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

**Agriculture Survey
of
Ishwarganj Upazila, Mymensingh**

August, 2016

Joint Venture
of
SCPL Sheltech Consultants Pvt. Ltd
and
Arc ARC Bangladesh Ltd

Government of the People's Republic of Bangladesh
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Package-02
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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)

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Ref: SCPL-ABL/UDD/2016/ PRA Report/Eshwarganj 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 Ishwarganj Upazila,
Mymensingh.

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

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)   (Md. Azibar Rahman)
Team Leader, Package -2   Socio-economic 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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Executive Summary

Comprehensive development plans for both rural and urban areas are essential for sustainable development. Though resources are limited, the Government of Bangladesh (GoB) has focused on the planned development at different layers of administrative organizations of the country. 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 our study nine wards and eleven unions of Ishwarganj 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 Ishwarganj Paurashava and unions. They have also recommended few development priorities for Ishwarganj Paurashava and unions. 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 Ishwarganj 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 the Ministry of Housing and Public Works has taken initiative to collect the information on local problems with causes, impacts and local potentials as well as development priorities from the local people for preparing 20 years long development plan of fourteen Upazilas under the Government of Bangladesh (GoB) funded project entitled "Preparation of Development plan for Fourteen Upazillas". Under this Project's Package-02, UDD management has taken decision to conduct PRA Session at each Union level in the rural areas and one session in every three wards under municipality areas of Ishwarganj Upazila (see Map-1). PRA session has been conducted on June 2015 at Ishwarganj Upazila where 260 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 Ishwarganj Upazila.

Map 1.1: Ishwarganj 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/purposes as described below:

1.3.1 Mapping Resources and Identifying Areas

The PRA method Social mapping has been applied 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 factors 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 purposes 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 exercise 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 it's 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) tool 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 purposes 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 PRA 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 case of rural area and one PRA for three wards in the municipal area of Ishwarganj Upazila.

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

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 has 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 to the severity of the problems and sticks them on the white color poster paper. The biggest circular sized paper indicates 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 5 (five) major problems on priority basis. Then the prioritized problems and potentials were represented by the Venn diagram.

1.4.3 Technology of Participation (ToP) Consensus Workshop on Development Needs

ToP is a 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.

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- 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 & Pairing)

Then the facilitator has asked the participants to think individually on the focus question and write 5 ideas in plain paper 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 loudly and checked if all are clear on the theme/meaning of the meta card, if not then asked the writer to clarify the content, after clarification, hanged it 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 Participants and Facilitators of PRA Seniors

1.5.1 The Participants

15-20 participants have been selected from each union for rural area and each three wards under municipal area. The category of target participants were: Union/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 being 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 260 participants (Male-205 and female-55) have attended in the PRA sessions in 12 different study locations of Ishwarganj Upazila from 15 June 2015 onwards. PRA session has started at 10:30 a.m. and continued up to 13:15 p.m. The participant's categories were shown in Table-1.1.

Table -1.1: Category of Participants

Name of the locations	Category of Participants (Nos.)												Total Participants
	UP/Pourashava Representative	Business-man	Service holder	Teacher	Elite /Politici	Student	Farmer	Imam	Housewife	NGO	Labor	Kazi	
Ishwarganj Paurashava	10	02	00	02	04	-	01	00	-	-			19
Atharabari Union	11	02	01	00	02	01	00	-	-	-			17
Barahit Union	04	02	03	04	05	03	-	-	08	01			30
Ishwarganj Union	01	03	-	-	-	02	04	-	02	-			12
Jatia Union	04	08	04		01		05				01		23
Magtala Union	04	04	06	-	03	03	03	01					24
Maijbagh Union	04	05	04	01	02		00		02				18
Rajibpur Union	12	02	01	01	02	02	00						20
Sarisha Union	11	02	02	03	04	02	01	01	03			01	30
Sohagi Union	11	01	02	02	02	01	02						21
Tarundia Union	06	08	06	01	02		01	01					25
Uchakhila Union	08	06	02	02			00		02			01	21

Source: Field Survey 2015

1.5.2 PRA 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 are shown in Table-1.2.

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Table-1.2: PRA Team and Organization

PRA Team	Organization
Md. Azibar Rahman: Social Expert and key facilitator Tarek Khan: Co-Facilitator Md. Minar Hossain: Logistics Manager Md. Rubaiyat Islam: Rapporteur	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. Schedule of PRA sessions conducted in Ishwarganj can be seen at a glance in Table-1.3.

Table-1.3: Schedule of PRA Session

	Ishwarganj Upazila		Ishwarganj Pourashava	
	Name of Union	PRA Date	Name of Ward	PRA Date
01	Atharabari Union	15-06-2015	1-9	16-06-2015 (Time: 10:30 am. - 5:00 p.m.)
02	Barahit Union	11-06-2015		
03	Ishwarganj Union	13-06-2015		
04	Jatia Union	14-06-2015		
05	Magtala Union	13-06-2015		
06	Maizbagh Union	15-06-2015		
07	Rajibpur Union	11-06-2015		
08	Sarisha Union	15-06-2015		
09	Sohagi Union	15-06-2015		
10	Tarundia Union	09-06-2015		
11	Uchakhila Union	10-06-2015		

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 been 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 and categories of participant of the PRA session for maintaining the discipline and ensuring representation of the whole society in the PRA sessions.

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 have been selected from each union for rural area and each three wards under municipal area. Facilitators always re-check different category of participant's availability in each PRA session as per ToR, if not fulfilled, then cancel that day session and re-schedule the program. PRA session has been held at Union Parishad of all unions except Sohagi Union. Sohagi high school has been chosen for PRA session. Chairs have been provided for siting of participants and they arranged in a circular manner so that everybody could participate equally. Everybody has been encouraged to talk and not letting someone dominate rather building consensus. Facilitators also confirmed reflection session by asking one male and one female participant to tell briefly their evaluation on the PRA process and finally make all the participants to take oath to continue support in future project activities especially helping consulting firms during other surveys in Ishwarganj.

1.7.3   Documentation and Compilation of PRA Sessions

Proper & timely documentation was an integral part of these PRA sessions. Facilitators compiled all notes and checked meta cards, flip charts and sticky wall materials to document individual PRA report covering 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. Individual PRA report has been written at night of the same day of PRA session using Laptop computers. The team took help of digital photographs taken in the PRA session. Finally, all hard copies of each PRA session have been preserved in separate file with names in it.

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 paid sudden visited the place. They also talked with participants and oversee sitting arrangement which was crucial for active participation. They also checked whether or not individual PRA report had been completed or not on the same day by checking the PRA file as well as the laptop.

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CHAPTER TWO: PRAs At MUNICIPAL WARD LEVEL

2.1 Overview of Ishwarganj Municipality/Pourashava

The Ishwarganj Paurashava is under the jurisdiction of Ishwarganj Upazila of Mymensingh district. Ishwarganj was liberated on 9 December 1971. Area of Ishwarganj paurashava is 12.48 sq km. It is bounded by Gauripur upazila on the north, Nandail upazila on the south, Kendua upazila on the east, Mymensingh sadar and Trishal upazilas on the west (please see Map 2.1). Total Population is 24991 and total no of ward is 9. Population density of this paurashava is 2000. 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, Gouripur Upazila is situated

West: On the west side of the study area, Gouripur Upazila is situated

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

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

Map 2.1: Ishwarganj Paurashava
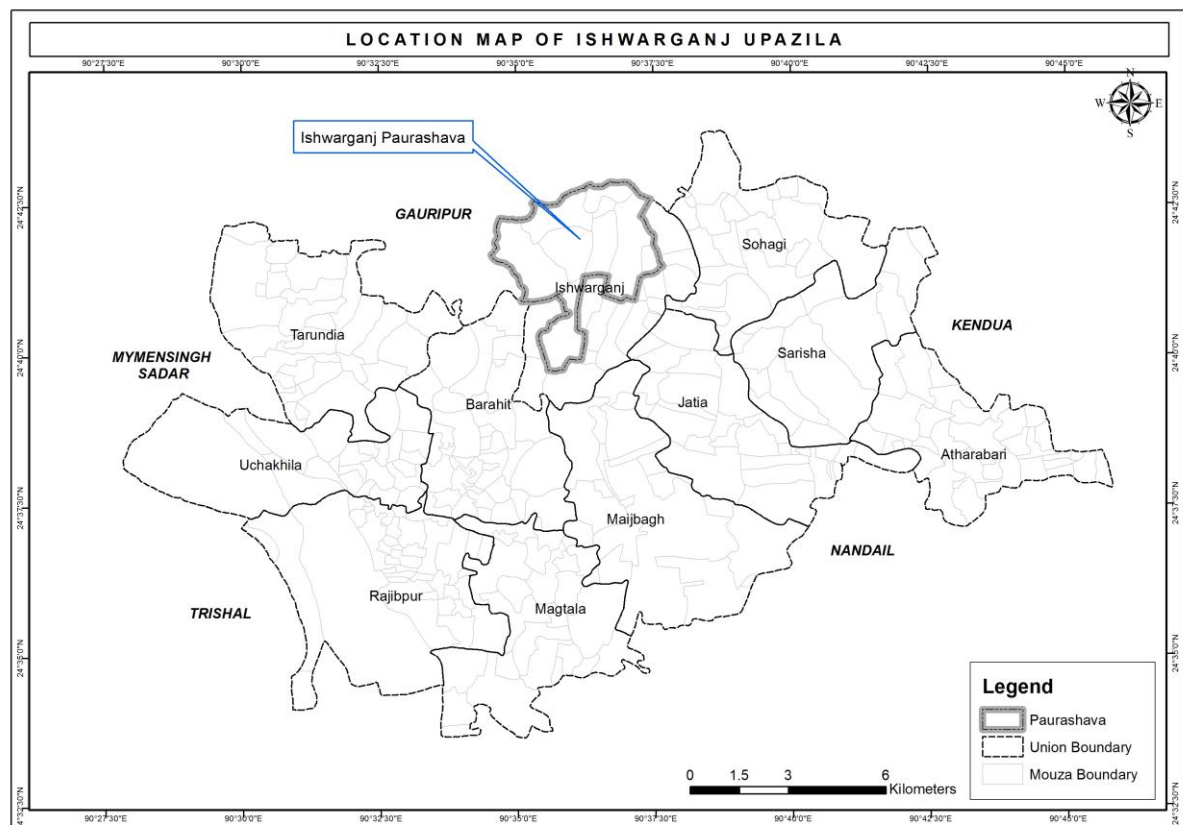
Table 2.1: Ishwarganj Paurashava

Features	Type	No.
Religious Institutions	Mosque	343
	Temple	18
Communication facilities	Pucca road	98 km
	Kacha road	574 km
	Railway	17 km
	Railway station	3
Educational institutions	Primary school	145
	Secondary school	26
	College	5
	Madrasa	106
Cultural organizations	Library	1
	Club	21
	Cinema hall	2
	Playground	15
Markets		30
Health centers	Upazilla Health Complex	6
	Clinic	61
	Hospital	3
Sources of drinking water	Tubewell	92.11%
	Tap	.32%
	Ponds	1.90%
	Others	5.67%

Source: Ishwarganj Pourashava, 2015

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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. It has been found that some information quite matches with information of Table 2.1.

| **Photograph 2.1: Preparing Social Map of Pourashava** | **Photograph 2.2: Social Map of Paurashava** |

2.2.1 Findings of Social Mapping

The major findings of social map are as follows:

- Though it is Paurashava but most of the land are agri-land and deep tube well is only irrigation water source
- River bed of Kanchamatia river has silted up

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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 Ishwarganj Pourashava

Major problems of Ishwarganj*	
Type of problems	Ward No
• Insufficient educational institution • Electricity connections are not as per requirement and continuous load shedding • Scarcity of potable water during dry season • Waterlogging at Kakonhati and Paihakuri	1 to 3
• Absence of pipeline gas supply in the area • Existing roads are poor in quality and not as per requirement • No community Centre in Ishwarganj • No playground and park in Ishwarganj • No improved Hospital in the area • Mosques are not updated	4 to 9

Source: PRA, 2015

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

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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 5 (five) major problems are as follows;

1. No pipe gas supply: No initiatives have been taken for pipe gas line.

2. Insufficient Electricity: Sub-station is located at Gouripur.

3. Communication: Road condition is not good between Ishwarganj and Paihakuri area.

4. No Govt. Hospital: Lack of doctor is the root cause of not establishing of Govt. hospital. Poor service has been provided by the clinic.

5. No playground and Park: Govt. does not take any initiatives for park and playground.
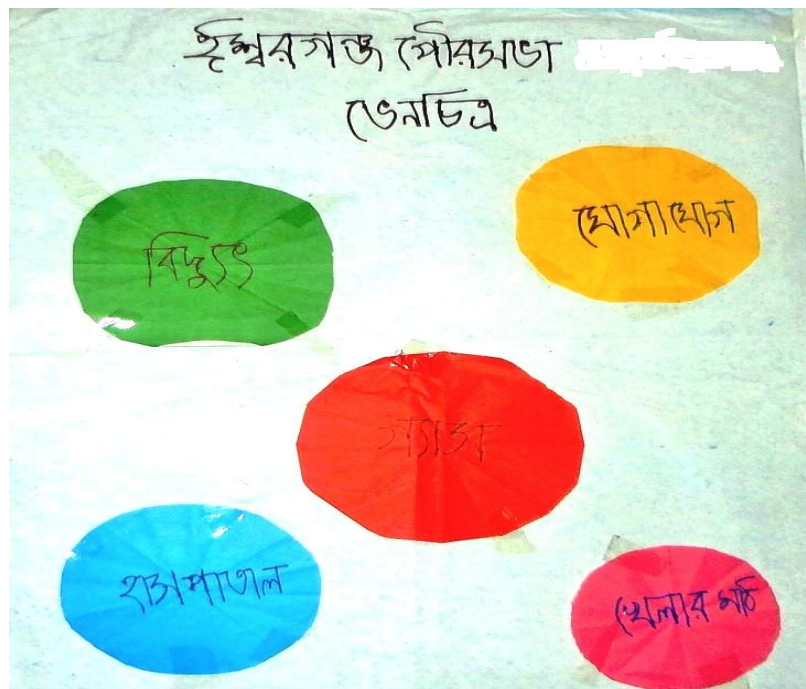
Photograph 2.3: Venn diagram of problems of Ishwarganj Pourashava

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 (Paddy)
- Deep Tube well
- River (Kacha matia)
- Ishwarganj Degree College
- Ishwarganj bazar
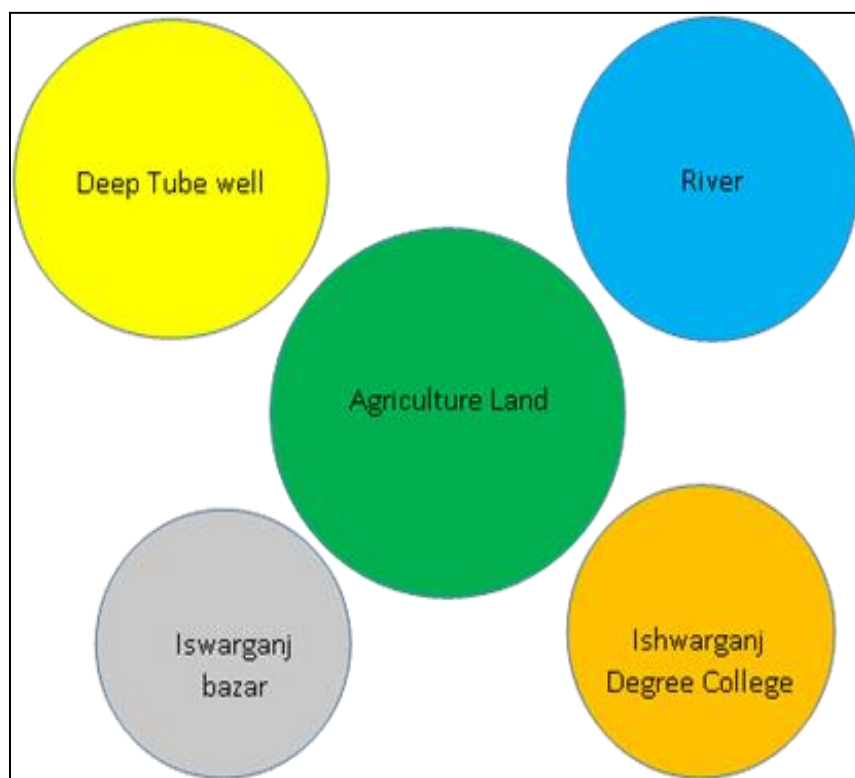
Figure 2.1: Major Five Potentials of Ishwarganj Pourashava

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 2.3: Problems, Cause, Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Probability
1. Gas Connection	• No initiative of authority	• Load shedding increased due to electricity is being used as fuel • Establishment of other factories is hampered. • Un-healthy due to fume • More time consumed in cooking • More money involvement	• Gas pipeline is only 3 Km apart from the Paurashava office.
2 Insufficient Electricity supply	• Higher demand • Supply is not increasing as per demand.	• Hamper study • Hampered irrigation • Reduce the normal production of paddy • Economical loss • Increased unlawful activities in the area like stealing, snatching	

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Identified Problems	Causes	Impact	Potentials/Probability
		• Accident risk due to darkness	
3.Poor Communication facilities	• Lack of proper GOB Financial support • Lack of NGO/Private Initiative	• Motorized vehicle are not available during rainy season • Movement is very difficult during monsoon due to muddiness and slipperiness • Accident risk for aged people • More time consumed for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Katcha Road • People are interested to give land for road widening and improvement
4.Hospital facilities	• Not yet established improved hospital • Not available modern clinic • Poor service from community health clinic • Doctor/Specialized Doctor is not available in all time • Ambulance is not available in all time • Lack of availability of necessary medicine in Hospital/Clinic	• Have to go to Mymensingh Town for treatment • Time loss for travelling • Over expenditure • Life risk for moribund patients	
5.Lack of Recreation	• No khas land in the area • No interested person to donate the land for playground	• No scope to organize sports tournament • People cannot enjoy recreation • Boys/Girls cannot play • Physic of student is not building up properly	

Source: PRA, 2015

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

2.4   Perceived Development Priorities

Based on Individual Ward Level PRA reports (please see Annexure: II), the recommended development priorities of Ishwarganj Paurashava have been outlined in Table-2.4, 2.5 & 2.6. It has been found that short-term priorities are those related to day to day comfort movement i.e. improvement of road condition and communication. Their mid-term priorities are availability of uninterrupted electricity and recreation facilities which are basic urban needs. Their long term priority is to establish modern high school to educate their children better.

Table 2.4: Short Term Development Priorities of Ishwarganj Paurashava

Short Term Development Priorities	Ward No
• Improvement of communication system	All Wards
• To construct pucca road	All Wards
• To construct quality road	1,2,3
• To improve katcha road by pucca.	4,5,6,7,8,9
• To connect HHs with gas supply through pipeline	1,2,3,4,5,6
• To establish Govt. college	1,2,3

Table 2.5: Mid Term Development Priorities of Ishwarganj Paurashava

Mid Term Development Priorities	Ward No
• Ensure uninterrupted electricity supply	All Wards
• To connect more household with electricity supply	1,2,3
• To improve sanitation condition through mass communication as well as awareness raising	1,2,3
• To establish Park and playground	4,5,6,7,8,9
• To establish community center	4,5,6,7,8,9

Joint Venture of SCPL-ABL

Table 2.6: Long Term Development Priorities of Ishwarganj Paurashava

Long Term Development Priorities	Ward No
• Establishment of modern high school	1,2,3

Joint Venture of SCPL-ABL

CHAPTER THREE: PRAs At UNION LEVEL

3.1 Overview

Ishwarganj Upazilla is consisted of eleven unions named: Atharabari, Ishwarganj, Uchakhila, Jatia, Tarundia, Barahit, Magtala, Maijbagh, Rajibpur, Sarisha, Sohagi.. Area of unions of Ishwarganj upazilla is 27.71 sq km. Total Population is 3, 07,132 and density is about 2000. Average literacy rate of the unions is 33.83%.
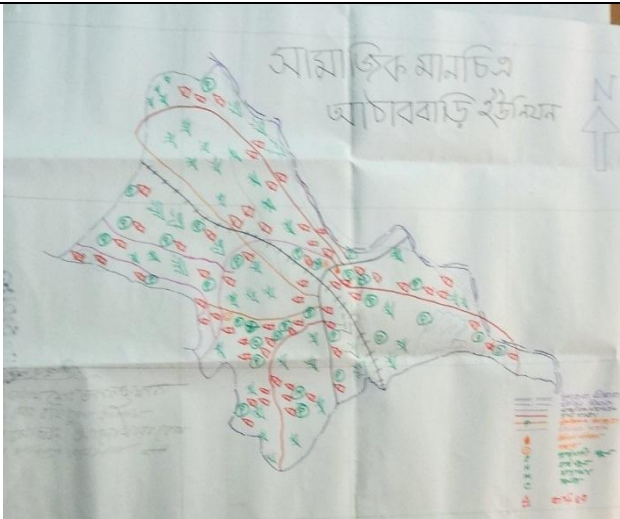
Map 3.1: Ishwarganj Upazila Unions

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 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 3.1:Preparing Social Map at Union Level	**Photograph 3.2: Social Map of one union (Atharabari Union)**

3.2.1 Findings of Social Mapping

The major findings of social map are as follows:

- Kanchamatia river is not helping to reduce drainage problem as it is silted up.
- Most of the land are agri land and deep tube well is irrigation water source

3.3 Major Problems and Potentials

3.3.1 Problems Identification

Most of the participants have participated in order to identify the problems and prioritized the problems with causes, effect/impact and potentials. It has been found from Individual PRA Report at Union Level (please see Annexure-III) that there are around 16 (sixteen) problems identified in different unions (please see Table-3.1) of Ishwarganj Upazila. Out of them, waterlogging, poor communication, lack of educational facilities and insufficient electricity supply are common in all unions. Besides these, other identified problems are mostly related to absent of gas supply, lack of potable water and lack of recreation facilities which are common features of any rural areas of Bangladesh.

Table 3.1: Major problems of eleven unions of Ishwarganj Upazila

Sl. No.	Major Problems	Unions*
1.	Waterlogging	All unions
2.	Poor Communication	All unions
3.	Poor infrastructure	7,8,9
4.	Lack of Educational facilities	All unions
5.	Absence of pipeline gas supply	1,2,3,4,5,6,8,10
6.	Lack of deep tube well	4,5,8,10
7.	Lack of potable water	1,2,3,4,5,6,7,9,11
8.	Wasteful use of water	1,3,5,6,7
9.	Poverty	1,3,4
10.	Lack of Community Clinic	1,2,3,6,7,9
11.	River/Khal siltation	2,3,4,7,8,11
12.	Lack of proper land use	1,2,3,7,10,11
13.	No drainage system	3,4,5,7,9,10
14.	Lack of recreational center/park	2,4,5,6,7,8
15.	Bad condition of katcha road	1,2,3,4
16.	Inefficient Electricity Supply	All unions

Source: PRA Survey, 2015

Note: * 1= Atharabari Union, 2 = Barahit Union, 3 = Ishwarganj Union,

      4 = Jatia Union, 5 = Magtala Union, 6 = Maizbagh Union,

      7 = Rajibpur Union, 8 = Sorisha Union, 9 = Sohagi Union,

      10 = Tarundia Union, 11 = Uchakhila Union

3.3.2 Problems Prioritization through Venn diagram

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

1. Waterlogging

2. Poor Communication

3. Inefficient Electricity Supply

4. Lack of Potable Water

5. Lack of education facilities

3.3.3 Potentials Identification

There were threadbare discussions on potentials of rural Ishwarganj to overcome the previously identified problems. Most of the participants indicated that their fertile agriculture land, availability of deep tubewell, rivers flowing in between the unions such as Kanchamatia and Brahmaputra, different water bodies like Andail beel, Baro Halia and other perennial khals, livestock rearing specially in Char areas, fish culture and ponds and different bazars like Atharabari, Jatia, Uchakhila, Modhupur, Sohagi are major potentials of Ishwarganj rural areas which can be utilized for their future development (please see Table 3.2).

Table 3.2: Major potentials of eleven unions of Ishwarganj Upazila

Sl.	Major Potentials	Unions*
1.	Agricultural land (Paddy)	All unions
2.	Deep Tube well	All unions
3.	River	All unions
4.	Livestock rearing	1,2,3,4,5,7,8,9,10
5.	Water Body/Beel	1,2,3,4,5,,7,8,9,11
6.	Recreational place	4,5,6,9,10,11
7.	Bazar	1,2,3,9,10,11
8.	Fish Pond	4,6,7,8,9,11

Source: PRA Survey, 2015

Note: * 1= Atharabari Union, 2 = Barahit Union, 3 = Ishwarganj Union,

4 = Jatia Union, 5 = Magtala Union, 6 = Maizbagh Union,

7 = Rajibpur Union, 8 = Sorisha Union, 9 = Sohagi Union,

10 = Tarundia Union, 11 = Uchakhila Union

3.3.4 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 (Paddy)
- Deep Tube well
- River
- Livestock rearing
- Water Body/Beel

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 effect/impact of problems and potentials in the area. The problems, causes, impact and potentials have furnished in the following table;

Table 3.3: Problems, Cause, Impact and Potentials of Ishwarganj Upazila*

Identified Problems	Causes	Impact	Potentials/Probability
1.Waterlogging	• Siltation of the drainage canal bed • No initiative to re-excavate existing canal or excavate new drainage canal	• Communication disruption • Loss of crops & assets • Loss of trees which are not able to survive during water logging • Bad odor	• Existing bed silted up • Khal is available
2.Poor Communication facilities	• GoB Financial support is not provided • NGO/Private support is not available	• Motorized vehicle are not available/ functional during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Wastage of time for traveling • Excess expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Katcha Road • People are interested to give land for widening and improvement of road
3.Insufficient Electricity Supply	• Increased the demand • Supply is not increasing as per	• Hampered lessons preparation of student • Hampered the	

	• Political influence disrupts distribution	irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area Accident risk due to darkness	
4.Lack of Potable Water	• During irrigation by Deep Tube well water is not available in Hand tube well • No piped water supply provision in area • Absence of alternative sources for drinking water	• Spread of waterborne diseases • Ill health • Life risk • Loss of money • Poverty	• Existing Deep Tube well
5.Lack of Education Facilities	• GOB Financial Support not available • NGO/Private or any interested person not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life style • Less scope to bear the expenditure for education, health and recreation aspect	

Source: PRA, 2015,

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

3.4 Perceived Development Priorities for Eleven Unions of Ishwarganj Upazilla of Mymensingh District

3.4.1 Short-term Development Priorities

During the ToP Consensus session, participants identified different mi-term priorities which they demanded to be fulfilled within 3-5 years period and these are termed as shor-term development priorities which need immediate intervention. Among the priorities, most common demands were improvement of electricity system as well as communication, improvement of infrastructure at the hat and bazars for their economic vibrant, improvement of sanitation as well as solving waterlogging problems both in agricultural land and hat bazars, establishment of hospital etc. (please see Table 3.4).

Practically, their short-term development priorities match with the problems identified in earlier section of this chapter.

Table 3.4: Short-term Development Priorities for eleven unions of Ishwarganj Upazilla

Sl. No.	Short Term Development Priorities	Unions*
1.	Improvement of electricity system	1,2,3,5,6,8,9,10
2.	Improvement of communication system	1,2,3,,6,8,9,10
3.	Improvement of educational facilities	1,2,3,5,6,8,9,11
4.	Ensure potable water supply to households	1,2,3,8,9,10
5.	Improvement of Infrastructure at the Hat & Bazar	1,2,3,4,5,8,9
6.	Improvement of sanitation system	1,2,4,6,8,9,10
7.	Improving waterlogging situation	1,2,3,5,8,9,10
8.	Establishment of Hospital	4,6,8,9,10,11
9.	Prevent occurrence of early marriage	4,7,8,9
10.	Ensure Medical Facilities	1,4,6,8

Source: PRA Survey, 2015

Note: * 1= Atharabari Union, 2 = Barahit Union, 3 = Ishwarganj Union,

   4 = Jatia Union, 5 = Magtala Union, 6 = Maizbagh Union,

   7 = Rajibpur Union, 8 = Sorisha Union, 9 = Sohagi Union,

   10 = Tarundia Union, 11 = Uchakhila Union

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 improvement of Improvement of educational facilities, Ensure 100% sanitation in rural communities, Construct more pucca road or converting katcha road to semi-pucca or pucca, Improvement of electricity system, Ensure supply of pure drinking water i.e. piped water supply and construction of more deep tube well for drinking water etc. (Please see Table 3.5). Practically, participants put electricity in both short-mid and long term priorities as they wanted it any period of time at least let the process roll on for them.

Table 3.5: Mid-term Development Priorities for eleven unions of Iswarganj Upazilla

Sl. No.	Mid-Term Development Priorities	Unions
1.	Improvement of educational facilities	1,2,3,4,5,6,8,9,11
2.	Alleviate the poverty	1,2,3,4,5,6,9,10
3.	Ensure 100% sanitation	1,2,3,4,8,9,10,11
4.	Construct more pucca road	1,3,4,5,6,8,9,11
5.	Employment generation	1,2,3,4,5,6,9,10
6.	Improvement of electricity system.	1,2,3,8,9,10,11
7.	Ensure supply of pure drinking water	1,2,3,5,6,8,9,11
8.	Ensure Sanitary latrine for the poor	2,4,6,8,9

Source: PRA Survey, 2015

Note: * 1= Atharabari Union, 2 = Barahit Union, 3 = Ishwarganj Union,

4 = Jatia Union, 5 = Magtala Union, 6 = Maizbagh Union,

7 = Rajibpur Union, 8 = Sorisha Union, 9 = Sohagi Union,

10 = Tarundia Union, 11 = Uchakhila Union

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 ensuring pipeline gas supply in all unions i.e. getting the urban facility in rural households. They also wanted initiatives from Govt., Non-govt., private or foreign investment to establish industry in Ishwarganj so that the present demography bonus or working population could get job within their Upazila. They were found very optimistic on establishing Econimic Zone at Uchakhila Union. Moreover, they gave emphasis on ensure sufficient potable water supply as well as employment generation for all literate unemployed in rural areas of Ishwarganj Upazila (please see Table 3.6).

Table 3.6: Long-term Development Priorities for eleven unions of Ishwarganj Upazilla

Sl. No.	Long-Term Development Priorities	Unions
1.	Ensure pipeline gas supply	All unions
2.	Establishment of industrial zone	1,2,3,5,7,8,10
3.	Ensure sufficient potable water	1,2,3,7,9,10,11
4.	Employment to be generated for all literate unemployed	1,3,4,5,7

Source: PRA Survey, 2015

Note: * 1= Atharabari Union, 2 = Barahit Union, 3 = Ishwarganj Union,

4 = Jatia Union, 5 = Magtala Union, 6 = Maizbagh Union,

7 = Rajibpur Union, 8 = Sorisha Union, 9 = Sohagi Union,

10 = Tarundia Union, 11 = Uchakhila Union

CHAPTER FOUR: CONCLUSION

4.1   Key Observations

The key observations of PRA study are:

- From the social mapping, it is evident that Ishwarganj Paurashava and 11 unions are having almost common findings. Among those, most of the land is agri-land, deep tube well is only irrigation water source and River bed of Kanchamatia has silted up is very common.

- Most of the participants have participated in order to identify the problems and prioritized the problems with causes, impact and potentials. Total 33 nos of problems have been identified from the study areas, of which Insufficient Educational Facilities, Lack of Pure drinking water, Water logging, Poor communication system and Poor sanitation system are the common problems in all locations. Again, Lack of proper land use, Water table depletion and some social problems like dowry, early marriage, corruption are also identified as their less important problems. Among all the study areas, in spite of being a Paurashava, Ishwarganj Paurashava is also suffering from lack of potable water, educational, communication, health facilities, waterlogging and so on.

- From the opinions of local people, there is no gas connection in the study locations except Ishwarganj Paurashava. Except Barahit and Sohagi Union, all other areas are suffering from Insufficient Electricity Supply. All the study areas' communication systems are very Poor except Jatia and Sohagi Union. Atharabari, Ishwarganj, Jatia, Magtala, Maijbagh Union 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 but Ishwarganj Paurashava, Barahit, Jatia, Rajibpur, Sarisha Union are suffering the most. In the educational sector Ishwarganj Paurashava Atharabari, Magtala and Uchakhila Union are having more facilities than all other areas. Again the people also spoke about sanitary latrine, Lack of Potable Water, Lack of Playground/ Park, Unemployment 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), River, Deep Tube well and Beel as their main potential to development among total 11 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, electricity sanitation sector and found almost all the area. On the other hand, gas supply, auditorium, park facilities are asked by few people from one or two union

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 Unions
- 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.
- But however the success of PRA depends on behaviour of the local peoples as well as the motivation of facilitators.

4.3 Implications of PRA Findings

There are certain important implications of PRA findings. 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.

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.

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.

PRA findings can be used as cross check for other findings generated through other survey results. 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
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"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^{TM}) 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.).
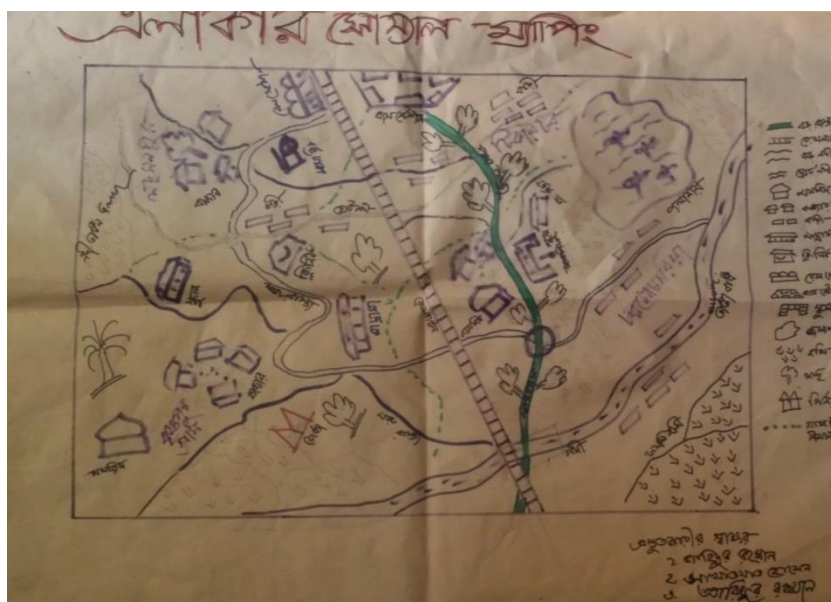
(f) Surrounding unions and important areas or establishments around the boundary will also be plotted on the map.

(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
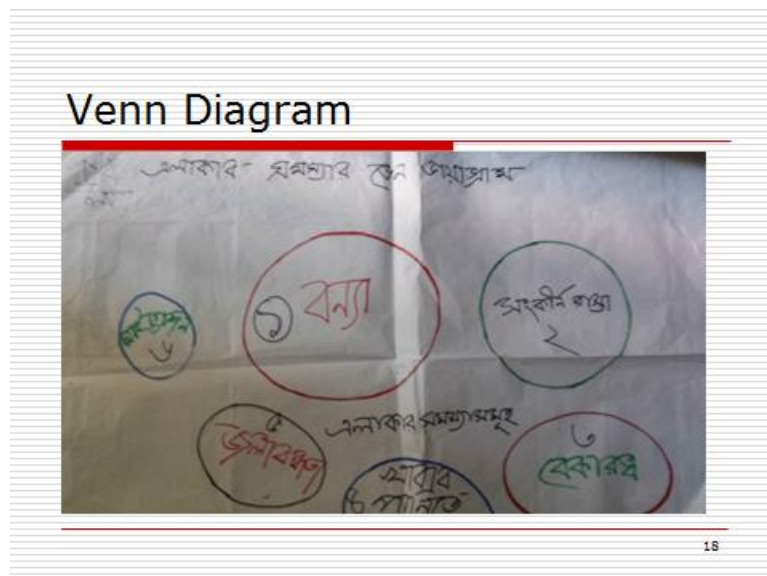
Procedure of Venn Diagram:

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.
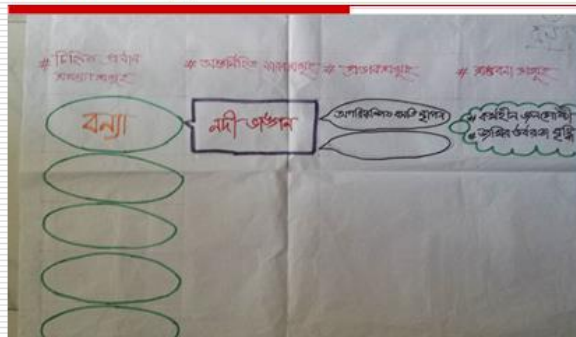
Technology of Participation (ToP^{TM}) Workshop
(www.ica-international.org, www.ica-bangladesh.org)

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.

ToP (টি.ও.পি.)
WORKING
(দলীয় কাজের শর্তসমূহ)
ASSUMPTIO

1. EVERYONE HAS WISDOM. প্রত্যেকের মাঝে প্রজ্ঞা রয়েছে।

2. WE NEED EVERYONE'S WISDOM FOR THE WISEST RESULT.
সর্বোচ্চ প্রজ্ঞাদীপ্ত ফলাফলের জন্য আমাদের প্রত্যেকের জ্ঞানের প্রয়োজন।

3. THERE ARE NO WRONG ANSWERS. - কোন উত্তরই ভুল না।

4. THE WHOLE IS GREATER THAN THE SUM OF IT'S PARTS. -
এককভাবের চেয়ে বহুজনের অংশগ্রহণই অধিক গ্রহণযোগ্য।

5. EVERYONE WILL HEARS OTHERS AND BE HEARD.
প্রত্যেকেই অন্যজনের কথা মনোযোগ সহকারে শুনবে ও গুরুত্ব দিবে

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.
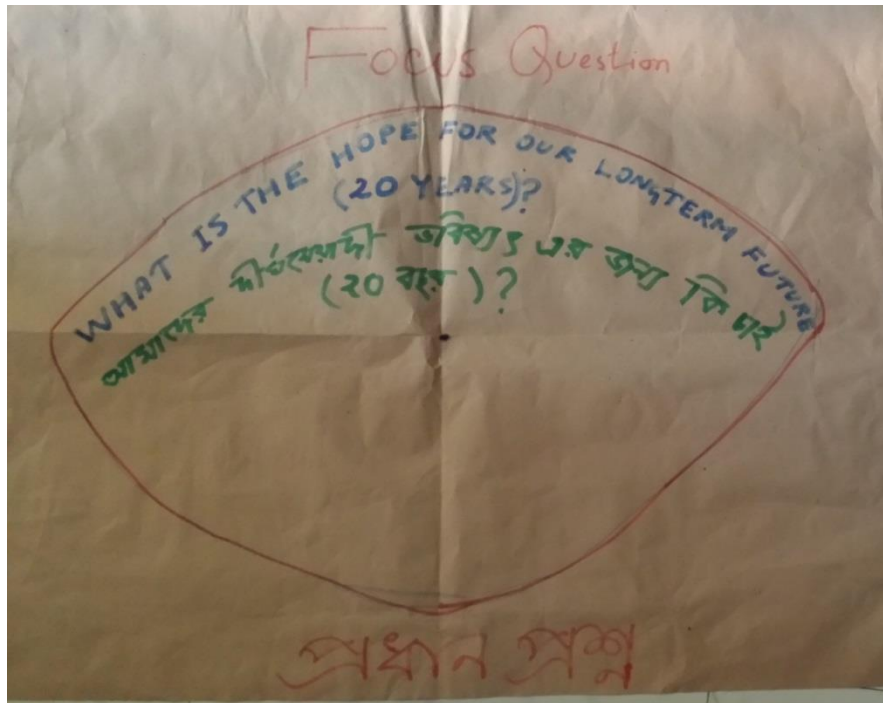
Brainstorming (20 minutes)

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: Individual PRA Report of Ishwarganj Municipality

Ishwarganj Paurashava

1. Introduction

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

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

2. Project Context for PRA

Considering the benefit of PRA, Urban Development Directorate (UDD) under Ministry of Housing and Public Works has taken initiative to collect the information on local problems with causes, effect/impact and local potentials as well as development priorities from the local people for preparing 20 years long development plan of fourteen Upazilas. In this regard, UDD management has taken decision to conduct Participatory Rural Appraisal (PRA) Session at each Union level in the rural areas and one session in the three ward under municipality areas. A Participatory Rural Appraisal (PRA) session has been conducted on 16 June 2015 at Paurashava Auditorium where 19 participants were involved. Social Mapping, Problems Identification and Prioritization, Potentials Identification and Prioritization, Cause and Effect Diagram and Technology of Participation (ToP) PRA methods have

been applied for collecting the opinions of community people in preparing development plan for 20 years in Ishwarganj Upazila.

3.   **Location of Ishwarganj Paurashava**

The Ishwarganj Paurashava is under the jurisdiction of Ishwarganj UPazila of Mymensingh district. The boundary of the Paurashava is as follows:
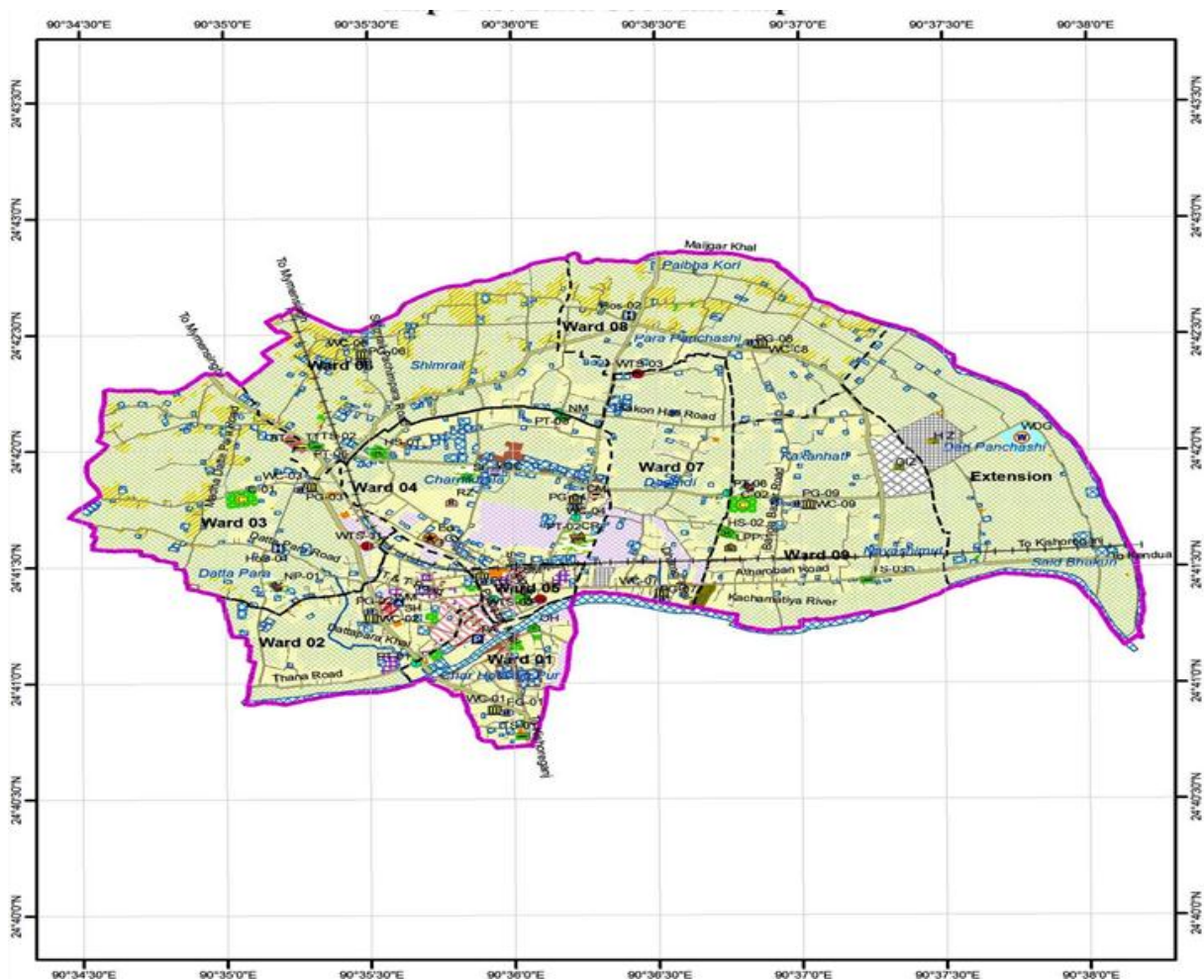
North: On the north side of the study area is situated the Gouripur UPazila

West: On the west side of the study area is also located Gouripur UPazila

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

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

Map 1: Ishwarganj Paurashava

4.   Participants Introduction and Objectives Explained

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

- Identify the local problems and potentials in study area.

- Identify the spatial location of problems and potentials in the study area.

- Identify all features with productivity in the study area.

- Identify the problems with severity, causes, effect/impact and related potentials in the area.

- Ensure local people participation in identifying the short, medium and long term needs of interventions in order to reduce/minimize the problems and develop the short, medium and long term plan.

| Photograph 1: Mayor, Ishwarganj is delivering speech | Photograph 2: Part of PRA session |

5.   The Participants

Total 19 participants (Male15 and female-04) have attended in the PRA session at Paurashava meeting room on 16 June 2015. PRA session has started at 10:30 a.m. and continued UP to 05:00 p.m. The participant's categories are as follows;

Table 1: Category of Participants

Category of Participants	PS Representative	Business-man	Service holder	Teacher	Local Elite /Politician	Imam	Farmer
Nos.	10	02	00	02	04	00	01

6. Methodology Applied for Conducting PRA

6.1 Scope of Work

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

6.2 Formation and Mobilization of PRA Team

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

6.3 PRA Team Member

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

Table:2 PRA Team members and Organizations

PRA Team	Organization
Session Conducted and Reported by: Md. Azibar Rahman (Social Expert) Co-Facilitator: Tarek Khan Logistics: Md. Minar Hossain and Nabiul Islam Rapporteur: Md. Rubaiyat Islam and Kazi Arifur Rahman	Sheltecch Consultants Pvt. Limited And Arc-Bangladesh, Dhaka .

6.4   Ensure Target Participants

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

6.5   Preparation of Materials and Festoons

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

6.6   Selection of PRA Method and Number

Three methods (Social Mapping, Venn diagram and Technology of Participation) have selected to exercise at field level for collecting information from the field as per requirement of the Project. As per decision one PRA has conducted for each union in case of rural area and for three wards in the municipal area.

7.0   Conduction of PRA

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

7.1   Social Resource Mapping

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

7.2   Purpose of Social Mapping

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

7.3   Preparation of Social Map

7.3.1 Social Mapping

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

Step-1:

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

Step-2

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

Step-3

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

Step-4

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

Step-5

Again, he asked the participants to mark where different groups in the community are living (i.e. the wealthy persons, the laborers, different religious groups, different ethnic groups etc.).
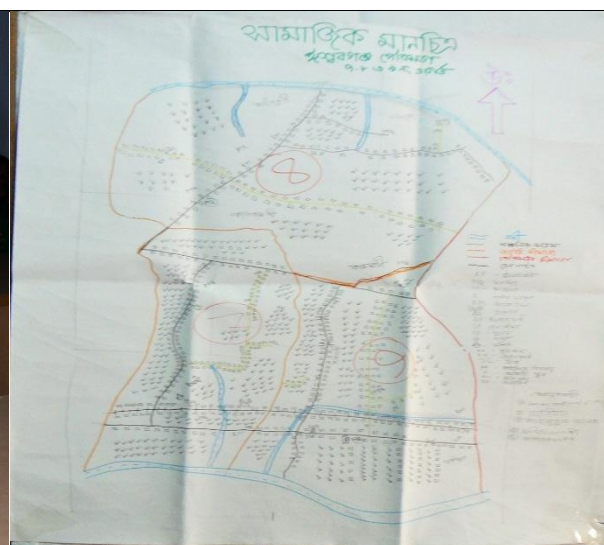
Step-6

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

Step-7

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

| **Photograph 3: Preparing Social Map** | **Photograph 4: Social Map of Paurashava** |

7.3.2 Findings of Social Mapping

The major findings of social map are as follows:

- Though it is Paurashava but most of the land are agri-land and deep tube well is only irrigation water source
- River bed of Kanchamatia river has silted up

8.　Problems Identification and Prioritization, Causes, Impact and Potentials through Venn diagram.

8.1　Problems Identification

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

- Absence of pipeline gas supply in the area

- Existing roads are poor in quality and not as per requirement

- Scarcity of potable water during dry season

- No community Centre in Ishwarganj

- No playground and park in Ishwarganj

- No improved Hospital in the area

- Waterlogging at Kakonhati and Paihakuri

- Electricity connections are not as per requirement and continuous load shedding

- Mosques are not updated

- Insufficient educational institution

8.2   Problems Prioritization through Venn diagram

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

1. Gas
2. Insufficient Electricity
3. Communication
4. Hospital
5. Playground and Park
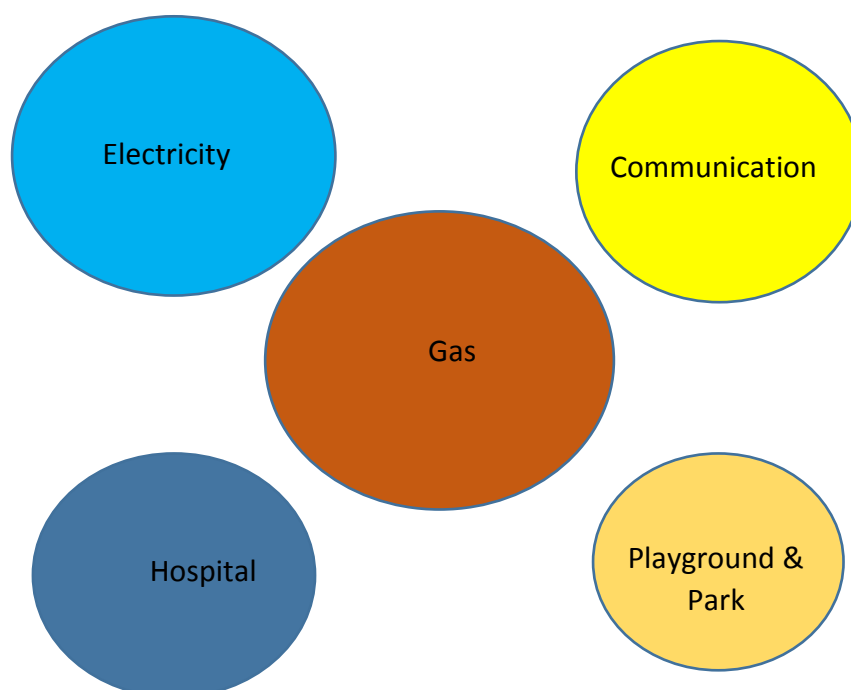
Figure 1: Major five Problems
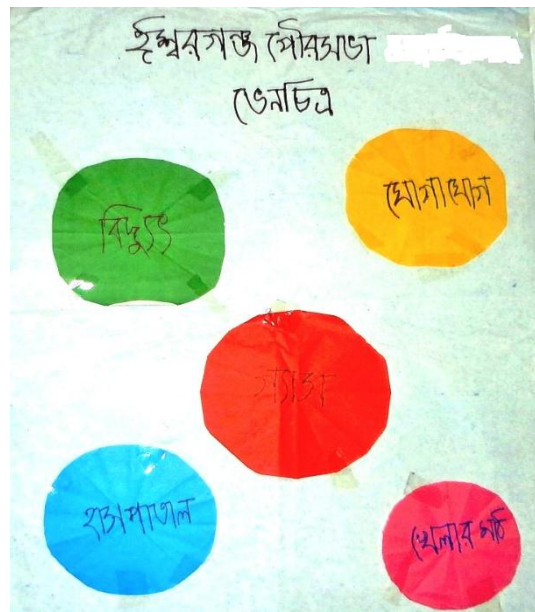
Photograph 5: Venn diagram

8.3   Identification of Potentials through Venn Diagram

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

- Agricultural land (Paddy)
- Deep Tube well
- River
- Ishwarganj Degree College
- Ishwarganj bazar

Figure 2: Major Five Potentials

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

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

Table 3: Problems, Cause, Impact and Potentials

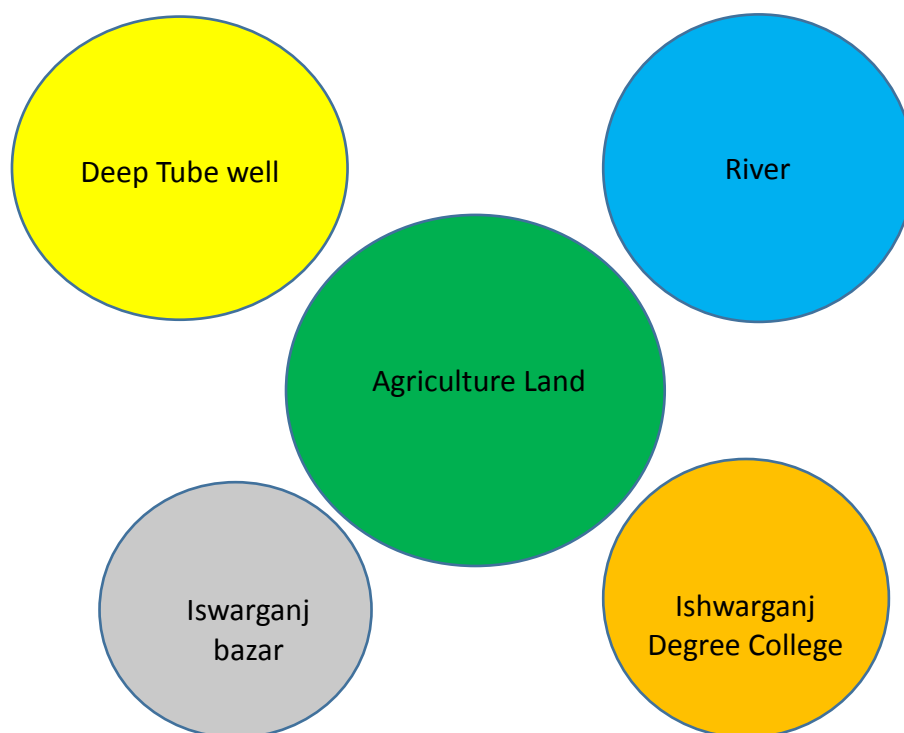| Identified Problems	Causes	Impact	Potentials/Probability
1. Gas Connection	• No initiative of authority	• Load shedding increased due to electricity is being used as fuel • Canopy coverage reduced due to wood is being used as fuel • Un-healthy due to fume • Uncleansed More time consumed in cooking • More money involvement	• Gas pipeline is only 3 Km apart from the Paurashava office.
2. Insufficient Electricity supply	• Increased the demand • supply is not increasing as per demand • Political influence in distribution	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
3. Poor Communication facilities	• GOB Financial support not provided • NGO/Private support not provided	• Motorized vehicle are not available during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Misuse of time for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Katcha Road • People are interested to give land for widening and improvement
4. Hospital facilities	• Not yet established improved hospital • Not available modern clinic	• Have to go to Mymensingh for treatment • Time loss for travelling • Over expenditure	

Identified Problems	Causes	Impact	Potentials/Probability
	• Poor service from health clinic • Doctor/Specialized Doctor is not available in all time • Ambulance is not available in all time • Lack of availability of necessary medicine in Hospital/Clinic	• Life risk for moribund patients • Poverty	
5.Lack Hospital facilities	• No khas land in the area • No interested person to donate the land for playground	• No scope to organize tournament • People cannot enjoy recreation • Boys/Girls cannot play • Physical structure of student is not building up properly	

9.   Technology of Participation (ToP)

9.1   Methodology for Conducting the ToP

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

Step-1

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

- To identify priorities for development and planning for next 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram.

- To get in people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.

- In all cases spatial dimension of local people's information will be checked for development planning purpose.

Step-.2

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

Step-3

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

Step-4

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

Step-5

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

9.2   Demand of Participants of Ishwarganj Paurashava in Preparing the Development Plan for the next 20 Years

The participants have demanded the development in many aspects which needs to be fulfilled for improving their lifestyle as well as environment. One issue has demanded more than one participants. The demanding issues of participants with numbers has furnished below:

Table-4: Demand of Participants for Ishwarganj Paurashava

Title	Demand with Nos.
Administrative Institution	• To establish Ishwarganj upazila as an district
Communication	• Development of communication system • Construction of pucca road • Construction of quality road • Improvement of katcha road to pucca
Education	• Establishment of more Govt. high School • Construction of more Govt. College
Potable water	• Need to ensure pure potable water supply • Need to connect more household with electricity
Electricity	• Need to ensure continuous electricity supply
Sanitation	• Need to resolve sanitation problem i/c mass communication and awareness raising
Recreation	• Establishment of modern park • Need to establish stadium
Community center	• Need to establish Community center
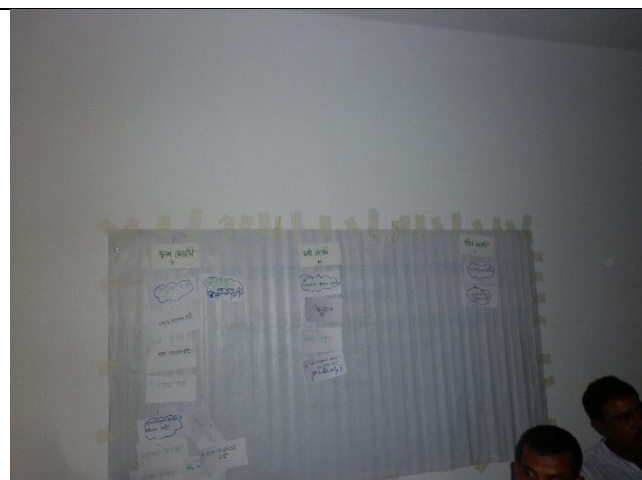
Photograph 6: Participant's Demands are categorizing	**Photograph 7: Demands sorted in short, medium and long term**

9.3 Identification of Development Priorities of Ishwarganj Paurashava under Mymensingh District.

The recommended development priorities of Ishwarganj Paurashava are as follows;

Table 4: Development Priorities of Ishwarganj Paurashava

Short term	Midterm	Long term
• Development of communication system • To construct pucca road • To construct quality road • To improve katcha road by pucca. • To connect with gas supply through pipeline • To establish Govt. college	• Ensure all time electricity supply • To connect more household with electricity supply • To resolve sanitation problem i/c mass communication as well as awareness raising • To establish Park and playground • To establish community center	• Establishment of modern high school

10. Challenges and observation

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

- Session couldn't not possible to start in notified time 9.00 a.m. due to lack of participants

- It was very difficult to draw the boundary of the Wards and Union.

- It was very difficult to express the affected area in the unit and cost of assets damaged also.

- It was difficult to complete three PRA methods within 3.5 Hrs.

- People are happy for identifying the development priorities for their union.

- People are in confusion that whether the plan will implement in future or not.

11. Closing with Conclusion

In this study, many PRA tools have been used in order to collect the actual problematic issues with effect and impact of the area which need to address within different time span. The PRA team has also collected the potentials of the area which may be used as resources during planning. In the closing session of PRA, facilitator has provided the scope for expressing the opinions of at least two participants, one from female and another one from male. In expressing their opinions, they said, this is the first time, any government organization have come to their door for collecting local people's opinions for preparing a comprehensive master plan for the Upazila. The participants opined that they have become proud to be apart for preparing 20 years long plan of their own locality. They also expressed that this plan will be realistic, fruitful and will meet UP the demand of local people if their suggestions implemented properly.

12. List of Participants

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 Reflection Action (PRA)
Registration of Participants

Date: 16-06-15

Name of Union/Wards of Pourashava:

| SL #	Name	Village/Mohallah & Ward ✓	Occupation	Age	Contact No	Signature
01	(মো)মা: গুলেম্যা	7,8,9,	councilor	47	01716860481	
02	র্যিহমা আম্তুর	4,5,6	councilor	55	01943142597	
03	মো: য়ামিদ	9		55	01974558099	মা: রশিদ
04	(মা: আন্দুর্যহম্যা	8		36	01929680051	
05	(মা: মা: আসুদুশ	9		42	01710404978	
06	আর্তুল কালাম আজ্ঞদ	8		55	01721528564	
07	(শ: হুত্মশ্যালী	8		50	01969470 8147	
08	মেন্দ আর্ত্যোত্ত	9		47	01734-450894	
09	(জি: জেম্মীরগ্যস্ত	9		35	01718-165036	
10	মাহমুদুল আলম	8	মি:ম্য:শিক্ষক	40	01911 689043	
11	(ম তাহিরুল(মি)শ্বা	9	কৃষক	76		
12	র্যিহম্যা বেনম	6				
13	স্যাল্দম বেসম্ক্				0223636359736	
14					538>11	
15						

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

1.0 Atharabari Union

1.1 Overview

The Atharabari Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union in north is Sarisha union and Kendua Upazila, in south is Nandail Upazila, in east is Kendua Upazila and in west is Sarisha Union and Jatia Union. Total area of Atharabari Union is 5377 acres. Total population is 36739 and total number of household is 7619. Population density is 1688 persons per sq. km. There are total 477 numbers of disabled persons in the union. There are 24 primary school, two madrashas, one college and one high school in the union.

Map 1.1: Atharabari Union
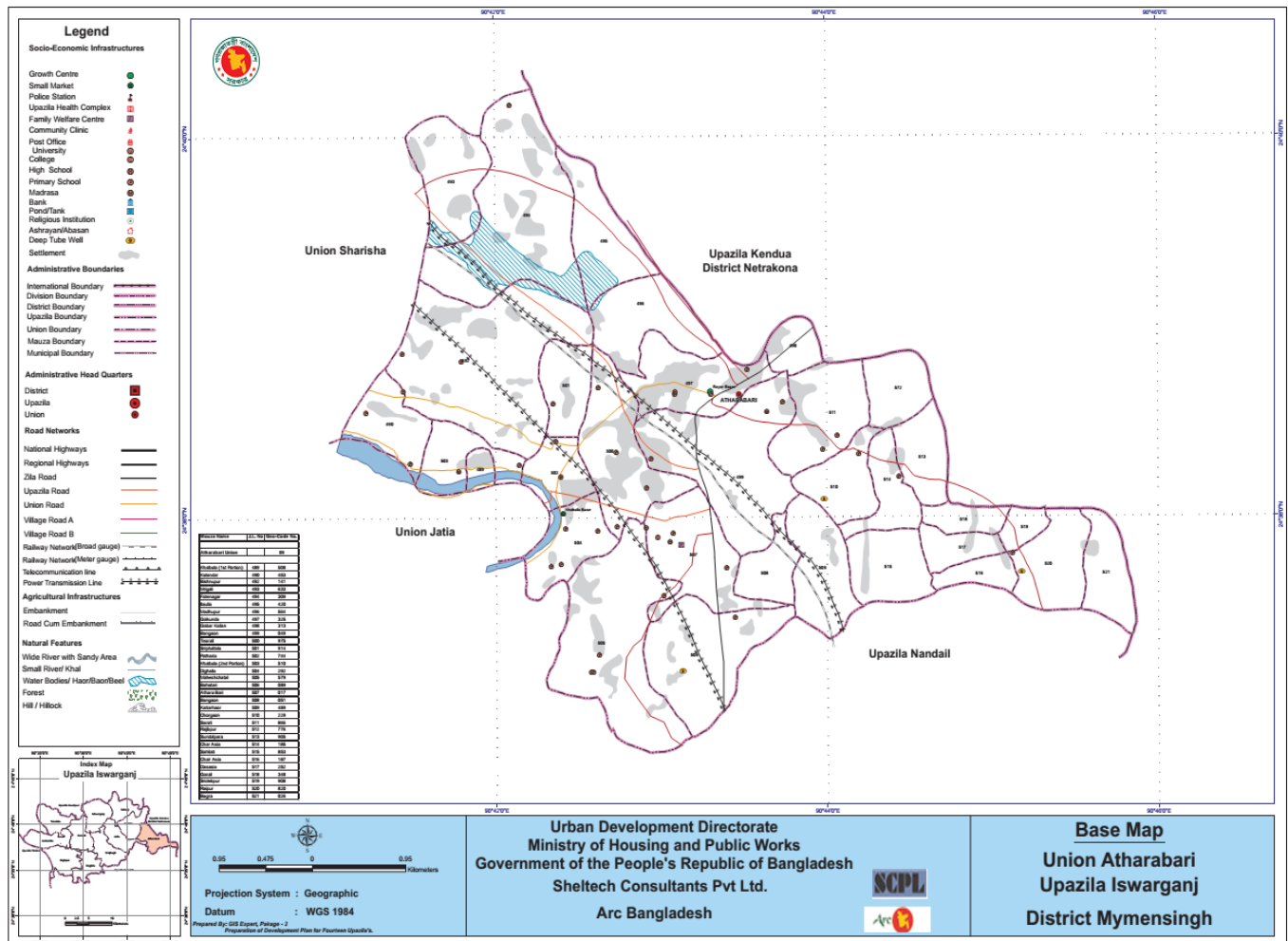
1.2 PRA Schedule and Other Information

Total 17 participants (Male-12 and female-05) have attended in the PRA session at Atharabari Union on 16 June 2015. PRA session has started at 11:00 a.m. and continued up to 2:30 p.m. The participant's categories are as follows:

Table1.1: Category of Participant

Category of Participants	UP Representative	Business-man	Service holder	Teacher	Local Elite /Politician	Student	Farmer
Nos.	11	02	01	00	02	01	00

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

- Identify the local problems and potentials in study area.

