ ডাক্তার দিয়ে মেয়েদের চিকিৎসা না করানো		*৭. মেয়েদের চাকরিতে বাঁধা দেয়া*		*৮. অন্যান্য*

৭.৩.৩ আইন-শৃঙ্খলা রক্ষাকারী বাহিনীর ভূমিকা (কোড) ঃ .....

কোড ৭.৩.৩ ঃ আইন-শৃঙ্খলা রক্ষাকারী বাহিনীর ভূমিকা

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক	৫. হতাশাজনক	৬. জানা নাই

৭.৩.৪ এলাকার সমস্যাসমূহ গুরুত্বের ক্রম অনুসারে সাজান

সমস্যা	ক্রম	সমস্যা	ক্রম	সমস্যা	ক্রম
লোডশেডিং		যানবাহন সম্পর্কিত		বর্জ্য নিষ্কাশনের জায়গার অভাব	
রাস্তাঘাট সম্পর্কিত		আইন শৃঙ্খলার অবনতি		বিদ্যুৎ সমস্যা (লো-ভোল্টেজ, বিদ্যুৎ নাই)	
জলাবদ্ধতা		পয়ঃনিষ্কাশন		ভাল শিক্ষা প্রতিষ্ঠানের অভাব	
খাবার পানি সংক্রান্ত		বাজার অনেক দূরে		কর্ম-সংস্থান সমস্যা	
নারী নির্যাতন		দুঃস্থ মাতৃপ্রধান পরিবারের আধিক্য		ধর্মীয় গোঁড়ামী	
বাল্য বিবাহ		বহু বিবাহ			
				অন্যান্য (উল্লেখ করুন)	

অধ্যায়-৮ঃ বিভিন্ন গুরুত্বপূর্ণ সরকারি প্রতিষ্ঠানের সেবার মান

৮.১ ইউনিয়ন পরিষদ/পৌরসভার সেবাসমূহের মান

ক্রম নং	সেবা সমূহ	সেবার মান (কোড)	ক্রম নং	সেবা সমূহ	সেবার মান (কোড)
৮.১.১	পানি সরবারহ		৮.১.১১	পার্ক, খেলার মাঠ, কমিউনিটি স্থাপনা রক্ষাণাবেক্ষণ	
৮.১.২	স্যানিটেশন		৮.১.১২	হোল্ডিং নাম্বার/ নাম	
৮.১.৩	কঠিন আবর্জনা অপসারন		৮.১.১২	ভূমির সীমানা নির্ধারণ	
৮.১.৪	সড়ক বাতি		৮.১.১৪	গালিস	
৮.১.৫	ড্রেন ও রাস্তা পরিস্কার		৮.১.১৫	পারিবারিক আদালত	
৮.১.৬	ইমারতের নক্সা অনুমোদন		৮.১.১৬	পশু জবাইয়ের স্থান পরিদর্শন ও মাংশের গুণগতমান নিশ্চিতকরণ	
৮.১.৭	নাগরিকত্ব সনদ প্রদান		৮.১.১৭	মশক নিধন	
৮.১.৮	জন্ম সনদ প্রদান		৮.১.১৮	কুকুর নিধন	
৮.১.৯	মৃত্যু সনদ প্রদান		৮.১.১৯	ইপিআই (টিকা) কার্যক্রম	
৮.১.১০	উত্তরাধিকার সনদ প্রদান		৮.১.২০	গণসচেতনা বৃদ্ধিমূলক কর্মকান্ড	

কোড ৮.১ ঃ সেবার মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	*৩.গ্রহণযোগ্য*	*৪.* অসন্তোষজনক	*৫. হতাশাজনক*	*৬. জানা নাই*

অধ্যায়-৯ঃ ধর্মীয় ও সাংস্কৃতিক কর্মকান্ড

৯.১ ধর্মীয় সাংস্কৃতিক কর্মকান্ডের তথ্য ঃ

৯.১.১ এলাকার সাংস্কৃতিক অনুষ্ঠানগুলি কী ? (কোড)ঃ ☐, ☐, ☐, ☐, ☐, ☐ ৯.১.১.১অন্যান্য (উল্লেখ করুন) ঃ .....

কোড ৯.১.১ ঃ এলাকার সাংস্কৃতিক অনুষ্ঠান

১. সাহিত্য ও সাংস্কৃতিক প্রতিযোগিতা	*২. বাৎসরিক নাটক*	*৩.গানের অনুষ্ঠান*	*৪. বাৎসরিক যাত্রা/পালাগান*	*৫. বাৎসরিক মেলা*
৬. আন্তর্জাতিক মাতৃভাষা দিবস	*৭. স্বাধীনতা দিবস*	*৮. বিজয় দিবস*	*৯. অন্যান্য*	

৯.২ এলাকার ঐতিহ্যবাহী উৎসবগুলি কী ? (কোড)ঃ ☐, ☐, ☐, ☐, ☐, ☐ ৯.২.১ অন্যান্য (উল্লেখ করুন)ঃ .....

কোড ৯.২ ঃ এলাকার ঐতিহ্যবাহী উৎসব

১. বাংলা নববর্ষ	*২. চৈত্র সংক্রান্তি*	*৩.নবান্ন*	*৪.* বসন্ত বরণ	*৫. বর্ষা বরণ*	*৬. গ্রাম্য মেলা*	*৭. স্বাধীনতা দিবস*
৮. একুশে ফেব্রুয়ারী	*৯.পহেলা বৈশাখ*	*১০. অন্যান্য*				

অধ্যায়-১০ঃ খানা সদস্যদের প্রতিদিনের ভ্রমণ সংক্রান্ত তথ্য

১০. ১ পরিবারের সদস্যদের ভ্রমণ সংক্রান্ত তথ্যঃ

সদস্য নং (ওউ)	ভ্রমণ নং	ভ্রমণের উৎস (স্থান)	ভ্রমণের গন্তব্য (স্থান)	ভ্রমণের দূরত্ব	উদ্দিষ্ট স্থান (কোড)	ভ্রমণের সময়		বাহন (কোড)	সমস্যা (কোড)
						শুরু	শেষ		
	১০.১.*.১	১০.১.*.২	১০.১.*.৩	১০.১.*.৪	১০.১.*.৫	১০.১.*.৬	১০.১.*.৭	১০.১.*.৮	১০.১.*.৯

কোড ১০.১..৫ ঃ উদ্দিষ্ট স্থান*

১. কর্মস্থল	*২. শিক্ষা প্রতিষ্ঠান*	*৩. কাঁচা বাজার*	*৪. দোকান/বিপণি বিতান*
৫. আনন্দ ভ্রমণ/বিনোদন/খেলাধুলা	*৬. আত্মীয় গৃহ*	*৭. অন্যান্য ঃ .....*	

কোড ১০.১..৮ ঃ বাহন*

১. বাহনহীন (পায়ে হাটা)	*২. সাইকেল*	*৩. রিক্সা*	*৪. ভ্যান*	*৫. ভটভটি*	*৬. ইজিবাইক*	*৭. অটো রিক্সা*
৮. টেম্পু/হিউম্যান হলার	*৯. বাস*	*১০. অন্যান্য*				

কোড ১০.১..৯ ঃ সমস্যা*

১. রাস্তা সংকীর্ণ	*২. যানজট*	*৩. বাস স্টপেজ দূরে*	*৪. বাহন সংখ্যা কম*	*৫. জরাজীর্ণ রাস্তা*
৬. গন্তব্যে যেতে বাহন পরিবর্তন	*৭. ভাড়া বেশি*	*৮. অন্যান্য ঃ .....*		

অধ্যায়-১১: সম্পদ সম্পর্কিত তথ্য

১১.১ উল্লেখযোগ্য কি কি সম্পদ আছে?

কোড ৯.২ ঃ এলাকার ঐতিহ্যবাহী উৎসব

১. টেলিভিশন	*২. মোবাইল ফোন*	*৩.রেডিও*	*৪.ক্যাসেট প্লেয়ার*	*৫.ট্রাক্টর*	*৬. 'স' মিল*	*৭. রাইস মিল*
৮. অন্যান্য.....						

অধ্যায়-১২ঃ উন্নয়ন পরিকল্পনা সম্পর্কিত

১২.১ শিবপুর/রায়পুর/ঈশ্বরগঞ্জ উপজেলার উন্নয়ন পরিকল্পনা প্রণয়ন সম্পর্কে অবহিত আছেন কি? 1. হ্যাঁ 2. না

১২.২ গুরুত্ব অনুসারে প্রয়োজনীয় উন্নয়নমূলক কাজ কি কি হতে পারে?

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

ডাটা এন্ট্রিকারীর নাম ও স্বাক্ষরঃ ..... তারিখ ঃ.....

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

☐ সকল তথ্য নেয়া হয়েছে ☐ অসম্পূর্ণ

.....

সুপারভাইজারের স্বাক্ষর

তথ্য প্রদানের জন্য আপনাকে আন্তরিক ধন্যবাদ

Annexure-02

Table: List of Socioeconomic Survey Team Members

Sl	**Name**	**Designation**	**Date Start**	**Date End**
1	Tarek Khan	Supervisor	12/8/2015	12/31/2015
2	Rubaiat Islam	Supervisor	12/8/2015	12/31/2015
3	Md Jahangir	Supervisor	12/8/2015	12/31/2015
4	Kawsar Hamid	Supervisor	12/8/2015	12/31/2015
5	Md. Zahirul haque	Surveyor	12/8/2015	12/31/2015
6	Md. Babul Prodhan	Surveyor	12/8/2015	12/31/2015
7	Md. Emran	Surveyor	12/8/2015	12/31/2015
8	Tarikul Gazi	Surveyor	12/8/2015	12/31/2015
9	Shohanur Rahman	Surveyor	12/8/2015	12/31/2015
10	Badhaan Chandra	Surveyor	12/8/2015	12/31/2015
11	Md. Ebrahim Khalil	Surveyor	12/8/2015	12/31/2015
12	Tanvir Alam	Surveyor	12/8/2015	12/31/2015
13	Manik Barman	Surveyor	12/8/2015	12/31/2015
14	Harisul Haque	Surveyor	12/8/2015	12/31/2015
15	Md. Habibullah	Surveyor	12/8/2015	12/31/2015
16	Md. Touhidul Alam Tusar	Surveyor	12/8/2015	12/31/2015
17	Md. Reazuddin	Surveyor	12/8/2015	12/31/2015
18	Nadim Sarkar	Surveyor	12/8/2015	12/31/2015
19	Rocky	Surveyor	12/8/2015	12/31/2015
20	Md. Mahabub	Surveyor	12/8/2015	12/31/2015
21	Ratul Chandra	Surveyor	12/8/2015	12/31/2015
22	Md. Mohsin	Surveyor	12/8/2015	12/31/2015
23	Tahmina Akter	Surveyor	12/8/2015	12/31/2015
24	Tarikul Islam Tuhin	Surveyor	12/8/2015	12/31/2015
25	Arif Nazir	Surveyor	12/8/2015	12/31/2015
26	Md. Masud	Surveyor	12/8/2015	12/31/2015
27	Sumaia Islam	Surveyor	12/8/2015	12/31/2015
28	Mamun Khan	Surveyor	12/8/2015	12/31/2015

Annex-III

Plate: Socio-economic survey at Raipura

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-02
(Ishwarganj Upazila, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Socio-economic Survey of Raipura Upazila, Narsingdi

August, 2016

Joint Venture

of

SCPL Sheltech Consultants Pvt. Ltd

and

ARC Bangladesh Ltd

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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Hydrological Survey
of
Raipura Upazila, Narsingdi

August, 2016

Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

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JV of SCPL-ABL
Preparation of Development Plan for Fourteen Upazilas Project (Package-02)

Ref: SCPL-ABL/UDD/2016/ Hydrological Survey Report/Raipura Upazila Date:

To
The Project Director
"Preparation of Development Plan for fourteen Upazilas" Project
Urban Development Directorate
82, Segunbagicha, Dhaka, 1000.

Subject: Submission of the Final Hydrological Survey Report of Raipura Upazila, Narsingdi

Dear Sir,
We are pleased to submit herewith the Final Hydrological Survey Report of Raipura Upazila, Narsingdi for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)
Team Leader, Package -2

(D S Adibul Abedin)
Hydrologist, Package -2

Encl: As stated.

Copy to:
1. Project Manager, Package-2, 14 Upazila Project, UDD
2. Director, Sheltech Consultants Pvt. Limited
3. Chairman, Arc-Bangladesh limited, Dhaka

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
Phone: +880-2-9611171 Fax: +880-2-9611172
Email: scpl.mail@gmail.com

Abbreviations

ArcGIS	Spatial Date Analysis Software by ESRI
BADC	Bangladesh Agricultural Development Corporation
BM	Benchmark
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board
DEM	Digital Elevation Model
EGL	Existing Ground Level
EPA SWMM	The United States Environmental Protection Agency (EPA) Storm Water Management Model (SWMM)
EV I	The first asymptotic distribution of extreme values
GCP	Ground Control Point
GPS	Global Positioning System
HEC-HMS	The Hydrologic Modeling System is designed to simulate the precipitation-runoff processes of dendritic drainage basins.HEC-HMS is a product of the Hydrologic Engineering Center within the U.S. Army Corps of Engineers.
HEC-RAS	A computer program that models the hydraulics of water flow through natural rivers and other channels developed by the US Department of Defense, Army Corps of Engineers.
HFL	Highest Flood Level
IDF	Intensity Duration Frequency
L/B	Left bank
LFL	Lowest Flood Level
LGED	Local Government Engineering Department
mPWD	RL found against a PWD benchmark in meters
PWD	Public Works Department
R\B	Right Bank
RHD	Roads and Highway Department
RL	Reduced Level
TBM	Temporary Benchmark
UDD	Urban Development Directorate

EXECUTIVE SUMMARY

This report presents the hydrological survey data obtained during the hydrological survey works conducted at Raipura Upazila under Narshingdi district. The task is a part of the project, “Preparation of Development Plan for Fourteen Upazilas”, Package-2. Bathymetric survey of Arial Khan River at Raipura Upazila is still to be done when the monsoon water subsides. During 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. While collecting data for existing drainage systems, information about water logging zones or water logging points were collected. For the natural perennial channels, 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 collected data include flow directions, channel names, presence of tidal effects etc. 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 analyzed data of water level gauge stations, the rainfall data analysis and the project site data deduced from them.

CHAPTER 1
PROJECT OVERVIEW

1.0 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 Old Brahmaputra River flows adjacent to the northern boundary of the Upazila. The Arial Khan River flow in line with the western boundary which off-takes from the Old Brahmaputra near Belabo and then falls into the Meghna River near Narshingdi Sadar. The eastern and southern boundaries of the Upazila is constituted by the mighty Meghna River. Raipura experiences moderate monsoon flooding. Normally only the low areas get flooded during early monsoon. The built up areas being in the high grounds are less prone to flooding. The urban areas lack 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 Arial Khan River. She flows into the Meghna River near Narshingdi Sadar and finally falls into the Bay of Bengal. Although flooding in the area is governed mainly by the Old Brahmaputra and The Meghna River, as the study area can be limited within the Upazila, the bathymetric survey of these two rivers will not be necessary. 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. 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 & Fig: 2)*. 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 BWDB gauge stations SW 177 at Lakpur, SW 229 at Toke, SW 274 at Narshingdi and SW 295 at Ajabpur have been collected. The rainfall data of the stations CL 76 at Narshingdi and CL 79 at Shibpur have 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.

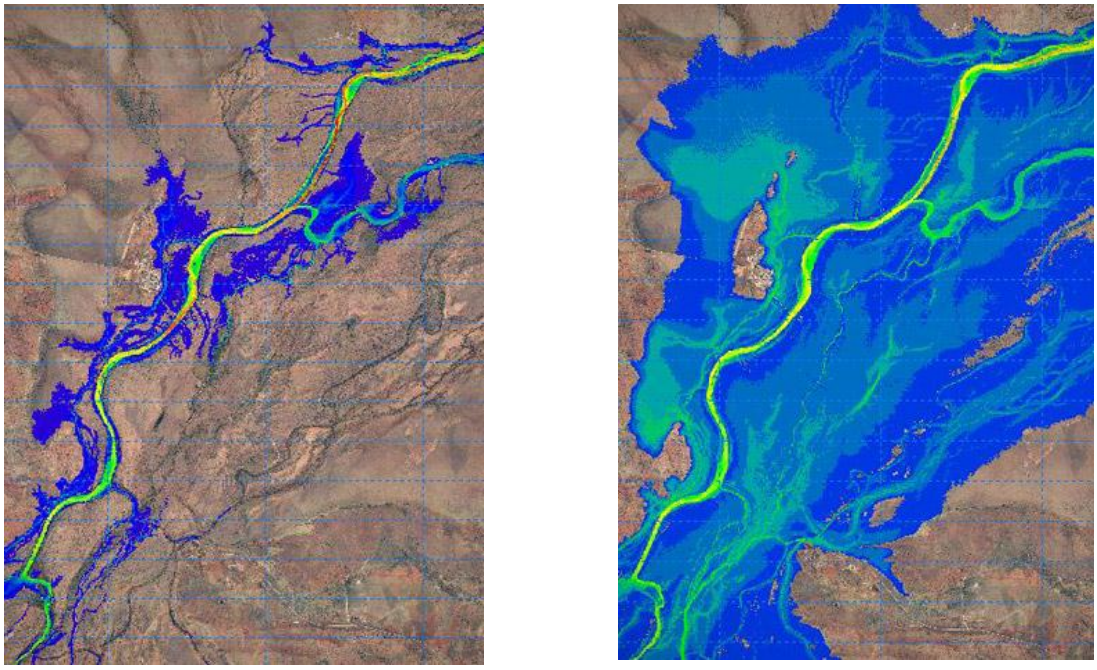


Fig-1: An integrated 1D-2D flood model on a flood plain showing flood conditions at different water level and flow time using Mike Flood (DHI)

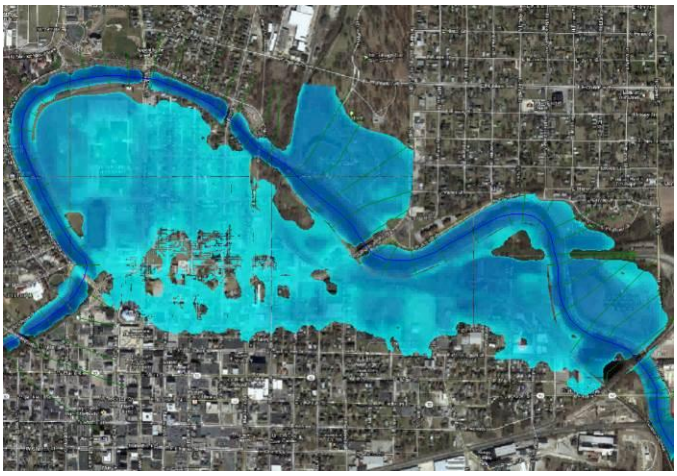


Fig-2: An integrated 1D-2D flood model showing flood conditions in a city area using HEC-RAS

Understanding the water logging problems within the town area and proposing a comprehensive drainage system is another aspect of the survey. Drainage system development is unavoidable when it comes to sustainable urbanization. It is necessary to plan ahead for an efficient drainage system. For this, assessment of capacity and utility of the existing drainage system is essential. Information of the existing drains in Raipura have been collected. The information includes depth, width and EGL at the junction points of the drains. 3-hourly rainfall data, collected from Goddard Earth Sciences Data and Information Service Center, will be used to prepare the hourly rainfall data or the intensity duration frequency (IDF) curve for designing storm sewer system. This will be used to assess the

capacity of the existing drainage system and in designing the proposed drainage system. *(Fig: 3)*

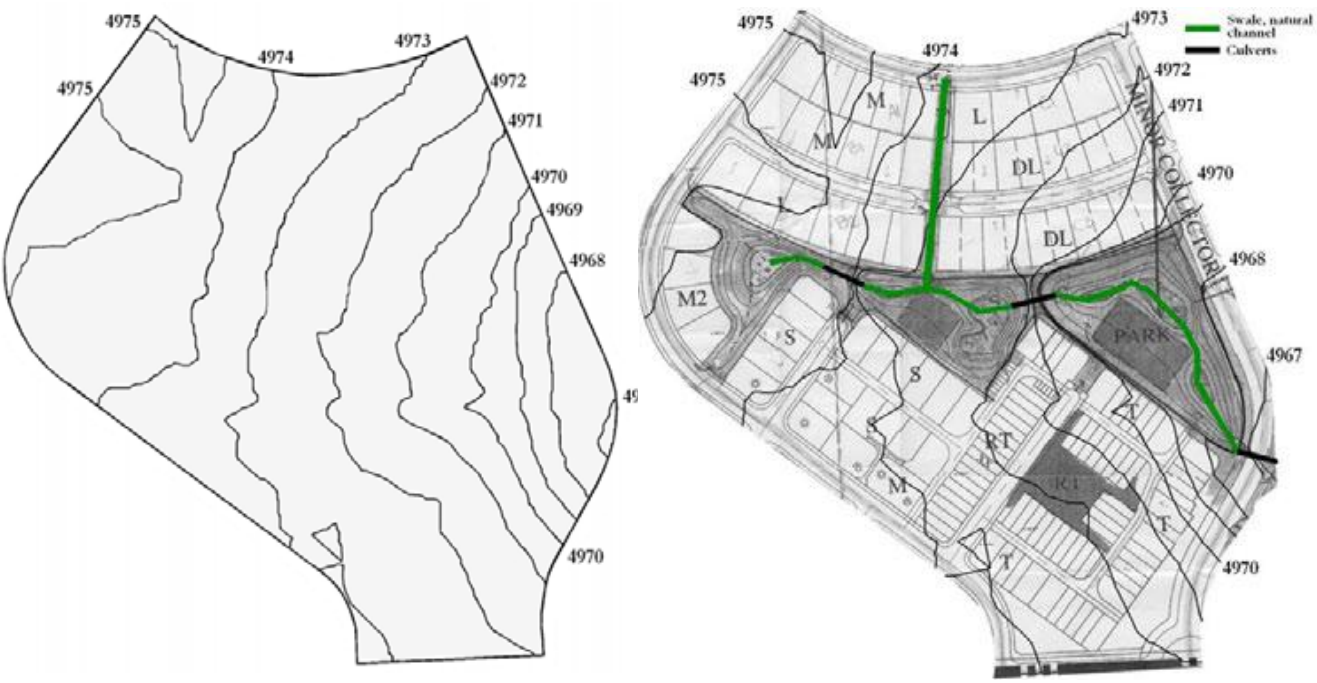


Fig-3: Model developed using EPA SWMM simulating undeveloped (left) and developed (right) conditions to calculate and compare the difference of discharge

With the above in view, the overall objectives of the survey are as listed below:

- Bathymetric survey of the major rivers.
- Identification of hydraulic structures and collecting information regarding capacity and sill levels of the structures.
- Identification of flood hazard locations.
- Identification of flow directions and tidal effects.
- Collection of observed flood levels in the field.
- Collecting information of any existing drainage system.
- Identification of water logging zones.
- Collecting information regarding encroachments of natural water bodies and drains.
- Collection of water level, discharge and rainfall data from secondary sources.

The analyses of the collected water level data done using EV I distribution are added in ANNEXURE - I(b). The Rest of the analysis using the Normal distribution, Log normal distribution and Log Pearson III distribution along with the goodness of fit analysis will be added in the final planning report of the project, “Preparation of Development Plan for Fourteen Upazilas”.

CHAPTER 2
METHODOLOGY

2.0 Survey Method

2.1 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.

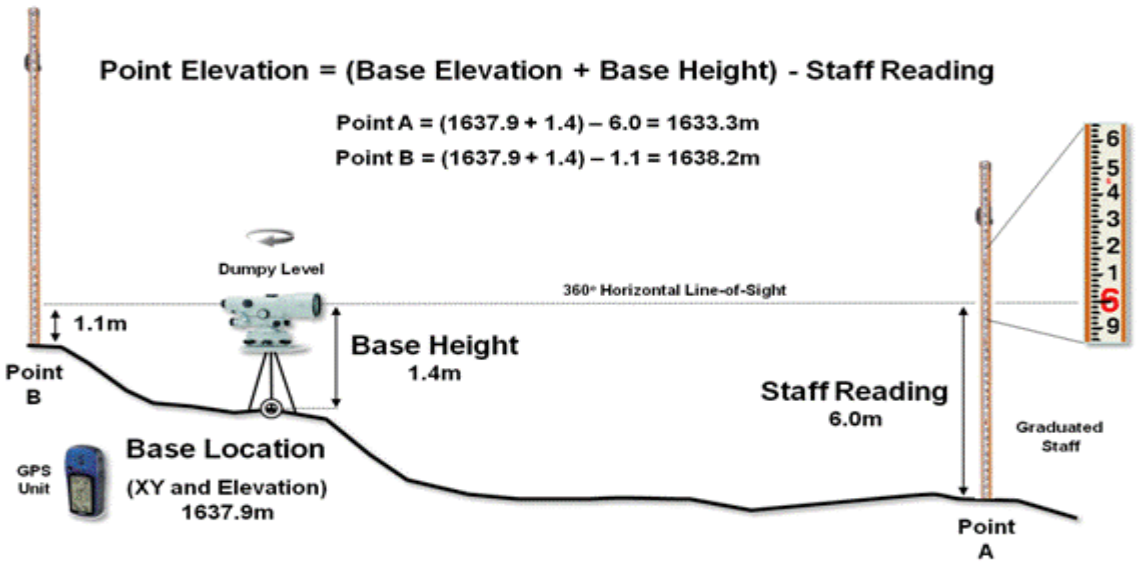


Fig-4: A Dumpy level establishes a horizontal plane to measure the relative elevation differences throughout a project area. A hand GPS is used to get the location of the base.

2.2 Identification of Location

A hand GPS was used to identify the location of the cross-sections, structures, drain control points etc.

2.3 Data Collection

To collect information regarding water control structures in the vicinity, the government organizations that are responsible for any development works regarding water resources development were contacted. The three government organizations that are active in the area are Bangladesh Water Development Board (BWDB), Local Government Engineering Department (LGED) and Bangladesh Agricultural Development Corporation (BADC). Key information of the structures about invert level, number and size of vents etc. were collected. *Plate-1 & 2* shows the bridge on Arial Khan River near BWDB gauge station SW 274 at Narshingdi near Hasnabad Railway station.

Plate-1 & Plate-2: Bridge on Arial Khan River near BWDB gauge station SW 274 at Narshingdi

To identify locations that are prone to flood hazards or water logging problems, questionnaire was prepared and information was collected accordingly. The questionnaire is attached to ANNEXURE – II (a). During the engineering survey, information like highest and normal flood levels, highest tide levels and lowest tide levels were collected from the local farmers, fishermen or boatmen.

As for the secondary data, water level data of the gauge stations SW 177, SW 229, SW 274 and SW 295 of Bangladesh water development are collected. Daily Rainfall data of BWDB gauge CL 76 and CL 79 have also been collected.

CHAPTER 3
FINDINGS OF SURVEY WORKS

3.0 Survey Results

3.1 Survey of Main Rivers

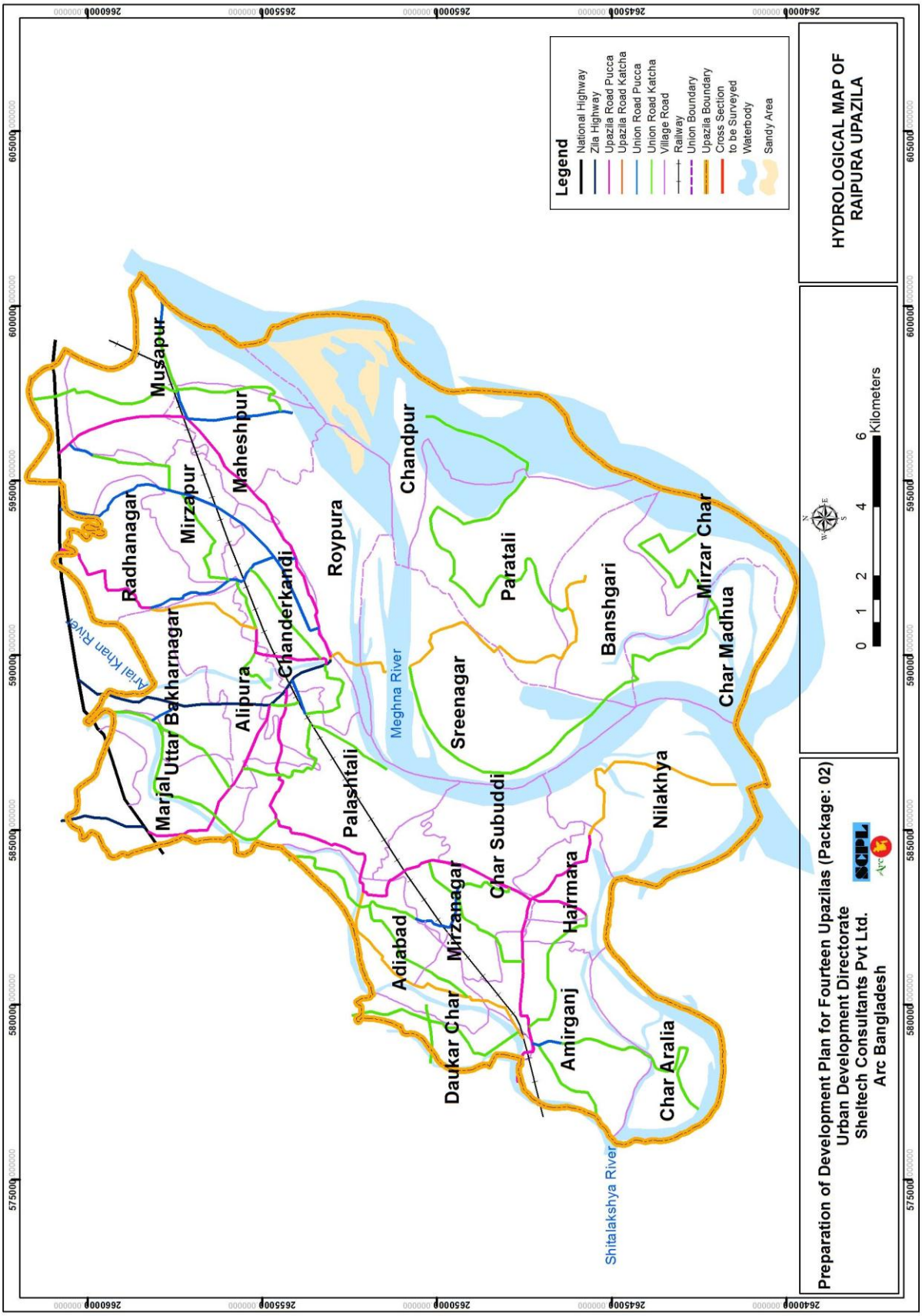
The bathymetric survey of the Arial Khan River is postponed due to monsoon water still not subsided making survey works complicated. As soon as the water subsides during the post monsoon, the cross-sectional survey works will be commenced. The main rivers and channels as identified are shown in *Map – 1 & 2.* Cross-sections will be prepared using the reduced levels obtained in the field against Bangladesh Water Development Board benchmarks. Later, when the photogrammetric images will be processed, the cross-sections will be converted to MSL datum. During the physical feature survey, information about hydraulic structures on the rivers and along the banks of the rivers has already been collected.

3.2 Dependencies

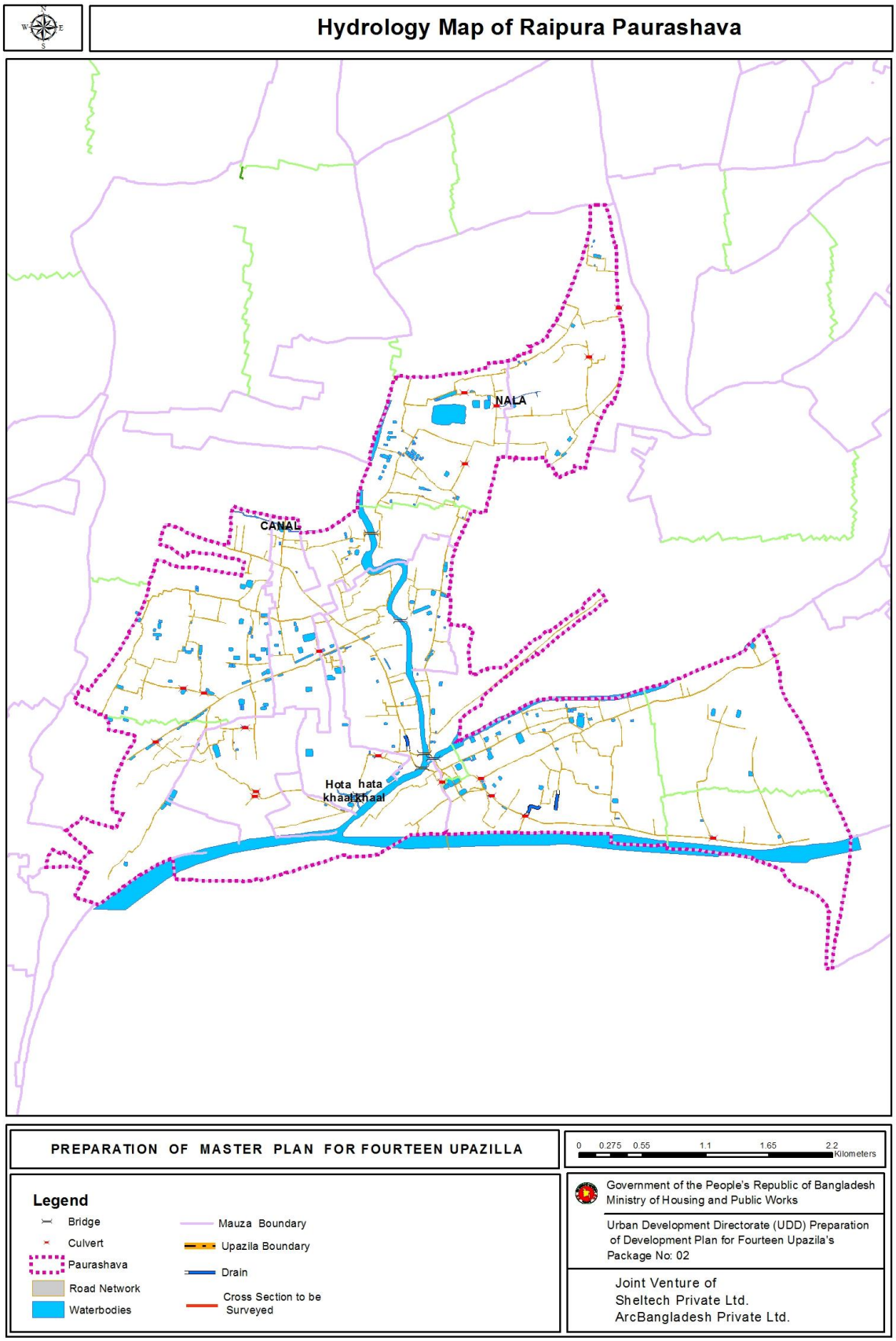
The hydrological works are dependent upon the land use survey, topographic survey and physical feature survey for the respective outcomes of those survey works done under this project. During Physical feature survey, information regarding hydraulic structures has been collected. The local offices of Government Agencies like BWDB, BADC and LGED have been contacted to get data about any irrigation projects or drainage projects that are either currently being operated or being planned by them. The responses of the local populace have been inquired to understand their attitude towards those projects.

The land use survey will be required to prepare the rainfall runoff model for Raipura. Depending upon the use of land, the runoff over a certain segment of land will vary. On a surface exhibiting vegetation, the rainwater shall be impeded from reaching any natural or man-made drainage system. A portion of the precipitation will be intercepted by the canopy before the rain water can reach the ground, also the infiltration rate will be high. All these factors prevents the accumulation of rain water and thus reduces runoff. On the other hand, on a buildup area, much of the vegetation is gone and the land is more or less covered with impervious construction. Interception and infiltration hence reduces, resulting in an increase in net runoff.

Topographic survey is required to understand the undulations on the ground surface. On a steep slope, the water flows quicker towards drainage bodies which are vice versa for a flat land. The digital 3D stereo imageries that have been collected as a measure of the survey works will be used to prepare a Digital Elevation Model (DEM) of the land.



Map-1: Map showing the main drainage channels as identified at Raipura Upazila under Narshingdi District.



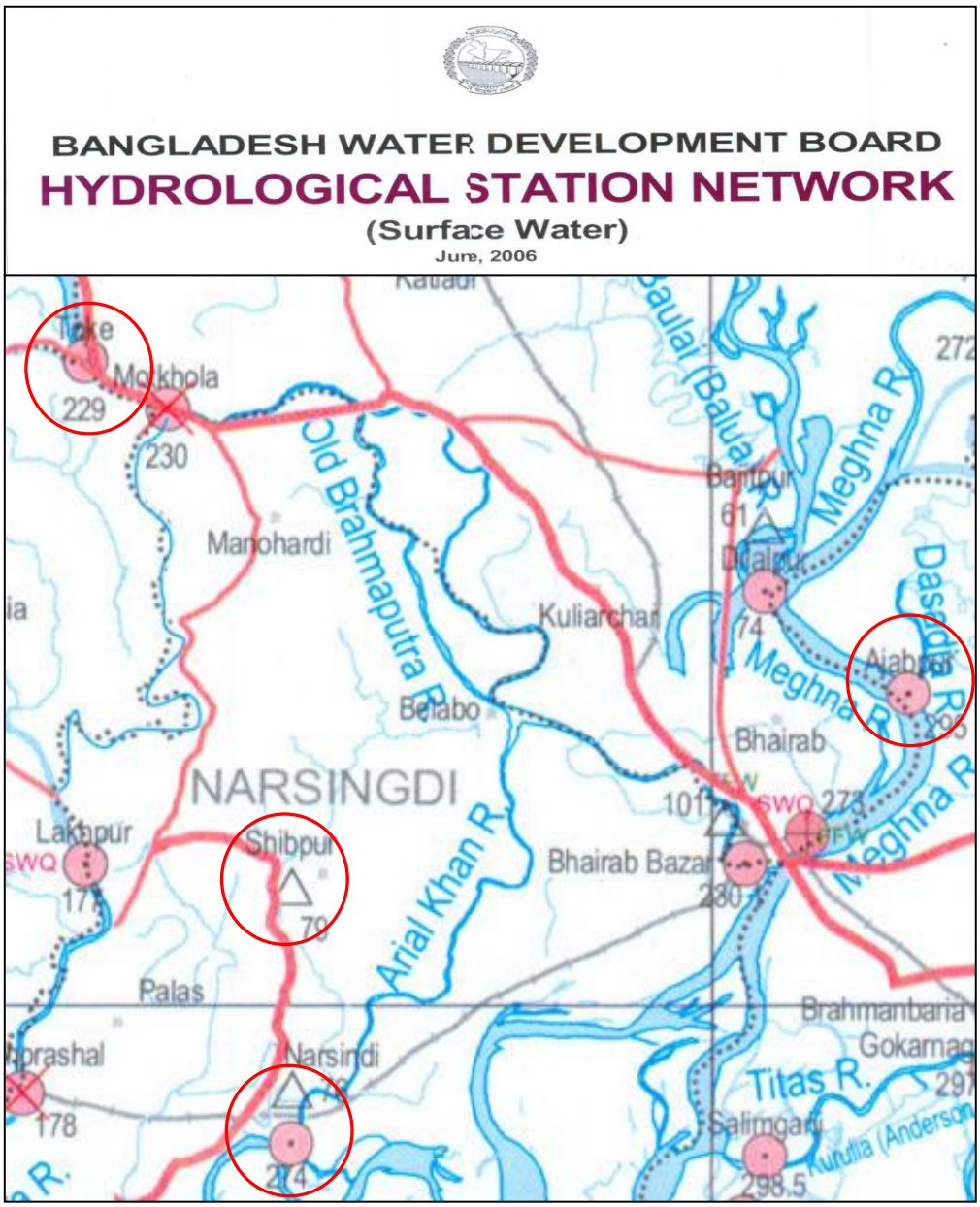
Map-2: Map showing the main drainage channels as identified at Raipura Paurashava under Narshingdi District.

3.3 Survey of the Existing Drainage Systems

Information of existing drains at Raipura regarding depth and width, RL and GPS locations at different junction points, starting points and ending points are obtained. Names of roads alongside the drains are also collected. Lining conditions (Lined or Unlined) of the existing drains have been identified during the survey. This information would be used to prepare a drainage inventory to assess the capacity of the existing drainage system and with a view to that; a drainage improvement plan will be prepared.