- Identify the spatial location of problems and potentials in the study area.

- Identify all features with productivity in the study area.

- Identify the problems with severity, causes, effect/impact and related potentials in the area

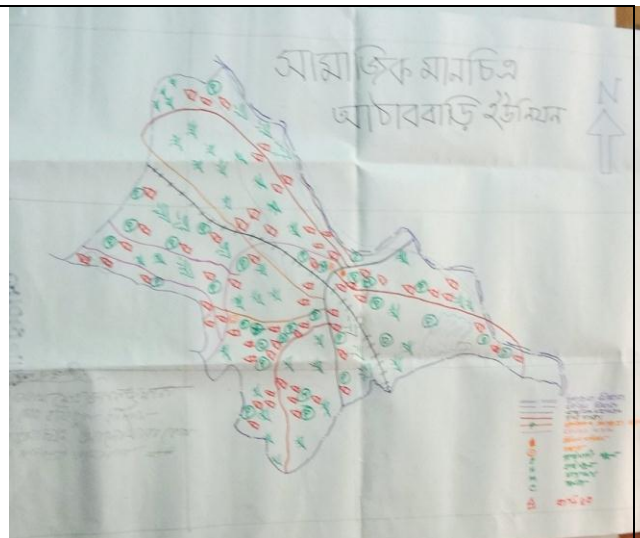| **Photograph 1.1: Part of a PRA session**	**Photograph 1.2: PRA facilitator explaining PRA objectives & goal**

1.3 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 1.3:Preparing Social Map** | **Photograph 1.4: Social Map of Atharabari Union** |

1.3.a Findings of Social Mapping

The major findings of social map are as follows:

- Lack of drainage canal from beel to Norshunda river
- Most of the land are agri-land and deep tube well is only irrigation water source

1.4   Major Problems and Potentials

1.4.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 communication system
- Waterlogging
- Lack of pure drinking water
- Insufficient electricity
- Poor infrastructure at Hat-Bazar

- Lack of proper sanitation system

- Insufficient Educational facilities

- Poor service from Community Clinic

- Un-employment

- Absence of pipeline gas supply

- Lack of allowances for aged, widows and disabled persons

1.4.b   Problems Prioritization through Venn Diagram

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

1. Waterlogging

2. Poor Communication

3. Inefficient Electricity Supply

4. Lack of Pure drinking water

5. Un-employment
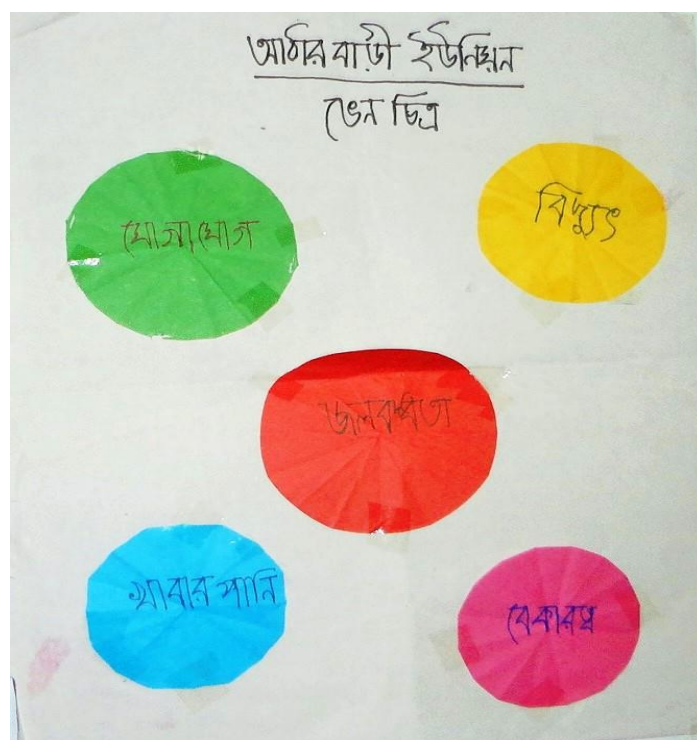
Photograph 1.5: Venn diagram of Major Five Problems

1.4.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 (Paddy)
- Deep Tube well
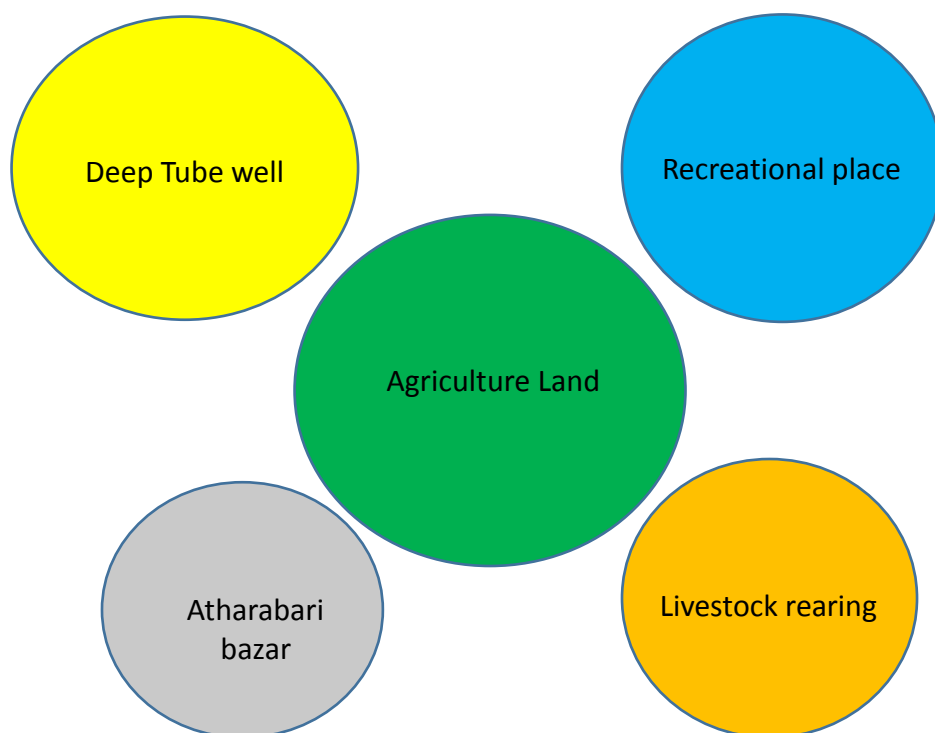- Recreational place
- Livestock rearing
- Atharabari bazar

Figure 1.1: Major Five Potentials

1.4.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 potent ials have furnished in the table 3.1.1

Table 1.2: Problems, Cause, Effect/Impact and Potentials

Identified Problems	Causes	Impact	Potentials/Proba bility
1. Water logging	• Siltation of the drainage canal bed • No initiative to re-excavate existing canal or excavate new drainage canal	• Communication disruption • Loss of crops & assets • Loss of trees which are not able to survive during water logging • Bad odor	• Existing bed silted up • Khal is available
2. Poor Communication facilities	• GoB Financial support is not provided • NGO/Private support is	• Motorized vehicle are not available/functional during rainy season	• Existing Katcha Road • People are

Identified Problems	Causes	Impact	Potentials/Probability
	not available	• Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Wastage of time for traveling • Excess expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	interested to give land for widening and improvement of road.
3. Insufficient Electricity Supply	• Increased the demand • Supply is not increasing as per demand • Political influence disrupts distribution	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
4. Lack of Potable Water	• During irrigation by Deep Tube well, potable water is not available in Hand tube well • No piped water supply provision in area • Absence of alternative sources for drinking water	• Spread of waterborne diseases • Ill health • Life risk • Loss of money • Poverty	Existing Deep Tube well
5. Unemployment	• Lack of industries in the area • Jobs are not available in agriculture field in all season.	• Irregular income • Less income • Not possible to maintain normal life style • Not possible to bear the normal educational cost • Not possible to maintain medical treatment cost • To become debt.	• Young people available • Demography bonus

1.4   Perceived Development Priorities for Atharabari Union under Mymensingh District.

The recommended development priorities of Atharabari Union are as follows;

Table 1.3: Development Priorities for Atharabari Union

Short term	Midterm	Long term
• Improvement of electricity system • Improvement of communication system • Improvement of educational facilities • Ensure potable water supply to households • Improvement of Infra-structure at the Hat & Bazar • Improvement of sanitation system • Improving waterlogging situation • Increase and expand the allowances for aged, widows and disabled	• Improvement of educational facilities • Alleviate the poverty • Reduction of unemployment • Ensure 100% sanitation	• Ensure pipeline gas supply

1.5   List of Participants

The handwritten registration form reads:

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: আঠারবাড়ি ইউনিয়ন ১   Date: 16·05·2015

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01				৪৬	০৭৯২৬৭৪৯০৭৮৮	
02				৫৫	০১৯৫৫৫৬০১১১	
03				৪২	০১২৬৮৫৮২২	
04				৪৫	০২৭৬৪৭৬৭৪০	
05				৪২	০৭৯৫৭৬	
06				৪২	০১৭৮৮৪৭৭২২	
07				৪২	০১৯৩২১০৫৬২২	
08				২৬	০১৭২৯৮৭৮০৪৪	
09				৪৬	০৭৯২৬২১৭৫০	
10				৪০	০১৯২০-৪৩০১৫০-	
11			০৭	৪০	০১৭২৪৪১৯৬৯৫	
12		অগ্নিনগর	শিক্ষার্থী	২৮	০১৭২৪৪১৯৬৯৫	
13	রেহানা	ঃ বনগাঁও	গৃহিনী	৪২	০১৯১৫৪১৬৫৫০	
14				৫৫	০১৭২৮-৩০১০৫	
15				২৮	০১৭২৪৫৭০৯৪৮	
16				৭২	০১৭৩১৪০৫৬৫৫ ০১৬২১৩৩৪৩৬৪	
17				৫৫	০১৭১৬১২০২১২	
18					৬৯৪÷১৭	
19						
20						

2.0 Barahit Union

2.1 Overview (Study Area)

The Barahit union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows: In north, Gouripur Upazila is situated; Tarundia, Uchakhila and Rajibpur Union are located on west side. On the south side of the study area, Magtala Union is located and Ishwarganj and Maizbagh Union are located on the eastern side. Total area of Barahit Union is 5867 acres. Total population is 29350 and total number of household is 6539. Population density is 1236 per sq. km. There are total 381 numbers of disabled persons in the union. There are seven primary schools, one madrasha, one high school and five bazars in the union.

Map 2.1: Barahit Union
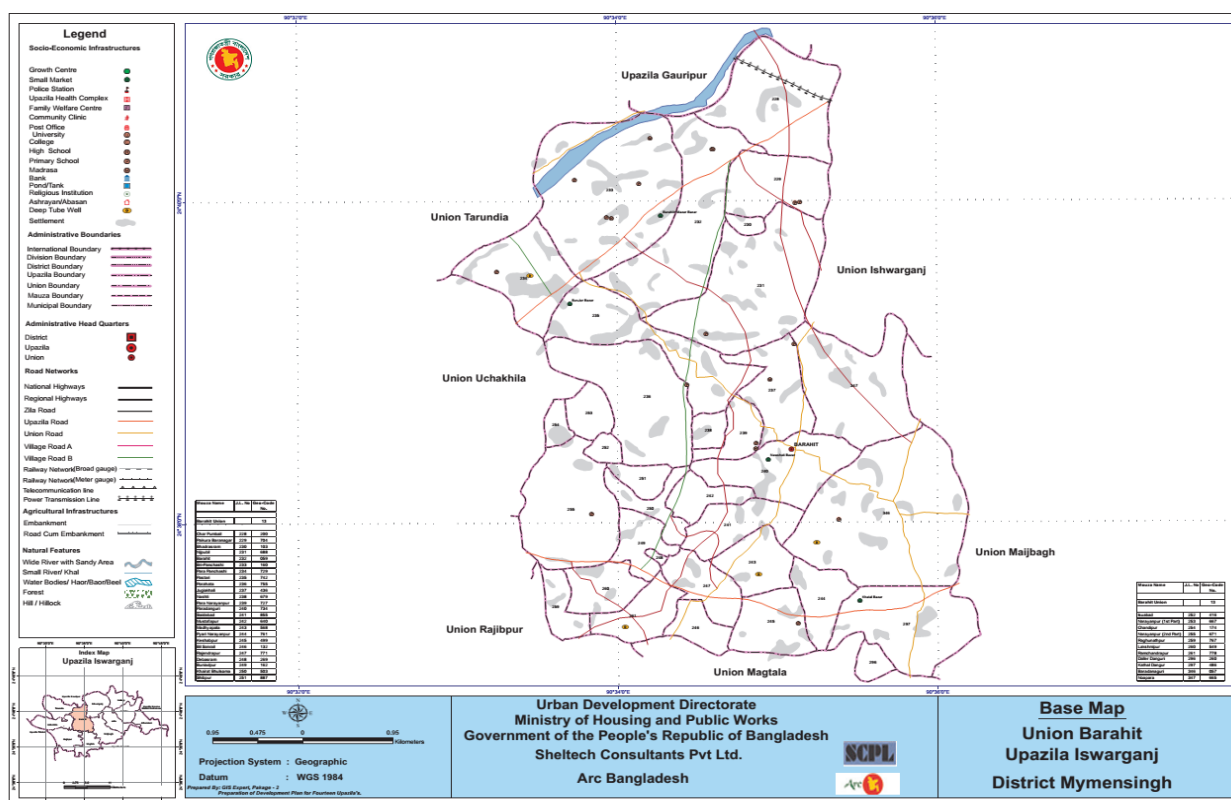
2.2   Spatial Aspects

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 Barahit 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 Barahit Union** |

2.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is mainly the irrigation water source
- Only one big perennial water body named Andail Bil Existed
- Kanchamatia river is not helping to reduce drainage problem as it is silted up.

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 maintenance

- Lack of deep tube well

- Insufficient educational institute

- Lack of maintenance of educational institutes (only seven primary school, one madrasha and one high school)

- Poor sanitation system

- Lack of community clinic

- Doctors are not available in time

- Lack of potable drinking water

- Water wastage

- No College in the area for higher study

- Poverty

- Unemployment

- Insufficient Electricity supply

Photograph 2.3: Venn diagram of Major Five Problems

2.3.b   Problems Prioritization through Venn Diagram

The session was divided into two groups: one group prepared and facilitated in the drawing of social map, another group identified the major problems and prospects of the locality. After a long discussion, the

participants have come to the consensus to identify the 5(five) major problems as priority basis. The five major problems are as follows;

1. Lack of college

2. Lack of road maintenance

3. Poor health facilities

4. Lack of potable water

5. Un-employment

2.3.c   Identification of Potentials through Venn Diagram

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

- Agricultural land (Paddy)
- Deep Tube well
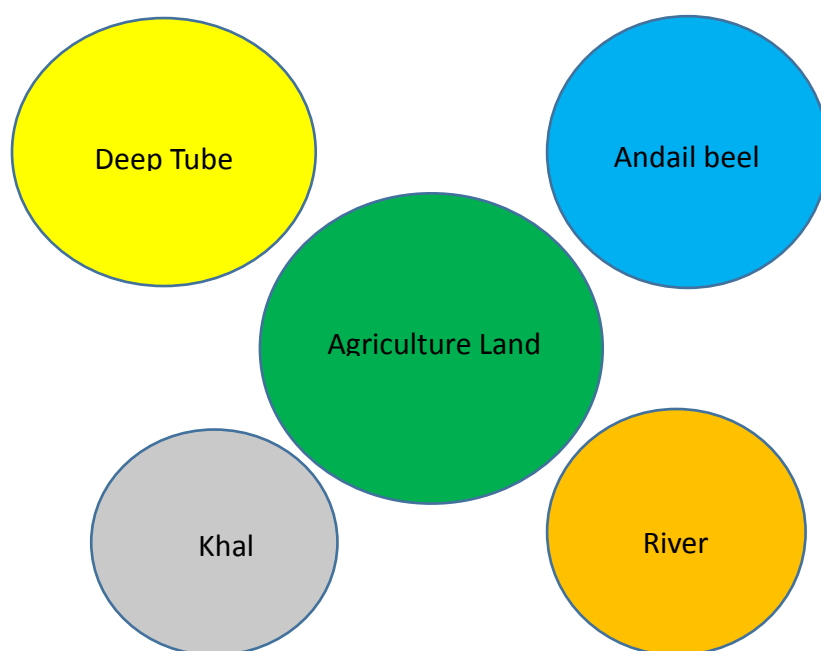- Andail Beel
- River
- Khal

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. Lack of College	• GoB Financial Support is not available • NGO/Private or any interested person is not available/willing to establish needed institutions	• Achieving Higher education is not easy • Social dignity hampered • Less scope for employment • Less scope to improve quality of life	
2. Lack of road maintenance	• GoB Financial Support is not provided • NGO/Private Support is not available	• Vehicle/Rickshaw is not available • Movement is very difficult due to damaged/dilapidated road • Accident risk for aged people • Wastage of time for traveling • Excess expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Road • People are interested to give land for widening and improvement
3. Poor Health facilities	• Not yet established any improved/modern hospital • Non-existence of modern clinic • Poor service of health/community clinic • Doctor/Specialized Doctors are not available in all time • 24 hr Ambulance service is not available • Necessary medicine is not available in Hospital/Clinic	• Have to go Mymensingh Town for treatment • Time loss for travelling • Over expenditure • Life risk for moribund patients • Became poor/Poverty.	
4. Lack of potable water	• Water scarcity in hand tube well during irrigation period • No piped water supply provision in area • No alternative sources for drinking water	• Affected by water borne diseases • Causes of ill health • Life risk • Loss of money • Poverty	

Identified Problems	Causes	Impact	Potentials/Probability
5. Unemployment	• Not established major industry in the area • No job availability in agriculture field in all season	• Irregular income • Less income • Not possible to maintain normal life style • Not possible to bear the normal educational cost	

2.4   Perceived Development Priorities for Barahit Union under Mymensingh District.

The recommended development priorities of Ishwarganj Paurashava are as follows;

Table 2.2: Identification of Development Plan for Barahit Union

Short term	Midterm	Long term
• Establishment of Hospital • Installation of tube well • Supply door to door electricity • Establishment of educational institute for higher education • Establishment of primary School at every village • Establishment of more Aliya madrasha • Supply more sanitary latrine to household and to campaign for awareness raising of usage the sanitary latrine	• Construct more pucca road • Construction of a bridge at Chandipur • Employment generation	• Establishment of Export Processing Zone(EPZ) • Establishment of industrial zone • Cultural development and awareness raising • Remove discrimination between Male & Female

2.5 List of Participants

3.0 Ishwarganj Union

3.1 Overview (Study Area)

The Ishwarganj Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh District. The boundary of the Union is as follows: On the north side of the study area, Sohagi Union and Gouripur Upazila are situated, on west side of the study area, Barahit Union and Gouripur Upazila are situated, on the south side of the study area, Maizbagh and Barahit Union are located and on the east side of the study area, Jatia and Sohagi Union are located. Total area of Ishwarganj Union is 3662 acres. Total population is 21223 and total number of household is 4398. Population density is 1432 persons per sq. km. There are total 318 numbers of disabled persons in the union.

Map 3.1: Ishwarganj 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 Ishwarganj 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 Ishwarganj Union** |

3.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is irrigation water source
- Congested housing area
- Kanchamatia river is not serving to the drainage purpose as it is silted up

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:

- Lack of high school
- Lack of hat-bazar
- Lack of potable water during dry season and during Irrigation period

- Sanitation problem

- Waterlogging

- Communication Problem

- Insufficient Electricity supply and 80% household not connected with electricity

- Agricultural Problem

- Low literacy rate

- Unemployment

- Lack of Community Clinic

- Lack of financial benefit for widow, disabled and aged

- Lack of Graveyard/Crematorium

- River/Khal siltation

- Lack of proper land use

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;

6. Lack of high school

7. Communication

8. Hat-Bazar

9. Water logging

10. Electricity Supply

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;

- Agricultural land (Paddy)

- Deep Tube well

- Kanchamatia River

- Beel
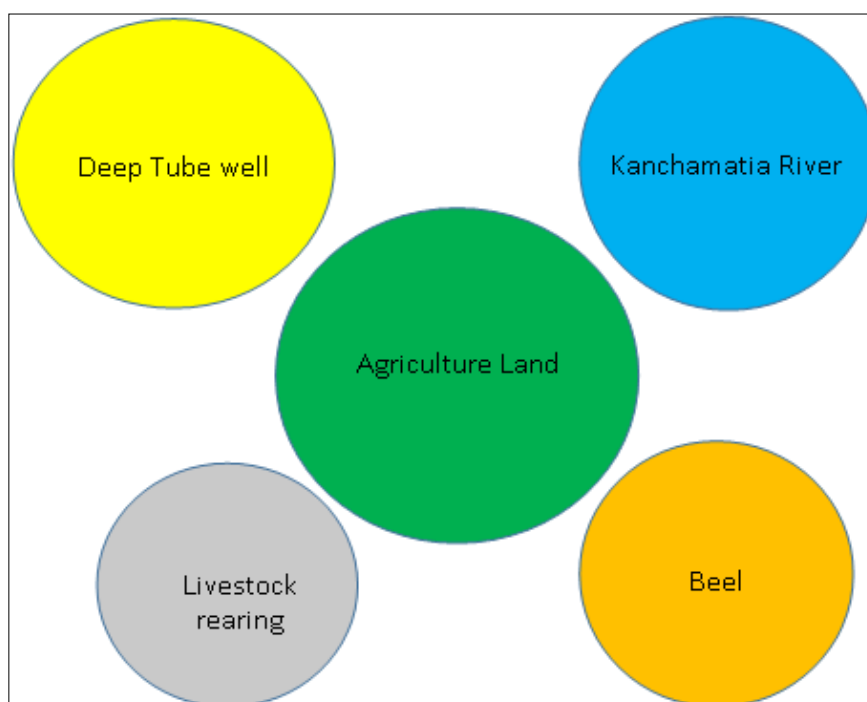
- Livestock rearing

Figure 3.1: 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, effect/impact and potentials have furnished in the following table

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

Identified Problems	Causes	Impact	Potentials/Probability
1.Lack of high School	• GOB Financial support is not available • NGO/Private or any interested person is not available	• Higher education not achieved easily • Social dignity hampered • Less scope for employment • Less scope to improve life style • Less scope to bear the expenditure for education, health and recreation aspect	
2.Communication	• GOB Financial support is not provided • NGO/Private support is not available	• Motorized vehicle is not available during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people. • Misuse of time for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force.	• Existing Kancha Road • People are interested to give land for widening and improvement of road.
3.Lack of Hat Bazaar	• Urban part of Ishwarganj union is now in the Pourashava area • No proper place to establish Hat/bazar	• People could not buy or sale anything within union area • More money spent for communicating with Ishwarganj bazar and carrying cost • No income of Union Parishad from Hat/bazar • Time loss for travelling	
4.Waterlogging	• Kanchamatia river filled up with silt as well as encroachment • No initiative to re-excavation	• Communication disruption • Crops & Assets loss • Foul Odor • Poverty	Waterlogging in agriculture land be used for fishery & vegetable plantation
5. Electricity Supply	• Increased the demand • Production not	• Hampered lessons preparation of student • Hampered the irrigation	

Identified Problems	Causes	Impact	Potentials/Probability
	increased as per demand • Political influence in distribution	• Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area. • Accident risk due to darkness	

3.4   Perceived Development Priorities for Ishwarganj Union under Mymensingh District.

The recommended development Priorities for Ishwarganj Union are as follows;

Table 3.2: Development Priorities for Ishwarganj Union

Short term	Midterm	Long term
• Improve the communication system • Establish High School/College/University • Improve the quality of education • To ensure sanitation for all • Prevent occurrence of early marriage	• Improvement of electricity system. • Increase electrification coverage	• Ensure proper use of land • Ensure sufficient potable water • To establish modern union • To establish improve Mosque/Madrasa • To establish many industry at Ishwarganj

3.5 List of Participants

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: Ishworgonj   Date: 13·06·2015

SL #	নাম / Name	Village/Mohallah & গ্রাম/Ward	Occupation	বয়স	(Contact No)	(Signature)
01	মাসুদ তানুরুদার	চর/কা/হারি	বেক্সা	৬৪	০১৭২৬৩৭৩৪৮৪	
02	সা: ছাকরফকির	হরিণাঁচাঁদী	কৃষি	৫৭	০২৭২৫-৫৭২০২৫	
03	মোঃ ইছলাছ উদ্দিন	আত্রাবপুর	কৃষি	৪৫	01815705472	
04		শক্তপুর	ব্যবসা	০২	01712-180425-	
05	রুব আক্কর	নালডুব হারি	৫০	01726361048	
06	(মোছাঃ রহিমা খাতুন	রসুল্লী	মুদিনী	৫৩	01782963240	
07	সুমন চন্দ বিশ্বাস	নাড়িখাঁচী	ব্যবসা	৫৪	01716-494918	
08	মোঃ জন হোসান ফকির	ঠহোলপুর	কৃষি	৩২	01938-789485	
09	হাসিম ঈমান খাহদ	আরিখাঁচাঁদী	কৃষি ও ব্যবসা	৫০	01710-679715	
10	শরীফুরখমান	আত্রাবপুর	(৩)	৫৭	01942897965	
11	মাহিস গহদাখদ	আত্রাবপুর	কৃষি	২৭	01710179134	
12	মো.আবুলকালাম মন্ডল	চরদুরাইল বন.ঠ২ব	ইউঃসদস্য	৫৫	01710693806	
13	-			৪২০=১২		

4.0 Jatia Union

4.1 Overview (Study Area)

The Jatia Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh District. The boundary of the Union is as follows: **North**: On the north side of the study area, Sohagi, Sarisha and Atharabari Union are situated; **West:** On the west side of the study area, Ishwarganj Union is located; **South:** On the south side of the study area, Maizbagh Union is located and **East:** On the east side of the study area, Atharabari Union and Nandail Upazila are located. Total area of Jatia Union is 5847 acres. Total population is 31515 and total number of household is 6618. Population density is 1332persons per sq. km. There are total 378 numbers of disabled persons in the union. There are 15 primary schools, two madrashas and two high s and one bazar in the union.

Map 4.1: Jatia 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 Ishwarganj 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 Jatia Union**

4.2.a   Findings of Social Mapping

The major findings of social map is as follows:

- Most of the land are agri land and deep tube well is irrigation water source
- Some non-perennial water bodies existed named Muktapuri, Barua Bil and Kanda Bil
- Silted up river (Kachamatia) could not serve to the drainage purpose

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:

- Waterlogging during monsoon
- Lack of Potable water during dry season(During Irrigation period)
- Lack of Electricity Supply

- Damaged pucca and Katcha Road
- Poverty
- Lack of medical Facilities
- Lack of Drain at Bazar area
- Lack of Educational Facilities
- Dowry
- Lack of social allowance for old, widows and obstructed
- Early Marriage

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;

- Lack of continuous Electricity Supply

- Lack of Education

- Lack of Medical Facilities

- Water logging

- Lack of Potable Water

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 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)

- Deep Tube well

- River (Kachamatia)

- Beel (Barua, Kanda)

- Jatia Bazar
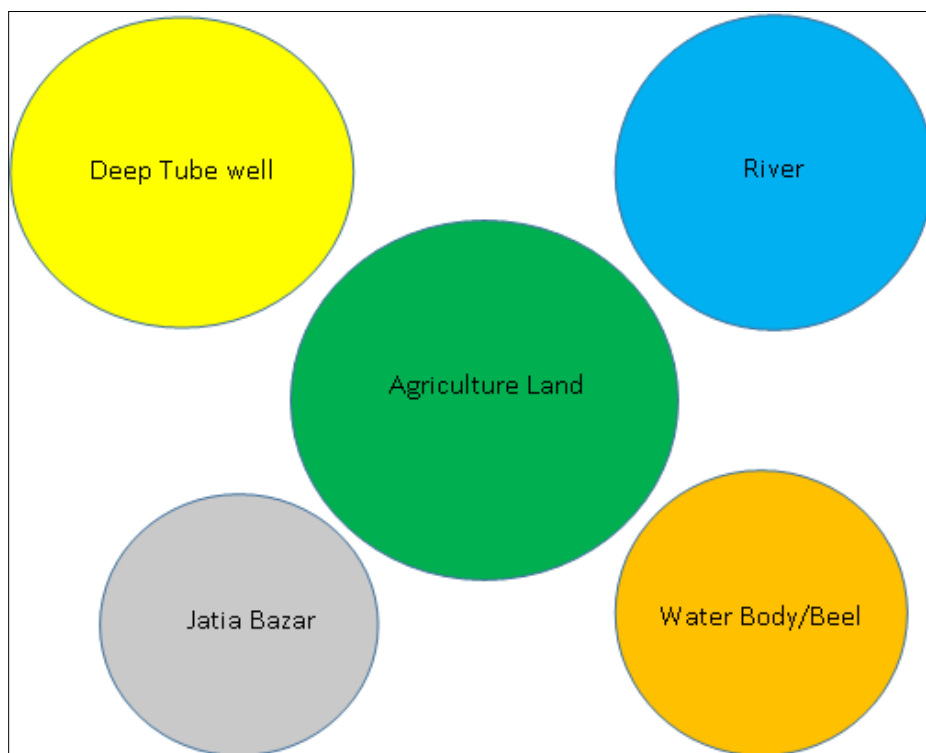
Figure 4.1: Major Five Potentials

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.Lack of Continuous Electricity Supply	• Increased the demand • Production not increased as per demand	• Hampered the preparation of lessons of student • Hampered the irrigation • Hampered the normal production • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
2.Lack of Education Facilities	• GOB Financial Support not available • NGO/Private or any interested person not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life style • Less scope to bear the expenditure for education, health and recreation aspect	
3.Lack of Medical Facilities	• Inadequate Health Service Provider(Clinic/Hospital) • Inadequate Doctor/Specialist Doctor • Lack of medicine in the Health Complex/Community Clinic • Lack of Ambulance • Lack of sanitary latrine • Lack of Awareness	• Ill-health and suffering • Life risk • Money loss for treatment • Poverty	
4.Waterlogging	• Drainage channel filled up/encroachment • No initiative to re-excavation	• Communication disruption • Crops & Assets loss • Bad Odor	

Identified Problems	Causes	Impact	Potentials/ Probability
5.Lack of Potable Water	• Water could not retain in Hand tube well during dry period due to irrigation by Deep Tube well • No piped water supply provision in the area • No alternative sources for drinking water	• Affected by water bone diseases • Causes of ill health • Life risk • Money loss • Poverty	

4.4   Perceived Development Priorities for Jatia Union under Mymensingh District.

The recommended development Priorities for Jatia Union is as follows:

Table 4.2: Development Priorities for Jatia Union

Short term	Midterm	Long term
• Ensure Medical Facilities • Develop the dilapidated Road by ensuring Pucca roads • Appoint doctor at village/Union level • Develop the villages • Develop road with street light • Ensure uninterrupted electricity supply • Supply electricity to every household • Education for all • Prevent early marriage in the society	• Ensure supply of pure drinking water • Install more hand tube well • Ensure Improved sanitation facilities • Ensure improved health facilities for all • Ensure Sanitary latrine for the poor	• Ensure Gas Supply through pipelines • Establish Mosque/Madrasha and Hospital • Establish Krishi Bank

4.5 List of Participants

5.0 Magtala Union

5.1 Overview (Study Area)

The Magtala Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh District. The boundary of the Union is as follows:

North: On the north side of the study area, Barohit and Maizbagh Union are situated

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

South: On the south side of the study area, Nandail Upazila is located

East: On the east side of the study area, Maizbagh Union.and Nandail Upazila are located

Total area of Magtala Union is 5975 acres. Total population is 35729 and total number of household is 7741. Population density is 1478 per sq. km. There are total 357 numbers of disabled persons in the union. There are 18 primary schools, three madrasha, four highschool and three bazasr in the union.

Map 5.1: Magtala 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 Magtala 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 Magtala Union** |

5.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agro-land and deep tube well is irrigation water source
- Only some non-perennial water bodies existed
- Private ponds for aqua culture
- Silted up Kanchamatia river and Kalongkini khal could not serve to the drainage purpose

5.3   Major Problems and Potentials

5.3.a   Problems Identification

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

- Lack of potable Water

- Not yet connected with electricity of 75% area of Union
- Around 75% Families have no Sanitary latrine
- Around 25% Families have no latrine/ open defecation
- Waterlogging
- Insufficient Pucca Road
- Services are not available from Community Clinic
- No drainage system yet at Modhupur and Dithpur Bazar
- Early marriage

5.3.b   Problems Prioritization through Venn Diagram

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

11. Lack of Potable water

12. Lack of Continuous Electricity Supply

13. Waterlogging

14. Insufficient pucca road

15. Lack of Sanitary Latrine
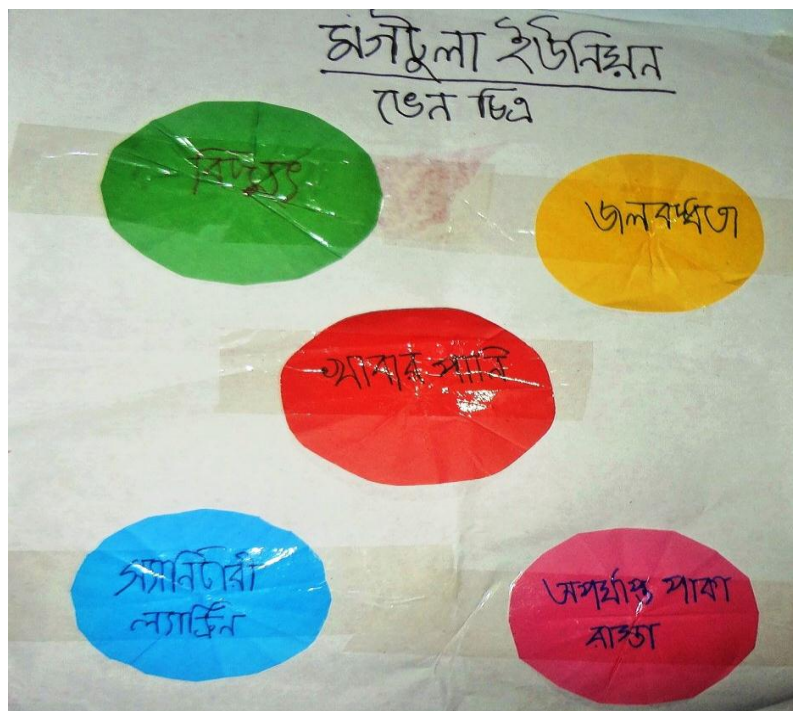
Photograph 5.3: Venn diagram of major proble

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;

- Agricultural land (Paddy)

- Deep Tube well

- River/KhalWater Body/Beel (kachamatia river, Kalongkini Khal)

- Fish Pond

- Modhupur Bazar
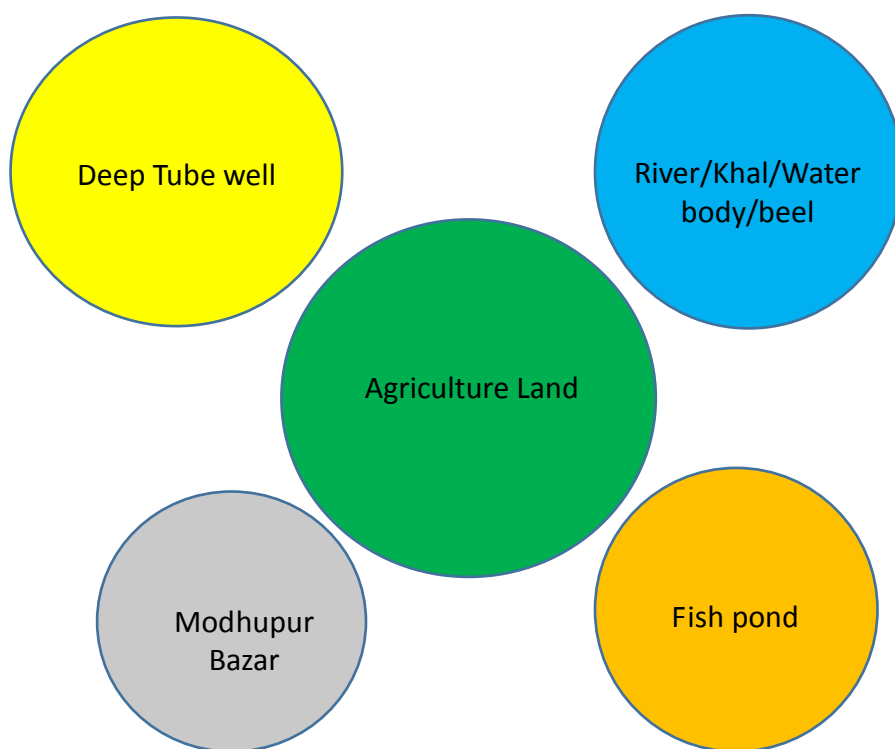
Figure 5.1: Major Five Potentials

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.Lack of Potable Water	• Water scarcity in Hand tube well during irrigation by Deep Tube well • No water supply provision in area • No alternative sources for drinking water	• Affected by water borne diseases • Causes of ill health • Life risk • Money loss • Poverty	• Deep tube well • Ponds
2.Insufficient Electricity Supply	• Increased the demand • Production did not increased as per demand	• Hampered the preparation of lessons of student • Hampered the irrigation • Hampered the normal production • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	• Available rooftop for solar panels
3.Waterlogging	• Drainage channel filled up/encroachment • No initiative to re-excavation	• Communication disruption • Crops & Assets loss • Bad Odor • Poverty	
4.Sanitary latrine	• Not supply from GOB/NGO • Not capable to establish by own cost • Lack of awareness on health problem of open defecation	• Repugnant odor due to excreta of open defecation • Risk of being affected by bacteria • Suffering from diarrhea, dysentery, typhoid & other water borne diseases • Ill-health • Loss of Money	
5.Insufficint Pucca Road	• GoB Financial Support is not provided • NGO/Private Support is not provided	• Motorized vehicle is not available during rainy season • Movement very difficult due to muddiness and slipperiness • Accident risk for older • More time required for traveling • More money required for	• Existing Katcha Road • People are interested to give land for widening and improvement

		traveling • Increased unlawful activities due decreased the watching of law and order force	

5.4 Perceived Development Priorities for Magtala Union under Mymensingh District.

Table 5.2: Development Priorities for Magtala Union

Short term	Midterm	Long term
• To ensure potable water • All areas of union to be connected with electricity supply • Early marriage to be stopped.	• Communication system to be developed • Sufficient Sanitary latrine to be supplied among the poor • Waterlogging to be removed • Canal to be re-excavated	Nil

5.5 List of Participant

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: _____   Date: 13-06-15

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01				৫০	০১৭৪১৫৮৮১৫	
02				১০১	০১৮৮৬৪৩৯২৩৬	
03				১৮২	০১৯২৬৭৮৫০	
04				৫৮	০১৭৫৪৫৪৪৮০	
05				৪৪	০১৭৮৮৬২০২৫	
06				৩৫	০১৯২৮৬০২৫১৫	
07				২৫	০১৭৩০৮০৬৪২	
08				৫৫	০১৬৮৩-৪২০৩৩৮-	
09				১১	০১৯২৩৮৯৭৮৭৬	
10				৫৫	০১৯৩৩২৮৩১৪৫-	
11				৪৫	০১৯১৪৫১০৬৪৭	
12				৫০	০১৮৮৭০১৫৪৫৭	
13				৪৮	০১৭১৫৭৫৬৬৭১	
14			৮	৬৫	০১৭৫৮৭৩৭৬	
15				৩৫	০১৮৪৫৮৪২৫৫	
16				২৫	০১৭১৭৭২১০০৮	
17				২২	০১৭১৩৮২৬৬৭৮	
18				৫৫	০১৭১৬৭৭৪৫৪৩	
19				৪৫	০১৭২৭৯১৬৭৩০	
20				৪০	০১৯২৬৩৬১০২৩	

01			মাচেব	৩২	০১৭৮৭২২০২৮	
02				৪৮	০১৭২৭৫২০৮৪৫০	
03				৫৫	০১৭২৫৫৬৫৪৫০	
04				৫২	০১৭৯৫৪-৮৫৭০০	

6.0 Maizbagh Union

6.1 Overview (Study Area)

The Maizbagh Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

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

West: On the west side of the study area, Barahit and Magtala Union are located.

South: On the south side of the study area, Nandail Upazila is located

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

Total area of Maizbagh Union is 7340 acres. Total population is 38925 and total number of household is 8576. Population density is 1310 persons per sq. km. There are total 381 numbesr of disabled persons in the union. There are 20 primary schoosl, four madrashas two high schools and five bazars in the union.

Map 6.1: Maizbagh 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 Magtala 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 Maizbagh Union** |
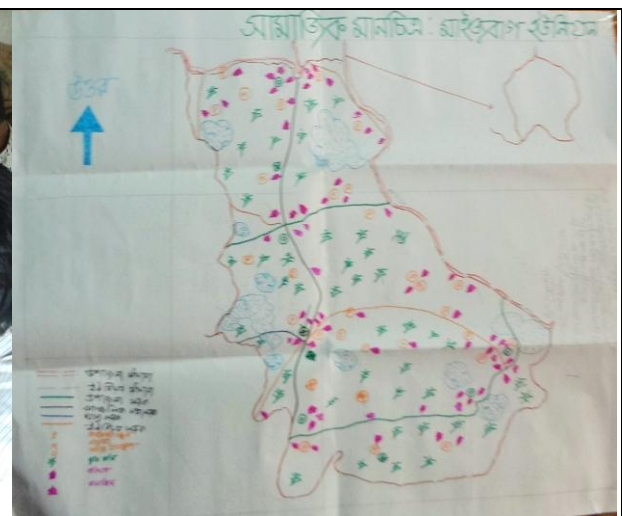
6.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only irrigation water source
- Some non-perennial water bodies existed
- Kanchamatia river could not serve to the drainage purpose as it is silted up

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:

- Waterlogging

- Poor communication system

- Lack of educational facilities

- Insufficient Electricity

- Lack of Sanitary latrine

- Lack of potable water

- Poverty

- Female oppression by men

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. Waterlogging

2. Poor communication facilities

3. Lack of education facilities

4. Poverty

5. Insufficient Electricity Supply
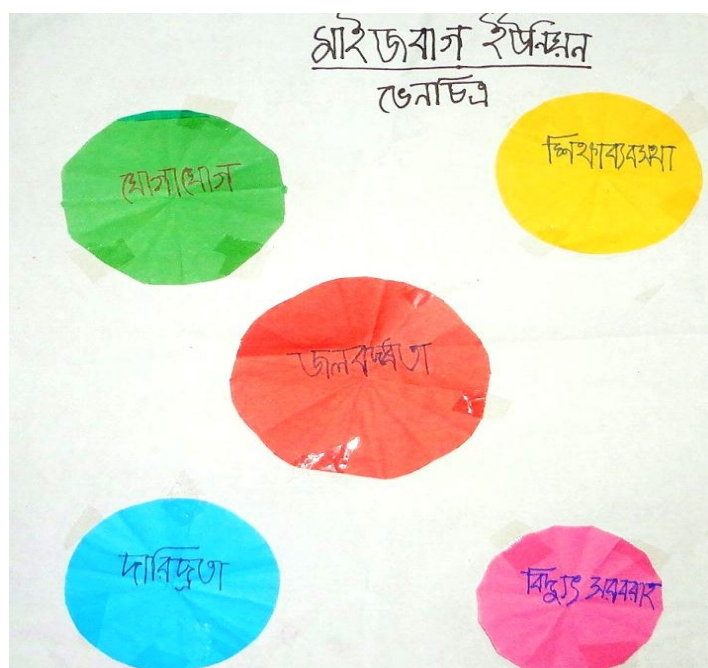
Photograph 6.3: Venn diagram of major problems

6.3.c   Identification of Potentials through Venn Diagram

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

- Agricultural land (Paddy)
- Deep Tube well
- Water Body/Beel
- Livestock rearing
- Fish/Aquaculture
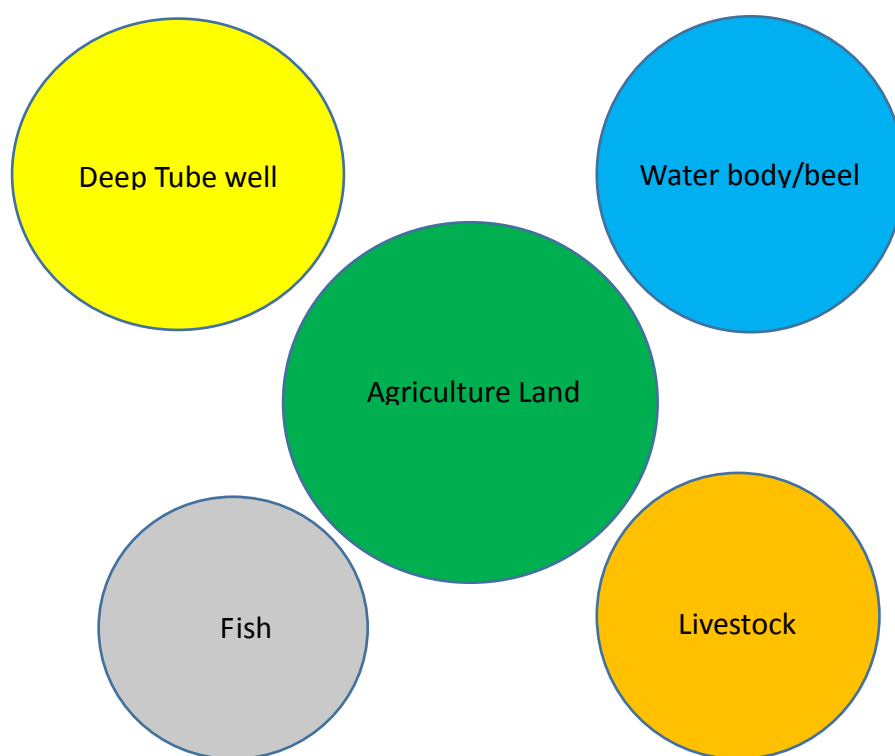
Figure 6.1: Major Five Potentials

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.Water logging	• Bed of drainage Khal has silted up • No initiative to re-excavate the khal	• Communication disruption • Crops & assets loss • Bad odor	• Khal is available
2.Poor Communication facilities	• GoB Financial Support is not provided • NGO/Private Support is not provided	• Motorized vehicle not available during rainy season • Movement very difficult due to muddiness and slipperiness • Accident risk for aged people • Increase travel time • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Katcha Road • People are interested to give land for widening and improvement
3.Lack of educational facilities	• GoB Financial Support is not available • NGO/Private or any interested person is not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life leading • Less scope to bear the expenditure for education, health and recreation aspect	
4.Insufficient Electricity Supply	• Increased the demand • Supply not increased as per demand • Political influence in distribution	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
5. Poverty	• Not established major industry in the area • No job available in agriculture field in all time	• Irregular income • Less income • Not possible to maintain normal life style • Not possible to bear the normal educational cost • Not possible to maintain medical treatment cost • To become debted.	

6.4   Perceived Development Priorities for Maizbagh Union under Mymensingh District.

The recommended development priorities for Maizbagh Union are as follows:

Table 6.2: Development Priorities of Maizbagh Union

Short term	Midterm	Long term
• Supply more electricity • Improvement of communication • Improvement of educational facilities • Provide proper vaccination to people	• Reach 100% sanitation • Re-excavation of khal	• Establish corruption free union through good governance • Reach 100% poverty free union • Establish mills/industry for employment generation • Khal to be excavated from Beel Raoul to Dakjuri

6.5   List of Participants

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: নাইচুবাদ ইউনিয়ন   Date: ২৫.৬.২৫

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01	রফিকুল ইসলাম	আগিয়ারী	কৃষক	৪৫	01731941080	
02	আব্দ রহিম	বড়চেরা	"	৪৪	01761559945	
03	হারুন অর রশিদ	চেমগা	ব্যবসা	৪৪	01740854435	
04	কমল মিয়া	চেমগা	৫	✓	৬৫	01770437778	
05	আকরাম হোসেন	চিংগুদ	কৃষক	৬৫	01972133280	
06	কালা মিয়া			৪৭	01717110310	
07	মোঃ নুরুল ইসলাম	চেমগা	কৃষক	৬৬	01717073009	
08	রফিকুল হাসান	চাগিয়া		৪৫	0172198759	
09	মোঃ তোরাব আলী	রাজনগর	৪৬	01777833579	
10	শিবুরমন	বড়চেরা		৪২	017515338	
11				৪৭	02986৯৬৬৬	
12	মোহন		ব্যবসা	৪৫	01733167863	
13	হারুন মিয়া			৪৪	0176298759	
14				৪৭	01776624465	
15				৬০	01700343৪৪	
16				৪৫		
17	প্রঃ গোলাম		✓	৬৭	01783-২৪১২৯১	
18				৪৬	02928207307	
19				808 ÷ 18		
20						

7.0 Rajibpur Union

7.1 Overview (Study Area)

The Rajibpur is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

West: On the West side of the study area, the Old Bhammaputra River and Trishal Upazila are situated

North: On the North of the study area, Uchakhila and Barahit Union are located

South: On the south side of the study area, Magtala union and Nandail Upazila are located

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

Total area of Razibpur Union is 8227 acres. Total population is 36758 and total number of household is 8090. Population density is 1104 persons per sq. km. There are total 404 numbers of disabled persons in the union. There are 23 primary schoosl, five madrashas, two high schools and one bazar in the union. Notable waterbodies are Kachamatia river, Haluarpar Beel.

Map 7.1: Rajibpur Union
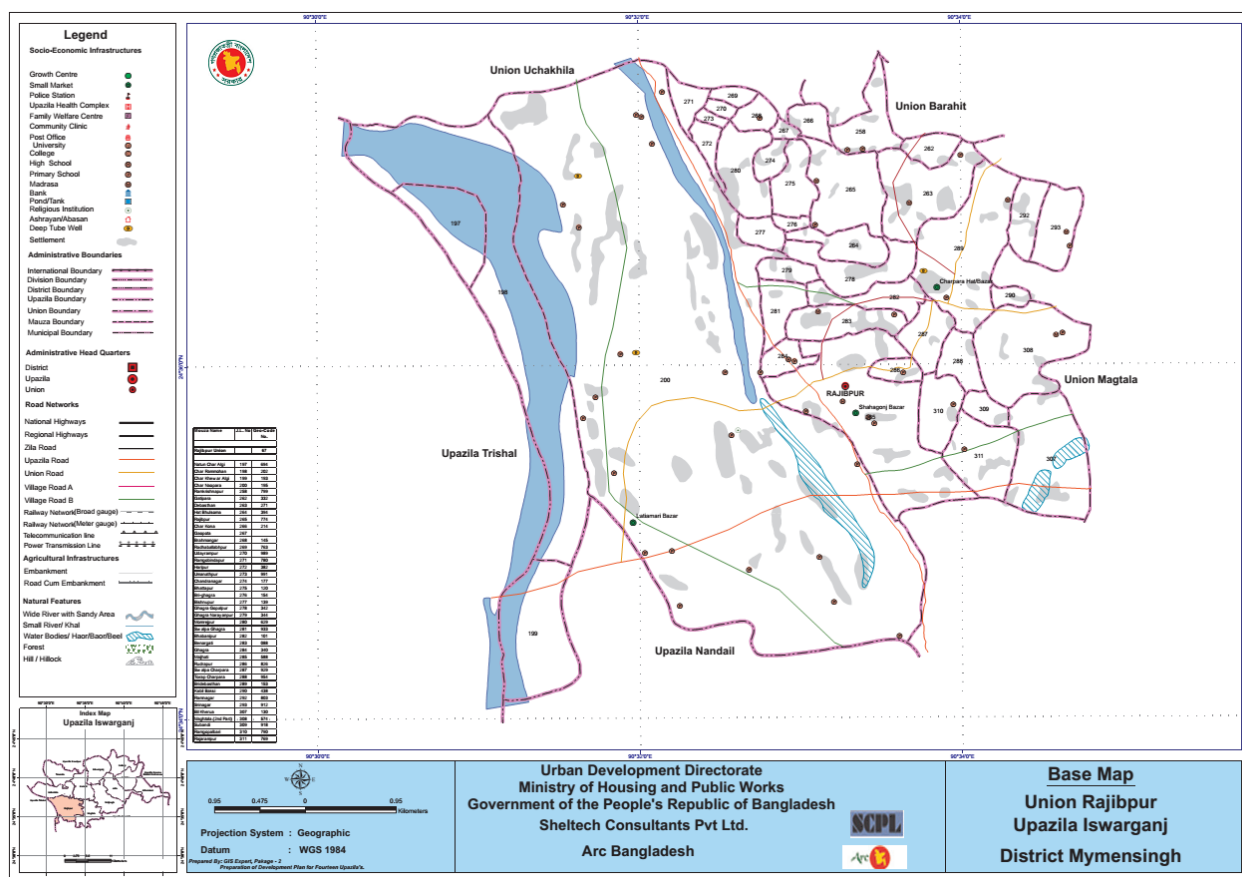
7.2   Spatial Aspects

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 Rajibpur 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 Rajibpur Union** |

7.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only irrigation water source
- Erosion prone area nearby the Brahmaputra river
- Kanchamatia river could not serve to the drainage purpose as it is silted up

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:

- Poor Communication system

- Poor Infrastructure in the Union

- Education system is not up-to-date

- Lack of institution for technical education

- Poor Services from Hospital

- Old Agricultural system

- Undeveloped bazar

- Insufficient electricity supply

- Insufficient drainage system

- Lack of sanitary latrine

- Lack of potable water

- Poverty and housing problem in char area

- Crop damaged due to lack of embankment

- Lack of recreational center/park

- Un-employment

- Lack of financial support for the disabled

- Lack of educational institution for disabled

- Lack of potato/vegetable preservation center

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;

- Poor communication facilities

- Lack of education facilities

- Lack of medical facilities

- Insufficient electricity supply

- Agricultural System not updated

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;

- Agricultural land (Paddy)
- Deep Tube well
- River (Kachamatia, Brahmaputra)
- Livestock rearing
- Recreational place
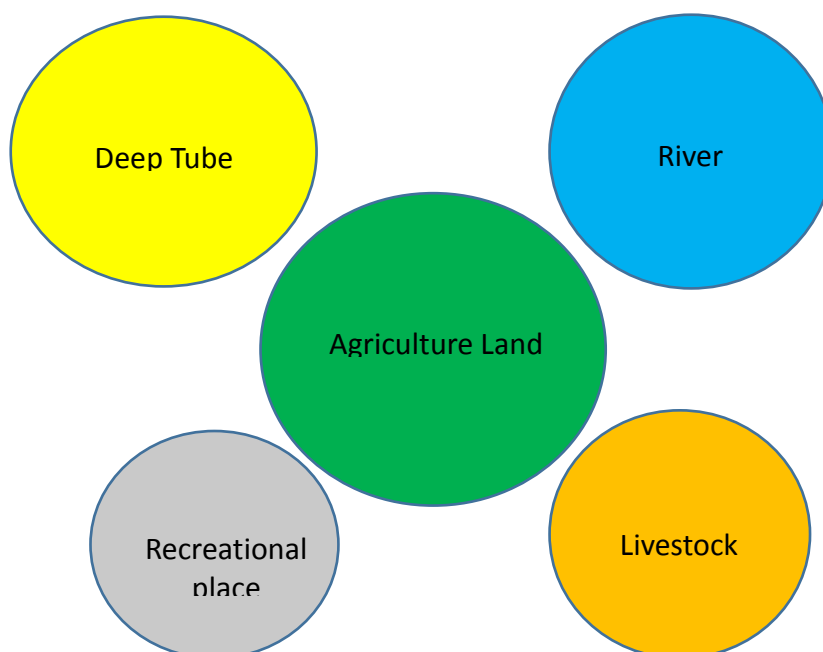
Figure 7.1: Major Five Potentials

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 Communication facilities	• GOB Financial support is not provided • NGO/Private support is not provided	• Motorized vehicle is not available during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Misuse of time for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Kancha Road • People are interested to give land for widening and improvement
2. Lack educational facilities	• GOB Financial Support is not available • NGO/Private or any interested person is not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life leading • Less scope to bear the expenditure for education, health and recreation aspect	
3. Lack of medical facilities	• Not yet established any improved hospital • Not availability of modern clinic • Poor service of health clinic • Doctor/Specialized Doctor is not available in all time • Ambulance is not available in all time • Necessary medicine is not available in Hospital/Clinic	• Have to go Mymensingh for treatment which is problematic • Time loss for travelling • Over expenditure • Life risk for moribund patients • Become poor/Poverty.	
4. Insufficient Electricity Supply	• Increased the demand • Supply has not increased as per demand	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal	

	• Political influence in distribution	production of paddy • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
5. Agriculture System not updated	• No Pucca drain • No necessary tractor support • No easy availability of improved seed • No easy availability of paddy processing machine • High price of seed, fertilizer, electricity cost etc.	• Water loss • Time loss for using plough possible to maintain normal life style • Not possible to bear the normal educational cost • Not possible to maintain medical treatment cost • To become debted.	

7.4 Perceived Development Priorities for Rajibpur Union under Mymensingh District

The recommended development priorities for Rajibpur Union is as follows:

Table 7.2: Development Priorities for Rajibpur Union

Short term	Midterm	Long term
• Improvement of Medical facilities i.e. establishment of hospital with sufficient doctors. • Improvement of educational facilities i.e. establishment of Degree College and computerized educational institutions • Literate person to be in every households • Establishment of Govt. Female Madrasa • Educational Institutions to be developed	• Electrification coverage to be increased • All households to be connected with electricity • Communication system to be developed • All road in the village to be carpeting	• Employment to be generated for all literate unemployed

7.5 List of Participants

8.0 Sarisha Union

8.1 Overview (Study Area)

The Sarisha Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

North: On the north & west side of the study area, Sohagi Union and Kendua Upazila are situated.

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

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

East: On the East side of study area, Atharabari Union and Kendua Upazila are located.

Total area of Sharisha Union is 5320 acres. Total population is 28305 and total number of household is 6024. Population density is 1104 persons per sq. km. There are total 283 numbers of disabled persons in the union.

Map 8.1: Sarisha Union
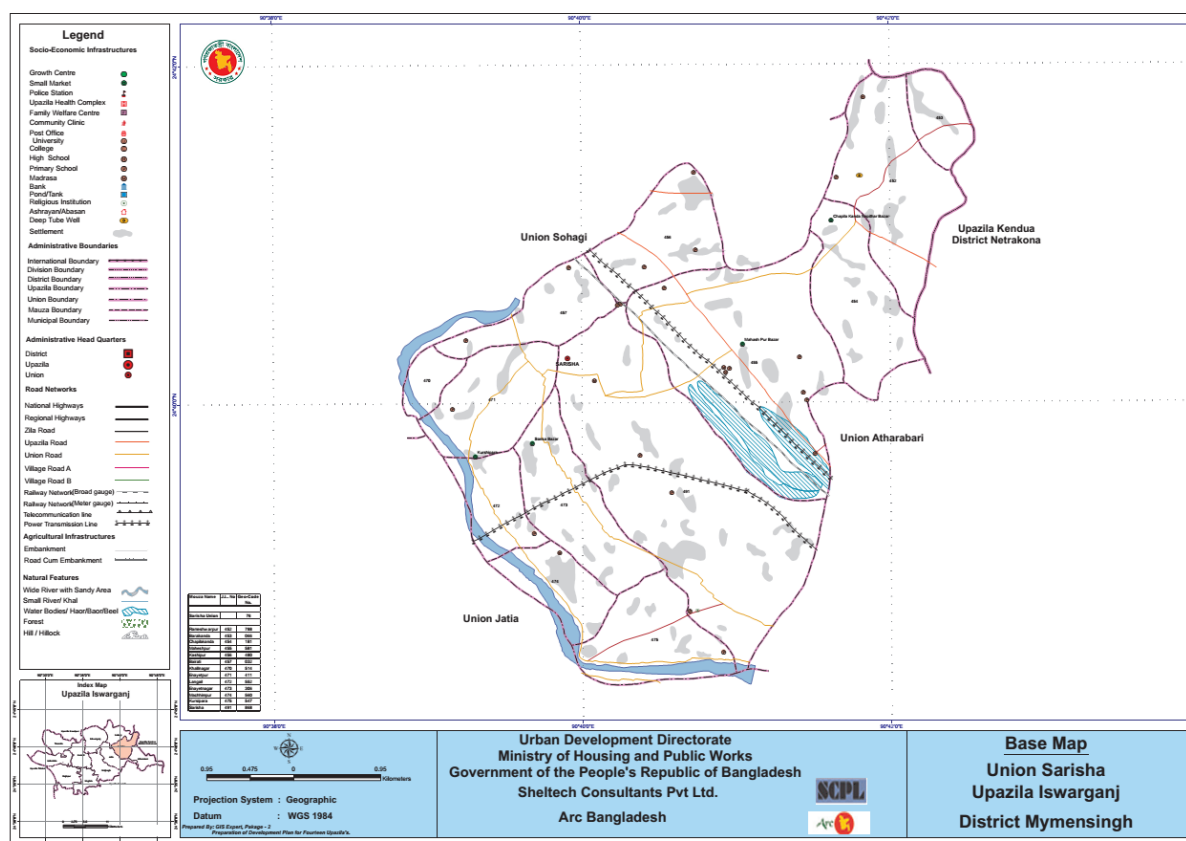
8.2 Spatial Aspects

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 Sarisha 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 Sarisha Union** |

8.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only irrigation water source
- A big perennial water body existed
- Kanchamatia river could not serve to the drainage purpose as it is silted up

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:

80% household are not connected with electricity

- Insufficient educational institute for higher study
- Bad condition of katcha road
- Insufficient Health Facilities
- Drainage Problem

- No playground
- Crop damage

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. Lack of electricity supply

2. Lack of higher education facilities

3. Lack of well condition road

4. Lack of playground

5. Lack of health facilities
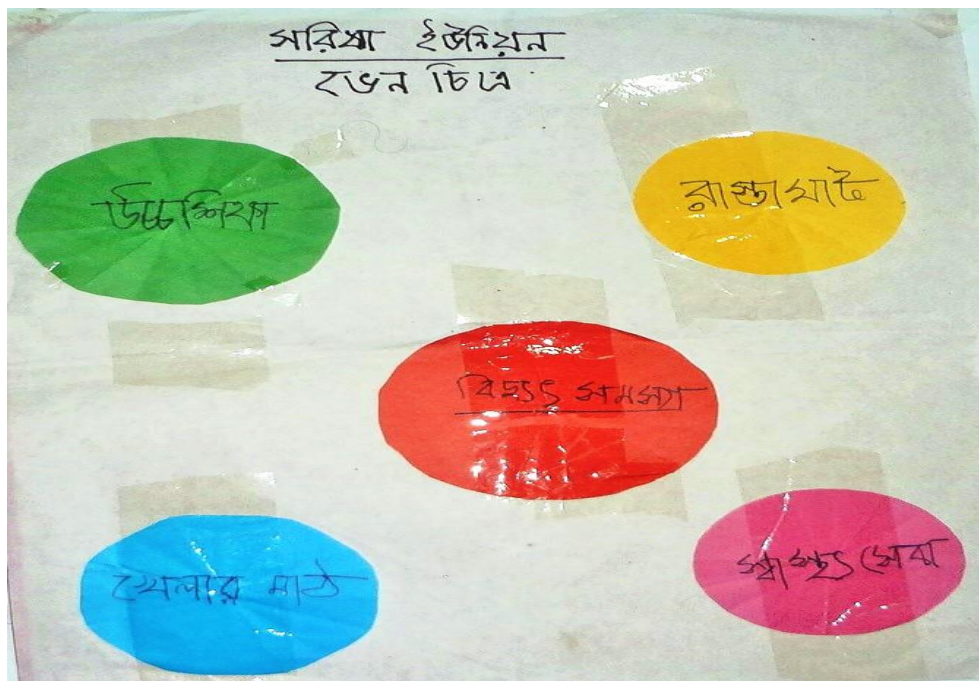
Photograph 8.3: Major five Problems

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 (Paddy)
- Deep Tube well
- Big Beel
- River (Kachamatia)
- Livestock rearing
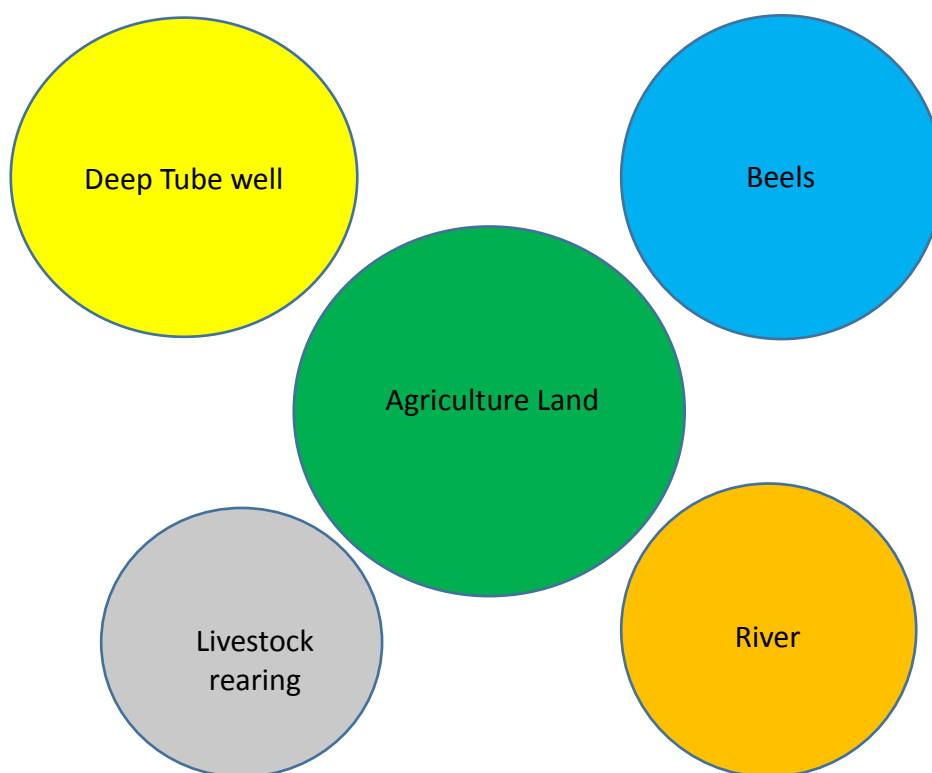
Figure 8.1: Major Five Potentials

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.Lack of electricity supply	• Increased the demand • Supply not increased as per demand • No initiative of REB	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Hampered paddy husking • Hampered the livestock rearing Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	

Identified Problems	Causes	Impact	Potentials/Probability
2.Lack of educational facilities	• GoB Financial support not available • NGO/Private or no initiative of local elite	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life leading • Less scope to bear the expenditure for education, health and recreation aspect	• People are available to donate land for establishment of Educational institution
3.Lack of well-conditioned road	• GoB Financial Support not provided • NGO/Private Support not provided	• Motorized vehicle not available during rainy season • Movement very difficult due to muddiness and slipperiness • Accident risk for aged people • Miss use of time for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Katcha Road • People are interested to give land for widening and improvement
4.Lack of Health facilities	• Not yet established improved hospital • Not available modern clinic • Poor service of health clinic • Doctor/Specialized Doctor not available in all time • Ambulance not available in all time • Necessary medicine not available in Hospital/Clinic	• People have to go Mymensingh for medical treatment • Time loss for travelling • Over expenditure • Life risk for moribund patients • Became poor/poverty.	
5.Lack of Playground	• No khass land in the area • No interested person to donate the land for playground	• No scope to organize tournament • People could not enjoy recreation • Boys/Girls could not play • Physic of student not built up properly	

8.4   Perceived Development Priorities for Sarisha Union under Mymensingh District.

The recommended development priorities for Sarisha Union is are follows:

Table 8.2: Development Priorities for Sarisha Union

Short term	Midterm	Long term
• Door to door electricity supply • Establish college • Ensure potable water supply • To establish College • To establish high school for both boys and girls • To provide higher educational facilitie • To improve health facilities	• Establish playground • Establish digital auditorium	• To establish electricity production center • To generate employment • To alleviate poverty • To establish improved Hospital (100 bedded)

8.5   List of Participants

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: সরিষা

Date: 15-06-2015

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01		৩		৪৭	০১৭৩৩-৫৬৫৮৭	
02		৪		৬২	০১৭৩০৭৫০৭৫৪	
03		৭		৩৮	০১৭১৬৬৭৫০৪০	
04		৬		৪০	০১৭৯৬৩৫৩৭৩০	
05			ই.বি.	৪৫	০১৭১৬৫৫	
06			ই.বি.	৪০	০১৯৭৩৭৩৭৬৫৫	
07			ই.ই	৫০	০৭৮০৩৬৮২৭০৮	
08				৪৫	০১৯১৭২৫৮১৯৭	
09			প্র.শি	২৩	০১৭২১২০৭৫৭১	
10			প্র.শি	৩১	০১৭১৮-৩৫৫১৮৫	
11			ই.কৃষক	৪০	০১৭৬৩৮০৬৬১২	
12			ই.শি	৪২	০১৭৭৭১৯১৮৪	
13			কৃষক	৪২	০১৭৩৩৩৪৮৪৪৬৫	
14				৪৬		
15				৩৫	০১৭২৬৪০৫৬০	
16				৩২	০১৭১৬৫২৫৫৬০	
17				৪০	০১৭৯২৭০১২৫৪	
18			ই ডি সি	৩৫	০১৭৩৫৬৩ ৬৫৫৬৭	
19			হি.ম	২৭	০১৭৭৯০৯৭৫৫০	
20			ই.(সি)	৪৫	০১৯১৭৫৩৯২৩১	
01			হি.ম	৪৫	০১৭৩৬৬৪৯২২৯৬	
03				৫৮	০১৭২১৯২২১৬০	
04			(ম)		০১৭২৩৫৭৯৭০	
05			কৃষক	৪৫	০১৭৯২৫৬৭০৭৭	
06			ই.বি.শি	৫৫	০১৭৫১১৭০২৫৫	
07			(মেস)			
08			ই.বি.শি	৪২	০১৭৯৮৭৯২৭২৫৫	
03					০৭৭৩-৫৭৪৪৩০	
10					০১৭১৬-৭৫৭৩৬	

9.0 Sohagi Union

9.1   Overview (Study Area)

The Sohagi union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

**North:** On the north side of the study area, Gouripur Upazila is situated

West: On the west side of the study area, Ishwarganj and Jatia Union are located

South: On the south side of the study area, Sarisha union is located

East: On the south side of the study area, Jatia and Sarisha Union are located

Total area of Shohagi Union is 5390 acres. Total population is 27853 and total number of household is 6131. Population density is 1277 persons per sq. km. There are total 278 numbers of disabled persons in the union. There are 12 primary schools, one madrasha, one high school and three bazars in the union. Notable waterbodies are Kachamatia river, Katakhal and Koratia Beel

Map 9.1: Sohagi union
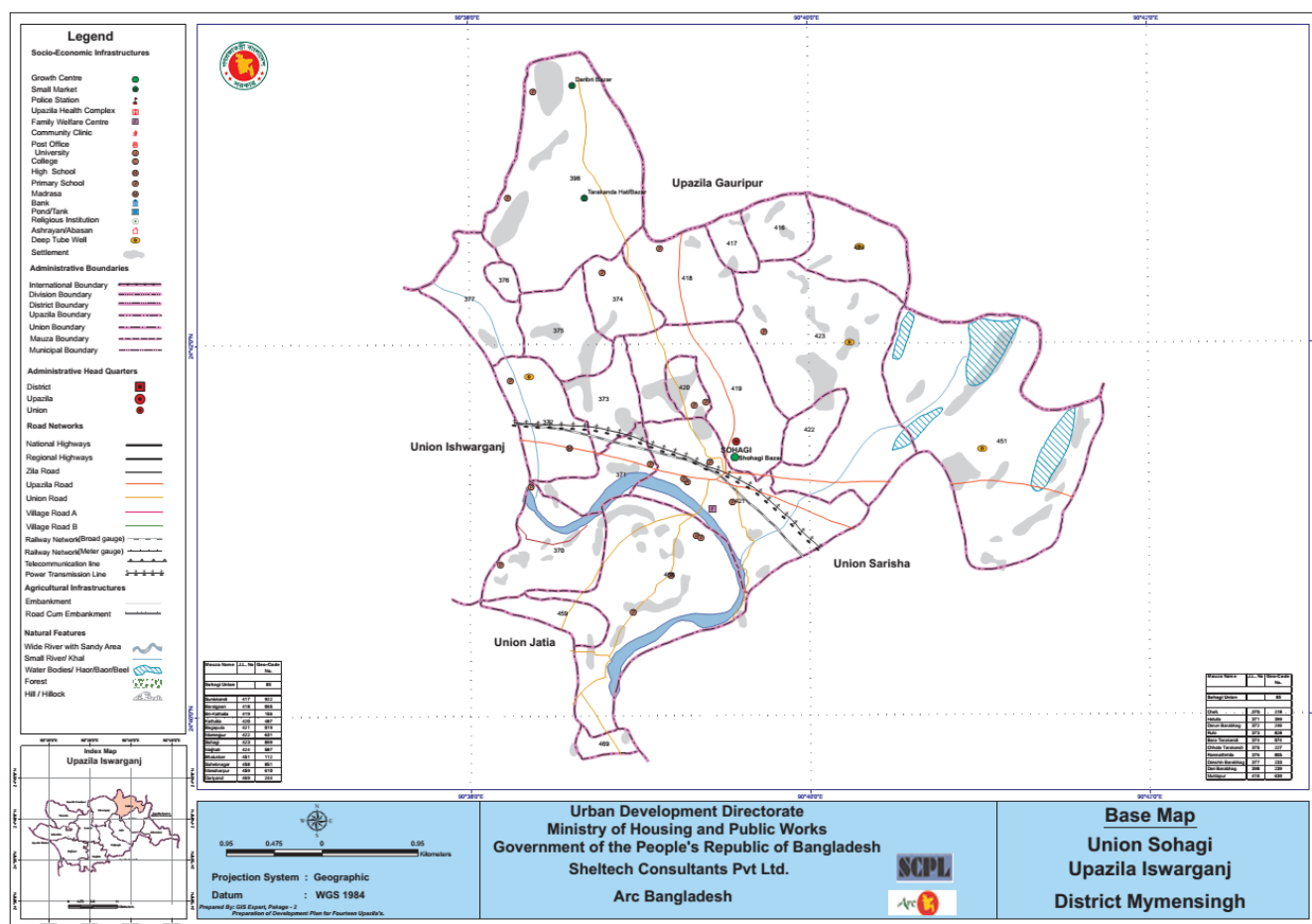
9.2   Spatial Aspects

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 Sohagi 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 Sohagi Union** |

9.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only the irrigation water source
- A big perennial water body exists (Koratia Beel).
- Kanchamatia river could not serve to the drainage purpose as it is silted up

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:

- 500-600 families affected by kanchamatia river erosion
- Baro halia khal silted up

- All infrastructures are in poor quality at Dewanganj bazar
- Insufficient poor quality houses in the Gucchagram
- Waterlogging at Sohagi bazar
- Road has been damaged on the bank of Bogapotta khal
- Building of Sohagi high school is in poor quality
- Playground of Sohagi high school is not up to date for playing.

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;

- River bank Erosion of Kanchamatia river

- Drainage problem at Sohagi bazar

- Water logging

- Problems of Guchchhagram/ cluster village

- Lack of educational facilities
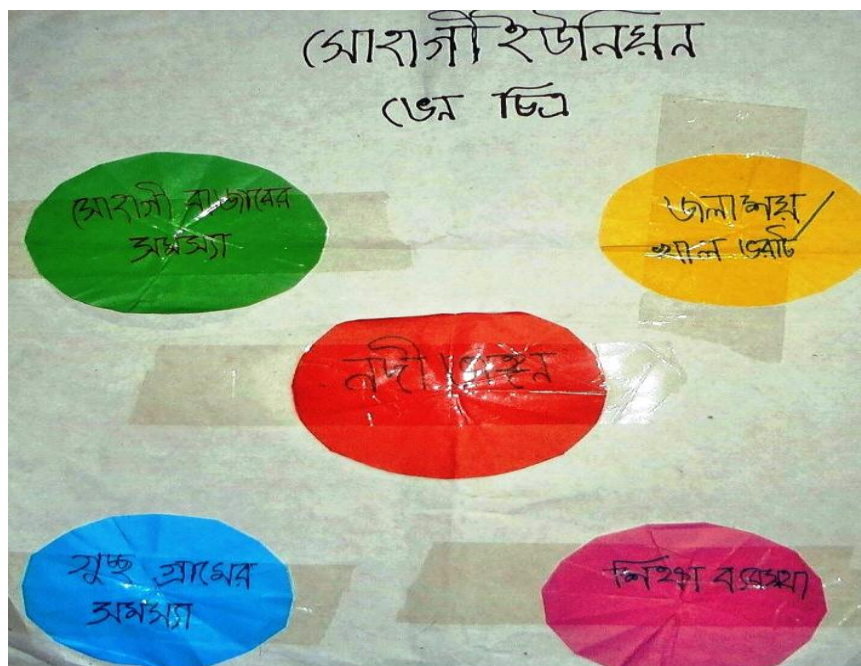
Photograph 9.3: Major five Problems

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;

- Agricultural land (Paddy)
- Deep Tube well

- Beel
- River
- Livestock rearing

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. River Bank erosion of Kanchamatia river	• River bank not protected • Strong current in the river during rainy season	• 500-600 families hampered due to river erosion	
2. Drainage problem at Sohagi Bazar	• No existing drain at the bazar area • Drainage khal's bed has silted up (Katakhal)	• Water stagnation due to lack of drain • Road become muddy and slippery due to stagnation of water	• Available spaces for construction of Drain and Khal re-excavation.

Identified Problems	Causes	Impact	Potentials/Probability
		• Sufficient customers not gathered during rainy day. • Less money earned due to less customers	
3. Water logging	• Silted up the Kanchamatia river bed • No initiative to excavate the river	• Communication disruption • Crops & assets loss • Bad odor	• Bed silted up drainage khal is available
4. Problem of Gucchagram/ Cluster Village	• Landless people are living • Have no sufficient house	• Congested house/room • Most of the shed of houses are poor condition and rainwater could not be protect during rain • Fencing also poor condition and floor is katcha • No social security • Asset loss	• Sufficient space for more house construction
5.Lack of Education Facilities	• GoB Financial Support not available • NGO/Private or any interested person not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life style • Less scope to bear the expenditure for education, health and recreation aspect	

9.4   Perceived Development Priorities for Sohagi Union under Mymensingh District.

The recommended development priorities for Sohagi Union are as follows:

Table 9.2: Development Priorities for Sohagi Union

Short term	Midterm	Long term
- To construct a madrasa at Zigatola - To develop the Sohagi high school and its playground - To construction a high school at Zigatola - To construct more road and maintenance of the existing road - To construct a Bridge over Bhalukbher khal - To construct drain at Sohagi Bazar - To construct road from Charpara to Bhalukbher via Pacchar bazar	- To improve the communication system - To construct road from Kendua pucca road to Bhalukbher - To re-excavate the Puria khal - To excavate a khal from katachabur beel - To construct road from Sohagi bazar to Sohagipara - To construct road from Sohagi bazar to Dewanganj Bazar	- To ensure electricity supply - To remove the waterlogging - To develop the union as digital Union model

9.5 List of Participants

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: _____ Date: _____

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01				৬৫	01713-826763	
02				৩০	01723-767573	
03				৭৯	০১৭১২৪৪৮৫৫	
04				৪৫	০১৭১৪৮৬৮২২	
05				৫২	০১৭১২০০৭৮৪৮	
06				৪৯	০১৭১৫৮১৭৬৭৭	
07				৪২	০১৮৫৬১৬১৪৪৫	
08				৬৮	০১৭১৪৭০৬১৭২৫	
09				৪৬	০১৫৬৬৬৯৭২৫	
10				৩৯	০১৭৭২৪৬৩০৩২	
11				৩৫	01929-108676	
12				৪১	01711-071007	
13				৪৭	01722824663	
14				৫৮	01761598466	
15				৬৫	029২2023143	
16				৬৮		
17				৪৫	০১৭১৪৮৫২৩৩	
18				৬৫	0.1727878119	
19				৫৫	01777286090	
20				৫০		

10.0 Tarundia Union

10.1   Overview (Study Area)

The Tarundia Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

**North**: On the north side of the study area, Gouripur Upazila is situated

West: On the west side of the study area, Gouripur Upazila is located

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

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

Total area of Tarundia Union is 6577 acres. Total population is 30610 and total number of household is 6831. Population density is 1150 persons per sq. km. There are total 306 numbers of disabled persons in the union. There are one primary school and three bazars in the union. Notable waterbodies are Kachamatia river, Baroikuri Beel.

Map 10.1: Tarundia Union
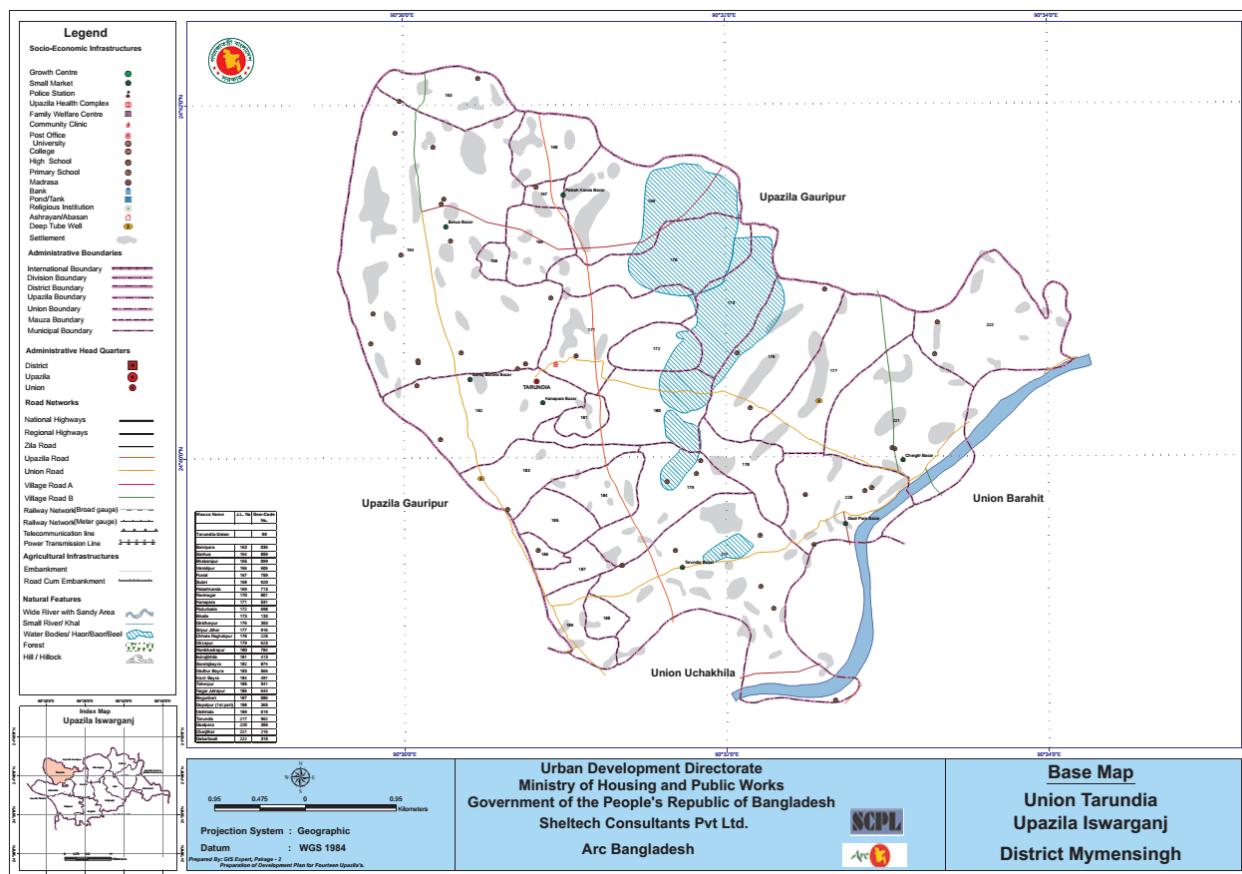
10.2 Spatial Aspects

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 Tarundia 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 Tarundia Union** |
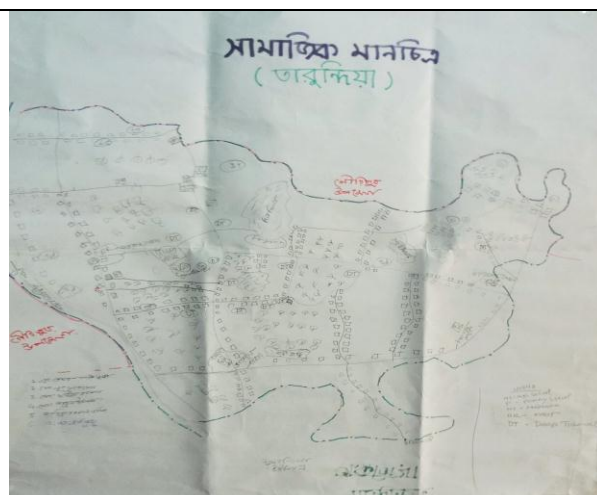
10.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only the irrigation water source
- Some non-perennial water bodies existed

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:

- No College in the area for higher study
- No Carpeting road in the areas as per demand

- Insufficient room as well as furniture in the educational institute
- Lack of potable water during dry season (During Irrigation period)
- Insufficient Electricity supply
- Lack of pucca drain of Deep Tube well Irrigation
- No water supply, pucca road and latrines at the bazar area
- No sanitary latrine of at least 65% household
- No development and maintenance of mosque
- No Community Clinic
- No digital (Computer, Internet facilities) educational institute in the area
- Unplanned Land use

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;

- Lack of College

- Lack of Carpeting Road.

- Lack of Infrastructure at the Tarundia bazar

- Insufficient Class Room/ Furniture in the educational institute

- Insufficient Electricity Supply
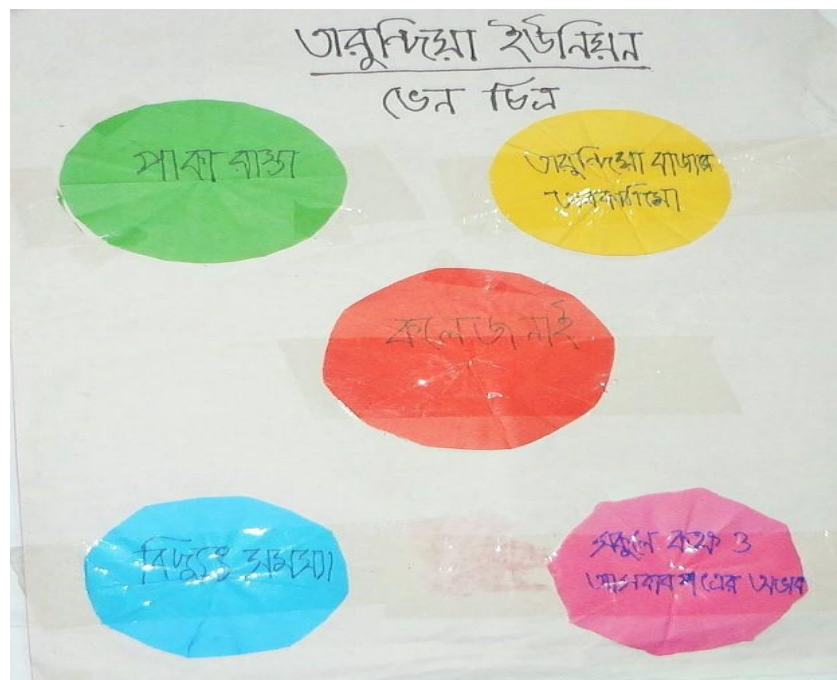
Photograph 10.3: Major 5 Problems

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 (Paddy)
- Deep Tube well
- Water Body/Beel
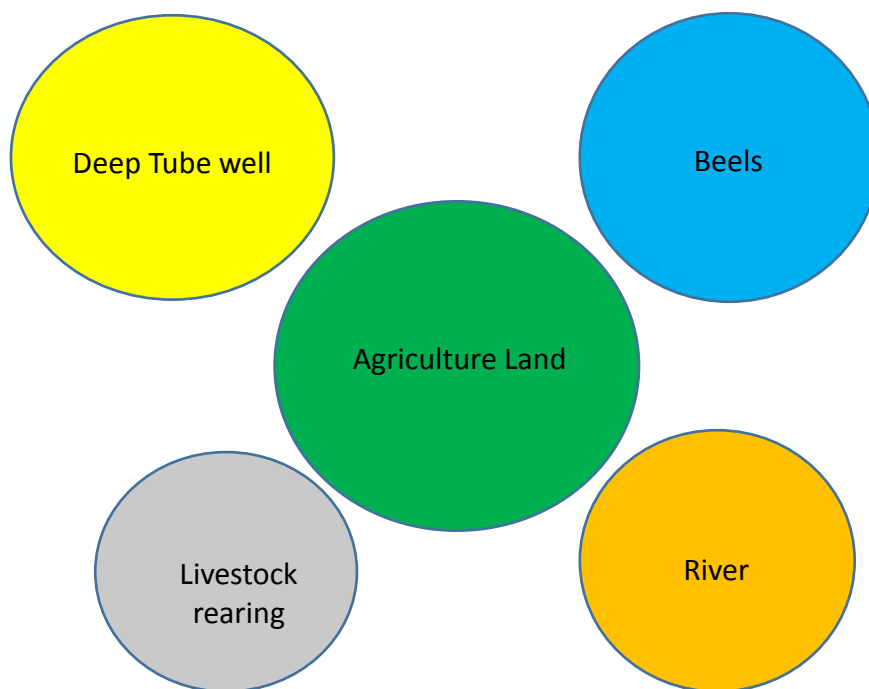- Livestock rearing
- Available Labor
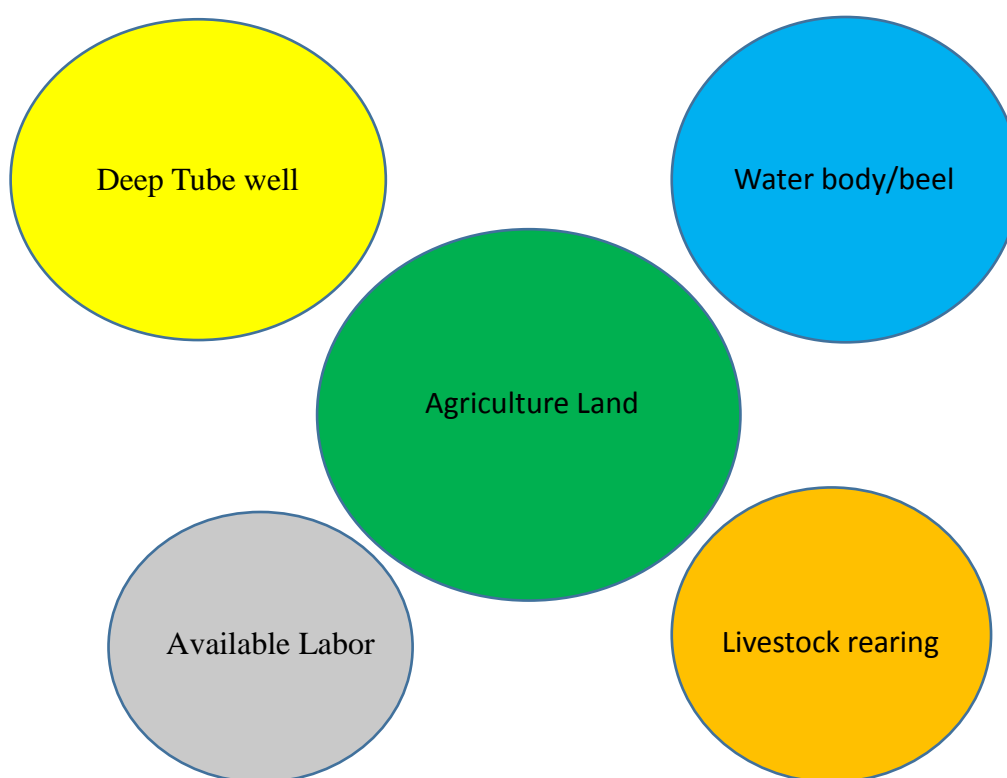
Figure 10.1: Major Five Potentials

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
5. Lack of College	• GoB Financial Support is not available • NGO/Private or any interested person is not available	• Higher education not achieved easily, • Social dignity hampered • Less scope for employment • Less scope to improve life leading • Less scope to bear the expenditure for education, health and recreation aspect	• Large Complex of Tarundia High School
6. Lack of Carpeting Road	• GoB Financial Support is not provided • NGO/Private Support is not provided	• Motorized vehicle is not available during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Misuse of time for traveling • Over expenditure for traveling • Increased unlawful activities due to less patrolling of law and order force	• Existing Kancha Road • People are interested to give land for widening and improvement
3.Lack of Infrastructure at Tarundia bazar	• Poor income of Bazar committee • GOB Financial Support is not provided • NGO/Private Support is not provided	• Bad odor due to lack of toilet and open defecation • Water stagnation due to lack of drain • Muddy and slippery due to lack of pucca Rd. • Sufficient customers not gathered during rainy day. • Less money earned due to less customers • Customers could not pray properly in the bazar area due to lack of spacious mosque.	• Available spaces for Mosque/Road/Drain/ latrine and necessary Shed construction
4.Insufficient Electricity Supply	• Increased the demand • Supply has not increased as per demand • Political influence in distribution	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area	

		• Accident risk due to darkness	
5. Insufficient room, space and furniture in school	• GoB Financial Support is not available • NGO/Private or any interested person is not available	• Less enrollment of student in school • Boys/Girls are deprived from education • Increased early marriage • Increased unemployment. • Less scope to earn more money	

10.4   Perceived Development Priorities for Tarundia Union under Mymensingh District.

The recommended development priorities for Tarundia Union are as follows;

Table 10.2: Development Priorities for Tarundia Union

Short term	Midterm	Long term
• Establishment of college • Road Construction /Maintenance • Replace existing Mosque in Bazar by constructing new mosque. • Bazar re-development. • Establishment of Industry in order to generate employment • Construction of Sanitary latrine. • Improvement of health Facilities. • Establishment of Hospital • Introduction of digital education system • Supplying potable water to each household.	• Improvement of Electricity system. • Increasing educational institution • Increase REB electrification coverage.	• Establish Tarundia Union as digital union. • No alteration of Agri land • Establishment of University

10.5　　List of Participants

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 Reflection Action (PRA)
Registration of Participants

তারুণ্দিয়া

Name of Union/Wards of Pourashava: Tarundia　　　　　　Date: 09·06·2015

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01						
02	ক্যামেস্টিকেল হক গার	ইউনি অচির, W-৪,(কোনাচার)	চাকুরী	৪৭	01713534789	
03	নিরঞ্জি	ward; ১,2,3	UP Member	35	01703408813	
04	কাতন্তি পারভীন	ward-7,8,9	UP Member	32	01987933293	
05	গ্রাম: এস. মিজবুল	মাডখা, ward-2	ব্যবসা	38	01764142320	
06	রাশেদুল ইসলাম	কোনাপাড়া	ব্যবসা	৩৩	01794405900	
07	তাজুল ইসলাম	খেলারপাড়	কৃষি	৬২	01748960দা	
08	রায়হান	বেগুনবাড়ী এই:পাড়	৬১	01761509279	
09	নুরিফরেয়ারা	খেলা নাড়া ইমরান	৬2	01980688400	
10	মেহেরুল কবির ভূঞা	সারভারগাছী ইউপি,সদস্য	৫৭	02016785676	
11	মো. দুইট্রেট ওবমেন	ward-4	SAAO	৬৫	01720591666	
12	তানু, রকমান হোসেন	সাংগঠনিকবিসয়ক	৫৪	05929765683	
13	মো. এনায়েত	খেলারপাড় কৃষক	৪০	01964840212	
14	গ্রাম: তারুন্দিয়া ২৮	সোনাপাড় কৃষক	২৮	05710608020	
15	মো: ২৮ বরুক	তারুন্দিয়া ইউপি চেয়ারম্যান 54	01922880696	
16	মো: লুতফর ইসলাম	ব্যবসা ব্যবসা	৫৪	01026800০	
17	সোহেলিনা আক্তার	word 4,56	Service	38	01717953232	
18	মোড়া: রাবেয়া আক্তার	word. 7,8,9	Service	35	01720839284	
19	মো: দা: খাদিজ কর্তা, লাল W-5	H-Asst.	40	01719529177	
20	মোহম্মদ রফিকুল ইসলাম	ব্যবসা কোনাপাড়া ব্যবসা	৬৮	01730347534	

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 Reflection Action (PRA)

Registration of Participants

Name of Union/Wards of Pourashava: Tarundia

Date: 09·06·2015

SL. #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01	ব্যাপক বরহিম	(ফোনাবঘর)	ইঃ শিঃ সদা	৬৫	01925834284	
02	অসুল হালাস	ফোনাবঘর	মেম্বার	৫২	০২৭৬৬২৭২৫২	
03	মোঃ হাসান শহীদ	পদর বাহুরা ৪ নং ওয়ার্ড	সহ-সভাপতি কৃষক কল্যাণ সংস্থা অযোয়ানীসীন	৭৫	০২৭২৭২৭২৬৬	
04	,, হসনা বেগম	কোনাবাড়ী ৪ নং ওয়ার্ড	গৃহিণী বালিকা শাখা	৭৭	০১৭৪০৮৮৬৫০	
05	মোঃ আসুল হালাম	লোনাবঘর	বসার	৫৭	- ০১৭৬৪৭২৫৫৩	
06					1048÷28	

11.0 Uchakhila Union

11.1   Overview (Study Area)

The Uchakhila Union is under the administrative jurisdiction of Ishwarganj Upazila of Mymensingh district. The boundary of the Union is as follows:

North: On the north side of the study area, Tarundia Union and Gouripur Upazila are situated.

West: On the west side of the study area, Brahmaputra river and Trishal Upazila are located.

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

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

Total area of Uchakhila Union is 6658 acres. Total population is 30710 and total number of household is 6576. Population density is 1140 persons per sq. km. There are total 368 numbers of disabled persons in the union. There are 13 primary schools, three madrashas and one High school in the union.

Map 11.1: Uchakhila Union
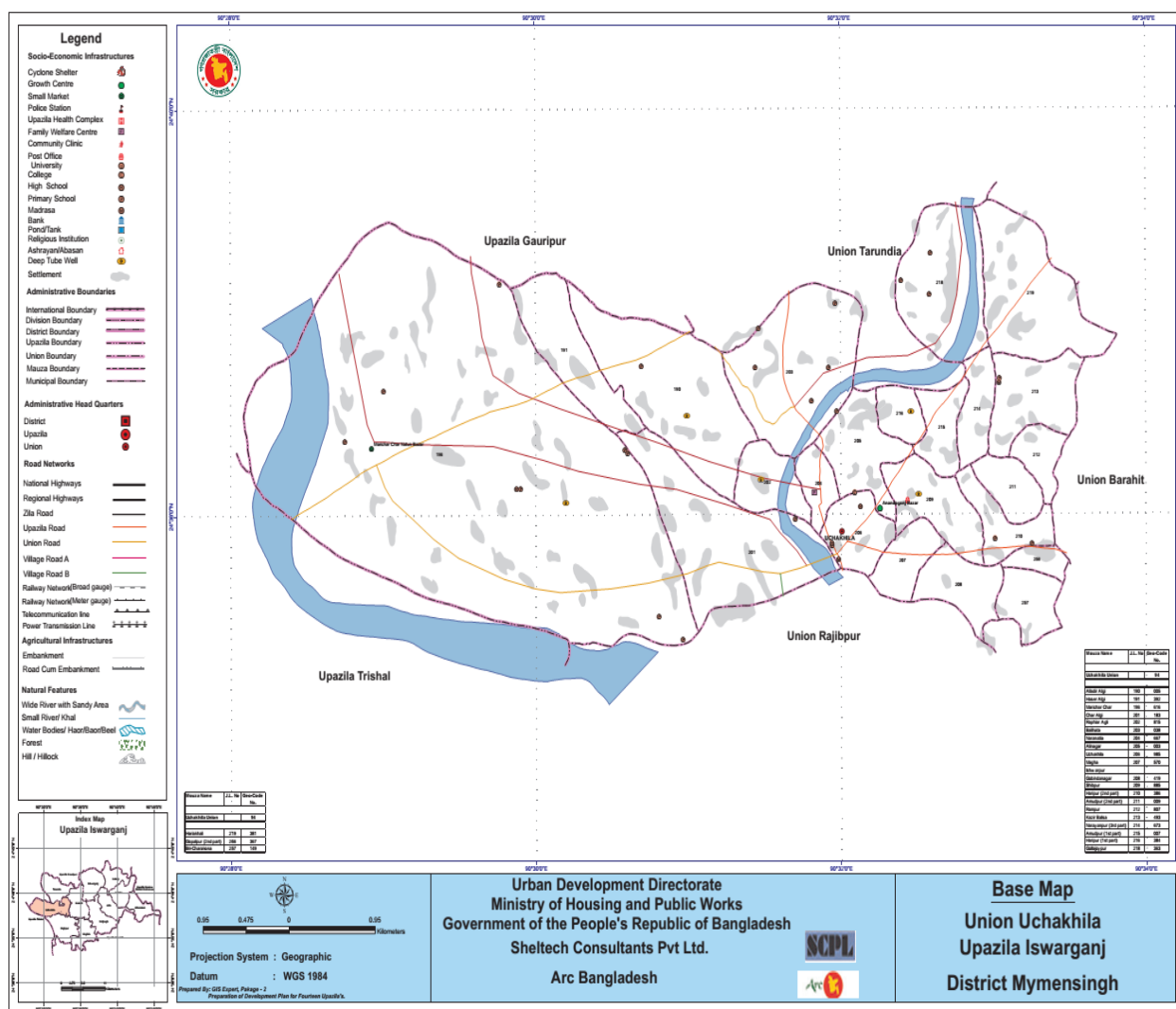
11.2 Spatial Aspects

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 Uchakhila 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: Uchakhila Union	**Photograph 11.2: Completed Social Map of Uchakhila Union**

11.2.a   Findings of Social Mapping

The major findings of social map are as follows:

- Most of the land are agri-land and deep tube well is only the irrigation water source
- Some non-perennial water bodies existed
- Kanchamatia river could not serve to the drainage purpose as it is silted up

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:

- Drainage problem

- Lack of Sanitary toilet

- Partly encroachment of Uchakhila Bazzar

- Water table depletion

- Road Pucca & Katcha

- Lack of Deep tube well

- Encroachment of canal

- 40% people of Char Algee are poor and living below standard

- Communication disrupted from Ishwarganj to Kalir due to lack of four bridges

- Lack of maintenance of pucca road

- Lack of potable water during dry season

- Lack of pucca drain of Deep tube well for irrigation

- Lack of road at Moricharchar Namapara

- Silted up the bed of Kanchamatia river

- Lack of educational institute

- Lack of employment generation for the disabled

- More people living at Bagilhati

- No hospital

- River erosion of Brahmaputra river

- Lack of development of Uchakhila Bazzar

- Waste management problem of Uchakhila bazar

- Lack of Electricity

- Un-Employment

- Lack of Industry

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;

- Lack of Communication

- Lack of Sanitary latrine

- Lack of Potable Water/Lack of Uchakhila Bazar Developments

- Lack of Electricity

- Poverty

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;

- Agricultural land (Paddy)
- Brahmaputra River
- Deep Tube well
- Beels
- Uchakhila Bazzar
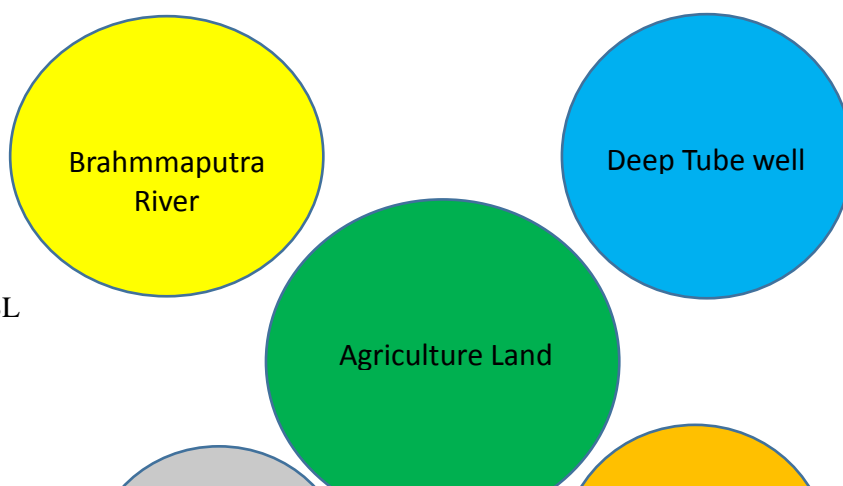
Figure 11.1: Major Five Potentials

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.Lack of Communication	• GoB Financial support is not provided • NGO/Private Support is not provided	• Motorized vehicle is not available during rainy season • Movement is very difficult due to muddiness and slipperiness • Accident risk for aged people • Misuse of time for traveling • Over expenditure for travelling • Increased unlawful activities due to less patrolling of law and order force	• Existing Kacha Road • People are interested to give land for widening and improvement
2.Lack of Sanitary latrine	• No supply from GoB/NGO • Not capable to establish by own cost • Not aware about the negative impacts of open latrine/ defecation	• Bad odor due to excreta of open place • Risk of being affected by bacteria • Suffering from diarrhea and other water borne diseases • Ill-health • Loss of Money • Poverty.	

3.Lack of Electricity Supply	• Increased the demand • Supply has not increased as per demand • Political influence in distribution	• Hampered lessons preparation of student • Hampered the irrigation • Hampered the normal production of paddy • Economical loss • Increased unlawful activities in the area • Accident risk due to darkness	
4.Lack of Uchakhila Bazar development	• Poor income of Bazar committee • GoB Financial Support is not provided • NGO/Private Support is not provided • Some part of cow selling has encroached by local influential persons • Bazar committees could not develop the infrastructures in the bazar areas due to less income	• Bad odor due to lack of sanitary toilet • Water stagnation due to lack of drains • Muddy and slippery due to lack of pucca Rd. • Sufficient customers not gathered during rainy day. • Less money earned due to less customers • Income of Bazar committee has reduced • People could not marketing easily due to lack of infrastructure facilities • Less people gathered at the Hat-Bazar for marketing • Less selling of shopkeepers • Less income of shopkeepers	• Necessary spaces are available for development

11.4 Perceived Development Priorities for Uchakhila Union under Mymensingh District.

The recommended development priorities for Uchakhila Union are as follows;

Table 11.2: Development Priorities for Uchakhila Union

Short term	Midterm	Long term

• Ensure well medical treatment • Ensure Sanitation system • Ensure Potable water supply • Ensure protection of river bank erosion • Development of bazar including cow selling market	• Ensure communication development • Reconstruction/Maintenance the Amlitala bridge • Establish school/Madrasha • Provide facility of higher education • Establish Police Station	• Ensure electricity supply • Reduction of poverty • Establish the Uchakhila union as digital union model • Construct train line

11.5　List of Participants

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: Ichakhila　　　　　　　Date: 10-06-15

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01	মো আশিকুল ইসলাম	সবিচারব	ইউ, পি চেয়ারম্যান		01213-563638	
02	হুমায়ুন কবির		ইউ, পি সচিব		01210-124124	
03	মো সুলতান উদ্দিন	সবিচারব	ইউ, পি সদস্য		01925397281	
04	মো. গোলাম মোস্তফা	হরিপুর ২নং	''		০১৭৮৪০৫৭৩৪৮৭	
05	মো. রাফিকুল ইসলাম	কাঠির বক্স	''		01732426126	
06	মো: আবুল বাক্কার	চরআনরী	''		০১৮৪০০৭৬৩৬	
07	মো: দেলোয়ার হোসেন চরুআনরী		''		01775676806	
08				৪৫	01739098829	
09				৪০	০১৭৫৬৭৬৩৬৪	
10	মো: দুলাল হোসেন			৪৫	01728673614	
11				৩৫	01911-688383	
12			কৃষক	৬২	01721298166	
13			কৃষক	২২	01937578৪৫	
14				৪৫	০১৭৫৭৬৪৫০৬৪	
15				৪৬	01748022528	
16		১নং ওয়ার্ড	গৃহিনী	৪৫	01922472349	
17		৮নং ওয়ার্ড	গৃহিনী	৩৬	0177563৭	
18	মো:		গৃহিনী	৪২	01713515011	
19	মিনা আকতার				0176159৮৫৮	
20					01766৬০৬০৫	

উচাখিলা

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 Reflection Action (PRA)
Registration of Participants

Name of Union/Wards of Pourashava: __Ucha Vila__

Date: __১০-06-15__

SL #	Name	Village/Mohallah & Ward	Occupation	Age	Contact No	Signature
01	মাহফুজ ইসলাম	বালিশহরে	ব্যবসা	২২	০১৭২৬-১৩৯৪৩০	মাহফুজ
02				458.12		
03						

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

Survey Report

Geological Survey
of
Ishwarganj Upazila
August 2016

Submitted By

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

EXECUTIVE SUMMARY

Present study at Ishwarganj Upazila, geological survey work has been carried out in the project area under the package-2, project titled 'Preparation of Development Plan for Fourteen Upazilas' a initiative of Urban Development Directorate (UDD). In this development plan, subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment. This 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 have been carried out in the field which are geo-morphological survey; boreholes drilling and preparation of borehole logs; undisturbed and disturbed soil sample collection as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting PS logging test; conducting down-hole seismic test and Multi-Channel Analysis of Surface Wave (MASW) test. Laboratory testing of soil samples such as Grain Size Analysis, Natural Moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. To meet the above geological, geotechnical and geophysical task 30 boreholes with SPT program, five MASW and four down-hole seismic tests survey programs have been conducted at Ishwarganj Upazila.

Field and laboratory investigation data will be analyzed and result will be integrated in a module by which it is possible to produce 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.

Above test result would give a clear idea about the geo-hazard status of Ishwarganj Upazila 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.

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:

First growing 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.

Present study considering following investigations and surveys which has been carried out into the field, 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 covered by floodplain and elevated Pleistocene trace with some low or marshy land. Geologically and structurally the area is not much complex, that's why geotechnical and geophysical investigations are covered whole floodplain area except low or marshy land 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 or 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 280.43 sq. km (BBS 2011). It is located between 24º33' and 24º44' north latitudes and between 90º28' and 90º46' east longitudes. The upazila is bounded on the north by Gauripur upazila, on the east by Kendua upazila of Netrokona zila, on the south by Nandail upazila and on the west by Trishal and Mymensingh sadar upazilas. Ishwarganj is distance from Dhaka-142 km and from Mymensingh 22 Km.

Ishwarganj upazila came into existence as a Thana in 1936 and was upgraded to upazila in 1983. Nothing is definitely known about the origin of the upazila name. It is said that in the long past, there lived an influential man named Ishwar patni at the present place of the upazila. A local bazar was named as Ishwarganj after his name. It is generally believed that the upazila might have derived its name after the name of the bazar where the upazila Head Quarters is located. Atharo Bari is the rich full area in Ishwarganj Upazila under Mymensingh district. From the British period this area is advance of business and communication. Historical glory of abandoned Jamindar Promoth Chandra Ray's home is situated in this upazila which is most heritage sites in this area. It is stands for two hundred and fifty years. Other historical sites in this upazila are Telowari Jame Mosque and Ishwarganj Kali Mandir.

Ishwarganj has a population of 376348. Males constitute 49.74% of the population, and females 50.26%. It has 376293 units of household. Ishwarganj has an average literacy rate of 41.0% (7+ years), and the national average of 51.77% literate. Table 3.1.C. provides ward/union based population and number of households of the project area as found in the 2011 census report. (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 Ishwarganj upazila 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 Boar firming.

The city of Ishwarganj is served by several highways. The main road transport is Dhaka-Mymensing highway. Mainly three types of roads such as pucca, HBB/ brick soling and kutcha roads connect different parts of the Upazilla. It has 61.02 km of pucca road, 13.03 km of kutcha road. The total union has 73.72 km of pucca road and 88.16 km of kutcha road. The total rural area has 14.94 km of pucca road and 132.69 km of kutcha road. The river way is about 12 km. Ishwarganj upazila is connected with the railway network. Daily train service connecting Dhaka to Mymensingh is by a pair of trains. Ishwarganj is served by

Mymensingh section of meter gauge line. There are 18.97km railway line and three railway station in Ishwarganj upazila. There are three railstations, seventeen busstations and one helipad exist here. (Source: Banglapedia)
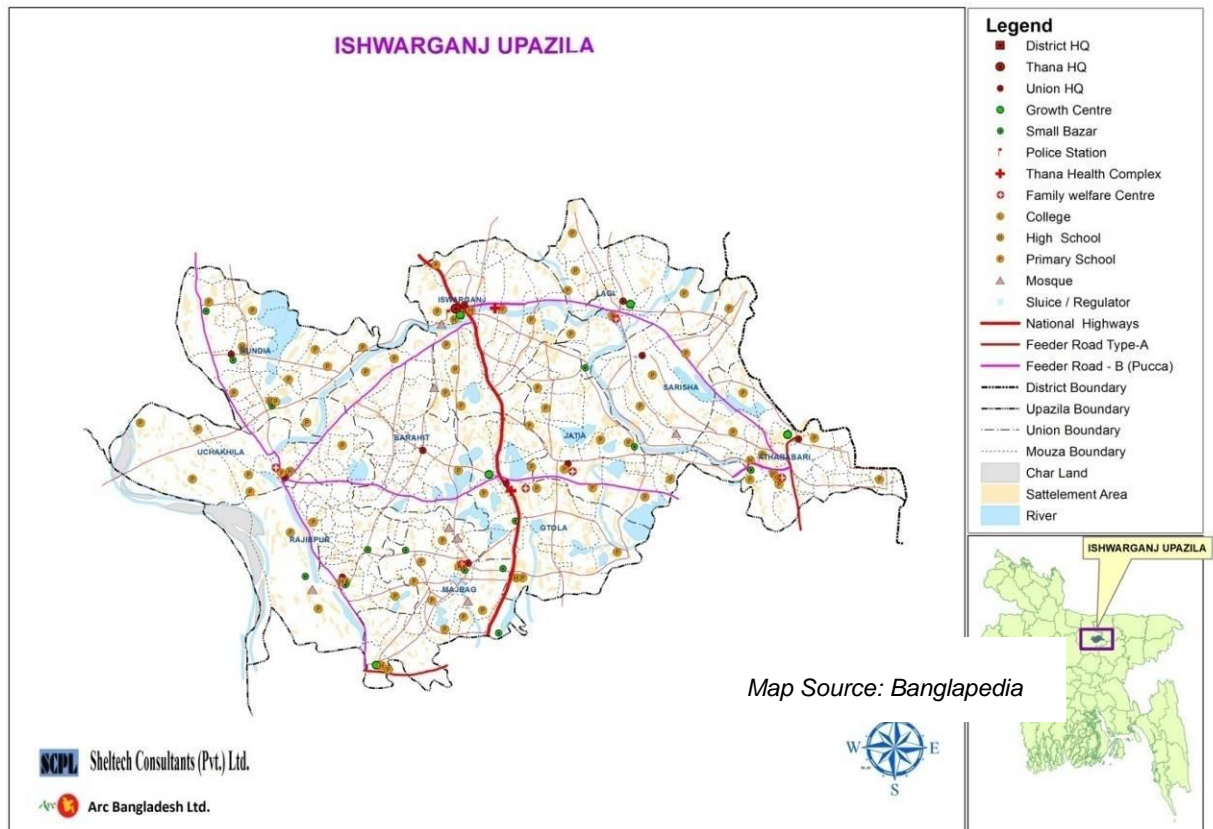
Source: JV of SCPL and ABL, 2015

N.B: Based on SOB, Map

Map 1: Ishwarganj Upazila 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 field 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 Plate3 and the trigger to the data acquisition unit Plate4. 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 in Plate5. 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.
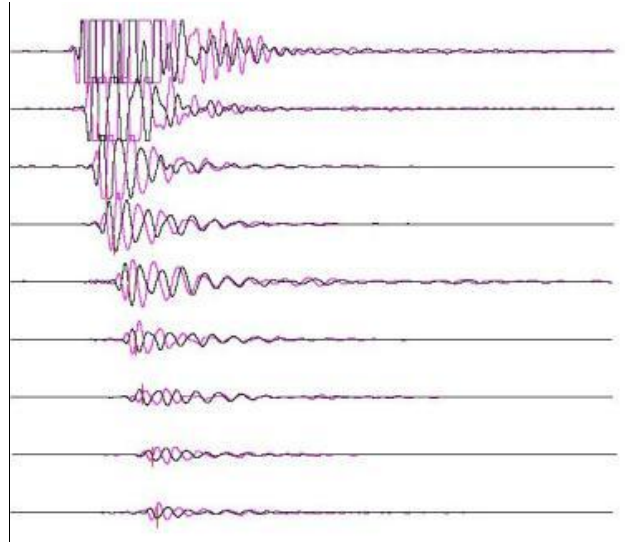
Figure 1: Determination of the Arrival Time of S-Wave

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.
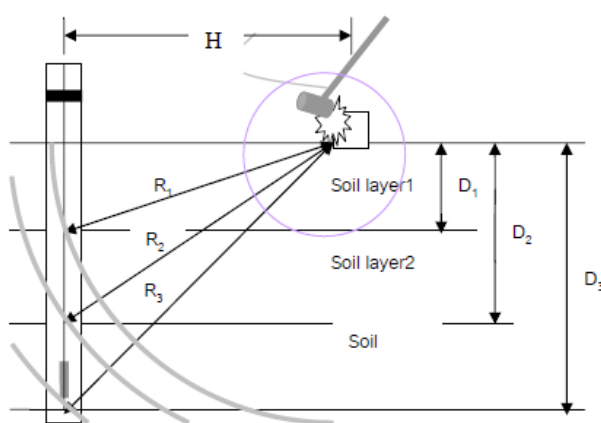
$$t_c = D\frac{t}{R}$$

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 in Table 1.

Table 1: MASW Data Acquisition Parameters

Seismic refraction	
Number of channels	12
Geophone spacing	3m
Array length	33m
Sampling rate	1ms
Record length	2 sec
Natural frequency of Geophone	10 Hz
Source	8 kg hammer
Shot number	13 points, 11 between geophones and 2 outside of measuring line

Source: Park and Miller, 1999; Xia et al. 1999; Miller et al. 1999; Anbazhagan and Sitharam, 2008.

2.2.1. Analysis of MASW

Data processing consists of two main steps: (i) Obtaining the dispersion curves of Rayleigh wave phase velocity from the records; (ii) Determining the V_s profiles from which the Vs30 values are calculated (see figure 3). In the phase velocity analysis, SPAC (Spatial Autocorrelation) method (Okada, 2003) is employed. Okada (2003) shows Spatial Autocorrelation function 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
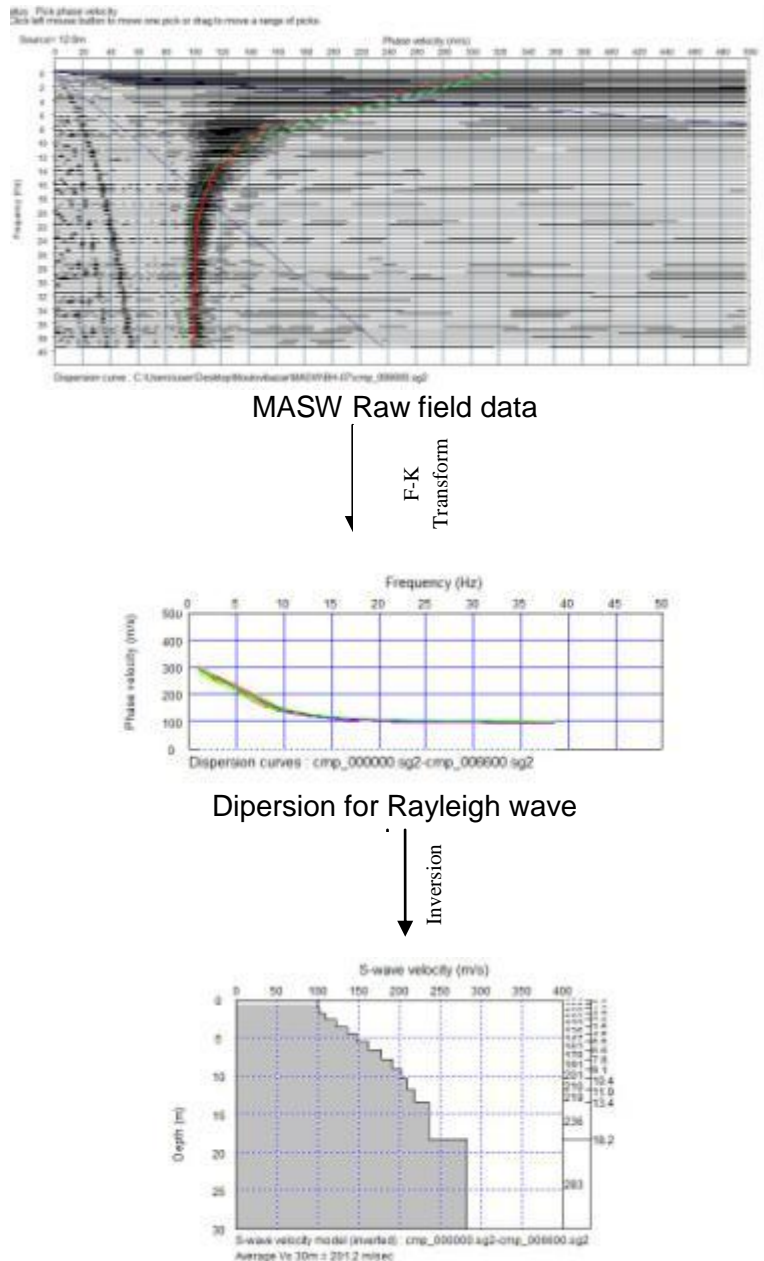
Shear wave velocity profile
Figure 3: Main Step of the MASW Processing Technique

2.3. Test Details and Procedure of Standard Penetration Test

The geotechnical boreholes have been constructed using wash boring method. In this investigation, 30 numbers of boreholes have been prepared at Ishwarganj Upazila. 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.
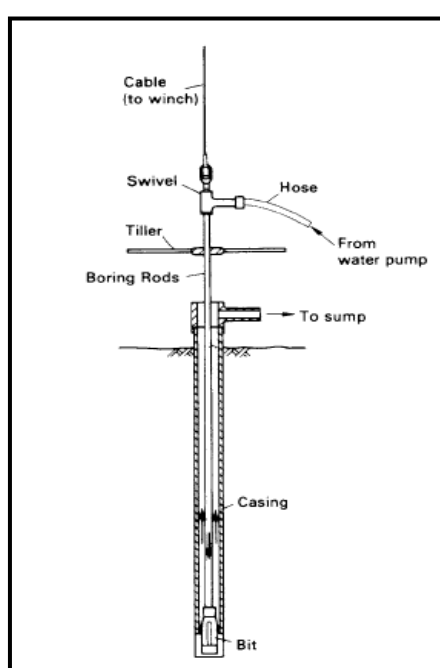
Figure 4: Wash Boring

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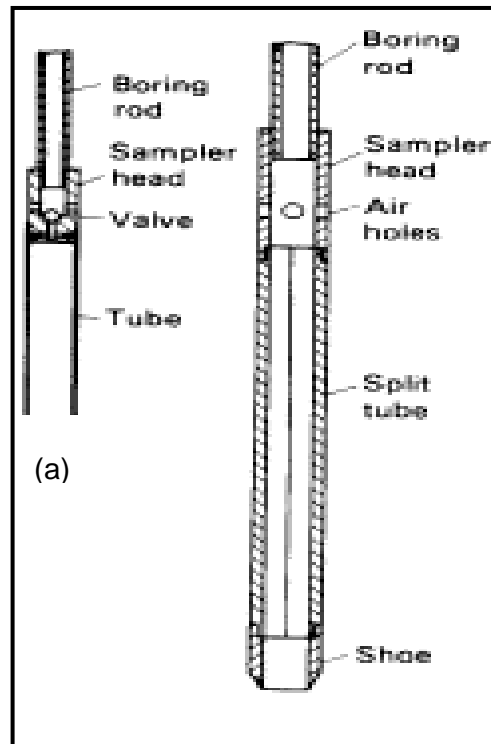
Figure 5: (A) Thin-Walled (Shelby Tube) Sampler, And (B) Split-Spoon Sampler.

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.
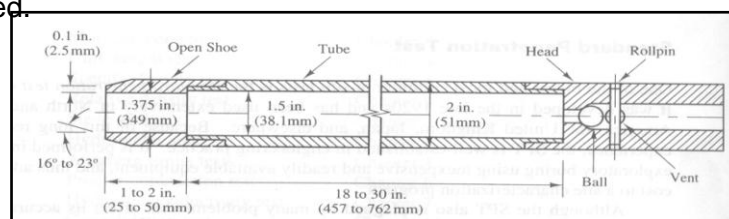
Figure 6: Split-Spoon Sampler.
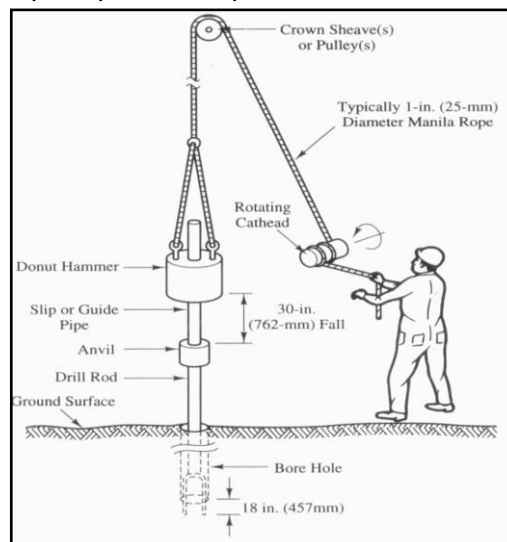
Figure 7: The SPT Sampler In Place In The Boring.