3.4 Samples of Collected Data

The BWDB Water Level, Discharge and Rainfall gauge stations of which the data has been collected are shown on *Map-3.* The sample data are charted from **Table – 3.1 to 3.4**



Map-3: Locations of BWDB Water Level, Discharge and Rainfall gauge stations at and around Raipura, Narshingdi, of which the data has been collected (SW 177, SW 229, SW 274, SW 295, CL 76 and CL 79).

Table 3.1: Sample of Collected Rainfall data of BWDB station CL76 & CL79

District	StationID	StationName	DateTime	Rainfall
Narsingdi	CL76	Narsindi	01-Jan-81	0
Narsingdi	CL76	Narsindi	02-Jan-81	0
Narsingdi	CL76	Narsindi	03-Jan-81	0
Narsingdi	CL76	Narsindi	04-Jan-81	0
Narsingdi	CL76	Narsindi	05-Jan-81	0
Narsingdi	CL76	Narsindi	06-Jan-81	0
Narsingdi	CL76	Narsindi	07-Jan-81	0
Narsingdi	CL76	Narsindi	08-Jan-81	1.8
Narsingdi	CL76	Narsindi	09-Jan-81	0
Narsingdi	CL76	Narsindi	10-Jan-81	0
Narsingdi	CL76	Narsindi	11-Jan-81	0
Narsingdi	CL76	Narsindi	12-Jan-81	1.3
Narsingdi	CL76	Narsindi	13-Jan-81	0
Narsingdi	CL76	Narsindi	14-Jan-81	0
Narsingdi	CL76	Narsindi	15-Jan-81	0
Narsingdi	CL76	Narsindi	16-Jan-81	0
Narsingdi	CL76	Narsindi	17-Jan-81	0
Narsingdi	CL76	Narsindi	18-Jan-81	0
Narsingdi	CL76	Narsindi	19-Jan-81	0
Narsingdi	CL76	Narsindi	20-Jan-81	0
Narsingdi	CL76	Narsindi	21-Jan-81	0
Narsingdi	CL76	Narsindi	22-Jan-81	0
Narsingdi	CL76	Narsindi	23-Jan-81	0
Narsingdi	CL76	Narsindi	24-Jan-81	0
Narsingdi	CL76	Narsindi	25-Jan-81	0
Narsingdi	CL76	Narsindi	26-Jan-81	0
Narsingdi	CL76	Narsindi	27-Jan-81	0
Narsingdi	CL76	Narsindi	28-Jan-81	0
Narsingdi	CL76	Narsindi	29-Jan-81	0
Narsingdi	CL76	Narsindi	30-Jan-81	0

District	StationID	StationName	DateTime	Rainfall
Narsingdi	CL79	Shibpur	1-Jan-81	0
Narsingdi	CL79	Shibpur	2-Jan-81	0
Narsingdi	CL79	Shibpur	3-Jan-81	0
Narsingdi	CL79	Shibpur	4-Jan-81	0
Narsingdi	CL79	Shibpur	5-Jan-81	0
Narsingdi	CL79	Shibpur	6-Jan-81	0
Narsingdi	CL79	Shibpur	7-Jan-81	0
Narsingdi	CL79	Shibpur	8-Jan-81	0
Narsingdi	CL79	Shibpur	9-Jan-81	0
Narsingdi	CL79	Shibpur	10-Jan-81	0
Narsingdi	CL79	Shibpur	11-Jan-81	0
Narsingdi	CL79	Shibpur	12-Jan-81	0.5
Narsingdi	CL79	Shibpur	13-Jan-81	0
Narsingdi	CL79	Shibpur	14-Jan-81	0
Narsingdi	CL79	Shibpur	15-Jan-81	0
Narsingdi	CL79	Shibpur	16-Jan-81	0
Narsingdi	CL79	Shibpur	17-Jan-81	0
Narsingdi	CL79	Shibpur	18-Jan-81	0
Narsingdi	CL79	Shibpur	19-Jan-81	0
Narsingdi	CL79	Shibpur	20-Jan-81	0
Narsingdi	CL79	Shibpur	21-Jan-81	0
Narsingdi	CL79	Shibpur	22-Jan-81	0
Narsingdi	CL79	Shibpur	23-Jan-81	0
Narsingdi	CL79	Shibpur	24-Jan-81	0
Narsingdi	CL79	Shibpur	25-Jan-81	0
Narsingdi	CL79	Shibpur	26-Jan-81	0
Narsingdi	CL79	Shibpur	27-Jan-81	0
Narsingdi	CL79	Shibpur	28-Jan-81	0
Narsingdi	CL79	Shibpur	29-Jan-81	0
Narsingdi	CL79	Shibpur	30-Jan-81	0

Table 3.2: Sample of Collected Water level Data of BWDB Station SW177 & SW229

RiverName	StationName	StationID	DateTime	HighTide	LowTide
Lakhya	Lakhpur	SW177	01-04-1983	2.18	1.83
Lakhya	Lakhpur	SW177	02-04-1983	2.13	1.78
Lakhya	Lakhpur	SW177	03-04-1983	2.05	1.73
Lakhya	Lakhpur	SW177	04-04-1983	1.93	1.58
Lakhya	Lakhpur	SW177	05-04-1983	1.83	1.48
Lakhya	Lakhpur	SW177	06-04-1983	1.78	1.43
Lakhya	Lakhpur	SW177	07-04-1983	1.73	1.38
Lakhya	Lakhpur	SW177	08-04-1983	1.73	1.38
Lakhya	Lakhpur	SW177	09-04-1983	1.78	1.48
Lakhya	Lakhpur	SW177	10-04-1983	1.91	1.53
Lakhya	Lakhpur	SW177	11-04-1983	1.98	1.58
Lakhya	Lakhpur	SW177	12-04-1983	2.13	1.68
Lakhya	Lakhpur	SW177	13-04-1983	2.18	1.71
Lakhya	Lakhpur	SW177	14-04-1983	2.28	1.78
Lakhya	Lakhpur	SW177	15-04-1983	2.38	1.83
Lakhya	Lakhpur	SW177	16-04-1983	2.13	1.83
Lakhya	Lakhpur	SW177	17-04-1983	1.98	1.73
Lakhya	Lakhpur	SW177	18-04-1983	1.93	1.63
Lakhya	Lakhpur	SW177	19-04-1983	1.83	1.53
Lakhya	Lakhpur	SW177	20-04-1983	1.78	1.48
Lakhya	Lakhpur	SW177	21-04-1983	1.73	1.43
Lakhya	Lakhpur	SW177	22-04-1983	1.78	1.43
Lakhya	Lakhpur	SW177	23-04-1983	1.73	1.63
Lakhya	Lakhpur	SW177	24-04-1983	2.08	1.68
Lakhya	Lakhpur	SW177	25-04-1983	2.28	1.73
Lakhya	Lakhpur	SW177	26-04-1983	2.33	1.83
Lakhya	Lakhpur	SW177	27-04-1983	2.46	1.88
Lakhya	Lakhpur	SW177	28-04-1983	2.48	1.98
Lakhya	Lakhpur	SW177	29-04-1983	2.63	1.98
Lakhya	Lakhpur	SW177	30-04-1983	2.68	2.03
Lakhya	Lakhpur	SW177	01-05-1983	2.76	2.03
Lakhya	Lakhpur	SW177	02-05-1983	2.86	2.08

RiverName	StationName	StationID	DateTime	HighTide	LowTide
Old Brahmaputra	Toke	SW229	01-04-1981	1.36	1.05
Old Brahmaputra	Toke	SW229	02-04-1981	1.48	1.30
Old Brahmaputra	Toke	SW229	03-04-1981	1.66	1.45
Old Brahmaputra	Toke	SW229	04-04-1981	1.91	1.60
Old Brahmaputra	Toke	SW229	05-04-1981	2.12	1.78
Old Brahmaputra	Toke	SW229	06-04-1981	2.33	2.03
Old Brahmaputra	Toke	SW229	07-04-1981	2.36	2.12
Old Brahmaputra	Toke	SW229	08-04-1981	2.24	1.94
Old Brahmaputra	Toke	SW229	09-04-1981	2.12	1.88
Old Brahmaputra	Toke	SW229	10-04-1981	1.97	1.75
Old Brahmaputra	Toke	SW229	11-04-1981	1.97	1.69
Old Brahmaputra	Toke	SW229	12-04-1981	1.91	1.66
Old Brahmaputra	Toke	SW229	13-04-1981	1.94	1.75
Old Brahmaputra	Toke	SW229	14-04-1981	2.09	1.78
Old Brahmaputra	Toke	SW229	15-04-1981	2.12	1.99
Old Brahmaputra	Toke	SW229	16-04-1981	2.24	1.94
Old Brahmaputra	Toke	SW229	17-04-1981	2.48	2.18
Old Brahmaputra	Toke	SW229	18-04-1981	2.67	2.30
Old Brahmaputra	Toke	SW229	19-04-1981	2.76	2.61
Old Brahmaputra	Toke	SW229	20-04-1981	2.76	2.70
Old Brahmaputra	Toke	SW229	21-04-1981	2.79	2.70
Old Brahmaputra	Toke	SW229	22-04-1981	2.76	2.67
Old Brahmaputra	Toke	SW229	23-04-1981	2.70	2.58
Old Brahmaputra	Toke	SW229	24-04-1981	2.61	2.42
Old Brahmaputra	Toke	SW229	25-04-1981	2.45	2.27
Old Brahmaputra	Toke	SW229	26-04-1981	2.36	2.15
Old Brahmaputra	Toke	SW229	27-04-1981	2.27	2.03
Old Brahmaputra	Toke	SW229	28-04-1981	2.15	1.94
Old Brahmaputra	Toke	SW229	29-04-1981	2.15	1.83
Old Brahmaputra	Toke	SW229	30-04-1981	2.04	1.83
Old Brahmaputra	Toke	SW229	01-05-1981	2.01	1.80
Old Brahmaputra	Toke	SW229	02-05-1981	2.29	2.01

Table 3.3: Sample of Collected Water level Data of BWDB Station SW274 & SW295

RiverName	StationName	StationID	DateTime	HighTide	LowTide
Surma-Meghna	Narsingdi	SW274	01-04-1981	1.13	0.98
Surma-Meghna	Narsingdi	SW274	02-04-1981	1.44	1.07
Surma-Meghna	Narsingdi	SW274	03-04-1981	1.50	1.09
Surma-Meghna	Narsingdi	SW274	04-04-1981	1.71	1.22
Surma-Meghna	Narsingdi	SW274	05-04-1981	1.92	1.47
Surma-Meghna	Narsingdi	SW274	06-04-1981	2.14	1.65
Surma-Meghna	Narsingdi	SW274	07-04-1981	2.23	1.80
Surma-Meghna	Narsingdi	SW274	08-04-1981	2.23	1.83
Surma-Meghna	Narsingdi	SW274	09-04-1981	2.27	1.86
Surma-Meghna	Narsingdi	SW274	10-04-1981	2.11	1.80
Surma-Meghna	Narsingdi	SW274	11-04-1981	1.98	1.71
Surma-Meghna	Narsingdi	SW274	12-04-1981	1.89	1.68
Surma-Meghna	Narsingdi	SW274	13-04-1981	1.80	1.66
Surma-Meghna	Narsingdi	SW274	14-04-1981	1.80	1.65
Surma-Meghna	Narsingdi	SW274	15-04-1981	1.82	1.71
Surma-Meghna	Narsingdi	SW274	16-04-1981	2.23	1.95
Surma-Meghna	Narsingdi	SW274	17-04-1981	2.47	2.14
Surma-Meghna	Narsingdi	SW274	18-04-1981	2.55	2.17
Surma-Meghna	Narsingdi	SW274	19-04-1981	2.50	2.20
Surma-Meghna	Narsingdi	SW274	20-04-1981	2.50	2.24
Surma-Meghna	Narsingdi	SW274	21-04-1981	2.49	1.71
Surma-Meghna	Narsingdi	SW274	22-04-1981	2.44	1.68
Surma-Meghna	Narsingdi	SW274	23-04-1981	2.41	1.66
Surma-Meghna	Narsingdi	SW274	24-04-1981	2.41	1.65
Surma-Meghna	Narsingdi	SW274	25-04-1981	2.23	1.71
Surma-Meghna	Narsingdi	SW274	26-04-1981	2.17	1.95
Surma-Meghna	Narsingdi	SW274	27-04-1981	2.15	1.94
Surma-Meghna	Narsingdi	SW274	28-04-1981	2.04	1.92
Surma-Meghna	Narsingdi	SW274	29-04-1981	1.98	1.89
Surma-Meghna	Narsingdi	SW274	30-04-1981	2.08	1.89
Surma-Meghna	Narsingdi	SW274	01-05-1981	2.09	1.89
Surma-Meghna	Narsingdi	SW274	02-05-1981	2.17	1.82

RiverName	StationName	StationID	DateTime	HighTide	LowTide
Titas	Ajabpur	SW295	01-04-1981	1.50	1.34
Titas	Ajabpur	SW295	02-04-1981	1.68	1.40
Titas	Ajabpur	SW295	03-04-1981	1.98	1.57
Titas	Ajabpur	SW295	04-04-1981	2.11	1.77
Titas	Ajabpur	SW295	05-04-1981	2.27	2.01
Titas	Ajabpur	SW295	06-04-1981	2.46	2.21
Titas	Ajabpur	SW295	07-04-1981	2.47	2.32
Titas	Ajabpur	SW295	08-04-1981	2.43	2.29
Titas	Ajabpur	SW295	09-04-1981	2.36	2.23
Titas	Ajabpur	SW295	10-04-1981	2.32	2.18
Titas	Ajabpur	SW295	11-04-1981	2.27	2.12
Titas	Ajabpur	SW295	12-04-1981	2.24	2.11
Titas	Ajabpur	SW295	13-04-1981	2.20	2.11
Titas	Ajabpur	SW295	14-04-1981	2.24	2.11
Titas	Ajabpur	SW295	15-04-1981	2.30	2.17
Titas	Ajabpur	SW295	16-04-1981	2.38	2.27
Titas	Ajabpur	SW295	17-04-1981	2.49	2.36
Titas	Ajabpur	SW295	18-04-1981	2.70	2.52
Titas	Ajabpur	SW295	19-04-1981	2.79	2.67
Titas	Ajabpur	SW295	20-04-1981	2.88	2.79
Titas	Ajabpur	SW295	21-04-1981	2.85	2.78
Titas	Ajabpur	SW295	22-04-1981	2.81	2.75
Titas	Ajabpur	SW295	23-04-1981	2.78	2.73
Titas	Ajabpur	SW295	24-04-1981	2.73	2.64
Titas	Ajabpur	SW295	25-04-1981	2.67	2.62
Titas	Ajabpur	SW295	26-04-1981	2.59	2.49
Titas	Ajabpur	SW295	27-04-1981	2.43	2.36
Titas	Ajabpur	SW295	28-04-1981	2.39	2.27
Titas	Ajabpur	SW295	29-04-1981	2.30	2.23
Titas	Ajabpur	SW295	30-04-1981	2.36	2.21
Titas	Ajabpur	SW295	01-05-1981	2.39	2.21
Titas	Ajabpur	SW295	02-05-1981	2.48	2.29

CHAPTER 4
HYDROLOGIC DATA ANALYSIS

4.0 Analysis of Hydrological Data

4.1 Estimation of Design Discharge and Water Level

Estimation of both flood discharges and high water levels are necessary for bank protection design. Careful estimation of discharge and water level is important for all sites with erodible banks. This section describes the methods of assessing flood discharge and water level at the site under consideration. The design discharge and water level are determined for selected probability of exceedance or return period.

The design discharge and water level arising from floods should be selected after due consideration of the following:

- The maximum historical discharge as recorded at the site, or as calculated on the basis of recorded water level at the site, or as calculated on the basis of measured discharge at other points on the river from which corresponding site discharge can reasonably be inferred**.**
- The discharge derived from a frequency analysis using a probability of exceedance or return period which is appropriate to the importance and value of the protection work.
- The maximum historical water level as recorded at the site, or as inferred from observed or recorded water level at other points on the river from which level can reasonably be transferred to the site in question.
- The water level derived from a frequency analysis using a probability of exceedance or return period which is appropriate to the importance and value of the protection work.

In estimating high flows, primary reliance should be placed on careful field investigations, local enquiries and searches of historical records. Data so obtained should be compared with recorded data for hydrometric stations, and supplemented by analytical procedure using stage-discharge curves. At most hydrometric gauging stations reasonably stable relationship exists between water level and discharge. At some sites, however, the stage discharge curve may be quite unstable because of aggradation or degradation at channel bed or backwater effect from downstream, and may change drastically during major floods. A persistent trend of rising or lowering of curve indicates progressive channel aggradation or degradation. The stage corresponding to design flood which exceeds any recorded flow obtained by extrapolating the stage-discharge relationships.

The most commonly used method for estimating design discharge and water level examines the observed discharge and water level to arrive at suitable estimates. The method, known as frequency analysis, is founded on statistical analyses of discharge and water level records. For locations where records of stream flows are available, or where flows from another basin can be transported to the design location, design flood magnitude and water level can be estimated directly from those records by means of frequency analysis.

4.2 Frequency Analysis

Frequency of a hydrological event, such as the annual peak flow is the probability that a value will be equaled or exceeded in any year. This is more appropriately called the exceedance probability, P (F). The reciprocal of the exceedance probability is the return period T in years, that is, $T = 1/P(F)$. The length of record should be sufficient to justify extrapolating the frequency relationship. For example, it might be reasonable to estimate a 50-year flood on the basis of a 30-year record, but to estimate a 100-year flood on the basis of a 10-year record would normally be absurd (Neill 1973) [(1)]. Viessman and Lewis (1996) [(2)] noted that as a general rule, frequency analysis is cautioned when working with shorter records and estimating frequencies of hydrological events greater than twice the record length.

Frequency analysis can be conducted in two ways: one is the analytical approach and the other is the graphical technique in which flood magnitudes are usually plotted against probability of exceedance.

Here in the following sections, procedures are given mostly for discharge frequency analysis; the similar procedures can also be followed for water level frequency analysis.

4.3 Analytical Frequency Analysis

Analytical frequency analysis is based on fitting theoretical probability distributions to given data. Numerous distributions have been suggested on the basis of their ability to 'fit' the plotted data from streams (Linsley et al. 1982) [(3)]. The Log-Pearson Type III (LP3) has been adopted for use in the United States Federal Agencies for flood analysis. The first asymptotic distribution of extreme values (EV1), commonly called Gumbel Distribution has been widely used and is recommended in the United Kingdom. For this project, all the collected data will be analyzed using Normal distribution, Log-Normal distribution, Log-Pearson III distribution and Extreme Variable Distribution and the best fit distribution will be adopted for analysis.

4.3.1 Extreme Value Distributions:

Distributions of the extreme values selected from sets of samples of any probability distribution converge to any one of three forms of Extreme Value Distributions, called Type I, II, and III, respectively, when the number of selected extreme values is large. The three limiting forms are special cases of a single distribution called Generalized Extreme Value (GEV) Distribution (Chow et al. 1988) [(4)]. The cumulative distribution function for the GEV is:

$$F(x) = \exp\left[-\left(1-\kappa\frac{x-u}{\alpha}\right)^{1/\kappa}\right] \qquad (1)$$

Here κ, u, and α are parameters to be determined. For EVI Distribution x is unbounded, while for EVII, x is bounded from below, and for EVIII, x is bounded from above. The EVI and EVII Distributions are also known as the Gumbel and Frechet Distributions, respectively.

The Extreme Value Type I (EVI) cumulative distribution function is:

$$F(x) = \exp\left[-\exp\left(-\frac{x-u}{\alpha}\right)\right] \qquad -\infty \le x \le \infty \qquad (2)$$

The parameters are estimated by

$$\alpha = \frac{\sqrt{6}}{\pi} s \quad \text{and} \quad u = \bar{x} - 0.5772\alpha \tag{3}$$

Eq (2) can be expressed as

$$F(x) = e^{-e^{-y}} \tag{4}$$

Where y is the reduced variate defined as

$$y = \frac{x-u}{\alpha} \tag{5}$$

Solving Eq (4) for y:

$$y = -\ln\left[\ln\left(\frac{1}{F(x)}\right)\right] \tag{6}$$

Noting that the probability of occurrence of an event $x \geq x_T$ is the inverse of its return period T, we can write

$$\frac{1}{T} = P(x \geq x_T) = 1 - P(x \leq x_T) = 1 - F(x_T)$$

So,

$$F(x_T) = 1 - \frac{1}{T}$$

Substituting for *F(* x_T *)* into Eq (6)

$$y_T = -\ln\left[\ln\left(\frac{T}{T-1}\right)\right] \tag{7}$$

For a given return period x_T is related to y_T by Eq (5), or

$$x_T = u + \alpha y_T \tag{8}$$

4.3.2 Frequency Analysis using Frequency Factors

Calculating the magnitudes of extreme events by the method outlined in the above example requires that the probability distribution function be invertible, that is, given a value of *T* or $F(x_T) = 1 - \frac{1}{T}$, the corresponding value of x_T can be determined. Some probability distribution functions are not readily invertible, like the Normal and Pearson Type III Distributions. Thus an alternative method based on frequency factor is used for calculating the magnitudes of extreme events. Chow (1951) [(5)] has shown that most frequency functions can be generalized to

$$x_T = \bar{x} + K_T s \tag{9}$$

where x_T is a flood of specified probability or return period *T*, $\bar{x}$ is the mean of the flood series, s is the standard deviation of the series; and K_T is the frequency factor and is a function of return period and type of probability distribution, as well as coefficient of skewness for skewed distributions, such as LP3.

In the event that the variable analyzed is $y = \log x$, for example as in Lognormal and LP3 Distributions, the same method is applied to the statistics for the logarithms of data using $y_T = \bar{y} + K_T s_y$, and the required value of x_T is found taking antilog of y_T.

Chow (1951) [5] proposed the frequency factor as in Eq (9), and it is applicable to many probability distributions used in hydrological frequency analysis. The K-T relationship can be expressed in mathematical terms or by a table.

Normal Distribution: From Eq (9) the frequency factor can be expressed as

$$K_T = \frac{x_T - \bar{x}}{s} = z \qquad (10)$$

Thus, for Normal Distribution K_T is the same as the standard normal variable z. The value of z and hence K_T can be obtained from Table 1 in ANNEXURE – I(a).

Lognormal Distribution: The recommended procedure for use of the Lognormal Distribution is to convert the data series to logarithms and compute:

1) $y_i = \log x_i$
2) Compute the mean, $\bar{y}$ and standard deviation s_y
3) Compute $y_T = \bar{y} + K_T s_y$

$$K_T = \frac{y_T - \bar{y}}{s_y} = z$$

So, K_T can be taken from Table 1 in ANNEXURE – I(a).

4) Finally compute $x_T = anti \log y_T$

Log-Pearson Type III (LP3) Distribution: The recommended procedure for use of the LP3 Distribution is to convert the data series to logarithms and compute:

1) $y_i = \log x_i$
2) Compute the mean, $\bar{y}$ and standard deviation s_y
3) Compute coefficient of skewness

$$C_s = \frac{n\sum(y_i - \bar{y})^3}{(n-1)(n-2)s_y^{\ 3}}$$

4) Compute $y_T = \bar{y} + K_T s_y$ (11)

Where K_T is taken from Table 2 in ANNEXURE – I(a)..

5) Finally compute $x_T = anti \log y_T$

Table 3 in ANNEXURE – I(a) gives values of the frequency factors for the LP3 Distribution for various values of return period and coefficient of skewness, C_s. When C_s =0, the frequency factor is equal to the standard normal variable z (Table 1 in ANNEXURE – I(a)).

Extreme Value I (EVI) Distribution: Chow (1951) [5] derived the following expression for frequency factor for the EVI Distribution

$$K_T = -\frac{\sqrt{6}}{\pi}\left[0.5772 + \ln\left\{\ln\left(\frac{T}{T-1}\right)\right\}\right] \qquad (12)$$

When $x_T = \mu$, Eq (9) (in population term) gives $K_T = 0$ and Eq (12) gives T=2.33 years. This is the return period of the mean of the EVI Distribution.

Table of frequency factors for the EVI Distribution, given in Table 3 in ANNEXURE – I(a), is taken from Haan (1977) [(6)]. The values computed from the above equation are equivalent to an infinite sample size in Table 3.

4.3.3 Goodness of Fit Test

The goodness of fit of a probability distribution can be tested by comparing the theoretical and sample values of the relative frequency or the cumulative frequency function. In the case of the relative frequency function, the χ^2 – test is used and with cumulative frequency function the Kolmogorov-Smirnov test is used.

Chi-Square Test: The test statistic is given by

$$\chi^2 = \sum_{i=1}^{k} \frac{n\left[f_s(x_i) - p(x_i)\right]^2}{p(x_i)} \qquad (13)$$

Where, *k* is the number of intervals; the sample value of the relative frequency of interval *i* is, $f_s(x_i) = n_i/n$; the theoretical value of the relative frequency function (also called incremental probability function) is $p(x_i) = F(x_i) - F(x_{i-1})$. It may be noted that $nf_s(x_i) = n_i$, the observed number of occurrences in interval *i*, and $np(x_i)$ is the corresponding expected number of occurrences in interval *i*.

To describe the χ^2 test, the χ^2 probability distribution must be defined. A χ^2 distribution with $\upsilon = k-l-1$ degrees of freedom (*l* is the number of parameters used in fitting the proposed distribution) is the distribution for the sum of squares of υ independent standard normal random variables z_i. The critical χ^2 distribution function is tabulated (in Table 4 in ANNEXURE – I(a)) from Haan (1977) [(6)]. A confidence level is chosen for the test; it is often expressed as 1-*α*, where *α* is termed the significance level.

Kolmogorov-Smirnov Test: The theoretical and sample values of the cumulative frequency are compared with the Kolmogorov-Smirnov (S-K) test. The test statistic *D*, which is based on deviations of the sample distribution function *P*(*x*) from the completely specified continuous hypothetical distribution function $P_o(x)$, such that:

$$D = \max\left|P(x) - P_o(x)\right|$$

Developed by Kolmogorov (Kite 1988) [(7)] in 1933, the test requires that the value of D computed from the sample distribution be less than the tabulated value of D (Table 5) at the required confidence level. Kolmogorov-Smirnov test for Gumbel's Extremal Distribution gives better result in Bangladesh.

4.4 Disaggregation of Daily Rainfall Data

4.4.1 Rainfall Cascade Disaggregation Model

Cascade level refers to the time series at a certain resolution. The transition from one cascade level to the higher one, corresponding to a doubling of resolution, is called *modulation*. A time interval at an arbitrary cascade level (i.e. time scale) is termed a *box*, which is characterized by an associated precipitation amount (0 if dry, >0 if wet). The

break-up of a wet box into two equally sized sub-boxes is denoted *branching*. In one branching, the total amount is redistributed according to two multiplicative weights, $0 \leq W_1 \leq 1$ and $0 \leq W_2 \leq 1$ ($W_1 + W_2 = 1$). The model is a multiplicative random cascade of branching number 2 with exact conservation of mass (micro canonical property as opposed to canonical cascades where the volume is only approximately conserved). The model divides daily precipitation into non overlapping time intervals. If the precipitation in a day is P_d, $P_1 = P_dW_1$ is the precipitation amount assigned to the first half of the day, and $P_2 = P_dW_2$ the amount assigned to the second half. Similarly, each half is then branched to a doubled resolution, and so on. The implementation of cascade – based model allows the conversion of daily amount into 12-hourly (1 steps), 6-hourly (2 steps), and 3-hourly (3 steps) values. The short-time intensity disaggregation model (Connolly et al. 1998) [(8)], is used to have three fine-resolution time interval that are 1-hour, 1/2-hour and 10-minutes. A single Poisson distribution parameter represents the number of events, N, on a rainy day. The density function of the Poisson distribution (adjusted so that N > =1) has the form:

$$f(N) = \frac{\eta^{N-1} \cdot e^{-\eta}}{(N-1)!} \tag{14}$$

Where η is a fitted coefficient. Mean (μ_N) and variance (σ^2_N) are given as:

$$\mu_N = \eta + 1 \tag{15}$$

$$\sigma^2{}_N = \eta \tag{16}$$

The simulated number of event N is the lowest integer to satisfy:

$$\sum_{i=1}^{N} \frac{\eta^{i-1} \cdot e^{-\eta}}{(i-1)!} \geq U \quad N \geq 1 \tag{17}$$

Where U is a uniform random number in the range 0–1.

The duration of each event, D, is represented with a gamma distribution. The scale parameter of the gamma distribution, α, has to be estimated and the shape parameter, β, is set held at 2. It results the following density function:

$$f(D) = \alpha^2 \cdot D \cdot e^{-\alpha \cdot D} \tag{18}$$

A uniform random number in the range 0–1, U, is generated and the event duration is simulated by solving the cumulative density function of the gamma distribution using Newton's method:

$$1-(1+\alpha \cdot D) \cdot e^{-\alpha \cdot D} = U \tag{19}$$

With these estimated point (10′-30′-1 h, 3 h, 6 h, 12 h and 24 h) following the procedures for the frequency distribution, it is possible to define the rainfall probability curves.

Using the above equations, daily and monthly basis analysis of water level data have been prepared which is shown in **ANNEXURE -I (b).**

CHAPTER 5
DESIGNING STORM SEWER

5.0 Capacity Estimate and Designing Drain Sections (Prismatic)

5.1 Manning's Formula

The Manning's formula is a widely used formula around the world to estimate capacity of an open channel or design required section. The formula is also known as Gauckler-Manning-Strickler formula. It is an empirical formula to estimate the average velocity of water flowing through an open channel. The Manning's equation is as follows:

$$V = \frac{K_n}{n} R^{\frac{2}{3}} s^{\frac{1}{2}} \qquad (20)$$

Where, V = average velocity of flow (SI unit: m/s; Imperial: ft/s)

K_n = Unit conversion factor (1.00 for SI unit and 1.49 for Imperial unit)

R = Hydraulic Radius = $\frac{P}{A}$ (SI unit: m, Imperial: ft)

Here, P = Wetted Perimeter (SI unit: m, Imperial: ft)

A = Cross-sectional area of flow (SI unit: m^2, Imperial: ft^2)

s = hydraulic gradient of flow (SI unit: m/m, Imperial: ft/ft)

n = Manning's dimensionless roughness coefficient

Manning's roughness coefficient may be selected using the following **Table-5.1.**

Table-5.1: Manning's n for Channels (Chow (1951)) [5].

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.03	0.033
b. same as above, but more stones and weeds	0.03	0.035	0.04
c. clean, winding, some pools and shoals	0.033	0.04	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.05
e. same as above, lower stages, more ineffective slopes and sections	0.04	0.048	0.055
f. same as "d" with more stones	0.045	0.05	0.06
g. sluggish reaches, weedy, deep pools	0.05	0.07	0.08
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.1	0.15
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			

Table-5.1: Manning's n for Channels (Chow (1951)) [5].

Type of Channel and Description	Minimum	Normal	Maximum
a. bottom: gravels, cobbles, and few boulders	0.03	0.04	0.05
b. bottom: cobbles with large boulders	0.04	0.05	0.07
3. Floodplains			
a. Pasture, no brush			
1.short grass	0.025	0.03	0.035
2. high grass	0.03	0.035	0.05
b. Cultivated areas			
1. no crop	0.02	0.03	0.04
2. mature row crops	0.025	0.035	0.045
3. mature field crops	0.03	0.04	0.05
c. Brush			
1. scattered brush, heavy weeds	0.035	0.05	0.07
2. light brush and trees, in winter	0.035	0.05	0.06
3. light brush and trees, in summer	0.04	0.06	0.08
4. medium to dense brush, in winter	0.045	0.07	0.11
5. medium to dense brush, in summer	0.07	0.1	0.16
d. Trees			
1. dense willows, summer, straight	0.11	0.15	0.2
2. cleared land with tree stumps, no sprouts	0.03	0.04	0.05
3. same as above, but with heavy growth of sprouts	0.05	0.06	0.08
4. heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.08	0.1	0.12
5. Same as 4. with flood stage reaching branches	0.1	0.12	0.16
4. Excavated or Dredged Channels			
a. Earth, straight, and uniform			
1. clean, recently completed	0.016	0.018	0.02
2. clean, after weathering	0.018	0.022	0.025
3. gravel, uniform section, clean	0.022	0.025	0.03
4. with short grass, few weeds	0.022	0.027	0.033
b. Earth winding and sluggish			
1. no vegetation	0.023	0.025	0.03
2. grass, some weeds	0.025	0.03	0.033
3. dense weeds or aquatic plants in deep channels	0.03	0.035	0.04
4. earth bottom and rubble sides	0.028	0.03	0.035
5. stony bottom and weedy banks	0.025	0.035	0.04
6. cobble bottom and clean sides	0.03	0.04	0.05
c. Dragline-excavated or dredged			
1. no vegetation	0.025	0.028	0.033
2. light brush on banks	0.035	0.05	0.06

Table-5.1: Manning's n for Channels (Chow (1951)) [5].

Type of Channel and Description	Minimum	Normal	Maximum
d. Rock cuts			
1. smooth and uniform	0.025	0.035	0.04
2. jagged and irregular	0.035	0.04	0.05
e. Channels not maintained, weeds and brush uncut			
1. dense weeds, high as flow depth	0.05	0.08	0.12
2. clean bottom, brush on sides	0.04	0.05	0.08
3. same as above, highest stage of flow	0.045	0.07	0.11
4. dense brush, high stage	0.08	0.1	0.14
5. Lined or Constructed Channels			
a. Cement			
1. neat surface	0.01	0.011	0.013
2. mortar	0.011	0.013	0.015
b. Wood			
1. planed, untreated	0.01	0.012	0.014
2. planed, creosoted	0.011	0.012	0.015
3. un-planed	0.011	0.013	0.015
4. plank with battens	0.012	0.015	0.018
5. lined with roofing paper	0.01	0.014	0.017
c. Concrete			
1. trowel finish	0.011	0.013	0.015
2. float finish	0.013	0.015	0.016
3. finished, with gravel on bottom	0.015	0.017	0.02
4. unfinished	0.014	0.017	0.02
5. gunite, good section	0.016	0.019	0.023
6. gunite, wavy section	0.018	0.022	0.025
7. on good excavated rock	0.017	0.02	
8. on irregular excavated rock	0.022	0.027	
d. Concrete bottom float finish with sides of:			
1. dressed stone in mortar	0.015	0.017	0.02
2. random stone in mortar	0.017	0.02	0.024
3. cement rubble masonry, plastered	0.016	0.02	0.024
4. cement rubble masonry	0.02	0.025	0.03
5. dry rubble or riprap	0.02	0.03	0.035
e. Gravel bottom with sides of:			
1. formed concrete	0.017	0.02	0.025
2. random stone mortar	0.02	0.023	0.026
3. dry rubble or riprap	0.023	0.033	0.036
f. Brick			
1. glazed	0.011	0.013	0.015
2. in cement mortar	0.012	0.015	0.018

Table-5.1: Manning's n for Channels (Chow (1951)) [5].

Type of Channel and Description	Minimum	Normal	Maximum
g. Masonry			
1. cemented rubble	0.017	0.025	0.03
2. dry rubble	0.023	0.032	0.035
h. Dressed ashlar/stone paving	0.013	0.015	0.017
i. Asphalt			
1. smooth	0.013	0.013	
2. rough	0.016	0.016	
j. Vegetal lining	0.03		0.5

Estimation of capacity of the existing drains and drainage channels will be estimated using Manning's formula. Design sections of the proposed sections will also be calculated using this formula.

CHAPTER 6
CONCLUSION

6.0 Conclusion

The findings and the collected data during the survey works will be used in the subsequent planning stage of the project, “Preparation of Development Plan for Fourteen Upazilas”. The prepared DEM will be used for Delineation of Catchment area and preparing contours of the project area. The collected water level, rainfall and discharge data will be analyzed and tested for fitness with observed data and successively used to predict the respective data for different time periods. These are going to be incorporated in the final planning report. The results should assist in preparing a development plan that will be sustainable from the hydrologic point of view. The surveyed cross sections, drainage inventories and list of the road name along the drains will be updated after accumulation and processing of physical feature data.

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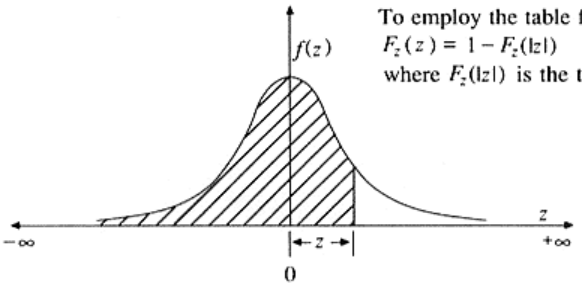
TABLES

Table 1: Cumulative probability of the Standard Normal Distribution

Cumulative probability of the standard normal distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

Source: Grant, E. L., and R. S. Leavenworth, *Statistical Quality and Control*, Table A, p.643, McGraw-Hill, New York, 1972. Used with permission.



To employ the table for $z < 0$, use
$F_z(z) = 1 - F_z(|z|)$
where $F_z(|z|)$ is the tabulated value.

Table 2: Frequency factors for Pearson Type III Distribution

K_T values for Pearson Type III distribution (positive skew)

Skew coefficient C_s or C_w	Return period in years						
	2	5	10	25	50	100	200
	Exceedence probability						
	0.50	0.20	0.10	0.04	0.02	0.01	0.005
3.0	–0.396	0.420	1.180	2.278	3.152	4.051	4.970
2.9	–0.390	0.440	1.195	2.277	3.134	4.013	4.909
2.8	–0.384	0.460	1.210	2.275	3.114	3.973	4.847
2.7	–0.376	0.479	1.224	2.272	3.093	3.932	4.783
2.6	–0.368	0.499	1.238	2.267	3.071	3.889	4.718
2.5	–0.360	0.518	1.250	2.262	3.048	3.845	4.652
2.4	–0.351	0.537	1.262	2.256	3.023	3.800	4.584
2.3	–0.341	0.555	1.274	2.248	2.997	3.753	4.515
2.2	–0.330	0.574	1.284	2.240	2.970	3.705	4.444
2.1	–0.319	0.592	1.294	2.230	2.942	3.656	4.372
2.0	–0.307	0.609	1.302	2.219	2.912	3.605	4.298
1.9	–0.294	0.627	1.310	2.207	2.881	3.553	4.223
1.8	–0.282	0.643	1.318	2.193	2.848	3.499	4.147
1.7	–0.268	0.660	1.324	2.179	2.815	3.444	4.069
1.6	–0.254	0.675	1.329	2.163	2.780	3.388	3.990
1.5	–0.240	0.690	1.333	2.146	2.743	3.330	3.910
1.4	–0.225	0.705	1.337	2.128	2.706	3.271	3.828
1.3	–0.210	0.719	1.339	2.108	2.666	3.211	3.745
1.2	–0.195	0.732	1.340	2.087	2.626	3.149	3.661
1.1	–0.180	0.745	1.341	2.066	2.585	3.087	3.575
1.0	–0.164	0.758	1.340	2.043	2.542	3.022	3.489
0.9	–0.148	0.769	1.339	2.018	2.498	2.957	3.401
0.8	–0.132	0.780	1.336	1.993	2.453	2.891	3.312
0.7	–0.116	0.790	1.333	1.967	2.407	2.824	3.223
0.6	–0.099	0.800	1.328	1.939	2.359	2.755	3.132
0.5	–0.083	0.808	1.323	1.910	2.311	2.686	3.041
0.4	–0.066	0.816	1.317	1.880	2.261	2.615	2.949
0.3	–0.050	0.824	1.309	1.849	2.211	2.544	2.856
0.2	–0.033	0.830	1.301	1.818	2.159	2.472	2.763
0.1	–0.017	0.836	1.292	1.785	2.107	2.400	2.670
0.0	0	0.842	1.282	1.751	2.054	2.326	2.576

Cont….

Table 2 Continued

K_T values for Pearson Type III distribution (negative skew)

Skew coefficient C_s or C_w	Return period in years						
	2	5	10	25	50	100	200
	Exceedence probability						
	0.50	0.20	0.10	0.04	0.02	0.01	0.005
–0.1	0.017	0.846	1.270	1.716	2.000	2.252	2.482
–0.2	0.033	0.850	1.258	1.680	1.945	2.178	2.388
–0.3	0.050	0.853	1.245	1.643	1.890	2.104	2.294
–0.4	0.066	0.855	1.231	1.606	1.834	2.029	2.201
–0.5	0.083	0.856	1.216	1.567	1.777	1.955	2.108
–0.6	0.099	0.857	1.200	1.528	1.720	1.880	2.016
–0.7	0.116	0.857	1.183	1.488	1.663	1.806	1.926
–0.8	0.132	0.856	1.166	1.448	1.606	1.733	1.837
–0.9	0.148	0.854	1.147	1.407	1.549	1.660	1.749
–1.0	0.164	0.852	1.128	1.366	1.492	1.588	1.664
–1.1	0.180	0.848	1.107	1.324	1.435	1.518	1.581
–1.2	0.195	0.844	1.086	1.282	1.379	1.449	1.501
–1.3	0.210	0.838	1.064	1.240	1.324	1.383	1.424
–1.4	0.225	0.832	1.041	1.198	1.270	1.318	1.351
–1.5	0.240	0.825	1.018	1.157	1.217	1.256	1.282
–1.6	0.254	0.817	0.994	1.116	1.166	1.197	1.216
–1.7	0.268	0.808	0.970	1.075	1.116	1.140	1.155
–1.8	0.282	0.799	0.945	1.035	1.069	1.087	1.097
–1.9	0.294	0.788	0.920	0.996	1.023	1.037	1.044
–2.0	0.307	0.777	0.895	0.959	0.980	0.990	0.995
–2.1	0.319	0.765	0.869	0.923	0.939	0.946	0.949
–2.2	0.330	0.752	0.844	0.888	0.900	0.905	0.907
–2.3	0.341	0.739	0.819	0.855	0.864	0.867	0.869
–2.4	0.351	0.725	0.795	0.823	0.830	0.832	0.833
–2.5	0.360	0.711	0.771	0.793	0.798	0.799	0.800
–2.6	0.368	0.696	0.747	0.764	0.768	0.769	0.769
–2.7	0.376	0.681	0.724	0.738	0.740	0.740	0.741
–2.8	0.384	0.666	0.702	0.712	0.714	0.714	0.714
–2.9	0.390	0.651	0.681	0.683	0.689	0.690	0.690
–3.0	0.396	0.636	0.666	0.666	0.666	0.667	0.667

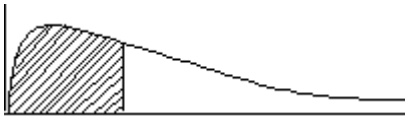
Source: U. S. Water Resources Council (1981).

Table 3: Frequency factors for Pearson Type III Distribution

	Return Period								
Sample	5	10	15	20	25	50	75	100	1000
15	0.967	1.703	2.117	2.410	2.632	3.321	3.721	4.005	6.265
20	0.919	1.625	2.023	2.302	2.517	3.179	3.563	3.836	6.006
25	0.888	1.575	1.963	2.235	2.444	3.088	3.463	3.729	5.842
30	0.866	1.541	1.922	2.188	2.393	3.026	3.393	3.653	5.727
35	0.851	1.516	1.891	2.152	2.354	2.979	3.341	3.598	
40	0.838	1.495	1.866	2.126	2.326	2.943	3.301	3.554	5.576
45	0.829	1.478	1.847	2.104	2.303	2.913	3.268	3.520	
50	0.820	1.466	1.831	2.086	2.283	2.889	3.241	3.491	5.478
55	0.813	1.455	1.818	2.071	2.267	2.869	3.219	3.467	
60	0.807	1.446	1.806	2.059	2.253	2.852	3.200	3.446	
65	0.801	1.437	1.796	2.048	2.241	2.837	3.183	3.429	
70	0.797	1.430	1.788	2.038	2.230	2.824	3.169	3.413	5.359
75	0.972	1.423	1.780	2.029	2.220	2.812	3.155	3.400	
80	0.788	1.417	1.773	2.020	2.212	2.802	3.145	3.387	
85	0.785	1.413	1.767	2.013	2.205	2.793	3.135	3.376	
90	0.782	1.409	1.762	2.007	2.198	2.785	3.125	3.367	
95	0.780	1.405	1.757	2.002	2.193	2.777	3.116	3.357	
100	0.779	1.401	1.752	1.998	2.187	2.770	3.109	3.349	5.261
α	0.719	1.305	1.635	1.866	2.044	2.592	2.911	3.137	4.936

Source: Journal American Statistical Association 47:425-441, 1952.Z.W. Birnbaum.

Table 4: χ^2 Distribution



$X^2_{a,\,v}$

DOF v	$x^2_{.995}$	$x^2_{.99}$	$x^2_{.975}$	$x^2_{.95}$	$x^2_{.90}$	$x^2_{.75}$	$x^2_{.50}$	$x^2_{.25}$	$x^2_{.10}$	$x^2_{.05}$	$x^2_{.025}$	$x^2_{.01}$	$x^2_{.005}$
1	7.88	6.63	5.02	3.84	2.71	1.32	0.455	0.102	0.0158	0.0039	0.0010	0.0002	0.0000
2	10.6	9.21	7.38	5.99	4.61	2.77	1.39	0.575	.211	.103	.0506	.0201	.0100
3	12.8	11.3	9.35	7.81	6.25	4.11	2.37	1.21	.584	.352	.216	.115	.072
4	14.9	13.3	11.1	9.49	7.78	5.39	3.36	1.92	1.06	.711	.484	.297	.207
5	16.7	15.1	12.8	11.1	9.24	6.63	4.35	2.67	1.61	1.15	.831	.554	.412
6	18.5	16.8	14.4	12.6	10.6	7.84	5.35	3.45	2.20	1.64	1.24	.872	.676
7	20.3	18.5	16.0	14.1	12.0	9.04	6.35	4.25	2.83	2.17	1.69	1.24	.989
8	22.0	20.1	17.5	15.5	13.4	10.2	7.34	5.07	3.49	2.73	2.18	1.65	1.34
9	23.6	21.7	19.0	16.9	14.7	11.4	8.34	5.90	4.17	3.33	2.70	2.09	1.73
10	25.2	23.2	20.5	18.3	16.0	12.5	9.34	6.74	4.87	3.94	3.25	2.56	2.16
11	26.8	24.7	21.9	19.7	17.3	13.7	10.3	7.58	5.58	4.57	3.82	3.05	2.60
12	28.3	26.2	23.3	21.0	18.5	14.8	11.3	8.44	6.30	5.23	4.40	3.57	3.07
13	29.8	27.7	24.7	22.4	19.8	16.0	12.3	9.30	7.04	5.89	5.01	4.11	3.57
14	31.3	29.1	26.1	23.7	21.1	17.1	13.3	10.2	7.79	6.57	5.63	4.66	4.07
15	32.8	30.6	27.5	25.0	22.3	18.2	14.3	11.0	8.55	7.26	6.26	5.23	4.60
16	34.3	32.0	28.8	26.3	23.5	19.4	15.3	11.9	9.31	7.96	6.91	5.81	5.14
17	35.7	33.4	30.2	27.6	24.8	20.5	16.3	12.8	10.1	8.67	7.56	6.41	5.70
18	37.2	34.8	31.5	28.9	26.0	21.6	17.3	13.7	10.9	9.39	8.23	7.01	6.26
19	38.6	36.2	32.9	30.1	27.2	22.7	18.3	14.6	11.7	10.1	8.91	7.63	6.84
20	40.0	37.6	34.2	31.4	28.4	23.8	19.3	15.5	12.4	10.9	9.59	8.26	7.43
21	41.4	38.9	35.5	32.7	29.6	24.9	20.3	16.3	13.2	11.6	10.3	8.90	8.03
22	42.8	40.3	36.8	33.9	30.8	26.0	21.3	17.2	14.0	12.3	11.0	9.54	8.64

23	44.2	41.6	38.1	35.2	32.0	27.1	22.3	18.1	14.8	13.1	11.7	10.2	9.26
24	45.6	43.0	39.4	36.4	33.2	28.2	23.3	19.0	15.7	13.8	12.4	10.9	9.89
25	46.9	44.3	40.6	37.7	34.4	29.3	24.3	19.9	16.5	14.6	13.1	11.5	10.5
26	48.3	45.6	41.9	38.9	35.6	30.4	25.3	20.8	17.3	15.4	13.8	12.2	11.2
27	49.6	47.0	43.2	40.1	36.7	31.5	26.3	21.7	18.1	16.2	14.6	12.9	11.8
28	51.0	48.3	44.5	41.3	37.9	32.6	27.3	22.7	18.9	16.9	15.3	13.6	12.5
29	52.3	49.6	45.7	42.6	39.1	33.7	28.3	23.6	19.8	17.7	16.0	14.3	13.1
30	53.7	50.9	47.0	43.8	40.3	34.8	29.3	24.5	20.6	18.5	16.8	15.0	13.8
40	66.8	63.7	59.3	55.8	51.8	45.6	39.3	33.7	29.1	26.5	24.4	22.2	20.7
50	79.5	76.2	71.4	67.5	63.2	56.3	49.3	42.9	37.7	34.8	32.4	29.7	28.0
60	92.0	88.4	83.3	79.1	74.4	67.0	59.3	52.3	46.5	43.2	40.5	37.5	35.5
70	104.2	100.4	95.0	90.5	85.5	77.6	69.3	61.7	55.3	51.7	48.8	45.4	43.3
80	116.3	112.3	106.6	101.9	96.6	88.1	79.3	71.1	64.3	60.4	57.2	53.5	51.2
90	128.3	124.1	118.1	113.1	107.6	98.6	89.3	80.6	73.3	69.1	65.6	61.8	59.2
100	140.2	135.8	129.6	124.3	118.5	109.1	99.3	90.1	82.4	77.9	74.2	70.1	67.3

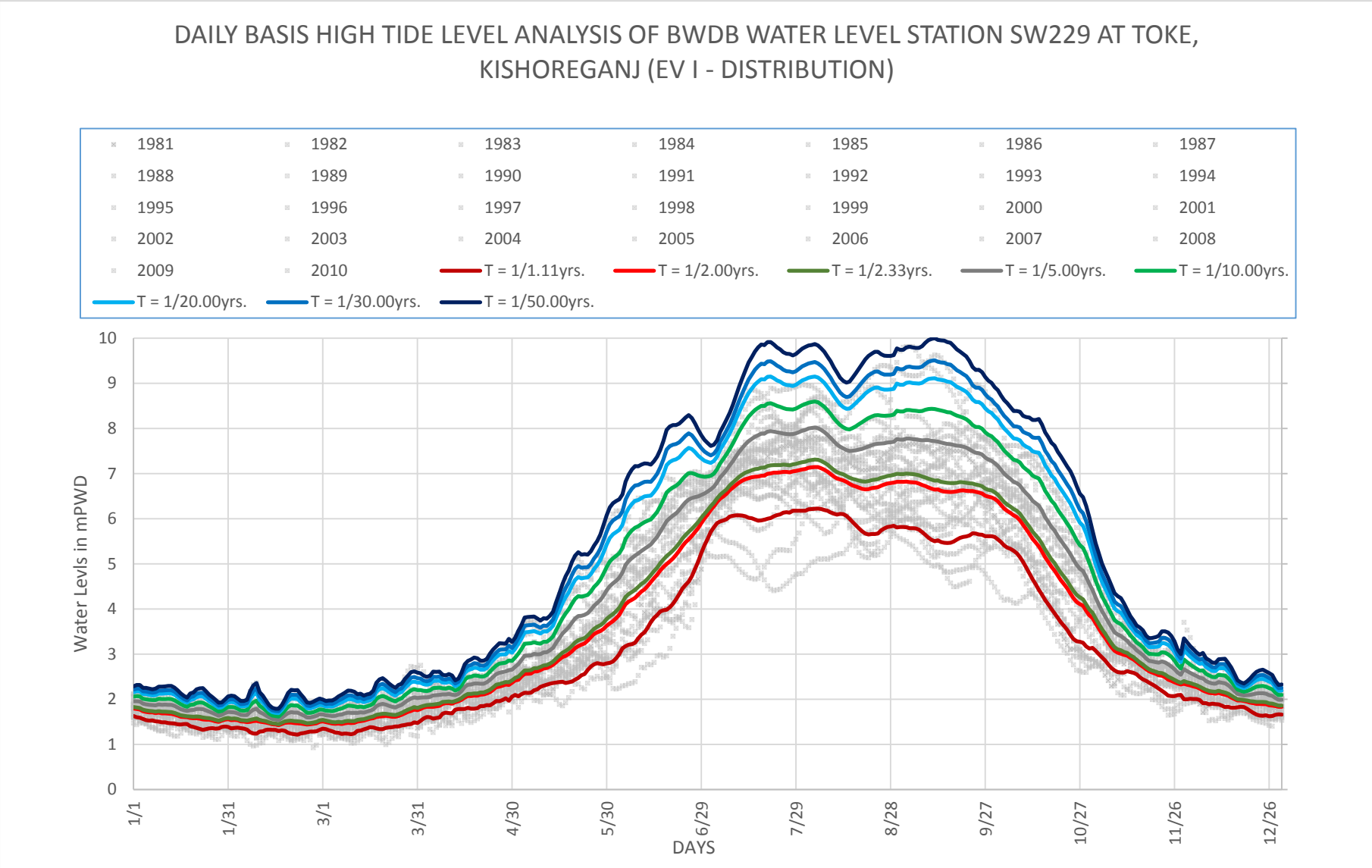
Source: Catherine M. Thompson, Table of percentage points of the χ^2 distribution, Biometrika, Vol. 32 (1941), by permission of the author and publisher.

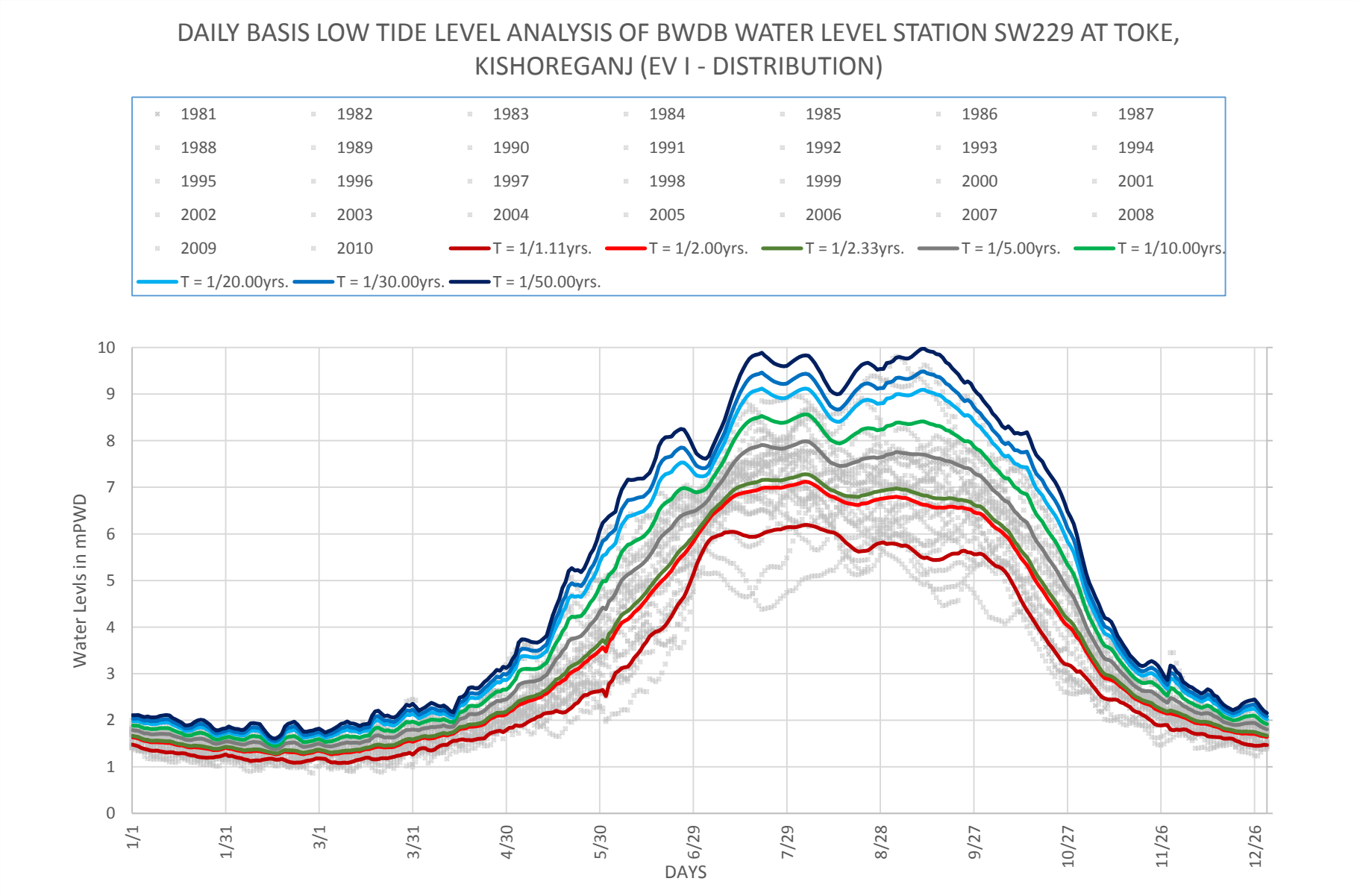
Table 5: Kolmogorov-Smirnov Distribution

Sample size (n)	Significance Level				
	.20	0.15	0.10	0.05	0.01
1	.900	.925	.950	.975	.995
2	.684	.726	.776	.842	.929
3	.565	.597	.642	.708	.829
4	.494	.725	.564	.624	.734
5	.446	.474	.510	.563	.669
6	.410	.436	.470	.521	.618
7	.381	.405	.438	.486	.577
8	.358	.381	.411	.457	.543
9	.339	.360	.388	.432	.514
10	.322	.342	.368	.409	.486
11	.307	.326	.352	.391	.468
12	.295	.313	.338	.375	.450
13	.284	.302	.325	.361	.433
14	.274	.292	.314	.349	.418
15	.266	.283	.304	.338	.404
16	.258	.274	.295	.328	.391
17	.250	.266	.286	.318	.380
18	.244	.259	.278	.309	.370
19	.237	.252	.272	.301	.361
20	.231	.246	.264	.294	.352
25	.21	.22	.24	.264	.32
30	.19	.20	.22	.242	.29
35	.18	.19	.21	.23	.27
40				.21	.25
50				.19	.23
60				.17	.21
70				.16	.19
80				.15	.18
90				.14	
100				.14	
Asymptotic Formula	$\frac{1.70}{\sqrt{n}}$	$\frac{1.14}{\sqrt{n}}$	$\frac{1.22}{\sqrt{n}}$	$\frac{1.36}{\sqrt{n}}$	$\frac{1.63}{\sqrt{n}}$

Source: Journal American Statistical Association 47:425-441, 1952.Z.W. Birnbaum.

A.1b.1 ANALYSED RESULTS OF BWDB WATER LEVEL GAUGE STATION SW 229 ON THE OLD BRAHMAPUTRA RIVER



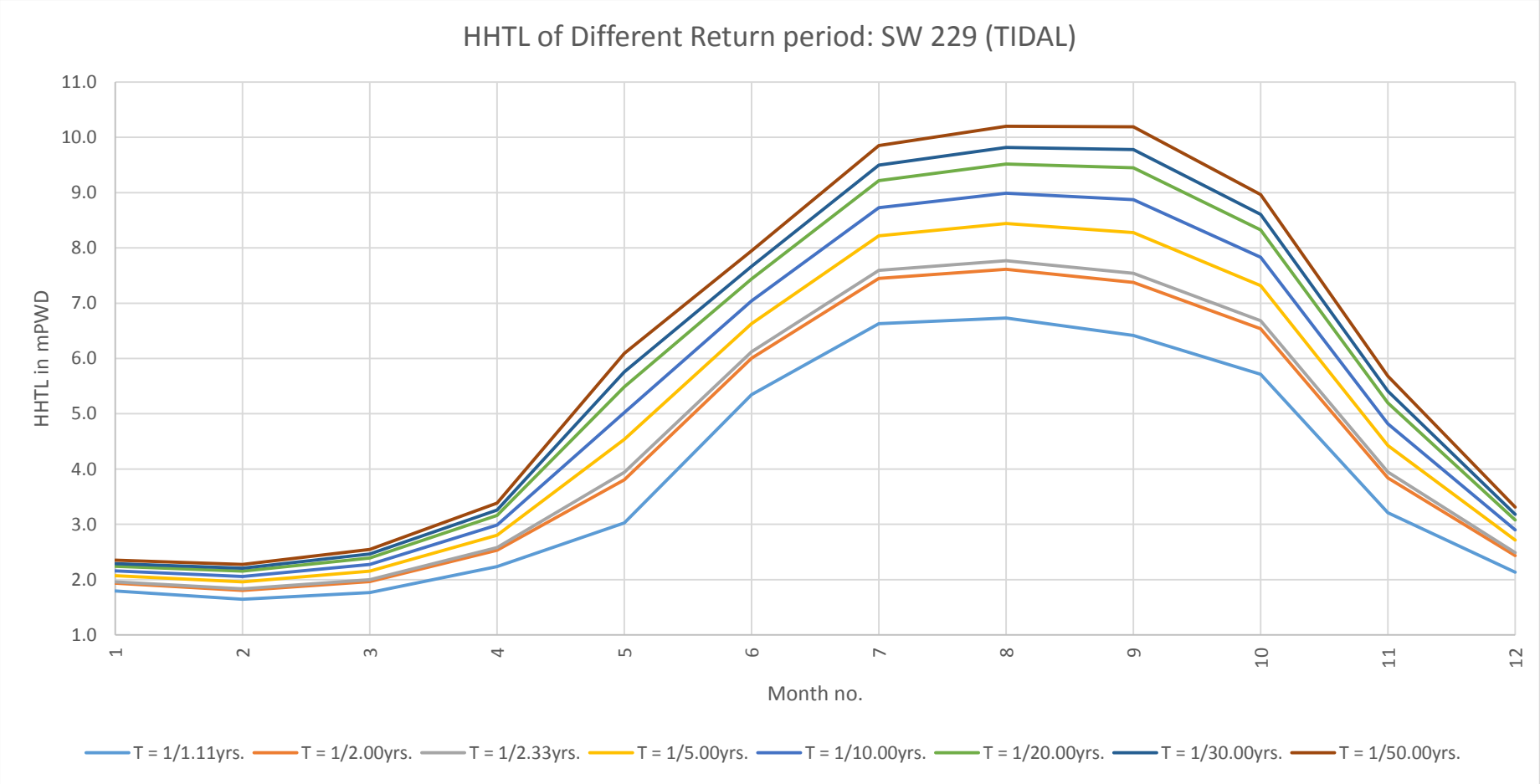

DAILY BASIS LOW TIDE LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW229 AT TOKE, KISHOREGANJ (EV I - DISTRIBUTION)
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
T = 1/1.11yrs.
T = 1/2.00yrs.
T = 1/2.33yrs.
T = 1/5.00yrs.
T = 1/10.00yrs.
T = 1/20.00yrs.
T = 1/30.00yrs.
T = 1/50.00yrs.
Water Levls in mPWD
0
1
2
3
4
5
6
7
8
9
10
1/1
1/31
3/1
3/31
4/30
5/30
6/29
7/29
8/28
9/27
10/27
11/26
12/26
DAYS

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (HTL)

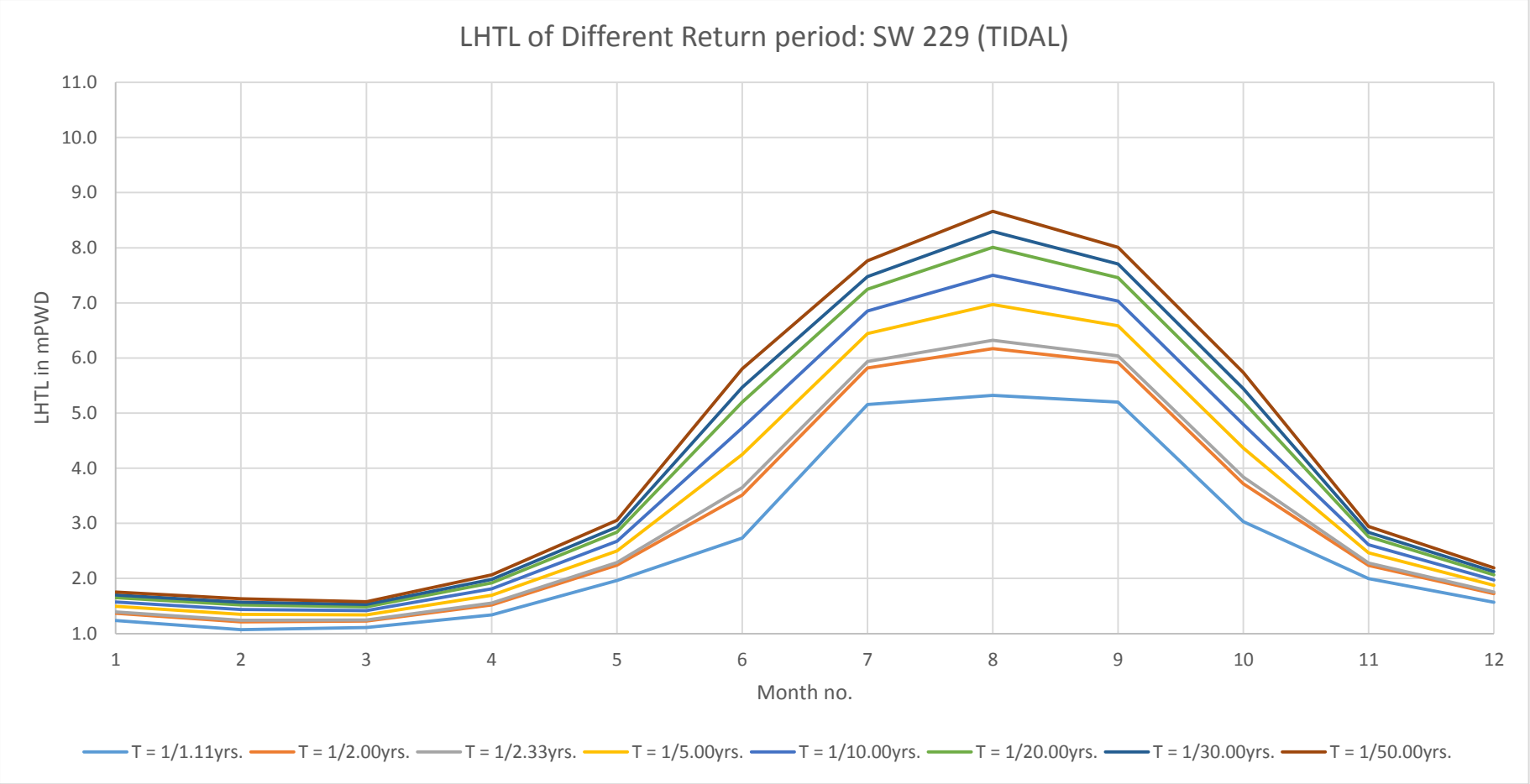
Monthly Data	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL		Monthly Maximum HTL (mPWD)												Monthly Minimum HTL (mPWD)											
	1981				02.79	03.51	04.88	07.71	07.80	07.65	06.07	02.90	02.71				01.36	02.01	03.63	05.27	07.07	06.22	02.90	02.20	01.62
	1982	01.83	01.62	01.71	02.59	03.78	06.87	07.34	08.01	07.12	06.64	02.76	02.00	01.22	01.10	01.13	01.77	02.26	02.65	06.90	05.84	05.75	02.59	01.64	01.40
	1983	01.73	01.69	02.23	02.64	03.86	05.70	06.92	07.76	07.99	07.53	04.24	02.36	01.15	00.96	01.18	01.60	02.26	03.43	05.72	06.20	07.10	04.46	02.25	01.63
	1984	01.94	01.74	01.96	02.54	05.02	06.77	08.19	08.71	08.97	08.40	04.40	02.23	01.36	00.92	01.20	01.41	02.31	04.61	06.00	06.30	06.28	04.58	02.14	01.53
	1985	01.67	02.36	02.08	02.75	03.44	06.45	08.16	08.38	07.43	06.73	03.78	02.50	01.26	01.08	01.36	01.55	02.45	03.25	06.23	06.23	06.53	03.88	02.38	01.84
	1986	01.99	01.76	01.86	02.82	02.87	05.28	06.81	06.83	07.30	07.38	04.20	02.51	01.38	01.07	00.99	01.26	02.21	02.22	05.60	05.13	06.16	04.39	02.27	01.59
	1987	01.92	01.70	01.75	02.57	02.61	05.17	07.95	08.92	07.85	07.70	04.02	02.53	01.31	01.13	01.10	01.43	02.22	02.48	05.32	08.01	07.48	04.24	02.29	01.83
	1988	01.99	01.82	02.06	02.64	05.82	07.04	08.66	09.46	09.81	06.49	04.11	03.53	01.31	01.32	01.39	01.65	02.19	04.88	06.44	07.06	06.32	04.36	02.51	01.83
	1989	01.94	01.98	01.88	02.20	04.54	06.07	07.57	06.98	07.07	06.94	04.27	02.18	01.44	01.26	01.19	01.18	02.16	04.65	05.08	05.92	05.98	04.43	02.21	01.56
	1990	01.73	01.69	02.00	02.87	04.19	06.58	07.52	07.60	06.85	07.42	04.17	02.55	01.26	01.11	01.13	01.50	02.47	04.47	06.39	05.94	05.53	04.34	02.21	01.80
	1991	02.28	01.97	01.80	02.23	05.19	06.94	08.25	07.47	08.10	07.58	04.88	02.55	01.42	01.35	01.14	01.52	02.35	05.08	06.60	06.76	07.04	05.06	02.35	01.89
	1992	02.11	02.01	02.18	02.46	03.43	05.64	06.80	06.39	06.00	05.74	03.43	02.26	01.49	01.36	01.46	01.82	02.32	03.02	05.94	05.18	05.14	03.59	02.35	01.71
	1993	01.98	02.09	02.03	02.30	04.54	06.91	08.08	07.95	08.27	06.56	03.67	02.56	01.43	01.31	01.33	01.40	02.29	03.72	06.70	07.28	05.84	03.77	02.34	01.77
	1994	02.13	01.88	02.72	02.75	03.02	05.60	05.69	05.82	05.56	04.48	02.95	02.25	01.39	01.28	01.34	02.05	02.04	02.73	04.40	04.78	04.58	02.71	01.76	01.54
	1995	01.80	01.67	01.90	02.23	04.36	06.82	08.85	08.21	07.49	07.19	03.67	02.54	01.10	01.14	01.02	01.52	01.94	03.67	06.85	06.38	05.86	03.38	02.59	01.83
	1996	01.87	01.86	02.00	02.29	04.49	05.05	07.87	07.62	06.90	05.43	04.69	02.42	01.33	01.28	01.21	01.78	02.34	03.58	05.42	06.23	05.35	03.54	02.50	01.98
	1997	02.12	01.88	01.92	02.13	02.91	05.67	07.61	06.76	06.87	06.80	02.88	02.09	01.50	01.41	01.34	01.59	01.81	02.92	05.49	05.66	05.75	02.90	01.95	01.69
	1998	01.96	01.73	02.09	02.77	04.00	06.44	08.94	09.39	09.62	06.65	04.96	02.84	01.44	01.25	01.25	01.63	02.11	04.11	06.47	08.51	06.72	04.08	02.70	01.98
	1999	02.15	01.76	01.84	02.41	03.37	06.20	07.30	07.53	07.82	06.01	04.84	02.42	01.56	01.42	01.38	01.41	02.50	03.46	06.47	06.11	06.06	05.02	02.45	01.96
	2000	02.02	01.80	02.04	03.17	04.70	06.76	06.96	07.81	07.61	07.21	04.17	02.44	01.55	01.39	01.31	01.58	02.87	04.91	06.10	06.16	06.87	03.50	02.29	01.94
	2001	01.95	01.90	01.88	02.32	03.27	05.33	05.68	06.80	06.95	06.29	03.91	02.72	01.58	01.40	01.36	01.48	02.08	03.33	04.65	05.42	05.82	03.89	02.50	01.89
	2002	02.07	01.75	02.15	03.30	03.78	06.54	08.15	08.65	06.70	05.83			01.55	01.33	01.35	01.70	03.17	03.48	06.50	06.86	04.49	02.85		
	2003	01.97	01.71	01.91										01.60	01.40	01.31									
	2004																								
	2005																								
	2006																								
	2007																								
	2008																								
	2009																								
	2010																								
	2011																								
	2012																								
	2013																								
	2014																								
	2015																								
	MAX	02.28	02.36	02.72	03.30	05.82	07.04	08.94	09.46	09.81	08.40	04.96	03.53	01.60	01.42	01.46	02.05	03.17	05.08	06.90	08.51	07.48	05.06	02.70	01.98
	MIN	01.67	01.62	01.71	02.13	02.61	04.88	05.68	05.82	05.56	04.48	02.76	02.00	01.10	00.92	00.99	01.18	01.81	02.22	04.40	04.78	04.49	02.59	01.64	01.40
	N	22	22	22	22	22	22	22	22	22	22	21	21	22	22	22	22	22	22	22	22	22	22	21	21
	AVE.	01.96	01.83	02.00	02.58	03.94	06.12	07.59	07.77	07.54	06.68	03.95	02.49	01.39	01.24	01.25	01.55	02.29	03.65	05.93	06.32	06.04	03.84	02.28	01.75
	σ	00.15	00.17	00.21	00.31	00.83	00.70	00.87	00.94	01.02	00.88	00.67	00.32	00.14	00.15	00.13	00.20	00.30	00.83	00.71	00.90	00.76	00.73	00.26	00.17

ANALYSED DATA:																									
T = 1/1.11yrs.	$K_{1.11}$	=	-1.10	01.79	01.65	01.77	02.24	03.03	05.35	06.63	06.73	06.42	05.71	03.21	02.13	01.24	01.07	01.11	01.34	01.96	02.73	05.16	05.32	05.20	03.03	02.00	01.57
T = 1/2.00yrs.	$K_{2.00}$	=	-0.16	01.94	01.81	01.96	02.53	03.80	06.01	07.45	07.61	07.37	06.54	03.84	02.43	01.37	01.21	01.23	01.52	02.24	03.51	05.82	06.17	05.91	03.72	02.24	01.72
T = 1/2.33yrs.	$K_{2.33}$	=	0.00	01.96	01.83	02.00	02.58	03.94	06.12	07.59	07.77	07.54	06.69	03.95	02.49	01.39	01.24	01.25	01.55	02.29	03.65	05.93	06.32	06.04	03.84	02.28	01.75
T = 1/5.00yrs.	$K_{5.00}$	=	0.72	02.07	01.96	02.15	02.80	04.54	06.63	08.22	08.44	08.28	07.32	04.43	02.71	01.49	01.35	01.34	01.70	02.50	04.25	06.44	06.97	06.59	04.37	02.46	01.87
T = 1/10.00yrs.	$K_{10.00}$	=	1.30	02.16	02.06	02.27	02.99	05.02	07.04	08.73	08.99	08.87	07.83	04.82	02.90	01.57	01.44	01.41	01.81	02.67	04.73	06.85	07.50	07.03	04.79	02.61	01.97
T = 1/20.00yrs.	$K_{20.00}$	=	1.87	02.24	02.15	02.39	03.16	05.49	07.44	09.22	09.52	09.45	08.32	05.19	03.08	01.65	01.52	01.49	01.92	02.84	05.20	07.25	08.01	07.46	05.21	02.76	02.07
T = 1/30.00yrs.	$K_{30.00}$	=	2.19	02.29	02.21	02.46	03.26	05.76	07.67	09.50	09.82	09.78	08.61	05.41	03.18	01.70	01.57	01.53	01.98	02.94	05.47	07.48	08.30	07.70	05.44	02.84	02.12
T = 1/50.00yrs.	$K_{50.00}$	=	2.59	02.35	02.28	02.55	03.38	06.09	07.95	09.85	10.20	10.19	08.96	05.68	03.31	01.76	01.63	01.58	02.06	03.05	05.80	07.76	08.66	08.01	05.74	02.94	02.19

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (HTL)



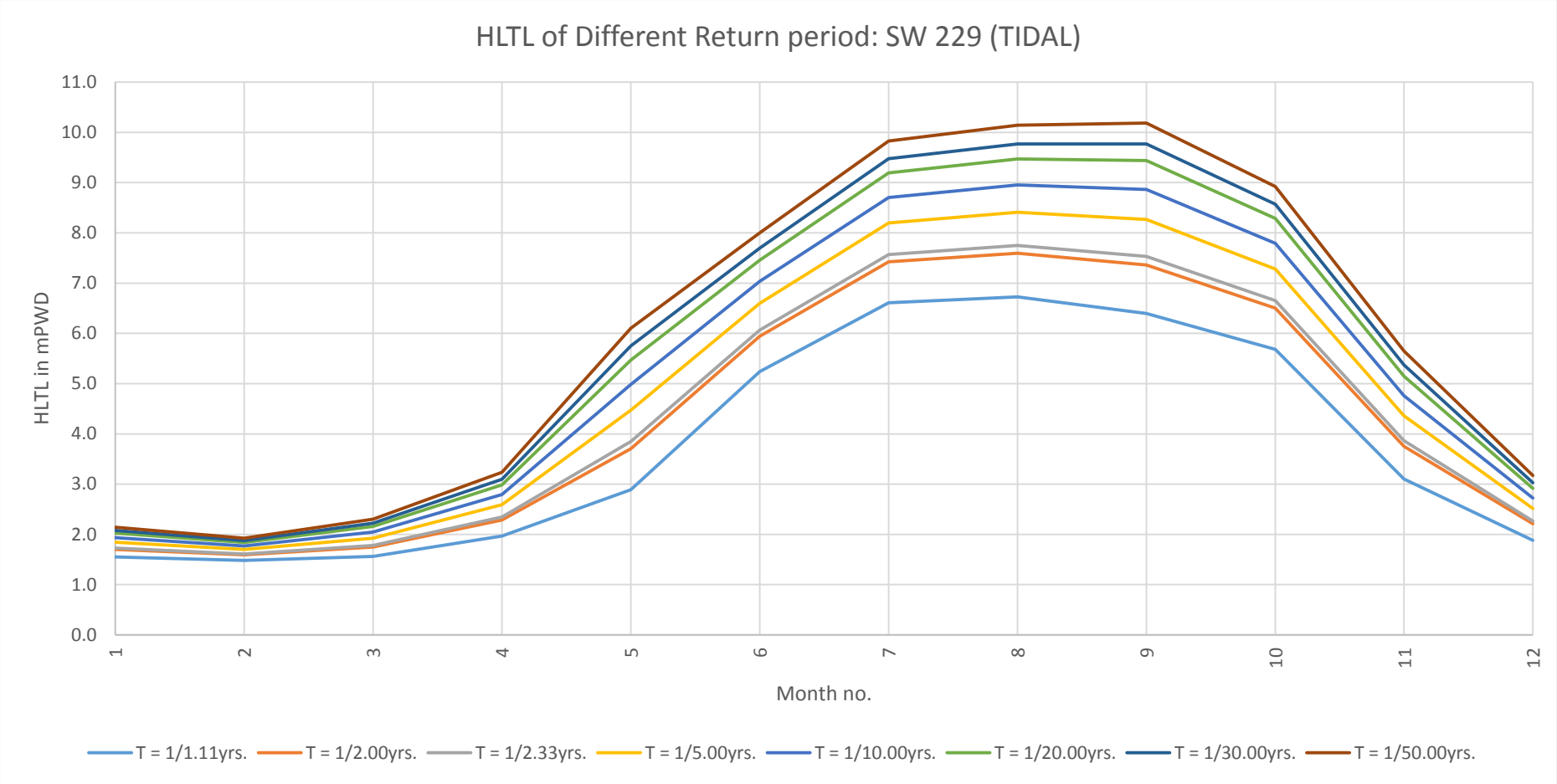
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (HTL)