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 ISHWARGANJ 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 Ishwarganj 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 4 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
Ishwarganj	Downhole Seismic Test (PS Logging)	PS-01	Dhohakhola, Kagir Panati	24.708617	90.506458
		PS-02	Uchakhila and Bhangnamari Union boundary	24.669931	90.480714
		PS-03	Chor Nicla uchho Biddaloy, Ishwarganj Sadar	24.63045	90.6106
		PS-04	Near Maijbagh Union Porishod, Maijbagh Union	24.68915	90.60033
	Multi-channel Analysis of Surface Wave (MASW)	MASW Is 01	Maijbagh Bus Stop, Magtala Union	24.5987	90.61471
		MASW Is 02	Mollickpur lokkhiganj uchho Biddaloy, Maijbagh Union	24.63384	90.60931
		MASW Is 03	Atharobari Girls High School, Atharbari Union	24.64428	90.71794
		MASW Is 04	Ishwarganj Degree College, Ishwarganj Sadar	24.6859	90.60021
		MASW Is 05	Near, Uchakhila Union Parishad	24.63065	90.53135

Source: Field Survey, 2016
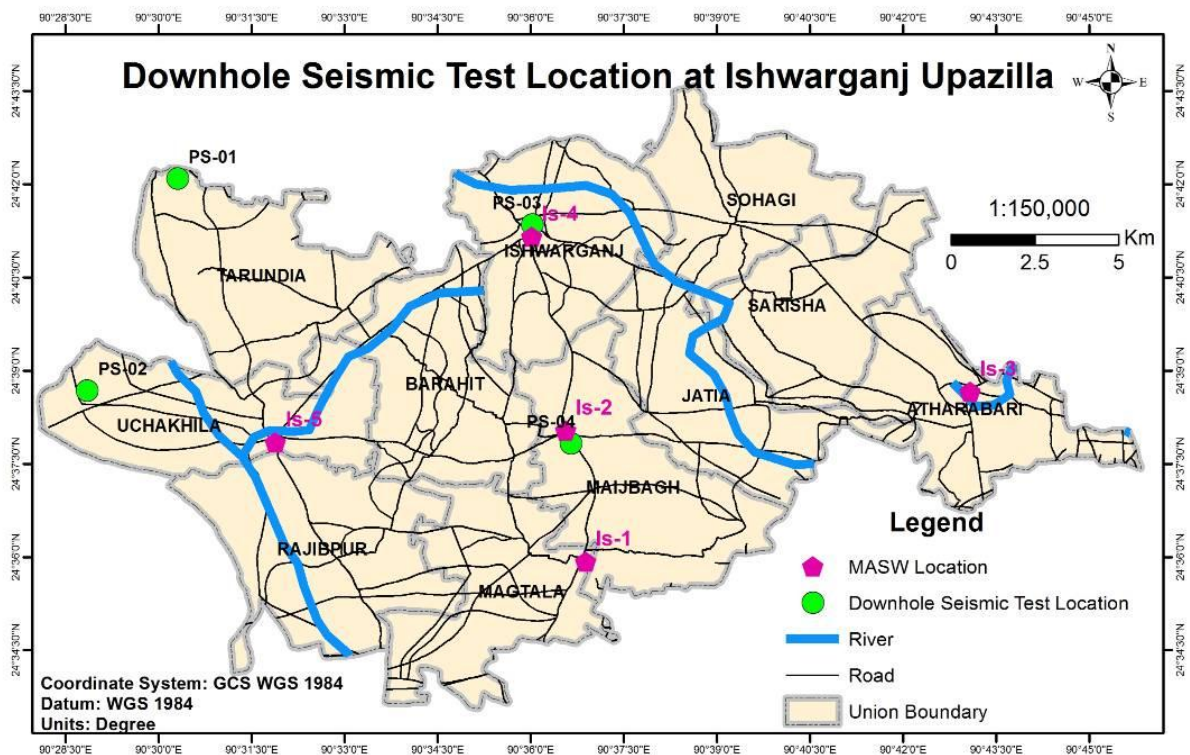
Map 2: Locations Map of the geophysical tests at Ishwarganj Upazila

MASW is 1, Maijbagh Bus Stop, Magtala Union

MASW is 2,Mollickpur lokkhiganj uchho Biddaloy, Maijbagh Union
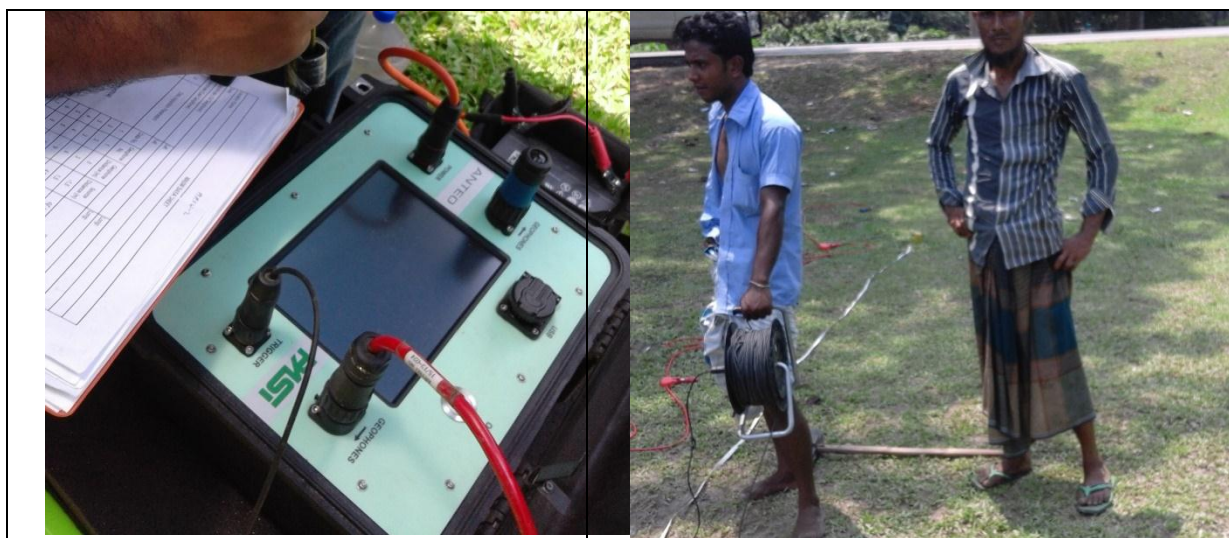
MASW is 3, Atharobari Girls High School, Atharbari Union

MASW is 4, Ishwarganj Degree College, IshwarganjSadar
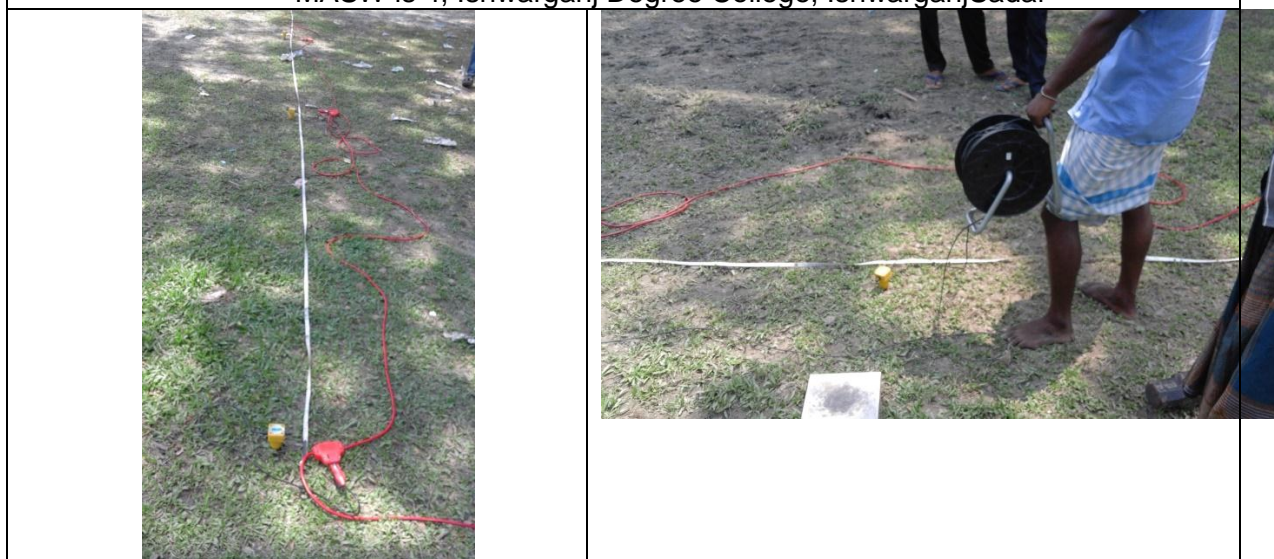
MASW is 5, Near Uchakhila Union Parishad

Plate7: MASW Data Acquisitions at Ishwarganj Upazila

BH-03, Near Maijbagh Union Porishod, Maijbagh Union

BH-20, ChorNiclauchhoBiddaloy, IshwarganjSadar

Plate8: PS logging Data Acquisitions at Iswarganj Upazila

3.1.1. Down-Hole Seismic (PS Logging) Test Results

As a fundamental parameter, shear wave velocity is required to definethe 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 Ishwarganj Upazilla in four different locations on date 26th 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 Ishwarganj Upazilla by 26th August 2016 and field raw data has also been processed and interpreted. According to MASW test result, average shear wave velocity at all locations are above 180 m/s. From those shear wave velocity, it can be saying, the project area is showing moderate soil condition for foundation. The shear wave velocities at soil layer shows gradually increase from 110m/s to 300m/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 3: Summary of MASW Test Results

MASW ID	Average Shear Wave Velocity (Vs 30)
MASW Shib 1	207.1 m/s
MASW Shib 2	203.4 m/s
MASW Shib 3	201.4 m/s
MASW Shib 4	204.2 m/s
MASW Shib 5	199.7 m/s

Source: Field survey, 201

	MASW ID:Is-1 Date: 25.08.2016
	Coordinate : Lat-24.59870 Long-90.61471
	Location: Maijbagh Bus Stop, Magtala Union,Ishwarganj,Narshindhi

Depth	S-Wave Velocity	1D Model
0.00	109.63	
0.54	105.32	
1.15	102.84	
1.85	103.80	
2.64	113.29	
3.50	128.83	
4.45	146.37	
5.48	161.90	
6.59	178.46	
7.79	193.99	
9.07	208.05	
10.43	223.86	
11.87	240.02	
13.39	273.14	
18.21	290.62	

S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2
Average Vs 30m = 207.1 m/sec

2D Model

		MASW ID: Is-2Date: 25.08.2016

Coordinate : Lat-24.63384   Long-90.60931

Location: MollickpurlokkhiganjuchhoBiddaloy, MaijbaghUnion,Ishwarganj,Narshindhi

Depth	S-Wave Velocity	**1D Model**
0.00	108.82	
0.54	105.95	
1.15	103.63	
1.85	102.98	
2.64	108.25	
3.50	122.11	
4.45	138.45	
5.48	154.67	
6.59	170.81	
7.79	188.56	
9.07	203.78	
10.43	218.62	
11.87	236.27	
13.39	267.20	
18.21	291.25	

S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2
Average Vs 30m = 203.4 m/sec

2D Model

MASW ID: Is-3Date: 25.08.2016
Coordinate : Lat-24.64428   Long-90.71794
Location: Atharobari Girls High School, Atharbari Union,Ishwarganj,Narshindhi

Depth	S-Wave Velocity	1D Model
0.00	102.71	
0.54	101.49	
1.15	99.43	
1.85	101.08	
2.64	109.18	
3.50	123.05	
4.45	137.58	
5.48	153.25	
6.59	170.52	
7.79	187.82	
9.07	207.19	
10.43	223.27	
11.87	241.10	
13.39	270.78	
18.21	283.80	

S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2
Average Vs 30m = 201.4 m/sec

2D Model

MASW ID: Is-4 Date: 25.08.2016
Coordinate : Lat-24.68590Long-90.60021
Location: Ishwarganj Degree College, Ishwarganj Sadar,Ishwarganj, Narshindhi

Depth	S-Wave Velocity	1D Model
0.00	103.89	
0.54	102.19	
1.15	99.97	
1.85	100.12	
2.64	107.13	
3.50	122.86	
4.45	140.97	
5.48	158.01	
6.59	176.75	
7.79	192.48	
9.07	205.08	
10.43	217.07	
11.87	230.37	
13.39	257.79	
18.21	304.07	

S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2
Average Vs 30m = 204.2 m/sec

2D Model

S-wave velocity cross-section

MASW ID: Is-5 Date: 25.08.2016		
Coordinate : Lat-24.63065 Long-90.531345		
Location: Near Uchakhila Union Parishad, Ishwarganj, Narshindhi		

Depth	S-Wave Velocity	1D Model
0.00	110.75	
0.54	107.00	
1.15	104.20	
1.85	103.03	
2.64	107.90	
3.50	121.13	
4.45	138.36	
5.48	155.09	
6.59	169.42	
7.79	182.46	
9.07	194.39	
10.43	205.18	
11.87	216.81	
13.39	240.26	
18.21	297.49	

S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2
Average Vs 30m = 199.7 m/sec

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 30 points at Ishwarganj Upazila.
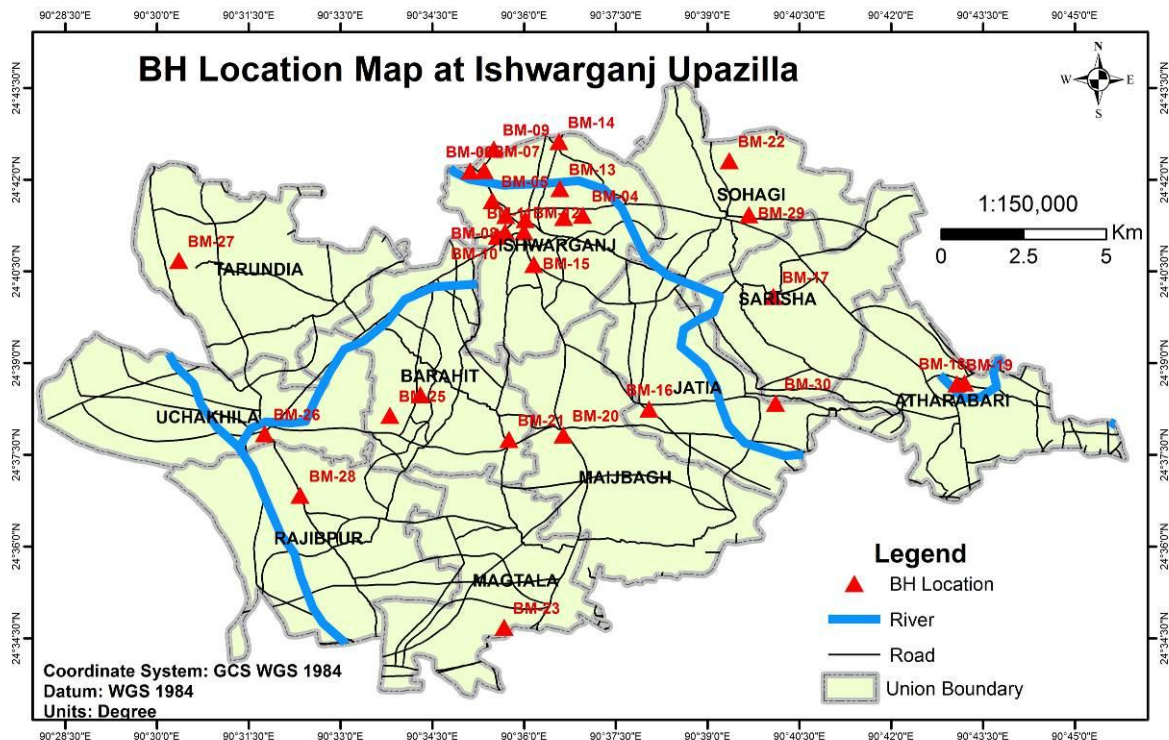
Map 3: Locations Map of the Standard Penetration tests (SPT) at Ishwarganj Upazila

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.

All the borings has to be conducted and preparation of field bore log by visual classification has to be done in the presence of the experienced technical personnel. The borehole

records have to be taken that include soil type, nature of sample, soil moisture content and consistency, SPT blow counts (N Value), ground water observation and apparent origin (fill, alluvium, recent sediments, etc.) and daily field logs have been prepared. The bore locations are given in following table 5 and the geotechnical borehole log are enclosed in the below section.

Table 4: Bore Hole Information Summary at Ishwarganj Upazila

BH ID	Location	Lat	Long
BM-01	Ishwarganj Upazila	24.690228	90.595044
BM-02	Ishwarganj Hospital	24.689658	90.610756
BM-03	Char Nikhla High School	24.689122	90.600283
BM-04	KakonHati Primary School	24.690264	90.615931
BM-05	Ishwarganj Paurashava	24.694250	90.591333
BM-06	Dattapara Zobeda Ali Primary School	24.702375	90.585289
BM-07	Simrail Primary School	24.702500	90.589128
BM-08	In front of hasem Member	24.690228	90.595044
BM-09	Front of Sattar Commander	24.708300	90.591764
BM-10	Ishwarganj Thana	24.684556	90.592722
BM-11	Ishwarganj Court	24.685722	90.594833
BM-12	Ishwarganj Degree College	24.685786	90.599953
BM-13	Dhamdi Primary School	24.697514	90.609764
BM-14	AbulKhalek Primary School	24.710364	90.609481
BM-15	Ishwarganj Union Parishad	24.676828	90.602633
BM-16	Jathia Union Parishad	24.637475	90.634019
BM-17	Sarisha Union Parishad	24.668142	90.667864
BM-18	Atharobari Union Parishad	24.644572	90.720017
BM-19	Atharobari Girls High School	24.644289	90.717947
BM-20	Maizbag Union Parishad	24.630425	90.610658
BM-21	Sahinbag	24.629181	90.595864
BM-22	Charpara	24.705167	90.655844
BM-23	Mogtola	24.577944	90.594556
BM-24	Barohit Union Parishad	24.641358	90.571697
BM-25	Barohid Primary School	24.635722	90.563444
BM-26	Uchakhila Union Parishad	24.630722	90.529278
BM-27	Tarundia Union Parishad	24.677944	90.505944
BM-28	Rajibpur	24.613944	90.538972
BM-29	Sohagi Union Parishad	24.690444	90.661222
BM-30	Sarisha Primary School	24.639056	90.668444

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

_____

Ref: SCPL-ABL/UDD/2016/ Geological Survey Report/Ishwarganj 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 Ishwarganj Upazila, Mymensingh.

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

Thanking you and assuring you of our best services.

Your Sincerely,

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

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CHAPTER-04

Conclusion

Geologically and geo-morphologically Ishwarganj Upazila and its adjoining areas is mostly comprises by monotonous flood plain area except few depression and very homogeneous in their soil quality that's why geological, geotechnical and geophysical investigations has been carried out along whole area to cover all morphological unit. 30 boreholes with SPT, 4 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

Physical feature Survey, Land Use Survey
Topographic Survey and Photogrammetry Works
of
Ishwarganj Upazila, Mymensingh

August, 2016

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

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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

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

_____

Ref: SCPL-ABL/UDD/2016/ Final Survey Report/Ishwarganj 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 Survey Report (Draft) of Ishwarganj Upazila, Mymensingh.

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

Thanking you and assuring you of our best services.

Yours Sincerely,

(Dr. Nurul Islam Nazem)   (Md. Shamim Hasan)   (Shahina Akhter)
Team Leader, Package -2   Survey Expert, Package -2   Photogrammetry 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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1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
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EXECUTIVE SUMMARY

Visionary planning is the first step towards optimal utilization of resource. Land use planning is particularly important as "land" is the basic resource which embraces all the natural and man-made resources. The project on "Preparation of Development Plan for Fourteen Upazilas" is the outcome of such effort in Bangladesh which will promote well organized development and use of land to ensure a balanced economic growth and reduce abuse of limited natural resources that are attached to land.

The development of urban centre at local level can be done only when they are linked with national development plans. Isolated infrastructure development and expansion will fail to achieve ultimate goals of planned physical development. Hence proposals will have to be tailored to the basic national strategies related to poverty alleviation, disaster management and MDGs.

Ishwarganj is an upazila of Mymensingh district in the division of Mymensingh, Bangladesh. It is bounded by Gauripur Upazila to the north, Nandail to the south, Kendoua to the east and Trisal Upazila to the west. It is 147 km away from Dhaka. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Ishwarganj upazila, based on stereo satellite imagery through photogrammetric technology.

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.

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.

Physical Feature Survey 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.

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.

Chapter-01: Introduction

1.0   Background

Ishwarganj is an upazila of Mymensingh district in the division of Mymensingh, Bangladesh. It is bounded by Gauripur Upazila to the north, Nandail to the south, Kendoua to the east and Trisal Upazila to the west. It is 147 km away from Dhaka. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey in Ishwarganj 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**, Ishwarganj 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**.
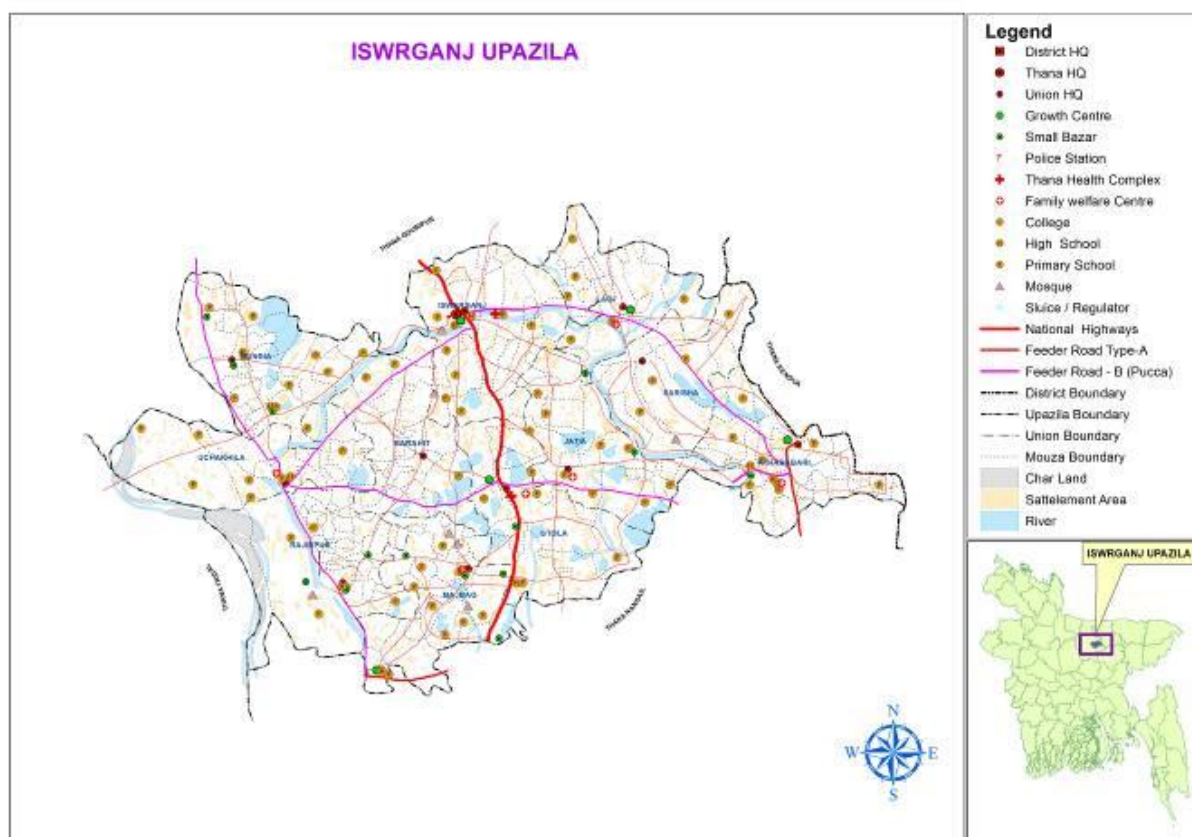
M**ap 1.1: Project area map of Ishwarganj Upazilla**

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**:

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Collection of Mauza Maps
from DLRS

Scanning of Mauza Maps
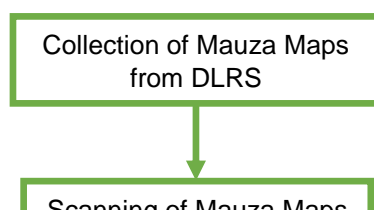
Figure-2.1: Flow Diagram for Preparation of GIS Database using RS Mauza Map

2.1.1   Collection of Mauza Maps

All the mauza maps covering the entire project area have been collected by the Consultant from DLRS office. The mauza sheets having distortion due to rapping or pasting cloths/tape were avoided during collection of mauza maps.

Table-2.1: Mauza Maps Collection from DLRS

Upazila	Mauza Version	Mauza Maps		Collection Percentage
		Total No. of Sheet	No of Collected Sheet	
Ishwarganj	RS	364	364	100%

2.1.2   Approval of Collected Mauza Maps for Scanning and Digitization

After collection of mauza maps of Ishwarganj 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**	
Ishwarganj	364	364	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 Arc Map'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.
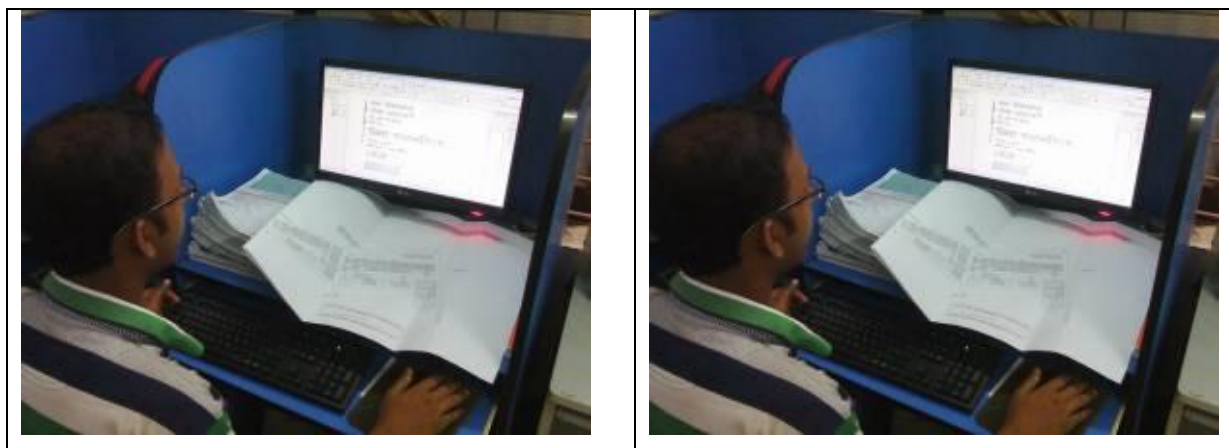
Figure 2.3: On Screen Digitization and Sample Digitized Mauza Map

Table-2.5: Status of Digitizing of Mauza Map

Upazila	Mauza Maps		Digitization Percentage
	Total No. of Mauza Sheets	**Total No of Digitized Sheets**	
Ishwarganj	364	364	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 Arc GIS. 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

Geo-referencing is the process of establishing real world coordinates or geographical coordinates of certain points of the map (at least 4 points) with great accuracy while the remaining points are calculated automatically, based on transformation formulas.

In addition to GCP survey for geo-referencing mauza maps, Ortho-rectified satellite image of the study area has been used as a control layer. This layer contains a rich source of real world coordinates, because it is derived by aerial triangulation of stereo images in photogrammetric environment and later Ortho-rectified by the generated DEM of the area. It should be noted here that a required number of GCPs were acquired through RTK-GPS/DGPS method for the process of Aerial Triangulation that is a pre-requisite for photogrammetric works.

The Coordinate System used for both GCP and Ortho-rectified satellite image is the **Bangladesh Universal Transverse Mercator (BUTM2010)** which is established by the national mapping agency **Survey of Bangladesh (SoB)**. The parameters of BUTM 2010 are as below:

Spheroid   : WGS 1984

Datum   : WGS 1984

Unit   : Meters

False Easting   : 500000

False Northing   : 0.0

Central Meridian   : 90.0

Scale Factor   : 0.9996

Latitude of Origin: 0.0

Since, we can pick real world coordinates (Easting, Northing) of any point on the Ortho-rectified satellite image, geo-referencing of 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.
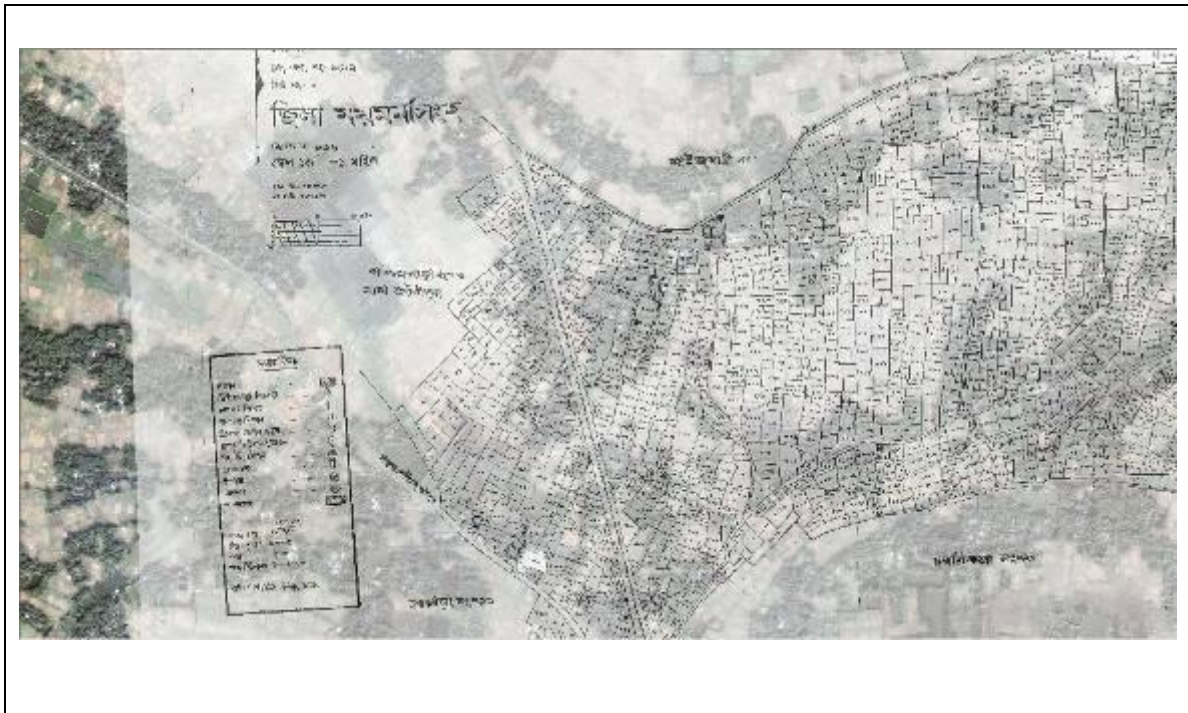
Figure-2.4: Sample Geo-referenced Raster Mauza Map Overlaid on Satellite Image

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 was applied. Total RMS error was kept within 0.5/1.5 meter i.e. within 1 to 3 pixels of the satellite image. Thus individual sheet of the mauza maps get properly geo-referenced. Finally, permanently geo-referenced images of mauza maps have been created by using 'Rectify' tool of Arc Map.

2.1.8 Geo-referencing of Vector Mauza Map

After geo-referencing of scanned image of mauza maps (raster mauza maps), geo-referencing 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 geo-referenced raster mauza map sheet. The Spatial Adjustment Tools of Arc Map 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.
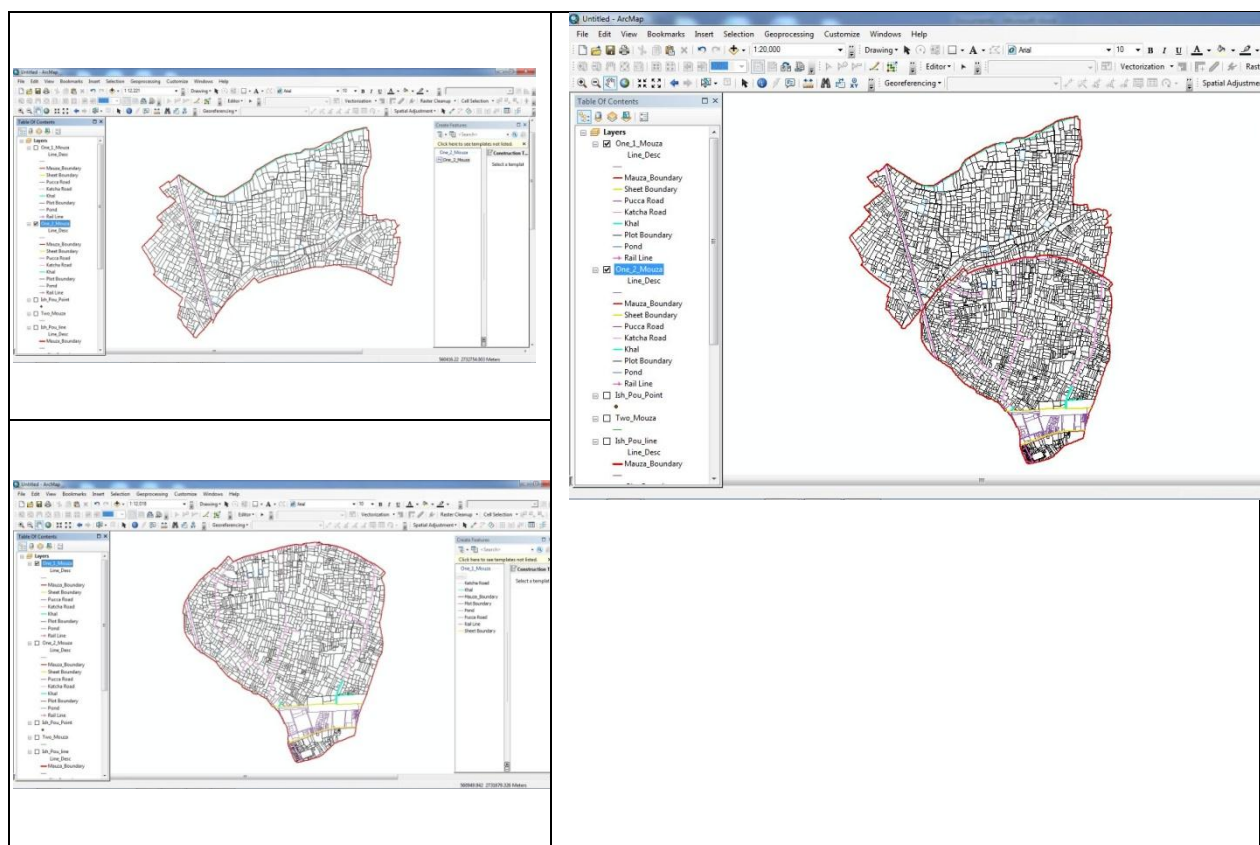
Figure-2.5: Sample Diagram of Edge-matching

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 mosaicing, 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 with merged Mauza map of Ishwarganj Upazila is shown in **Map 1.1.**

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 Arc GIS such as Dissolve, Erase, Intersect, Spatial Join, etc.

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. 15 BM pillars have been established in Ishwarganj Upazila. The network establishment for the survey comprises the 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.

Map 2.1: Merged Mauza Map of the Ishwarganj Upazila
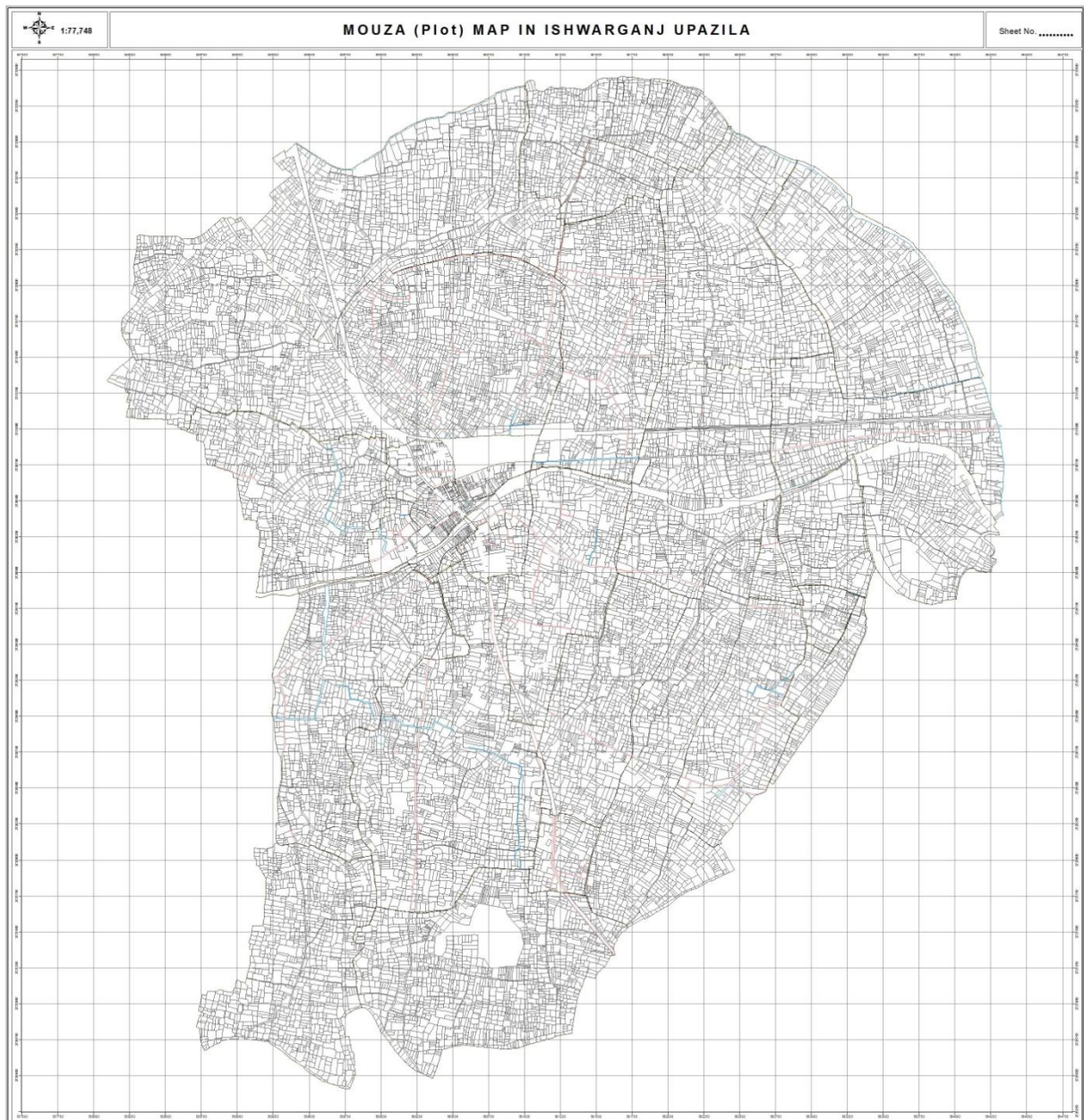
2.2.2 Design of Pillars

BM pillars in the Study area have been constructed according to the design supplied by UDD. The approved design sheet appears at **Figure-2.5.**
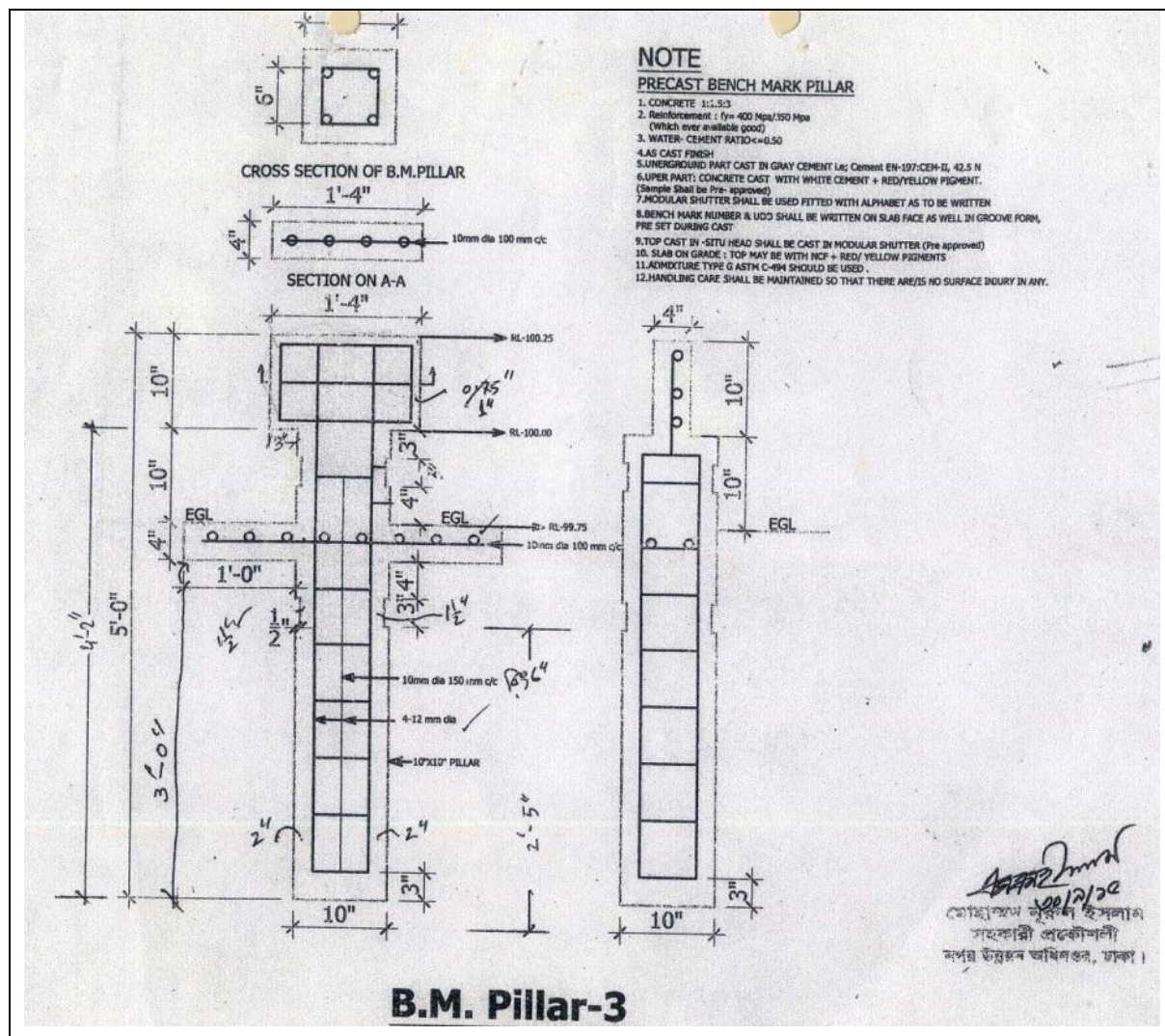
Figure-2.6: Design of BM Pillar

2.2.3   Construction of BM Pillars

Ishwarganj Upazila is covered by 15 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 GPS 2227, GPS 5380 and GPS 5386 of Survey of Bangladesh (SoB) as reference BM pillar in Ishwarganj Upazila. The information of Reference BM Pillars has been collected from Survey of Bangladesh.

Plate-2: Reference BM Pillar (GPS-5380) of SoB in Ishwarganj 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	GPS 2227	24°37''55.58164''	90°43'05.68096''	8.6030	The pillar is situated in the compound of Atharabari Model Primary School. It is 38 meter west from kishoreganj-kendua road and north – west corner of a tank. Vill: Atharabari, Upazila: Ishwarganj, District: Mymensingh
2	GPS 5380	24°41'28.56224''	90°35'54.44765''	11.2571	The pillar is situated in north-east corner of the playground of Charoni Kholapourasabha. It is 30ft. West from idgha mimbar. Vill: Charonikhola, Upazila: Ishwarganj, District: Mymensingh

| 3 | GPS 5386 | 24°37'28.18207'' | 90°36'23.56232'' | 10.2946 | The pillar is situated in south-east corner of the field of Charshangkr primary School. It is 25m east from west side road.

Vill: Charshangkr,
Upazila: Ishwarganj,
District: Mymensingh. |

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.

The GPS Survey Team has conducted survey by RTK/DGPS methods. The Base station has been established by connecting to the Reference BM (GPS 2227 and GPS 5380 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 15 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. The location of BM's, photographs and its x, y and z values are given in **Table-2.7** and location of BM pillars are given in **Map-2.2**.
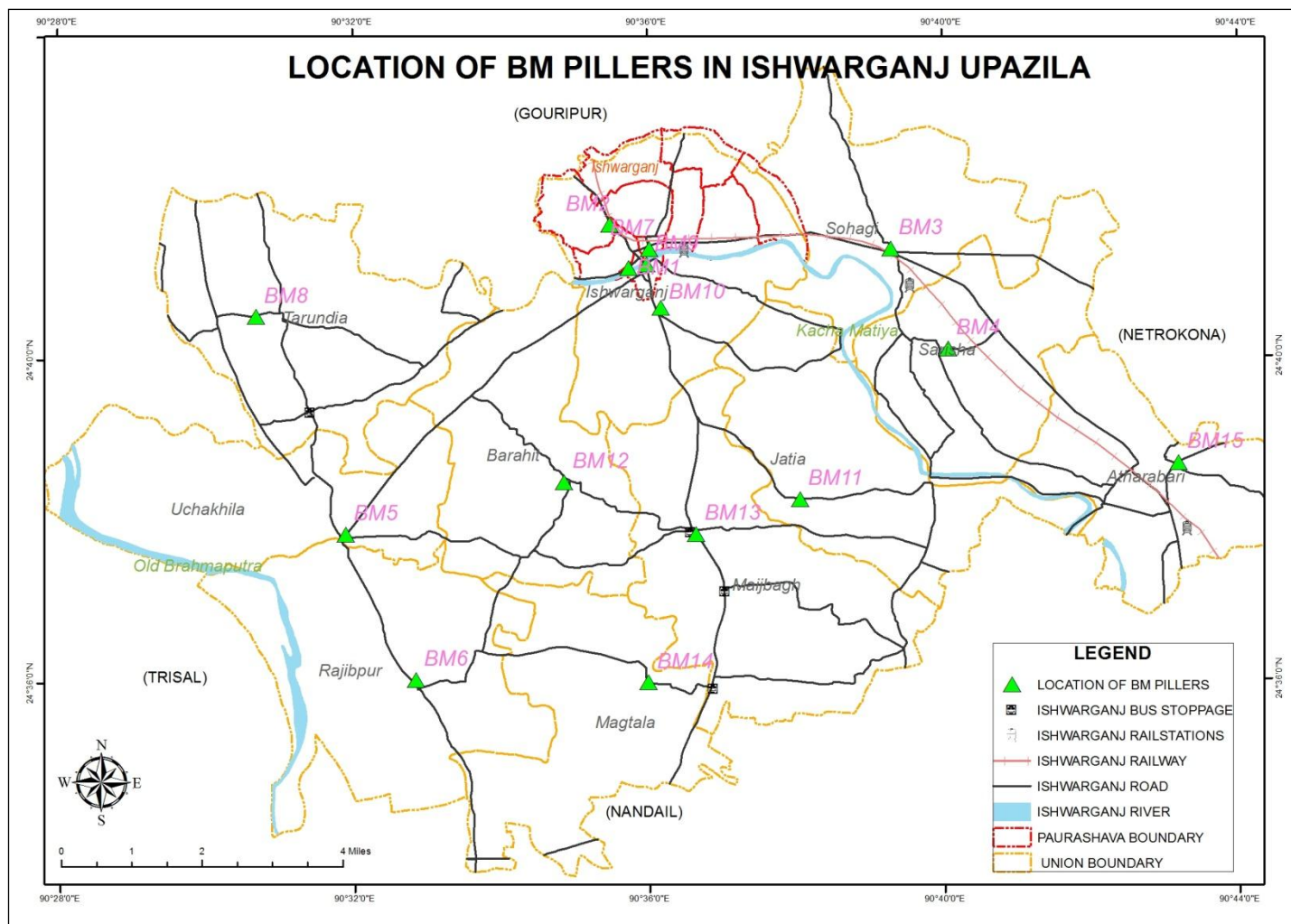
Map-2.2: Location of BM Pillars in Ishwarganj Upazil

Table-2.7: Photographs and Descriptions of the BM Pillars

BM No.	Location	BM Photo	Description
1	The pillar is situated in the compound of Bisseswari pilot high school near to the Headmaster room.		**Latitude:** 24:41:06.76553N **Longitude:** 90:35:44.36683E **RL:** 10.3601
2	The pillar is situated in the compound of Ishwarganj Paurashava near to the UTIDP BM piller.		**Latitude:** 24:41:38.75080N **Longitude:** 90:35:29.05259E **RL**: 11.3777
3	The pillar is situated in the compound of Shohagi Union Complex		**Latitude:** 24:41:20.44735N **Longitude:** 90:36:10.30825E **RL:** 11.9418
4	The pillar is situated in the compound of Sarisa Union Parishad Complex		**Latitude:** 24:38:14.50991N **Longitude:** 90:38:03.14656E **RL:** 11.4425

BM No.	Location	BM Photo	Description
5	The pillar is situated in the compound of Uchakhila Primary school, High school and college near to the left side of the entrance gate.		**Latitude:** 24:37:49.54853N **Longitude:** 90:31:53.33381E **RL:** 13.2045
6	The pillar is situated in the infront of Rajibpur UP Complex		**Latitude:** 24:36:01.16159N **Longitude:** 90:32:50.11218E **RL:** 13.258
7	The pillar is situated in the compound of Char Nikhla Primary School near to the teacher's room.		**Latitude:** 24:41:20.44735N **Longitude:** 90:39:17.76536E **RL:** 10.4904
8	The pillar is situated in the infront of Tarundia UP Complex		**Latitude:** 24:41:20.73952N **Longitude:** 90:36:01.38990E **RL:** 11.8495

BM No.	Location	BM Photo	Description
9	The pillar is situated in the in front of Ishwarganj Degree college Market		**Latitude:** 24:41:09.21641N **Longitude:** 90:35:58.98378E **RL:** 13.376
10	The pillar is situated in the compound of Ishwarganj UP Complex near to the chairman room.		**Latitude:** 24:35:58.67165N **Longitude:** 90:35:59.35103E **RL:** 11.94
11	The pillar is situated in the compound of Jatia Up Complex		**Latitude:** 24:40:05.87629N **Longitude:** 90:40:04.05555E **RL:** 9.5708
12	The pillar is situated in the compound of Barahit UP Complex		**Latitude:** 24:38:27.71054N **Longitude:** 90:34:51.19286E **RL:** 11.6134

BM No.	Location	BM Photo	Description
13	The pillar is situated in the compound of Maijbagh UP Complex		**Latitude:** 24:37:48.80864N **Longitude:** 90:36:38.58429E **RL:** 11.956
14	The pillar is situated in the compound of Magtula UP Complex near to unused tube well.		**Latitude:** 24:40:31.46763N **Longitude:** 90:30:40.88091E **RL:** 20.2264
15	The pillar is situated in the compound of Atharobari UP Complex		**Latitude:** 24:38:40.61267N **Longitude:** 90:43:11.46543E **RL:** 13.35

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

.2.3 Data Acquisition & Processing

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-3: 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 Ishwarganj Upazila has been divided into 5720 grids and survey base maps have been prepared based on these grids. The base maps have been printed on A4 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-2.6** and Grids with photogrammetric data and satellite image is shown in **Figure-2.7.**

A sample base map comprising photogrammetric data and satellite image is shown in **Map-2.2** and photogrammetric data with mauza map is shown in **Map-2.3**.
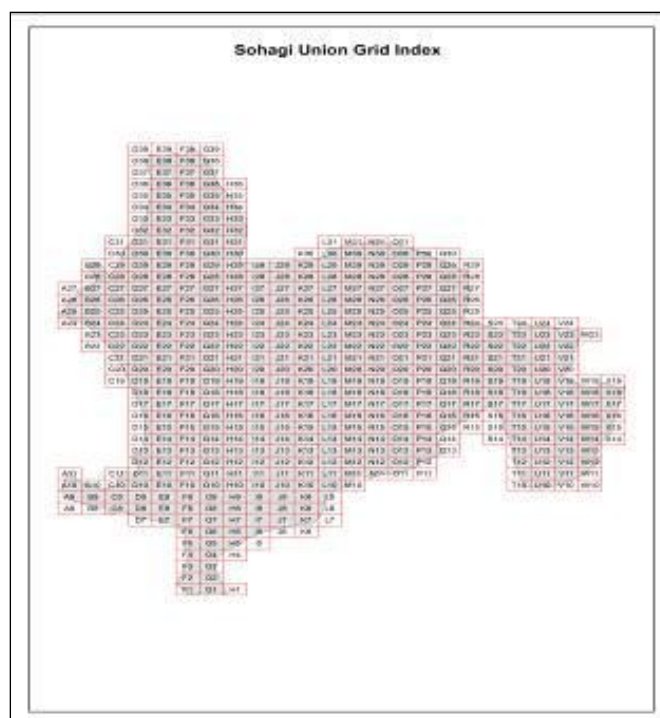
Figure-2.7: Grids for Survey Base Maps of Ishwarganj Upazila (Sohagi Union)
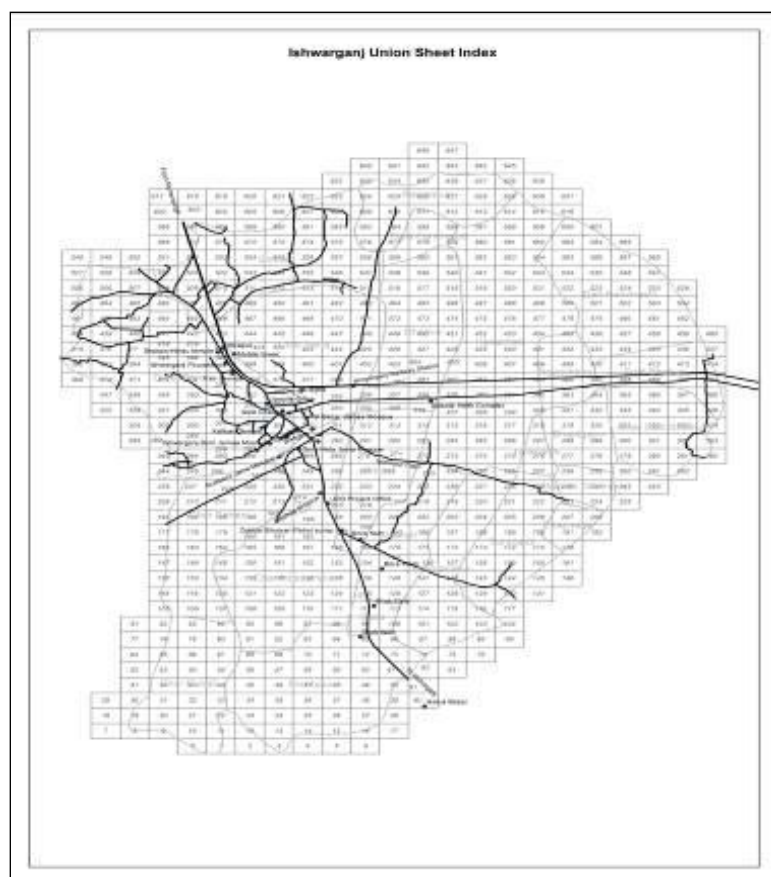
Figure-2.8 Grids for Survey Base Maps of Ishwarganj Paurashava

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-II**. 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

2.3.4 Topographic Features Extraction from Satellite Image

After initial image processing and building up of stereo models, extraction of topographic features has been done by a team of skilled photogrammetrists. Digital Photogrammetry 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 Arc GIS 10.2 of ESRI has been used for topographic data storing and editing.

Topographic features that have been extracted by Digital Photogrammetry are as below:

i.   DTM Point Extraction

ii.   Break-lines Extraction

iii.   Water bodies extraction

iv.   Generation of DEM/TIN

The Photogrammetric Expert and the GIS Expert has monitored the feature extraction works examine the topographic features for their proper registration.

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 2.8**
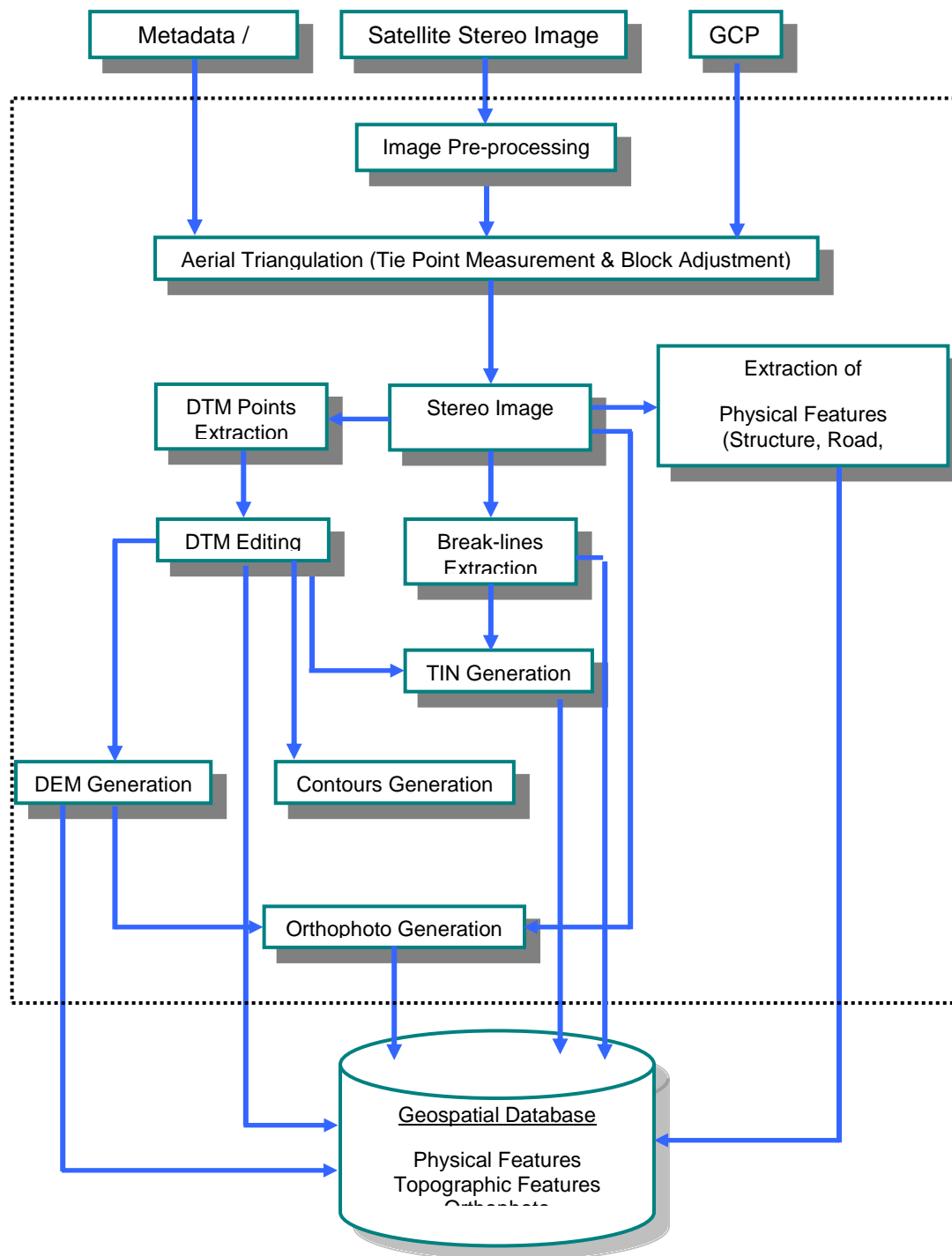
Figure-2.9: Workflow of Stereo Satellite Image Processing and Data Extraction

2.4.1 Image Collection

The satellite image was ordered to PCI India. the authorized reseller/partner of Airbus. 0.5 meter stereo pair image has been purchased by the Consultant for Ishwarganj. The specifications of the purchased satellite image are as below:

For **Town Area** of Ishwarganj Upazila:

    Image Sensor : **Pléiades 1A**

    Type   : Ortho ready stereo (3D)

    Resolution   : 0.5m Panchromatic, 2.0 meter Multispectral

    Source   : New Acquisition, 15th December 2015

    Total Area   : 100 Sq. km.

    Bit Rate   : 16 Bit

    Company   : Airbus Defence and Space

For **Rural Area** of Ishwarganj Upazila:

    Image Sensor : **Pléiades 1A**

    Type   : Ortho ready stereo (3D)

    Resolution   : 0.5m Panchromatic, 2.0 meter Multispectral

    Source   : New Acquisition, 15th December 2015

    Total Area   : 100 Sq. km.

    Bit Rate   : 16 Bit

    Company   : Airbus Defence and Space

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-2.9** 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-2.10** shows the merged satellite image with color and contrast balance.
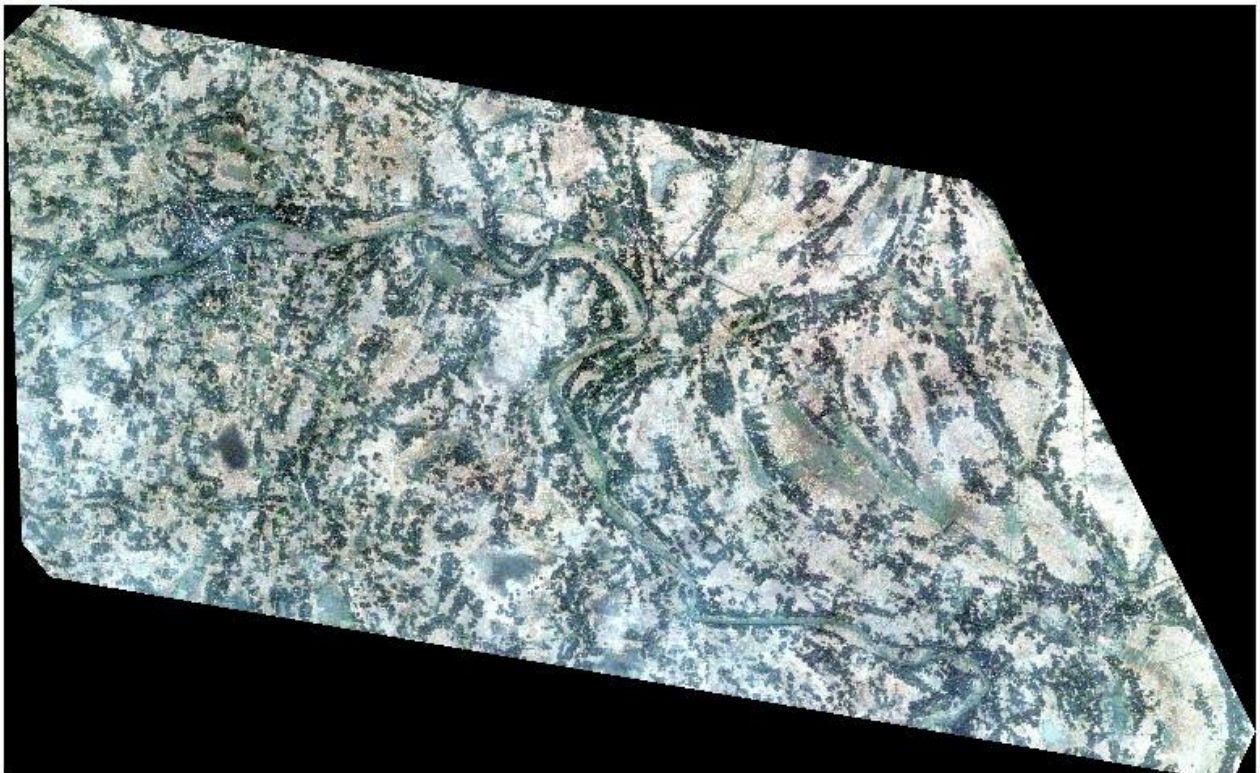
Figure-2.10: Tiles of satellite image without color and contrast balance
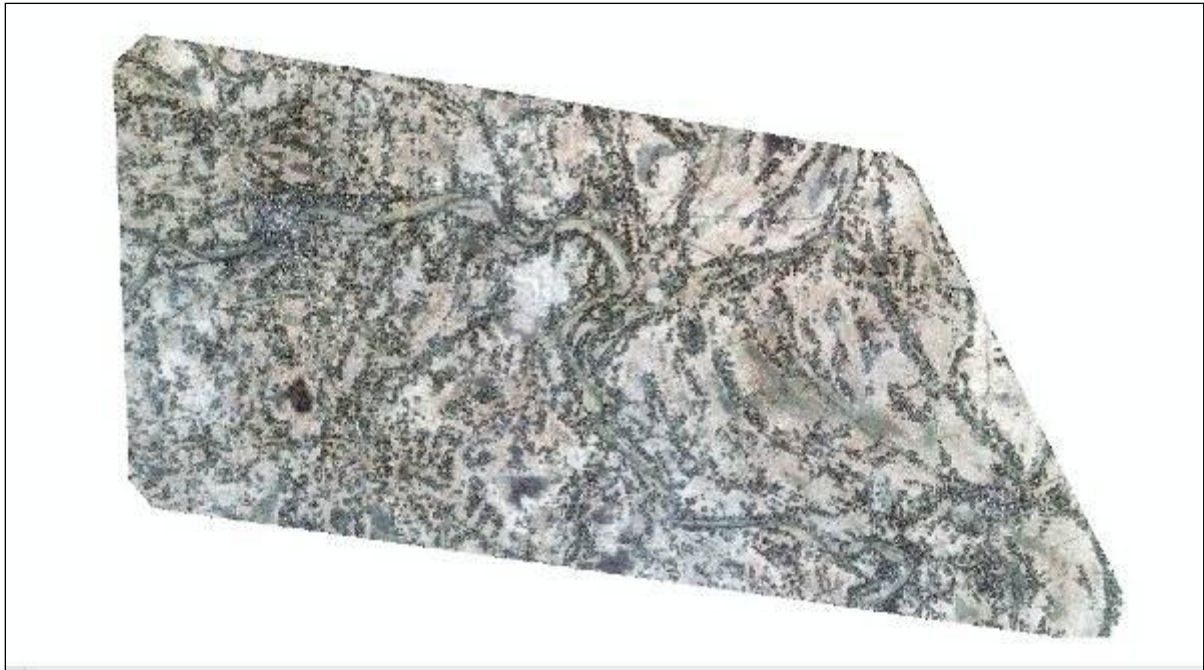
Figure-2.11: Merged satellite image with color and contrast balance

Figure-2.12: Satellite Image Multispectral Image 2.0 meter

Figure-2.13: Satellite Image Panchromatic 0.5 meter

Figure-2.14: 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 10.2of ESRI has been used for vector data storing and editing.
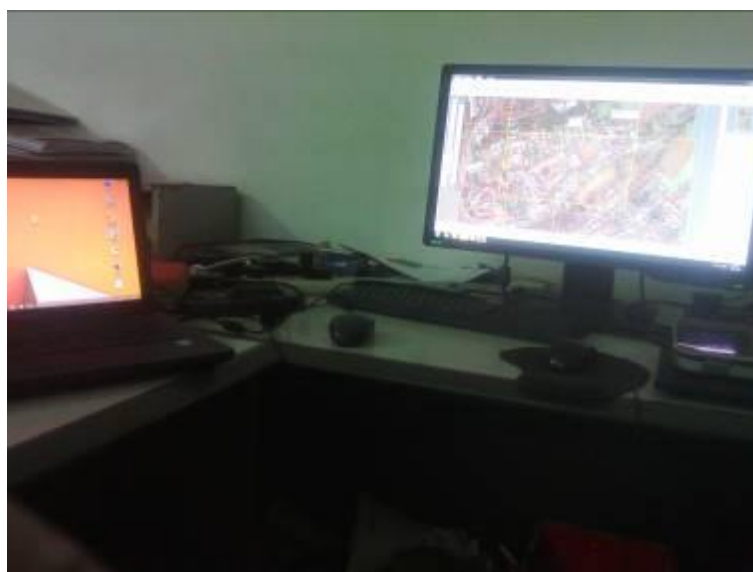
Plate-4: Digital Photogrammetric Workstation (DPW)

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 2.14** and **Figure 2.15** shows the extracted features of Ishwarganj Upazila at a glance.