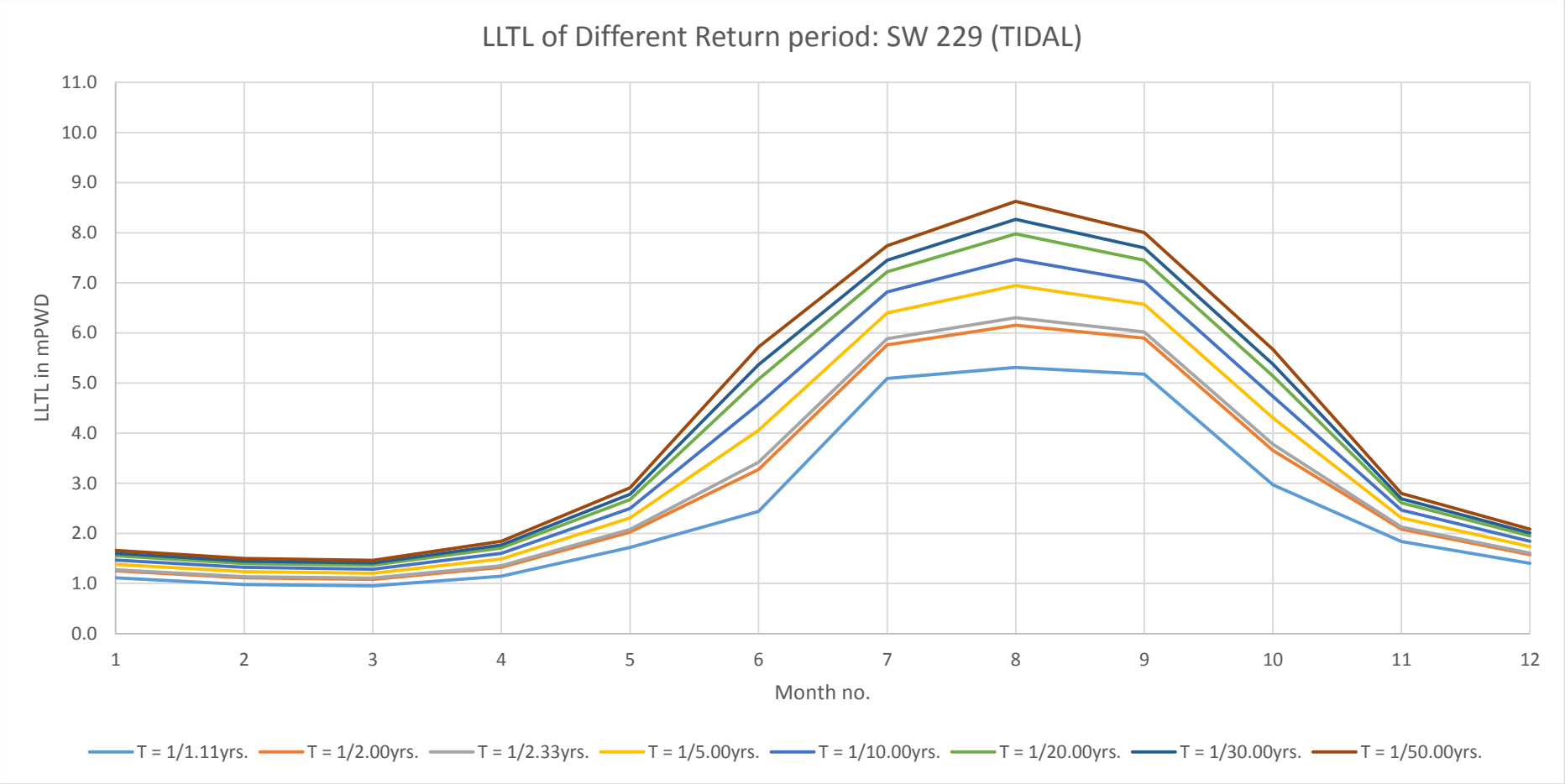
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (LTL)

Monthly Data		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL	Year	Monthly Maximum LTL (mPWD)												Monthly Minimum LTL (mPWD)											
	1981				02.70	03.35	04.76	07.68	07.77	07.65	06.01	02.74	02.47				01.05	01.80	03.57	05.12	07.07	06.16	02.80	01.98	01.40
	1982	01.52	01.40	01.49	02.35	03.75	06.82	07.29	08.01	07.12	06.55	02.64	01.72	01.10	01.01	00.98	01.55	02.04	02.56	06.88	05.84	05.75	02.56	01.46	01.23
	1983	01.46	01.46	01.97	02.43	03.83	05.65	06.91	07.75	07.97	07.49	04.14	02.05	01.05	00.90	01.04	01.32	02.05	03.40	05.71	06.17	07.09	04.39	02.03	01.48
	1984	01.65	01.54	01.72	02.27	05.01	06.76	08.17	08.70	08.95	08.32	04.32	02.06	01.21	00.86	01.01	01.17	02.06	04.58	05.99	06.29	06.28	04.51	02.08	01.43
	1985	01.47	01.49	01.87	02.61	03.32	06.43	08.11	08.37	07.43	06.72	03.73	02.16	01.14	01.02	01.19	01.42	02.22	02.96	06.22	06.22	06.52	03.84	02.18	01.61
	1986	01.76	01.58	01.59	02.54	02.76	04.96	06.81	06.81	07.28	07.38	04.12	02.25	01.27	01.00	00.88	01.08	02.13	02.02	05.41	05.12	06.12	04.30	02.13	01.46
	1987	01.63	01.52	01.53	02.28	02.47	05.10	07.86	08.91	07.83	07.67	03.93	02.18	01.13	01.01	00.92	01.23	01.95	02.26	05.27	07.95	07.48	04.14	02.14	01.60
	1988	01.68	01.58	01.82	02.19	05.71	07.04	08.66	09.28	09.81	06.45	04.01	03.45	01.16	01.16	01.21	01.44	01.93	04.86	06.38	07.05	06.31	04.26	02.30	01.71
	1989	01.74	01.74	01.67	02.00	04.36	06.06	07.54	06.98	07.05	06.90	04.19	02.03	01.29	01.23	01.02	01.00	01.96	04.60	05.07	05.91	05.95	04.36	02.06	01.38
	1990	01.53	01.52	01.75	02.64	04.12	06.53	07.51	07.59	06.83	07.42	04.10	02.25	01.14	00.98	00.97	01.28	02.34	04.29	06.38	05.90	05.53	04.27	02.02	01.66
	1991	01.98	01.71	01.56	01.96	05.18	06.90	08.24	07.46	08.10	07.55	04.80	02.36	01.26	01.18	00.90	01.30	01.79	05.02	06.57	06.74	07.03	04.98	02.20	01.72
	1992	01.84	01.82	01.92	02.19	03.40	05.49	06.79	06.39	06.00	05.69	03.37	02.04	01.38	01.24	01.30	01.56	02.15	02.89	05.81	05.17	05.12	03.53	02.08	01.53
	1993	01.73	01.82	01.77	01.98	04.52	06.87	08.08	07.91	08.26	06.54	03.66	02.28	01.27	01.15	01.14	01.22	02.00	03.66	06.66	07.25	05.84	03.74	02.14	01.59
	1994	01.84	01.66	02.43	02.45	02.85	05.60	05.67	05.82	05.54	04.42	02.70	01.95	01.26	01.16	01.16	01.75	01.79	02.55	04.38	04.78	04.53	02.62	01.62	01.37
	1995	01.54	01.46	01.62	01.97	04.35	06.81	08.84	08.21	07.41	07.13	03.59	02.36	01.01	01.00	00.90	01.32	01.70	03.64	06.78	06.34	05.85	03.31	02.41	01.71
	1996	01.68	01.68	01.81	02.07	04.48	04.91	07.86	07.58	06.90	05.42	04.65	02.28	01.28	01.20	01.16	01.61	02.13	03.55	05.26	06.21	05.34	03.50	02.34	01.81
	1997	01.94	01.73	01.73	01.96	02.70	05.63	07.59	06.76	06.86	06.78	02.84	01.97	01.38	01.29	01.22	01.45	01.65	02.80	05.41	05.65	05.74	02.84	01.88	01.64
	1998	01.79	01.63	01.91	02.54	03.94	06.43	08.93	09.39	09.62	06.56	04.89	02.72	01.37	01.17	01.14	01.45	02.03	04.10	06.46	08.50	06.68	04.08	02.62	01.91
	1999	02.01	01.64	01.72	02.15	03.23	06.05	07.30	07.49	07.82	06.00	04.77	02.29	01.46	01.34	01.28	01.30	02.20	03.36	06.43	06.09	06.03	04.98	02.36	01.87
	2000	01.81	01.67	01.95	03.10	04.60	06.73	06.96	07.81	07.60	07.17	04.09	02.23	01.49	01.28	01.26	01.48	02.77	01.97	06.10	06.13	06.87	03.49	02.22	01.83
	2001	01.82	01.75	01.70	02.10	03.00	05.33	05.63	06.78	06.93	06.28	03.86	02.51	01.51	01.33	01.24	01.34	01.94	03.19	04.64	05.42	05.78	03.83	02.36	01.75
	2002	01.89	01.59	01.95	03.12	03.73	06.53	08.07	08.64	06.66	05.82			01.43	01.23	01.20	01.49	03.04	03.37	06.47	06.82	04.46	02.77		
	2003	01.72	01.48	01.72										01.48	01.26	01.22									
	2004																								
	2005																								
	2006																								
	2007																								
	2008																								
	2009																								
	2010																								
	2011																								
	2012																								
	2013																								
	2014																								
	2015																								
	MAX	02.01	01.82	02.43	03.12	05.71	07.04	08.93	09.39	09.81	08.32	04.89	03.45	01.51	01.34	01.30	01.75	03.04	05.02	06.88	08.50	07.48	04.98	02.62	01.91
	MIN	01.46	01.40	01.49	01.96	02.47	04.76	05.63	05.82	05.54	04.42	02.64	01.72	01.01	00.86	00.88	01.00	01.65	01.97	04.38	04.78	04.46	02.56	01.46	01.23
	N	22	22	22	22	22	22	22	22	22	22	21	21	22	22	22	22	22	22	22	22	22	22	21	21
	AVE.	01.73	01.61	01.78	02.35	03.85	06.06	07.57	07.75	07.53	06.65	03.86	02.27	01.28	01.14	01.11	01.36	02.08	03.42	05.88	06.30	06.02	03.78	02.12	01.60
	σ	00.16	00.12	00.20	00.34	00.87	00.75	00.87	00.92	01.02	00.88	00.69	00.35	00.15	00.14	00.14	00.19	00.32	00.89	00.72	00.90	00.77	00.73	00.26	00.18
ANALYSED DATA:																									
T = 1/1.11yrs.	$K_{1.11}$ = -1.10	01.55	01.48	01.56	01.97	02.89	05.24	06.61	06.73	06.40	05.68	03.10	01.88	01.11	00.98	00.95	01.15	01.72	02.44	05.09	05.31	05.18	02.97	01.84	01.40
T = 1/2.00yrs.	$K_{2.00}$ = -0.16	01.70	01.59	01.75	02.29	03.71	05.94	07.43	07.59	07.36	06.50	03.75	02.21	01.25	01.11	01.08	01.32	02.02	03.27	05.76	06.15	05.89	03.66	02.08	01.57
T = 1/2.33yrs.	$K_{2.33}$ = 0.00	01.73	01.61	01.78	02.35	03.85	06.06	07.57	07.75	07.53	06.65	03.86	02.27	01.28	01.14	01.11	01.36	02.08	03.42	05.88	06.30	06.02	03.78	02.12	01.60
T = 1/5.00yrs.	$K_{5.00}$ = 0.72	01.84	01.70	01.93	02.59	04.47	06.60	08.20	08.41	08.27	07.28	04.36	02.52	01.38	01.24	01.21	01.49	02.31	04.06	06.40	06.95	06.57	04.30	02.31	01.74
T = 1/10.00yrs.	$K_{10.00}$ = 1.30	01.94	01.77	02.04	02.79	04.98	07.04	08.71	08.95	08.87	07.79	04.76	02.72	01.47	01.32	01.29	01.60	02.50	04.58	06.82	07.47	07.02	04.73	02.46	01.84
T = 1/20.00yrs.	$K_{20.00}$ = 1.87	02.03	01.84	02.16	02.98	05.47	07.46	09.20	09.47	09.44	08.29	05.15	02.92	01.55	01.40	01.36	01.71	02.68	05.08	07.22	07.97	07.45	05.14	02.61	01.95
T = 1/30.00yrs.	$K_{30.00}$ = 2.19	02.08	01.88	02.22	03.10	05.75	07.70	09.48	09.77	09.77	08.57	05.37	03.03	01.60	01.44	01.41	01.77	02.78	05.36	07.45	08.26	07.70	05.38	02.69	02.01
T = 1/50.00yrs.	$K_{50.00}$ = 2.59	02.14	01.92	02.30	03.23	06.10	08.00	09.83	10.14	10.19	08.92	05.65	03.17	01.66	01.50	01.46	01.84	02.91	05.72	07.74	08.63	08.01	05.67	02.79	02.08

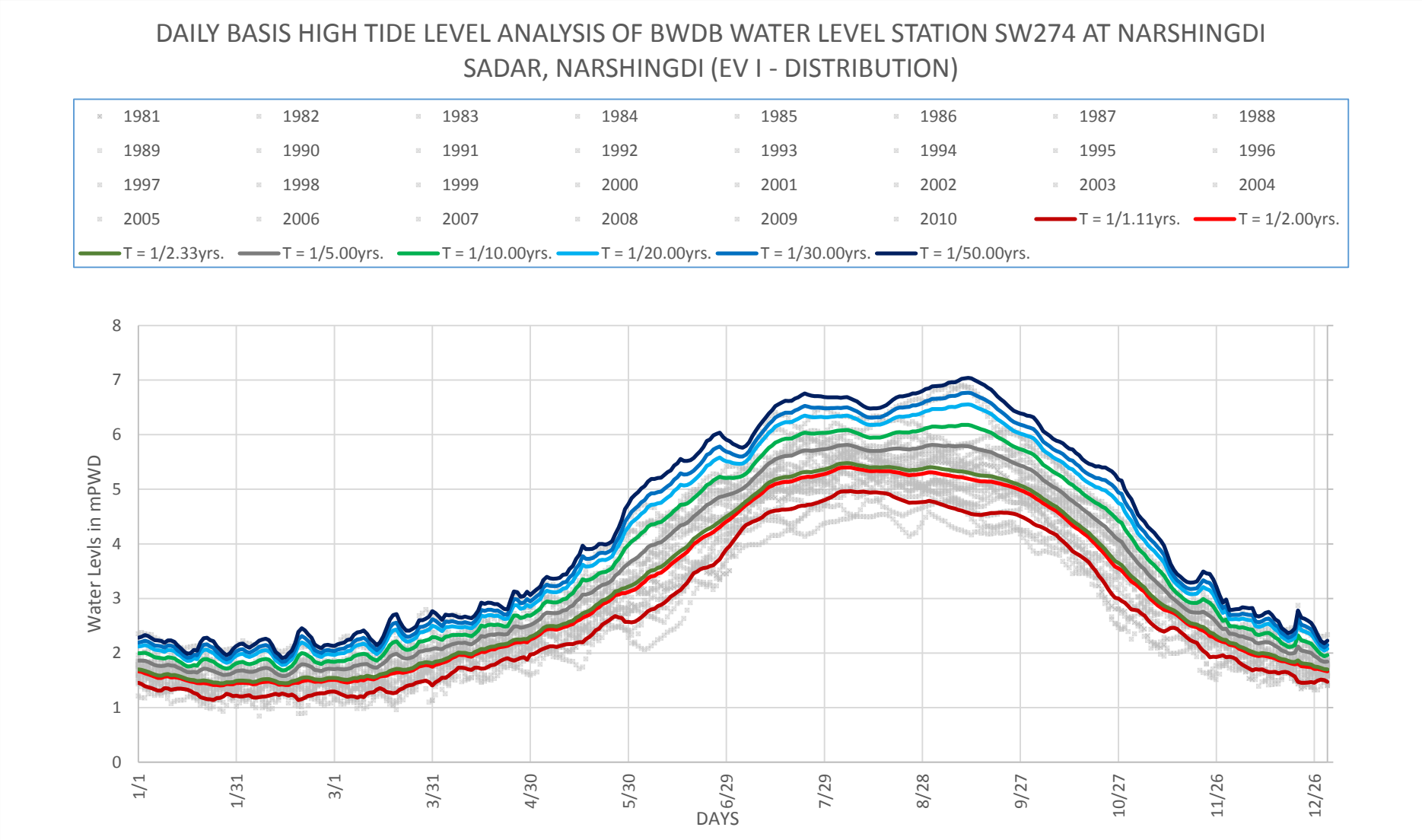
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (LTL)

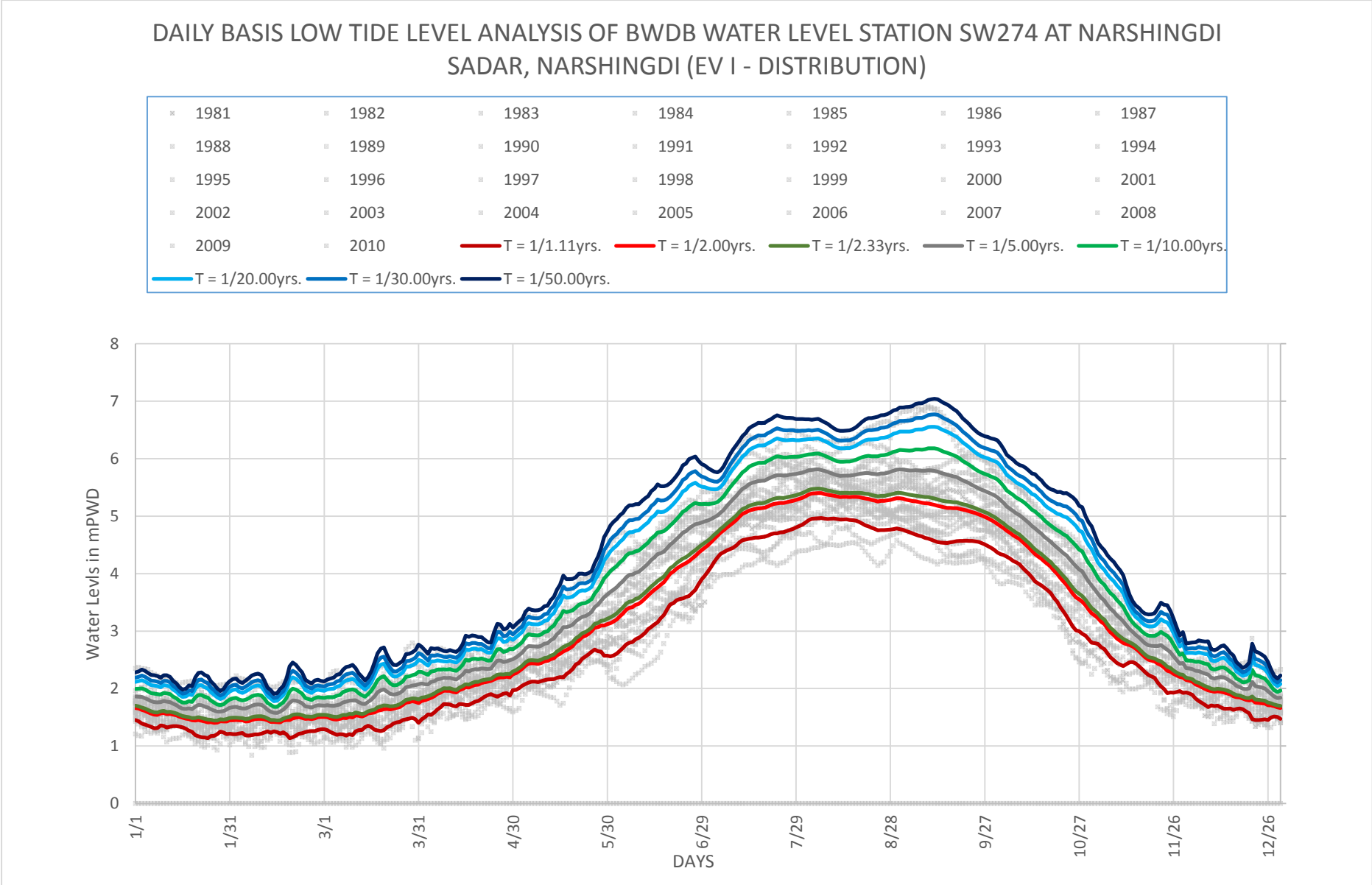


MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 229 (LTL)



A.1b.2 ANALYSED RESULTS OF BWDB WATER LEVEL GAUGE STATION SW 274 ON THE MEGHNA RIVER




DAILY BASIS LOW TIDE LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW274 AT NARSHINGDI SADAR, NARSHINGDI (EV I - DISTRIBUTION)
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
T = 1/1.11yrs.
T = 1/2.00yrs.
T = 1/2.33yrs.
T = 1/5.00yrs.
T = 1/10.00yrs.
T = 1/20.00yrs.
T = 1/30.00yrs.
T = 1/50.00yrs.
Water Levls in mPWD
0
1
2
3
4
5
6
7
8
1/1
1/31
3/1
3/31
4/30
5/30
6/29
7/29
8/28
9/27
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DAYS

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (HTL)

Monthly Data			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL		Year	Monthly Maximum HTL (mPWD)												Monthly Minimum HTL (mPWD)											
		1981				02.55	02.97	03.60	05.38	05.70	05.50	04.85	02.90	02.38				01.13	02.04	02.87	03.51	05.32	04.94	02.65	02.11	01.34
		1982	01.65	01.60	01.78	02.40	02.46	04.53	05.15	05.62	05.14	04.69	02.81	01.99	01.04	01.07	01.04	01.75	02.24	02.20	04.55	04.99	04.73	02.43	01.51	01.37
		1983	01.75	01.79	02.42	02.84	03.18	04.18	05.09	05.79	06.04	05.89	04.04	02.23	01.15	00.84	01.18	01.74	02.45	03.09	04.19	05.13	05.69	04.09	02.09	01.54
		1984	02.01	01.82	02.08	02.69	04.16	04.98	06.08	06.21	06.11	05.78	03.52	02.06	01.32	01.04	01.19	01.54	02.29	04.19	04.84	04.95	05.12	03.58	01.77	01.41
		1985	01.67	01.84	02.20	02.47	03.02	04.50	05.48	05.67	05.16	04.74	03.63	02.31	01.02	01.08	01.24	01.68	02.17	03.02	04.55	04.97	04.72	03.67	02.14	01.46
		1986	01.83	01.63	01.88	02.72	02.86	03.69	04.83	05.15	04.99	04.86	03.91	02.35	01.09	00.89	00.96	01.25	02.15	02.06	03.75	04.51	04.68	03.94	02.30	01.36
		1987	01.83	01.80	01.86	02.54	02.50	04.06	05.59	06.27	05.90	05.78	03.54	02.31	01.13	01.14	00.98	01.50	02.06	02.40	04.18	05.69	05.58	03.54	02.07	01.62
		1988	01.91	01.90	02.12	02.61	04.34	05.01	06.40	06.70	06.90	05.20	03.60	02.55	01.17	01.24	01.24	01.71	02.04	04.26	05.03	05.39	05.20	03.74	02.48	01.44
		1989	01.79	01.98	01.94	02.30	03.24	04.68	05.48	05.58	05.10	05.02	03.98	02.32	01.21	01.15	01.06	01.14	02.06	03.26	04.31	05.05	05.02	04.04	02.08	01.42
		1990	01.76	01.84	02.15	03.08	03.64	04.75	05.27	05.32	04.95	05.41	03.74	02.41	01.19	01.01	01.28	01.55	02.41	03.64	04.66	04.97	04.51	03.84	02.08	01.49
		1991	02.02	01.67	01.88	02.29	04.21	05.15	05.46	05.27	05.72	05.48	03.95	02.87	01.09	01.08	01.10	01.65	02.46	04.23	05.02	04.95	05.10	03.98	02.27	01.43
		1992	01.88	01.87	02.05	02.45	02.79	03.83	04.82	04.71	04.53	04.14	03.28	02.03	01.18	01.19	01.24	01.79	02.02	02.56	03.87	04.14	04.16	03.40	02.13	01.57
		1993	01.83	02.13	01.97	02.18	03.56	05.28	06.07	05.90	05.67	05.02	03.26	02.38	01.25	01.11	01.36	01.38	02.26	03.47	05.22	05.51	04.86	03.28	02.07	01.53
		1994	01.86	01.82	02.79	02.74	02.96	04.35	04.53	05.11	04.95	03.94	02.86	02.16	00.98	01.13	01.31	02.09	02.24	02.77	04.14	04.40	04.03	02.62	01.60	01.32
		1995	01.72	01.54	01.78	02.08	03.75	05.14	06.10	05.97	05.79	05.23	03.19	02.41	00.93	00.97	00.98	01.43	01.91	03.05	05.13	05.08	04.86	03.05	02.45	01.58
		1996	01.93	01.76	02.15	02.41	03.39	03.83	05.94	05.76	05.60	04.61	03.44	02.24	01.24	01.16	01.08	01.95	02.43	03.36	04.10	05.20	04.67	03.25	02.28	01.72
		1997	01.95	01.62	01.92	02.05	02.84	04.06	05.69	05.45	05.10	05.06	02.53	01.89	01.16	01.25	01.23	01.47	01.59	02.77	04.03	04.85	04.72	02.39	01.62	01.40
		1998	01.84	00.00	02.12	02.50	03.32	04.83	06.49	06.65	06.91	04.97	03.59	02.74	01.12	00.00	01.12	01.73	02.00	03.35	04.83	06.29	05.07	03.48	02.55	01.73
		1999	02.08	01.86	01.85	02.45	03.12	04.51	05.70	05.94	05.95	05.27	04.26	02.42	01.37	01.39	01.40	01.47	02.46	03.18	04.76	05.30	05.30	04.37	02.44	01.80
		2000	02.00	01.84	02.26	02.72	04.00	05.42	05.43	05.86	05.75	05.55	00.00	02.05	01.36	01.38	01.50	01.80	02.83	04.05	04.95	04.95	05.44	03.38	00.00	01.63
		2001	01.80	01.86	01.92	02.30	03.20	04.50	04.75	05.49	05.16	04.70	03.79	02.20	01.47	01.42	01.42	01.45	01.85	03.20	04.37	04.86	04.74	03.87	02.10	01.55
		2002	01.62	00.00	01.68	02.44	03.32	04.96	05.90	05.95	05.29	04.20	03.00	02.53	01.33	00.00	01.33	01.47	02.25	03.28	04.80	05.36	04.24	02.92	02.54	02.30
		2003	02.37	02.24	02.40										02.02	02.02	02.05									
		2004																								
		2005																								
		2006																								
		2007																								
		2008																								
		2009																								
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		2011																								
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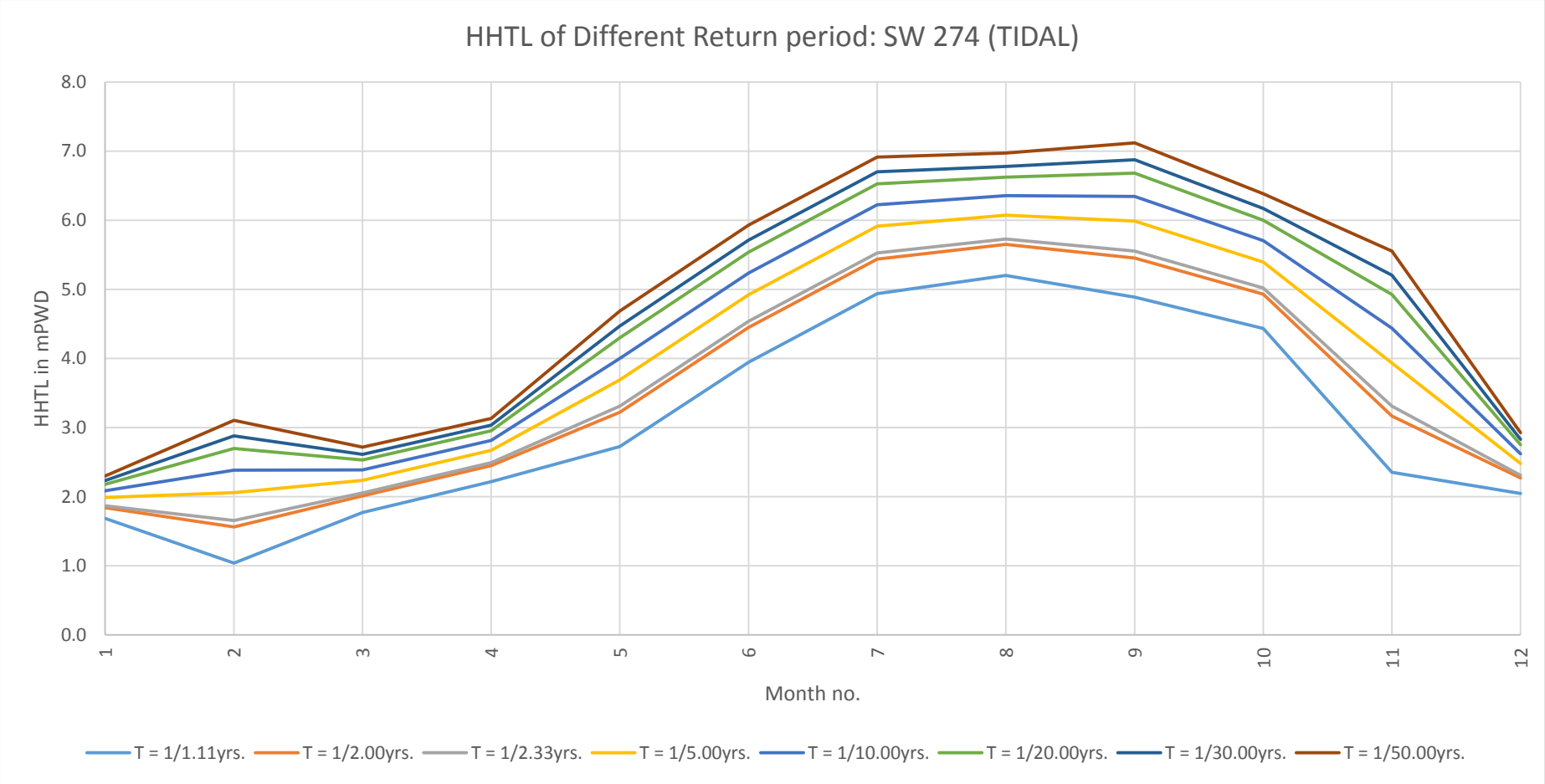
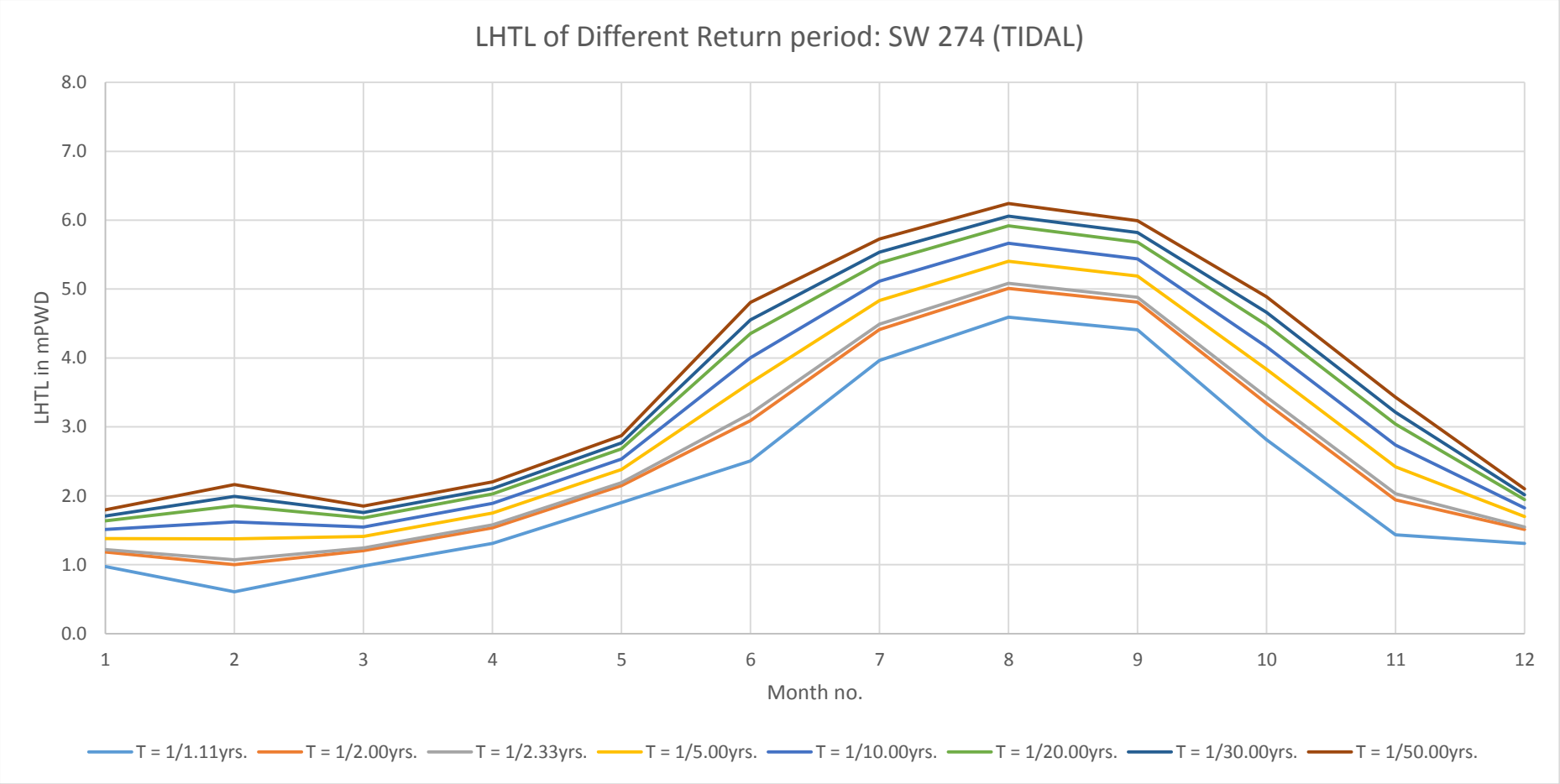
		2015																								
		MAX	02.37	02.24	02.79	03.08	04.34	05.42	06.49	06.70	06.91	05.89	04.26	02.87	02.02	02.02	02.05	02.09	02.83	04.26	05.22	06.29	05.69	04.37	02.55	02.30
		MIN	01.62	00.00	01.68	02.05	02.46	03.60	04.53	04.71	04.53	03.94	00.00	01.89	00.93	00.00	00.96	01.13	01.59	02.06	03.51	04.14	04.03	02.39	00.00	01.32
		N	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
		AVE.	01.87	01.66	02.05	02.49	03.31	04.54	05.53	05.73	05.56	05.02	03.31	02.31	01.22	01.07	01.24	01.58	02.19	03.19	04.49	05.08	04.88	03.43	02.03	01.55
		σ	00.17	00.56	00.26	00.25	00.53	00.54	00.54	00.48	00.60	00.53	00.87	00.24	00.22	00.42	00.24	00.24	00.26	00.62	00.48	00.45	00.43	00.56	00.54	00.21
ANALYSED DATA:																										
T = 1/1.11yrs.	$K_{1.11}$	= -1.10	01.68	01.04	01.77	02.22	02.72	03.95	04.94	05.20	04.89	04.44	02.35	02.05	00.97	00.61	00.98	01.31	01.90	02.51	03.96	04.59	04.41	02.81	01.43	01.31
T = 1/2.00yrs.	$K_{2.00}$	= -0.16	01.84	01.56	02.01	02.45	03.22	04.45	05.44	05.65	05.46	04.93	03.17	02.27	01.18	01.00	01.20	01.54	02.15	03.09	04.41	05.01	04.81	03.34	01.94	01.51
T = 1/2.33yrs.	$K_{2.33}$	= 0.00	01.87	01.66	02.05	02.49	03.31	04.54	05.53	05.73	05.56	05.02	03.31	02.31	01.22	01.07	01.24	01.58	02.19	03.19	04.49	05.08	04.88	03.43	02.03	01.55
T = 1/5.00yrs.	$K_{5.00}$	= 0.72	01.99	02.06	02.24	02.67	03.69	04.92	05.91	06.08	05.99	05.40	03.93	02.48	01.38	01.37	01.41	01.75	02.38	03.64	04.83	05.41	05.19	03.84	02.42	01.70
T = 1/10.00yrs.	$K_{10.00}$	= 1.30	02.08	02.38	02.39	02.81	04.00	05.24	06.23	06.36	06.34	05.70	04.44	02.62	01.51	01.62	01.55	01.89	02.53	04.00	05.11	05.67	05.44	04.16	02.74	01.83
T = 1/20.00yrs.	$K_{20.00}$	= 1.87	02.18	02.70	02.53	02.95	04.30	05.54	06.53	06.62	06.68	06.00	04.93	02.75	01.64	01.86	01.68	02.03	02.68	04.35	05.38	05.92	05.68	04.48	03.04	01.95
T = 1/30.00yrs.	$K_{30.00}$	= 2.19	02.23	02.88	02.61	03.03	04.47	05.71	06.70	06.78	06.88	06.17	05.21	02.83	01.71	01.99	01.76	02.11	02.77	04.55	05.54	06.06	05.82	04.66	03.21	02.01
T = 1/50.00yrs.	$K_{50.00}$	= 2.59	02.30	03.10	02.72	03.13	04.69	05.93	06.92	06.97	07.12	06.38	05.55	02.93	01.80	02.16	01.85	02.20	02.87	04.81	05.73	06.24	05.99	04.89	03.43	02.10

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (HTL)



MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (HTL)



MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (LTL)