Plate-5: Photogrammetrist Extracting Features in DPW
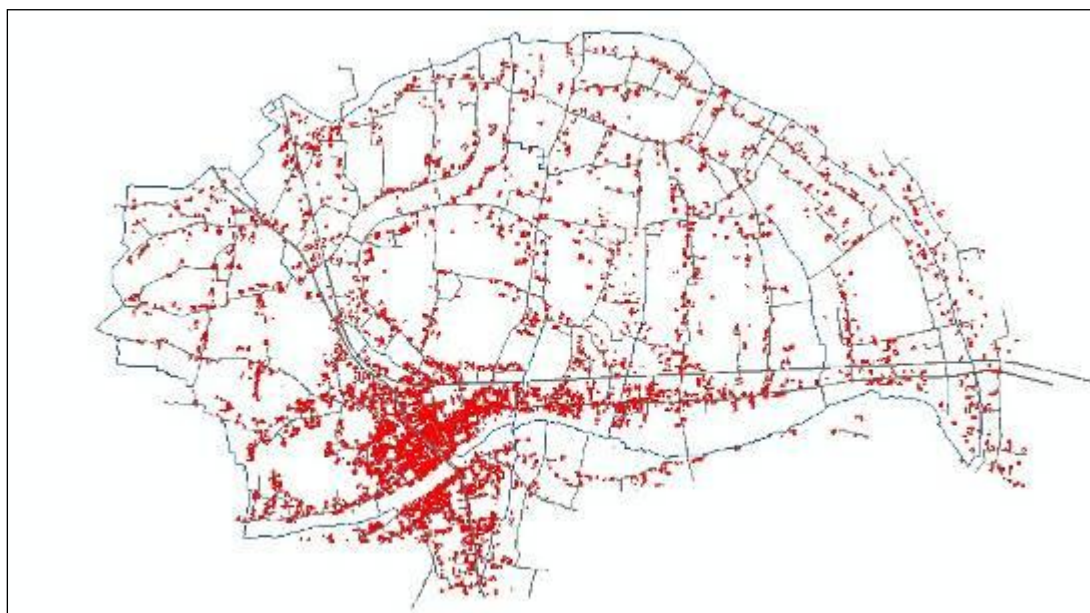
Figure-2.15: Extracted Features of Entire Ishwarganj Upazila by Photogrammetry
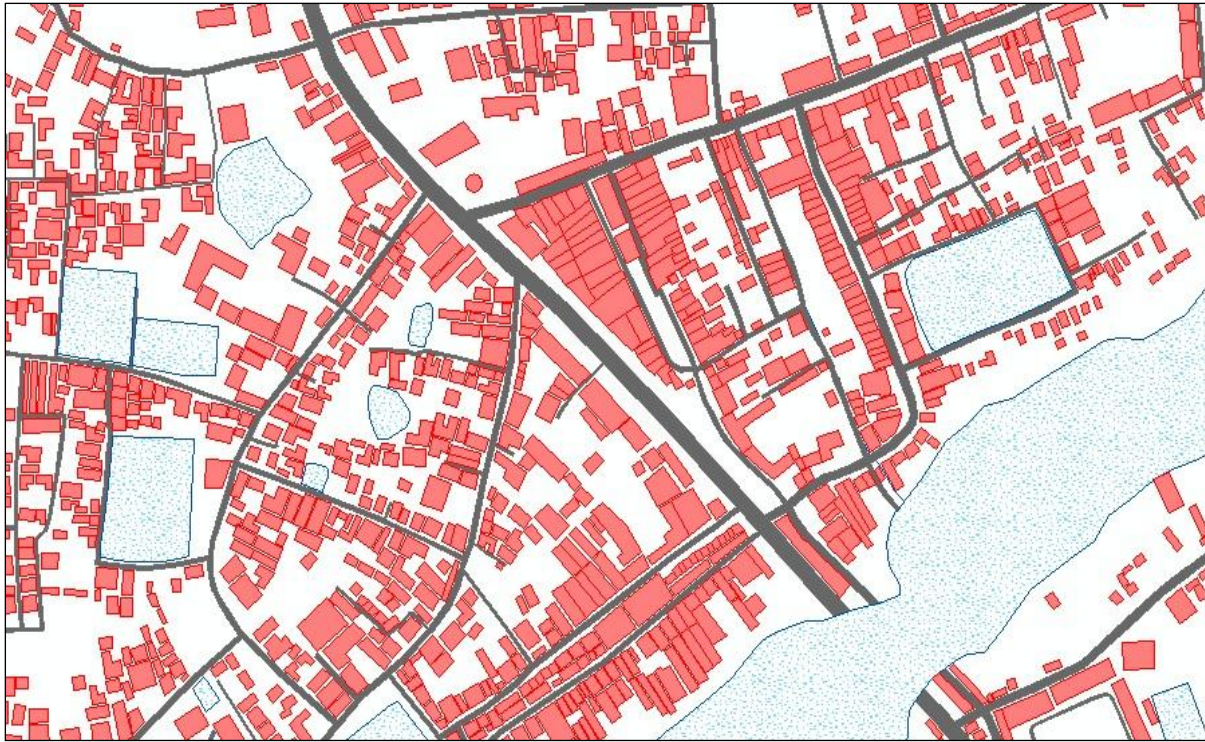
Figure 2.16: Enlarged Partial View of Extracted Features of Ishwarganj

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.

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-2.16 shows a part ortho-rectified satellite image of Ishwarganj Upazila.

Figure 2.17: Ortho-Rectified Image of Ishwarganj 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	Bachelor of Geography and Environment	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 Ishwarganj 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**.
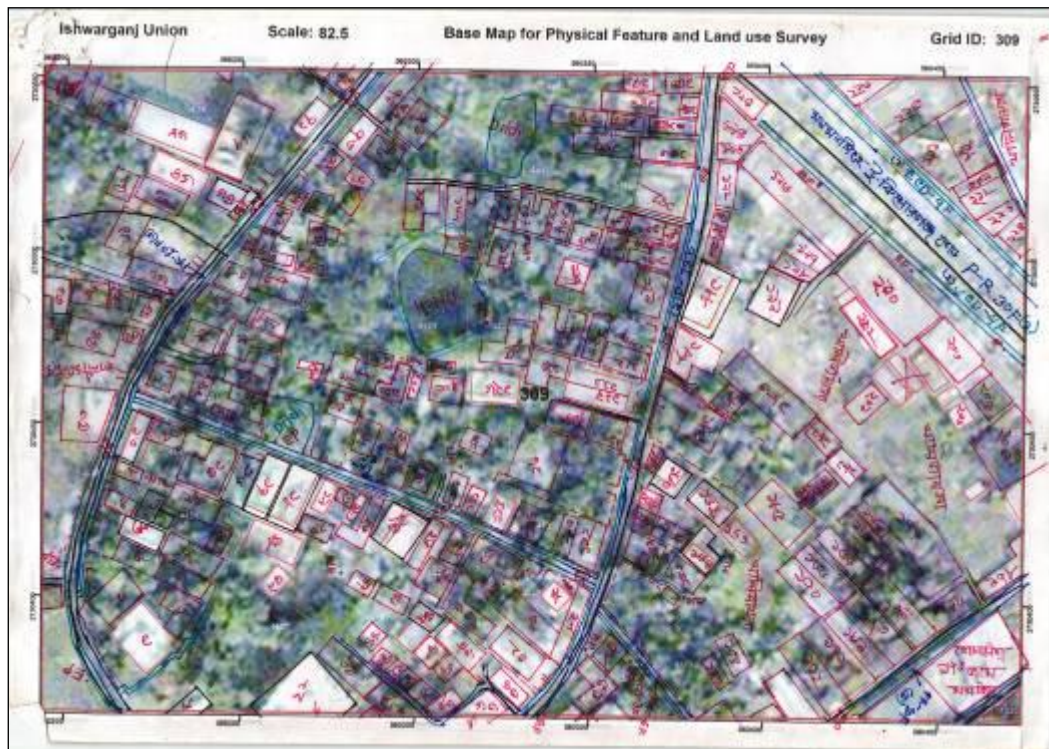
Figure-3.1: Sample Scanned Base Map for Physical Features and Land use Survey

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-6: Surveyors Working on the Field in Ishwarganj

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-7: 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-4.1** shows the interface of Data Entry and **Figure-4.2** shows the tabular view of entered data in Microsoft Access.

Figure-3.3: Log Book Data Entry Interface in Microsoft Access Software

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: Types of Structure in Ishwarganj Paurashava

Map-3.1.1: Types of Structure in Ishwarganj Paurashava

Map-3.2: Structure Type and Use in Ishwarganj Town Area
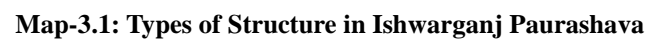
Figure-3.5: 3D Display of Physical Features in Ishwarganj Town Area

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 Ishwarganj Upazila.

Figure-3.6: Attribute Table of Structure Database of Ishwarganj Upazila

Figure-3.7 shows partial view of attribute table of Road Centerline of Ishwarganj Upazila.

Figure-3.7: Attribute Table of Road Centerline of Ishwarganj Upazila

Figure-3.8 shows partial view of attribute table of Mauza Map of Ishwarganj Upazila.

Figure-3.8: Attribute Table of Mauza Map of Ishwarganj Upazila

The **Figure-3.9** shows partial view of Scanned Mauza Map Files of Ishwarganj Upazila.

Figure-3.9: Catalog View of Scanned Mauza Map Files of Ishwarganj Upazila

The **Figure-3.10** shows partial view of Geo-database of Digitized Mauza Maps Files of Ishwarganj Upazila.

Contents	Preview	Description
Chainda_028_002.gdb	Dariar Dighi_037_004.gdb	Eidhgor_002_015.gdb	Jowarianala_012_001.gdb
Chainda_028_005.gdb	Dariar Dighi_037_005.gdb	Eidhgor_002_016.gdb	Jowarianala_012_007.gdb
Chainda_028_006.gdb	Dariar Dighi_037_006_Duplicate.gdb	Fotekhar Kul_022_001.gdb	Kauwar Kho_008_001.gdb
Chainda_028_007.gdb	Dariar Dighi_037_007.gdb	Fotekhar Kul_022_005.gdb	Khunia Palong_035_002.gdb
Chakmar Kul_018_001.gdb	Dhechua Palong_036_002.gdb	Gorjjonia_003_001.gdb	Khunia Palong_035_003.gdb
Chakmar Kul_018_002.gdb	Dhechua Palong_036_003.gdb	Gorjjonia_003_002.gdb	Khunia Palong_035_005.gdb
Chakmar Kul_018_004.gdb	Dholi Chora_014_005.gdb	Gorjjonia_003_003.gdb	Kocchopia_004_001.gdb
Dakshin Kocchopia_005_007.gdb	Dhowa Palong_034_001.gdb	Gorjjonia_003_005.gdb	Kocchopia_004_003.gdb
Dakshin Kocchopia_005_008.gdb	Eidgor_002_008.gdb	Gorjjonia_003_007.gdb	Kocchopia_004_007.gdb
Dakshin Kocchopia_005_010.gdb	Eidhgor_002_001.gdb	Gorjjonia_003_011.gdb	Kocchopia_004_008.gdb
Dakshin Methachori_027_008.gdb	Eidhgor_002_002.gdb	Gorjjonia_003_012.gdb	Kocchopia_004_009.gdb
Dakshin Methachori_027_009.gdb	Eidhgor_002_003.gdb	Gowalia Palong_033_001.gdb	Lot Ukhiyar Ghona_039_001.gdb
Dakshin Methachori_027_010.gdb	Eidhgor_002_004.gdb	Gowalia Palong_033_002.gdb	Lot Ukhiyar Ghona_039_002.gdb
Dakshin Mithachori_027_002.gdb	Eidhgor_002_005.gdb	Gowalia Palong_033_003.gdb	Lot Ukhiyar Ghona_039_003.gdb
Dakshin Mithachori_027_004.gdb	Eidhgor_002_006.gdb	Jangal Dariar Dighi_038_000.gdb	Lot Ukhiyar Ghona_039_004.gdb
Dakshin Mithachori_027_005.gdb	Eidhgor_002_007.gdb	Jangal Dholi Chori_013_001.gdb	Lot Ukhiyar Ghona_039_005.gdb
Dakshin Mithachori_027_006.gdb	Eidhgor_002_009.gdb	Jangal Dholi Chori_013_002.gdb	Lot Ukhiyar Ghona_039_006.gdb
Dakshin Mithachori_027_007.gdb	Eidhgor_002_010.gdb	Jangal Dholi Chori_013_003.gdb	Lot Ukhiyar Ghona_039_007.gdb
Dakshin Mithachori_027_011.gdb	Eidhgor_002_011.gdb	Jangal Dholi Chori_013_004.gdb	Moisho Koom_007_000.gdb
Dariar Dhighi_037_006.gdb	Eidhgor_002_012.gdb	Jangal Dholi Chori_013_005.gdb	Monir Jhil_006_003.gdb
Dariar Dighi_037_002.gdb	Eidhgor_002_013.gdb	Jangal Dhowa_Palong_030_000.gdb	Nona Chori_017_003.gdb
Dariar Dighi_037_003.gdb	Eidhgor_002_014.gdb	Jangal Gowalia Palong_032_000.gdb	Nona Chori_017_004.gdb

Figure-3.10: Catalog View of Geo-databases of Digitized Mauza Maps of Ishwarganj 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 18th august, 2016 the surveyors of UDD and consulting firm are visited the Ishwarganj 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-8: Field Verification/Ground Truthing

Map 3.3: Physical Feature Map for Field Checking in Ishwarganj Paurashava.

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.

4.1 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	Bachelor of Geography and Environment	3
Surveyor	Diploma in Survey/Civil Engineering	10
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 3.1). The following color code has been applied in field work of land use map. The Figure 3.2 shows the land use base map after survey.
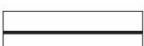
Figure 4.1: Color used by Color pencil for Land Use Demarcation
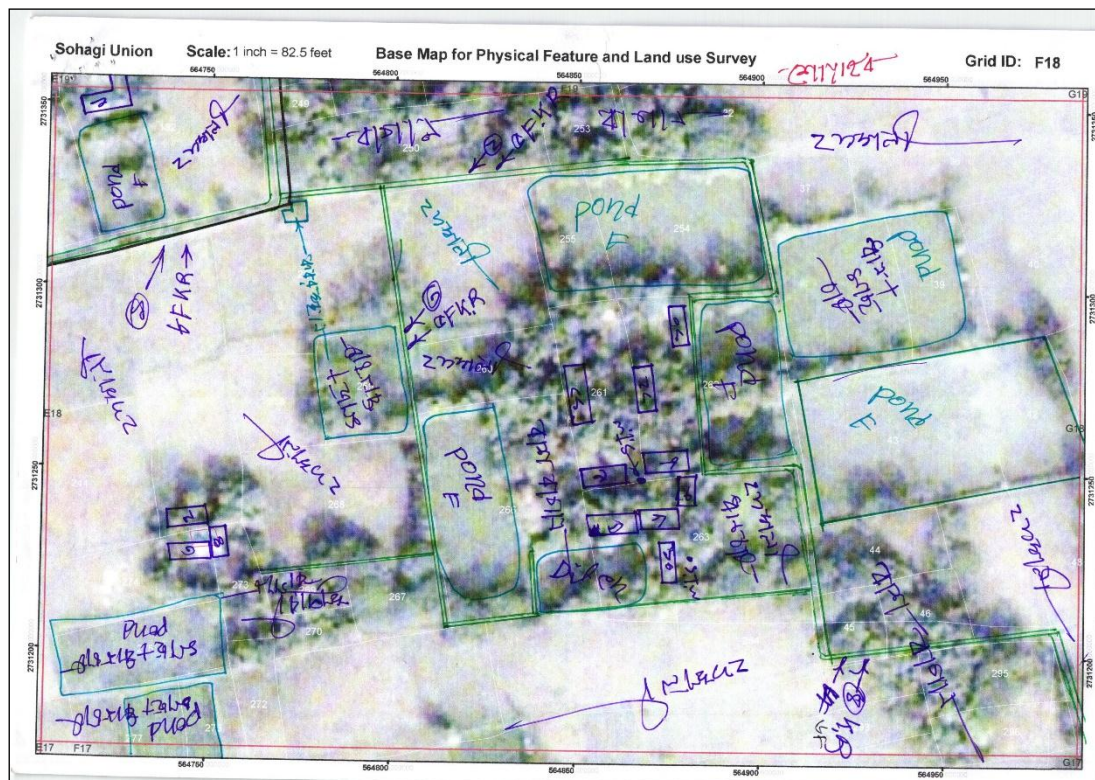
Figure 4.2: Land use Base Map used in Ishwarganj Upazila

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.
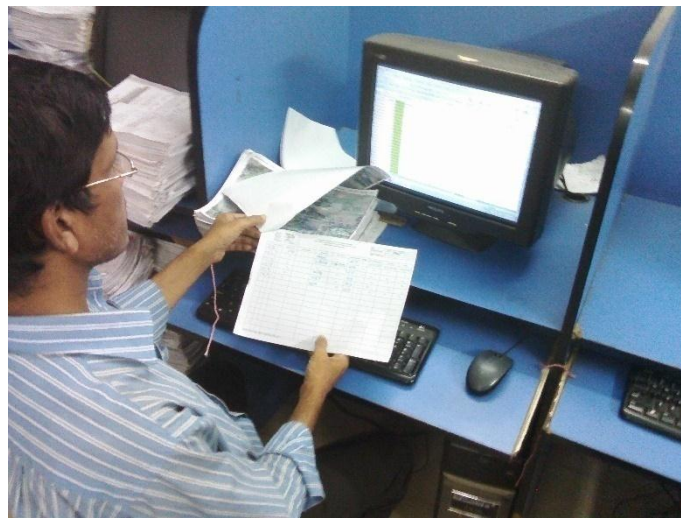
Plate-9: Updating works using Surveyed Map sheets

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 Ishwarganj town area has been presented in Map-4.1.
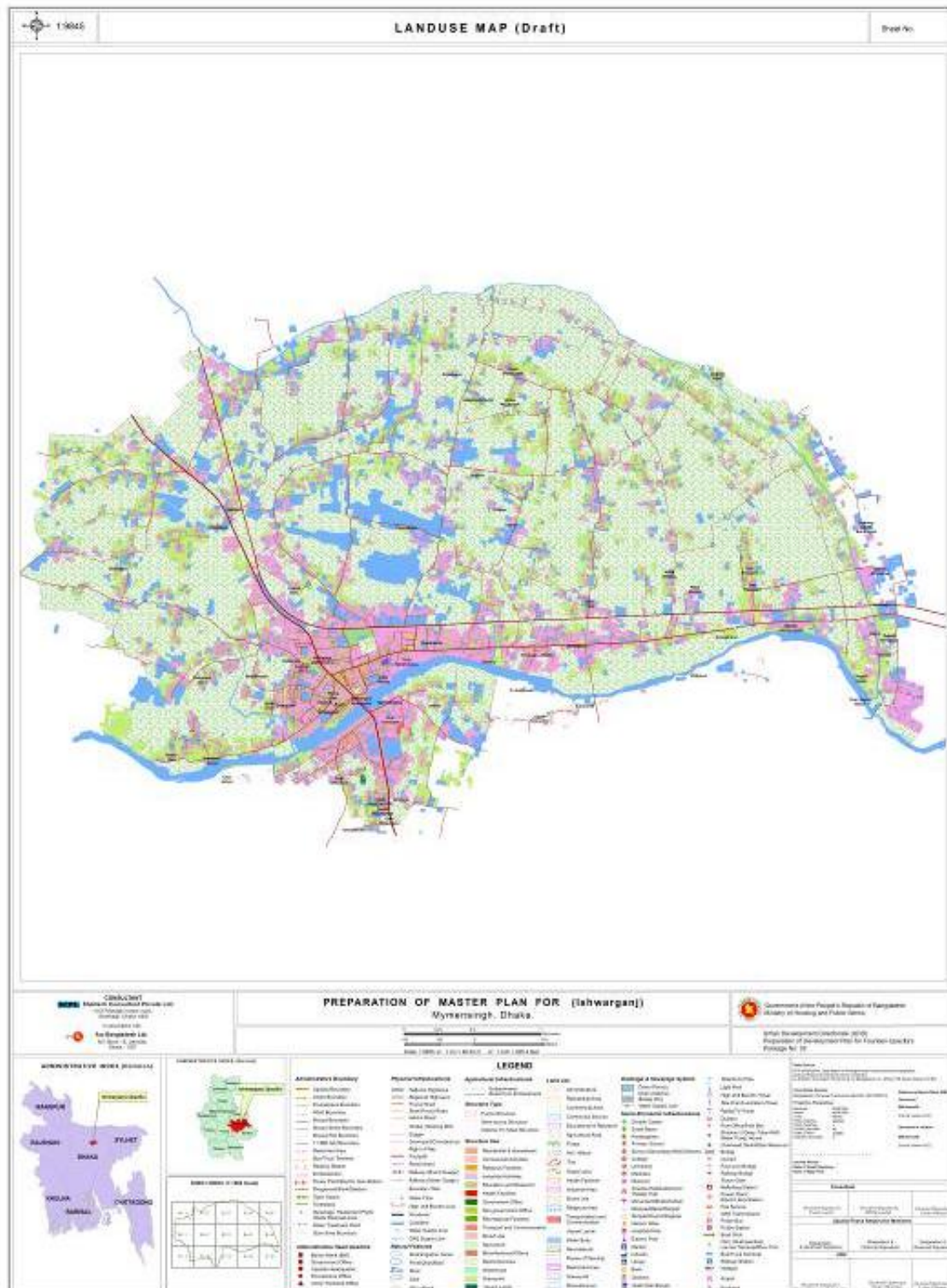
Map-4.1: Land Use in Ishwarganj Town Area

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, Warehouses 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**	DeputyCommissioner'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.

Sl. No.	Land uses	Illustrated
8.	**Non Government Services**	Other office/service area which are not included in government services.
9.	**Educational and Research Zone**	Kindergarten and Nursery, Primary School, High School, College, Public University, Private University, Public Medical College, Private Medical College, Homeopathic Medical College, Engineering College/University, Law College, Social Research, Health Research, Economic Research, Vocational Training Institute, Physical Training Institute, Nursing Training Institute, Teachers Training College, Computer Training Institute, Dakhil Madrasa, Alim Madrasa, Fazil Madrasa, Kamil Madrasa, Hafezia Madrasa, Tutorial/ Coaching Center, Government Training Institute, Library, Museum, Social Welfare Institution, Kindergarten,
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.

Sl. No.	Land uses	Illustrated
17.	**Utility Services**	Utility services include Overhead Tank, Power Office/Control Room, Public Toilet, Sewerage Office, Waste Disposal, Water Pump House, Water Reservoir, Drainage and Sewerage System, Water/Sewerage Supply Line, Water Treatment Plant etc.
18.	**Health Services/ Facilities**	Govt. Hospital / Pvt Hospital / Mental Hospital/ Maternity/ Children Hospital / Clinic/ Diagnostic Center, Clinic, Community Hospital and Veterinary Hospital.
19.	**Community Facilities/ Services**	Community Center, Social Club, Slaughter House, Monument, Graveyard, Crematorium, Cemetery, Eidgah, Shahid Minar etc. which will provide service to the community.
20.	**Religious Area/ Facilities**	Mosque, Eidgah/Mazar/Dargha, Madrasha, Temple, Church, Pagoda, Graveyard, Cemetery, Cremation place.
21.	**Historical and Heritage Site**	The entire mentionable historical and heritage site.
22.	**Restricted Area/ Facilities**	A Restricted Area is an area where no one but certain people can enter. Here, the areas which are not accessible for the general public except some high ranked personnel are considered as restricted area. Cantonment/BDR/Navy, Reserved Forest, TV Station, Radio Station, T&T Board, Power Supply Station.
23.	**Forest/ Groups of Trees**	Designated Forest area or Forest land.
24.	**Beach**	Sea Beach
25.	**Hilly Area/ 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

Land Use

Urban Residential Zone		Rural Settlement	
Commercial Zone		Mixed Use	
Heavy Industrial Zone		General Industrial Zone	
Administrative/Government Services		Non-Government Services	
Agricultural Zone		Educational & Research	
Water Body		Open Space	
Vacant Land		Recreational Facilities	
Circular Network		Transportation Facilities and Communication	
Utility Services		Health Facilities	
Community Service		Religious Area	
Historical and Heritage Site		Restricted Area	
Forest Area		Hill / Hillock	
Beach		Miscellaneous	

Figure-4.3: Legend for Existing Generalized Landuse

(	Growth Center	¿	Telephone Pole
R	Small Bazar	*	Light Post
K	Kindergarten	Ë	High-Volt Electric Tower
P	Primary School	Q	Tele-Communication Tower
e	School (Secondary/NGO/Others)	V	Market/Shopping Complex
á	College	£	Dustbin
U	University	þ	Post Office/Post Box
e	Madrasa	Ф	Shallow or Deep Tube-Well/ Water Pump House
ñ	Museum	n	Passenger shade
z	Cinema Hall/Auditorium/ Theater Hall	⏜	Bridge
¶	Monument/Shahid Miner	ê	Culvert
$	Mosque/Mazar/Dargah	L̈	Foot-over Bridge
ß	Temple/Church/Pagoda	ë	Railway Bridge
×	Historic Sites	l	Railway Over Bridge
O	Electric Pole	Ð	Sluice Gate
Ѱ	Bench Mark (BM)	U	Refueling Station
₥	District Headquarter (DC Office)	;	Power Plant/ Electric Sub-Station
A	Upazila Headquarter	m	Fire Service
$	Pourashava Office	c	Public Library
Z	Union Parishad Office	L	Police Box
◉	Godown	?	Industry
:	Bank		Boat Ghat
à	Brickfield	î	Ferry Ghat/Landing/ Launch Terminal/River Port
O	Drainage Outfall	h	Bus/Truck Terminal
f	Railway Station		
	Helipad		

Figure-4.4: Legend for Existing Important Point Feature

Table- 4.3: Generalize Land Use Information of the Project Area (The table below is for Ishwarganj Paurashava)

Sl	Land Use	Area(Acre)
1	Administrative	6.238
2	Agricultural Land	1653.687
3	Commercial Activities	11.572
4	Drain	2.069
5	Education and Research	4.051
6	Fellow Land	1.837
7	Garden	382.526
8	Graveyard	3.193
9	Health Facilities	0.51
10	Industrial Activities	1.036
11	Miscellaneous	0.129
12	Mixed Use	0.681
13	Non-government	0.772
14	Open Space	486.224
15	Recreational Facilities	0.111
16	Religious Facilities	2.457
17	Residential & Homestead	93.434
18	Transport and Communication Network	62.939
19	Water bodies	426.132
Total Paurashava Area (In Acre)		**3139.598**

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 Geography and Environment	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 Arc GIS software. **Map-5.1** shows the DEM of Ishwarganj Upazila

5.2.2 General Topography of Ishwarganj Upazila

Almost the whole of the Mymensingh with exception of Madhupur Jungle, is level and interested with a number of small rivers and channels. Ishwarganj 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.
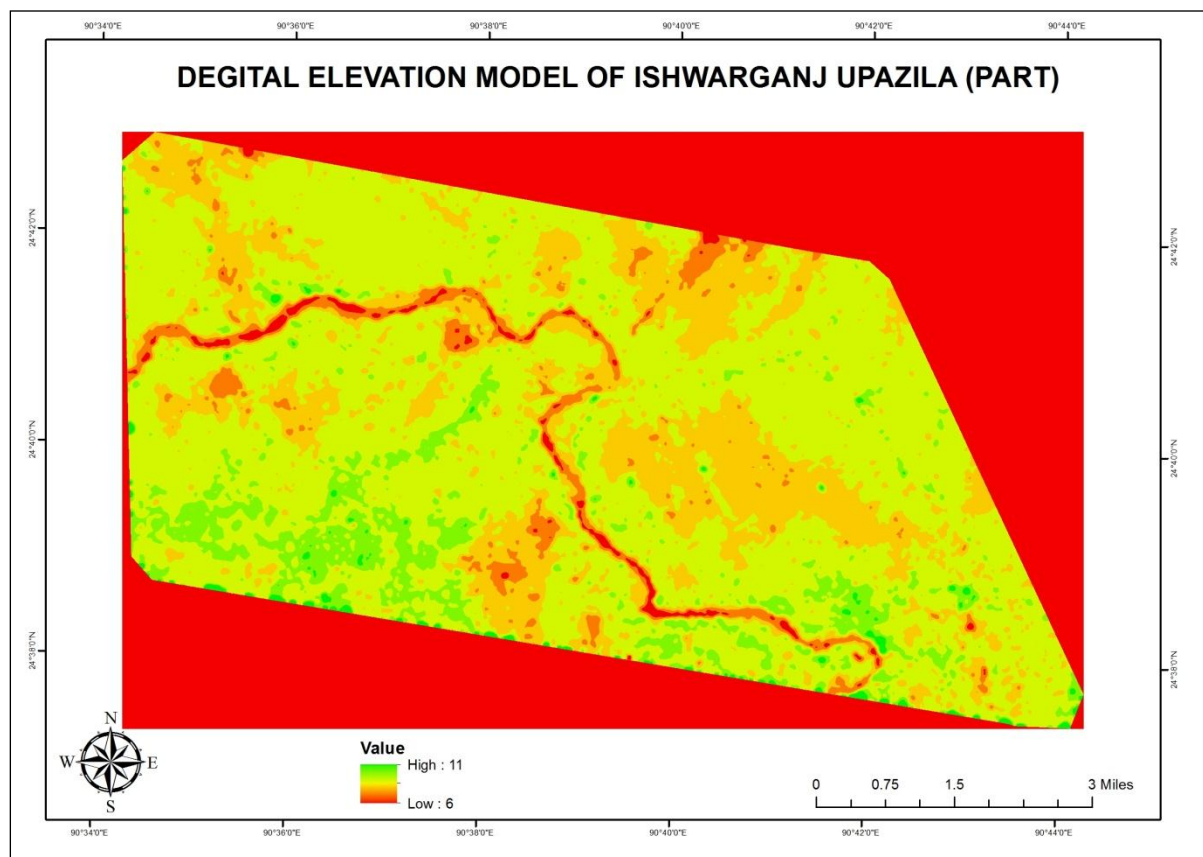
Map-5.1: Digital Elevation Model of Ishwarganj Upazila
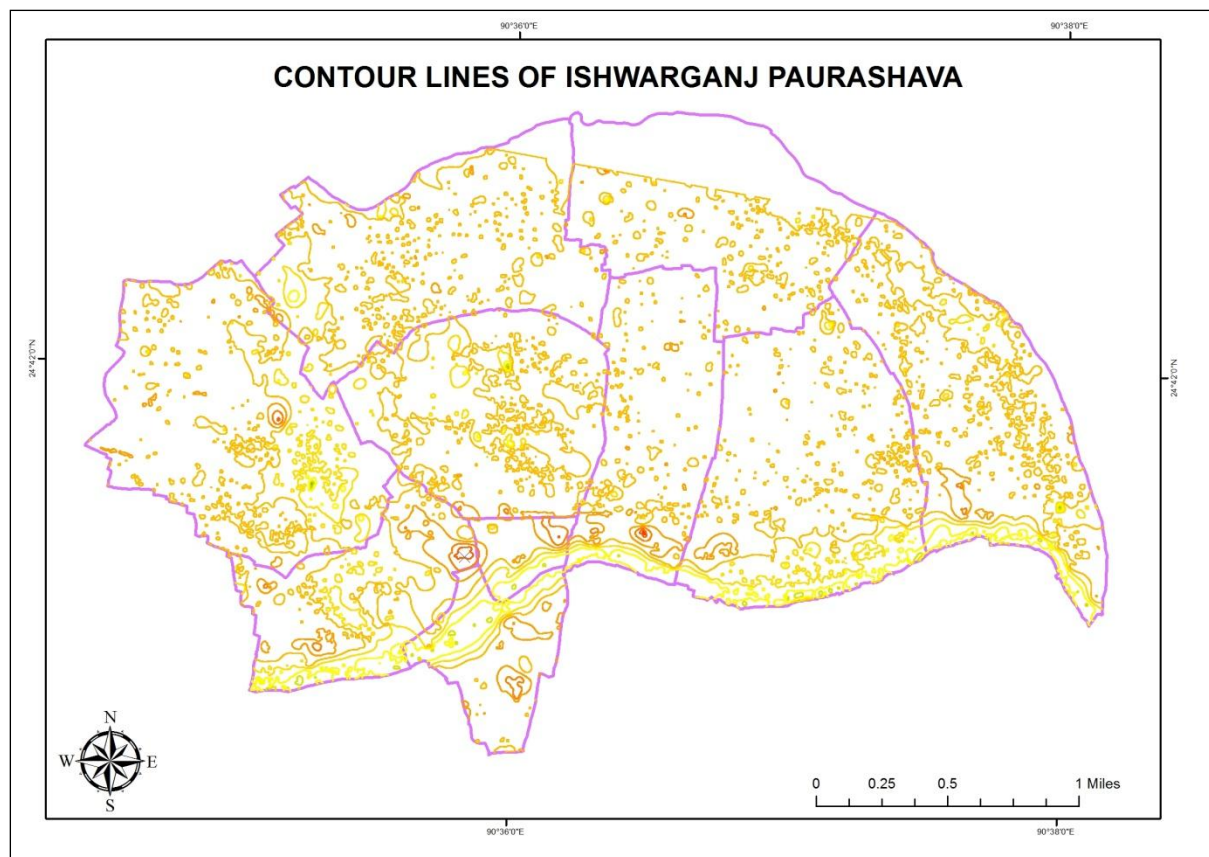
Map-5.2: Contour lines of Ishwarganj Upazila

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 Ishwarganj, five major highways pass through the study area neighboring area like Mymensingh Sadar and Kishoreganj, etc. Besides, the study area is also well connected by number of arterial roads with all parts of the study area.

Table 5.2: Crest level of major roads along their alignment in Ishwarganj

Name of the road	Height of crest level from MSL, in meter		
	Minimum	**Maximum**	**Average**
Mymensingh to Kisoreganj Road	3.125	8.961	6.043

Source: Topographic survey, 2016

Chapter-06: Conclusion

The physical features of Ishwarganj Upazila have been acquired through field survey based on high resolution stereo satellite imagery and RTK-GPS. By using Digital Photogrammetry technology, physical features are been digitized having 3D coordinates, i.e. every vertex or point has x, y and z-coordinate. So these data is valuable in terms of its potentiality for planning tasks. After performing preliminary processing and analysis, the output is used in producing various thematic maps on physical features, land use and topography. More data can be derived by further processing and advanced GIS analysis like Spatial Analysis, 3D Analysis, Network Analysis, etc which may be valuable input for preparation of development plans for the Upazila.

The land use features of Ishwarganj 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 Ishwarganj 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 Ishwarganj 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: Ishwarganj Upazila

ANNEXURE-I

RS Mouza List: Ishwarganj Upazila

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
1	Bakripara	বাকরিপাড়া	1	1
2	Sokhua	সখুয়া	2	2
3	Bhabanipur	ভবানীপুর	3	1
4	Mamdhipur	মামদীপুর	4	1
5	Punail	পুনাইল	5	1
6	Sulari	সুলারী	6	1
7	Polashkanda	পলাশকান্দা	7	1
8	Ramnagar	রামনগর	8	1
9	Konapara	কোনাপাড়া	9	1
10	Podur Boyra	পদুর বয়রা	10	1
11	Bil Kella	বিল কেল্লা	11	2
12	Nandi Para	নন্দীপাড়া	12	1
13	kandulia	কান্দুলিয়া	13	1
14	Giridhpur	গিরিধরপুর	14	1
15	Sripur Jithor	শ্রীপুর জিথর	15	1
16	Chotta Rakhobpur	ছোট রাখবপুর	16	1
17	Ram Bhadrapur	রামভদ্রপুর	17	1
18	Indrajit Khila	ইন্দ্রজিতথিলা	18	1
19	Sartaj boyra	সরতাজবয়রা	19	1
20	Madhur boyra	মধুর বয়রা	20	1
21	Mirjapur	মির্জাপুর	21	1
22	Kajir Boyra	কাজির বয়রা	22	1
23	Taherpur	তাহেরপুর	23	1
24	Nagar Jatrapur	নগর যাত্রাপুর	24	1
25	Begunbari	বেগুনবাড়ী	25	1
26	Gopalpur 1st Part	গোপালপুর ১ম খন্ড	26	1
27	SathiKhola	সাথিখোলা	27	1
28	Alladir Algi	আল্লাদির আলগী	28	1
29	Haser Algi	হাসের আলগী	29	1
30	Bholar Algi	ভোলার আলগী	30	1
31	Naobhanga	নাওভাঙ্গা	31	3
32	khodaboxpur	খোদাবক্সপুর	32	2
33	Char Bhabvkhali	চরভাবখালী	33	2
34	Maricha Char	মরিচারচর	34	6
35	Natun Char Algi	নতুন চরআলগী	35	1
36	Char Ram Mohon	চর রাম মোহন	36	4

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Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
37	Char Khewar ali	চর খেওয়ার আলগী	37	1
38	Char Noupara	চর নওপাড়া	38	6
39	Char Algi	চর আলগী	39	2
40	Bapiar Algi	বাপিয়ার আলগী	40	1
41	Bali Ata	বালি আটা	41	1
42	Narantia	নারানটিয়া	42	1
43	Alinagar	আলী নগর	43	1
44	Uchhakhila	উচাখিলা	44	2
45	Mogha	মঘা	45	1
46	Ishwarpur Gobindra Nagar	ঈশ্বরপুর গোবিন্দ নগর	46	1
47	Shibpur	শিবপুর	47	1
48	Haripur 2nd Part	হরিপুর ২য় খন্ড	48	1
49	Amudpur 2nd part	আমুদপুর ২য় খন্ড	49	1
50	Rampur	রামপুর	50	1
51	Kazir Balsha	কাজির বলসা	51	1
52	Narayanpur 2nd Part	নারায়নপুর ২য় খন্ড	52	1
53	Amodpur 2nd Part	আমোদপুর ২য় খন্ড	53	1
54	Haripur 1st Part	হরিপুর ১ম খন্ড	54	1
55	Tarundia	তারুন্দিয়া	55	1
56	Golla Joypur	গোল্লাজয়পুর	56	1
57	Haria Khali	হারিয়া খালী	57	1
58	Goal Para	গোয়ালপাড়া	58	1
59	Char Jithor	চর জিথর	59	1
60	Gabor Boali	গাবর বোয়ালী	60	1
61	Terosira	তেরশিরা	61	1
62	Dharua	ধরুয়া	62	3
63	Bandhanpara	বন্ধনপাড়া	63	1
64	Biswanathpur	বিশ্বনাথপুর	64	1
65	Pumbail	পুম্বাইল	65	2
66	Char Pumbail	চর পুম্বাইল	66	1
67	Paikura Boronagar	পাইকুড়া বড়নগর	67	1
68	Bhadrasram	ভদ্রাশ্রম	68	1
69	Nij Pumbail	নিজ পুম্বাইল	69	1
70	Borohit	বড়হিত	70	1
71	Bri-Pachasi	বৃ-পাচাশি	71	1
72	Pura Pachasi	পোড়া পাচাশি	72	1
73	Posthori	পস্থরী	73	2
74	Pora Dangori]	পাড়া ডাঙরী	74	1

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
75	Maddhapala	মধ্যপালা	75	1
76	Peri Narayanpur	প্যারী নারায়নপুর	76	1
77	Kesobpur	কেশবপুর	77	1
78	Bil Sakrail	বিল সাকরাইল	78	1
79	Rajendrapur	রাজেন্দ্রপুর	79	1
80	Debsram	দেবশ্রম	80	1
81	Baniatpur	বানিয়াতপুর	81	1
82	Khairat Bhulsoma	খেরত ভুলসোমা	82	1
83	Sayedbad	সেয়দবাদ	83	1
84	Mustafapur	মুস্তফাপুর	84	1
85	Para Narayanpur	পারা নারায়নপুর	85	1
86	Nasti	নসতি	86	1
87	Jogia Khali	জগিয়া খালী	87	1
88	Porahata	পোড়াহাতা	88	1
89	Shibpur	শিবপুর	89	1
90	Isouabad	ঈসুয়াবাদ	90	1
91	Narayanpur 1st Part	নারায়নপুর ১ম খন্ড	91	1
92	Chandipur	চন্ডিপুর	92	1
93	Narayanpur 2nd Part	নারায়নপুর ২য় খন্ড	93	1
94	Gopalpur 2nd Part	গোপালপুর ২য় খন্ড	94	1
95	Bri Charkona	বৃ চরকোনা	95	1
96	Ramkrisnapur	রামকৃষ্ণপুর	96	1
97	Raghunathpur	রঘুনাথপুর	97	1
98	Laksmipur	লক্ষীপুর	98	1
99	Ramchandrapur	রামচন্দ্রপুর	99	1
100	Gatipara	গাতিপাড়া	100	1
101	Besthan	বেস্থান	101	1
102	Ghagra Gopalpur	ঘাগড়া গোপালপুর	102	1
103	Ghagra Narayanpur	ঘাগড়া নারায়নপুর	103	1
104	Bisnupur	বিষ্ণুপুর	104	1
105	BhulhatSoma	ভুলহাটসোমা	105	1
106	Bri Ghagra	বৃ ঘাগড়া	106	1
107	Votrupur	ভউপুর	107	1
108	Rajibpur	রাজিবপুর	108	1
109	Charkona	চরকোনা	109	1
110	Chandra Nagar	চন্দ্র নগর	110	1
111	Brahmongati	ব্রাহ্মণগাতি	111	1
112	Sahebnagar	সাহেবনগর	112	1

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
113	Radhabollabpur	রাধাবল্লভপুর	113	1
114	Uday Rampur	উদয় রামপুর	114	1
115	Ram Gobindrapur	রাম গোবিন্দপুর	115	1
116	Umanathpur	উমানাখপুর	116	1
117	Haripur	হরিপুর	117	1
118	Momrojpur	মোমরোজপুর	118	1
119	Shalpa Ghagra	স্বল্প ঘাগড়া	119	1
120	Bhabanipur	ভবানীপুর	120	1
121	Ghagra	ঘাগড়া	121	1
122	Behargati	বেহারগাতি	122	1
123	Majhihati	মাঝিহাটি	123	2
124	Rudrapur	রুদ্রপুর	124	1
125	Shalpa Charpara	স্বল্প চরপাড়া	125	1
126	Tarup Charpara	তরপ চরপাড়া	126	1
127	Bri Debsthan	বৃ দেবস্থান	127	1
128	Kabil Baksi	কাবিল বাকসী	128	1
129	Mogtola Tarup Pachail	মগতোলা তরপ পাচাইল	129	2
130	Ramnagar	রামনগর	130	1
131	Sri Nagar	শ্রী নগর	131	1
132	Uchargati	উচারগাতী	132	1
133	Narayanpur	নারায়নপুর	133	1
134	Datter Danguri	দত্তের ডাঙ্গুরী	134	1
135	Kathal Danguri	কাঠাল ডাঙ্গুরী	135	1
136			136	1
137	Raghudebpur	রঘুদেবপুর	137	1
138	Ballabpur	বল্লভপুর	138	1
139	Dubli	ডুবলী	139	1
140	Tarup Sonasoni	তরপ সোনাসনী	140	1
141	Mogtola Dhaniakandi	মগটোলা ধনিয়কান্দি	141	1
142	Mogtola Para Basati	মগটোলা পাড়া বাসাটি	142	1
143	Durgapur	দুর্গাপুর	143	1
144	Srirampur	শ্রীরামপুর	144	1
145	Bil Kherua	বিলখেরুয়া	145	1
146	Mogtula 1st Part	মগটোলা ১ম খন্ড	146	1
147	Subundi	সুবন্দি	147	1
148	Ram Gopalbari	রামগোপালবাড়ী	148	1
149	Rajarampur	রাজারামপুর	149	1
150	Naopara	নওপাড়া	150	1
151	Modhupur	মধুপুর	151	1

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Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
152	Tajpur	তাজপুর	152	1
153	Nardari	নার্ডরি	153	2
154	Bagber Abdullapur	বাগবেড় আব্দুল্লাপুর	154	1
155	Gauripur	গৌরীপুর	155	1
156	Ghorakandia	গড়াকান্দিয়া	156	1
157	Nagar Danguri	নগর ডাঙ্গুরী	157	1
158	Galahar	গালাহার	158	1
159	Chatiantola Boirati	ছাতিয়ানতোলা বৈরাটি	159	2
160	Baghber Abdullapur	বাগবেড় আব্দুল্লাপুর	160	1
161	Dhitpur	ধিতপুর	161	1
162	Barmma	বর্ম্মা	162	1
163	Banasram	বানাশ্রম	163	1
164	Khorddasaia	খোর্দ্দসাইয়া	164	1
165	Shadur Gola	সাধুর গোলা	165	1
166	Bhasa Gakul Nagar	ভাসা গকুল নগর	166	1
167	Char Sankar	চর সঙ্কর	167	1
168	Uttamkpur	উত্তমপুর	168	1
169	Maijbagh	মাইজবাগ	169	6
170	Tarati	তারাটি	170	2
171	karimpur	করিমপুর	171	1
172	Dattagaon	দত্তগাঁও	172	2
173	Boroibari	বরইবাড়ী	173	1
174	Jatia	জটিয়া	174	2
175	Kabir Bhulsoma	কবির ভুলসোমা	175	1
176	Pitamborpara	পিতাম্বরপাড়া	176	1
177	Uttampur	উত্তমপুর	177	1
178	Harua	হারুয়া	178	1
179	Terochati	তেরচাটি	179	1
180	Mollikpur	মল্লিকপুর	180	1
181	Mujatia	মুজাটিয়া	181	1
182	Borojhora	বড়জোড়া	182	2
183	Boro Danguri	বড়ডাঙ্গুরী	183	2
184	Noupara	নওপাড়া	184	1
185	Char Pubaiol	চরপুবাইল	185	1
186	Char Sehari	চর সেহারী	186	1
187	Char Hossainpur	চর হোসেনপুর	187	4
188	Joypur	জয়পুর	188	1
189	khairati	খৈরাটী	189	1
190	Sharsi	শর্শি	190	1

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
191	Asrabpur	আশ্রবপুর	191	1
192	Majiakandi	মাঝিয়াকান্দি	192	1
193	Kumra Shason	কুমড়া শাসন	193	1
194	Shadrpara	সাদারপাড়া	194	1
195	Durgapur	দুর্গাপাড়া	195	1
196	Khulatia	খুলিয়াটী	196	1
197	GhagraPara	ঘাগড়াপাড়া	197	1
198	Majiakandi	মাঝিয়াকান্দি	198	1
199	Shaktapur	সাকতাপুর	199	1
200	Eoajnagar	এওয়াজনগর	200	1
201	Balisita	বালিসিতা	201	1
202	Tarakandi	তারাকান্দি	202	1
203	Bhaigaon	ভাইদগাও	203	1
204	Naya Shimul	নয়া শিমুল	204	1
205	Sayed Bhakuri	সেয়দ ভাকুরী	205	1
206	Char Sayed Bhakurui	চর সেয়দ ভাকুরী	206	1
207	Charti	চর্টী	207	1
208	Hatulia	হাটুলিয়া	208	1
209	Darun borobagh	দারুণ বড়ভাগ	209	1
210	Ruhi	রুহি	210	1
211	Boro tarakandi	বড় তারাকান্দি	211	1
212	Chota tarakandi	ছোট তারাকান্দি	212	1
213	Ramnathlila	রামনাথখিলা	213	1
214	Dakshin Borovog	দক্ষিণ বড়ভাগ	214	1
215	Dori Pachhasi	দড়ি পাচাসী	215	1
216	Kakon Hati	কাকন হাটি	216	2
217	Pat bhakuri	পাট ভাকুরী	217	1
218	Para Pachhasi	পাড়া পাচাসী	218	1
219	Dhamdi	ধামদী	219	1
220	Char Nikla	চর নিকলা	220	3
221	Dattapara	দত্তপাড়া	221	5
222	Shimrail	শিমরাইল	222	1
223	Dari Borobhag	দড়ি বড়ভাগ	223	1
224	Muktapur	মুক্তাপুর	224	1
225	Suniakandi	সুনিয়াকান্দি	225	1
226	Baroigaon	বারইগাঁও	226	1
227	Bri Kathalia	বৃ কাঠালিয়া	227	1
228	Kathalia	কাঠালিয়া	228	1
229	Bogaputi	বগাপুটি	229	1
230	Momrojpur	মোমরোজপুর	230	1
231	Sohagi	সোহাগী	231	2
232	Maijhati	মাইজহাটি	232	1

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
233	Bhalukber	ভালুকবেড়	233	2
234	Baroikandi	বারইকান্দা	234	1
235	Rameshwarpur	রামেশ্বরপুর	235	2
236	Chapilkanda	চাপিলকান্দা	236	1
237	Mahespur	মহেশপুর	237	3
238	Kasipur	কাশিপুর	238	1
239	Boirati	বৈরাটী	239	1
240	Shaheb nagar	সাহেব নগর	240	2
241	Monoharpur	মনোহরপুর	241	1
242	Nij Tulandar	নিজ তুলন্দর	242	1
243	Tanga Tangia	টঙ্গটাঙ্গিয়া	243	1
244	Moliati	মালিয়াটী	244	1
245	Tangongati	টাঙ্গনগাতী	245	1
246	Harishwar	হরিশ্বর	246	1
247	Koroikandi	করইকান্দি	247	1
248	Haripur	হরিপুর	248	1
249	Paiksha	পাইকসা	249	1
250	Phanur	ফানুর	250	1
251	Doriunda	দড়িউন্দ	251	1
252	Khalilnagar	খলিলনগর	252	1
253	Inayetpur	ইনায়েতপুর	253	1
254	Langail	লাঙ্গাইল	254	1
255	Enayet Nagar	এনায়েত নগর	255	1
256	Machimpur	মাছিমপুর	256	1
257	Kusipara	কুশিপাড়া	257	1
258	Suthia	সুখিয়া	258	1
259	Hiradhar	হিরাধর	259	1
260	Sathia	সাথিয়া	260	1
261	Makarjhap	মাকরঝাপ	261	1
262	Bausati	বাউসটী	262	1
263	Kahetgaon	কাহেতগাঁও	263	1
264	Rampur	রামপুর	264	1
265	Kumaruli	কুমারুলি	265	1
266	Saguli	সাগুলি	266	1
267	Bijoypur	বিজয়পুর	267	1
268	Rokonpur	রোকনপুর	268	1
269	Fatehpur	ফতেপুর	269	1
270	Palan	পালান	270	1
271	Khalbola 1st Part	খালবোলা ১ম খন্ড	271	1
272	Palandor	পালান্দর	272	1
273	Sarisa	সরিষা	273	3
274	Bisnupur	বিষ্ণুপুর	274	2

Sl	Mouza	Mouza Name (Bangla)	JL No	Sheet No
275	Mri Gali	মৃ গালী	275	1
276	Fatehnagar	ফতেনগর	276	1
277	Itaulia	ইটাউলিয়া	277	1
278	Madhupur	মধুপুর	278	1
279	Golkunda	গলকুন্ড	279	3
280	Gaborkailan	গাবরকাইলান	280	1
281	Bongaon	বনগাঁও	281	1
282	Teorail	তেওরাইল	282	1
283	Sriphaltola	শ্রীফলতলা	283	1
284	Pathalia	পাখালিয়া	284	1
285	Khalbola 2nd Part	খালবোলা ২য় খন্ড	285	1
286	Dhigalia	দিঘলিয়া	286	1
287	Mohes Chatol	মহেষ চাতল	287	1
288	Behaori	বেহাওরি	288	1
289	Atharobari	আঠারবাড়ী	289	1
290	Bongaon	বনগাঁও	290	1
291	Katiar Haor	কাটিয়ার হাওর	291	1
292	Chorgaon	চোরগাঁও	292	1
293	Sarati	সরাটী	293	1
294	rajibpur	রাজিবপুর	294	1
295	Sondailpara	সোনদাইলপাড়া	295	1
296	Char Achia	চর আসিয়া	296	1
297	Sahilati	সহিলাটী	297	1
298	Chair Asia	চাইর আসিয়া	298	1
299	Dosasia	দশাশিয়া	299	1
300	Gorail	গড়াইল	300	1
301	Sridebpur	শ্রীদেবপুর	301	1
302	Raypur	রায়পুর	302	1
303	Bhagra	বাগড়া	303	1

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-5_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

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.

<table>
<tr><td colspan="4">

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:
</td></tr>
<tr><td>Mauza Name</td><td>JL No</td><td>Sheet No</td><td>File Name</td></tr>
<tr><td>Dattapara</td><td>221</td><td>2</td><td>**Dattapara_221_002.jpg**</td></tr>
</table>

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 **M**auza 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 **M**auza 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.

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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

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Feature Type/Item	Layer Name	Feature Code (ID)
0tier Info		62
Demarcation Pillar		71
Settlement Pillar		72
Stone		73
Station		74
Pucca Pillar		75
Municipality Pillar		76
CS Iron Pillar		77
Other Point Feature		88
Plot Boundary		14
Katcha Road		30
Semi-Pucca Road		29
Pucca Road	ML_XXX_XXX	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

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		Faridpur	29	Faridpur Sadar	47
7	Dhaka	30	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

followingtables:

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"

Field **Name**	Field **Type**	**Width** of the field	**Purpose** of the field
			- "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.

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.

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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"

Field **Name**	Field **Type**	**Width** of the field	**Purpose** of the field
			- "Over Bridge" - "Pagoda" - "Police Box" - "Police Station" - "Post Office" - "River Port" - "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
" Registered High School"	135

Point Feature Categories	Unique ID
" 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

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ANNEXURE-III
Structure Attribute Collection Form

ANNEXURE-III

Structure Attribute Collection Form

GRID NO…………….

ID	Type	Floor	Structure Use	Structure Name	Owner Name	Photo ID	Construction Year	Holding No	Ward No	Plot No Mauza Name	Road Name	Locality

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PHYSICAL FEATURE SURVEY

LAND USE SURVEY

TOPOGRAPHIC SURVEY

PHOTOGRAMMETRIC WORKS

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
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, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

DRAFT SURVEY REPORT

Formal-Informal Economic Survey
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)

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Ref: SCPL-ABL/UDD/2016/ Formal-Informal Economic Survey/Ishwarganj 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 Ishwarganj Upazila, Mymensingh.

Dear Sir,
We are pleased to submit herewith the Formal-Informal Economic Survey Report (Final) of Ishwarganj Upazila, Mymensingh for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincere

(Dr. Nurul Islam Nazem)   (Dr. Gulam Murtaza)
Team Leader, Package -2   Urban Economist

Encl: As stated.

Copy to:
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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. One of the important findings of socio-economic survey was Ishwarganj Upazila is on the edge of entering in "Demographic Bonus" window within the coming years. On the other hand, here it has been found that the upazila needs skilled labor but female is totally segregated from both of formal and informal sectors of economy. Thus government could take necessary steps to build the young people of this area into working skilled labor by establishing new training centers and also encouraging women to enter into the economy by taking some appropriate steps. Moreover, one of the major economic success of this area is the local markets are capable of meeting the need of the local economic units of this area. And, the products are going beyond the upazila boundary. 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. On the other hand, 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 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 in 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

Ishwarganj upazila came into existence as a Thana in 1936 and was upgraded to upazila in 1983. The upazila occupies an area of 280.43 sq. km. It is located between 24º33' and 24º44' north latitudes and between 90º28' and 90º46' east longitudes. The upazila is bounded on the north by Gauripur upzila, on the east by Kendua upazila of Netrokona zila, on the south by

Nandail upazila and on the west by Trishal and Mymensingh sadar upazilas (Banglapedia, 2016). There are some of very prominent areas in Ishwarganj Upazila. Luxmigonj Bazar, Mirzapur, Tarundia, Uchakhila, Borohit, Sohagi Railway Station, Atharabari Railway Station and Bazar, Uchakhila Bazar etc.

Map 1.1: Upazila Map, Ishwarganj, Mymensingh Source: LGED, 2016

Ishwarganj Upazila of Mymensingh 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 Ishwarganj with the regional growth centers makes it one of the most important cities in this region. According to BBS (2011), the upazila has 5 growth centres, 50 hat/bazars, 70 poultry farms, 36 dairy farms and 21 nurseries. It also has 34 government offices, 8 nationalized bank branches, 2 private bank branches, 2 residential hotels and 20 NGOs. The upazila's famous crop is paddy. It possesses 52883 total farm holding.

According to Census Report 2011, total 388 rice mills have been set up at Ishwarganj because of huge demand of rice processing operations. Total 50 handloom establishments are also found because of handloom industrial development at Ishwarganj. Among them 40 are operational and rest of 10 are non-operational. Total 1,032 handy, 355 husking crafts mills and 145 potteries small scale cottage industry has been found here. Moreover, total 995 bamboo and cane industry, 76 wooden furniture based industries, 40 saw mills and 28 rice mills are found here. In addition, 10 oil mills and 12 bakeries are also located in Ishwarganj. 37 pottery and 2 printing presses, 220 tailoring shops and 125 flour mills are also found in Ishwarganj.

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: $n = \dfrac{z^2}{d^2} pq$

Where,

$n = Sample\ size$,

$z = Statistical$ certainty $chosen$,

$p = $ Coverage rate/estimated prevalence ,

$q = 1 - p$ and

d = precision desired : 0.05

Then, they used stratified sampling technique under probability sampling technique to collect questionnaire based primary data for formal-informal economy analysis. The stratified sampling technique is further used for collecting samples from all the sub zones such as industries, hawkers etc. of Ishwarganj 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 Ishwarganj 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 Ishwarganj 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 Ishwarganj 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 Ishwarganj 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 Ishwarganj 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 Ishwarganj

The above mentioned vision, plan, policies and strategies will be prepared considered for preparation of development plan Ishwarganj 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 Ishwarganj are: (1) Brick Field; (2) Cottage Industry; (3) Food Processing; (4) Ice Cream factory (5) Poultry & Fish farm (6) Rice and Flour Mill (7) Workshop. The locations of interviewed economic unit's personnel are given below:

Table 4.1 Type of Industries with Location

Location	Number of Industries							
	Brick Field	Cottage Industry	Food Processing	Ice Cream factory	Rice and Flour Mill	Rice Mill	Work shop	Total
Atharabari	1	0	1	1	0	2	1	6
Barahit	0	0	0	0	0	0	0	0
Rajibpur	0	0	0	0	0	1	0	1
Sohagi	0	1	0	1	1	0	1	4
Uchakhila	1	0	0	0	0	0	0	1
Total	2	1	1	2	1	3	2	12

Source: Field survey 2015

There are 2 brick fields in Ishwarganj Upazila. One is located at Atharabari and another is located at Uchakhila. These two brick fields are contributing to develop the local household and infrastructure development functions. Only one cottage industry is located at Sohagi Union and it plays vital role to supply local cotton based products. One food processing industry is located at Atharabari. Two ice cream factories are found in Atharabari and Sohagi those are employing few people at cold food processing unit. One rice and flour mill is located in Sohagi. Total three rice mills are found in Ishwarganj where 2 of them are located at Atharabari and one is located at Rajibpur. There are also two workshops in Ishwarganj, where one is located at Atharabari and another is located in Sohagi. Total 6 industries are located at Atharabari, and none in Barahit union. Total 4 industries are found in Sohagi, one in both Rajibpur and Uchakhila unions. It has been seen that there are various types of industries are located varying from brickfields to small workshops in Ishwarganj upazila.