Monthly Data	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL		Monthly Maximum LTL (mPWD)												Monthly Minimum LTL (mPWD)											
	1981				02.55	02.97	03.60	05.38	05.70	05.50	04.85	02.90	02.38				01.13	02.04	02.87	03.51	05.32	04.94	02.65	02.11	01.34
	1982	01.65	01.60	01.78	02.40	02.46	04.53	05.15	05.62	05.14	04.69	02.81	01.99	01.04	01.07	01.04	01.75	02.24	02.20	04.55	04.99	04.73	02.43	01.51	01.37
	1983	01.75	01.79	02.42	02.84	03.18	04.18	05.09	05.79	06.04	05.89	04.04	02.23	01.15	00.84	01.18	01.74	02.45	03.09	04.19	05.13	05.69	04.09	02.09	01.54
	1984	02.01	01.82	02.08	02.69	04.16	04.98	06.08	06.21	06.11	05.78	03.52	02.06	01.32	01.04	01.19	01.54	02.29	04.19	04.84	04.95	05.12	03.58	01.77	01.41
	1985	01.67	01.84	02.20	02.47	03.02	04.50	05.48	05.67	05.16	04.74	03.63	02.31	01.02	01.08	01.24	01.68	02.17	03.02	04.55	04.97	04.72	03.67	02.14	01.46
	1986	01.83	01.63	01.88	02.72	02.86	03.69	04.83	05.15	04.99	04.86	03.91	02.35	01.09	00.89	00.96	01.25	02.15	02.06	03.75	04.51	04.68	03.94	02.30	01.36
	1987	01.83	01.80	01.86	02.54	02.50	04.06	05.59	06.27	05.90	05.78	03.54	02.31	01.13	01.14	00.98	01.50	02.06	02.40	04.18	05.69	05.58	03.54	02.07	01.62
	1988	01.91	01.90	02.12	02.61	04.34	05.01	06.40	06.70	06.90	05.20	03.60	02.55	01.17	01.24	01.24	01.71	02.04	04.26	05.03	05.39	05.20	03.74	02.48	01.44
	1989	01.79	01.98	01.94	02.30	03.24	04.68	05.48	05.58	05.10	05.02	03.98	02.32	01.21	01.15	01.06	01.14	02.06	03.26	04.31	05.05	05.02	04.04	02.08	01.42
	1990	01.76	01.84	02.15	03.08	03.64	04.75	05.27	05.32	04.95	05.41	03.74	02.41	01.19	01.01	01.28	01.55	02.41	03.64	04.66	04.97	04.51	03.84	02.08	01.49
	1991	02.02	01.67	01.88	02.29	04.21	05.15	05.46	05.27	05.72	05.48	03.95	02.87	01.09	01.08	01.10	01.65	02.46	04.23	05.02	04.95	05.10	03.98	02.27	01.43
	1992	01.88	01.87	02.05	02.45	02.79	03.83	04.82	04.71	04.53	04.14	03.28	02.03	01.18	01.19	01.24	01.79	02.02	02.56	03.87	04.14	04.16	03.40	02.13	01.57
	1993	01.83	02.13	01.97	02.18	03.56	05.28	06.07	05.90	05.67	05.02	03.26	02.38	01.25	01.11	01.36	01.38	02.26	03.47	05.22	05.51	04.86	03.28	02.07	01.53
	1994	01.86	01.82	02.79	02.74	02.96	04.35	04.53	05.11	04.95	03.94	02.86	02.16	00.98	01.13	01.31	02.09	02.24	02.77	04.14	04.40	04.03	02.62	01.60	01.32
	1995	01.72	01.54	01.78	02.08	03.75	05.14	06.10	05.97	05.79	05.23	03.19	02.41	00.93	00.97	00.98	01.43	01.91	03.05	05.13	05.08	04.86	03.05	02.45	01.58
	1996	01.93	01.76	02.15	02.41	03.39	03.83	05.94	05.76	05.60	04.61	03.44	02.24	01.24	01.16	01.08	01.95	02.43	03.36	04.10	05.20	04.67	03.25	02.28	01.72
	1997	01.95	01.62	01.92	02.05	02.84	04.06	05.69	05.45	05.10	05.06	02.53	01.89	01.16	01.25	01.23	01.47	01.59	02.77	04.03	04.85	04.72	02.39	01.62	01.40
	1998	01.84	00.00	02.12	02.50	03.32	04.83	06.49	06.65	06.91	04.97	03.59	02.74	01.12	00.00	01.12	01.73	02.00	03.35	04.83	06.29	05.07	03.48	02.55	01.73
	1999	02.08	01.86	01.85	02.45	03.12	04.51	05.70	05.94	05.95	05.27	04.26	02.42	01.37	01.39	01.40	01.47	02.46	03.18	04.76	05.30	05.30	04.37	02.44	01.80
	2000	02.00	01.84	02.26	02.72	04.00	05.42	05.43	05.86	05.75	05.55	00.00	02.05	01.36	01.38	01.50	01.80	02.83	04.05	04.95	04.95	05.44	03.38	00.00	01.63
	2001	01.80	01.86	01.92	02.30	03.20	04.50	04.75	05.49	05.16	04.70	03.79	02.20	01.47	01.42	01.42	01.45	01.85	03.20	04.37	04.86	04.74	03.87	02.10	01.55
	2002	01.62	00.00	01.68	02.44	03.32	04.96	05.90	05.95	05.29	04.20	03.00	02.53	01.33	00.00	01.33	01.47	02.25	03.28	04.80	05.36	04.24	02.92	02.54	02.30
	2003	02.37	02.24	02.40										02.02	02.02	02.05									
	2004																								
	2005																								
	2006																								
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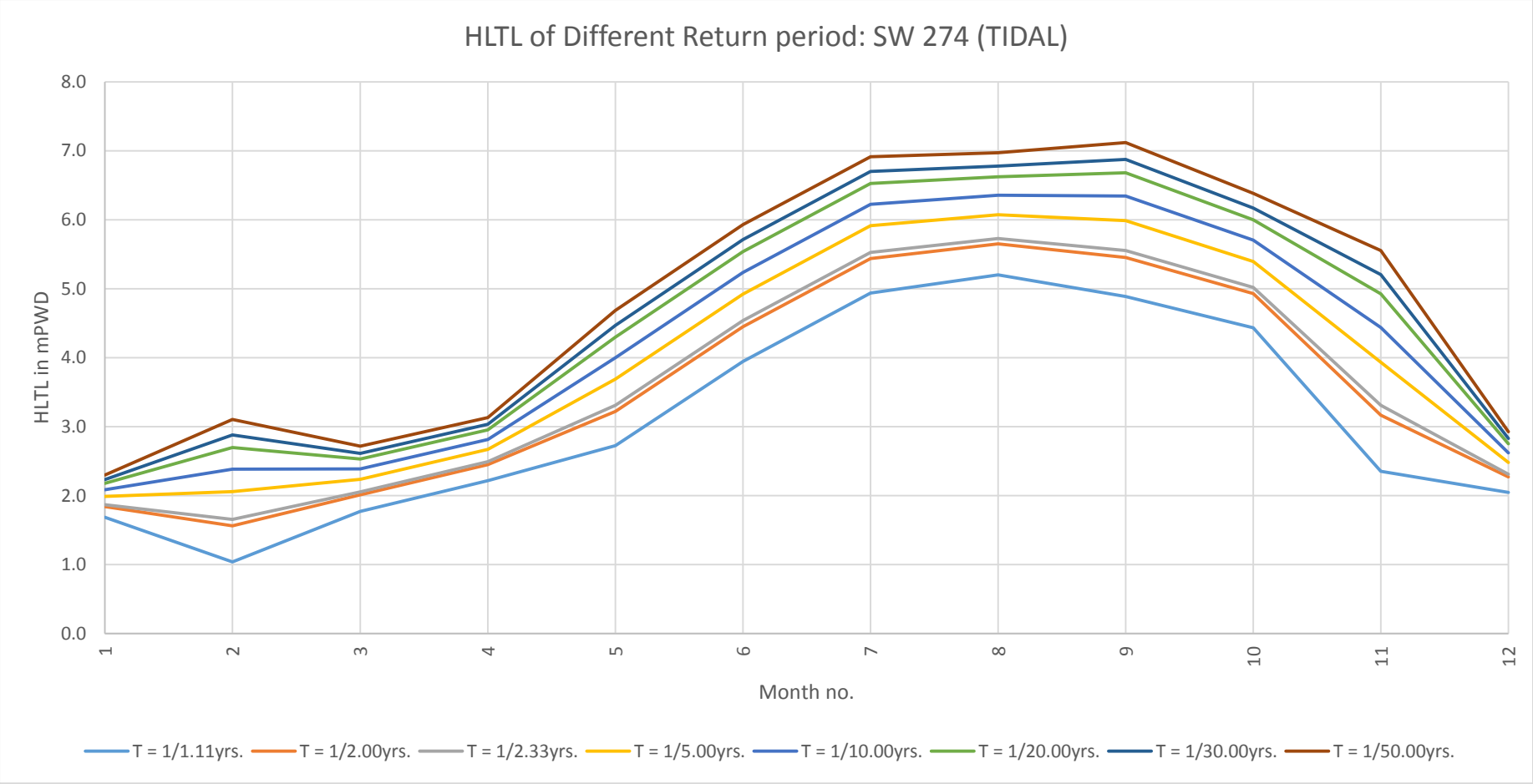
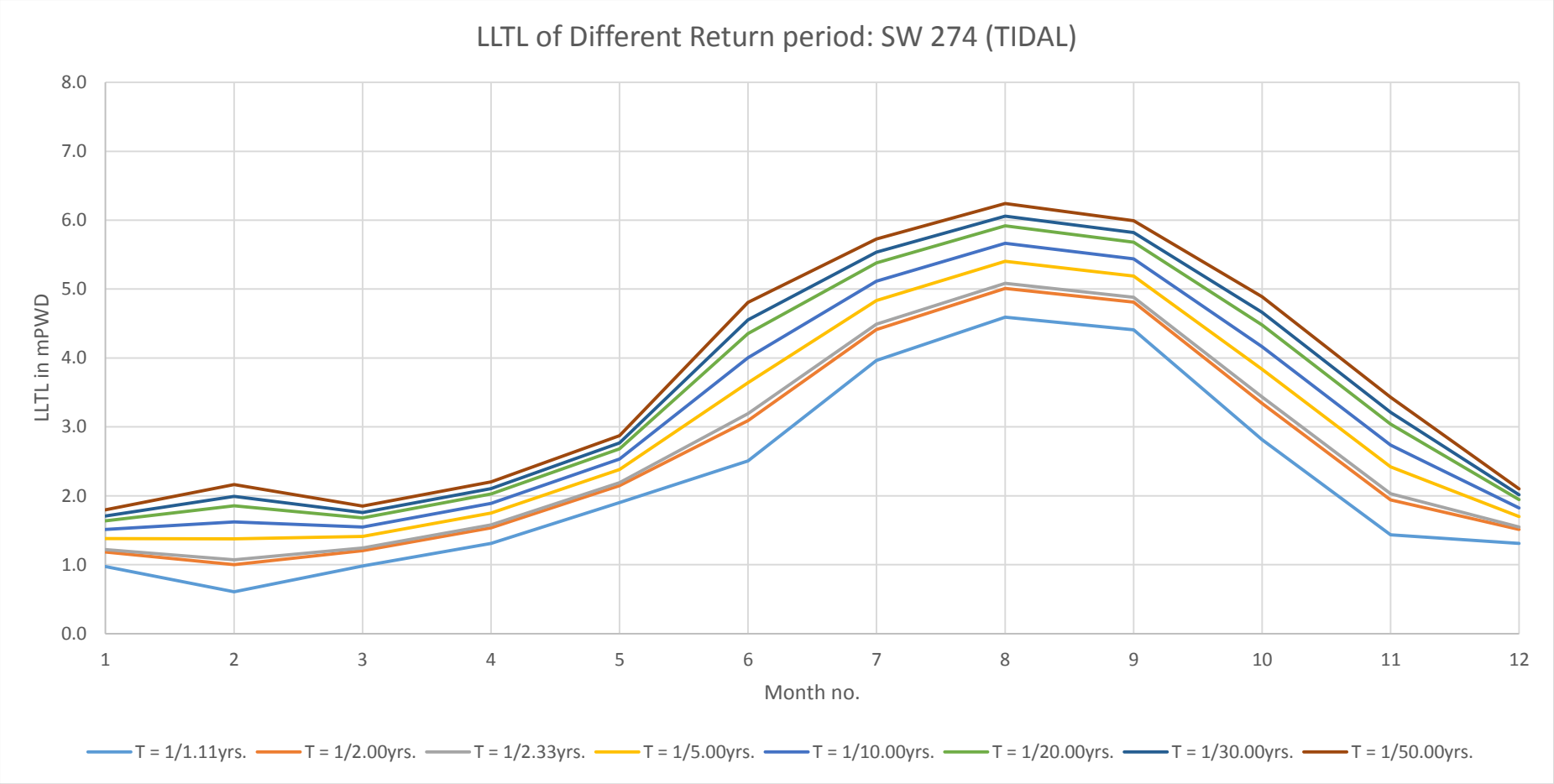
	2013																								
	2014																								
	2015																								
	MAX	02.37	02.24	02.79	03.08	04.34	05.42	06.49	06.70	06.91	05.89	04.26	02.87	02.02	02.02	02.05	02.09	02.83	04.26	05.22	06.29	05.69	04.37	02.55	02.30
	MIN	01.62	00.00	01.68	02.05	02.46	03.60	04.53	04.71	04.53	03.94	00.00	01.89	00.93	00.00	00.96	01.13	01.59	02.06	03.51	04.14	04.03	02.39	00.00	01.32
	N	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	AVE.	01.87	01.66	02.05	02.49	03.31	04.54	05.53	05.73	05.56	05.02	03.31	02.31	01.22	01.07	01.24	01.58	02.19	03.19	04.49	05.08	04.88	03.43	02.03	01.55
	σ	00.17	00.56	00.26	00.25	00.53	00.54	00.54	00.48	00.60	00.53	00.87	00.24	00.22	00.42	00.24	00.24	00.26	00.62	00.48	00.45	00.43	00.56	00.54	00.21
ANALYSED DATA:																									
T = 1/1.11yrs.	$K_{1.11}$ = -1.10	01.68	01.04	01.77	02.22	02.72	03.95	04.94	05.20	04.89	04.44	02.35	02.05	00.97	00.61	00.98	01.31	01.90	02.51	03.96	04.59	04.41	02.81	01.43	01.31
T = 1/2.00yrs.	$K_{2.00}$ = -0.16	01.84	01.56	02.01	02.45	03.22	04.45	05.44	05.65	05.46	04.93	03.17	02.27	01.18	01.00	01.20	01.54	02.15	03.09	04.41	05.01	04.81	03.34	01.94	01.51
T = 1/2.33yrs.	$K_{2.33}$ = 0.00	01.87	01.66	02.05	02.49	03.31	04.54	05.53	05.73	05.56	05.02	03.31	02.31	01.22	01.07	01.24	01.58	02.19	03.19	04.49	05.08	04.88	03.43	02.03	01.55
T = 1/5.00yrs.	$K_{5.00}$ = 0.72	01.99	02.06	02.24	02.67	03.69	04.92	05.91	06.08	05.99	05.40	03.93	02.48	01.38	01.37	01.41	01.75	02.38	03.64	04.83	05.41	05.19	03.84	02.42	01.70
T = 1/10.00yrs.	$K_{10.00}$ = 1.30	02.08	02.38	02.39	02.81	04.00	05.24	06.23	06.36	06.34	05.70	04.44	02.62	01.51	01.62	01.55	01.89	02.53	04.00	05.11	05.67	05.44	04.16	02.74	01.83
T = 1/20.00yrs.	$K_{20.00}$ = 1.87	02.18	02.70	02.53	02.95	04.30	05.54	06.53	06.62	06.68	06.00	04.93	02.75	01.64	01.86	01.68	02.03	02.68	04.35	05.38	05.92	05.68	04.48	03.04	01.95
T = 1/30.00yrs.	$K_{30.00}$ = 2.19	02.23	02.88	02.61	03.03	04.47	05.71	06.70	06.78	06.88	06.17	05.21	02.83	01.71	01.99	01.76	02.11	02.77	04.55	05.54	06.06	05.82	04.66	03.21	02.01
T = 1/50.00yrs.	$K_{50.00}$ = 2.59	02.30	03.10	02.72	03.13	04.69	05.93	06.92	06.97	07.12	06.38	05.55	02.93	01.80	02.16	01.85	02.20	02.87	04.81	05.73	06.24	05.99	04.89	03.43	02.10

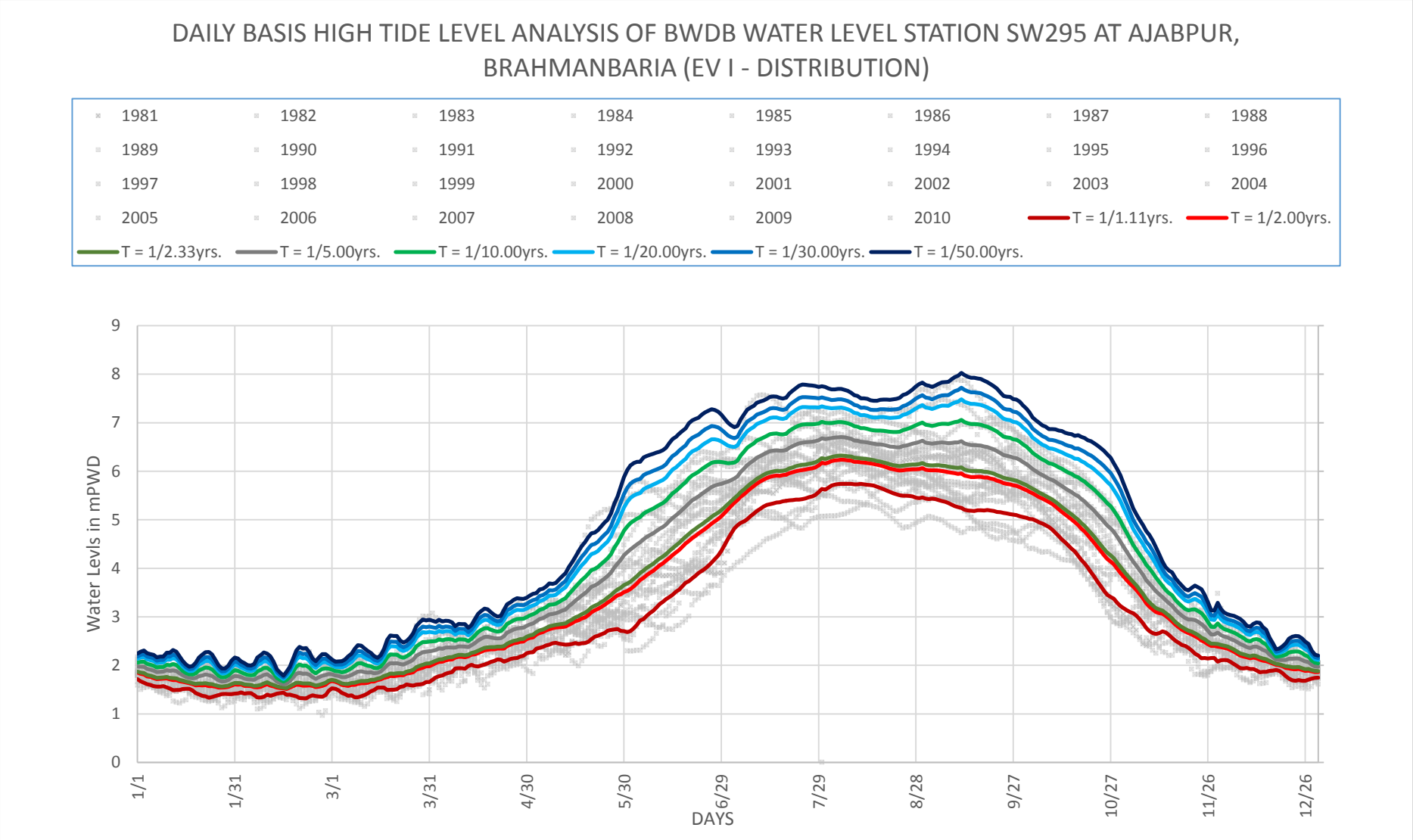
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (LTL)

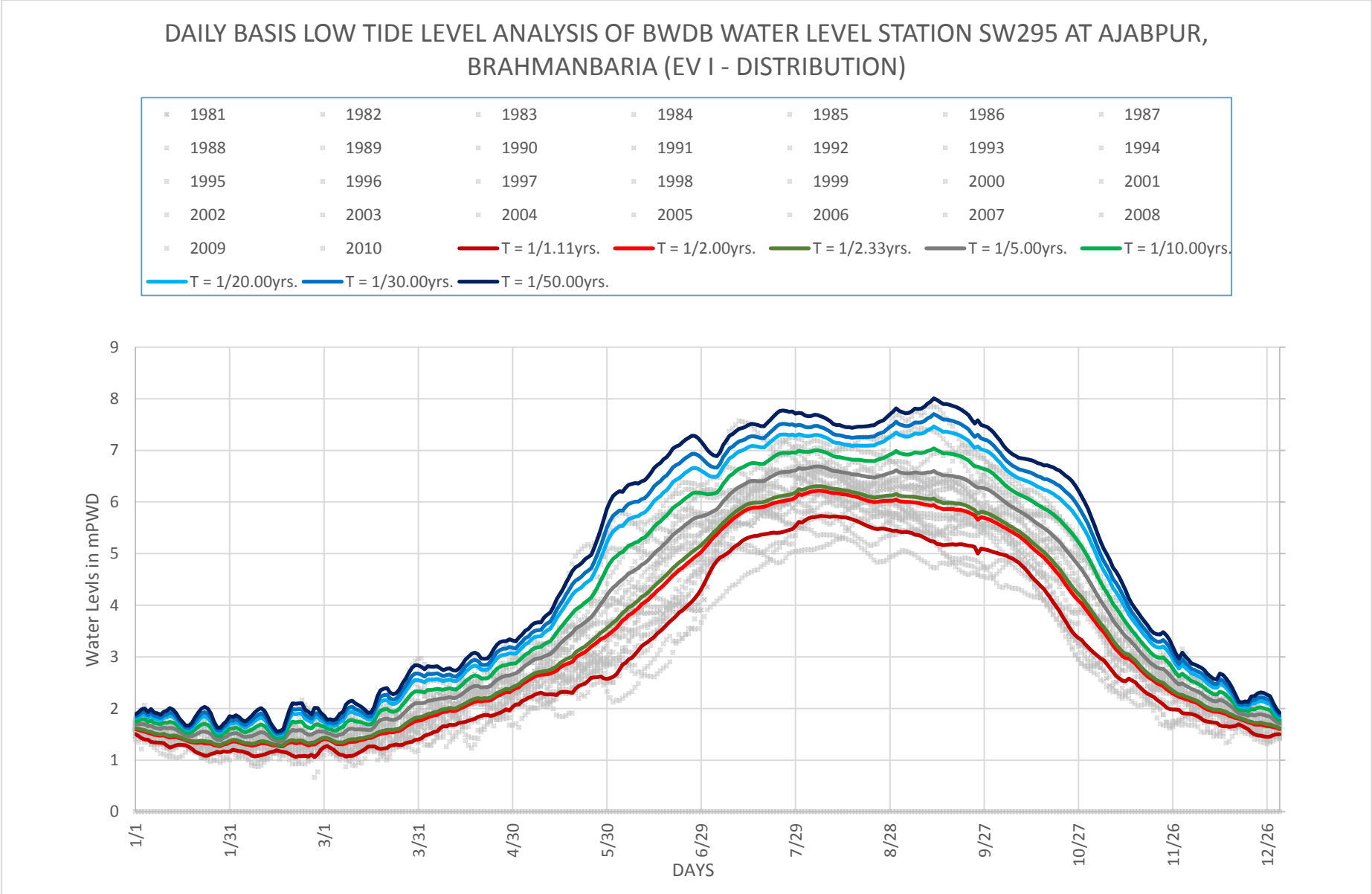


MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 274 (LTL)



A.1b.3 ANALYSED RESULTS OF BWDB WATER LEVEL GAUGE STATION SW 295 ON THE MEGHNA RIVER



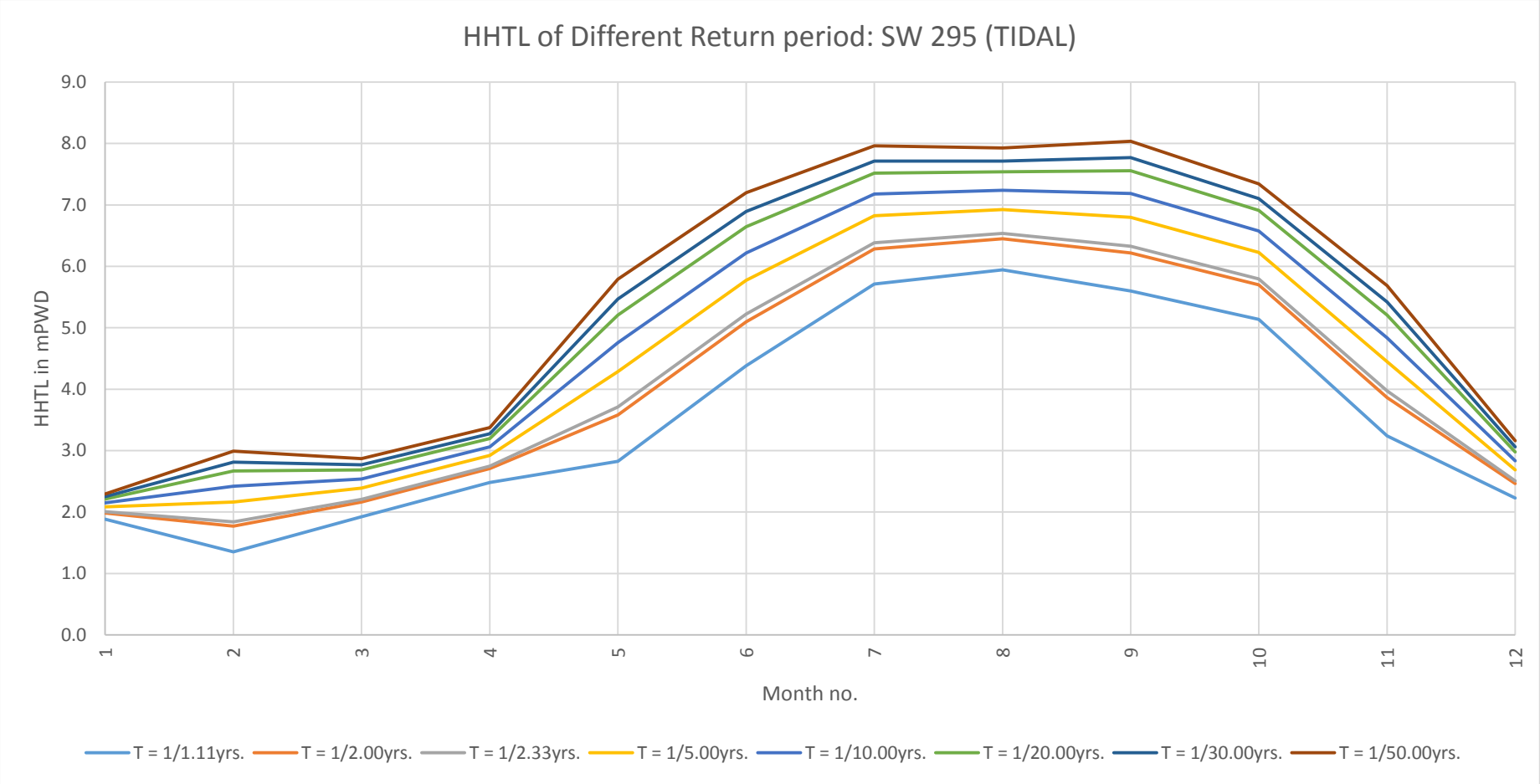

DAILY BASIS LOW TIDE LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW295 AT AJABPUR, BRAHMANBARIA (EV I - DISTRIBUTION)
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
T = 1/1.11yrs.
T = 1/2.00yrs.
T = 1/2.33yrs.
T = 1/5.00yrs.
T = 1/10.00yrs.
T = 1/20.00yrs.
T = 1/30.00yrs.
T = 1/50.00yrs.
Water Levls in mPWD
0
1
2
3
4
5
6
7
8
9
1/1
1/31
3/1
3/31
4/30
5/30
6/29
7/29
8/28
9/27
10/27
11/26
12/26
DAYS

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (HTL)

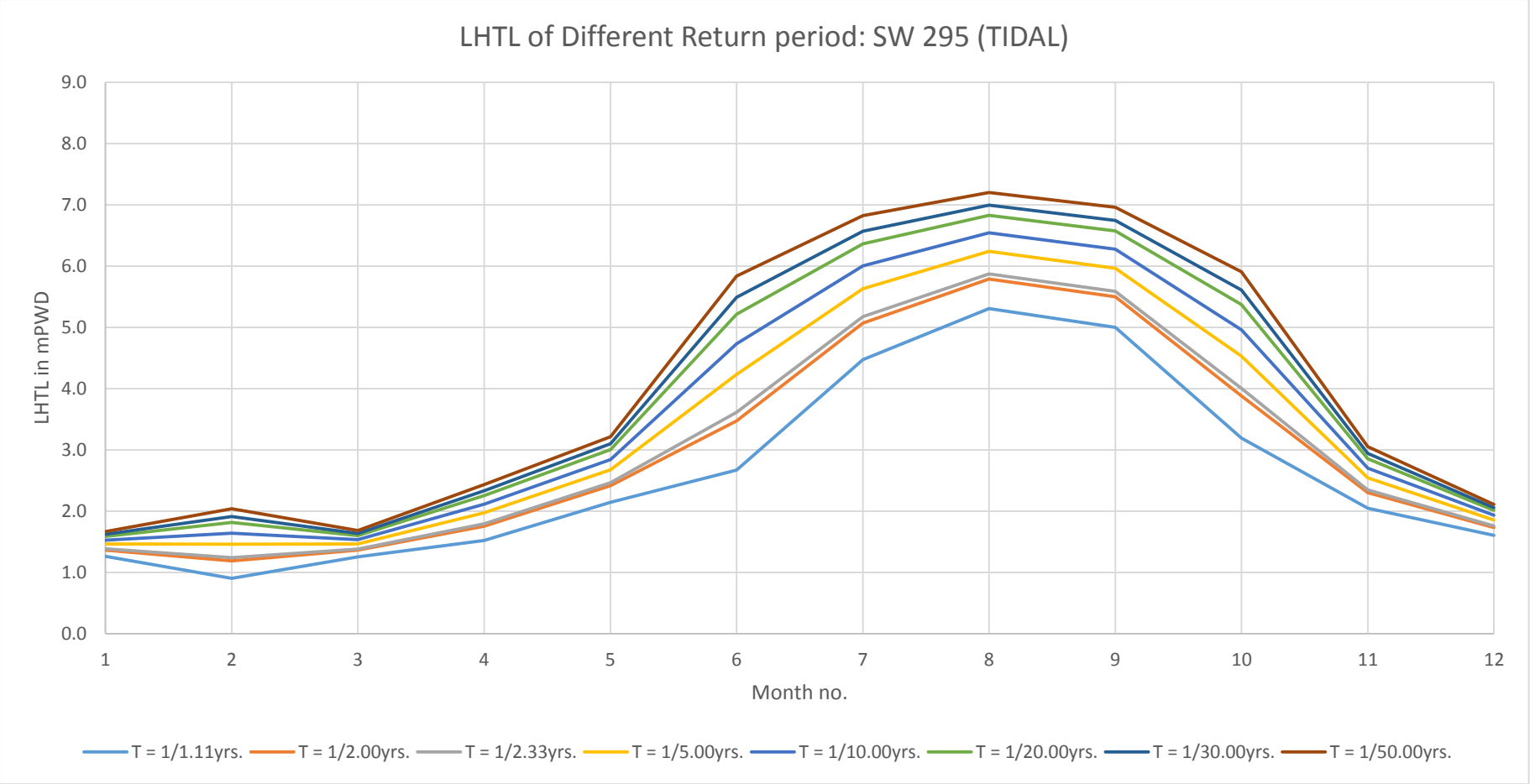
Monthly Data		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL	Year	Monthly Maximum HTL (mPWD)												Monthly Minimum HTL (mPWD)											
	1981				02.88	03.60	04.02	06.25	06.60	06.42	05.67	03.05	02.71				01.50	02.21	03.45	04.11	06.10	05.72	03.13	02.29	01.69
	1982	01.91	01.77	01.97	02.77	03.01	05.39	06.14	06.60	05.84	05.55	02.93	02.17	01.33	01.31	01.28	01.84	02.40	02.51	05.44	05.77	05.44	02.85	01.78	01.53
	1983	01.90	01.95	02.67	02.99	03.69	04.76	06.06	06.80	06.97	06.70	04.92	02.53	01.27	01.10	01.36	02.00	02.93	03.54	04.79	06.13	06.65	05.02	02.45	01.78
	1984	02.08	01.85	02.12	02.79	05.07	05.77	07.09	07.06	07.10	06.62	03.96	02.21	01.49	00.97	01.33	01.67	02.47	04.97	05.53	05.77	05.77	04.06	02.10	01.61
	1985	01.78	01.91	02.39	02.83	03.09	05.43	06.51	06.54	05.91	05.51	03.86	02.48	01.35	01.29	01.58	01.94	02.41	03.29	05.46	05.83	05.50	03.95	02.39	01.76
	1986	01.96	01.76	02.09	02.95	02.94	03.75	05.51	05.78	05.61	05.77	04.75	02.77	01.29	01.11	01.25	01.49	02.47	02.29	03.85	05.17	05.37	04.84	02.69	01.67
	1987	01.98	01.84	01.96	02.70	02.71	04.76	06.54	07.11	06.70	06.69	04.02	02.53	01.37	01.35	01.23	01.78	02.29	02.62	04.94	06.71	06.12	04.17	02.35	01.83
	1988	01.99	01.95	02.20	02.68	05.43	06.24	07.57	07.69	07.89	06.23	04.39	03.17	01.24	01.36	01.48	01.88	02.28	05.08	06.20	06.24	06.29	04.51	02.68	01.85
	1989	02.00	02.08	02.08	02.63	03.57	05.12	06.52	06.62	06.08	05.84	04.86	02.40	01.51	01.36	01.38	01.41	02.67	03.54	04.98	05.99	05.84	04.96	02.48	01.72
	1990	01.99	02.01	02.41	03.30	03.96	05.63	06.15	06.25	05.94	06.24	04.45	02.59	01.39	01.34	01.41	01.84	02.96	04.08	05.62	05.98	05.30	04.61	02.30	01.85
	1991	02.27	01.99	02.08	02.65	05.39	06.27	06.33	06.06	06.56	06.40	04.80	02.40	01.40	01.41	01.38	02.07	02.61	05.43	05.82	05.73	05.68	04.88	02.33	01.82
	1992	02.03	02.01	02.18	02.56	03.05	04.30	05.74	05.49	05.07	04.88	03.91	02.27	01.42	01.32	01.47	01.99	02.17	02.77	04.49	04.83	04.73	04.01	02.31	01.75
	1993	01.99	02.35	02.19	02.35	04.09	06.40	07.20	06.91	06.49	05.80	03.68	02.48	01.43	01.29	01.59	01.70	02.41	04.03	06.26	06.33	05.57	03.77	02.28	01.67
	1994	02.09	01.90	03.01	03.07	03.04	04.89	05.17	05.80	05.68	04.55	03.08	02.33	01.30	01.33	01.45	02.38	02.33	02.93	04.83	05.07	04.64	03.00	01.86	01.51
	1995	01.86	01.78	01.95										01.12	01.26	01.15									
	1996				02.66	03.67	04.37	06.63	06.47	06.30	05.28	03.96	02.47				02.18	02.62	03.68	04.51	05.89	05.34	03.67	02.59	02.00
	1997	02.15	01.97	02.10	02.25	03.10	04.67	06.37	06.00	05.85	05.77	02.83	02.03	01.39	01.37	01.36	01.60	01.83	03.05	04.70	05.54	05.36	02.81	01.81	01.54
	1998	01.90	01.76	02.27	02.68	03.51	05.56	07.26	07.34	07.48	05.83	03.86	02.85	01.25	01.23	01.23	01.76	02.12	03.43	05.47	07.00	05.97	03.86	02.73	01.92
	1999	02.18	02.02	02.06	02.62	03.31	05.10	06.63	06.51	06.53	05.85	04.74	02.47	01.52	01.42	01.56	01.58	02.62	03.44	05.35	06.08	05.89	04.88	02.51	01.90
	2000	02.05	01.89	02.19	02.79	04.48	06.20	06.25	06.64	06.45	06.30	03.91	02.45	01.49	01.38	01.36	01.86	02.98	04.60	05.53	05.50	06.15	03.88	02.41	01.94
	2001	02.02	02.06	02.00	02.53	03.12	05.22	05.46	06.24	05.83	05.35	04.22	02.73	01.53	01.43	01.38	01.53	02.29	03.14	05.03	05.49	05.42	04.26	02.57	01.80
	2002	02.03	00.00	02.19	03.03	04.10	05.87	06.71	06.77	06.14	04.89	03.21	02.59	01.47	00.00	01.43	01.67	02.68	04.03	05.75	06.19	04.54	02.93	02.38	01.74
	2003	01.95	01.84											01.48	01.41	01.34									
	2004																								
	2005																								
	2006																								
	2007																								
	2008																								
	2009																								
	2010																								
	2011																								
	2012																								
	2013																								
	2014																								
	2015																								
	MAX	02.27	02.35	03.01	03.30	05.43	06.40	07.57	07.69	07.89	06.70	04.92	03.17	01.53	01.43	01.59	02.38	02.98	05.43	06.26	07.00	06.65	05.02	02.73	02.00
	MIN	01.78	00.00	01.95	02.25	02.71	03.75	05.17	05.49	05.07	04.55	02.83	02.03	01.12	00.00	01.15	01.41	01.83	02.29	03.85	04.83	04.54	02.81	01.78	01.51
	N	21	21	20	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
	AVE.	02.00	01.84	02.21	02.75	03.71	05.22	06.39	06.54	06.33	05.80	03.97	02.51	01.38	01.24	01.38	01.79	02.46	03.61	05.17	05.87	05.59	04.00	02.35	01.76
	σ	00.11	00.44	00.26	00.24	00.80	00.76	00.61	00.54	00.66	00.60	00.66	00.25	00.11	00.31	00.12	00.25	00.29	00.86	00.64	00.51	00.53	00.73	00.27	00.14

ANALYSED DATA:																									
T = 1/1.11yrs.	$K_{1.11}$	=	-1.10	01.88	01.35	01.92	02.48	02.82	04.38	05.71	05.94	05.60	05.14	03.24	02.23	01.26	00.90	01.25	01.52	02.14	02.67	04.47	05.31	05.00	03.19	02.05	01.60
T = 1/2.00yrs.	$K_{2.00}$	=	-0.16	01.99	01.77	02.16	02.71	03.58	05.10	06.29	06.45	06.22	05.70	03.86	02.46	01.36	01.19	01.36	01.75	02.42	03.47	05.07	05.79	05.50	03.88	02.30	01.73
T = 1/2.33yrs.	$K_{2.33}$	=	0.00	02.00	01.84	02.21	02.75	03.71	05.23	06.39	06.54	06.33	05.80	03.97	02.51	01.38	01.24	01.38	01.79	02.46	03.62	05.17	05.87	05.59	04.00	02.35	01.76
T = 1/5.00yrs.	$K_{5.00}$	=	0.72	02.08	02.16	02.39	02.92	04.29	05.77	06.82	06.92	06.80	06.23	04.45	02.69	01.46	01.46	01.46	01.97	02.67	04.23	05.63	06.24	05.97	04.53	02.54	01.85
T = 1/10.00yrs.	$K_{10.00}$	=	1.30	02.15	02.42	02.54	03.06	04.76	06.22	07.18	07.24	07.19	06.58	04.83	02.84	01.53	01.64	01.53	02.11	02.84	04.73	06.00	06.54	06.28	04.96	02.70	01.93
T = 1/20.00yrs.	$K_{20.00}$	=	1.87	02.21	02.67	02.68	03.20	05.21	06.65	07.52	07.54	07.56	06.91	05.21	02.98	01.59	01.81	01.60	02.25	03.01	05.21	06.36	06.83	06.57	05.37	02.85	02.01
T = 1/30.00yrs.	$K_{30.00}$	=	2.19	02.25	02.81	02.77	03.28	05.47	06.89	07.72	07.71	07.77	07.10	05.42	03.06	01.62	01.91	01.64	02.33	03.10	05.49	06.57	07.00	06.74	05.61	02.94	02.05
T = 1/50.00yrs.	$K_{50.00}$	=	2.59	02.29	02.99	02.87	03.37	05.79	07.20	07.96	07.93	08.04	07.35	05.69	03.16	01.67	02.04	01.68	02.43	03.22	05.84	06.83	07.20	06.96	05.91	03.05	02.11

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (HTL)



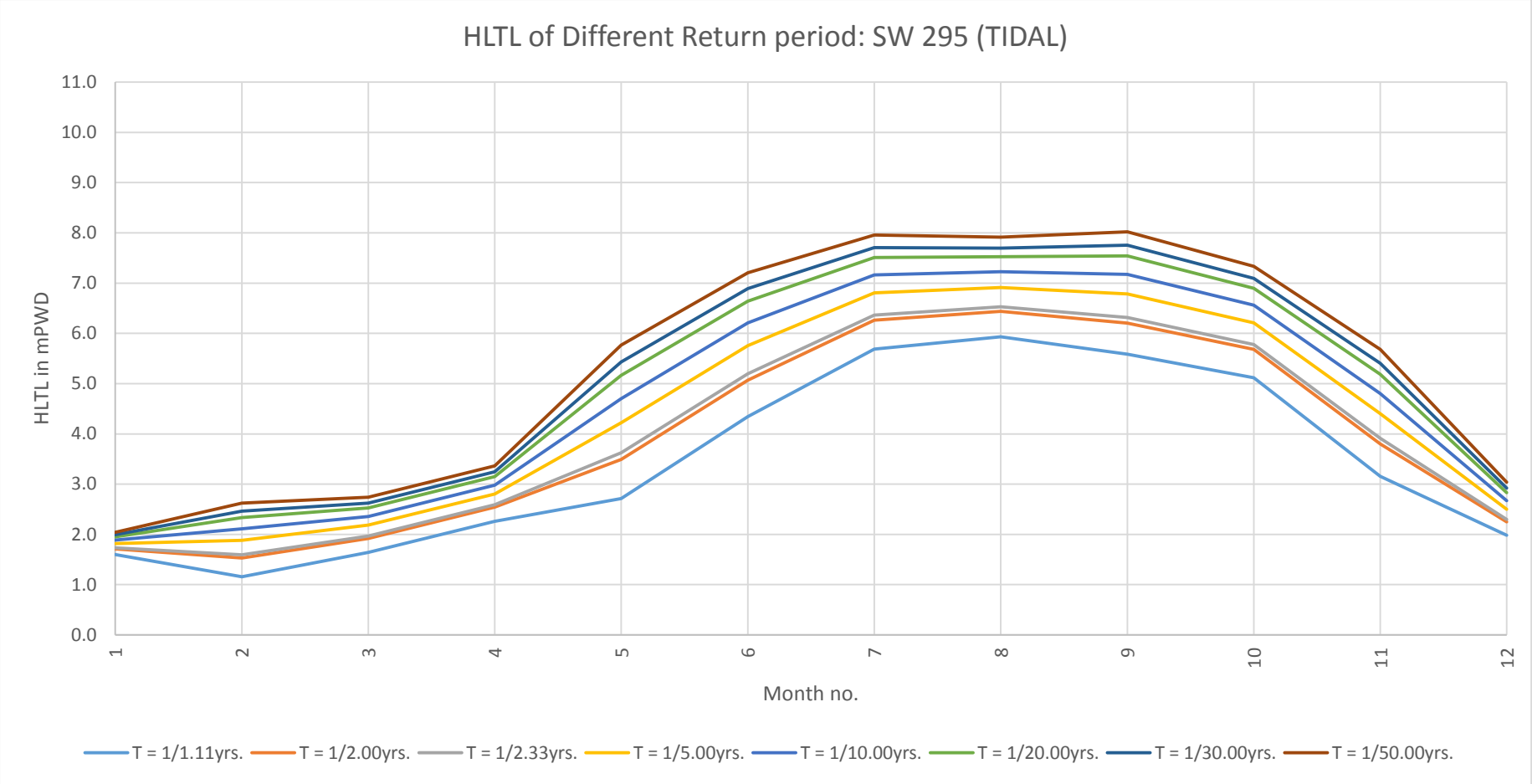
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (HTL)



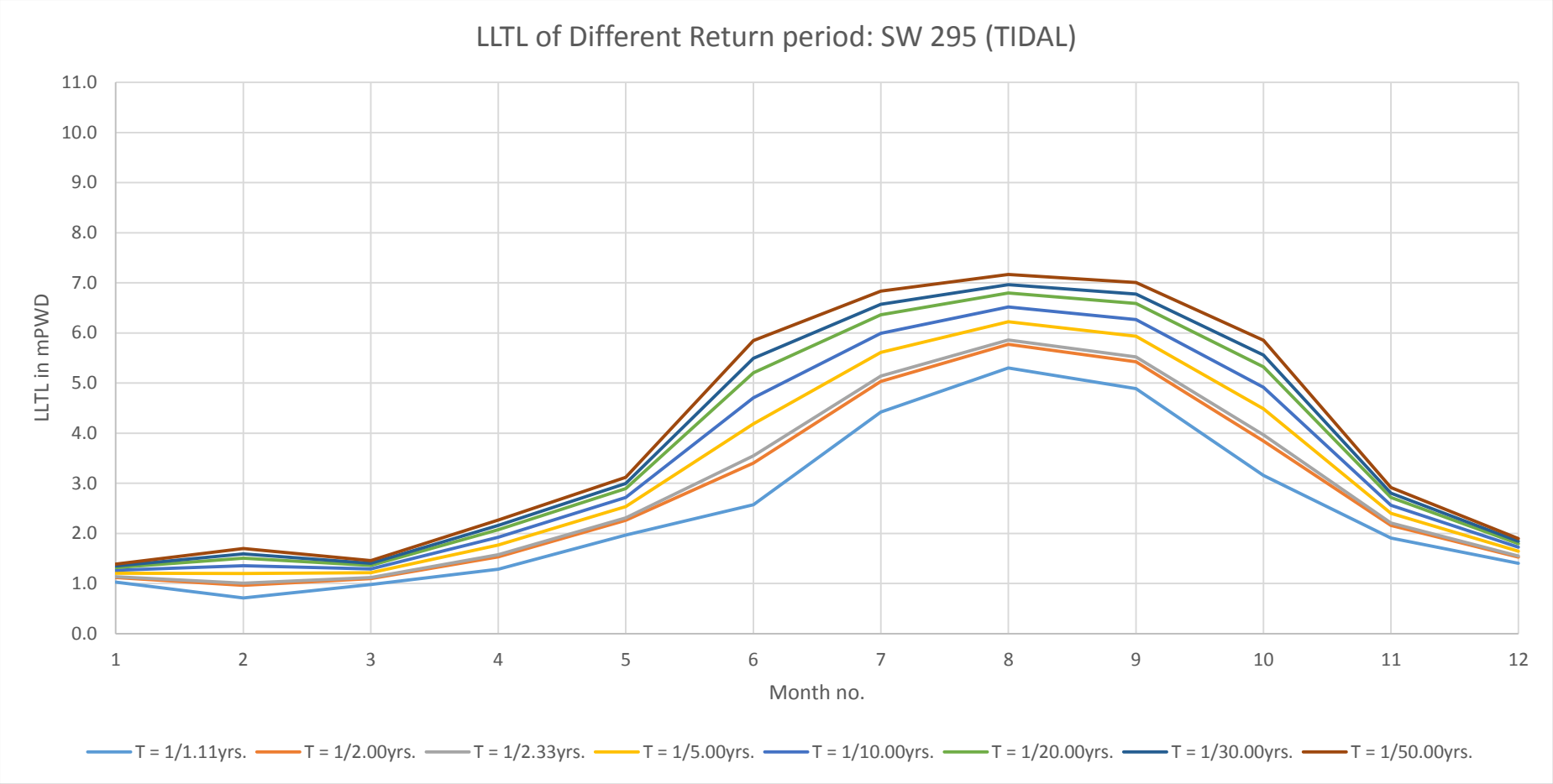
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (LTL)

Monthly Data	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WL		Monthly Maximum LTL (mPWD)												Monthly Minimum LTL (mPWD)											
	1981				02.79	03.32	04.02	06.25	06.60	06.42	05.67	03.05	02.62				01.34	02.12	03.45	04.11	06.10	05.72	03.13	02.29	01.50
	1982	01.66	01.56	01.86	02.69	02.89	05.39	06.14	06.60	05.84	05.52	02.81	01.94	01.10	01.04	01.05	01.69	02.32	02.51	05.44	05.77	05.44	02.81	01.67	01.34
	1983	01.62	01.64	02.53	02.93	03.66	04.75	06.02	06.79	06.97	06.68	04.87	02.33	01.07	00.87	01.20	01.86	02.89	03.52	04.78	06.09	06.64	04.98	02.36	01.62
	1984	01.89	01.66	01.89	02.56	05.04	05.76	07.08	07.06	07.10	06.60	03.89	02.02	01.26	00.66	01.06	01.46	02.30	04.95	05.53	05.77	05.77	04.00	01.95	01.43
	1985	01.54	01.70	02.26	02.72	02.98	05.40	06.47	06.53	05.89	05.50	03.83	02.27	01.19	01.02	01.35	01.76	02.27	03.11	05.45	05.82	04.59	03.92	02.28	01.52
	1986	01.72	01.56	01.88	02.88	02.83	03.66	05.51	05.77	05.59	05.77	04.72	02.62	01.04	00.92	01.00	01.28	02.33	02.12	03.77	05.15	05.36	04.80	02.60	01.48
	1987	01.73	01.62	01.77	02.56	02.63	04.69	06.45	07.10	06.69	06.69	03.98	02.30	01.13	01.06	00.99	01.59	02.15	02.50	04.83	06.60	06.11	04.11	02.24	01.62
	1988	01.72	01.70	01.96	02.42	05.28	06.22	07.57	07.68	07.85	06.19	04.30	03.06	01.00	01.22	01.26	01.65	02.10	05.07	06.19	06.24	06.27	04.46	02.46	01.65
	1989	01.72	01.83	01.82	02.45	03.46	05.12	06.45	06.60	06.08	05.83	04.81	02.27	01.28	01.26	01.16	01.19	02.51	03.50	04.97	05.98	05.81	04.91	02.33	01.45
	1990	01.74	01.72	02.19	03.24	03.96	05.62	06.14	06.24	05.92	06.23	04.41	02.33	01.15	01.10	01.16	01.62	02.90	03.99	05.61	05.97	05.27	04.56	02.13	01.68
	1991	02.06	01.77	01.75	02.42	05.38	06.25	06.32	06.05	06.53	06.39	04.74	02.17	01.19	01.20	01.15	01.82	02.20	05.40	05.81	05.71	05.66	04.86	02.22	01.71
	1992	01.81	01.83	01.89	02.32	02.91	04.23	05.74	05.49	05.06	04.87	03.86	02.07	01.17	01.07	01.20	01.70	01.98	02.67	04.42	04.83	04.69	03.97	02.13	01.51
	1993	01.69	02.16	01.93	02.17	04.08	06.38	07.19	06.90	06.48	05.80	03.67	02.24	01.18	01.06	01.38	01.47	02.25	04.01	06.25	06.32	05.54	03.73	02.10	01.45
	1994	01.77	01.68	02.92	02.97	02.96	04.89	05.16	05.79	05.66	04.51	02.92	02.04	00.99	01.07	01.15	02.25	02.24	02.84	04.82	05.06	04.60	02.96	01.72	01.33
	1995	01.62	01.52	01.70										00.95	01.00	00.89									
	1996				02.55	03.63	04.36	06.62	06.46	06.29	05.24	03.90	02.34				01.98	02.43	03.64	04.41	05.88	05.31	03.63	02.41	01.75
	1997	01.86	01.66	01.86	02.01	02.95	04.64	06.36	05.99	05.82	05.76	02.73	01.72	01.18	01.12	01.09	01.43	01.63	02.92	04.66	05.52	05.34	02.77	01.62	01.31
	1998	01.58	01.40	02.08	02.52	03.42	05.56	07.25	07.32	07.46	05.75	03.82	02.60	00.97	00.92	00.87	01.53	02.00	03.39	05.46	06.98	05.90	03.84	02.57	01.72
	1999	01.87	01.67	01.72	02.34	03.21	04.96	06.62	06.46	06.52	05.84	04.72	02.32	01.21	01.19	01.16	01.26	02.40	03.33	05.21	06.07	05.88	04.81	02.40	01.70
	2000	01.75	01.59	01.96	02.74	04.42	06.18	06.24	06.63	06.45	06.29	03.85	02.16	01.25	01.08	01.18	01.54	02.81	04.55	05.51	05.49	06.11	03.86	02.23	01.57
	2001	01.65	01.74	01.69	02.24	03.03	05.21	05.35	06.23	05.82	05.35	04.20	02.51	01.20	01.15	01.12	01.23	02.06	03.04	05.01	05.48	05.39	04.23	02.42	01.61
	2002	01.72	00.00	01.90	02.87	04.08	05.86	06.69	06.76	06.13	04.88	03.06	02.32	01.12	00.00	01.10	01.44	02.62	04.01	05.73	06.18	04.53	02.88	02.20	01.57
	2003	01.64	01.52	01.79										01.21	01.11	01.02									
	2004																								
	2005																								
	2006																								
	2007																								
	2008																								
	2009																								
	2010																								
	2011																								
	2012																								
	2013																								
	2014																								
	2015																								
	MAX	02.06	02.16	02.92	03.24	05.38	06.38	07.57	07.68	07.85	06.69	04.87	03.06	01.28	01.26	01.38	02.25	02.90	05.40	06.25	06.98	06.64	04.98	02.60	01.75
	MIN	01.54	00.00	01.69	02.01	02.63	03.66	05.16	05.49	05.06	04.51	02.73	01.72	00.95	00.00	00.87	01.19	01.63	02.12	03.77	04.83	04.53	02.77	01.62	01.31
	N	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
	AVE.	01.73	01.60	01.97	02.59	03.62	05.20	06.36	06.53	06.31	05.78	03.91	02.30	01.13	01.01	01.12	01.58	02.31	03.55	05.14	05.86	05.52	03.96	02.21	01.55
	σ	00.12	00.40	00.30	00.30	00.83	00.77	00.61	00.54	00.66	00.60	00.68	00.29	00.10	00.27	00.13	00.27	00.31	00.89	00.65	00.50	00.57	00.73	00.27	00.13
ANALYSED DATA:																									
T = 1/1.11yrs.	$K_{1.11}$ = -1.10	01.60	01.16	01.64	02.26	02.71	04.34	05.69	05.93	05.59	05.12	03.16	01.98	01.03	00.71	00.98	01.28	01.97	02.57	04.42	05.30	04.89	03.16	01.90	01.40
T = 1/2.00yrs.	$K_{2.00}$ = -0.16	01.71	01.53	01.92	02.54	03.49	05.07	06.26	06.44	06.20	05.68	03.80	02.25	01.12	00.96	01.10	01.53	02.26	03.40	05.03	05.77	05.43	03.84	02.16	01.53
T = 1/2.33yrs.	$K_{2.33}$ = 0.00	01.73	01.60	01.97	02.59	03.63	05.20	06.36	06.53	06.31	05.78	03.91	02.30	01.13	01.01	01.12	01.58	02.31	03.55	05.14	05.86	05.52	03.96	02.21	01.55
T = 1/5.00yrs.	$K_{5.00}$ = 0.72	01.82	01.88	02.18	02.81	04.22	05.75	06.80	06.91	06.79	06.21	04.40	02.50	01.21	01.20	01.21	01.77	02.53	04.19	05.61	06.22	05.93	04.49	02.40	01.64
T = 1/10.00yrs.	$K_{10.00}$ = 1.30	01.89	02.11	02.36	02.98	04.70	06.21	07.16	07.22	07.17	06.56	04.80	02.67	01.26	01.35	01.29	01.92	02.72	04.71	05.99	06.52	06.27	04.92	02.56	01.72
T = 1/20.00yrs.	$K_{20.00}$ = 1.87	01.95	02.34	02.52	03.15	05.17	06.64	07.51	07.53	07.54	06.90	05.19	02.83	01.32	01.50	01.36	02.07	02.89	05.21	06.36	06.80	06.59	05.32	02.71	01.80
T = 1/30.00yrs.	$K_{30.00}$ = 2.19	01.99	02.46	02.62	03.24	05.43	06.89	07.71	07.70	07.75	07.09	05.41	02.92	01.35	01.59	01.40	02.16	02.99	05.49	06.57	06.96	06.77	05.56	02.80	01.84
T = 1/50.00yrs.	$K_{50.00}$ = 2.59	02.04	02.62	02.74	03.37	05.77	07.20	07.95	07.92	08.02	07.34	05.68	03.04	01.39	01.70	01.45	02.26	03.12	05.85	06.84	07.16	07.00	05.86	02.91	01.89

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (LTL)



MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 295 (LTL)



INSTRUCTIONS TO SURVEYORS:
INFORMATION TO BE COLLECTED DURING BATHYMETRIC SURVEY AND PHYSICAL FEATURE SURVEY:

1. During survey works, information regarding water levels should be collected. Information should include: a. Notable highest flood level (HFL) and lowest flood level (LFL) in the past. (ASK LOCALS) b. Notable Highest tide level (HTL) and lowest tide level (LTL) in the past. (ASK LOCALS) c. Present water level (PWL) during survey at the point of surveyed section should be measured.
2. Cross-sections should be collected at entry and exit of a bends of rivers, at centers of riffles of rivers at junctions with tributaries and distributaries and mouths of rivers, near locations of water level gauges and at locations of hydraulic structures.
3. GPS location of the surveyed section should be collected.
4. Local names of the rivers being surveyed and their tributaries (If any) should be collected. (ASK LOCALS)
5. Information regarding hydraulic structures have to be collected consulting with the government agencies like BWDB, BADC, LGED and RHD. Information should include: a. Sill level of regulators, rubber dams, weirs and culverts. b. Opening of the structures. c. Storage level of water retention structures and dams. d. Information of the projects that funded the construction of the structures if possible to collect.
6. Consulting with the local people, information regarding flash flood have to be collected. Information should include: a. Number of incident(s) of flash flood in a year. b. Probable time(s) of flash flood(s) to occur. c. Duration(s) of flash flood(s). d. Areas that are more prone to damage inflicted by flash flood.
7. Information regarding water logging should be collected. Local people should be consulted in this regard. Information should include: a. Name of the areas experiencing frequent water logging problems. b. Duration of water logging. c. Local idea about cause of water logging.
8. Information regarding drains should include: a. Size of drains: (Depth X Width) b. RL of drains at different locations.
    1. c. Construction type of drains: i. Lined / Unlined ii. Man-made / Natural d. Method of connection of households to the drains. e. Location of different point of the drains: i. Starting points ii. Junction points iii. End points f. Name of roads alongside the drains, ward no. / name of village. g. Use of drains: i. Sewer ii. Storm-sewer iii. Mixed
9. Information regarding encroachment of drains and natural channels should be collected.

Table A2.1: Dumpy level reading sheet

Ch.	Distance (m)		Staff reading			Height of instrument	RL	Remarks
(m)	(m)	(m)	BR (m)	IS (m)	FR (m)	(m)	(m)	

Table A2.2: Drainage Inventory

Upazila	Ward no.	By road	Reach	GPS location		RL (mPWD)		Reach Length	Depth	Width	Type
				Start	End	Start	End	(m)	(mm)	(mm)	

CROSS-SECTIONS OF RIVERS AND CHANNELS AS SURVEYED

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-02
(Ishwarganj Upazila, Mymensing; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Hydrological Survey
of
Raipura Upazila, Narsingdi

August, 2016

Joint Venture of

Sheltech Consultants Pvt. Limited
And
Arc-Bangladesh Limited

EXECUTIVE SUMMERY

.Raipura is the largest Upazila under Narsingdi district.This Upazila holds an important arena in Narsingdi District with her natural resources and ecosystem.The landscape is complex. It is reported that natural disasters like drought, flood, decreasing ground water, heavy rain, early rain, erosion, water logging and hail-storm damage crops of this Upazila.However shifting agricultural land to non-agricultural purposes is a common phenomenon in this Upazila.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 proposed Preparation of Development Plan for Fourteen Upazilas, Package 02 is expected to contribute to achieving the objectives of the National Agriculture Policy**.**

. Bangladesh has been divided into 30 Agro Ecological Zones based on soil, landform and climatic characteristics. RaipuraUpazila falls into 04 Agro Ecological Zone: (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii)Old Brahmaputra Floodplain (AEZ 9), (ii)Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). RaipuraUpazilla consists of 24 Unions and 1 Paurashava. Most of the people of this Upazila are directly or indirectly dependent on agriculture.

RaipuraUpazila 24 unions consist of 4 land Zones. These are: (1).Agriculture Zones, (2) Agro-Fisheries Zone, (3) Agro-fisheries Zone (Char Land) and (4) Agro-Forest-Fruits Garden Zone.The highest percentage is double cropped area (63%) followed by single cropped area (24%), and triple crop area (13%) under RaipuraUpazila. The cropping intensity ofRaipuraUpazila is 201% which is less thanNarsingdi district (207%)and higher than average National cropping Intensities (190%).

The scenario of present cropping pattern under RaipuraUpazila is complex and predominantlyBoro and B. Aman& T. Aman Rice, Jute, Vegetables, Oilseeds, Pulses Spices, Fruits Garden based. Study finding shows 12 different cropping pattern are practiced by RaipuraUpazila farmers. RaipuraUpazila present one main cropping pattern area isBoro(HYV/Hybrid)→Fallow→Fallow which is practiced 36.53% of the Net Cultivable Area (NCA).Similarly,Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 28.49% of the Net Cultivable Area (NCA). Further, winter vegetables→KHarif-1 vegetables→Kharif-11 summer vegetables which are practiced about 12.05% of the Net Cultivable Area (NCA).Mustard→Boro(HYV/Hybrid)→T. Aman (HYV/LV) is covering about 5.57 % of the NCA. Potato & Sweet Potato are the cropping pattern covering about 4%&2%of the NCA. Fruits Garden is covered about 13% of the Net Cultivable Area.Spices→Jute→Fallow is practiced about 4% Net Cultivable Area.

Rice, Jute, winter and summer vegetables, potato, mustard, groundnut and pulses, and various fruits crops are grown in 24 Unions and 1 Municipality under RaipuraUpazila. The present total different cropped area is **35392** ha of which rice cropped area are **24530** ha and the rest **10862** 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 70% and 30% respectively of the total cropped area. The highest land area was used for Boro (HYV/Hybrid), T. Aman (HYV) rice and Jute cultivation.Total crop production is **290304.89** metric tons of which rice production is **133058.24** metric tons and non-rice production is **157246.65**metric tons**.** Among the rice crops the contributions of T. Aman (LV), T. Aman (HYV) and Boro (HYV & Hybrid) are about 5%, 16%, & 78% and Aus (HYV),Boro(local) and Boro(Hybrid) less than respectively. The highest contribution among the non-rice crops are

winter vegetables (45%)& Summer vegetables (18%) followed by Potato (11%), fruits (9%)and Jute (8%) respectively.

The main source of water is both surface and ground water. A total of 5413 machine were used for irrigation under Unions in RaipuraUpazila. There is no DTW under RaipuraUpazila for irrigation. A total 5116 STW and 297LLP used for Boro rice and others crops irrigation under different Unions. Different Unions **3436** STW and also **290** LLP has no electricity facilities for irrigation. Framers wanted nonstop electricity supply during Boro season.All the irrigation drainage system is not pucca which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Rice production cost of Boro and Aus are Tk.18.65 and Tk.18.64 per kg, and Aman rice production cost is Tk.17.61 per kg which is less than Boro and Aus.The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower and cucumber vegetables production under RaipuraUpazila. Study finding shows Brinjal cultivation is more profitable (Tk.820000/-per ha) followed by Cabbage/Cauliflower(Tk475000/- per ha), Tomato (Tk.450000/- and Potato (Tk350000/- per ha) and Cucumber (Tk.200000/-).

It is found that 81% local variety rice was decreased during last ten years. Remarkable significant changed or increased during 10 years was occurred inHYV paddy cultivation (251%) summer vegetables (84%), winter vegetables (102%),Wheat(33%), Tuber crops(30%) oilseeds (20%), Spices (52%) and Jute cultivation (15%) land use. Among the other purposes remarkable significant changed were occurred in poultry farm (205%) and Brick field (102%) and followed by gardening (69%) and Housing (57%) respectively.

Major problems to crop production in 24 Unions and 1 Municipality under RaipuraUpazila are drought; heavy rain, water logging, and river erosion, electricity power failure during Boro crop season, no wholesale market and infrastructure for agriculture product, no cold storage and large vegetables selling center or market under 24 Unions. Farmers lack of knowledge on modern crop production. Triple cropped land converted into unplanned non-agriculture purposes(construction of houses, brickfield, sawmill, road, market and other infrastructures).

Ensure availability of good quality crop seeds and cultivation machineries. Nonstop electricity supply during Boro crop season and Kutcha drain need to made pucca drain. Road network at local level, agro-processing and 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.Each Union one wholesale market infrastructure need to be constructed.DAE may arrange joint collaborative soil testing and recommendation and training program for beneficiaries. Financial support needs to be provided to DAE from project.

Agro-based processing center & industries need to beestablishment under 24 unions and Municipality. There is a need for construction of infrastructure for some agro-base processing center. There is a need tointegrated effort for industrial effluents and waste management.

Abbreviation/Acronyms

AEO	Agriculture Extension Officer
AEZ	Agro-Ecological Zone
BARI	Bangladesh Agriculture Research Institute
BCR	Benefit Cost Ratio
BINA	Bangladesh Institute of Nuclear Agriculture
BRRI	Bangladesh Rice Research Institute
BSRI	Bangladesh Sugarcane Research Institute
BBS	Bangladesh Bureau of Statistics
CC	Climate Change
CA	Commercial Area
CDS	Coastal Development Strategy
DAE	Department of Agricultural Extension
DTW-	Deep Tube Well
DS/m	Deci-Siemens/meter
FAO	Food and Agricultural Organization
GO-	Government Organization
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
LLP	Low Lift Pump
NCA	Net Cultivable Area
NLUP	National Land Use policy
NWP	National Water Policy
NIPM	National Integrated Pest Management
NWMP	National Water Management Policy
P^H	Negative Logarithm of Hydrogen ion concentration
PRA	Participatory Rapid Appraisal
SAAO	Sub-Assistant Agricultural Officer
SRDI	Soil Resource Development Institute
SPSS	Statistical Package for Social Sciences
STW	Shallow Tube Well
T. Aman	Transplanted Aman
T. Aus	Transplanted Aus
ToT	Training of Trainers
UAO	Upazila Agricultural Officer
WARPO	Water Resources Planning Organization

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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 :02

Raipura and Shibpur Upazila, District: Narsingdi & Ishwarganj Upazila, District: Mymensingh

DRAFT FINAL SURVEY REPORT

Agricultural Survey
of
Raipura Upazila

August 2016

Joint venture of

SHELTECH CONSULTANTS PVT. LIMITED

An

ARC BANGLADESH LTD

EXECUTIVE SUMMERY

Land is a resource base for livelihood activities of human being. It is used for food production, industry, housing and other development activities. Increased population and their growing demand for various productions, the area of agricultural land is decreasing. Protecting agriculture land and to meet rational needs of other sectors are our great national challenges. 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 proposed Preparation of Development Plan for Fourteen Upazilas, Package 02 is expected to contribute to achieving the objectives of the National Agriculture Policy**.**

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The highest percentage is double cropped area (63%) followed by single cropped area (24%), and triple crop area (13%) under Raipura Upazila. The cropping intensity of Raipura Upazila is 201% which is less than Narsingdi district (207%) and higher than average National cropping Intensities (190%).

Land type is the dominant factor guiding choice of crops and cropping patterns of Roypura Upazila. Selection of crop largely depends on topographic position of land. Study finding shows 12 different cropping patterns are practiced by Raipura Upazila farmers. Raipura Upazila present major cropping pattern area is Boro(HYV/Hybrid)→Fallow→Fallow which is practiced 36.53% of the Net Cultivable Area (NCA). Similarly, Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 28.49% of the Net Cultivable Area (NCA). Further, winter vegetables→Kharif-1 vegetables→Kharif-11 summer vegetables which are practiced about 12.05% of the Net Cultivable Area (NCA). Mustard→Boro(HYV/Hybrid)→T. Aman (HYV/LV) is covering about 5.57 % of the NCA. Potato & Sweet Potato are the cropping pattern covering about 4% &2% of the NCA. Fruits Garden is covered about 13% of the Net Cultivable Area. Spices→Jute→Fallow is practiced about 4% Net Cultivable Area.

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In Rabi crop season maximum cultivated area (57-100%) are covered by irrigation water under different Unions**.** This indicates that farmers have access to irrigation water that facilitated ground water and surface water lifting. The main source of water is both surface and ground water. A total of 5413 machine were used for irrigation under Unions in Raipura Upazila. There is no DTW under Raipura Upazila for irrigation. A total 5116 STW and 297LLP used for Boro rice and others crops irrigation under different Unions. Different Unions 3436 STW and also 290 LLP has no electricity facilities for irrigation. Framers wanted nonstop electricity supply during Boro season. All the irrigation drainage

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. Remarkable significant changed or increased during 10 years was occurred in HYV paddy cultivation (251%) summer vegetables (84%), winter vegetables (102%), Wheat(33%), Tuber crops(30%) oilseeds (20%), Spices (52%) and Jute cultivation (15%) land use. It is found that 81% local variety rice was decreased during last ten years. Among the other purposes remarkable significant changed were occurred in poultry farm (205%) and Brick field (102%) and followed by gardening (69%) and Housing (57%) respectively.

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Appendixes

Chapter-01:
Introduction

1.1 Background of the Study

Land is a resource base for livelihood activities of human being. It is used for food production, industry, housing and other development activities. Increased population and their growing demand for various productions, the area of agricultural land is decreasing. Additionally flood, erosion, drought, cyclone and storm surges are affecting and degrading land resources. Protecting agriculture land and to meet rational needs of other sectors are our great national challenges. Raipura Upazila under Narsingdi district is located in the north-eastern direction of Dhaka Capital city. Several rivers are flowing through the upazila such as Meghna, Old Brahmaputraand Arial Khan. The Agro-ecological zones of the under the upazila are: Young Brahmaputra Floodplain (AEZ-8), Middle Meghna River Floodplain (AEZ-16) and Madhupur tract (AEZ-28).

Raipura Upazilla consists of one Municipality and 24 Unions. Most of the people of this Upazila are directly or indirectly dependent on agriculture. The newly accreted *Chars* and *Islands* have special uses also. It is reported that natural disasters like seasonal flood, drought, river erosion, water logging, and hail-storm, tornado and land erosion damage crops of this Upazila. 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.

Furthermore, improper land uses affect flora and fauna habitat and thus impact ecosystem and biodiversity. 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 Raipura 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.KII information was collected by used of questionnaire Annex-1. The secondary data were collected and reviewed on land use from DAE Union and Upazila Office documents.

KII information was collected from 51 Sub-Assistant Agriculture Officers under 1 Municipality and 24 Unions through interview. Structured and semi-structured questionnaire was used for data collection (Annex-2). Data collection and consolidation occurred simultaneously. 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, and d-Base for data analysis.

Chapter-02:
Agriculture Relevant Policy Framework

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 programme 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: 02 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. Most of the programs are likely to be implemented in coastal areas.

Preparation of Development Plan for Fourteen Upazilas Package: 02 has been designed in line with this Plan and addresses its key objectives for the water resource management in the Raipura Upazila under Narsingdi district areas.

2.3 The Ground Water Management Ordinance, 1985 (Ordinance No. Xxvit 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 02 has been designed in line with this Plan and addresses its key objectives for the ground water management ordinance for Raipura 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 coastal chars will be maintained. Among the 28 policy statements of NLUP, the following are relevant to the Raipura Upazila under Dhaka Region area:

- forests declared by the Ministry of Environment and Forests will remain
- as forest lands;
- reclassification of forest lands will be prevented; and
- effective green belts will be created all along the coast.

Preparation of Development Plan for Fourteen Upazilas Package 02 is designed in accordance with this Policy and will comply with the above listed requirements.

2.5 National 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: 02 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 02 is expected to contribute to achieving the reduces pesticides used in agriculture sector and increases use of other pest control methods under National IPM policy.

Chapter-03:
Present Land Used

3.1 Description of the Present Situation

Wide range of rabi and kharif crops such as Paddy, jute, wheat, mustard, potato, groundnut, vegetables etc grow here. Major fruits of this upazila are mango, jackfruit, papaya, guava, plum and melon. Raipura is the largest Upazila under Narsingdi district. Bangladesh has been divided into 30 Agro Ecological Zones based on soil, landform and climatic characteristics. Raipura Upazila falls into 04 Agro Ecological Zone: (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). Most of the areas of this Upazila are developed from terrace, piedmont and transformed alluvial deposit by the Meghna, Brahmaputra and Jamuna river. The landscape is complex.

General soil color of Raipura is grey to brownish. The top soil is occupied by acidic, permeable loamy soils and some parts are clayey. In Raipura 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 4.6-7.0(SRDI 2003 and UAO 2016). Raipura Upazilla consists of 24 Unions and 1 Paurashava. Most of the people of this Upazila are directly or indirectly dependent on agriculture.

3.2 Raipura Upazila and Union Wise Farm Families

Farmers in Roypura Upazila lead their livelihood from agricultural activities. It is the main source of their employment and income. Raipur Upazila has 24 Unions and 1 Municipality. It has 107 Mauza, 23 Paura mahalla and 239 villages and 9 wards. Raipura has 73 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), and medium (2.51-7.50 acre land) and larger (above 7.50 acre land).

Union and category wise farm family under RaipuraUpazila is shown in Table 1. On an average about land less 20229, marginal 31876, small 30440, medium large 4467 farm families and remaining 229 are larger farmers under Raipura Upazila. The highest percentages of farm families are Marginal (37%), followed by small farmers (35%) landless (23%), medium farmers (5%) and remaining less than 1 % are larger farmers (Fig-1).

Table1: Union and Category Wise Farm Family under Raipura Upazila

Name of Union	Landless (%)	Marginal (%)	Small (%)	Medium (%)	Larger (%)	Total
	(.05-.50 acre)	(.51-1.50acre)	(1.51-2.50 acre)	(2.51-7.50 acre)	(above 7.50 acre)	
Amirganj Union	1370(26.50)	1780(34.43)	1940(37.52)	80(1.55)	0(0.0)	5170
Adiabad Union	1162(42.72)	915 (33.64)	530(19.49)	113(4.15)	0 (0.00)	2720

Alipura Union	942(25.58)	1381(37.51)	1306(35.47)	53(1.44)	0 (0.00)	3682
Banshgari Union	112(3.381)	1214(36.64)	1761(53.15)	217(6.55)	9(0.27)	3313
Chanderkandi Union	1205(35.82)	1130(33.59)	829(24.64)	182(5.41)	18(0.54)	3364
Chandpur Union	825(21.41)	1610(41.77)	1148(29.79)	271(7.03)	0(0.00)	3854
Char Aralia Union	348(14.65)	765(32.21)	1252(52.72)	10(0.42)	0 (0.00)	2375
Char Madhua Union	497 (22.14)	840 (37.42)	740(32.96)	160 (7.13)	8 (0.36)	2245
Char Subuddi Union	806 (24.76)	1232(37.85)	1136 (34.90)	74 (2.27)	7 (0.22)	3255
Daukar Char Union	295 (15.05)	840 (42.86)	776 (39.59)	49 (2.5)	0(0.00)	1960
Hairmara Union	685 (28.84)	605 (25.47)	975(41.05)	100(4.21)	10(0.42)	2375
Maheshpur Union	1237(28.85)	1320(30.79)	1670(38.95)	60(1.40)	0 (0.00)	4287
Marjal Union	670 (15.55)	2020 (46.87)	1375(31.90)	228 (5.29)	17(0.39)	4310
Mirzanagar Union	818(25.49)	1275(39.73)	806 (25.12)	305(9.50)	5(0.16)	3209
Mirzapur Union	861(25.40)	1118(32.98)	1279(32.98)	130(3.83)	2(0.06)	3390
Mirzar Char Union	450(22.17)	900(44.33)	450(13.27)	205 (10.10)	25(1.23)	2030
Musapur Union	1250(29.19)	1690(39.47)	1237(28.89)	105(2.45)	0(0.00)	4282
Nilakhya Union	500 (15.87)	800(18.68)	1450(46.03)	360(11.43)	40 (1.27)	3150
Palashtali Union	1012(15.77)	2628(40.94)	2687(41.86)	89(1.39)	3(0.05)	6419
Paratali Union	1144(25.09)	1072(23.51)	1853(40.64)	445(9.76)	45(0.99)	4559
Radhanagar Union	748(20.61)	1850(50.96)	950(26.17)	82(2.26)	0 (0.00)	3630
Roypura Union	485(20.12)	805(33.40)	820(34.02)	282(11.70)	18(0.75)	2410
Sreenagar Union	700(17.11)	1194(29.18)	1691(41.32)	495(12.10)	12(0.29)	4092
Uttar Bakharnagar Union	940(27.67)	1397(41.12)	872(25.67)	188(25.67)	0(0.00)	3397
Raipura Paurashava	1167(31.01)	1495 (39.73)	907(24.10)	184(4.89)	(0.27)	3763
Total	20229 (23.19)	31876(36.54)	30440(34.89)	4467(5.12)	229(0.26)	87241

Source: SAAOs Raipur Upazila, DAE 2016

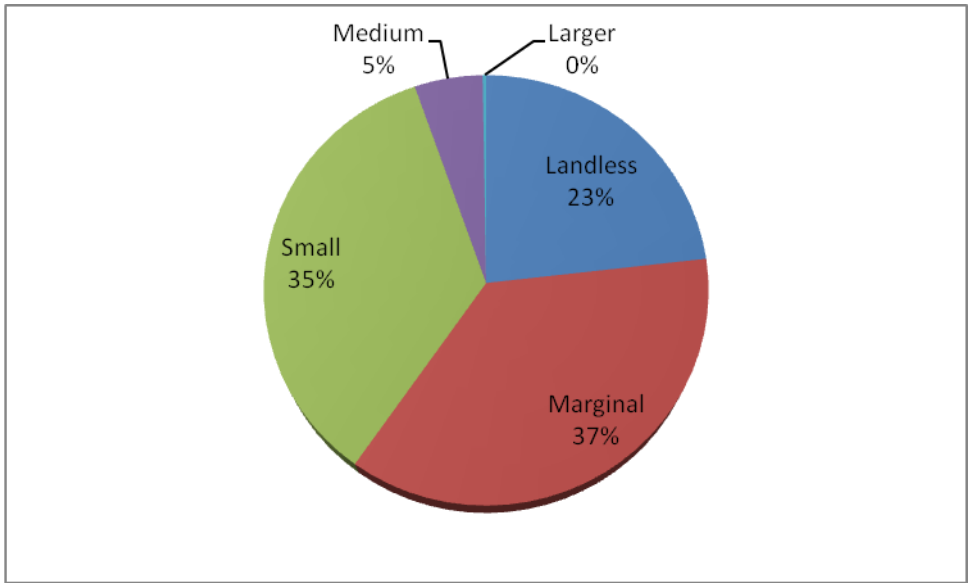

Figure 1: Percentage of Category Wise Farm Family under Raipur Upazila

3.3 Present Agricultural Land Use

3.3.1 Present Upazila Land Use

Agriculture is very important to local communities in Raipura. It is a science, art and business of cultivating soil, producing crops, and raising livestock. This Upazila holds an important arena in Narsingdi District with her natural resources and ecosystem. The scenario of Raipua Upazila present different land utilized is shown in Table 2. Types of lands are 2760 ha high land, 7876ha medium high land, 7501 ha medium low land and 5548ha low land respectively. Raipura Upazila covers 23685 ha of net cropped area of which about cultivated area is 44929 ha. The highest land area is 14950 ha is used as double crop and followed by single crop of 5588 ha and remaining 3147 ha is used as triple crops under Raipur Upazila.

Other land use: Permanent Fruit Garden 533ha, Forest 328ha and Fish cultivation 2801 ha. Annual food production under Raipura Upazila is 81242.75 mt. It is one of the food deficits Upazila (7523.12 mt). Percentage of single, double, triple cropped area used in Raipura Upazila is shown in Fig 2. The highest percentage is double cropped area (63%) followed by single cropped area (24%), and triple crop area (13%) under Raipura Upazila. The cropping intensity of Raipura Upazila is 201%. Union-wise Present Agriculture Land Use Information and Identified land Zoning of Raipura Upazila are shown in Table 3 and Table 4 and Fig 1.