4.2   Ownership Pattern

Most of the formal economic units (about three fourth) ownership pattern is private. Rest of them is owned by 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).
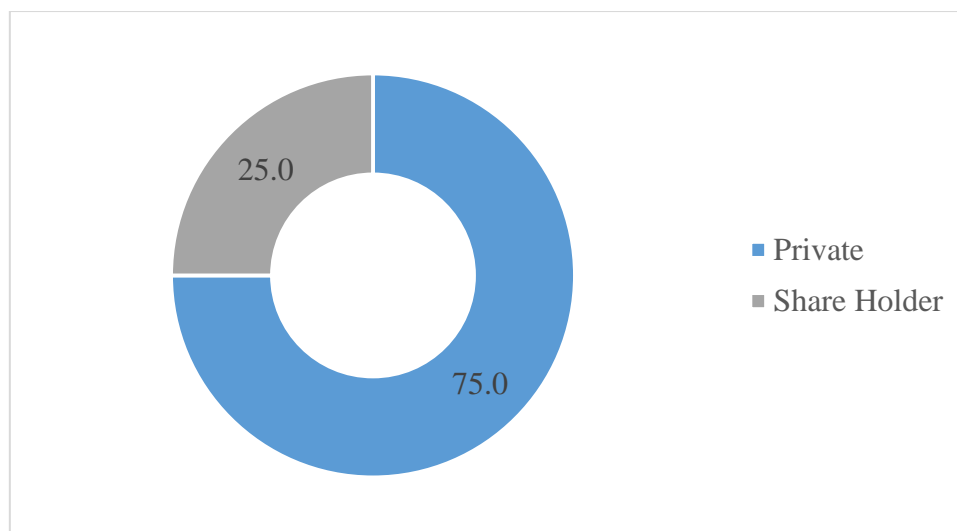
Figure 4.1: Ownership patterns of formal economic units (Source: Field Survey, 2015)

4.3 Area Occupied

It has been found that about two third of total formal economic units needs area less than 0.1 acre. These types of industries are mainly the workshops. About 17% of them also need more than 0.1 but less than 0.2 acres. In addition, the rice mills mainly need more land (more than 0.3 acre) than others (Please see figure 4.2)
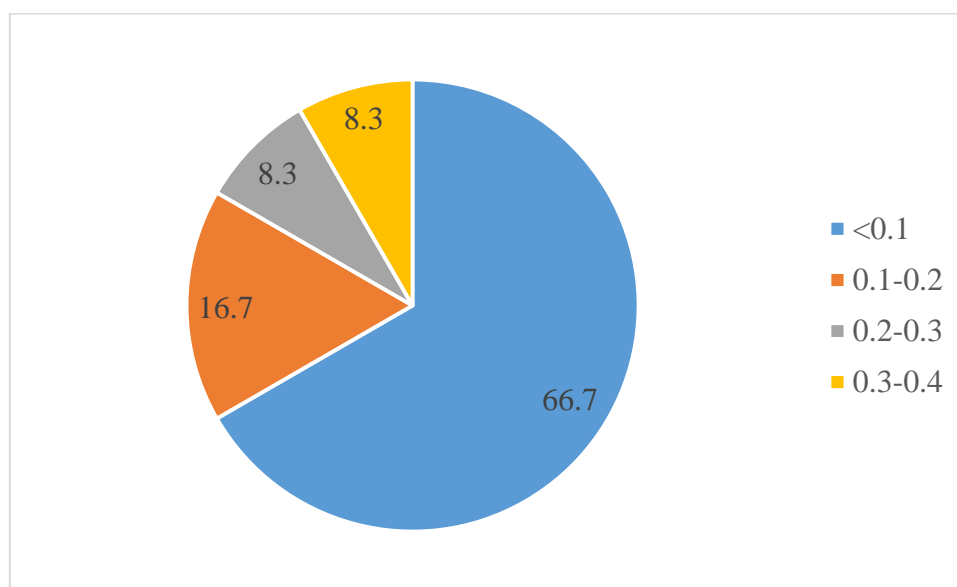
Figure 4.2: Area occupied by formal economic units in acre (Source: Field Survey, 2015)

4.4 Number of Employees

It has been found that almost all of the brick fields need more than 30 people. Half of them need more than 50 people. On the other hand, almost all of the cottage industries, food processing, ice cream factory and workshop need employee less than 10. About one fourth of the total rice and flour mills need employees more than 10

Table 4.2: Distribution of no. of employees (in percentage) by types of industries

	< 10	10-20	30-40	40-50	>50
Brick field			50.0		50.0
Cottage Industry	100.0				
Food Processing	100.0				
Ice factory				100.0	
Ice cream factory	100.0				
Rice and flour mill	75.0	25.0			
Workshop	100.0				

Source: Field Survey, 2015

4.5   Number of Labors

Almost all of the brick fields and ice factories need labor more than 20. Among the brick fields about half of them have to employ about more than 40 numbers of labors. Among the different types of industries brick fields employ maximum number of labors. Whereas rest of them employs less than 10 labors in their industries. Besides, about one fourth of total rice and flour mills employ more than 10 but less than 20 numbers of labors in their industries.

Table 4.3: Distribution of no. of labors (in percentage) by types of industries

	<10	10-20	20-30	30-40	40-50
Brick field			50.0		50.0
Cottage Industry	100.0				
Food Processing	100.0				
Ice factory				100.0	
Ice cream factory	100.0				
Rice and flour mill	75.0	25.0			
Workshop	100.0				

Source: Field Survey, 2015

4.6   Male-Female Ratio in Different Types of Industries

It has been found that, most of the industries have little or no participation of female in their industries. In cottage industries highest number of female participation has observed. In that particular types of industries about one third of total employees are female. Rice and flour mills, and ice factories employed about 10% of female employees of total.
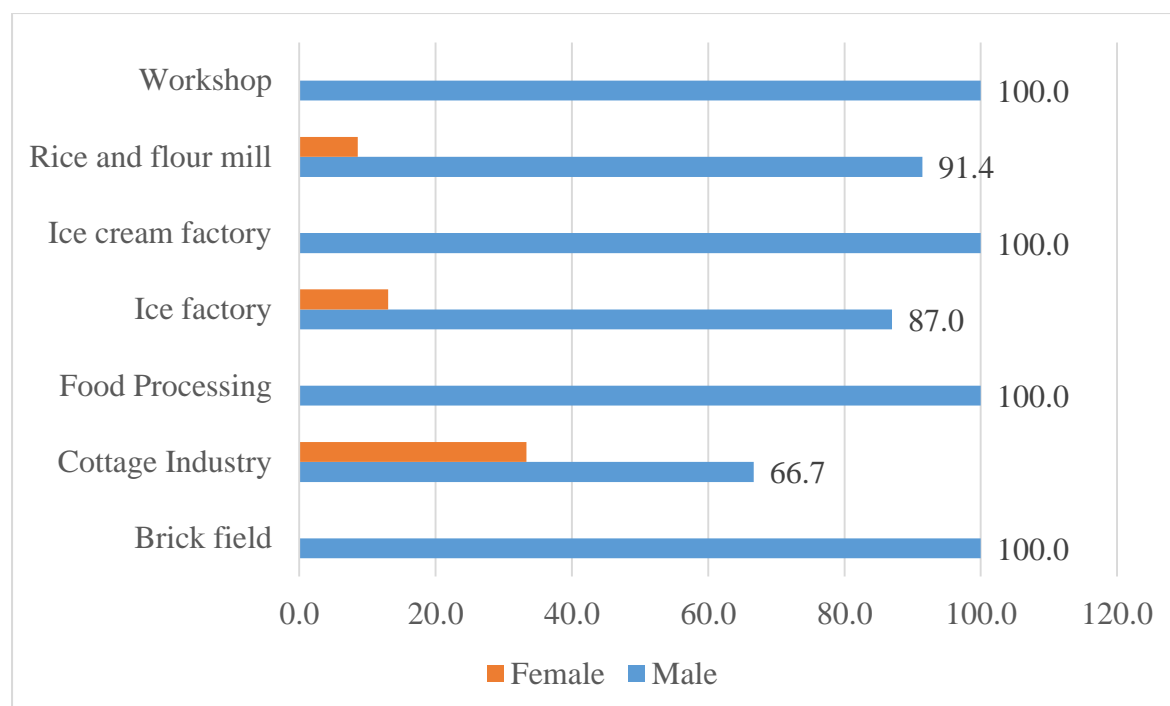
Figure 4.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2015)

4.7   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 is the major raw material of cottage industry. Again water, sugar and *suzi* are one of the major raw materials for ice cream factories. Iron and iron pat are the major raw materials for workshop. Moreover, flour is the major raw materials for food processing industries, whereas paddy is for rice and flour mill. Though major raw materials vary from industries to industries, almost all of the major raw materials' sources are local market. Thus, the upazila is self-sufficient in the perspective of supply of major raw materials.

Table 4.4: Major raw materials (in percentage)

	Bamboo	Flour	Iron	Iron Pat	Paddy	Soil	Water, Sugar, Suzi
Brick field						100.0	
Cottage Industry	100.0						
Food Processing		100.0					
Ice cream factory							100.0
Rice and flour mill					100.0		
Workshop			50.0	50.0			

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 used coal in their industries. And almost all of the coal's source is imported from other regions. Apart from these, most of the industries' minor raw materials' source is local market. Moreover, food processing industries used sugar, and ice cream factories used barley and coconut as their minor raw materials. Again rice and flour mills used *tush*, wheat and wooden powder in their industries. Workshops also used steel as their minor raw materials.

Table 4.5: Minor raw materials (in percentage)

	Barley, Coconut	Coal	Steel	Sugar	*Tush*	Wheat	Wooden Powder
Brick field		100.0%					
Food Processing				100.0%			
Ice cream factory	100.0%						
Rice and flour mill					33.3%	33.3%	33.3%
Workshop			100.0%				

Source: Field Survey, 2015

4.7.3 Other Raw Materials

Brick fields also mentioned as sand is the other raw materials they used. Whereas, ghee is another raw material used in food processing. Ice cream factory also used milk and Sweetener as their raw materials in their industries. As most of the workshop works have been done by electricity, the industries also mentioned it as their raw materials. In addition, almost all of the raw materials have been collected from local markets. Thus, the economy of this upazila is strong enough to support its own production.

Table 4.6: Other raw materials

	Chile	Electricity	Ghee	Milk, Sweetener	Sand
Brick field					100.0%
Food Processing			100.0%		
Ice cream factory				100.0%	
Rice and flour mill	100.0%				
Workshop		100.0%			

Source: Field Survey, 2015

4.8 Products and Their Market

It has been seen that only brick fields along with rice and flour mills exported their products in other markets. Among them, rice has been exported to Kendua and Netrokona mainly. Apart from these, most of the industries' product only supports the local needs.

Table 4.7: Products and Their Market

Industries	Product	Local (%)	Others (%)
Brick field	Brick	97.5	2.5
Cottage Industry	Household Goods (Jhuri, Kula, Chalon, Shaji, Pakha)	100.0	0.0
Food Processing	Dry Food	100.0	0.0
Ice cream factory	Ice Cream	100.0	0.0
Rice and flour mill	Rice & Flour	98.3	1.7
Workshop	House Construction, Iron Product	100.0	0.0

Source: Field Survey, 2015

4.9 Production amount and their yearly price

It can be seen in Table 4.8 that production of different products in this upazila and their yearly price has been given. Here, brick fields produced about 15,00,000-25,00,000 pcs of brick per year which yearly price is highest (about BDT 90,00,000) among other products. Dry food positioned in second (BDT 24,00,000) in the perspective of yearly price of production. Workshops did about 10,000 of house construction works per year. And produce about 2 tons of iron product yearly which yearly production price is the lowest (BDT 1,80,000).

Table 4.8: Production amount and their yearly price

Products	Production	Yearly price of products in BDT
Brick	15,00,000-25,00,000 Pcs per year	90,00,000
House Construction	10000.00 Pcs per year	36,00,000
Household Goods (Jhuri, Kula, Chalon, Shaji, Pakha)	1000.00 Pcs per year	2,50,000
Ice Cream	1,80,000-2,20,000 Pcs per year	3,60,000
Dry Food	24000 tons per year	24,00,000
Iron Product	2 tons per year	1,80,000
Rice	10-36 tons per year	3,00,000
Rice & Flour	136 tons per year	8,32,000

Source: Field Survey, 2015

4.10 Mode of Transportation of Raw Materials

About one-third 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-fourth of total industries also used truck as their primary mode of transportation. In addition, about same percentage of industries also used pickup and tempo/*nosimon* as their primary mode of communication.
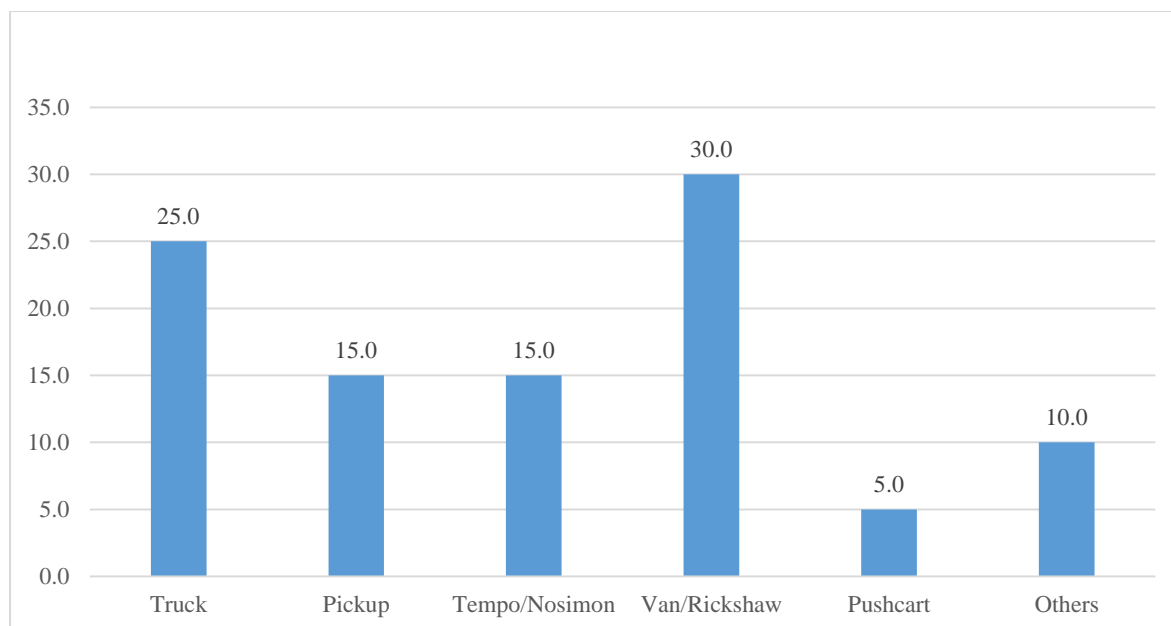
Figure 4.4: Mode of transportation of raw materials (Source: Field Survey, 2015)

4.11 Solid Waste, Management and Environment

a. Waste disposal site

From the survey it has been found that food processing industries make highest amount (100 tons) of solid waste whereas brickfields make about 20 tons of solid waste. And rest of the types of industries produce less than one tons of solid waste. About half of them dispose the waste into roadside. About more than 40% of total industries also use open field as waste disposal site. But the alarming is that about 10% of total industries also use agricultural land as waste disposal site (please see figure 4.5). Moreover, the whole waste is non-refined waste.
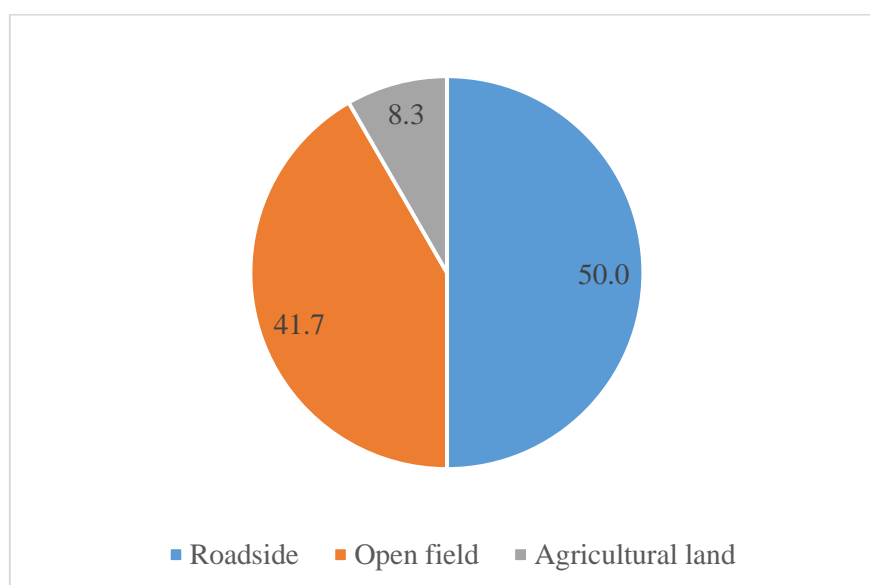
Figure 4.5: Waste disposal site (Source: Field Survey, 2015)

b. Availability of waste treatment system

Moreover, approximately more than 80% of total industries said they do not have any waste treatment system (please see figure 4.6). Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Necessary steps should be taken regarding these.
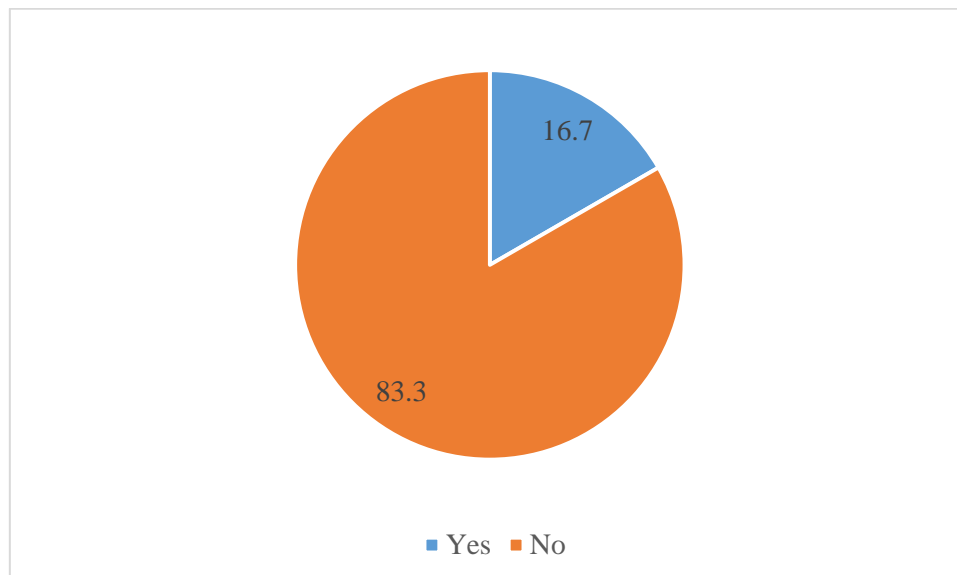
Figure 4.6: Availability of waste treatment system (Source: Field Survey, 2015)

c. Environmental clearance of the industry

Regarding measures taken against pollution generated by the organization about same small percentage of industries said that they use Fix Chimney (brick field) that is free from Environmental Pollution and dumped their waste under soil (food processing).
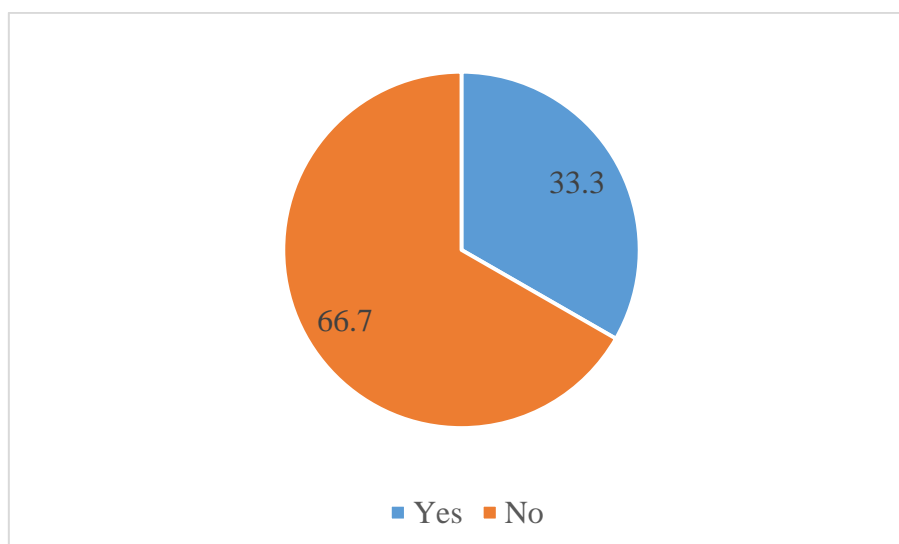
Figure 4.7: Environmental clearance of the industry (Source: Field Survey, 2015)

d. Measures taken against pollution

But alarming is that, about more that 80% of total industries mentioned that they do not take any measurements regarding against pollution (please see figure 4.8). In addition, not a single industries completed their Environmental Impact Assessment (EIA) report and about two third of total industries do not have any environmental clearance of the industry (please see figure 4.7)
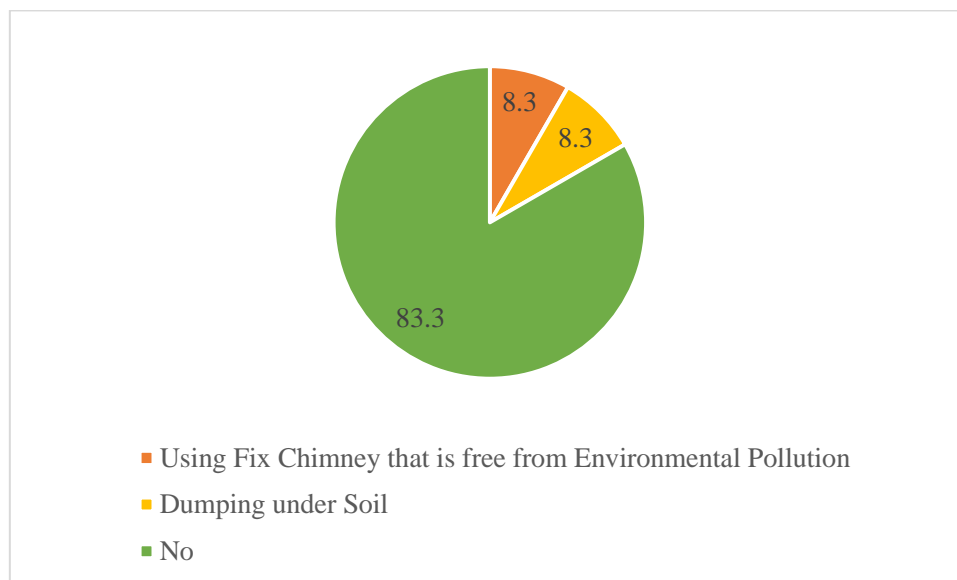
Figure 4.8: Measures taken against pollution (Source: Field Survey, 2015)

4.12 Health Security of the Worker

In approximately one third of total cases, workers have no health security. For some cases (about 8%), owner assist workers only on serious condition. But most of the workers of industries (about 60%) opinioned that owner pays on health security of the workers. Thus, in this case, workers get their rights of treatment in most of the time.
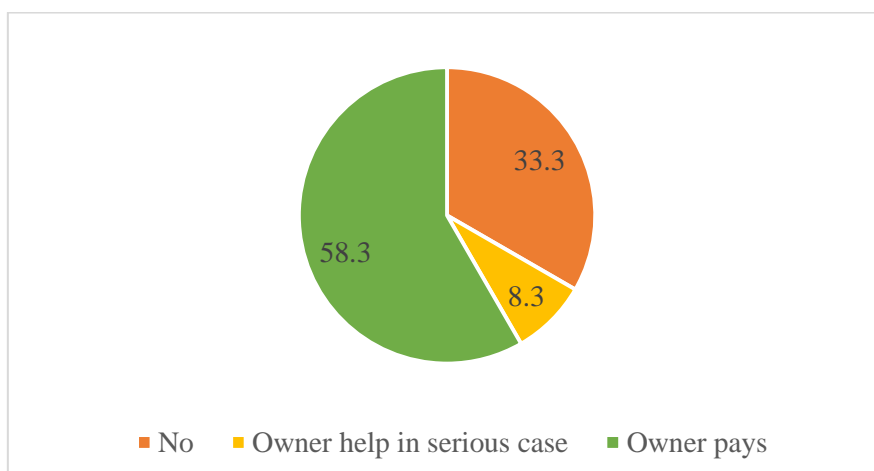
Figure 4.9: Health security of the worker (Source: Field Survey, 2015)

4.13 Problems in the Industries

About 40% (highest) of total industries said that lack of skilled labor is their major problem. About one third of them mentioned that their next major problems are either electricity problem or crisis of fuel. Thus there are lack of skilled laborers in this upazila which is mentioned strongly by the industries.
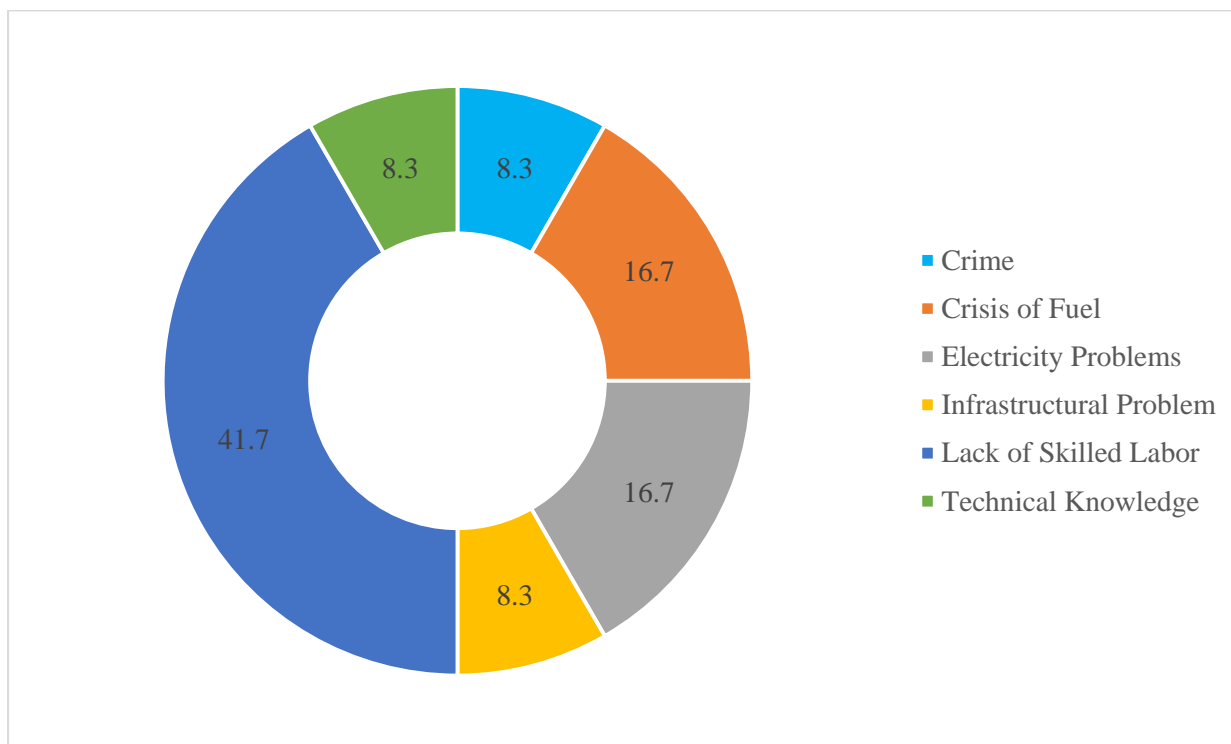
Figure 4.10: Problems in the industry (Source: Field Survey, 2015)

4.14 Suggestions to Solve the Industrial Problems

About half of the total industries notified that the solution of above mentioned problem is supply of skillful labor and uninterrupted electric supply. About 17% also said that enough supply of gas could also be a significant solution regarding the fuel problem.
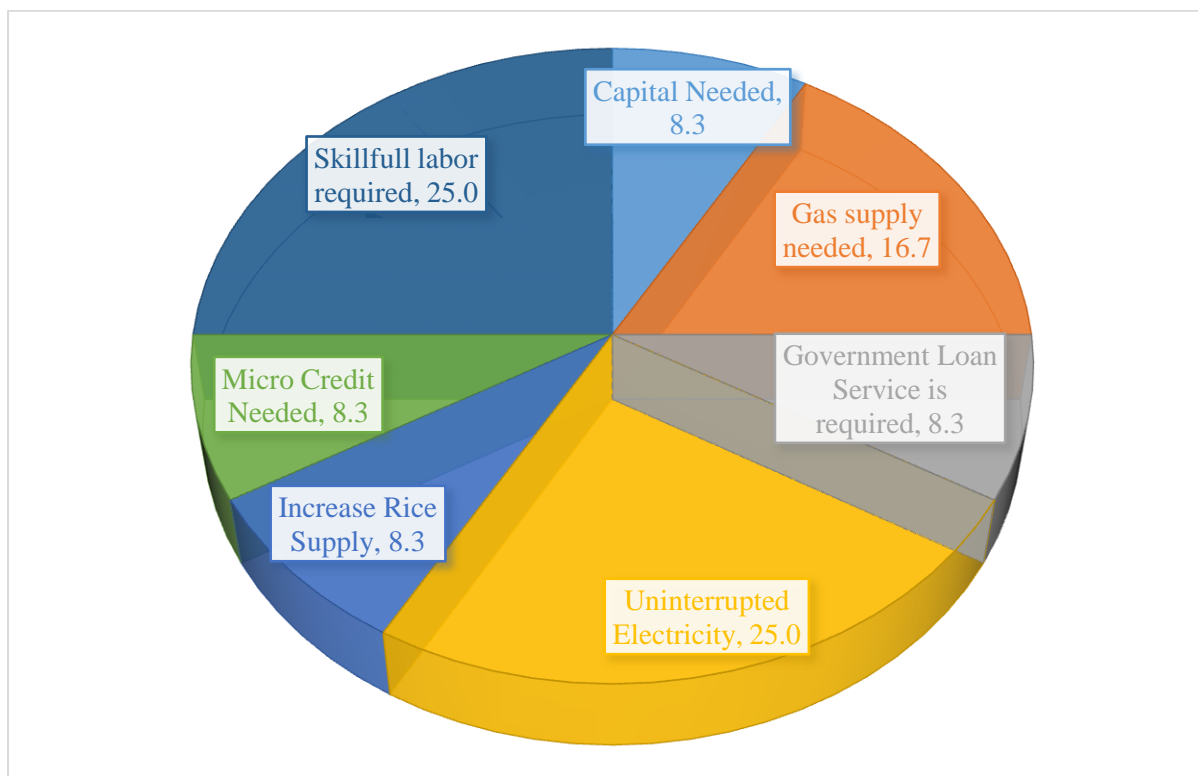
Figure 4.11: Suggestions to solve industrial problems (Source: Field Survey, 2015)

4.15 Government Initiative for Industrial Development in Ishwarganj

Recently Bangladesh Economic Zone Authority (BEZA) has preliminary proposed a "Mymensingh Economic Zone" which is located at Charrammohan Mouza under Rajibpur union, Upazila-Ishwarganj (please see Plate-4.1 to Plate-4.3). The proposed area is almost 177 acres which is located near river Brahmaputra and the other side the upazila-Trishal.
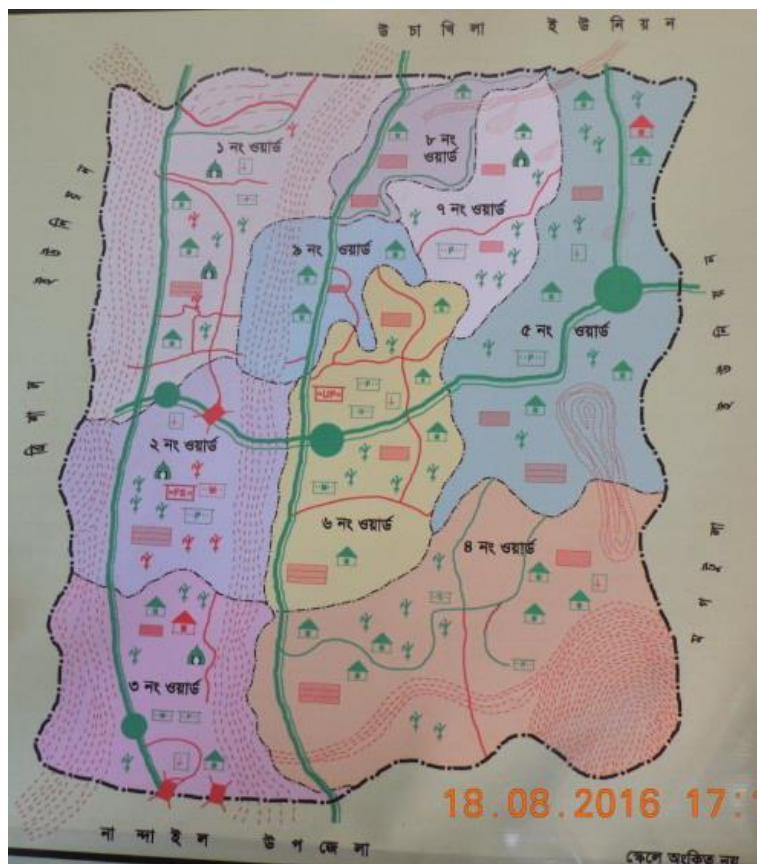
Plate-4.1: Location map of Proposed Mymensingh Economic Zone

Plate-4.2: Existing kutcha road towards river proposed from Latiamara Bazar

Plate-4.3: Brahmaputra river near the Economic Zone area

CHAPTER FIVE: INFORMAL ECONOMIC SURVEY

5.1 Introduction

The major formal types of economic activities in Ishwarganj are: (1) Fish farm; (2) Furniture making; (3) Saw mills; (4) Poultry; (5) Poultry & Fish farm. The locations of interviewed informal economic units are given below:

Table 5.1 Type of Industries with Location

	Fish farm	Furniture making	Saw mills	Poultry	Poultry & Fish farm
Atharabari	0	0	0	0	0
Barahit	0	0	0	0	1
Rajibpur	0	0	0	0	0
Sohagi	1	1	2	2	0
Uchakhila	0	0	0	0	0

Source: Field survey 2015

One fish farm has found at Sohagi union and it supplies fish based food demand in Ishwarganj. One furniture making economic unit is located at Sohagi. There are also two saw mills are found in Sohagi those are plays vital role to develop wood based household and other infrastructure development in Ishwarganj. Total two poultry farms are found at Sohagi that plays vital role to meet the meat supply demand at the area. One poultry and fish farm, combined function is found at Barahit. Total one economic unit was surveyed in Barahit union. Total 6 economic units were surveyed in Sohagi, none in both Rajibpur and Uchakhila unions.

5.2 Ownership Pattern

Most of the informal economic units (about 86%) 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 4.1).
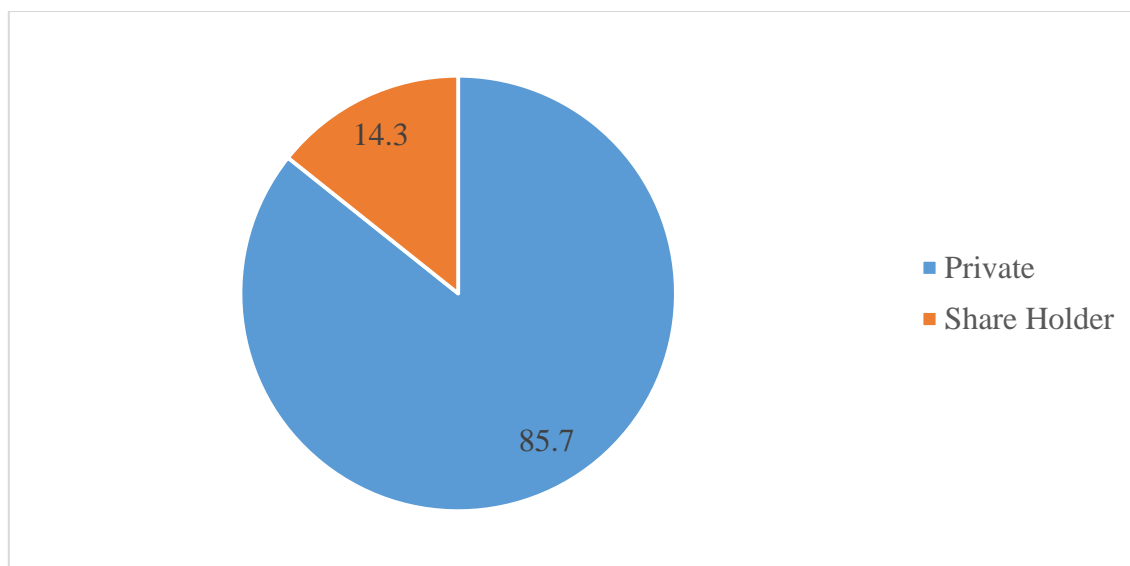
Figure 5.1: Ownership patterns of formal economic units (Source: Field Survey, 2015)

5.3 Area Occupied

It has been found that about more than half (about 58%) of total informal economic units needs area less than 0.1 acre. This types of economic units are mainly the poultry and saw mills. About 30% of them also needs more than 0.1 but less than 0.6 acres. In addition, the fish farm and some of saw mills mainly need more land (more than 0.6 acre) than others (Please see figure 4.2)
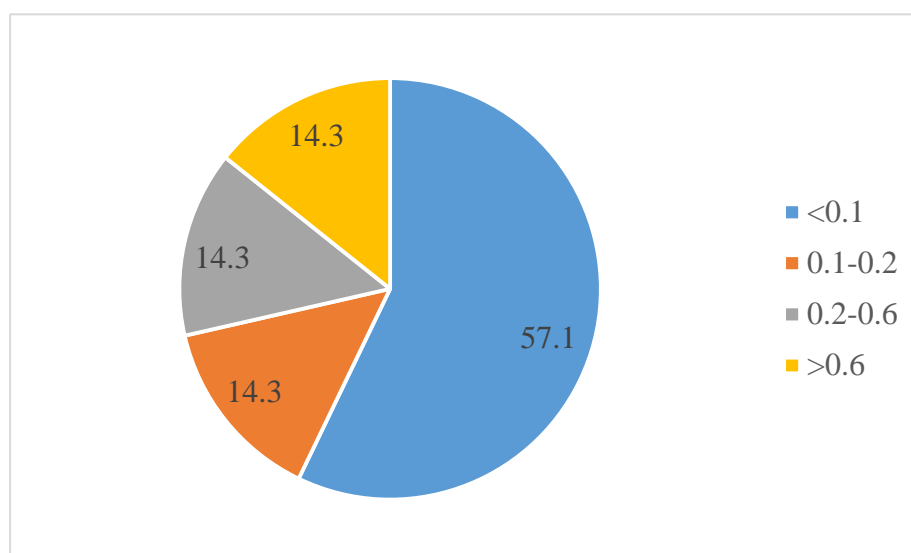
Figure 5.2: Area occupied by formal economic units in acre (Source: Field Survey, 2015)

5.4 Number of Employees

It has been found that almost all of the saw mills need employees between 4 to 6. On the other hand, Poultry can manage their business with less than 3 employees. Poultry and Fish

farm need employees between 7 and 10. The highest number of employees (more than 10) is required by the fish farms.

Table 5.2: Distribution of no. of employees (in percentage) by types of industries

	1-3 persons	4-6 persons	7-10 persons	>10 persons
Saw mills		100		
Poultry	100			
Poultry and Fish farm			100	
Fish farm				100
Furniture making		100		

 Source: Field Survey, 2015

5.5 Number of Labors

It has been found that almost all of the saw mills need labor less than 6. About half of them can manage their works using 3 labors. On the other hand, Poultry can manage their business with less than 3 labors. Poultry and Fish farm need labors between 7 and 10. The highest number of labors (more than 10) is required by the fish farms.

Table 5.3: Distribution of no. of labors (in percentage) by types of industries

	1-3 persons	4-6 persons	7-10 persons	>10 persons
Saw mills	50	50		
Poultry	100			
Poultry and Fish farm			100	
Fish farm				100
Furniture making		100		

 Source: Field Survey, 2015

5.6 Male-Female Ratio in Different Types of Industries

It has been found that, in informal economy also there are significantly low or no participation of women. In poultry and fish farm, only about 13% female employees have been found. In rest of the informal economic types women are totally absent. Thus awareness program or other appropriate steps should be taken regarding these.
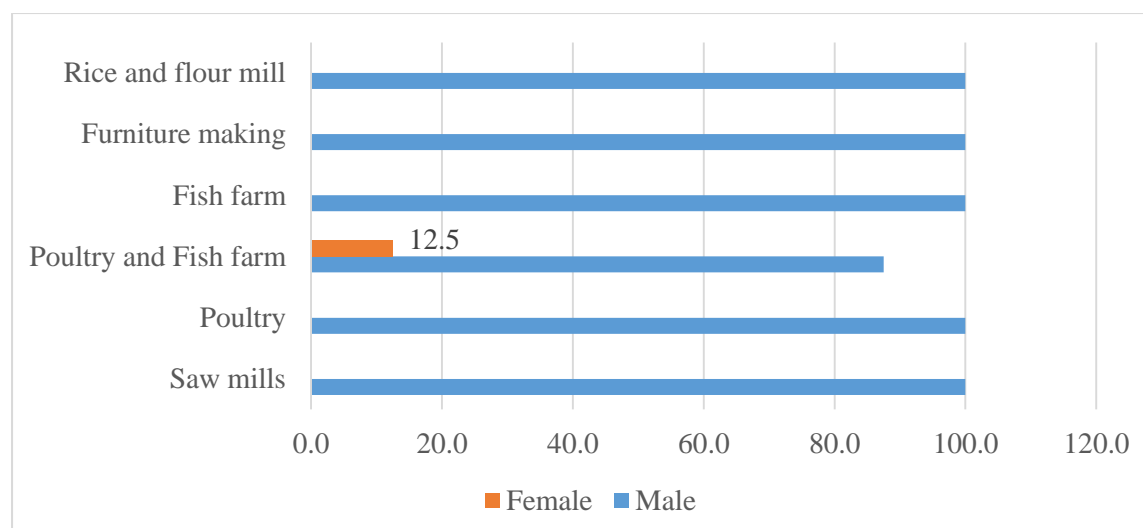
Figure 5.3: Male-Female Ratio in Different Types of Industries (Source: Field Survey, 2015)

5.7 Raw Materials

5.7.1   Major Raw Materials

Major raw materials vary by different types of informal industries. For instance, major raw materials for saw mills is tree, whereas Rein tree and Karai Tree are the major raw materials for Furniture making. Again chicken and hen are one of the major raw materials for poultry and fish farms. And their source of all kinds of raw materials are local market. Thus local markets are sufficient enough to supply the demands for these informal economies.

Table 5.4: Major raw materials

	Chicken	Fish Pona	Rein tree and Karai Tree	Tree
Saw mills				100.0%
Poultry	100.0%			
Poultry and Fish farm	50.0%	50%		
Fish farm		100.0%		
Furniture making			100.0%	

Source: Field Survey, 2015

5.7.2   Minor Raw Materials

Apart from the major raw materials, only poultry and fish farms need some minor raw materials. They need Pituitary Gland Medicine for their farms. In addition, they also mentioned that the foods required for their farms are another important raw material.

5.8 Products and Their Market

Poultry and fish farms are going outside the upazila area to sell their products after meeting demands of the area. Poultry and Fish farms exported about 80% of their products outside the upazila. Some of their exported areas are Dhaka, Sylhet, B. Baria and elsewhere. Those who has only poultry farms about half of their total productions are exported beyond the upazila

boundary. They mentioned that, their products mainly got exported to Kishorganj. Apart from these, saw mills and furniture making economic units' product only support the local needs.

Table 5.5: Products and Their Market

Industries	Product	Local	Others
Saw mills	Wood	100.0	0.0
Poultry	Chicken	50.0	50.0
Poultry and Fish farm	Chicken, Fish	20.0	80.0
Fish farm	Fish	80.0	20.0
Furniture making	Furniture	100.0	0.0

Source: Field Survey, 2015

In below table production of different products in this upazila and their yearly price has been given. Here, brick fields produced about 15,00,000-25,00,000 pcs of brick per year which yearly price is highest (about BDT 90,00,000) among other products. Dry food positioned in second (BDT 24,00,000) in the perspective of yearly price of production. Workshops did about 10,000 of house construction works per year. And produce about 2 tons of iron product yearly which yearly production price is the lowest (BDT 1,80,000).

Table 5.6: Production amount and their yearly price

Products	Production	Yearly price of products in BDT
Saw mills	18,900 units per year	5,35,000
Poultry	2,65,000 pcs per year	5,50,12,500
Poultry and Fish farm	50 tons per year	1,70,00,000
Fish farm	30 tons per year	2000000
Furniture making	60 pcs per year	420000

Source: Field Survey, 2015

5.9 Mode of Transportation of Raw Materials

About half of total informal economic units use Van/Rickshaw as their primary mode of transportation for raw materials. This is because, as discussed earlier the major source of raw materials are the local markets. Moreover, about one-fourth of total informal economic units also used pickup as their primary mode of transportation. In addition, about 16% of informal economic units also used truck as their primary mode of communication.
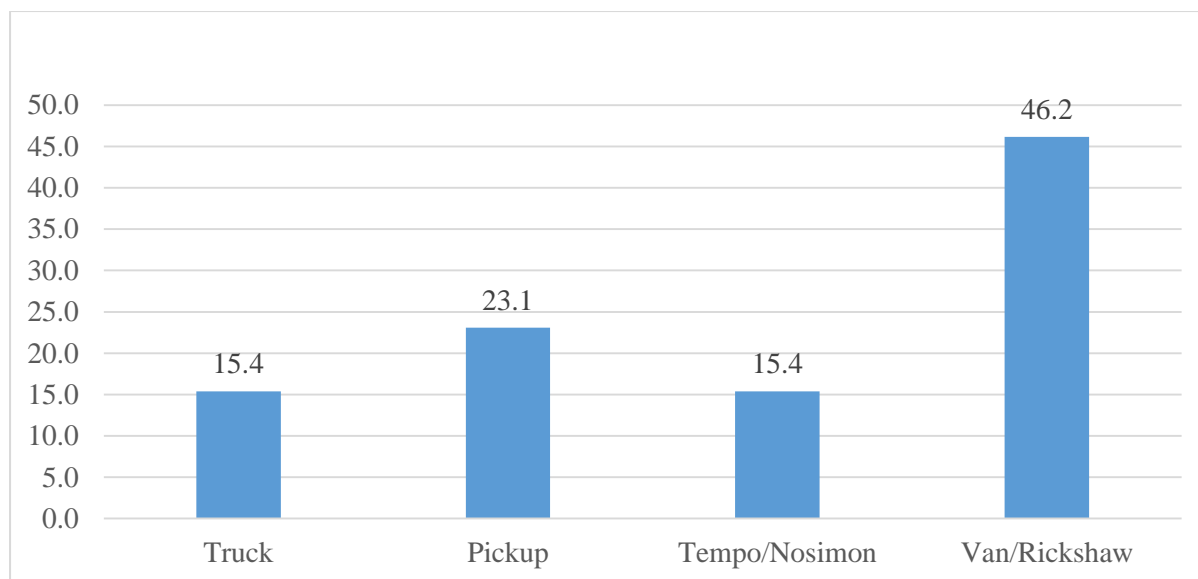
Figure 5.4: Mode of transportation of raw materials (Source: Field Survey, 2015)

5.10   Solid Waste, Management and Environment

From the survey it has been found that poultry and fish farms make highest amount (50 tons) of solid waste. Saw mill and only poultry farms make about 2 tons of solid waste yearly. And rest of the types of industries produce less than one tons of solid waste. About more than half of them dispose the waste into roadside. About more than one fourth of total informal economic units also use open field as waste disposal site. But the alarming is that about 15% of them also use agricultural land as waste disposal site (please see figure 4.5). Moreover, the waste contained both of refined and non-refined waste.
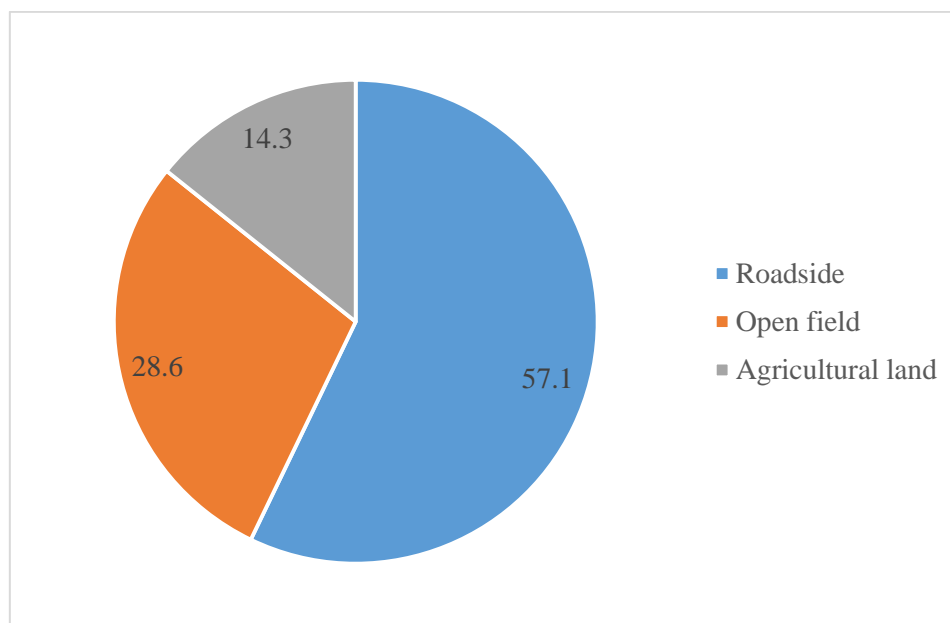
Figure 5.5: Waste disposal site (Source: Field Survey, 2015)

Moreover, approximately more than 85% of total informal economic units said they do not have any waste treatment system (please see figure 5.6). Thus, the waste disposal condition of the industries of this upazila is unhealthy and unplanned. Necessary steps should be taken regarding these.
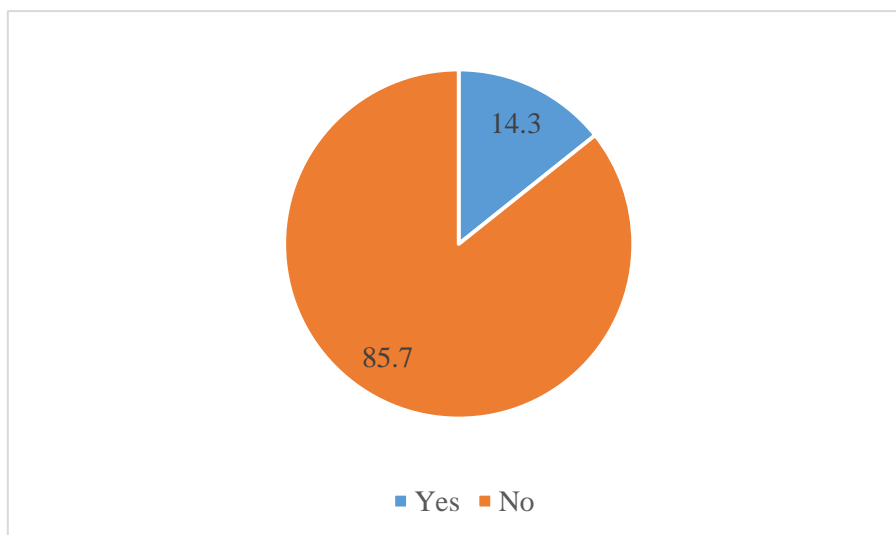
Figure 5.6: Availability of waste treatment system (Source: Field Survey, 2015)

Regarding measures taken against pollution generated by the organization about 15% of informal economic units (poultry farms) mentioned that they dumped the waste under the soil, thus it could produce the fertilizer.

But alarming is that, about more that 85% of total industries mentioned that they do not take any measurements regarding against pollution (please see figure 4.7). In addition, not a single economic units completed their Environmental Impact Assessment (EIA) report and do not have any environmental clearance (please see figure 5.7)
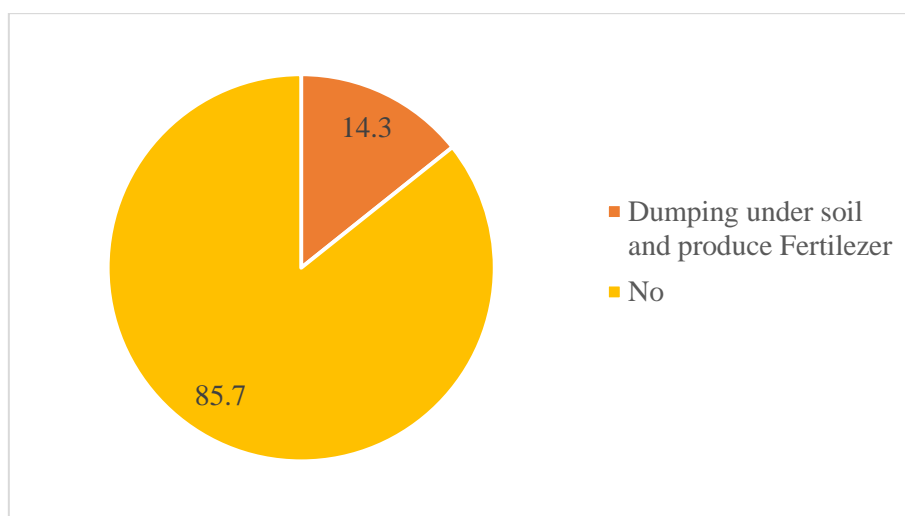
Figure 5.7: Measures taken against pollution (Source: Field Survey, 2015)

5.11   Health Security of the Worker

Most of the workers of industries (about three fourth of total) owner pays on health security of the workers. And rest of the cases the organization pay the health expenditures. Thus, in this case, workers get their rights of treatment in most of the time.
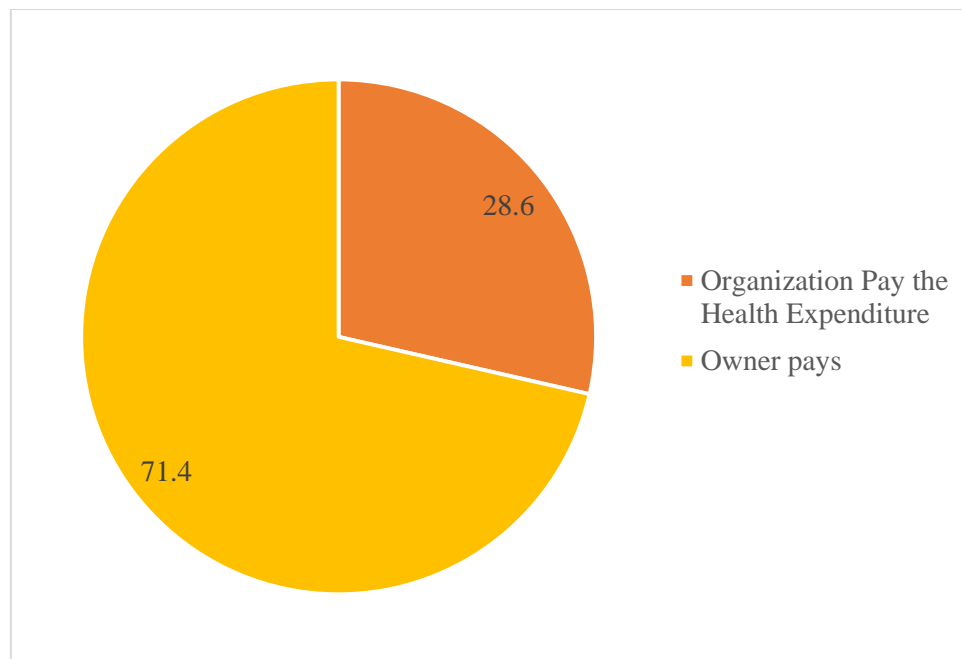
Figure 5.8: Health security of the worker (Source: Field Survey, 2015)

5.12   Problems in the Industries

About more than half (highest) of total informal economic units said that lack of skilled labor is there major problem. About 30% of them also mentioned that their next major problems infrastructure problem. Thus there are lack of skilled labor in this upazila which is mentioned strongly by the industries. The least priority for the major problems towards them is electricity problem.
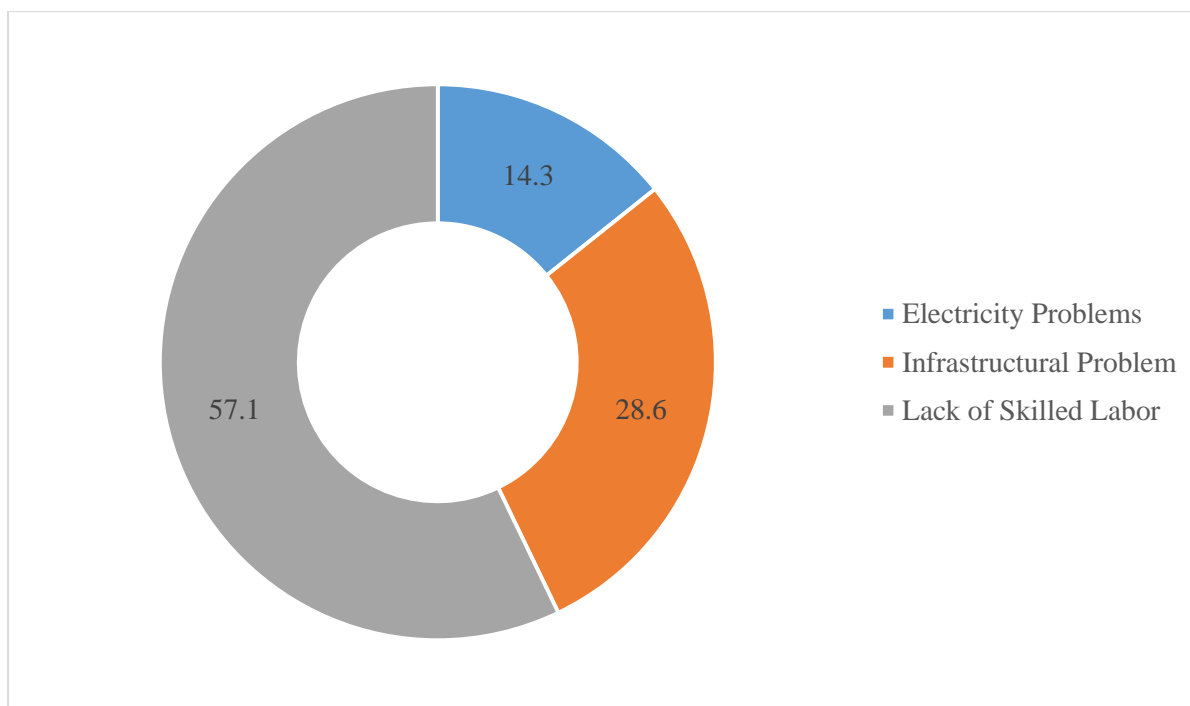
Figure 5.9: Problems in the industry (Source: Field Survey, 2015)

5.13   Suggestions to Solve the Problems

About more than half of the total economic units notifies that the solution of above mentioned problem could be government loan to them with low interest. Rest of them equally give the priority to the requirement of skilled labors and capitals needed, for them.
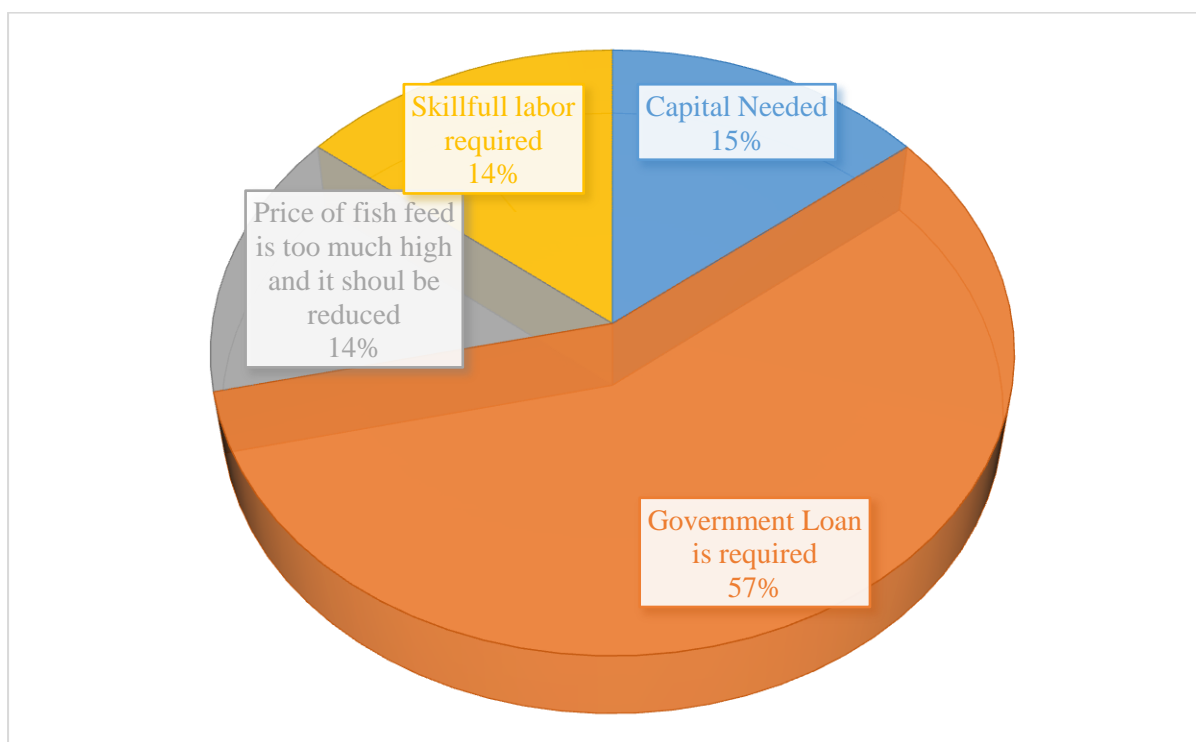
Figure 5.10: Suggestions to solve industrial problems (Source: Field Survey, 2015)

Chapter 6: Conclusion and Policy Framework

Ishwarganj 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. So, there is immense need to build new industries. Bangladesh Economic Zone Authority (BEZA) has already preliminary proposed a "Mymensingh Economic Zone" which is located at Charrammohan Mouza under Rajibpur union, Upazila-Ishwarganj. The proposed area is almost 177 acres which is located near river Brahmaputra and the other side the upazila-Trishal. Thus, there is immense importance of knowing the formal-informal economy of this area before establishing a new economic zone. Most of the economic units of this area are in private ownership. And one of the major economic success of this area is the local markets are enabled to meet the need of the local economic units of this area. 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 small percentages of total economic units have consciousness about the management of generated waste and the problems created by these industries. Lack of skilled labor has been mentioned as major problems of the area. Whereas, a huge percentage of informal economic unit wants government's helping hand towards them by providing loan on small interest. 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 শিল্প কারখানা (বৃহৎ, ক্ষুদ্র, মাঝারি ও কুটির)**

    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   ☐ প্রক্রিয়াজাত সাদা মাছ   ☐ দুধ ও দুগ্ধজাত খাবার   ☐ গৃহস্থালির পণ্যসামগ্রী
☐ ইট ভাটা   ☐ পাটজাত দ্রব্য   ☐ প্যাকেটজাত খাবার   ☐ প্লাস্টিকের পণ্য
☐ বোতলকৃত তরল প্রাকৃতিক গ্যাস   ☐ ডিম   ☐ সুতা ও বস্ত্র   ☐ অন্যান্য (উল্লেখ করুন) ঃ
☐ 'স' মিল

    (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 ঃ
....
....
....

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   ☐ দুর্নীতি   ☐ শ্রমিক অসন্তোষ

৪.২১. সমস্যা সমাধানের পরামর্শ থাকলে তার বিবরণ ঃ

....
....
....
....

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

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
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, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

FINAL SURVEY REPORT

Transportation Survey
of
Ishwarganj **Upazila, Mymensingh**

September, 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/ Transportation Survey Report/ Ishwarganj 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 Transportation Survey Report of Ishwarganj Upazila, Mymensingh.

Dear Sir,
We are pleased to submit herewith the Final Transportation Draft Survey Report of Ishwarganj Upazila, Mymensingh for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)   (Dr. Shahid Mamun)
Team Leader, Package -2   Transportation Expert, 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

The future progress of Ishwarganj Upazila depends mostly how the transportation of that area functions. It is the main element around which other facilities and development revolves. To achieve this, five types of traffic and transportation survey have been carried out at Ishwarganj namely Traffic Volume Count Survey, Origin and Destination (O D) Survey, Pedestrian Survey, Bus Passenger Interview Survey and finally Regional Transportation Network Survey.

In Traffic Volume Count Survey, three major intersections namely Muktijoddha Moor, Atharabari Moor and Lakshiganj Bazar Moor have been studied. In addition, two roadway segments were also carried out in Uchakhila Bazar (Rajibpur-Uchakhila Segment) and in front of BRAC Office (Mymensingh-Kishoreganj Segment). Hat Day and Non Hat Day has been taken into consideration for each intersection and roadway segment. Monday and Friday are the serving as Hat Day at Ishwarganj Upzila. From survey, it has been found that in Athrabari Intersection, Netrokona Link has highest PCE which is 398.50. The Muktijoddha Moor is the busiest road of Ishwarganj upazila where more than 800 vehicle/hour are plying in the link of Mymensingh and Kishoreganj. In Lankshiganj Bazar, The Kishoreganj and Ishwarganj Link has comparatively higher traffic volume/hour than Jatia and Uchakhali Link. Moreover, Muktijoddha-Mymensingh and Muktijoddha-Kishoreganj link of Muktijoddha Moor Intersection have the highest volume of traffic in both Hat Day and Non Hat Day. In Athrabari Intersection, Atharabrai- Rayer Bazar has lowest traffic volume which is160 at Hat Day. In Lakshiganj Bazar, Lakshiganj-Uchakhali and Lakshiganj-Jatia have comparatively smaller volume of traffic. In two roadway segments (BRAC Office and Uchakhali Bazar) that have been surveyed for traffic volume count, it has been found that in both sections have,lower volume of traffic respectively 386 and 247 vehicle /hour**.**

In O-D Survey, it has been found that people lean to travel internally within Unions and also travel other Upazilas and Districts. People from Ishwarganj also travel in different unions for their trip purposes. It is also found that people from Ishwarganj travel most in Mymensingh as it belongs under the jurisdiction of Mymensingh District. And the trip distribution is going on most in nearest Upazilas like Bhairab, Kishoreganj. In case of mode choices. It was found that most of the people travel by auto rickshaw/tempo and the Second most popular mode is Bus. About 44% people choose bus for travelling whereas the percentage of car/pickup is very few like as rickshaw/van and truck. Only 1% use bicycle.

In Pedestrian survey, it has been found that pedestrian are mostly moved in Muktijoddha Moor where more than 1 person/minute is moving in different links. It is much busy in both Hat Day and Non Hat Day. Muktijoddha-Atharabari Link has highest movement of pedestrian. In Atharabari and Lakshiganj Bazar

intersections, pedestrian density is almost same but not so much busy like Muktijoddha Moor. It is also seen that people travel main center of the Upazila from almost every union. On the survey day, People from Rajibpur Union travel most at the selected survey locations. In case of travel expenditure, it was found within 50 takas, few travel within 5 km, few travel within 15 km and even some people travel more than 20 km. Because people prefer long commuter vehicles when they have to travel longer distance. But in case of shorter distance they prefer different modes such as Auto rickshaw, tempo etc.

Regional transport network survey has been done for Buses, Trucks and Trains which are coming into study area and going out form study area. It has been found that the percentage of buses travel in Mymensingh is higher. Buses are traveling in Kendua, Netrokona, Kishoreganj in frequently. And trips are creating by buses or trucks in other Districts/ Upazilas such as Dhaka, Khulna, and Chittagong in daily basis. Most of the buses has more than 35 persons carrying capacity. Bus stands have been seen in Ishwarganj Bus Stand and Atharobari Bus Stand where buses stop or starts for their journey. 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.

Ishwarganj Upazila has great potentiality because of having regional connectivity with other regions and train connectivity with several important regions. The survey results will help to future transport demand, transport modeling, a system for developing the transportation system of Ishwarganj.

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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Plate-2: Traffic Volume Count Survey at Uchakhila Intersection, Ishwarganj

Plate-2: Traffic Volume Count Survey at Attharbari Bazar, Ishwarganj

Plate-2: Traffic Volume Count Survey at Lakhsmiganj Bazar, Ishwarganj

ORIGIN AND DESTINATION SURVEY

Table B-1: Types of Mood

Types of Vehicle	Frequency	Percent
Auto Rickshaw/Tempo	31	49.2
Bicycle	1	1.6
Bus	28	44.4
Car/Pickup/Jeep/Motorbus	1	1.6
Rickshaw/Van	1	1.6
Truck	1	1.6
Total	63	100

Table B-2: Trip Purpose

Trip Purpose	Frequency	Percent
Business related	4	6.3
Education	4	6.3
Shopping	3	4.8
Social	19	30.2
Treatment	2	3.2
Work/Commute	31	49.2
Total	63	100

Table B-3: Nature of Origin

Origin Type	Frequency	Percent
Residence	38	60.3
School/College/University	2	3.2
Shopping	4	6.3
Social	7	11.1
Workplace	12	19
Total	63	100

Table B-4: Nature of Destination

Destination Type	Frequency	Percent
Hospital	2	3.2
Residence	21	33.3
School/College/University	3	4.8
Social	10	15.9
Workplace	27	42.9
Total	63	100

Table B-5: Origin and Destination Pattern

Origin ＼ Destination			Destination Pattern					
			Hospital	Reside nce	School/Col lege/Unive rsity	Social	Work place	Tot al
Origin Pattern	Residence	Frequency	2	0	3	10	23	38. 00
		Percentage	5.30%	0.00%	7.90%	26.3%	60.5 %	100 %
	School/College/ University	Frequency	0	2	0	0	0	2.0 0
		Percentage	0.00%	100.0 %	0.00%	0.00%	0.00 %	100 %
	Shopping	Frequency	0	4	0	0	0	4.0 0
		Percentage	0.00	100.0	0.00	0.00	0.00 %	100 %
	Social	Frequency	0	7	0	0	0	7.0 0
		Percentage	0.00%	100.0 %0	0.00%	0.00%	0.00 %	100 %
	Workplace	Frequency	0	8	0	0	4	12. 00
		Percentage	0.00%	66.70 %	0.00%	0.00%	33.30 %	100 %
	Total	Frequency	2	21	3	10	27	63. 00
		Percentage	3.20%	33.30 %	4.80%	15.90%	42.90 %	100 %

Table B-6: Trip Purpose

Trip Purpose	Frequency	Percent
Business related	4	6.3
Education	4	6.3
Shopping	3	4.8
Social	19	30.2
Treatment	2	3.2
Work/Commute	31	49.2
Total	63	100

Table B-7: Frequency of Passengers Occupancy

No. of people in vehicle	Frequency	Percent
Within 5 persons	11	17.5
6 to 10 persons	21	33.3
11 to 15 persons	5	7.9
26 to 30 persons	7	11.1
31 to 35 persons	5	7.9
Above 40 persons	14	22.2
Total	63	100

PASSENGERS INTERVIEW SURVEY

Table B-8: Trip Purpose of Bus Passengers

Trip Purpose	Frequency	Percent
Business related	4	5.1
Recreation	1	1.3
Shopping	14	17.7
Social	40	50.6
Treatment	1	1.3
Work/Commute	19	24.1
Total	79	100

Table B-9: Modes used by Bus Passengers

Types of Mode	Frequency	Percent
Bus/Motor Cycle/Rickshaw	4	5.56
Motor Cycle	24	33.33
Rickshaw	41	56.94
Rickshaw/Van	1	1.39
Van	1	1.39
Van/Rail	1	1.39
Total	72	100

Table B-10: 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-11: 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-12: 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-13: 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-14: Trip Purpose according to the Age pattern

Trip Purpose / Age		Trip Purpose						
		Business related	Recreation	Shopping	Social	Treatment	Work/ Commute	Total
16-20 Years	Frequency	0	0	7	4	0	0	11
	Percentage	0.00%	0.00%	63.60%	36.40%	0.00%	0.00%	100.00%
21-30 Years	Frequency	0	1	7	14	1	8	31
	Percentage	0.00%	3.20%	22.60%	45.20%	3.20%	25.80%	100.00%
31-40 Years	Frequency	1	0	0	7	0	3	11
	Percentage	9.10%	0.00%	0.00%	63.60%	0.00%	27.30%	100.00%
41-50 Years	Frequency	2	0	0	5	0	3	10
	Percentage	20.00%	0.00%	0.00%	50.00%	0.00%	30.00%	100.00%
Above 51 years	Frequency	1	0	0	9	0	5	15
	Percentage	6.70%	0.00%	0.00%	60.00%	0.00%	33.30%	100.00%
Below 15 Years	Frequency	0	0	0	1	0	0	1
	Percentage	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
Total	Frequency	4	1	14	40	1	19	79
	Percentage	5.10%	1.30%	17.70%	50.60%	1.30%	24.10%	100.00%

Table B-15: Trip frequency according to the Gender

Trips/week			Trips per week							
Sex			1 trip	2 trips	3 trips	More than 3 times	Everyday	Randomly in Month	Randomly in year	Total
Sex	Female	Frequency	2	0	1	0	0	2	6	11
		Percentage	18.20%	0.00%	9.10%	0.00%	0.00%	18.20%	54.50%	100.00%
	Male	Frequency	9	6	3	6	4	21	19	68
		Percentage	13.20%	8.80%	4.40%	8.80%	5.90%	30.90%	27.90%	100.00%
	Total	Frequency	11	6	4	6	4	23	25	79
		Percentage	13.90%	7.60%	5.10%	7.60%	5.10%	29.10%	31.60%	100.00%

Table B-16: Trip Cost according to the Distance

Distance		Total Distance								
Travel Cost		Within 5 km	6 to 10 km	11 to 15 km	16 to 20 km	21 to 30 km	31 to 40 km	41 to 50 km	More than 51 km	Total
Travel Cost	Within 50 taka	2	1	2	3	7	6	7	2	30
	51 to 100 taka	0	0	0	0	2	7	4	8	21
	101 to 150 taka	0	1	0	0	0	1	0	10	12
	151 to 200 taka	0	0	0	0	0	0	1	1	2
	201 to 250 taka	0	0	0	0	1	0	0	3	4
	251 to 300 taka	0	0	0	0	0	0	0	5	5
	More than 300 taka	0	0	0	0	0	0	0	4	4
	Total	2	2	2	3	10	14	12	33	78

REGIONAL TRANSPORT SURVEY

Table B-17: Trip Frequency by Regional Bus

No. of trips/Day	Frequency	Percentage
1 trip	9	64
2 trips	3	22
More than 2 trips	2	14

Table B-18: Regional Network with surrounding Upazilas/Districts

Origin & Destination in Upazila/District	Frequency	Percentage
Sylhet	2	7.14
Chittagong	3	10.71
Moulovi Bazar	1	3.57
Dhaka	5	17.86
Kishoreganj	1	3.57
Khulna	1	3.57
Bhairab	1	3.57
Narikeltala	1	3.57
Mymensingh	4	14.29
Sherpur	1	3.57
Rajshahi	1	3.57
Ishwarganj	2	7.14
Kishoreganj	1	3.57
Kendua	2	7.14
Netrokona	2	7.14

Table B-19: Regional Bus Survey

Survey location	Company/ Agency name	Origin point	Destination point	No. of trips/ Day	Average no. of passengers per trip	Major stoppage area inside the Upazila
Ishwarganj Bus Stand	Anan Paribahan	Mymensingh	Sylhet	1	38	Ishwarganj Bus Stand
Ishwarganj Bus Stand	ShamimParibahan	Sherpur	Chittagong	1	40	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Relax Paribahan	Dhaka	Chittagong	1	45	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Jalalabad Paribahan	Mymensingh	Sylhet	1	42	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Anik Travels	Rajshahi	Moulovi Bazar	1	50	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Alam Bangla	Ishwarganj	Dhaka	2	46	Ishwarganj Bus Stand
Ishwarganj Bus Stand	M. K Paribahan	Mymensingh	Kishoreganj	7	42	Ishwarganj Bus Stand
Ishwarganj Bus Stand	BRTC	Kishoreganj	Khulna	1	50	Ishwarganj Bus Stand
Ishwarganj Bus Stand	BRTC	Ishwarganj	Dhaka	1	45	Ishwarganj Bus Stand
Ishwarganj Bus Stand	ShamolChaya	Mymensingh	Bhairab	2	46	Ishwarganj Bus Stand
Atharobari Bus Stand	Ishakha Service	Kendua	Dhaka	5	45	Atharobari Bus Stand
Atharobari Bus Stand	NiloyParibahan	Kendua	Dhaka	2	45	Atharobari Bus Stand
Atharobari Bus Stand	Shanti Promise Paribahan	Netrokona	Chittagong	1	50	Atharobari Bus Stand
Atharobari Bus Stand	S. S Travels	Netrokona	Narikeltala	1	42	Atharobari Bus Stand

Table B-20: Regional Truck Survey

Survey location	Origin point	Destination point	No. of trips/week	Major stoppage area inside the Upazila	Types of goods carried
Ishwarganj Bus Stand	Mymensingh	Kendua	2	Ishwarganj, Atharobari	Cosmetic, Sugar, Salt
Ishwarganj Bus Stand	Ishwarganj	Dhaka	4	Ishwarganj	Vegetables, Jalpai
Ishwarganj Bus Stand	Ishwarganj	Sylhet	2	Ishwarganj	Vegetables, Jalpai
Ishwarganj Bus Stand	Ishwarganj	Kapasia, Gazipur	3	Ishwarganj	Paddy

Table B-21: Regional Railway Survey

Survey location	Company/ Agency name	Origin points	Destination points	No. of trips/Day
Ishwarganj Train Station	Ishakha Express	Mymensingh	Dhaka	1
	Nasirabad Train	BahadurabadGhat	Chittagong	1
	Kasari Train	Mymensingh	Bhairab	1
	Intercity Train	Mymensingh	Dhaka	1

ORIGIN AND DESTINATION SURVEY

Table B-1: Types of Mood

Types of Vehicle	Frequency	Percent
Auto Rickshaw/Tempo	31	49.2
Bicycle	1	1.6
Bus	28	44.4
Car/Pickup/Jeep/Motorbus	1	1.6
Rickshaw/Van	1	1.6
Truck	1	1.6
Total	63	100

Table B-2: Trip Purpose

Trip Purpose	Frequency	Percent
Business related	4	6.3
Education	4	6.3
Shopping	3	4.8
Social	19	30.2
Treatment	2	3.2
Work/Commute	31	49.2
Total	63	100

Table B-3: Nature of Origin

Origin Type	Frequency	Percent
Residence	38	60.3
School/College/University	2	3.2
Shopping	4	6.3
Social	7	11.1
Workplace	12	19
Total	63	100

Table B-4: Nature of Destination

Destination Type	Frequency	Percent
Hospital	2	3.2
Residence	21	33.3
School/College/University	3	4.8
Social	10	15.9
Workplace	27	42.9
Total	63	100

Table B-5: Origin and Destination Pattern

Origin \ Destination			Destination Pattern					
			Hospital	Residence	School/College/University	Social	Work place	Total
Origin Pattern	Residence	Frequency	2	0	3	10	23	38.00
		Percentage	5.30%	0.00%	7.90%	26.3%	60.5%	100%
	School/College/University	Frequency	0	2	0	0	0	2.00
		Percentage	0.00%	100.0%	0.00%	0.00%	0.00%	100%
	Shopping	Frequency	0	4	0	0	0	4.00
		Percentage	0.00	100.0	0.00	0.00	0.00%	100%
	Social	Frequency	0	7	0	0	0	7.00
		Percentage	0.00%	100.0%0	0.00%	0.00%	0.00%	100%
	Workplace	Frequency	0	8	0	0	4	12.00
		Percentage	0.00%	66.70%	0.00%	0.00%	33.30%	100%
	Total	Frequency	2	21	3	10	27	63.00
		Percentage	3.20%	33.30%	4.80%	15.90%	42.90%	100%

Table B-6: Trip Purpose

Trip Purpose	Frequency	Percent
Business related	4	6.3
Education	4	6.3
Shopping	3	4.8
Social	19	30.2
Treatment	2	3.2
Work/Commute	31	49.2
Total	63	100

Table B-7: Frequency of Passengers Occupancy

No. of people in vehicle	Frequency	Percent
Within 5 persons	11	17.5
6 to 10 persons	21	33.3
11 to 15 persons	5	7.9
26 to 30 persons	7	11.1
31 to 35 persons	5	7.9
Above 40 persons	14	22.2
Total	63	100

PASSENGERS INTERVIEW SURVEY

Table B-8: Trip Purpose of Bus Passengers

Trip Purpose	Frequency	Percent
Business related	4	5.1
Recreation	1	1.3
Shopping	14	17.7
Social	40	50.6
Treatment	1	1.3
Work/Commute	19	24.1
Total	79	100

Table B-9: Modes used by Bus Passengers

Types of Mode	Frequency	Percent
Bus/Motor Cycle/Rickshaw	4	5.56
Motor Cycle	24	33.33
Rickshaw	41	56.94
Rickshaw/Van	1	1.39
Van	1	1.39
Van/Rail	1	1.39
Total	72	100

Table B-10: 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-11: 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-12: 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-13: 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-14: Trip Purpose according to the Age pattern

Trip Purpose / Age			Trip Purpose						
			Business related	Recreation	Shopping	Social	Treatment	Work/ Commute	Total
Age pattern	16-20 Years	Frequency	0	0	7	4	0	0	11
		Percentage	0.00%	0.00%	63.60%	36.40%	0.00%	0.00%	100.00%
	21-30 Years	Frequency	0	1	7	14	1	8	31
		Percentage	0.00%	3.20%	22.60%	45.20%	3.20%	25.80%	100.00%
	31-40 Years	Frequency	1	0	0	7	0	3	11
		Percentage	9.10%	0.00%	0.00%	63.60%	0.00%	27.30%	100.00%
	41-50 Years	Frequency	2	0	0	5	0	3	10
		Percentage	20.00%	0.00%	0.00%	50.00%	0.00%	30.00%	100.00%
	Above 51 years	Frequency	1	0	0	9	0	5	15
		Percentage	6.70%	0.00%	0.00%	60.00%	0.00%	33.30%	100.00%
	Below 15 Years	Frequency	0	0	0	1	0	0	1
		Percentage	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
	Total	Frequency	4	1	14	40	1	19	79
		Percentage	5.10%	1.30%	17.70%	50.60%	1.30%	24.10%	100.00%

Table B-15: Trip frequency according to the Gender

Trips/week			Trips per week							
Sex			1 trip	2 trips	3 trips	More than 3 times	Everyday	Randomly in Month	Randomly in year	Total
Sex	Female	Frequency	2	0	1	0	0	2	6	11
		Percentage	18.20%	0.00%	9.10%	0.00%	0.00%	18.20%	54.50%	100.00%
	Male	Frequency	9	6	3	6	4	21	19	68
		Percentage	13.20%	8.80%	4.40%	8.80%	5.90%	30.90%	27.90%	100.00%
	Total	Frequency	11	6	4	6	4	23	25	79
		Percentage	13.90%	7.60%	5.10%	7.60%	5.10%	29.10%	31.60%	100.00%

Table B-16: Trip Cost according to the Distance

Distance		Total Distance								
Travel Cost		Within 5 km	6 to 10 km	11 to 15 km	16 to 20 km	21 to 30 km	31 to 40 km	41 to 50 km	More than 51 km	Total
Travel Cost	Within 50 taka	2	1	2	3	7	6	7	2	30
	51 to 100 taka	0	0	0	0	2	7	4	8	21
	101 to 150 taka	0	1	0	0	0	1	0	10	12
	151 to 200 taka	0	0	0	0	0	0	1	1	2
	201 to 250 taka	0	0	0	0	1	0	0	3	4
	251 to 300 taka	0	0	0	0	0	0	0	5	5
	More than 300 taka	0	0	0	0	0	0	0	4	4
	Total	2	2	2	3	10	14	12	33	78

REGIONAL TRANSPORT SURVEY

Table B-17: Trip Frequency by Regional Bus

No. of trips/Day	Frequency	Percentage
1 trip	9	64
2 trips	3	22
More than 2 trips	2	14

Table B-18: Regional Network with surrounding Upazilas/Districts

Origin & Destination in Upazila/District	Frequency	Percentage
Sylhet	2	7.14
Chittagong	3	10.71
Moulovi Bazar	1	3.57
Dhaka	5	17.86
Kishoreganj	1	3.57
Khulna	1	3.57
Bhairab	1	3.57
Narikeltala	1	3.57
Mymensingh	4	14.29
Sherpur	1	3.57
Rajshahi	1	3.57
Ishwarganj	2	7.14
Kishoreganj	1	3.57
Kendua	2	7.14
Netrokona	2	7.14

Table B-19: Regional Bus Survey

Survey location	Company/ Agency name	Origin point	Destination point	No. of trips/ Day	Average no. of passengers per trip	Major stoppage area inside the Upazila
Ishwarganj Bus Stand	Anan Paribahan	Mymensingh	Sylhet	1	38	Ishwarganj Bus Stand
Ishwarganj Bus Stand	ShamimParibahan	Sherpur	Chittagong	1	40	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Relax Paribahan	Dhaka	Chittagong	1	45	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Jalalabad Paribahan	Mymensingh	Sylhet	1	42	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Anik Travels	Rajshahi	Moulovi Bazar	1	50	Ishwarganj Bus Stand
Ishwarganj Bus Stand	Alam Bangla	Ishwarganj	Dhaka	2	46	Ishwarganj Bus Stand
Ishwarganj Bus Stand	M. K Paribahan	Mymensingh	Kishoreganj	7	42	Ishwarganj Bus Stand
Ishwarganj Bus Stand	BRTC	Kishoreganj	Khulna	1	50	Ishwarganj Bus Stand
Ishwarganj Bus Stand	BRTC	Ishwarganj	Dhaka	1	45	Ishwarganj Bus Stand
Ishwarganj Bus Stand	ShamolChaya	Mymensingh	Bhairab	2	46	Ishwarganj Bus Stand
Atharobari Bus Stand	Ishakha Service	Kendua	Dhaka	5	45	Atharobari Bus Stand
Atharobari Bus Stand	NiloyParibahan	Kendua	Dhaka	2	45	Atharobari Bus Stand
Atharobari Bus Stand	Shanti Promise Paribahan	Netrokona	Chittagong	1	50	Atharobari Bus Stand
Atharobari Bus Stand	S. S Travels	Netrokona	Narikel tala	1	42	Atharobari Bus Stand

Table B-20: Regional Truck Survey

Survey location	Origin point	Destination point	No. of trips/week	Major stoppage area inside the Upazila	Types of goods carried
Ishwarganj Bus Stand	Mymensingh	Kendua	2	Ishwarganj, Atharobari	Cosmetic, Sugar, Salt
Ishwarganj Bus Stand	Ishwarganj	Dhaka	4	Ishwarganj	Vegetables, Jalpai
Ishwarganj Bus Stand	Ishwarganj	Sylhet	2	Ishwarganj	Vegetables, Jalpai
Ishwarganj Bus Stand	Ishwarganj	Kapasia, Gazipur	3	Ishwarganj	Paddy

Table B-21: Regional Railway Survey

Survey location	Company/ Agency name	Origin points	Destination points	No. of trips/Day
Ishwarganj Train Station	Ishakha Express	Mymensingh	Dhaka	1
	Nasirabad Train	BahadurabadGhat	Chittagong	1
	Kasari Train	Mymensingh	Bhairab	1
	Intercity Train	Mymensingh	Dhaka	1

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(Package: 02): UDD

<u>Roadside Interview Survey (O-D Survey) Questionnaire</u>

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

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 upgradation 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 Ishwarganj Upzila, 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 has 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 Ishwarganj Upazila, the no. of households is 81,070. Sample size is calculated by taking confidence interval 13% 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:

$$n = \frac{n_0}{1 + \dfrac{n_0}{N}}$$

Where n is requiring sample size and N is no. of Household of Upazila. So, the required sample size is 57 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, three major intersections have been identified. The intersections are: Muktijoddha Moor, Atharabari Moor and Lakshiganj Bazar Moor. In addition, two roadway segments were also carried out in Uchakhila Bazar (Rajibpur-Uchakhila Segment) and in front of BRAC Office (Mymensingh-Kishoreganj Segment). (Please see **Figure 1.1 & Map 1.1**) Hat Day and Non Hat Day has been taken into consideration for each intersection and roadway segment. Monday and Friday are the serving as Hat Day at Ishwarganj Upzila. 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 2.1 represents the Hat Day of nearest growth center in each intersection and roadway segment and Table 1.2 represents the PCE value for the traffic volume calculation.

Table 1.1: 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.

Intersection 1: Muktijoddha Moor

Intersection 2: Atharabari Moor
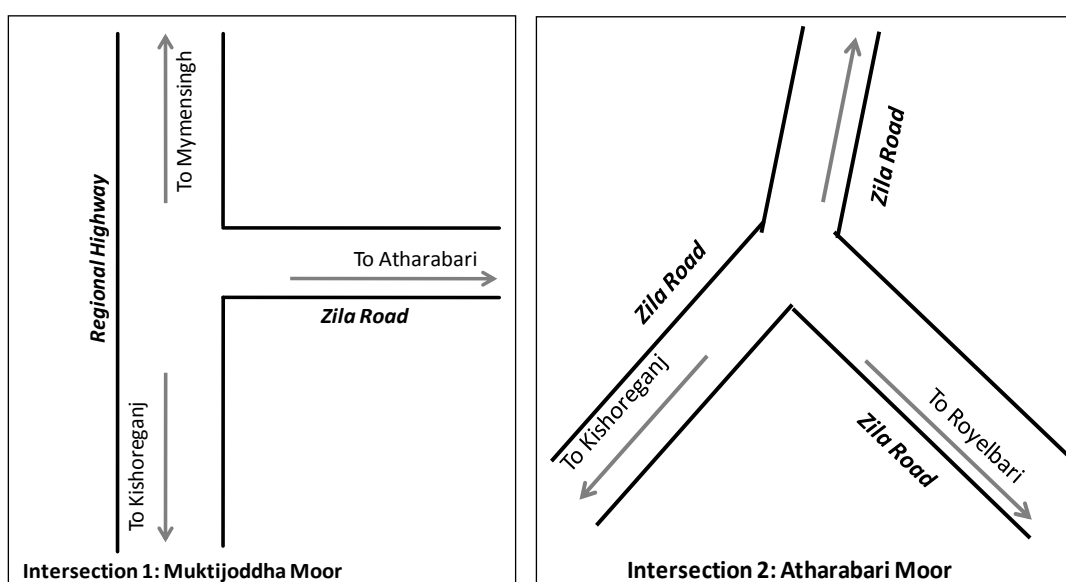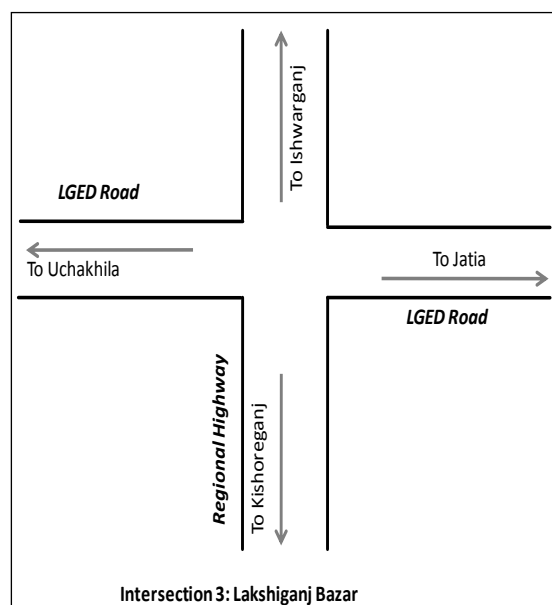
Figure 1.1: Three Major Intersections for Traffic Volume Count

✓ **Origin and Destination (O D) Survey**

Origin Destination (O-D) survey provides a detailed picture of the trip patterns and travel choices of a study area. The survey data related to households, individuals and trips allows stakeholders to understand travel patterns and characteristics; measure trends; provide input to travel demand model development, forecasting, and planning for area-wide transportation infrastructure needs and services; and, monitor progress in implementing transportation policies. The O D Survey has taken infront of BRAC Office (Mymensingh – Kishoreganj Road); Uchkhali Bazar (Uchakhali – Razibpur Road) & Shohagi Bazar (Shohagi – Atharobaria Road). (Please see **Map 1.2**) 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. The survey locations were Ishwarganj Thana Moar and Kakohati Moar. (Please see **Map 1.3**)

✓ **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: Ishwarganj Bus Station, Atharabari Bus/Tempo Stand & Shohagi Railway Station and radom questionnaire survey has been applied. (Please see **Map 1.4**)

Table 1.2: Output and methodology of the conducted survey

Survey	Data	Methodology
Traffic Volume Count	Details of vehicle classification, fluctuation of flow, specific vehicular movements, road features, no. of vehicle per hour.	• 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 1.1: Locations of Traffic Volume Count Survey in Ishwarganj Upazila

Source: Traffic and Transportation Survey, 2015.

Map 1.2: Locations of Origin Destination Survey in Ishwarganj Upazila

Source: Traffic and Transportation Survey, 2015.

Map 1.3: Locations of Passenger Interview Survey in Ishwarganj Upazila

Source: Traffic and Transportation Survey, 2015.

Map 1.4: Locations of Regional Transportation Netwrok Survey in Ishwarganj Upazila

Source: Traffic and Transportation Survey, 2015.
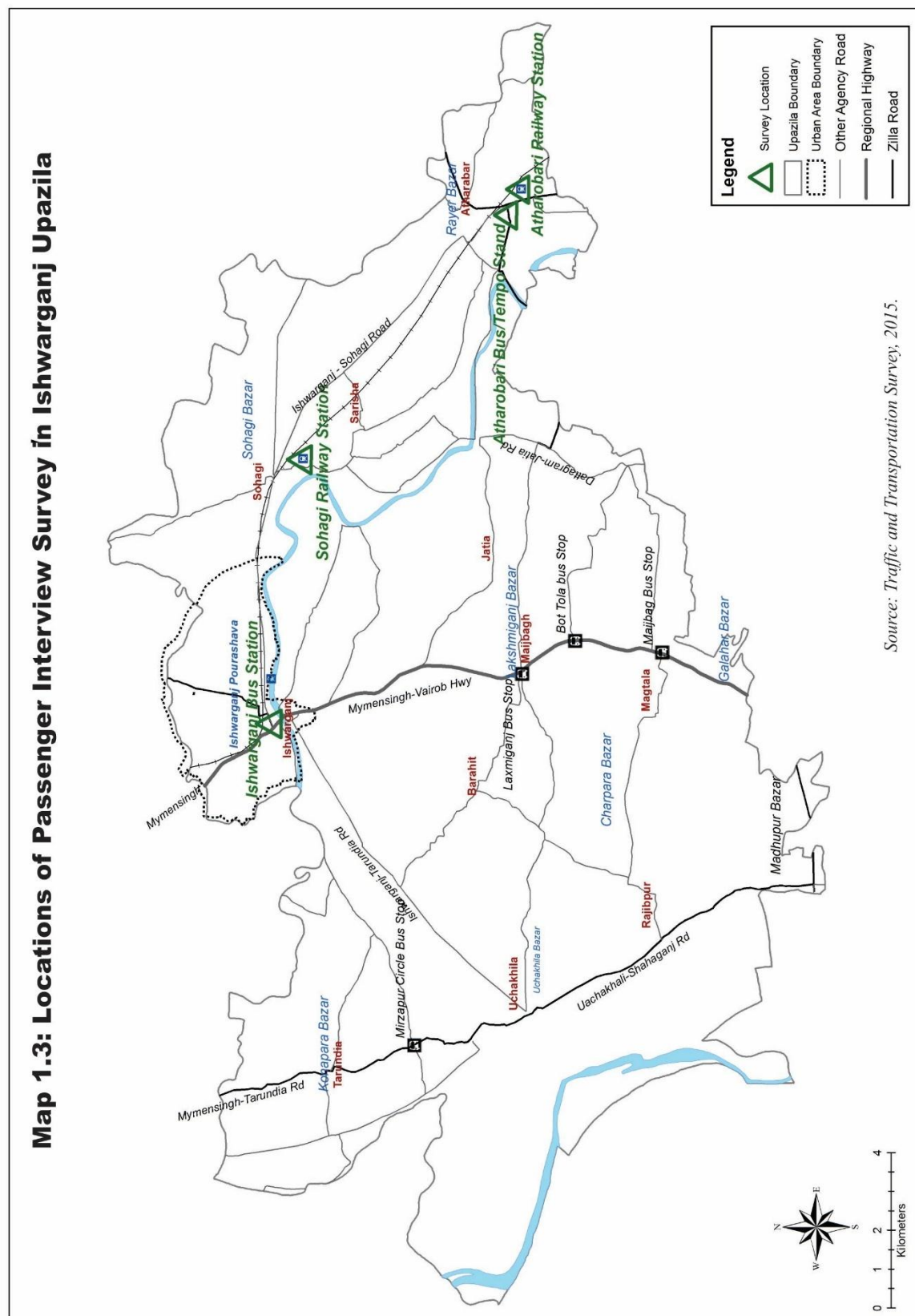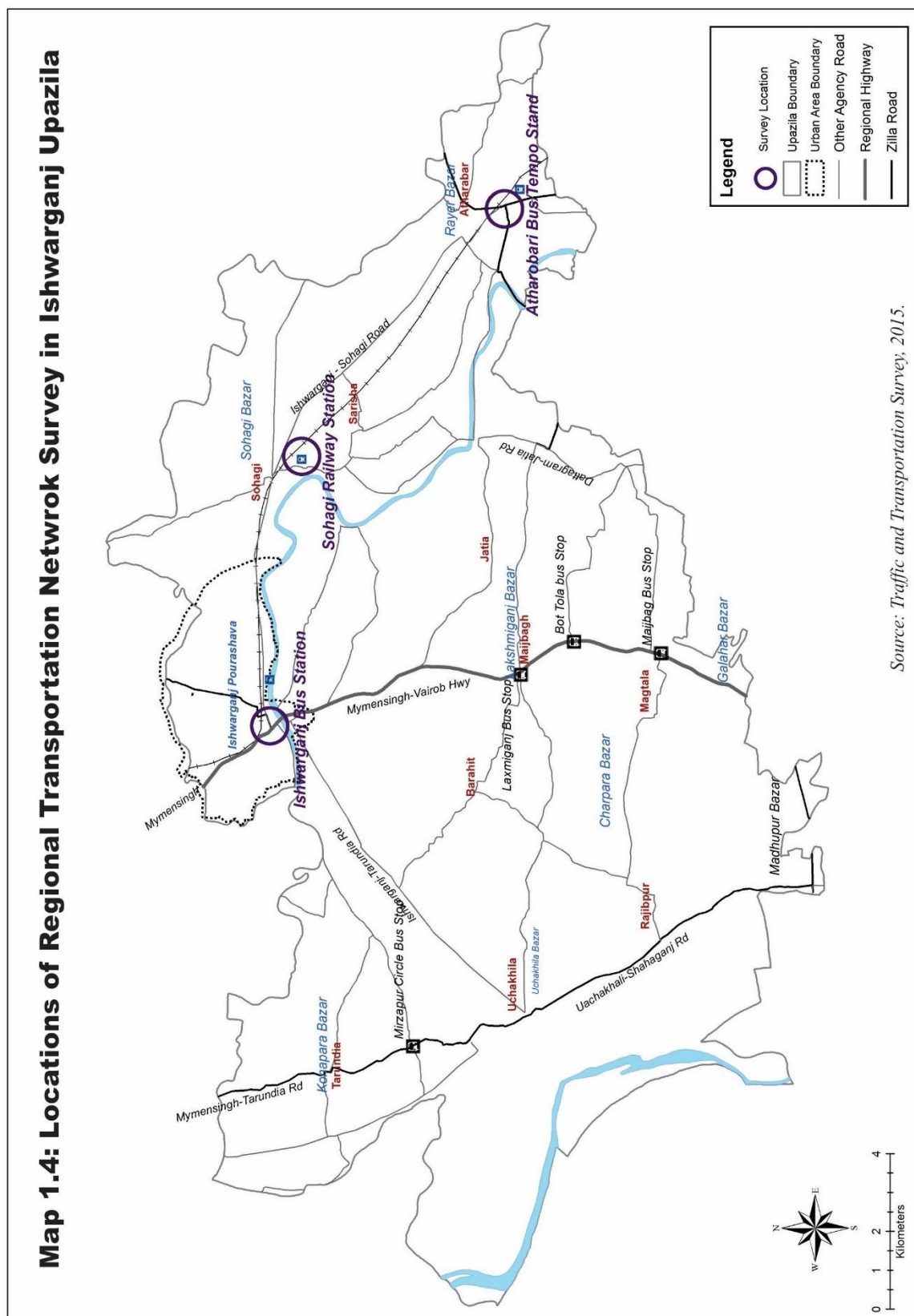
1.4 Formulation and Mobilization of Survey Team

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 Ishwarganj Upazila Office (9th November, 2015) for giving a clear concept about the objectives of the project and different type of surveys. The Consultant team with expert has attended the orientation program and Mr. Uday Sankar 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, time schedule of conducting Survey, location of conducting Survey etc.

1.4.3   Selection of Survey Locations

Considering the intensity, linkage and movement of traffic different survey locations have been selected to conduct different types of survey including Volume Count, O D Survey, Passenger Survey and Regional Transport Survey which refers as a reconnaissance survey. Major intersections, Major Roads, Bus Terminal and Railway Station have been identified for conducting different types of Survey. Details of survey location 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 Ishwarganj Upazila.

Table 1.3: List of members in Traffic and Transportation Survey

Sl. No.	Name	No.	Activities
1	Transportation Expert Dr. Md. Shahid Mamun	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. Rubayet Hossain, 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

Ishwarganj Upazila under the jurisdiction of Mymensingh District occupies an area of 286.19 sq. km. which is located between 24°33' and 24°44' north latitudes and between 90º28' and 90º46' east longitudes. The Upazila is bounded on the north by Gauripur Upzila, on the east by Kendua Upazila of Netrokona Zila, on the south by Nandail Upazila and on the west by Trishal and Mymensingh Sadar Upazilas. Ishwarganj Upazila is situated 147 km from Dhaka and 24 km from Mymensing. (BBS, 2012) Though the National Highway N3 has flown through Mymensingh District to Trisal Upazila, Ishwarganj Upazila is well connected in regional context and Regional Road R360 is the main regional road which has linked with surrounding upazilas such as Nandail, Kishorganj, Kendua etc. (Please see **Map 2.1**)

2.2 Road Network

2.2.1 Existing Road Network

Ishwarganj 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 will be further updated by physical feature survey.

Table 2.1: Road Length of Ishwarganj Upazila

Road	Length (km)
Upazilla Pucca Road	61.02
Upazilla Katcha Road	13.03
Union Pucca Road	73.72
Union Katcha Road	88.16
Rural Pucca Road	14.94
Rural Katcha Road	132.69
Total Road	**383.56**

Source: Bangladesh National Web portal, 2016.

Table 2.2: Existing Road Infrastructure of Ishwarganj Upazila

Road Type	Earthen Road (km)	Pavement Road (km)	Total Length (km)
Upazila Road	8.49	76.17	84.67
Union Road	58.91	81.47	143.78
Village Road-A	77.54	21.42	98.96
Village Road-B	147.98	6.69	156.67

Source: LGED, 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 Ishwarganj Upazila

The Regional Highway and several Zila Road has passed through Ishwarganj Upazila. The major roads of Ishwarganj Upazila has shown in Table 2.2.

Table 2.3: Major Roads of Ishwarganj Upazila

Road ID	Name of the Road	Length of Road (km)
R360	Mymensingh (Raghurampur)-Kishoreganj (Battali)-Bhairab (Bazar) Road	116
Z3710	Netrokona-Bishiura-Ishwarganj Road	27
Z3614	Atharabari-Rasulpur Road	6
Z3608	Nandail-Atharabari-Kendua Road	21

Source: RHD, 2016.

2.3 Waterway Network

Though the river Kancha Matia flows through the upazila, the water way is not viable in this Upazila.

2.4 Railway Network

Ishwarganj upazila is connected with the railway network. Daily train service connecting Dhaka to Mymensingh is by a pair of train. Ishwarganj is served by Mymensingh section of Meter Gauge line. There are 18.97 km railway line and three railway station in Ishwarganj upazila. The name of stations is Shohagi, Ishwarganj and Atharobari.

2.5 Air Network

Ishwarganj has no provision of air service.

Map 2.1: Regional Transportation Network System of Ishwarganj Upazila

Map 2.2: Road Map of Ishwarganj Upazila
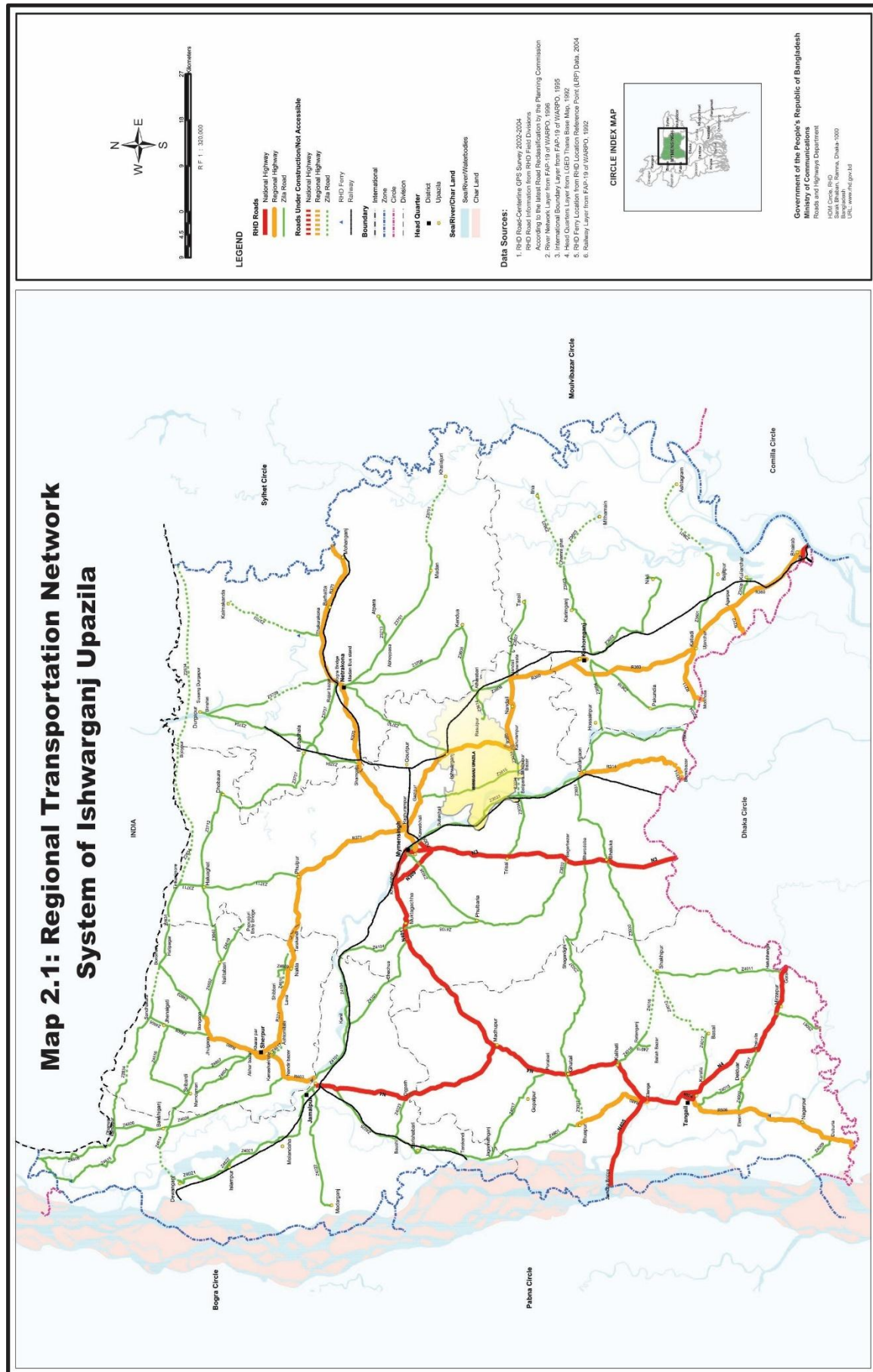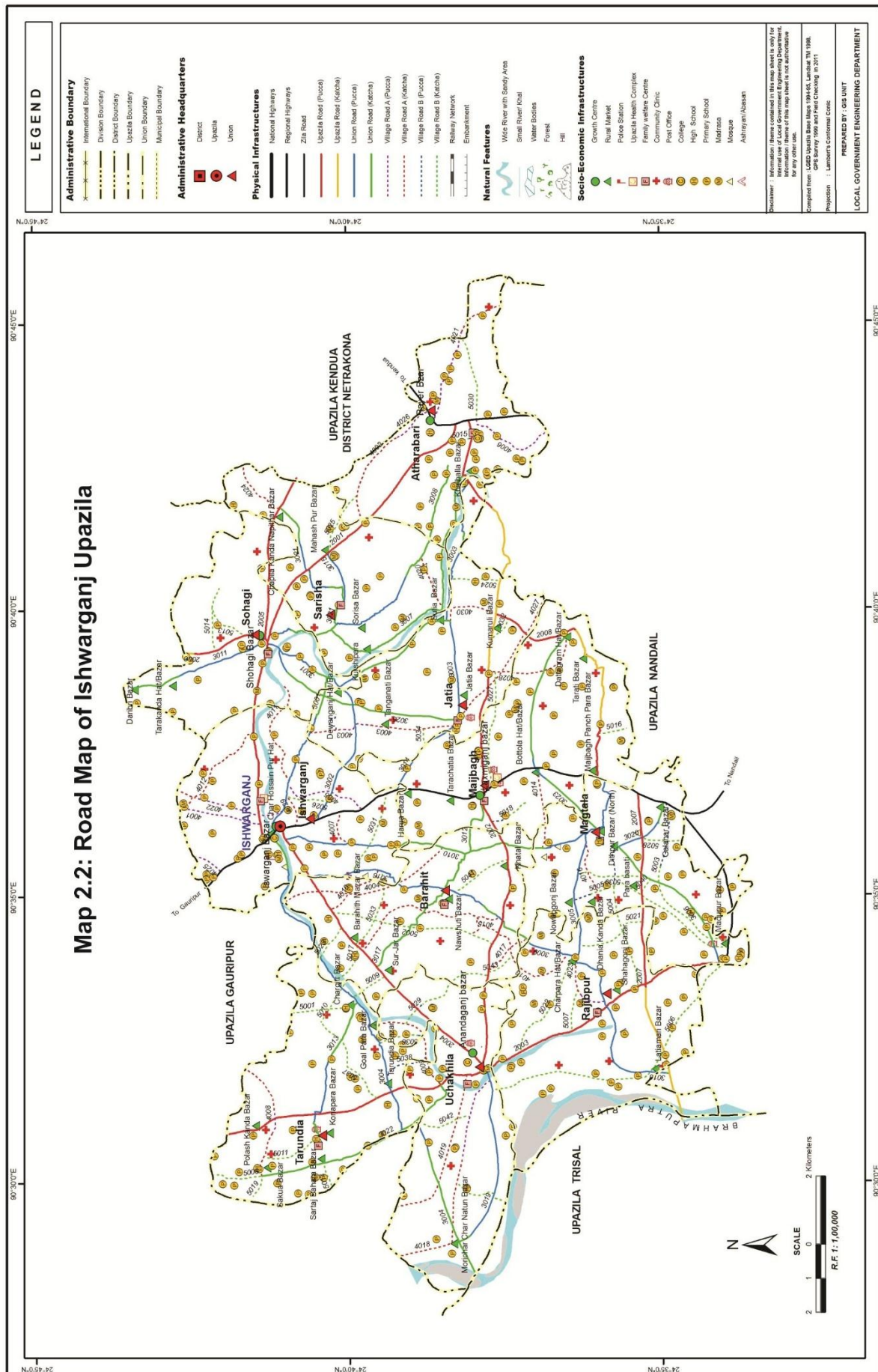
CHAPTER 3: ANALYSIS OF SURVEY FINDINGS

3.1 Traffic Volume Count Survey

Traffic volume count survey has been done in three important intersections and two road way segments in Ishwarganj Upazila. As different areas have different impacts, the peak time and off peak time vary according to the its activities. In study area, Monday and Friday 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:

➢ Atharabari Moor
➢ Muktijoddha Moor
➢ Lakshiganj Bazar
➢ In front of BRAC Office
➢ Uchakhila Bazar

3.1.1 Traffic flow at Atharabari Moor (Intersection)

In Athrabari Moor, there are three links which flow to Kishoreganj, Rayer Bazar and Kendua/Netrokona. From the survey, it has been seen that traffic flows are busier in Netrokona/Kendua link. The following vehicle flows have been observed in Athrabari-Netrokona/Kendua link on Hat Day at peak hour.
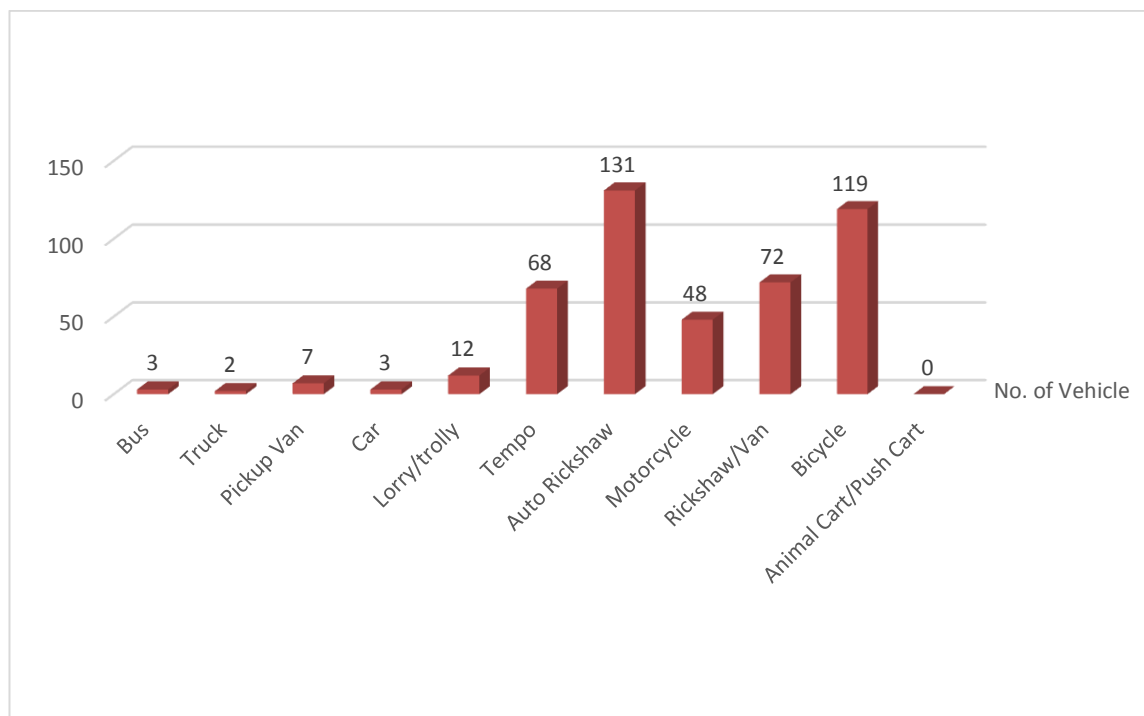
Figure 3.1: Types of Mode in Athrabari-Netrokona/Kendua link at Atharabari Intersection

Source: Traffic and Transportation Survey, 2015

From the chart, it has been shown that Auto Rickshaw are been commuting more which is 131. The Non-Motorized Vehicle such as Rickshaw and Bicycle are also visible as these modes are compatible during Hat Day.

3.1.2 Motorized Vehicle and Non-Motorized Vehicle
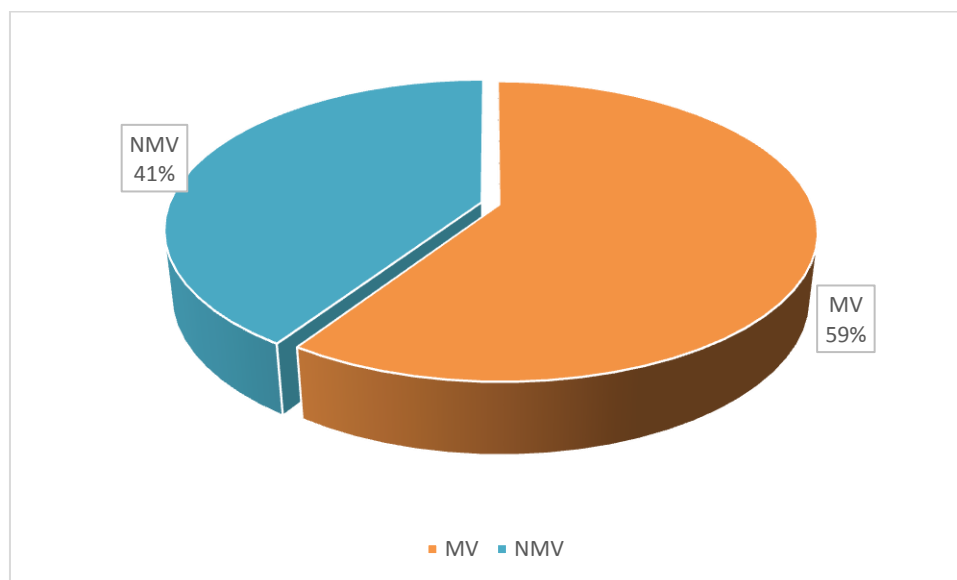
Figure 3.2: Status of MV and NMV vehicle at Atharabari Moor

Source: Traffic and Transportation Survey, 2015

From the figure, it is clear that the total MV vehicle is 59% and NMV vehicle is 41% at Hat Day in Athrabari Moor. There are almost same kind of scenarios in every link of Atharabari Moor. For further details, please see **Appendix-A**.

3.1.3 Traffic flows in other Intersections and Roadway segments

Traffic flows are occurred in different ways in every intersection. They have different significances which are summarized in **Appendix-A**.

3.1.4 Traffic Volume in Surveyed Intersections

Table 3.1: PCE and Traffic Volume at Intersections

Intersection Name	Link Name	Average PCE/Hour		Average Vehicle/Hour	
		Hat Day	Non Hat Day	Hat Day	Non Hat Day
Atharabari Moor	Atharabari Moor - Kishoreganj	375.00	294.88	359	318
	Atharabari Moor-Rayer Bazar	152.00	141.50	160	158
	Atharabari Moor-Netrokona	398.50	317.63	391	354
Muktijoddha Moor	Muktijoddha Moor-Mymensingh	939.00	908.92	820	780
	Muktijoddha Moor-Kishoreganj	1005.92	970.67	864	824
	Muktijoddha Moor-Atharabari	381.92	428.58	363	397
Lakshiganj Bazar	Lakshiganj Bazar-Uchakhila	115.50	106.75	135	119
	Lakshiganj Bazar-Jatia	172.63	142.63	176	146
	Lakshiganj Bazar-Kishoreganj	467.88	428.00	459	440
	Lakshiganj Bazar-Ishwarganj	462.75	412.88	444	417

Source: Traffic and Transportation Survey, 2015

From the above table, In Athrabari Intersection, Netrokona Link has highest PCE which is 398.50. The Muktijoddha Moor is the busiest road of Ishwarganj upazila where more than 800 vehicle/hour are plying in the link of Mymensingh and Kishoreganj. In Lankshiganj Bazar, The Kishoreganj and Ishwarganj Link has comparatively higher traffic volume/hour than Jatia and Uchakhali Link.
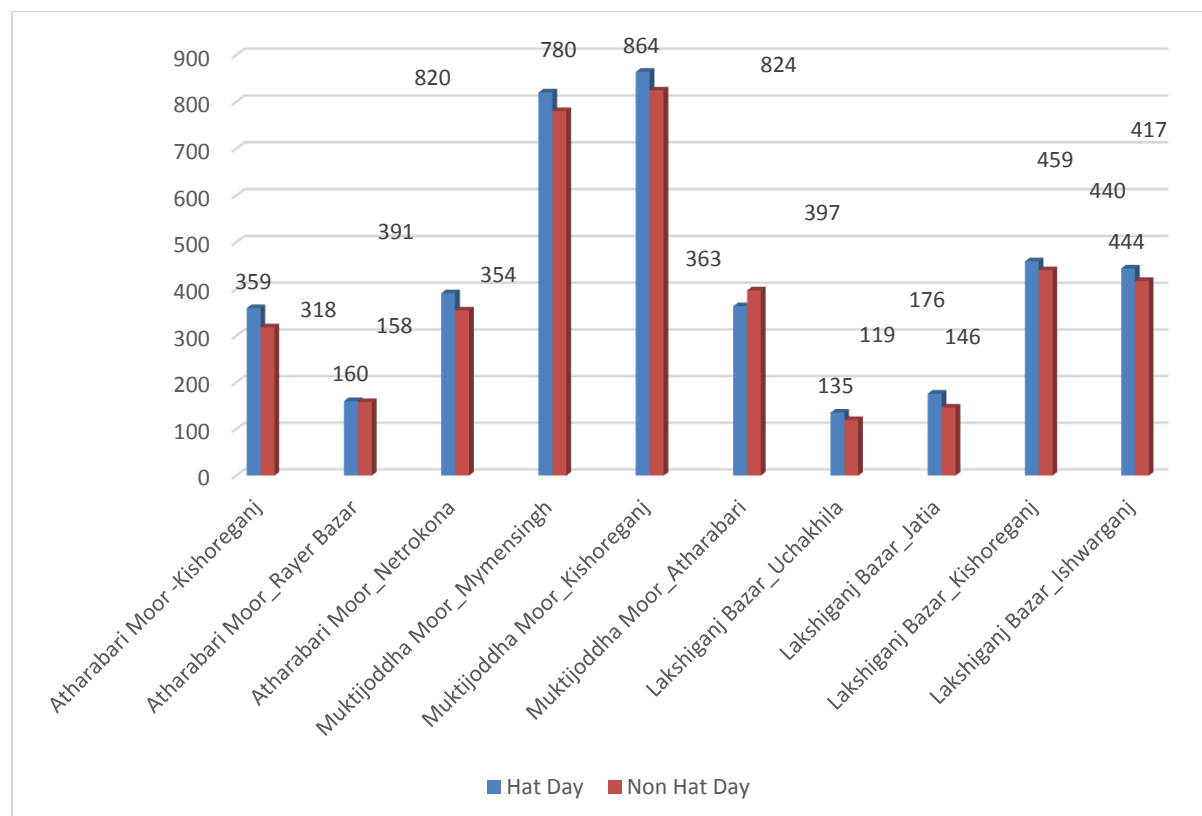
Figure 3.3: Average Frequency of Vehicle/Hour at Links of three Intersections
Source: Traffic and Transportation Survey, 2015

From the chart, it can depict that Muktijoddha-Mymensingh and Muktijoddha-Kishoreganj link of Muktijoddha Moor Intersection have the highest volume of traffic in both Hat Day and Non Hat Day. In Athrabari Intersection, Atharabrai- Rayer Bazar has lowest traffic volume which is160 at Hat Day. In Lakshiganj Bazar, Lakshiganj-Uchakhali and Lakshiganj-Jatia have comparatively smaller volume of traffic.

3.1.5 Traffic Volume and PCE at Roadway Segments

Table 3.2: Traffic Volume and PCE at Roadway Segments

Roadway Segment Name	Link Name	Average PCE/Hour	Average Vehicle/Hour
In front of BRAC Office	Kishoreganj_Mymensingh	391.08	386
Uchakhila Bazar	Uchakhila-Rajibpur	247.67	247

Source: Traffic and Transportation Survey, 2015

Two roadway segments have been surveyed for traffic volume count which are done in front of BRAC Office and Uchakhali Bazar. From the table, they are being experienced lower volume of traffic respectively 386 and 247 vehicle /hour**.**

3.1.6 Pedestrian Survey

Pedestrian is an important part of traffic. In case of designing an intersection or roadway, it is necessary to survey the pedestrian. In the traffic survey, pedestrian count has done in every link of three intersections which have summarized below.

Table 3.3: Pedestrian density in selected intersections

Intersection Name	Day	Link Name	Average Pedestrian/ Hour	Average Pedestrian/ Minute
Atharabari Moor	Hat Day	Atharabari Moor-Kishoreganj	82.50	1.38
		Atharabari Moor-Rayer Bazar	87.50	1.46
		Atharabari Moor-Netrokona	50.00	0.83
	Non Hat Day	Atharabari Moor-Kishoreganj	32.50	0.54
		Atharabari Moor-Rayer Bazar	44.50	0.74
		Atharabari Moor-Netrokona	42.50	0.71
Muktijoddha Moor	Hat Day	Muktijoddha Moor-Mymensingh	105.33	1.76
		Muktijoddha Moor-Kishoreganj	75.00	1.25
		Muktijoddha Moor-Atharabari	142.33	2.37
	Non Hat Day	Muktijoddha Moor-Mymensingh	107.33	1.79
		Muktijoddha Moor-Kishoreganj	94.67	1.58
		Muktijoddha Moor-Atharabari	136.00	2.27
Lakshiganj Bazar	Hat Day	Lakshiganj Bazar-Uchakhila	30.00	0.50
		Lakshiganj Bazar-Jatia	30.00	0.50
		Lakshiganj Bazar-Kishoreganj	45.00	0.75
		Lakshiganj Bazar-Ishwarganj	21.50	0.36
	Non Hat Day	Lakshiganj Bazar-Uchakhila	26.50	0.44
		Lakshiganj Bazar-Jatia	18.50	0.31
		Lakshiganj Bazar-Kishoreganj	40.50	0.68
		Lakshiganj Bazar-Ishwarganj	34.00	0.57

Source: Traffic and Transportation Survey, 2015

From the table, it is seen that pedestrian are mostly moved in Muktijoddha Moor where more than 1 person/minute is moving in different links. It is much busy in both Hat Day and Non Hat Day. Muktijoddha-Atharabari Link has highest movement of pedestrian. In Atharabari and Lakshiganj Bazar intersections, pedestrian density is almost same but not so much busy like Muktijoddha Moor.

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 63 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 represent the trip distribution pattern of Ishwarganj Upazila respectively within Unions and other Upazilas/Districts.

Table 3.4: Origin Destination Matrix within Unions of Ishwarganj Upazila

Origin / Destination	Atharobari	Ishwarganj	Jatiya	Rajibpur	Shohagi	Uchakhila	Maizbagh	Total
Atharobari	0	2	0	0	0	0	0	2
Ishwarganj	3	0	1	1	3	1	0	9
Jatiya	0	0	0	0	0	1	1	2
Rajibpur	0	0	0	0	0	0	0	0
Shohagi	0	0	0	0	0	0	0	0
Uchakhila	1	0	0	5	0	0	0	6
Maizbagh	0	1	0	0	0	0	0	1
Total	4	3	1	6	3	2	1	20

Source: Traffic and Transportation Survey, 2015.

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 Rajibpur Union travel most at the selected survey locations. People from Ishwarganj also travel in different unions for their trip purposes.

Table 3.5: Origin Destination Matrix surrounding Upazilas/Dsitricts of Ishwarganj Upazila

Origin \ Destination	Bhairab	Dhaka	Kishoreganj	Mymensingh	Nandail	Netrokona	Tangail	Norsingdhi	Total
Bhairab	0	0	0	0	0	0	0	0	0
Dhaka	0	0	1	0	0	0	0	0	1
Kishoreganj	0	0	0	2	0	0	0	0	2
Mymensingh	1	0	3	0	0	0	0	0	4
Nandail	0	0	1	4	0	0	0	0	5
Netrokona	4	0	0	1	0	0	0	1	6
Tangail	0	0	1	0	0	0	0	0	1
Norsingdhi	0	0	0	0	0	0	0	0	0
Total	5	0	6	7	0	0	0	1	19

Source: Traffic and Transportation Survey, 2015.

The above matrix represents that people from Ishwarganj travel most in Mymensingh as it belongs under the jurisdiction of Mymensingh District. And the trip distribution is going on most in nearest Upazilas like Bhairab, Kishoreganj.