Table-2: Raipura Upazila Present Land Use

Sl. No	Upazila Land use	Total Area (ha)
1.	Total Agricultural land	44929
2.	Single cropped area	5588
3.	Double cropped area	14950

4.	Triple cropped area	3147
5	Net cropped area	23685
6.	Cropping Intensity	201%
7.	Total Irrigated land	19864
8.	Total cultivable Land	24745
9.	Land under present cultivation	23685
10.	Permanent Fallow Land	65
11.	Temporary Fallow Land	134
9.	Water land (River, Ponds and others)	2801
10.	Forest land	328
11.	Household area	2841
12.	High land	2760
13.	Medium high land	7876
14.	Medium low land	7501
15	Low land	5548
16.	Permanent Fruit Garden	533
17.	Road and Infrastructure	868
18.	Total Food Production	81242.75 mt
19.	Annual Food Requirement	88766.22mt
20.	Food surplus or Deficit	-7523.12mt

Source Upazila Agriculture Office Raipura, DAE 2016

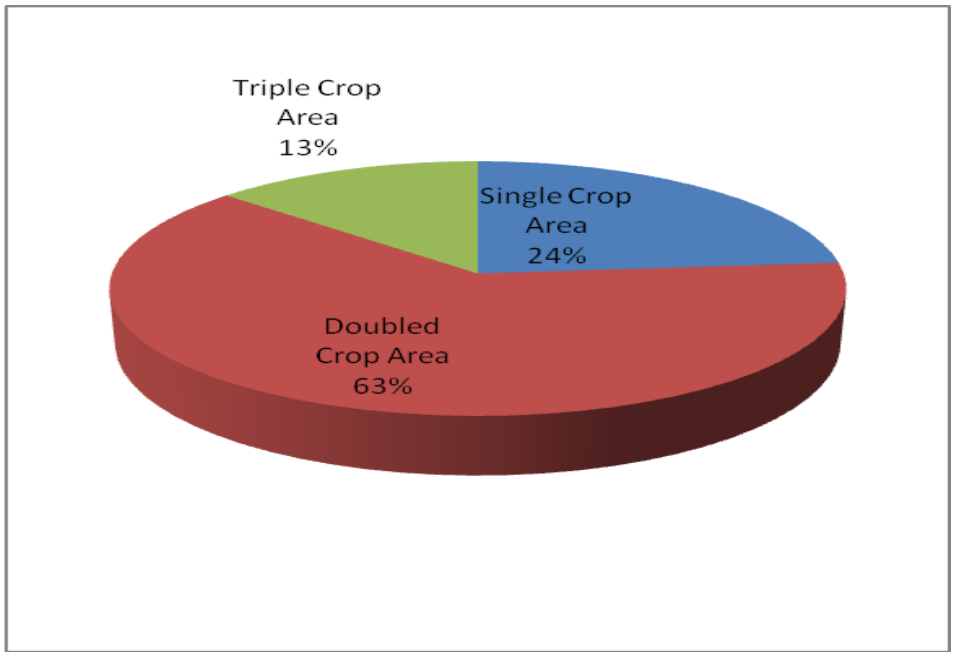

Figure 2. Percentage of Single, Double, Triple Cropped Area Used in Raipura Upazila

Table 3: Present Land Uses and Proposed Land Zoning of Raipura Upazila

Name	Area (ha)	Top Soil Texture	Cropping Intensity (%)	Summarized Land Use	Area (ha)	(%)	Recommended Land Zoning
Adiabad	718.8	Loam/ Silt Loam	240	Agricultural Land	426.06	59.27	Agriculture Zone
				Road	7.28	1.01	
				Rural Settlement & HV	257.53	35.83	
				Water Bodies	27.94	3.89	
Alipura	785.9	Loam/ Clay Loam	210	Agricultural Land	511.97	65.15	Agriculture Zone
				Road	3.01	0.38	
				Rural Settlement & HV	264.30	33.63	
				Water Bodies	6.58	0.84	
Amirganj	1626.8	Loam/ Silt Loam	199	Agricultural Land	982.13	60.37	Agriculture Zone
				Road	18.21	1.12	
				Rural Settlement & HV	560.71	34.47	
				Water Bodies	65.74	4.04	
Banshgari	1374.9	Clay Loam/ Clay	163	Agricultural Land	1100.58	80.05	Agro- Fisheries Zone (Char Land)
				Road	8.34	0.61	
				Rural Settlement & HV	143.77	10.46	
				Water Bodies	122.21	8.89	
Chander Kandi	903.1	Loam/ Clay	184	Agricultural Land	617.14	68.34	Agriculture Zone
				Road	11.29	1.25	
				Rural Settlement & HV	230.92	25.57	
				Urban Built-up Area	1.83	0.20	
				Water Bodies	41.87	4.64	

Contd

Name	Area (ha)	Top Soil Texture	Cropping Intensity (%)	Summarized Land Use	Area (ha)	(%)	Recommended Land Zoning
Chandpur	2414.8	Clay Loam/ Clay	171	Agricultural Land	1395.72	57.80	Agro- Fisheries Zone (Char Land)
				Road	0.71	0.03	
				Rural Settlement & HV	175.27	7.26	
				Water Bodies	843.06	34.91	
Char Aralia	1161.2	Loam/ Silt Loam	145	Agricultural Land	790.71	68.09	Agro- Fisheries Zone (Char Land)
				Road	4.47	0.38	
				Rural Settlement & HV	143.79	12.38	
				Water Bodies	222.28	19.14	
Char Madhua	910.3	Clay Loam/ Clay	146	Agricultural Land	539.43	59.26	Agro- Fisheries Zone (Char Land)
				Rural Settlement & HV	97.20	10.68	
				Water Bodies	273.63	30.06	
Char Subuddi	909.5	Loam/ Silt Loam	191	Agricultural Land	424.94	46.72	Agro- Fisheries Zone (Char land)
				Road	3.60	0.40	
				Rural Settlement & HV	257.93	28.36	
				Water Bodies	223.05	24.52	
Daukar Char	462.60	Loam/ Clay Loam	198	Agricultural Land	305.85	66.11	Agriculture Zone
				Road	7.92	1.71	
				Rural Settlement & HV	124.72	26.96	
				Water Bodies	24.11	5.21	
Hairmara	708.7	Silt Loam/ Loam	211	Agricultural Land	446.62	63.02	Agro- Fisheries Zone (Char Land)
				Road	6.58	0.93	
				Rural Settlement & HV	191.81	27.07	
				Water Bodies	63.67	8.98	
Maheshpur	903.1	Loam/ Sandy Loam	206	Agricultural Land	596.49	66.05	Agriculture Zone
				Road	3.30	0.37	
				Rural Settlement & HV	275.67	30.53	
				Water Bodies	27.62	3.06	
Marjal	1314.8	Loam/ Clay Loam	198	Agricultural Land	553.45	42.09	Agro- Forest- Fruits Garden Zone
				Forest	179.88	13.68	
				Fruits Garden	33.12	2.52	
				Road	12.02	0.91	
				Rural Settlement & HV	478.57	36.40	
				Water Bodies	57.79	4.40	
Mirzanagar	965.6	Loam/ Silt Loam	213	Agricultural Land	580.45	60.11	Agriculture Zone
				Road	14.04	1.45	
				Rural Settlement & HV	333.47	34.53	
				Water Bodies	37.64	3.90	
Mirzapur	1366.9	Loam/ Clay	188	Agricultural Land	918.33	67.19	Agriculture Zone
				Road	16.71	1.22	
				Rural Settlement & HV	374.01	27.36	

Name	Area (ha)	Top Soil Texture	Cropping Intensity (%)	Summarized Land Use	Area (ha)	(%)	Recommended Land Zoning
Musapur	1485.7	Loam/ Clay	201	Agricultural Land	716.36	48.22	Agro- Fisheries Zone (Char Land)
				Road	7.27	0.49	
				Rural Settlement & HV	328.78	22.13	
				Urban Built-up Area	9.64	0.65	
				Water Bodies	423.64	28.51	
Nilakhya	2347.8	Loam/ Clay	170	Agricultural Land	1403.93	59.80	Agro- Fisheries Zone (Char Land)
				Road	4.35	0.19	
				Rural Settlement & HV	270.23	11.51	
				Water Bodies	669.35	28.51	
Palashtali	1676.1	Loam/ Clay	204	Agricultural Land	995.95	59.42	Agriculture Zone
				Forest	9.54	0.57	
				Road	13.50	0.81	
				Rural Settlement & HV	512.93	30.60	
				Water Bodies	144.21	8.60	
Paratali	2562.3	Loam/ Clay	196	Agricultural Land	1901.67	74.22	Agro- Fisheries Zone (Char Land)
				Road	2.68	0.10	
				Rural Settlement & HV	271.71	10.60	
				Water Bodies	386.28	15.08	
Radhanagar	939.6	Loam/ Sandy Loam	217	Agricultural Land	589.34	62.72	Agro- Fisheries Zone
				Road	5.21	0.55	
				Rural Settlement & HV	288.57	30.71	
				Water Bodies	56.51	6.01	
Roypura	878.5	Clay Loam/ Clay	187	Agricultural Land	468.63	53.34	Agro- Fisheries Zone (Char Land)
				Road	0.07	0.01	
				Rural Settlement & HV	161.15	18.34	
				Water Bodies	248.66	28.30	
Sreenagar	2849.5	Loam/ Silt Loam	170	Agricultural Land	1960.52	68.80	Agro- Fisheries Zone (Char Land)
				Road	8.83	0.31	
				Rural Settlement & HV	207.92	7.30	
				Water Bodies	672.27	23.59	
Uttar Bakharnagar	922.6	Loam/ Clay Loam	199	Agricultural Land	512.02	55.50	Agriculture Zone
				Road	4.87	0.53	
				Rural Settlement & HV	376.87	40.85	
				Water Bodies	28.98	3.14	
Roypura Paurashava	847.6	Clay Loam/ Loam	188	Agricultural Land	453.54	53.51	Paurashava Area
				Road	12.16	1.44	
				Rural Settlement & HV	279.78	33.01	
				Urban Built-up Area	91.74	10.82	
				Water Bodies	10.34	1.22	

Table 4: Proposed Land Zoning for Raipura Upazila

Name of Zone	Union	Remarks
1. Agriculture Zone	Adiabad, Alipura, Amirganj, Daukar Char, Mirzanagar, Mirzapur, Palashtali Maheshpur and Uttar Bakharnagar	Considering present Agriculture lan use, land suitability analysis and a per opinion of local people thes unions are identified as agricultur zone
2.Agro-Fisheries Zone	Radhanagar	Some of the area is potential for capture and culture fisheries and high production of fisheries.
3.Agro-Fisheries Zone (Char Land)	Banshgari, Chandpur, Char Aralia, Char Madhua, Char Subuddi, Hairmara, Mirzar Char, Musapur, Nilakhya, Paratali, Chanderkandi , Roypura and Sreenagar	This area is stable char land of Meghna River and is potential for agriculture and capture and culture fisheries.
4. Agro- Forest- Fruits Garden Zone	Marjal	This union lies in agro -ecological zone of Modhupur tract and suitable for forest and various fruit garden.
5. Paurashava Area	Roypura Paurashava	Urban development plan should be implemented without degrading fertile agricultural land

Source: National Land Zoning Project Report January 2015

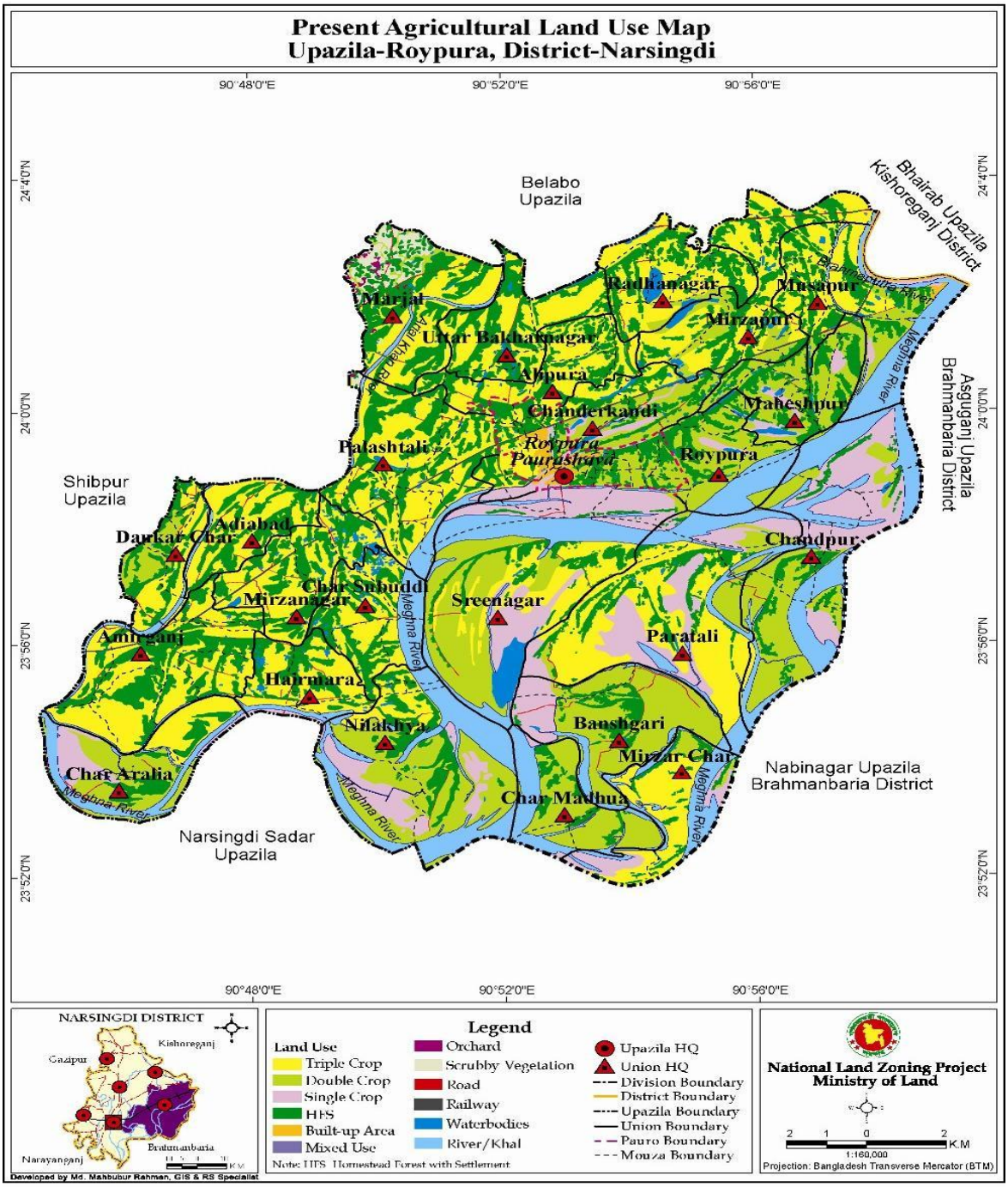

Figure 3. Agricultural Land Use Map of Raipura Upazila

Source: National Land Zoning Project Report January 2015

3.4 Union-Wise Present Agriculture Land Use

Raipur Upazila has 24 Unions and 1 Municipality lands used are given below.

3.4.1 Amirganj Union Land Use

General Description

Land of Amirganj is very potential for different crops cultivation such as rice, vegetables and fruits crops. Amirganj Union having agriculture cultivated area of 2230ha of land of which net cropped area is 1170 ha. The land types of this union are highland (6%), medium high land (52%), Medium low land (27%) , Low land (15%) and soil texture is loam & silt loam which indicates lands are suitable for different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-5.6. This Union is highly suitable for cultivation of Boro, T.Aman, Mustard, Jute, Potato and vegetables (Land Zoning Report, January 2015 SAAOs 2016).

Present Agriculture Land Use: Amirganj Union dominant land use is agriculture followed by homestead garden. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water. There are four cropping pattern are practiced in Amirganj Union which is shown in Table 5. The cropping intensity of this union is 191%. Major crops cultivated in this union are: paddy, Jute, Lemon, Dhaincha and Rabi & Kharif different vegetables.

Table-5: Present Cropping Patterns of Amirganj Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Amirganj	1170	Boro(HYV)→Fallow→T.Aman(HYV)	191	700	59.82
		Boro→ Jute → T.Aman		250	21.40
		Mustard→Boro→ Fallow		70	05.98
		Vegetable→Vegetable→Vegetable		150	12.8
		Total		1170	100

Source: SAAOs **of Amirganj Union 2016**

Major Problems on Crop Cultivation

Agriculture is the backbone of Raipur Upazila and is synonymous to the food security. The major problems in Amirganj Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought (iii) Shortage of modern agricultural equipments (iv Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Change in rivers and canals morphology.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of

road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Farmers training.

3.4.2 Adiabad Union Land Use

General Description

Soil of Adiabad union is very fertile and suitable for multiple crops cultivation such as mustard,winter and Summer vegetables. Adiabad Union having agriculture cultivated area of 780 ha of land of which net cropped area is 1665ha. The land types of this union are highland (19%), medium high land (23%), Medium low land (31%) , Low land (21%) and very low land (6%) and soil texture is loam & silt loam which indicates lands are suitable for different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5. This Union is highly suitable for cultivation of Boro, T. Aman, Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015 SAAOs 2016).

Present Agriculture Land Use: Adiabad Union dominant land use is Borro followed by vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water . There are four cropping pattern are practiced in Adiabad Union which is shown in Table 6. The cropping intensity of this union is 213%. Major crops cultivated in this union are: paddy, Mustard, Lemon, Banana and Rabi & Kharif different vegetables.

Table-6: Present Cropping Patterns of Adiabad Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Adiabad	780	Boro(HYV)→Fallow→Fallow	213	65	8.33
		Boro→ Fallow → T.Aman		355	45.51
		Mustard→Boro→ Fallow		120	15.39
		Vegetable→Vegetable→Vegetable		240	30.77
		Total		780	100

Source: SAAOs of Adiabad Union 2016

Major Problems on Crop Cultivation

Agriculture is the backbone of Raipur Upazila and is synonymous to the food security. The major problems in Adiabad Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training.

3.4.3 Alipura Union Land Use

General Description

Farmers of Alipura Union is grown various types of vegetables round the year. Alipura Union having agriculture cultivated area of 729 ha of land of which net cropped area is 1548 ha. The land types of this union are highland (17%), medium high land (45%), Medium low land (30%) , Low land (8%) and soil texture is loam & clay loam which indicates lands are suitable for different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 0.5-1. This Union is highly suitable for cultivation of Boro, T. Aman, Jute Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Alipura Union dominant land use is Borro followed by T.Aman, vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water . There are three cropping pattern are practiced in Alipura Union which is shown in Table 7. The cropping intensity of this union is 212%. Major crops cultivated in this union are: paddy, Mustard, Lemon, Jute and Rabi & Kharif different vegetables.

Table-7: Present Cropping Patterns of Alipura Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Alipura	729	Boro(HYV)→Fallow→ T.Aman	212	565	77.50
		Boro→ Jute→ Vegetables		39	05.35
		Vegetable→Vegetable→Vegetable		125	17.15
		Total		729	100

Source: SAAOs of Alipura Union 2016

Major Problems on Crop Cultivation

The major problems in Alipura Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training.

3.4.4 Banshgari Union Land Use

General Description

Banshgari Union dominant land use is Borro followed by B.Aman, vegetables production and fruits garden. This Union having agriculture cultivated area of 1147 ha of land of which net cropped area is 1855 ha. The land types of this union are highland (3%), medium high land (34%), Medium low land (34%) , Low land (18%) and very low land(11%) and soil texture is Clay/ clay loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-5.9. This Union is highly suitable for cultivation of Boro, B. Aman, Chili,Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water . There are three cropping pattern are practiced in Banshgari Union which is shown in Table 8. The cropping intensity of this union is 161%. Major crops cultivated in this union are: paddy, Til, Lemon, and Rabi & Kharif different vegetables.

Table-8: Present Cropping Patterns of Banshgari Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area(ha)	% of NCA
Banshgari	1147	Boro(HYV)→Fallow→ Fallow	161	763	66.52
		Mustard→ Boro→ Fallow		134	11.68
		Potato→Til→ B.Aman/T.Aman		150	13.08
		Spices/Vegetables→Melon→Vegetables		100	8.72
		Total		1147	100

Source: SAAOs of Banshgari Union 2016

Major Problems on Crop Cultivation

The major problems in Banshgari Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training.

3.4.5 Chanderkandi Union Land Use

General Description

Chanderkandi Union having agriculture cultivated area of 765 ha of land of which net cropped area is 1535 ha. The land types of this union are highland (14%), medium high land (44%), Medium low land (33%) , Low land (9%) and soil texture is Clay/ clay loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.2-5.9. This Union is highly suitable for cultivation of Boro, T. Aman, Wheat Mustard, Jute Chili, Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Chanderkandi Union dominant land use is Borro followed by T. Aman, Wheat, Jute, Mustard and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water . There are seven cropping pattern are practiced in Chanderkandi Union which is shown in Table 9. The cropping intensity of this union is 200%. Major crops cultivated in this union are: paddy, Til, Lemon, and Rabi & Kharif different vegetables.

Table-9: Present Cropping Patterns of Chanderkandi Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Chanderkandi	765	Boro(HYV)→Fallow→ T.Aman(HYV/LV)	200	215	28.10
		Boro→Fallow-------Fallow		300	39.22
		Mustard→ Boro→ T.Aman		70	9.15
		Potato→ Boro→ T.Aman		50	6.54
		Wheat→Jute----→T.Aman		20	2.61
		Vegetables→Vegetables→ T.Aman		50	6.54
		Vegetable→Vegetable→Vegetables		60	7.84
		Total		765	100

Source: SAAOs of Chanderkandi Union 2016

Major Problems on Crop Cultivation

The major problems in Chanderkandi Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training.

3.4.6 Chandpur Union Land Use

General Description

This Union is highly suitable for cultivation of Boro, T. Aman, Wheat Mustard, Jute Chili, Potato and vegetables and Banana and lemon. Chandpur Union having agriculture cultivated area of 1565 ha of land of which net cropped area is 2075 ha. The land types of this union are highland (8%), medium high land (27%), Medium low land (29%) , Low land (31%) and Very Low land (5%) and soil texture is Clay/ clay loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.4-6.5. (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Chandpur Union dominant land use is Borro followed by T. Aman, Wheat, Jute, Mustard and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water and surface water . There are seven cropping pattern are practiced in Chandpur Union which is shown in Table 10. The cropping intensity of this union is 132%. Major crops cultivated in this union are: paddy, Til, Lemon, and Rabi & Kharif different vegetables.

Table-10: Present Cropping Patterns of Chandpur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Chandpur	765	Boro(HYV)→Fallow→ T.Aman(HYV/LV)	132	215	28.10
		Boro→Fallow-------Fallow		300	39.22
		Mustard→ Boro→ T.Aman		70	9.15
		Potato→ Boro→ T.Aman		50	6.54
		Wheat→Jute----→T.Aman		20	2.61
		Vegetables→Vegetables→ T.Aman		50	6.54
		Vegetable→Vegetable→Vegetables		60	7.84
		Total		765	100

Source: SAAOs of Chandpur Union 2016

Major Problems on Crop Cultivation

The major problems in Chandpur Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Erosion (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training.

3.4.7 Char Aralia Union Land Use

General Description

Major crops cultivated in this union are: paddy, Jute, Mustard, Lemon, and Rabi & Kharif different vegetables.Char Aralia Union having agriculture cultivated area of 660 ha of land of which net cropped area is 1030 ha. The land types of this union are medium high land (6%), Medium low land (39%) , Low land (35%) and Very Low land (20%) and soil texture is loam & silt loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.0-7.0. This Union is highly suitable for cultivation of Boro, T. Aman, Wheat Mustard, Jute Chili, Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Char Aralia Union highest land use is Borro followed by T. Aman, Wheat, Jute, Mustard and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water . There are six cropping pattern are practiced in Char Aralia Union which is shown in Table 11. The cropping intensity of this union is 156%.

Table-11: Present Cropping Patterns of Char Aralia Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Char Aralia	660	Boro(HYV)→Fallow→ Fallow	156	440	
		Mustard→Boro→ Fallow		70	
		Boro→ Fallow--→ B. Aman		30	
		Potato/Wheat→ Jute→ Fallow		40	
		Chili→Jute----→ Fallow		70	
		Vegetable→Vegetable→Vegetables		10	
		Total			

Source: SAAOs of Char Aralia Union 2016

Major Problems on Crop Cultivation

The major problems in Char Aralia Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.8 Char Madhua Union Land Use

General Description

From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Char Madhua Union having agriculture cultivated area of 747 ha of land of which net cropped area is 1091 ha. The land types of this union are high land(12%), medium high land (25%), Medium low land (63%) and soil texture is Clay loam & clay which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-5.6. This Union is highly suitable for cultivation of Boro, T. Aman, Wheat Mustard, Jute Chili, Potato and vegetables and Banana and lemon (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: There are five cropping pattern is practiced in Char Madhua Union which is shown in Table 12. Char Madhua Union highest land use is Borro followed by T. Aman, Wheat, Jute, Mustard and vegetables production and fruits garden.. The cropping intensity of this union is 146%. Major crops cultivated in this union are: paddy, Jute, Mustard, Lemon, and Rabi & Kharif different vegetables.

Table-12: Present Cropping Patterns of Char Madhua Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Char Madhua	747	Boro(HYV)→Fallow→ Fallow	146	450	60.24
		Mustard→ Fallow-→T.Aman		90	12.05
		Potato→ Til→ B. Aman		40	5.35
		Wheat→ Jute→ Fallow		150	20.08
		Vegetable→Vegetable→Vegetables		17	2.28
		Total		747	100

Source: SAAOs of Char Madhua Union 2016

Major Problems on Crop Cultivation

The major problems in Char Madhua Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.9 Char Subuddi Union Land Use

General Description

Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). Char Subuddi Union having agriculture cultivated area of 655 ha of land of which net cropped area is 1255 ha. The land types of this union are high land(4%), medium high land (9%), Medium low land (64%) and soil texture is loam & silt clay which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016The soil P^H is 5.5-5.6. This Union is highly suitable for cultivation of Boro, T. Aman, Wheat, Jute, Potato and vegetables and Banana (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: There are four cropping pattern is practiced in Char Subuddi Union which is shown in Table 13. Char Subuddi Union highest land use is Borro followed by T. Aman, Wheat, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. The cropping intensity of this union is 191%. Major crops cultivated in this union are: paddy, Jute, Dhaincha, Lemon, and Rabi & Kharif different vegetables.

Table-13: Present Cropping Patterns of Char Subuddi Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Char Subuddi	655	Boro(HYV)→Fallow→ T.Aman	191	525	80.15
		Vegeatles→ Fallow-→T.Aman		70	10.69
		Wheat→ Jute→ T.Aman		25	3.82
		Vegetable→Vegetable→Vegetables		35	5.34
		Total		655	100

Source: SAAOs of Char Subuddi Union 2016

Major Problems on Crop Cultivation

The major problems in Char Subuddi Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.10 Daukar Char Union Land Use

General Description

This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard Potato and vegetables and Banana. Daukar Char Union having agriculture cultivated area of 396 ha of land of which net cropped area is 938 ha. The land types of this union are high land(17%), medium high land (26%), Medium low land (23%), Low land(20%),very low land (14) and soil texture is loam & clay loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-6.5 (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Daukar Char Union highest land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are seven cropping pattern are practiced in Daukar Char Union which is shown in Table 14. The cropping intensity of this union is 236%. Major crops cultivated in this union are: paddy, Jute, Mustard, Banana, and Rabi & Kharif different vegetables.

Table-14: Present Cropping Patterns of Daukar Char Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Daukar Char	396	Boro(HYV)→Fallow→ Fallow	236	35	8.84
		Boro(HYV)→ Fallow-→T.Aman		130	32.83
		Boro→Vegetables→T.Aman		15	3.79
		Boro→Jute→T.Aman		60	15.15
		Mustard→ Boro→Fallow		50	12.63
		Potato→ Jute→ T.Aman		35	8.84
		Vegetable→Vegetable→Vegetables		71	17.93
		Total		396	100

Source: SAAOs of Daukar Char Union 2016

Major Problems on Crop Cultivation

The major problems in Daukar Char Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.11 Hairmara Union Land Use

General Description

The soil texture in This Union is silt loam & loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Hairmara Union having agriculture cultivated area of 435 ha of land of which net cropped area is 805ha. The land types of this union are high land(4%), medium high land (58%), Medium low land (27%), Low land(11%). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5. This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard Potato and vegetables and Banana (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: The cropping intensity of this union is 185%. Hairmara Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are five cropping pattern are practiced in Hairmara Union which is shown in Table 15. Major crops cultivated in this union are: paddy, Jute, Mustard, Banana, and Rabi & Kharif different vegetables.

Table-15: Present Cropping Patterns of Hairmara Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Hairmara	435	Boro(HYV)→Fallow→ T.Aman	185	192	44.14
		RC→ Fallow-→T.Aman		100	22.99
		Mustard→ Boro→Fallow		75	17.24
		Boro→ Jute→ Vegetables		48	11.03
		Vegetable→Vegetable→Vegetables		20	4.60
		Total		435	100

Source: SAAOs of Hairmara Union 2016

Major Problems on Crop Cultivation

The major problems in Hairmara Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.12 Maheshpur Union Land Use

General Description

This Union is very important for agriculture and fish production under Raipura Upazila. Maheshpur Union having agriculture cultivated area of 895 ha of land of which net cropped area is 1835ha. The land types of this union are high land(19%), medium high land (36%), Medium low land (22%), Low land(20%), very low land (3) and soil texture is loam & sandy loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-5.6. This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard,Potato and vegetables and Banana (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Maheshpur Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are six cropping pattern are practiced in Maheshpur Union which is shown in Table 16. The cropping intensity of this union is 205%. Major crops cultivated in this union are: paddy, Jute, Mustard, Brinjal , Beans, Cucumber, Spices (onion, chili) and Rabi & Kharif different vegetables.

Table-16: Present Cropping Patterns of Maheshpur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Maheshpur	895	Boro(HYV)→Fallow→ T.Aman (HYV/LV)	205	305	34.08
		Vegetables→ Vegetables →T.Aman		100	11.17
		Mustard→ Boro (HYV)→Fallow		265	29.61
		Potato→Jute → T.Aman (HYV/LV)		100	11.17
		Boro→ Dhaincha→ T.Aman		100	11.17
		Vegetable→Vegetable→Vegetables		25	2.79
		Total		895	100

Source: SAAOs of Maheshpur Union 2016

Major Problems on Crop Cultivation

The major problems in Maheshpur Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.13 Marjal Union Land Use

General Description

Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 4.8.1-6.3 This Union is highly suitable for cultivation of Boro, T. Aman, Mustard, Potato and vegetables and Mango, Banana (Land Zoning Report, January 2015, SAAOs 2016). Marja**l** Union having agriculture cultivated area of 850 ha of land of which net cropped area is 1690ha. The land types of this union are high land(30%), medium high land (40%), Medium low land (21%), Low land(8%), very low land (1) and soil texture is loam & clay loam which indicates lands are suitable for Boro and different Rabi crops and Kharif crops Cultivation(SAAO,2016).

Present Agriculture Land Use: The cropping intensity of this union is 198%. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are five cropping pattern are practiced in Marjal Union which is shown in Table 17. Marjal Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. Major crops cultivated in this union are: paddy, Mustard, Brinjal, Beans, Cucumber, Guava, Litchi, Lotcon, Jack fruit and Rabi & Kharif different vegetables.

Table-17: Present Cropping Patterns of Marjal Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Marjal	850	Boro(HYV)→Fallow→ T.Aman (HYV/LV)	198	450	
		Vegetables→ Vegetables →Fallow		270	
		Mustard→ Boro (HYV)→T.Aman		40	
		Potato→ Fallow → T.Aman (HYV/LV)		30	
		Vegetable→Vegetable→Vegetables		50	
		Total			

Source: SAAOs of Marjal Union 2016

Major Problems on Crop Cultivation

The major problems in Marjal Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.14 Mirzanagar Union Land Use

General Description

Soil texture is loam & silt loam which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop cultivation(SAAO,2016). This Union is very potential for vegetables and fruit crops production under Raipura Upazila. Mirzanagar Union having agriculture cultivated area of 700 ha of land of which net cropped area is 1625ha. The land types of this union are high land(36%), medium high land (43%), Medium low land (11%), Low land(10%). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1.-5.6 This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Major crops cultivated in this union are: paddy, Jute, Mustard, Brinjal, Beans, Cucumber, Guava, Litchi, Lotcon, Jack fruit and Rabi & Kharif different vegetables.

Mirzanagar Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are seven cropping pattern are practiced in Mirzanagar Union which is shown in Table 18 The cropping intensity of this union is 232%.

Table-18: Present Cropping Patterns of Mirzanagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Mirzanagar	700	Boro(HYV)→Fallow→ T.Aman (HYV/LV)	232	365	52.14
		Vegetables→ Jute → T.Aman		125	17.86
		Boro→ Fallow-→ Fallow		35	5.00
		Mustard→ Boro (HYV)→ Fallow		10	1.43
		Potato→ Boro(HYV) → T.Aman (HYV/LV)		15	2.14
		RC→ Jute-→T.Aman (HYV/LV)		20	2.86
		Vegetable→Vegetable→Vegetables		130	18.57
		Total		700	100

Source: SAAOs of Mirzanagar Union 2016

Major Problems on Crop Cultivation

The major problems in Mirzanagar Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold

storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.15 Mirzapur Union Land Use

General Description

Mirzapur Union having agriculture cultivated area of 1141 ha of land of which net cropped area is 2146ha. The land types of this union are high land(9%), medium high land (45%), Medium low land (27%), Low land(9%),very low land(10%) and soil texture is loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.8 This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: There are seven cropping pattern is practiced in Mirzapur Union which is shown in Table 19. Mirzapur Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. The cropping intensity of this union is 188%. Major crops cultivated in this union are: paddy, Jute, Mustard, Brinjal, Beans, Cucumber, Guava, Litchi, Jack fruit and Rabi & Kharif different vegetables.

Table-19: Present Cropping Patterns of Mirzapur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Mirzapur	1141	Boro(HYV)→Fallow→ T.Aman (HYV/LV)	188	550	48.20
		Vegetables→ Fallow→ T.Aman		200	17.53
		Boro→ Fallow-→ Fallow		203	17.79
		Mustard→ Boro (HYV)→ Fallow		25	2.19
		Potato→ Boro(HYV) → T.Aman (HYV/LV)		80	7.01
		RC→ Jute-→T.Aman (HYV/LV)		22	1.93
		Vegetable→Vegetable→Vegetables		61	5.35
		Total		1141	100

Source: SAAOs of Mirzapur Union 2016

Major Problems on Crop Cultivation

The major problems in Mirzapur Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.16 Mirzarchar Union Land Use

General Description

This union is very potential for Agriculture and fish production. Mirzarchar Union having agriculture cultivated area of 687 ha of land of which net cropped area is 1407ha. The land types of this union are medium high land (15%), Medium low land (56%), Low land(17%),very low land(12%) and soil texture is Clay loam & loam soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-6.5. This Union is highly suitable for cultivation of Boro, B. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and fish cultivation (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Mirzarchar Union major land use is Borro followed by B. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are five cropping pattern are practiced in Mirzarchar Union which is shown in Table 20 The cropping intensity of this union is 204%. Major crops cultivated in this union are: paddy, Jute, Wheat, Til, dhaincha, Mustard, Brinjal, Beans, Cucumber, Guava, Litchi, Jack fruit and Rabi & Kharif different vegetables.

Table-20: Present Cropping Patterns of Mirzarchar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Mirzarchar	687	RC-→Boro(HYV→ B.Aman	204	280	40.76
		Boro→ Fallow-→ Fallow		87	12.66
		RC→ Boro (HYV)→ Fallow		260	37.85
		RC→ Jute-→ Fallow		35	5.09
		Vegetable→Vegetable→Vegetables		25	3.64
		Total		687	100

Source: SAAOs of Mirzarchar Union 2016

Major Problems on Crop Cultivation

The major problems in Mirzarchar Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix)

Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into unplanned non-agriculture purposes (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.17 Musapur Union Land Use

General Description

Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-6.5.This Union is highly suitable for cultivation of Boro, B. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016). Musapur Union having agriculture cultivated area of 915 ha of land of which net cropped area is 1815ha. The land types of this union are high land (10%),medium high land (51%), Medium low land (24%), Low land(15%), and soil texture is loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016).

Present Agriculture Land Use: There are seven cropping pattern is practiced in Musapur Union which is shown in Table 21. The cropping intensity of this union is 198%. From the agriculture point of view, this union is suitable for agriculture. Musapur Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Major crops cultivated in this union are: paddy, Jute, Wheat, dhaincha, Mustard, Cucumber, Mango, Guava, Litchi, Jack fruit and winter & Kharif different vegetables.

Table-21: Present Cropping Patterns of Musapur Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Musapur	915	Mustard-→Boro(HYV→ T.Aman	198	740	80.9
		Mustard→ Jute→ T.Aman (HYV/LV)		100	10.9
		Fallow→ Jute-→ T. Aman(HYV/LV)		30	3.3
		Vegetable→Vegetable→Vegetables		45	4.9
		Total		915	100

Source: SAAOs of Musapur Union 2016

Major Problems on Crop Cultivation

The major problems in Musapur Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.18 Nilakhya Union Land Use

General Description

This union is important for field crops & vegetables and fish production. Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-6.5.This Union is highly suitable for cultivation of Boro, B. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016). Nilakhya Union having agriculture cultivated area of 1220 ha of land of which net cropped area is 2020ha. The land types of this union are high land (15%),medium high land (23%), Medium low land (30%), Low land(19%), very low land(13%) and soil texture is loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016).

Present Agriculture Land Use: Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Nilakhya Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. There are four cropping pattern are practiced in Nilakhya Union which is shown in Table 22 The cropping intensity of this union is 165%. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, Mango, Guava, and Litchi, Jack fruit and winter & Kharif different vegetables.

Table-22: Present Cropping Patterns of Nilakhya Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Nilakhya	1220	Boro(HYV→ Fallow→Fallow	165	445	36.48
		Wheat→ Jute→ Fallow		600	49.18
		Mustard→ Til-→ T. Aman(HYV/LV)		150	12.30
		Vegetable→Vegetable→Vegetables		25	2.05
		Total		1220	100

Source: SAAOs of Nilakhya Union 2016

Major Problems on Crop Cultivation

The major problems in Nilakhya Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.19 Palashtali Union Land Use

General Description

Palashtali Union having agriculture cultivated area of 1400 ha of land of which net cropped area is 2870ha. The land types of this union are high land (13%), medium high land (45%), Medium low land (12%), Low land(29%), very low land(1%) and soil texture is loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5-6.5.This Union is highly suitable for cultivation of Boro, B. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: There are four cropping pattern are practiced in Palashtali Union which is shown in Table 23 The cropping intensity of this union is 205%. Palashtali Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by

using ground water and surface water. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, Mango, Guava, and Litchi, Jack fruit and winter & Kharif different vegetables.

Table-23: Present Cropping Patterns of Palashtali Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Palashtali	1400	Boro(HYV→ Fallow→ T.Aman (HYV/LV)	205	805	57.50
		Boro→ Jute→ T.Aman		125	8.93
		Boro→ Fallow→ Fallow		270	19.29
		Vegetable→Vegetable→Vegetables		200	14.29
		Total		1400	100

Source: SAAOs of Palashtali Union 2016

Major Problems on Crop Cultivation

The major problems in Palashtali Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for Pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.20 Paratali Union Land Use

General Description

The soil of this union is very fertile and suitable for agricultural crop production. Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). Paratali Union having agriculture cultivated area of 1910 ha of land of which net cropped area is 2920ha. The land types of this union are high land (9%),medium high land (25%), Medium low land (50%), Low land(16%) and soil texture is loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016The soil P^H is 5.5-6.5.This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, Mango, Guava, winter & Kharif different vegetables. Paratali Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are seven cropping pattern are practiced in Paratali Union which is shown in Table 24 The cropping intensity of this union is 153%.

Table-24: Present Cropping Patterns of Paratali Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Paratali	1910	Boro(HYV→ Fallow→ Fallow	153	1200	62.83
		Mustard→ Boro HYV/LV)→ Fallow		200	10.47
		Wheat→ Jute→ Fallow		35	1.83
		Pulses-→Boro(HYV)--→Fallow		100	5.24
		Sweet potato→Til→ Fallow		75	3.93
		Potato→Boro→T.Aman (HYV/LV)		200	10.47
		Vegetable→Vegetable→Vegetables		100	5.24
		Total		1910	100

Source: SAAOs of Paratali Union 2016

Major Problems on Crop Cultivation

The major problems in Paratali Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.21 Radhanagar Union Land Use

General Description

Farmers of this Union are cultivated Boro, B. Aman, Jute, Mustard, Potato and vegetables and Mango, Lemon, Banana and Guava. Radhanagar Union having agriculture cultivated area of 815 ha of land of which net cropped area is 1845ha. The land types of this union are high land (28%),medium high land (49%), Medium low land (19%), Low land(4%) and soil texture is loam & sandy loam soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop

Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.0-7.0 (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: There are eight cropping pattern are practiced in Radhanagar Union which is shown in Table 25 The cropping intensity of this union is 226%. Radhanagar Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, and Mango, lemon, Guava, winter & Kharif different vegetables.

Table-25: Present Cropping Patterns of Radhanagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity(%)	Area (ha)	% of NCA
Radhanagar	815	Boro(HYV→ Fallow→ Fallow	226	40	4.91
		Fallow→Fallow→T.Aman (HYV/LV)		20	2.45
		Boro HYV/LV)→ Fallow→ T.Aman(HYV)		400	49.08
		Boro→ Jute→ T.Aman		30	3.68
		Lemon→Lemon--→Lemon		10	1.23
		Banana→Banana→ Banana		25	3.07
		Turmeric/Zinger-------→Turmeric/Zinger		10	1.23
		Vegetable→Vegetable→Vegetables		280	34.36
		Total		815	100

Source: SAAOs of Radhanagar Union 2016

Major Problems on Crop Cultivation

The major problems in Radhanagar Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.22 Roypura Union Land Use

General Description

Roypura Union having agriculture cultivated area of 450 ha of land of which net cropped area is 820ha. The land types of this union are high land (10%),medium high land (40%), Medium low land (36%), Low land(10%),very low land(4%) and soil texture is clay loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-5.6.This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Lemon, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are eight cropping pattern are practiced in Roypura Union which is shown in Table 26. Roypura Union major land use is Borro followed by T. Aman, Jute, and vegetables production and fruits garden.The cropping intensity of this union is 182%. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Til Cucumber, and Mango, lemon, Guava, winter & Kharif different vegetables.

Table-26: Present Cropping Patterns of Roypura Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity(%)	Area (ha)	% of NCA
Roypura	450	Boro(HYV→ Fallow→ Fallow	182	120	26.67
		Potato→Boro→T.Aman (HYV/LV)		9	2.00
		Boro HYV/LV)→ Fallow→ T.Aman(HYV)		200	44.44
		Wheat→ Jute→ Fallow		5	1.11
		Boro→Jute--→ T.Aman		26	5.78
		Mustard→Boro→ Fallow		28	6.22
		S.Potato→ Til-→ Fallow		32	7.11
		Vegetable→Vegetable→Vegetables		30	6.67
		Total		450	100

Source: SAAOs of Roypura Union 2016

Major Problems on Crop Cultivation

The major problems in Roypura Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.23 Sreenagar Union Land Use

General Description

Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.5.This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016). Sreenagar Union having agriculture cultivated area of 1529 ha of land of which net cropped area is 2457 ha. The land types of this union are high land (4%),medium high land (22%), Medium low land (45%), Low land(29%) and soil texture is silt loam & clay soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop Cultivation(SAAO,2016)

Present Agriculture Land Use: From the agriculture point of view, this union is suitable for agriculture. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Til Cucumber, and Mango, lemon, Guava, winter & Kharif different vegetables Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are five cropping pattern are practiced in Sreenagar Union which is shown in Table 27 The cropping intensity of this union is 160%.

Table-27: Present Cropping Patterns of Sreenagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Sreenagar	1529	Boro(HYV→ Fallow→ Fallow	160	467	30.54
		RC→Fallow→T.Aman (HYV/LV)		100	6.54
		Boro HYV/LV)→ Fallow→ T.Aman(HYV)		850	55.59
		Mustard→Boro→ Fallow--→T.Aman		50	3.27
		Vegetable→Vegetable→Vegetables		62	4.05
		Total		1529	100

Source: SAAOs of Sreenagar Union 2016

Major Problems on Crop Cultivation

The major problems in Sreenagar Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil

testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.24 Uttar Bakharnagar Union Land Use

General Description

Soil texture is loam & clay loam soil which indicates lands are suitable for Boro and different Rabi and Kharif crops and also fruits crop cultivation (SAAO,2016). Uttar Bakharnagar Union having agriculture cultivated area of 850 ha of land of which net cropped area is 1785 ha. The land types of this union are high land (24%), medium high land (27%), Medium low land (33%), Low land (12%),very low land(4%). Union falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-5.8.This Union is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables and Mango, Banana and Guava cultivation (Land Zoning Report, January 2015, SAAOs 2016).

Present Agriculture Land Use: Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are six cropping pattern are practiced in Uttar Bakharnagar Union which is shown in Table 28 The cropping intensity of this union is 210%. Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, and Mango, lemon, Guava, winter & Kharif different vegetables.

Table-28: Present Cropping Patterns of Uttar Bakharnagar Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Uttar Bakharnagar	850	RC→Fallow→T.Aman (HYV/LV)	210	40	4.71
		Boro HYV/LV)→ Fallow→ T.Aman(HYV)		410	48.24
		Boro(HYV/LV)→ Fallow→ Fallow		110	12.94
		Potato→Jute→ T.Aman (HYV/LV)		30	3.53
		Vegetables→Fallow—T.Aman		40	4.71
		Vegetable→Vegetable→Vegetables		220	25.88
		Total		850	100

Source: SAAOs of Uttar Bakharnagar Union 2016

Major Problems on Crop Cultivation

The major problems in Uttar Bakharnagar Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

3.4.25 Raipura Paurashava Union Land Use

General Description

Raipura Paurashava falls into 4 Agro-ecological zones are (i) Young Brahmaputra and Jamuna Floodplain (AEZ 8), (ii) Old Brahmaputra Floodplain (AEZ 9), (ii) Middle Meghna River Floodplain (AEZ 16), and (iv) Madhupur Tract (AEZ 28). The soil P^H is 5.1-5.6. Raipura Paurashava is highly suitable for cultivation of Boro, T. Aman, Jute, Mustard, Potato and vegetables cultivation (Land Zoning Report, January 2015, SAAOs 2016). Raipura Paurashava having agriculture cultivated area of 845 ha of land of which net cropped area is 1547 ha. The land types of this union are high land (18%),medium high land (50%), Medium low land (24%), Low land(8%) and soil texture is loam & clay loam soil which indicates lands are suitable for Boro and different Rabi and Kharif crops Cultivation(SAAO,2016).

Present Agriculture Land Use: Major crops cultivated in this union are: paddy, Jute, Wheat, Mustard, Cucumber, and winter & Kharif different vegetables. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water and surface water. There are seven cropping pattern are practiced in Raipura Paurashava Union which is shown in Table 29 The cropping intensity of this union is 183%.

Table-29: Present Cropping Patterns of Raipura Paurashava Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	Area (ha)	% of NCA
Raipura Paurashava	845	Boro HYV/LV)→ Fallow→ T.Aman(HYV)	183	380	44.97
		Mustard→Boro(HYV)-→ T.Aman		60	7.10
		Boro(HYV/LV)→ Fallow→ Fallow		250	29.59
		Fallow→Jute→ T.Aman (HYV/LV)		20	2.37
		S. Potato→Til→ Fallow		40	4.73
		Potato→Boro—T.Aman		25	2.96
		Vegetable→Vegetable→Vegetables		70	8.28
		Total		845	100

Source: SAAOs of Raipura Paurashava Union 2016

Major Problems on Crop Cultivation

The major problems in Raipura Paurashava Union crop cultivation are: (i) Lack of quality good seeds (ii) Drought & heavy rain fall, (iii) Shortage of modern agricultural equipments (iv) Lack of improve irrigation facilities (v) No cold storage for preservation of vegetables and fruits (vi) Transport and marketing and (vii)) Increase insect and pest infestation (viii) Lack of disease resistance variety crop seeds (ix) Inadequate drainage facilities & water logging and(x) Lack of food storage facilities(xi) Lack of soil testing machine and (xii) Agricultural land converted into brickfield (non-agriculture purposes) (xiii) lack of technological knowledge and Problems of getting agricultural loan.

Recommendation: (i) Ensure availability of good quality seeds in Union level.(ii) increase supply of cultivation equipments such as tractor, power tiller, Harvester and sprayers. (iii) Establishment of cold storage and seed store (iv) Arrangement for pucca drain (v) Development of market infrastructure (vi) Improvement of road and communication system (vii) Repair seed store (viii) Produced crops directly purchased from farmers (ix) Re-excavation of silted canals and river (x) Arrange for ecological based Farmers training (xi) Availability of disease resistant crop variety seeds.

All 24 Unions and 1 Municipality percent of land used for single, double and triple crops under Raipura Upazila is shown in Figure 4. Figure 4 shows that highest single cropped area were present in Roypura Union followed by Chandpur ,Paratli and Charmadhua Unions. Similarly, all others Unions highest areas were used for double crops. Further, highest land used for triple crops in Daukar Union followed by Radhanagar andMirzanagar Unions under Raipura Upazila. Union Wise Land Used of Single, Double and Triple Cropped Area and cropping intensities under Raipura Upazila is shown in Table 30.

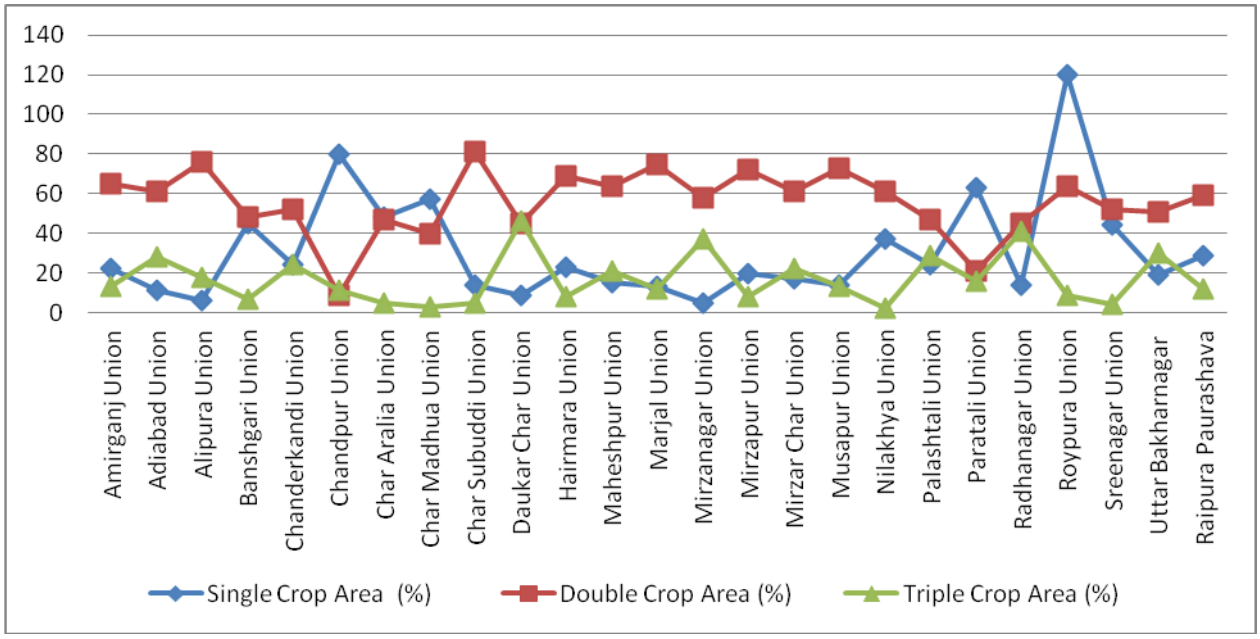

Fig 4 Percent of Union wise Single, Double & Triple cropped area under Raipura Upazila

Table 30: Union Wise Land Used of Single, Double and Triple Cropped Area under Raipura Upazila

	Present Land Used in ha (%)					
Name of Union	**Cultivated Area**	**Single Cropped Area**	**Double Cropped Area**	**Triple Cropped Area**	**Net Cropped Area (ha)**	**Cropping intensity (%)**
Amirganj Union	1170	260(22)	760(65)	150(13)	2230	191
Adiabad Union	780	89(11)	475(61)	216(28)	1665	213
Alipura Union	729	45(6)	549(76)	135(18)	1548	212
Banshgari Union	1147	520(45)	546(48)	81(7)	1855	161
Chanderkandi Union	765	180(24)	400(52)	185(24)	1535	200
Chandpur Union	1565	1250(80)	140(9)	175(11)	2075	132
Char Aralia Union	660	315(48)	310(47)	35(5)	1030	156
Char Madhua Union	747	425(57)	300(40)	22(3)	1091	146
Char Subuddi Union	655	90(14)	530(81)	35(5)	1255	191
Daukar Char Union	396	35(9)	180(45)	181(46)	938	236
Hairmara Union	435	100(23)	300(69)	35(8)	805	185
Maheshpur Union	895	138(15)	574(64)	183(21)	1835	205
Marjal Union	850	110(13)	640(75)	100(12)	1690	198
Mirzanagar Union	700	35(5)	405(58)	260(37)	1625	232
Mirzapur Union	1141	228(20)	821(72)	92(8)	2146	188
Mirzar Char Union	687	117(17)	420(61)	150(22)	1407	204

Musapur Union	915	130(14)	670(73)	115(13)	1815	198
Nilakhya Union	1220	450(37)	740(61)	30(02)	2020	165
Palashtali Union	1400	340(24)	650(47)	410(29)	2870	205
Paratali Union	1910	1200(63)	410(21)	300(16)	2920	152
Radhanagar Union	815	115(14)	370(45)	330(41)	1845	226
Roypura Union	450	120(120)	290(64)	40(9)	820	182
Sreenagar Union	1529	670(44)	790(52)	69(4)	2457	160
Uttar Bakharnagar Union	850	165(19)	435(51)	250(30)	1785	210
Raipura Paurashava	845	247(29)	494(59)	104(12)	1547	183

Source: SAAOs Raipur Upazila, DAE 2016

Chapter-04
Cropping Pattern and Cropping Intensities

4.1 Cropping Pattern

Land type is the dominant factor guiding choice of crops and cropping patterns of Roypura Upazila. Selection of crop largely depends on topographic position of 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.

The present cropping pattern under Raipura Upazila is complex and predominantly Boro and B.Aman & T. Aman Rice, Jute, Vegetables, Oilseeds, Pulses Spices, Fruits Garden based. Detailed Upazila cropping patterns by season are presented in Table 31. Study finding shows that 12 different cropping pattern are practiced by Raipura Upazila farmers. Raipura Upazila present one main cropping pattern area is Boro(HYV/Hybrid)→Fallow→Fallow which is practiced 36.53% of the Net Cultivable Area (NCA). Similarly, Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 28.49% of the Net Cultivable Area (NCA). Further, winter vegetables→KHarif-1 vegetables→Kharif-11 summer vegetables which are practiced about 12.05% of the Net Cultivable Area (NCA). Mustard→Boro→T. Aman (HYV/LV) is covering about 5.57 % of the NCA. Potato & Sweet Potato are the cropping pattern covering about 4% &2% of the NCA.

Fruits Garden is covered about 13% of the Net Cultivable Area. Spices→Jute→Fallow is practiced about 4% Net Cultivable Area (Table 31). This finding clearly indicated that. Raipura Upazila soil is very fertile and principal crop is Boro and farmers also cultivated multiple crops such as vegetables, Jute, Til, Spices, Pulses and different fruits production.

Table-31: Present Cropping pattern under Raipura Upazila

Major Cropping Pattern			Area (ha)	Contribution %
Rabi	**Kharif-1**	**Khari-2**		
Boro (HYV/Hybrid)	Fallow	T. Aman (HYV)	6747	28.49
Boro (HYV/Hybrid)	Fallow	Fallow	8652	36.53
Vegetables	Vegetables	Vegetables	2854	12.05
Mustard	Boro (HYV/Hybrid)	T. Aman (HYV/LIV)	1320	5.57
Boro (HYV/Hybrid)	B. Aman	B. Aman	550	2.32
Wheat	Jute/Aus	T. Aman (HYV/LV)	110	0.46
Chili	Jute	Fallow	258	1.09
Sweet Potato	Fallow	Fallow	536	2.26
Potato	Til	Fallow	907	3.83

Pulses	Fallow	T. Aman	271	1.14
Spices	Jute	Fallow	947	4.00
Fruits Garden	Fruits Garden	Fruits Garden	533	2.25
Total			23685	100

Source: SAAOs and UAO Raipura Upazila, DAE 2016

4.2 Cropping Intensity

Cropping intensity is an important index of utilization of land. Crop intensity index 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 distinguish single, double and triple cropping systems respectively.

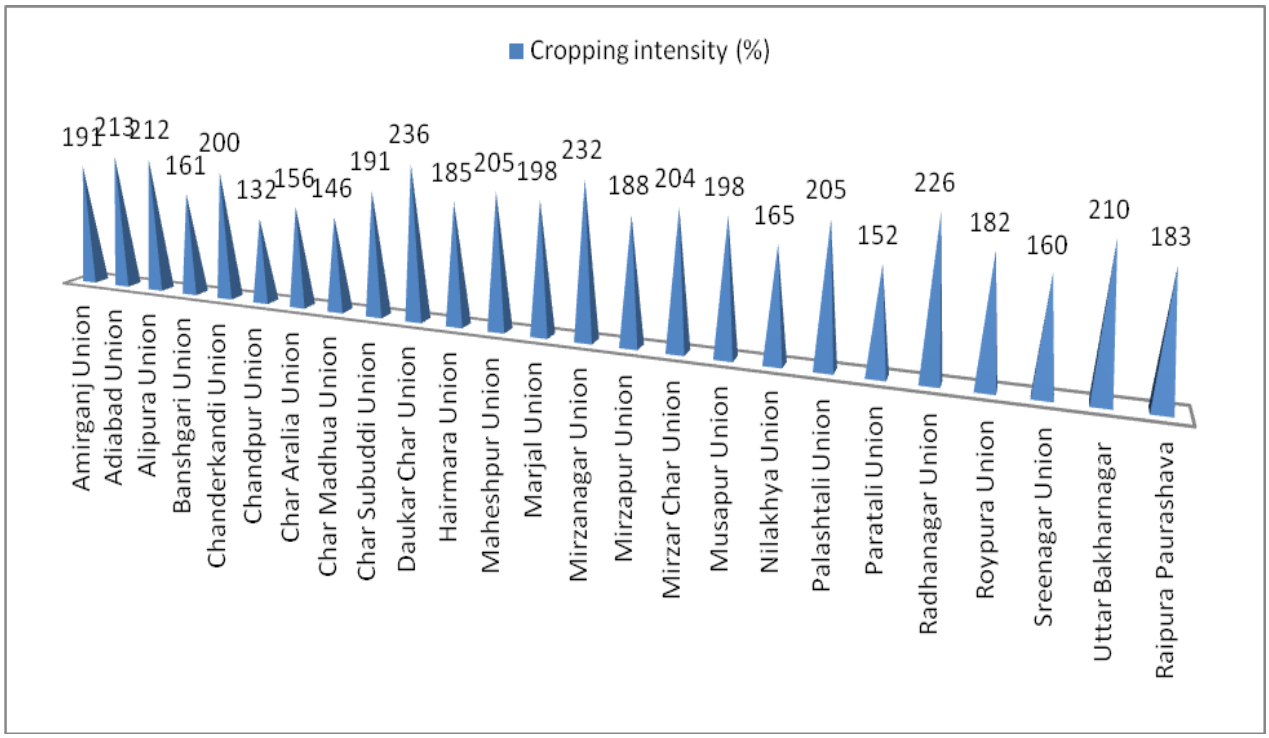

Figure 5: Union wise Cropping Intensities under Raipura Upazila

Different cropping pattern are practiced in Raipura Upazila. The present Union wise (24 Unions) and Municipality (1) cropping intensity is shown in Figure-5. The average cropping intensity under Raipur Upazila is 189% which is higher than cropping intensity of 10 Unions and Municipality and also less than 14 Unions (Fig.5). The highest cropping intensities were achieved in Daukarchar(236%), Mirzanagar(232%) and Radhanagar Union(226%) and lowest cropping intensity under Chandpur Union(132%).The average cropping intensity under Raipura Upazila is 189% which is less than Narsingdi district (207%) and national average cropping intensity (190%) (Krishi Diary 2016).

4.3 Present Cropped Area

Rice, Jute, winter and summer vegetables, potato, mustard, groundnut and pulses, and various fruits crops are grown in 24 Unions and 1 Municipality under Raipura Upazila. Raipura Upazila present scenario of different cropped area, yield rate and production levels are shown in Table 32. The present total different cropped area is 35392 ha of which rice cropped area are 24530 ha and the rest 10862 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 70% and 30% respectively of the total cropped area. The highest land area was used for Boro (HYV/Hybrid), T. Aman (HYV) rice and Jute cultivation.

4.4 Present Crop Production

Crops yield depends on variety, land types, fertilizer management and irrigation. HYV/Hybrid rice or others crops gives higher yield in compared to local variety crops. Total crop production is 290304.89 metric tons of which rice production is 133058.24 metric tons and non-rice production is 157246.65 metric tons (Table-32).

Among the rice crops the contributions of T. Aman (LV), T. Aman (HYV) and Boro (HYV & Hybrid) are about 5%, 16%, & 78% and Aus (HYV),Boro(local) and Boro(Hybrid) less than respectively. The highest contribution among the non-rice crops are winter vegetables (45%) & Summer vegetables (18%) followed by Potato (11%), fruits (9%) and Jute (8%) respectively (Table-32).

Table-32: Present Cultivated Area, Yield and Production under Raipura Upazila

Crop Grown	Crop area(ha)	Yield/ha (mt)	Production (mt)	Contribution (%)
T.Aus (HYV)	**40**	**3.5**	**140**	**0.11**
T. Aman(LV)	2682	2.43	6517.26	4.90
T. Aman(HYV)	5310	4	21240	15.96
Boro (HYV)	16086	6.45	103754.7	77.98
Boro (LV)	395	3.24	1279.8	0.96
Boro (Hybrid)	17	7.44	126.48	0.10
Sub Total Rice	24530		133058.24	100.00
S. Vegetables	1832	15	27480	17.48
W. vegetables	2854	25	71350	45.37
Jute	1215	9.68	11761.2	7.48
Sweet Potato	550	19.55	10752.5	6.84
Potato	850	19.8	16830	10.70
Spices	365	6	2190	1.39
Chili	655	1.55	1015.25	0.65
Oil seeds (Mustard, Til, Groundnut	1719	1.21	2079.99	1.32
Pulses	289	1.14	329.46	0.21
Fruits Garden	533	25.25	13458.25	8.56

Sub-Total	10862		157246.65	100.00
Total	35392		290304.89	

Source: SAAOs and UAO, Raipura 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 are assessed the present scenario of irrigation facilities and problems. For irrigation purposes, generally, Deep Tube Wells (DTW), Shallow Tube Well (STW), Low Lift Pump (LLP) and along with other indigenous irrigation tools are used for lifting water. Union wise DTW, STW and LLP under Raipura Upazila is shown in Table 33. A total of 5413 machine were used for irrigation under Unions in Raipura Upazila. There is no DTW under Raipura Upazila for irrigation.

A total 5116 STW and 297LLP used for Boro rice and others crops irrigation under different Unions. Different Unions **3436** STW and also **290** LLP has no electricity facilities for irrigation (Table 33). Electricity user's farmers reported that failed or disruption of electricity supply during Boro season were acute problems under Raipura Upazila. Framers wanted nonstop electricity supply during Boro season. Majority of the Farmers (95-100%) reported irrigation drainage system is not pucca which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Table 33 Union Wise Irrigation Machine under Raipura Upazila

	DTW		STW		LLP		Remarks
Name of Union	**Electricity**	**Diesel**	**Electricity**	**Diesel**	**Electricity**	**Diesel**	**% Kutch drain**
Amirganj Union	0	0	76	215	1	2	100
Adiabad Union	0	0	116	81	0	0	100
Alipura Union	0	0	117	223	0	0	100
Banshgari Union	0	0	0	74	0	97	100
Chanderkandi Union	0	0	76	157	0	0	100
Chandpur Union	0	0	0	156	0	38	100
Char Aralia Union	0	0	0	60	0	22	95
Char Madhua Union	0	0	0	31	0	27	100
Char Subuddi Union	0	0	75	161	0	1	98
Daukar Char Union	0	0	75	75	3	3	80
Hairmara Union	0	0	52	75	0	0	100
Maheshpur Union	0	0	107	178	0	1	100
Marjal Union	0	0	147	156	0	0	100

Mirzanagar Union	0	0	107	143	0	0	100
Mirzapur Union	0	0	186	189	0	0	100
Mirzar Char Union	0	0	0	38	0	21	100
Musapur Union	0	0	64	104	3	0	100
Nilakhya Union	0	0	0	105	0	25	80
Palashtali Union	0	0	189	242	0	0	98
Paratali Union	0	0	0	169	0	38	100
Radhanagar Union	0	0	60	172	0	1	100
Roypura Union	0	0	67	126	0	0	98
Sreenagar Union	0	0	0	180	0	14	100
Uttar Bakharnagar	0	0	34	275	0	0	100
Raipura Paurashava	0	0	132	51	0	0	100
Total	0	0	1680	3436	7	290	95-100

Source: SAAOs under Raipura Upazila, DAE 2016

For crop cultivation ground water conservation and utilization in Raipura upazila is important. In rabi season irrigation can help to increase agricultural production and crop diversification. Status of Union wise percent of irrigated and non- irrigated area cover under LLP and STW are shown in Table 34. In rabi season maximum cultivated area 57-100% were covered by irrigation water (Table 34). This indicates that farmers have access to irrigation water that facilitated ground water lifting cause an adverse impact both in agricultural production and surrounding environment.

Table 34: Union wise Irrigation and Groun& Surface Water Used under Raipura Upazila

Union	Irrigated Area (%)	Non Irrigated Area (%)	Irrigated Area				Availability of Surface Water	Drought Prone Area (in ha)	Char Land (in ha)	Waterlogged Area (in ha)	Remarks
			Surface Water		Ground Water						
			LLP		STW						
			No	Area (%)	No	Area (%)					
Amirganj	100	0	5	4	331	96	√	0	0	0	
Adiabad	100	0	0	0	187	100	-	0	0	0	
Alipura	100	0	0	0	270	100	-	2	0	5	
Bansgari	100	0	49	53	92	47	√	0	0	0	
Chander Kandi	82	18	1	1	325	99	√	0	0	10	
Chandpur	81	19	38	28	156	71	√	50	70	392	
Char Aralia	77	23	21	56	60	44	√	0	150	140	
Char Madhua	94	6	27	31	31	69	√	0	0	0	
Char Subuddhi	100	0	1	1	236	99	√	0	0	0	
Daukar Char	75	25	8	35	109	65	√	0	0	0	
Hairmara	100	0	0	0	133	100	-	0	0	0	-Rain fed crops need Supplemental Irrigation -Sudden Flood -Char Land Agriculture
Maheshpur	87	13	3	1	287	99	√	200	0	6	
Marjal	100	0	0	0	330	100	-	0	0	790	
Mirzanagar	69	31	0	0	249	100	√	0	0	270	
Mirzapur	91	9	0	0	312	100	-	0	0	20	
Mirzarchar	73	27	17	25	42	75	√	0	0	0	
Musapur	97	3	3	8	170	92	√	0	0	13	
Nilakhya	89	11	15	39	107	61	√	0	40	0	
Palashtali	98	2	0	0	424	100	-	0	0	13	
Paratali	82	18	37	10	168	90	√	0	270	12	
Radhanagar	90	10	1	2	162	98	√	110	0	30	
Roypura	81	19	5	12	236	88	√	0	0	0	
Sreenagar	57	43	11	7	252	93	√	0	30	0	
Uttar Bakharnagar	100	0	0	0	302	100	-	0	0	15	
Roypura Paurashava	70	30	01	3	122	97	√	0	0	0	

Source: National Land Zoning project Report January 2015

4.6 Cultivation Practices

All the Unions are dominated by agriculture crops are: Boro HYV/Hybrid variety of rice and Transplanted Aman rice, potato, Jute, and different kinds of winter and summer vegetables, spices, pulses which are cultivated under both rain fed and irrigation condition. Lemon cultivation are very famous in Raipura Upazila. Farmers are cultivated different vegetables such as Brinjal, Potato, chili and Cabbage etc. All the SAAOs and UAO reported that about 80-90% farmers used power tiller and tractor during land preparation. 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

Main crops: Rice is a primary crop and a staple food of this area. Here the growth of rice production is much faster. Paddy (Boro rice (HYV/Hybrid), and T. Aman (HYV/LIV), Jute, Wheat, Vegetables, Mustard, Groundnut, and Pulses etc. Jute is a primary and one of the main cash crops of this Upazila. It 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 grower's for this crop. Jute leaf is a common and favorable vegetable item to the farmer.

Oilseed crops: Mustard, Groundnut, and Til are popularly cultivated in Raipura Upazila. Mustard as an oilseed crops takes first place in respect of cultivated area in Bangladesh. Farmers of Raipura 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: Potato, 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 Raipura upazila. The soil and climate conditions of this raipura 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: Chili, Turmeric, Ginger, Onion & Garlic etc.
Fruits: Lemon, Mango, Jackfruit, Litchi, Banana, Coconut, Betel Nut, Country Goose Berry, Guava, Plum, Kul, & Papaya etc

4.8 Conversion of Agricultural Land to Non-Agriculture

Agricultural land is the main resource in agriculture. Many high value crop vegetables are grown in this Upazila. There is wide opportunity to lotkon and lemon, vegetables as commercial basis to export. The Upazila is considered as potential for agriculture. "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 Raipura a substantial amount of agricultural land had been shifted to a non-agricultural one viz construction of houses, brickfield, sawmill, road, market and other infrastructures. Absence of proper planning and land zoning convert the arable land to other uses rapidly. The major component for agricultural land converted into non- agricultural are:(i) Non agricultural development on agricultural land. (ii) New or existing urban development and expansion (iii)Construction of industries and new settlements in agricultural land & (iv) Acquisition of agricultural land for non-agricultural purpose.

Plate 1 Boro Rice Crop Field

Plate 2: Jute Field

Plate 3 Wheat Crop Field

Plate 4: Lemon Garden

Plate 5: Compost Demonstration of DAE

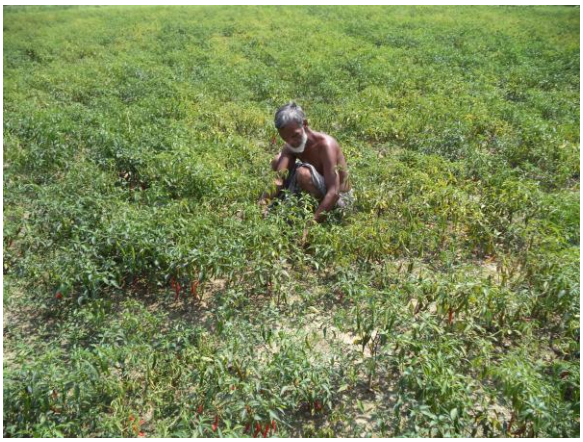

Plate 6: Chili Crop Field

Chapter 05:
Production Cost of Rice and Vegetables

5.1 Cost of Rice production

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) were conducted survey all over the country in three rice seasons (Boro, Aus and Aman paddy). BRRI study findings shows 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 (Table 35). Department of Agriculture Marketing was estimated production cost for Boro rice Tk.18.08per kg, Aman Rice Tk.18.20 per kg and Wheat Tk.23.50 per kg in the year 2015-16. On this basis Government has declared buying rate of Boro rice Tk.20.70, Aman rice Tk18.50 per kg and Wheat 27.02 per kg respectively. Raipura 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.

Table-35: Cost of Rice Production (2014-15)

Name of Rice	Average per kg rice production cost (TK)	Crop season
Boro	18.65	Rabi
Aus	18.64	Kharif-1
Aman	17.61	Kharif-11

Source: Agriculture Economic Division, BRRI 2016

5.2 Cost of Vegetable Production

The production cost of vegetables varies depending on crop, variety, time, place, and season. During the 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.

Monsura Zaman, Rokhsan-Ara-Hemel and Tahmina Ferdous (2010) assess 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.6) Cost of per kg and per 40kg was found approximately the highest for tomato and the lowest for cabbage and cauliflower.

Farmers of Raipura Upazila reported that major cultivation occurred in land preparation (Power tiller/tractor cost), irrigation, pesticides, fertilizers and labor. Farmers reported that per ha cultivation cost

is Tk. 6500-7000/- *(Upazila Agriculture Office, Raipura).* Generally, supplementary irrigation provided potatoes, Chili and winter vegetables. Supplementary irrigation cost is 1000-2000 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.4000-5000/-) ana W & S. vegetables fields (Taka 3000-4500/ha). Labor cost day by day increased and per day labor cost more or less Tk. 400-500 depends on crop season.

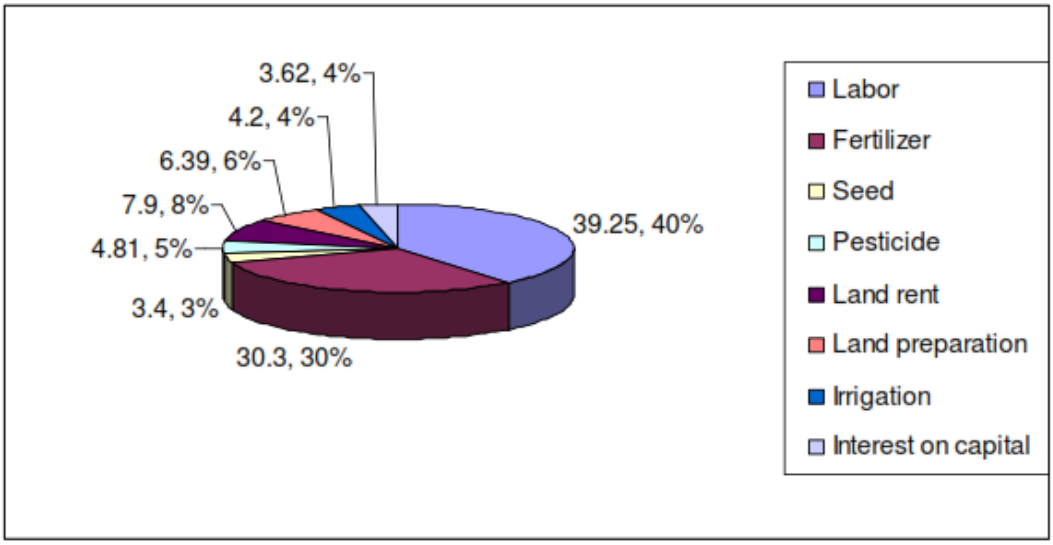

Fig 6: Percentage of Major Types of Production Costs for Vegetables.
Source: ASA University Review, Vol. 4 No. 1, January–June, 2010

Brinjal is one of the most popular and important vegetable in Raipura 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 36). 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 36: 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	Miahet 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
2016	Rangunia	61750	20.00	1235000	306492	9,28,508	4.03	UAO, DAE 2016

The present study was assessed financial profitability of Brinjal, Tomato, Potato and Cabbage/cauliflower and cucumber vegetables production under Raipura Upazila which is shown in Table 37. Finding shows that Brinjal cultivation is more profitable (Tk.820000/-per ha) followed by Cabbage/Cauliflower (Tk475000/- per ha), Tomato (Tk.450000/- and potato (Tk350000/- per ha) and Cucumber vegetables (Tk.200000/-) respectively.

Table 37: Financial Profitability of 5 types of Vegetables Production in Raipura Upazila

Vegetables	**Yield (Kg/kg)**	**Price (Tk/Kg)**	**Gross Return (Tk/ha)**	**Total Cost (Tk./ha)**	**Net Return (Tk/ha)**
Brinjal	40000	30	1200000	380000	820000
Tomato	30000	25	750000	300000	450000
Potato	30000	20	600000	250000	350000
Cabbage/Cauliflower	25000	25	625000	150000	475000
Cucumber	20000	20	400000	200000	200000

Source: SAAOs Raipura Upazila, DAE 2016

Chapter 06:
Growth or Decline of Agricultural Land during Last Ten Years

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 year data (2005 to 2015) from Upazila Agriculture Office and discussion with 24 Unions and 1 Municipality all Sub-Assistan Agriculture Officers of Raipura Upazila and review the other documents. The growth or decline of agricultural land use during last ten years under Raipura Upazila is shown in Table 38. It is found that 81% 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 rice. The HYV paddy cultivation area 251% was increased. Remarkable significant changed or increased during 10 years was occurred in summer vegetables (84%), winter vegetables (102%), Wheat(33%), Tuber crops(30%) oilseeds (20%), Spices (52%) and Jute cultivation (15%) land use. The main reasons for increases are vegetables, fruits market demand and price is high. Table 38 shows, among the other purposes remarkable significant changed were occurred in poultry farm (205%) and Brick field (102%) and followed by gardening (69%) and Housing (57%) respectively. Similarly 15% forest land was decreased under Raipura Upazila. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on crop production.

Table-38: Growth or Decline Agriculture Land Use during the Last 10 Year

Sl. No.	Agricultural land use	Land Use (2005) in ha	Land Use (2015) in ha	% Change
1	Paddy (local varieties)	18970	3628	-81
2	Paddy (HYV)	6110	21452	+251
3	Vegetables (Summer)	968	1786	+84
4	Vegetables (Winter)	1878	2870	+102
5	Tuber crops	1035	1350	+30
6	Pulse crops	250	295	+18
7	Oilseed crops	1194	1433	+20
	Wheat	90	120	+33
8	Spice crops	590	898	+52
10	Jute	1050	1215	+15
11	Sugarcane	21	23	+10
12	Other purposes			
	-Brick field	2.0(#2)	4.05(#6)	+102
	-Poultry farm	2.05(#100)	6.26(#515)	+205
	-Fish/shrimp culture	2534.8	2801	+11
	Forest	376	328	-15
	-Gardening	274	533	+69
	-Housing	1806	2841	57

Source: SAAOs, UAO, ULO, UFO and Upazila Statistic Office of Raipura Upazila 2016

Chapter-07:
Major Problems of Crop Production in Raipura Upazila (24 Unions and 1 Municipality)

Agriculture survey findings and Participatory Rural Appraisal March 2016 study report findings show farmers some problems are common in different unions under shibpur Upazila such as drought, bad communication and wholesale market and infrastructure.

The major problems in Raipura Paurashava Union for crop cultivation are:

(i) Lack of quality good quality seeds
(ii) Drought & heavy rain fall, & water logging
(iii) Shortage of modern agricultural equipments
(iv) Lack of improve irrigation facilities
(v) No cold storage for preservation of vegetables and fruits
(vi) Transport and marketing and infrastructure
(vii)) Increase insect and pest infestation
(viii) Lack of disease resistance variety crop seeds
(ix) Inadequate drainage facilities and 100% irrigation canals are kutcha which is increase the wastage of irrigation water and crop area is not possible to increase
(x) Lack of food storage facilities
(xi) Lack of soil testing machine
(xii) Agricultural land converted into brickfield (non-agriculture purposes)
(xiii) Lack of farmers modern technological knowledge
(xiv)Problems of getting agricultural loan
(xv) Electricity power failure during Boro crop season
(xvi) There is no agro processing center and industries under Unions.
(xvii) Siltation of canals and river
(xviii) Lack of labor during harvesting time
(xix) Produced crops market price (specially Rice) is less and production cost is high

Chapter-08:
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 Raipura Upazila.

1. Developing Infrastructural Facilities: Road network at local level, agro-processing and marketing infrastructure development, Re-excavation of canals, river 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. Each Union one wholesale market infrastructure need to be constructed. Construction of one seed store per Union under Raipura Upazila..
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2. To Reduce the Irrigation water Wastage, proper utilization and increase the irrigated command crop area the STW and, LLP kutcha drain need to be converted into pucca drainage system or introduce underground pipe irrigation system. During Boro crop season nonstop power supply for irrigation pumps.

3. Farming and Adaptation Practices: Adapt modern farming techniques and Choose high yields and drought tolerant and disease resistant crop varieties. 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 24 unions and1 Municipality 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 24 Unions and Municipality area. As results farmers could not get good price for their produced products. There is a need for establishment of cold storage each Union and development of market infrastructure.

5. Crop Production Inputs Availability: Ensure availability of good quality HYV and Hybrid crop seeds, fertilizer, pesticides and cultivation equipments. Information on quality seed need to be provided up to block level.

6. Availability of Crop Seeds: Drought 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 poato-21,22, 50, widely introduce and encouraged to cultivated farmers.

7. Fertilizer 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 project. Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops. Incorporating organic manure in the soil by changing cropping pattern /crop rotation system

8. Pest Management: Insects, rats, weeds and diseases are a chronic problems 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. 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 project.

9. Agro-based Industries: Establishment of Agro-based processing center & industries in 24 unions and Municipality. There is a need for construction of infrastructure for some agro-base processing center. 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 02 (Ishwarganj, Shibpur and Raipura Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

11. The following additional systems may be adapted in an innovated way for sustainable crop production and environmental conditions of Raipura 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.
- 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

Soil and weather conditions are highly suitable for Boro(HYV/Hybrid),T. Aus(HYV) & T. Aman (HYV) and different vegetables and other high value crops cultivation round the year in Raipura Upazila. Good quality HYV/Hybrid different crops seeds need to available in union level. There is a need to develop

vegetables wholesale market and improvement of communication system different Unions to Upazila. Each Union need to be established one cold storage for preservation of vegetables and fruits crops. 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 kutcha drain are to be made lined channel which will reduced irrigation water wastage and increase crop production. Integrated pest management need to implement for rice, jute, oilseeds crops and vegetable cultivation and reduce the pesticide use. Electricity power supply should be ensured during Boro crop season. Increase agriculture production through optimum use of land. Many high value crop vegetables are grown in this Upazila. There is wide opportunity to Banana and lemon, vegetables as commercial basis to export.

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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-OctoberMid March)	

Season	Farming Practices
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 Watermelon=		
Cowpea =			Species=		
Chickpea=			Chili=		

Crop Area(ha)	Yield/ha	**Total Production(MT)**	**Crop Area(ha)**	Yield/ha	**Total Production(MT)**
Others =			Onion=		
Tuber crops=			Garlic=		
Potato=			Jute=		
Sweet potato=			Sugarcane=		
Bamboo =			Betel nut=		
Betel vine(Pan)=					

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 ploder

1.----------2----------

3.----------4----------

5.----------6----------

Appendix-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	%
6.	Land less (.05-.50 acre)		
7.	Marginal (.51-1.50 acre)		
8.	Small (1.51 -2.50 acre)		
9.	Medium (2.51-7.50 acre)		
10.	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.

Appendix-3

Plate 1: Meeting with block supervisors of Raipura Agriculture Office