3.2.2 Mode Choice
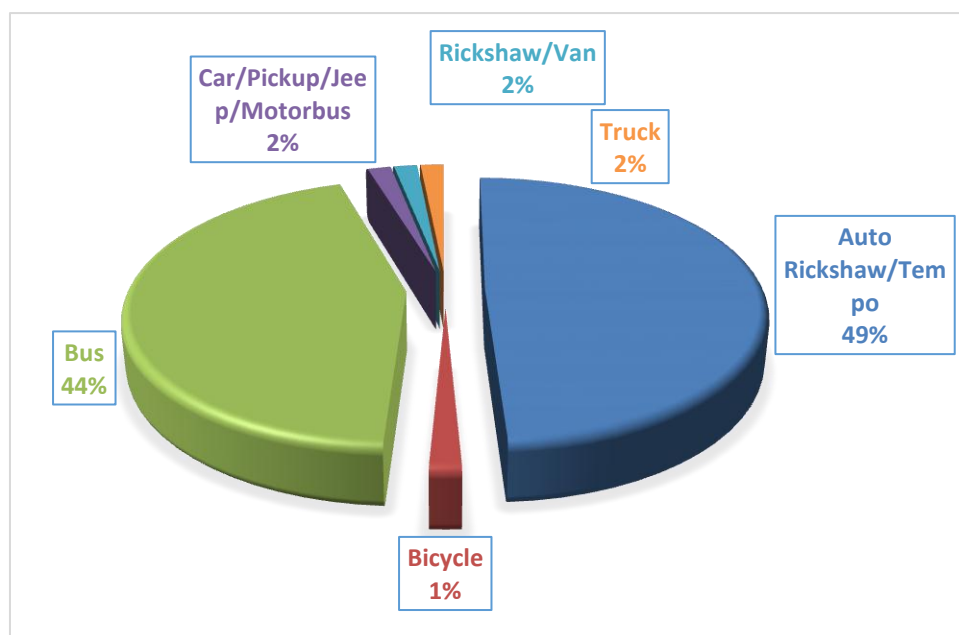
Figure 3.5: Types of Mode

Source: Traffic and Transportation Survey, 2015.

The above pie chart depicts the scenario of mode choices. From the chart it is visible that most of the people travel by auto rickshaw/temp and the percentage is 49%. This percentage is the highest among

others. Second most popular mode is Bus. About 44% people choose bus for travelling. Whereas the percentage of car/pickup is very few like as rickshaw/van and truck. Only 1% use bicycle.

3.2.3 Purpose of Trip
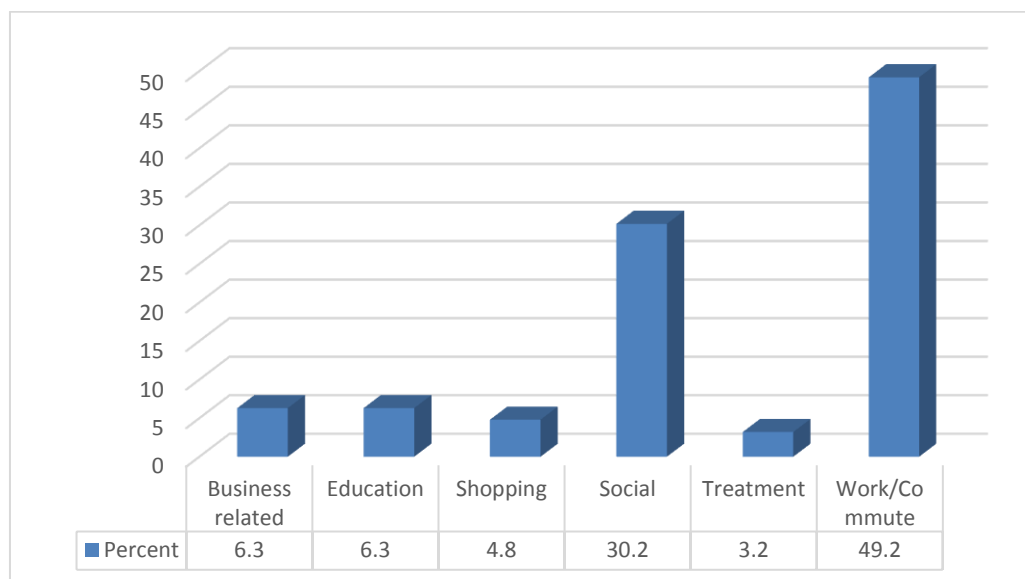
Figure 3.6: Trip purposes of surveyed respondents

Source: Traffic and Transportation Survey, 2015.

The bar chart represents the origin destination behavior of the passengers. From the data it is shown that people mostly travel for social and work/commute purposes. 49.2% passengers travel sue to work purpose and 30% for social. For the purpose of business and education only 6.3% passengers travel respectively. The least percentage of passenger travel for treatment.

3.2.4 Origin Destination Behavior
Table 3.6: Trip distribution pattern according to the trip purpose

Origin / Destination			Destination Pattern					
			Hospital	Residence	School/College/University	Social	Workplace	Total
Origin Pattern	Residence	Frequency	2	0	3	10	23	38
		Percentage	5.30%	0.00%	7.90%	26.3%	60.5%	100%
	School/College/University	Frequency	0	2	0	0	0	2
		Percentage	0.00%	100.0%	0.00%	0.00%	0.00%	100%
	Shopping	Frequency	0	4	0	0	0	4
		Percentage	0.00	100.0	0.00	0.00	0.00%	100%
	Social	Frequency	0	7	0	0	0	7
		Percentage	0.00%	100.0%0	0.00%	0.00%	0.00%	100%
	Workplace	Frequency	0	8	0	0	4	12
		Percentage	0.00%	66.70%	0.00%	0.00%	33.30%	100%
	Total	Frequency	2	21	3	10	27	63
		Percentage	3.20%	33.30%	4.80%	15.90%	42.90%	100%

Source: Traffic and Transportation Survey, 2015.

From the cross tab chart, it can depict that trip origin purposes are mostly occurred for work purpose. People commute within or outside Upazila for their working purpose which is 42.90. The others trip purposes are fluctuating. And, it is also seen that some people have to move from one work place to

other work place which percentage is 33.30%. So, people's daily trip purposes are mostly related to residence and work place.

3.2.5 Passengers density in different vehicle mode

	Within 5 persons	6 to 10 persons	11 to 15 persons	26 to 30 persons	31 to 35 persons	Above 40 persons
Frequency	11	21	5	7	5	14
Percent	17.5	33.3	7.9	11.1	7.9	22.2
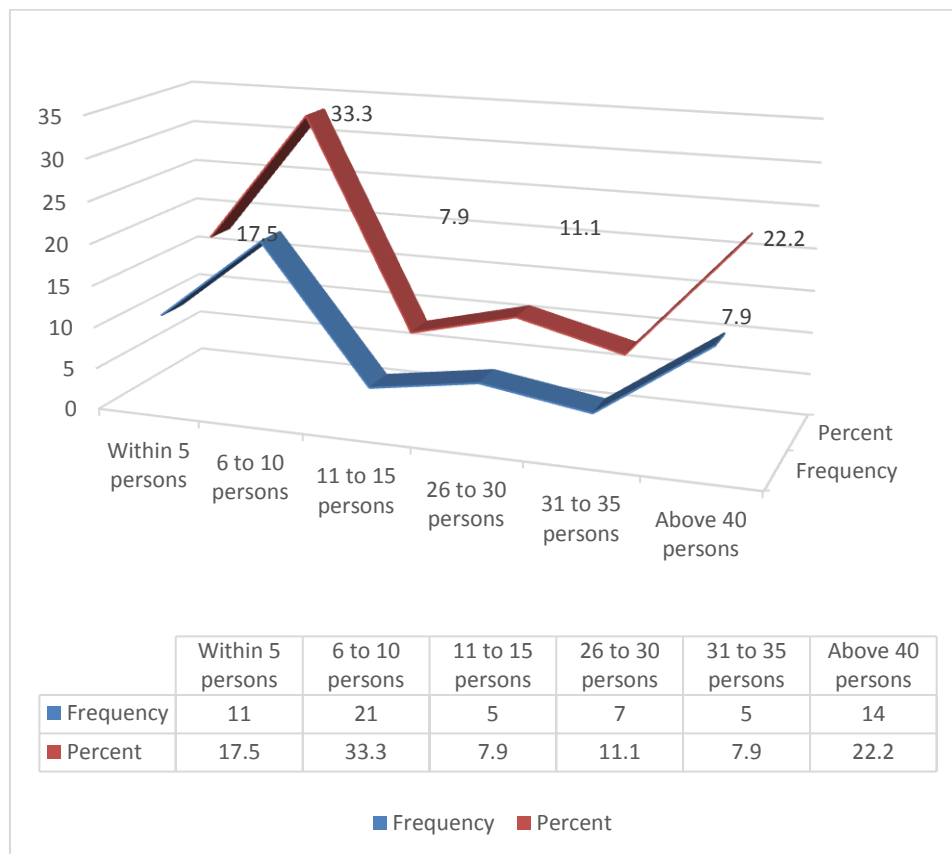
Figure 3.7: Occupancy of passengers in vehicle

Source: Traffic and Transportation Survey, 2015.

The graph show that passengers mostly choose those vehicles which can hold a medium number of passengers. Data 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

From the survey, different problems have been drawn and the main problems which are facing most are categorized below.

Table 3.7: Facing problems in Transportation

Maintenance Problem	Behavioral Problem	Infrastructural Problem	Insufficiency or Demand
• Bad condition of transport system • Poor Vehicle condition & Unfit to drive • Damaging of Road	• Overloading transport • Excessive Fare • Extortion • Time consuming travelling • Inefficient Drivers • Vehicles stand frequently	• Narrow Road • Weak transportation facilities	• Insufficiency of CNG Pump • No provision of Mini Bus

Source: Traffic and Transportation Survey, 2015.
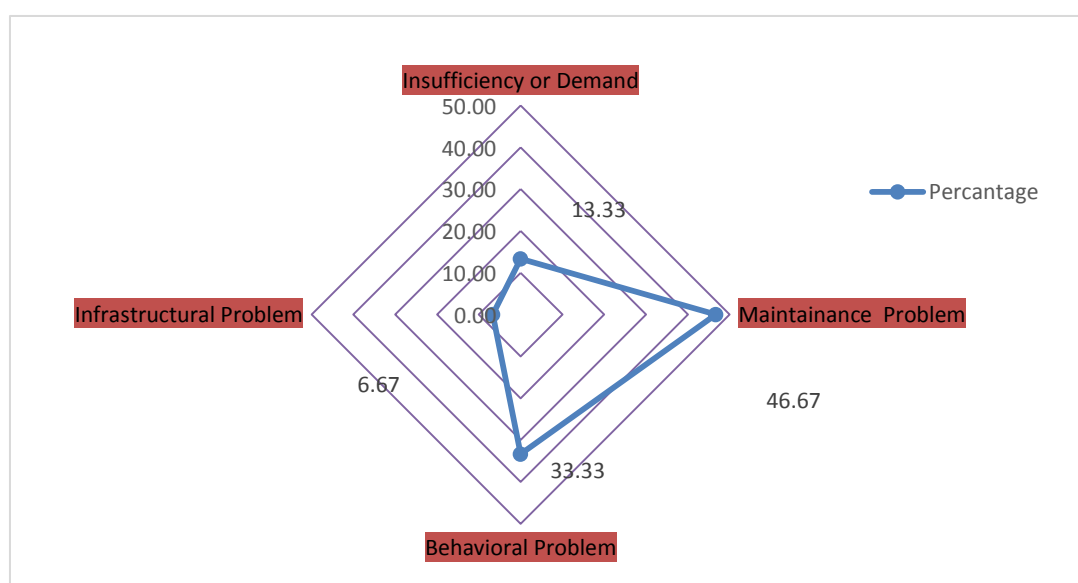
Figure 3.8: Identifications of Problems

Source: Traffic and Transportation Survey, 2015.

The chart depicts the opinion of passengers related to the problems faced by them during travel. First of all, there are four categories of problems which are infrastructural problems, insufficiency or demand, maintenance problem and behavioral problem. When these problems are prioritized then the outcome shows that mostly passengers are facing the maintenance problem which percentage is 46.67%. 33.33% thinks that behavioral problem can be a major issue whereas infrastructural and insufficiency or demand problem are lower in percentage.

3.3 Passenger Interview Survey Findings

Passenger's Interview Survey has bene 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 Trip Purpose
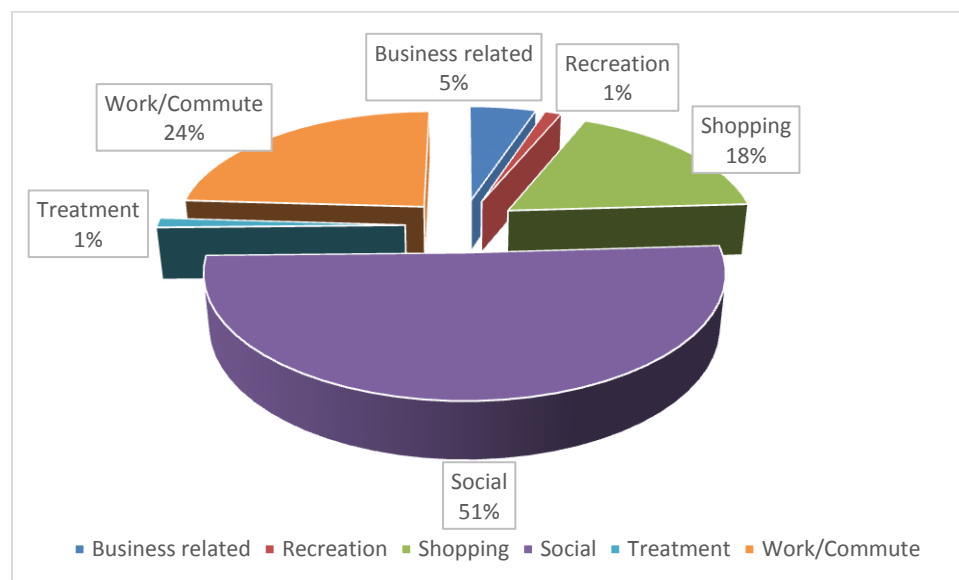
Figure 3.9: Percentages of trip purpose

Source: Traffic and Transportation Survey, 2015.

The chart displays the trip purpose. From the data it is visible that 51% passengers travel for social purpose, 24% for work and 18% for shopping. The percentages of these three purposes are significant than the others such as business related, treatment and recreation.

3.3.2 Types of Mode

	Bus/Motor Cycle/Rickshaw	Motor Cycle	Rickshaw	Rickshaw/Van	Van	Van/Rail
■ Frequency	4	24	41	1	1	1
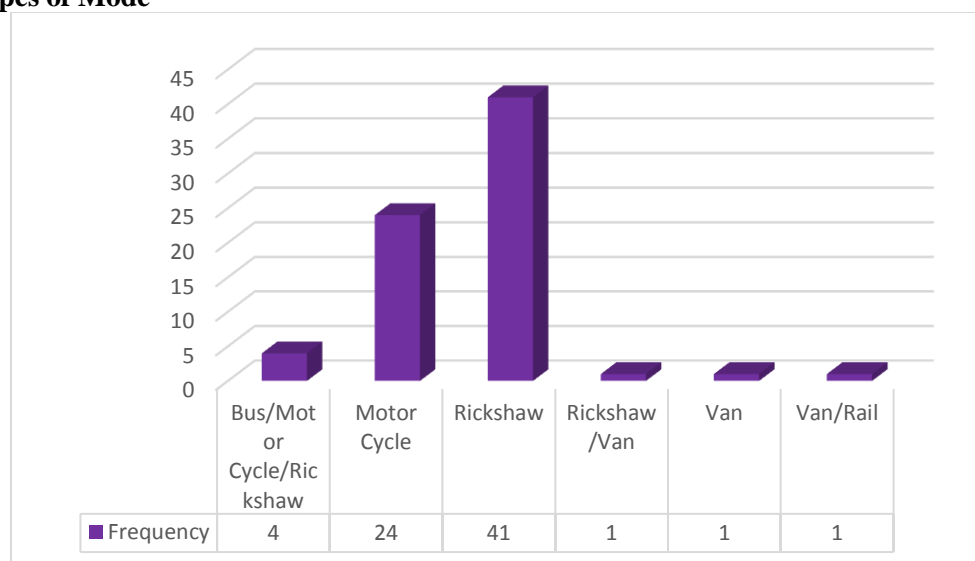
Figure 3.10: Types of Mode

Source: Traffic and Transportation Survey, 2015.

The chart represents the percentage of vehicles mostly used by the passengers. The data shows that more than half of the passengers use rickshaw which percentage is 56.94%. 33.33% passengers use motor cycle. Van, rail are the vehicles with the lowest percentages. (Please see **Appendix-B**)

3.3.3 Trip Distribution by Passengers
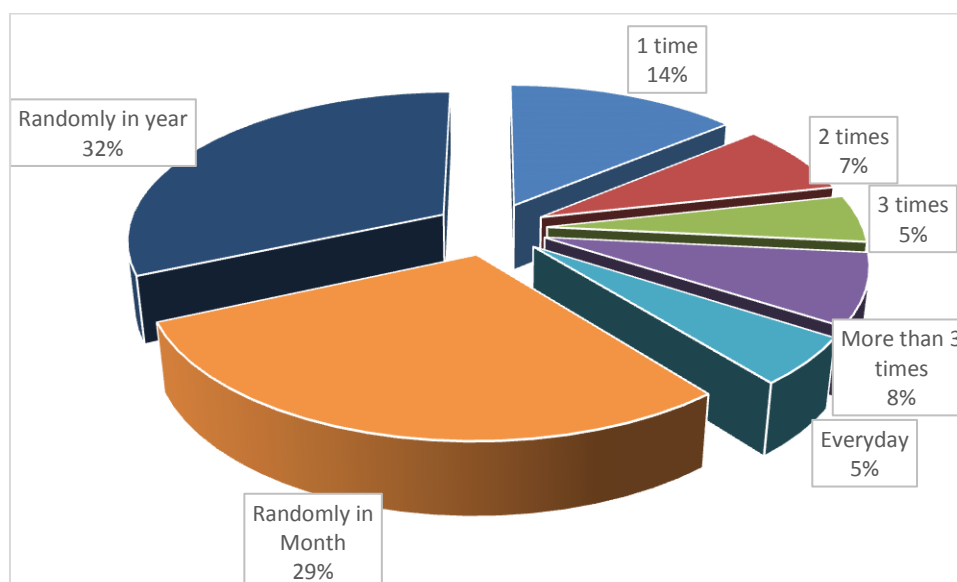
Figure 3.11: Trip Frequency

Source: Traffic and Transportation Survey, 2015.

The above chart represents the percentage of trips per week by the passengers. From the chart, it has been seen that people travel for their purposes irregularly. Few people travel everyday which is 5% of the respondents. So, people prefer bus for their occasional travels and in traveling long distance. The percentage of trip randomly in year is the highest it is 32% and randomly in month is 29%.

3.3.4 Age pattern of the Respondents

	16-20 Years	21-30 Years	31-40 Years	41-50 Years	Above 51 years	Below 15 Years	Total
Percent	13.9	39.2	13.9	12.7	19	1.3	100
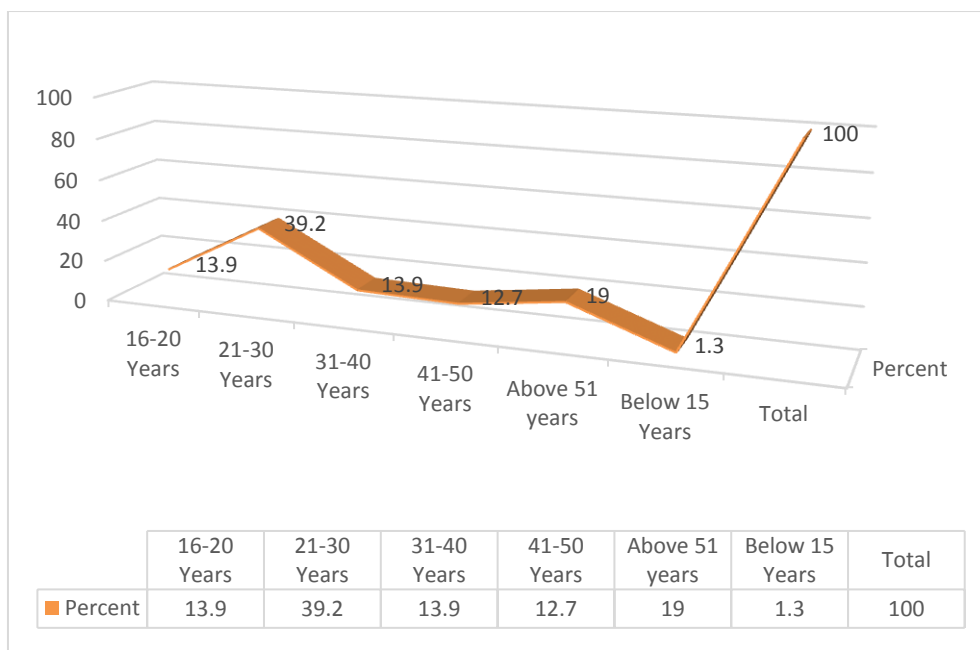
Figure 3.12: Age Group of the respondents

Source: Traffic and Transportation Survey, 2015.

The graph shows the age pattern of the respondents. 21-30 years' age group is the most frequently travel group as the percentage is 39.2%. This age group primarily represents the students and the job

holders. Above 51 years old age group travel 19%. The percentages of 16-20 and 31-40 years' age groups are 13.9%. Below 15 years old passengers travel less and the percentage is 1.3%.

3.3.5 Age group and trip purpose

Table 3.8: Trip production purpose according to the age group

Trip Purpose / Age			Business related	Recreation	Shopping	Social	Treatment	Work/Commute	Total
Age pattern	16-20 Years	Frequency	0	0	7	4	0	0	11
		Percentage	0.00%	0.00%	63.60%	36.40%	0.00%	0.00%	100.00%
	21-30 Years	Frequency	0	1	7	14	1	8	31
		Percentage	0.00%	3.20%	22.60%	45.20%	3.20%	25.80%	100.00%
	31-40 Years	Frequency	1	0	0	7	0	3	11
		Percentage	9.10%	0.00%	0.00%	63.60%	0.00%	27.30%	100.00%
	41-50 Years	Frequency	2	0	0	5	0	3	10
		Percentage	20.00%	0.00%	0.00%	50.00%	0.00%	30.00%	100.00%
	Above 51 years	Frequency	1	0	0	9	0	5	15
		Percentage	6.70%	0.00%	0.00%	60.00%	0.00%	33.30%	100.00%
	Below 15 Years	Frequency	0	0	0	1	0	0	1
		Percentage	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
	Total	Frequency	4	1	14	40	1	19	79
		Percentage	5.10%	1.30%	17.70%	50.60%	1.30%	24.10%	100.00%

Source: Traffic and Transportation Survey, 2015.

The people travel places for different purposes. Their trip purposes are varied according to their age range. From the chart, it is clear that where and what types of aging people mostly involve in travelling. It is seen that Below 20 and above 50 aged people travel for their social purposes. Between 16 to 20 years aged people love to shopping such as buying necessary needs which is 63.30% of total travel percentage of this aged range. Between 20 to 50 years aged people travel for their work purposes.

3.3.6 Gender and trip productions per week

Table 3.9: Trip frequency according to the gender

Trips/week Sex			Trips per week							
			1 trip	2 trips	3 trips	More than 3 times	Every day	Randomly in Month	Randomly in year	Total
Sex	Female	Frequency	2	0	1	0	0	2	6	11
		Percentage	18.20%	0.00%	9.10%	0.00%	0.00%	18.20%	54.50%	100.00%
	Male	Frequency	9	6	3	6	4	21	19	68
		Percentage	13.20%	8.80%	4.40%	8.80%	5.90%	30.90%	27.90%	100.00%
	Total	Frequency	11	6	4	6	4	23	25	79
		Percentage	13.90%	7.60%	5.10%	7.60%	5.10%	29.10%	31.60%	100.00%

Source: Traffic and Transportation Survey, 2015.

From the above cross table, it can be generalized about the trip production per week according to the gender. In case of female, they travel randomly in year and month as they have to keep busy with household works and their trip production purposes are mostly involved for social or health purpose. Male travels their place sin different interval. Few male persons travel regular basis and others travel irregular basis but they have to travel more or less for their livelihood.

3.3.7 Travel cost and travel distance
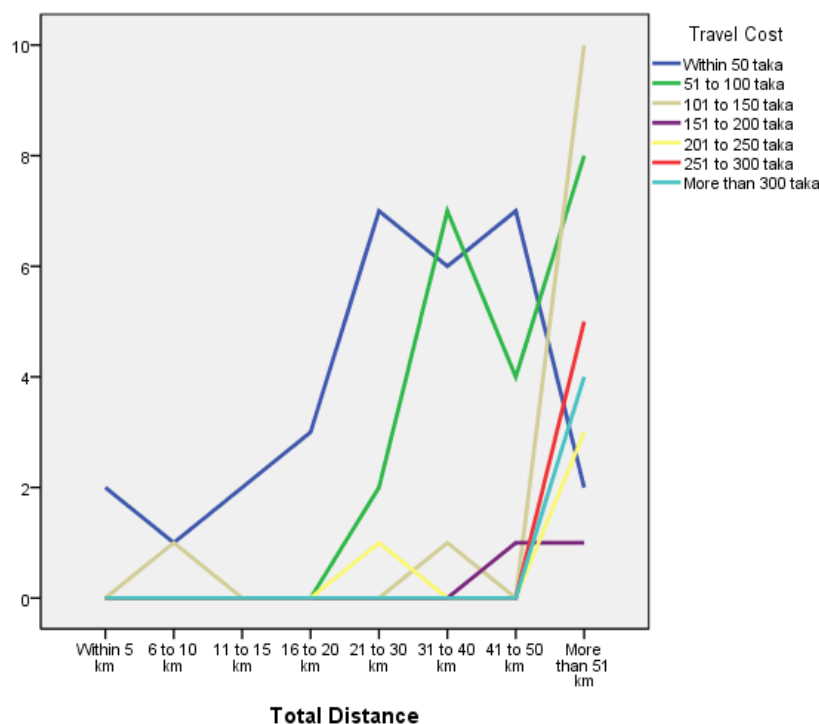
Figure 3.13: Travel cost according to the distance

Source: Traffic and Transportation Survey, 2015.

From the line chart, we can generalize an idea about the trip distance and trip fare. From the **Appendix -B** and above chart, it is seen that with the same amount of money people travel in different distance. Such as within 50 takas, few travel within 5 km, few travel within 15 km and even some people travel more than 20 km. Because people prefer long commuter vehicles when they have to travel longer distance. But in case of shorter distance they prefer different modes such as Auto rickshaw, tempo etc. But in other hand, it can be generalized about the idea of excessive fare by different modes. So, it can be taken into measures which type of mode is preferable by the people in both terms of money and time.

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.

3.4.1 Trip Frequency
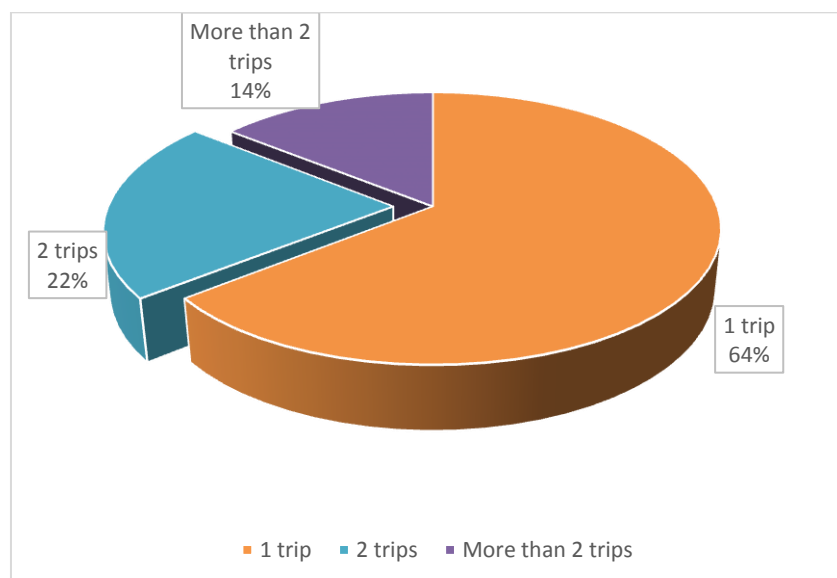
Figure 3.14: Trip frequency of Regional Buses

Source: Traffic and Transportation Survey, 2015.

In Regional transport survey, it is seen that the percentage of 1 trip by Bus coming into study area or going out from study area is most which is 64%. Few buses travel 2 trips or more.

3.4.2 Regional connectivity with surrounding regions
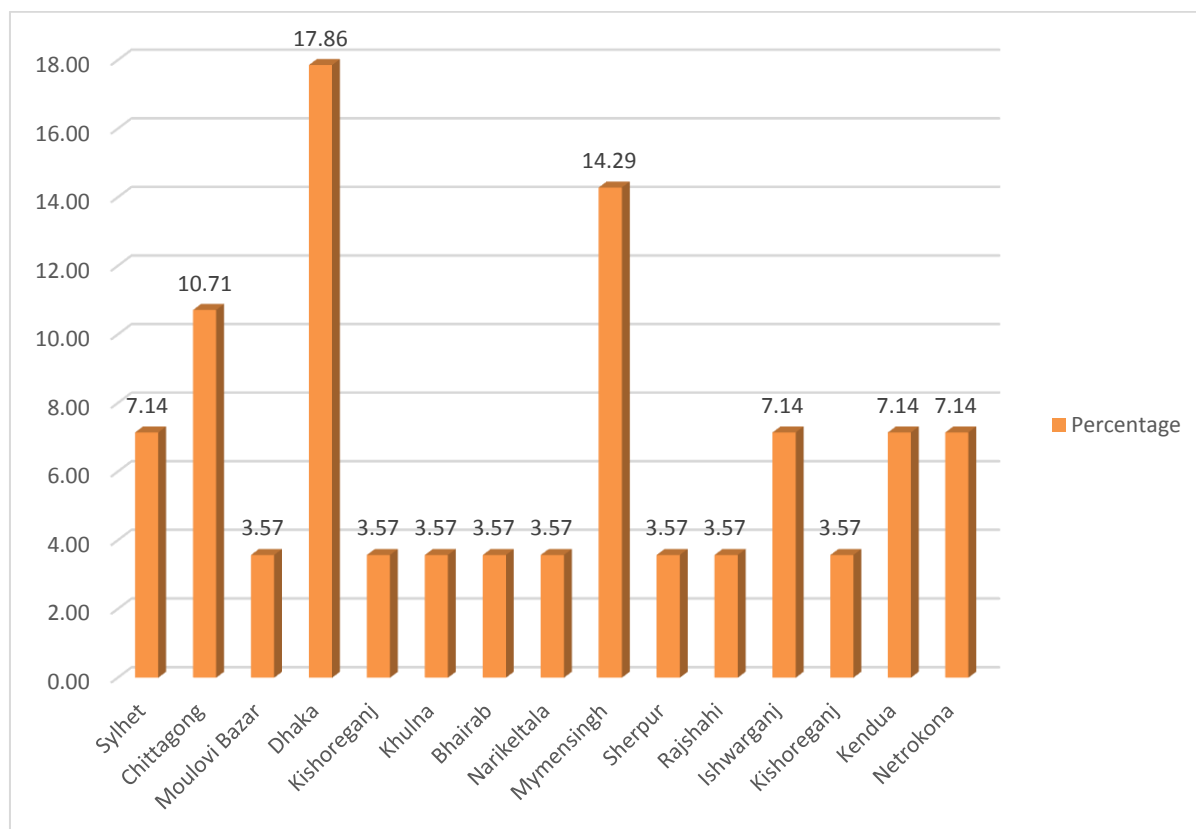
Figure 3.15: Regional Connectivity with surrounding regions

Source: Traffic and Transportation Survey, 2015.

By regional transport survey, the survey has been achieved a network linkage between other Upazilas and Districts with Ishwarganj Upazila. In the bar chart, the percentage of buses travel in Mymensingh is higher which is 14.29%. Buses are traveling in Kendua, Netrokona, Kishoreganj in frequently. And trips are creating by buses or trucks in other Districts/ Upazilas such as Dhaka, Khulna, Chittagong in daily basis.

3.4.3 Passenger carrying capacity
Most of the buses has more than 35 persons carrying capacity. Bus stands have been seen in Ishwarganj Bus Stand and Atharobari Bus Stand where buses stop or starts for their journey. (Please see **Appendix-B**)

3.4.4 Travel pattern of Trucks
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. They travel the study area mostly within 4 trips per week. (Please see **Appendix-B**)

3.4.5 Travel pattern of Trains
Train service has been applied in schedule basis at Ishwarganj Upazila. There are 4 trains available in Ishwarganj Upazila. 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

4.1.1 Mode of Communication

As there are very limited number of waterways are available almost all of the households' main mode of communication is road. A small percentage of total households also traveled by train for long distance travel as they think it is more safe mode of communication than others (please see Figure:4.1).
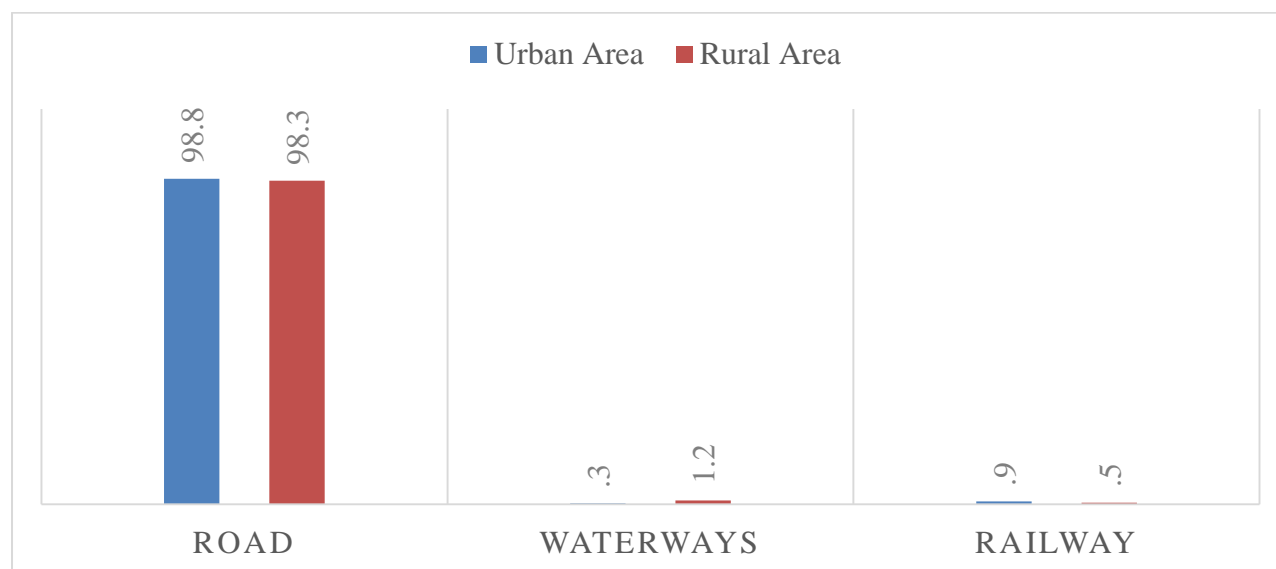
Figure 4.1: Mode of Communication (Source: Field Survey, 2015)

4.1.2 Types of Road

In urban area about half of total road is bituminous road. About same percentage of concrete and mud or katcha roads are also in urban area which altogether represents about one fourth of total road in urban area.On the other hand, more than about two third of total roads in rural areas are katcha. About one third of total rural roads are bituminous or concrete made. 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 Ishwarganj Upazila is not satisfactory (please see Figure: 4.2).
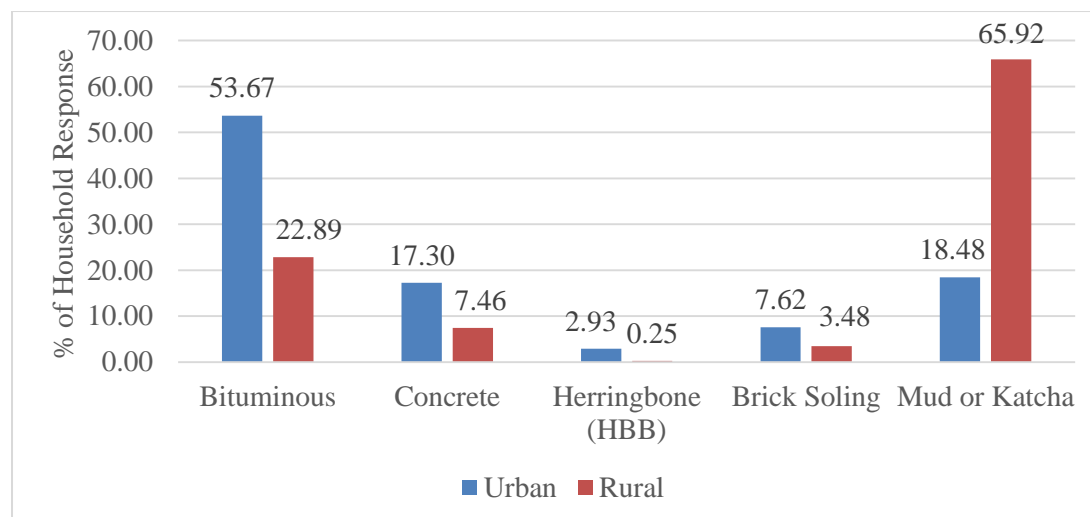
Figure 4.2: Types of Road (Source: Field Survey, 2015)

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 area most of the households went to main road by *Halot* or field boundary, and the percentage of using field boundary is about the double in rural area than urban. On the other hand, in urban area, more people used *halot* to get access to main road than rural area. (please see Figure: 4.3).
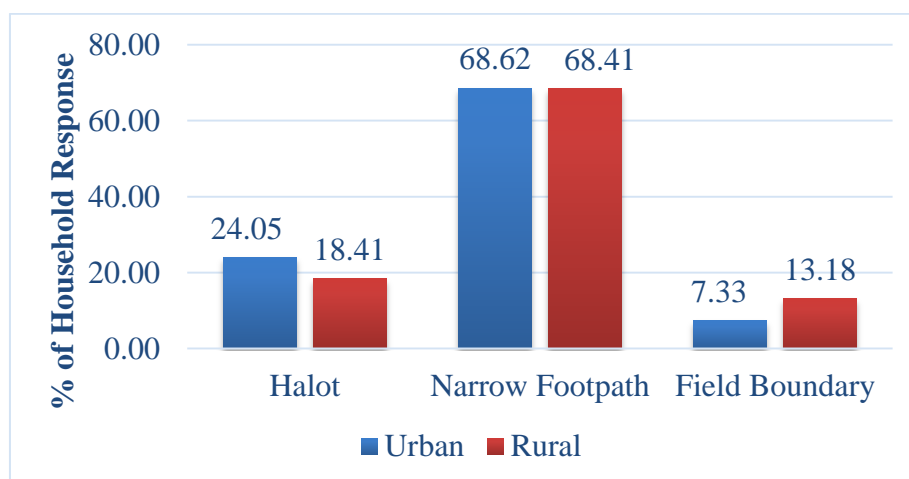
Figure 4.3: Mode of Access to Main Road (Source: Field Survey, 2015)

4.1.4   Condition of Road

In rural area about half of the roads are deteriorated, which needs quick maintenance before totally destroyed condition. Only about one fourth of total roads has been said as good. For about 20% rural roads have problem related with waterlogging. On the other hand, in urban area the percentage of having good road is comparatively higher than rural area. About more than 40% of urban roads are good. But, there are higher percentage of roads having waterlogging related problem than rural area. Again there are about double percentage of destroyed road in urban area than rural area. 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 two third 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
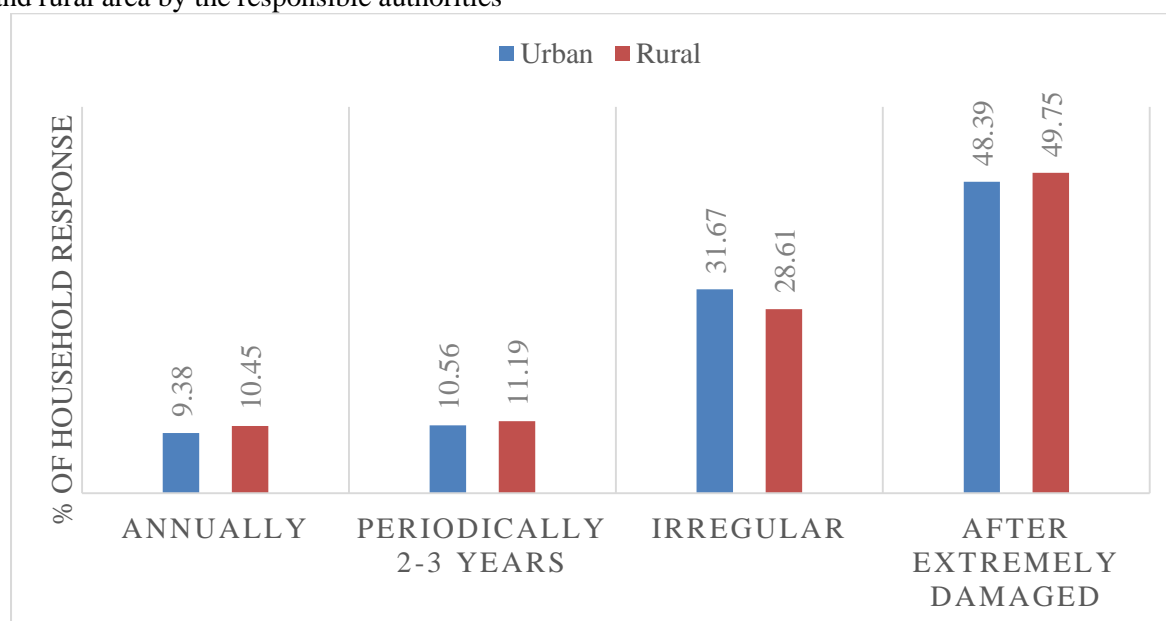
Figure 4.5: Maintenance of Road (Source: Field Survey, 2015)

CHAPTER 5: CONCLUSION

Ishwarganj Upazila has great potentiality because of having regional connectivity with other regions and train connectivity with several important regions. The growth of a region depends mostly on transportation. In the preparation of Development Plan for Ishwarganj Upazila, this transportation survey has inevitable impacts. This survey attempts to describe existing conditions at a given time in order to ascribe an order of magnitude to various transport phenomena, tries to establish causal explanations of different transport conditions. This results will help to future transport demand, transport modeling, a system for developing the transportation system. From the transportation survey several maps and databases such as road infrastructure data, road hierarchy, road pavement etc. will be established form the Physical Feature, Topographic and Landuse Survey.

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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, Mymensingh; Raipura Upazila and Shibpur Upazila, Narsingdi)

FINAL SURVEY REPORT

Transportation Survey
of
Ishwarganj **Upazila, Mymensingh**

September, 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

Socio-economic Survey
of
Ishwarganj Upazila, Mymensingh

August, 2016

Joint Venture
of
SCPL Sheltech Consultants Pvt. Ltd
and
Arc ARC Bangladesh Ltd

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

Ref: SCPL-ABL/UDD/2016/ Socio-economic Survey Report/ Ishwarganj 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 Survey Report of Ishwarganj Upazila, Mymensingh.

Dear Sir,
We are pleased to submit herewith the Final Socio-economic Draft Survey Report of Ishwarganj Upazila, Mymensingh for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

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

_____

1/E/2 Paribagh (Mazar Road), Shahbagh, Dhaka-1000, Bangladesh
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Executive Summary

This report aims to explore the socioeconomic condition of Ishwarganj upazila, Mymensingh. 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. Ishwarganj upazila, Mymensingh has some important *hat/bazars* like Luxmigonj Bazar, AtharabariBazar, Uchakhila Bazar etc. It also has important places like Mirzapur, Tarundia, Uchakhila, Borohit, Sohagi Railway Station, Atharabari Railway Station, Bhulsoma Jami Mosque (1600), Naluapara Jami Mosque (1625) etc. 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, 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 and recreational facilities. But the alarming is about this upazila's education quality. It is deteriorating day by day because of lack of enough qualified teacher and high student-techer ratio. Moreover, there are not enough provision for maternal and child health. So necessary steps should be taken by concerned authorities regarding these problems.

Abbreviation/Acronyms

BDT	Bangladesh Taka
BBS	Bangladesh Bureau of Statistics
BREB	Bangladesh Rural Electrification Board
FPC	Finite Population Correction
GoB	Government of Bangladesh
HDI	Human Development Index
HBB	Herring Bone Bond
HH	House Hold
PDB	Power Development Board
NGO	Non-Government Organization
SDG	Sustainable Development Goal
SPSS	Statistical Packages for the Social Sciences
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 collate a wide range of social and economic indicators in one location, and, through the report, present a broad perspective of socioeconomic conditions Ishwarganj Upazila, Mymensingh. The purpose of the present report is to:

1.   Broaden the access to the information contained in the database through publication of the most recent data gathered; and

2.   Provide readers with up-to-date information on short term changes in socio-economic conditions in the occupied Ishwarganj upazila, Mymensingh.

Socioeconomic indicators are an important ingredient for knowing an areas socio-economic conditions. 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 and 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

Ishwarganj upazila came into existence as a Thana in 1936 and was upgraded to upazila in 1983. Nothing is definitely known about the origin of the upazila name. It is said that in the long past, there lived an influential man named Ishwar patni at the present place of the upazila. A local bazar was named as Ishwarganj after his name. It is generally believed that the upazila might have derived its name after the name of the bazar where the upazila Head Quarters is located. The upazila occupies an area of 280.43 sq. km. It is located between 24º33' and 24º44' north latitudes and between 90º28' and 90º46' east longitudes. The upazila is bounded on the north by Gauripur upzila, on the east by Kendua upazila of Netrokona zila, on the south by Nandail upazila and on the west by Trishal and Mymensingh sadar upazilas. It has 11 unions, 9 Wards, 293 Mouzas, 13 Mahallas, and 291 villages. Ishwarganj was liberated on 9th December 1971. (Banglapedia, 2016).

1.3   Importance in the Regional Context

There are some of very prominent areas in Ishwarganj Upazila. Luxmigonj Bazar, Mirzapur, Tarundia, Uchakhila, Borohit, Sohagi Railway Station, Atharabari Railway Station and Bazar, Uchakhila Bazar etc. Mirzapur is a famous village in Ishwarganj Upazilla. Once upon a time all habitants of this village are Hindus except a Muslim family. This Muslim family is also very prominent in this area, Mr. Abdullah Mondal is the chief of this family. Once upon

a time Ishwarganj and Uchakhila bazar was very famous market in Mymensingh division. Basically these were famous for jute and cow/bull market. Recently, the name of big cattle market is "Lexmigonj Bazar", situated in this upazila, which bide price was 72 lac BDT (2016/2017 year) (Wikipedia, 2016). There are some well-known archaeological heritage and relics like Bhulsoma Jami Mosque (1600), Naluapara Jami Mosque (1625), Teloari Jami Mosque, Atharbari Jamindar Bari etc.
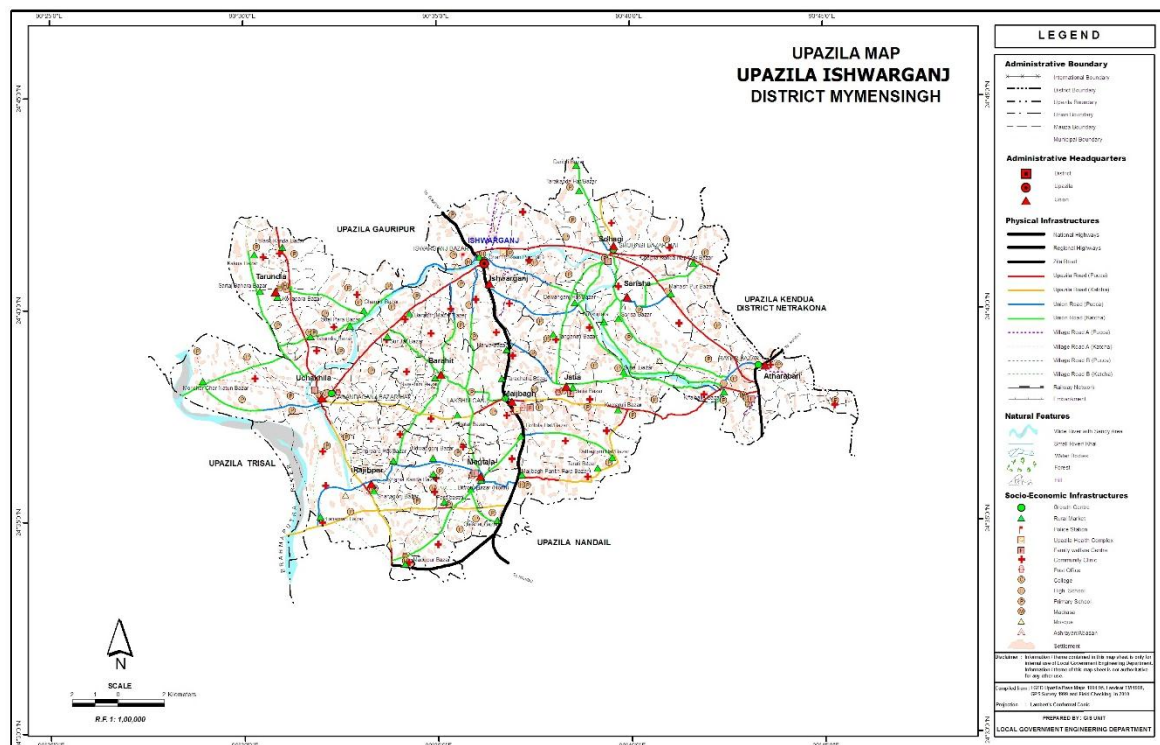
Figure 1.1 Upazila Map, Ishwarganj, Mymensingh   (Source: LGED, 2016)

1.4   Social Information

According to BBS (2011), there are total 81,070 households at Ishwarganj Upazila, Mymensingh Among them 74,002 is rural and rest of 7068 is urban households. Total number of population is 3,76,348 where the number of male is about 1,87,217 and number of female is 1,89,131. Density of this area is about 1036 per sq. km. The upazila is about 24 km far from zila sadar. It has about 1036 mosque, 12 mandir, 2 famous river named "The old Brahmaputra" and "Kachamatia". There are also 47 hat-bazar, 33 post office, 137 government primary school, 7 community primary school, 4 junior high school, 29 madrasa, and 3 colleges. About half of this upazila's total population is literate. The percentage is slightly higher among male than female. Some of the famous hat bazar of this area is Sohagi bazar. Rayer bazar cattle market etc. It also has 7431 ponds and a river flow named Arial Kha. There are 2 filing station, 1 fire brigade station, 2 police station, 466 bridge/culvert, 147.00km of pucca road, 8.00 km of semi pucca road and 334 km of kutcha road etc. There are also one community clinic and 12 upazila health and family planning Centre.

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 Ishwarganj Upazila, Mymensingh.

Specific objectives

The specific objectives of this report were:

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

2.2 Scope of Work

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

2.3 Sampling

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

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

The definition of the population: Households of the project area are considered as the statistical population. The rural populations are more homogeneous. For Ishwarganj Upazila total household number is 81,070. Whereas 74,002 are rural and 7068 are Urban. (BBS, 2011).

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

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

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

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 Ishwarganj Upazila

$$n^1 = \frac{n}{1 + (\dfrac{n}{N})}$$

$$\Rightarrow n^1 = \frac{384}{1 + (\dfrac{384}{7068})}$$

$$\Rightarrow n^1 \cong 341$$

For Rural area of Ishwarganj Upazila

$$n^1 = \frac{n}{1+(\frac{n}{N})} \Rightarrow n^1 = \frac{384}{1+(\frac{384}{74,002})}$$

$$\Rightarrow n^1 \cong 402$$

So, using 95% confidence interval and ±3% precision level total no of surveys are calculated. Distribution of sample for Ishwarganj Upazila is given below:

Sl. No	Urban	Rural	Total Sample
1	341	402	743

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 Ishwarganj 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 Ishwarganj 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	
Mymensingh	Ishwarganj	Ward-01	848	2049	1975	4024	52
		Ward-02	1290	3612	3060	6672	79
		Ward-03	492	1202	1230	2432	30
		Ward-04	651	1548	1560	3108	40
		Ward-05	276	721	676	1397	17
		Ward-06	626	1511	1558	3069	38
		Ward-07	597	1443	1389	2832	36
		Ward-08	424	982	994	1976	26
		Ward-09	713	1525	1596	3121	44
		Atharabari Union	7619	18231	18508	36739	39
		Barahit Union	6539	14509	14841	29350	33
		Ishwarganj Uion	4398	10729	10494	21223	22

Jatia Union	6618	15589	15926	31515	34
Maijbagh Union	8576	19218	19707	38925	44
Mogtola Union	7741	18129	17600	35729	39
Rajibpur Union	8090	18333	18425	36758	41
Sarisha Union	6034	13807	14498	28305	31
Sohagi Union	6131	13737	14116	27853	31
Tarundia Union	6831	15103	15507	30610	35
Uchakhila Union	6576	15239	15471	30710	33
Total	*81070*	*187217*	*189131*	*376348*	*743*

2.4   Tools Development

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

2.4.1   Preparation of Questionnaire

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

2.4.2   Pre-testing

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

2.4.3   Training of Enumerators and Survey Supervisors

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 Ishwarganj 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.

2.4.4   Survey Team Mobilization

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

2.5   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, 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.

2.6   Database Preparation and Processing

After completing the survey works in the field (Annexure 2), a detail database has been prepared to follow the survey questionnaire. The database has 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.

2.7   Limitation of the Study

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

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

Chapter 3: Study Findings

3.1   Introduction

This chapter describes the survey findings of different socio-economic factors in both urban and rural areas of Ishwarganj. Here, urban areas mean data gathered in 9 Wards of Ishwarganj Municipality/Pourashava and rural areas means data gathered from 11 Unions of Ishwarganj 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 Ishwarganj 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 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).
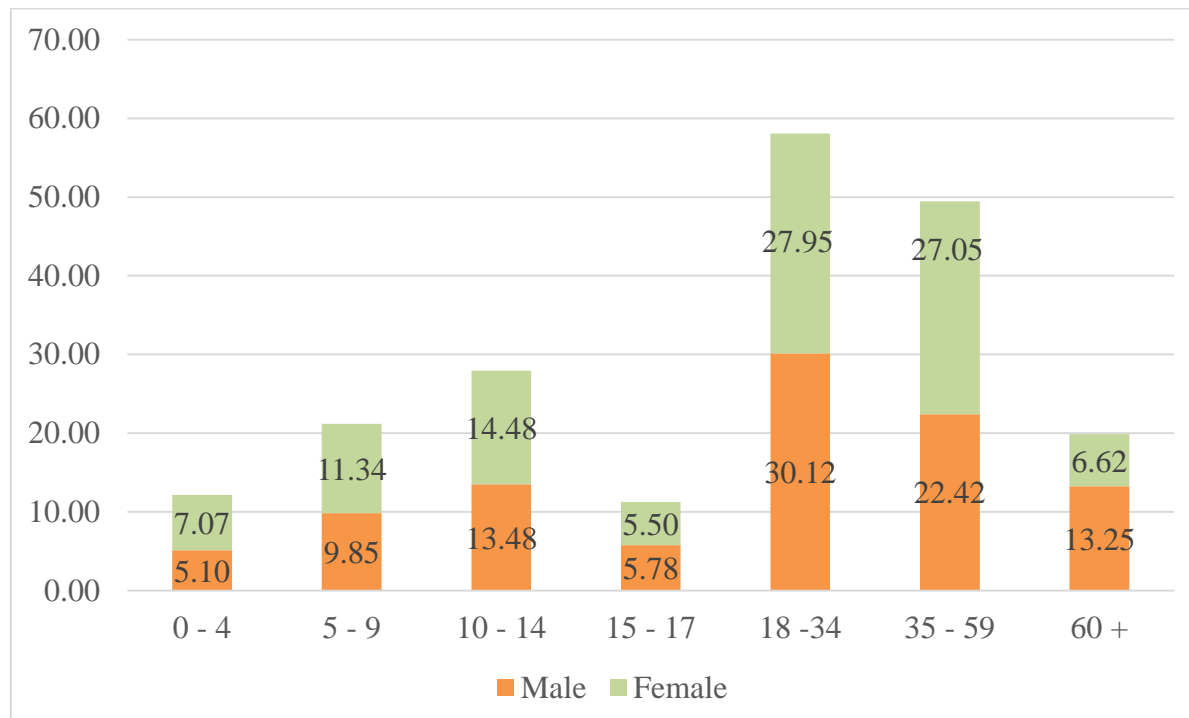
Figure 3.1: Age and Sex Structure of Households at Ishwarganj(Source: Field Survey, 2015)

Moreover, among senior citizen group male percentage is found higher (about double) than female (please see Figure 3.1).

The pyramid shows dependent and working age population by urban and rural area in Ishwarganj Upazila. In urban area, 35 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 60 percent people are found. While in rural areas of Ishwarganj, the corresponding figures were almost the similar (37 % and 59 % respectively). Please see Figure 3.2 and 3.3 below:
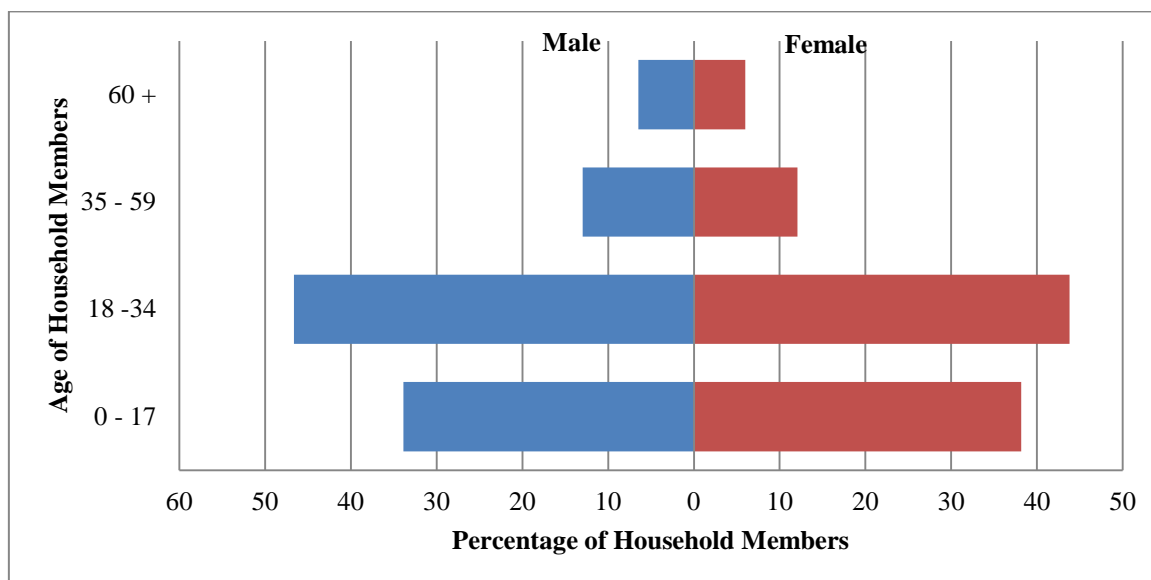
Figure 3.2: Age and Sex Pyramid of Urban Population (Source: Field Survey, 2015)
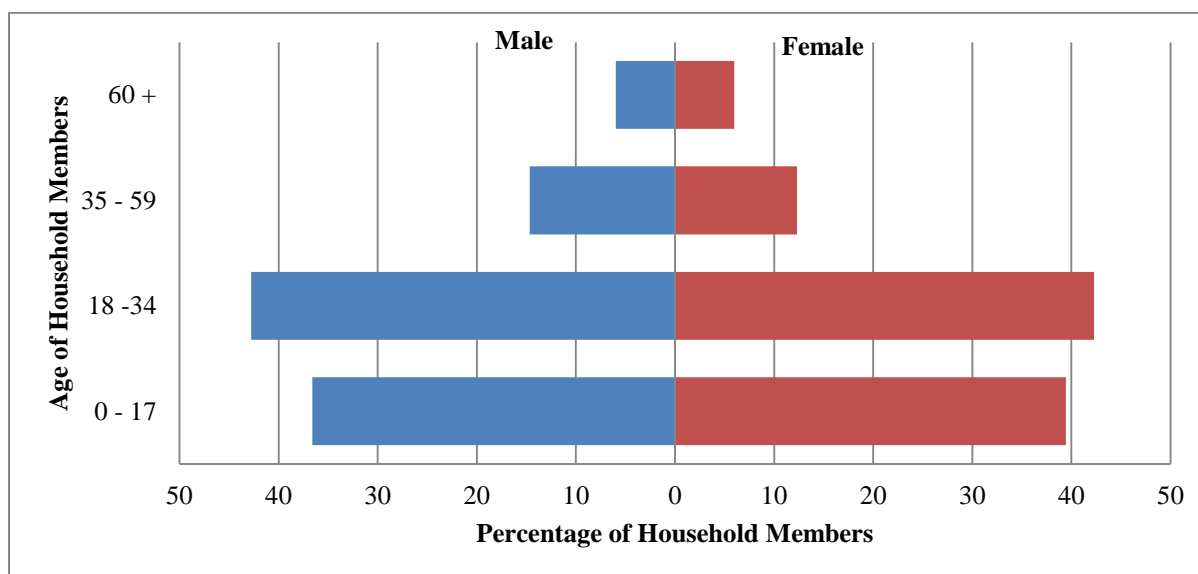
Figure 3.3: Age-sex Pyramid of Rural Population (Source: Field Survey, 2015)

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.
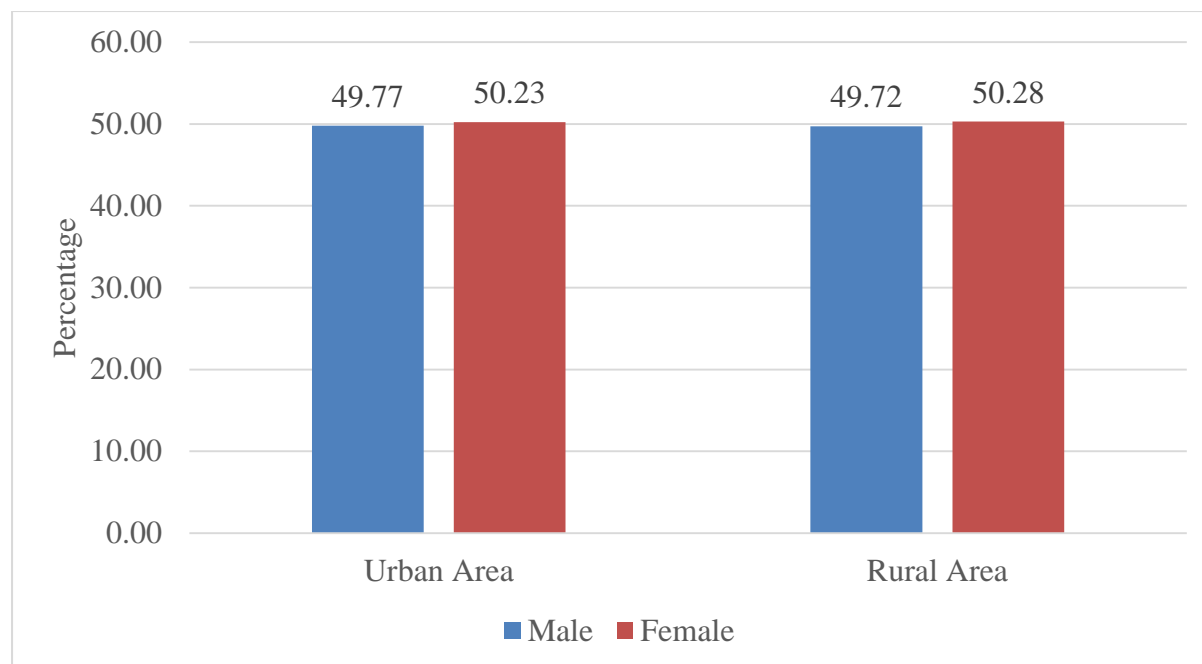
Figure 3.4: Male-Female Ratio in Urban and Rural Area (Source: Field Survey, 2015)

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. And the male and female ratio is about the same for both in urban and rural area.

3.4   Marital Status

It has been found in Ishwarganj Upazila most of the respondents are either single or married irrespective of rural or urban area. Among them the percentage of marital status "single" is slightly lower in rural area than urban area. Apart from these, some of them also found as widow (about 2%) in urban area, which is about half in rural area (please see Figure: 3.5).
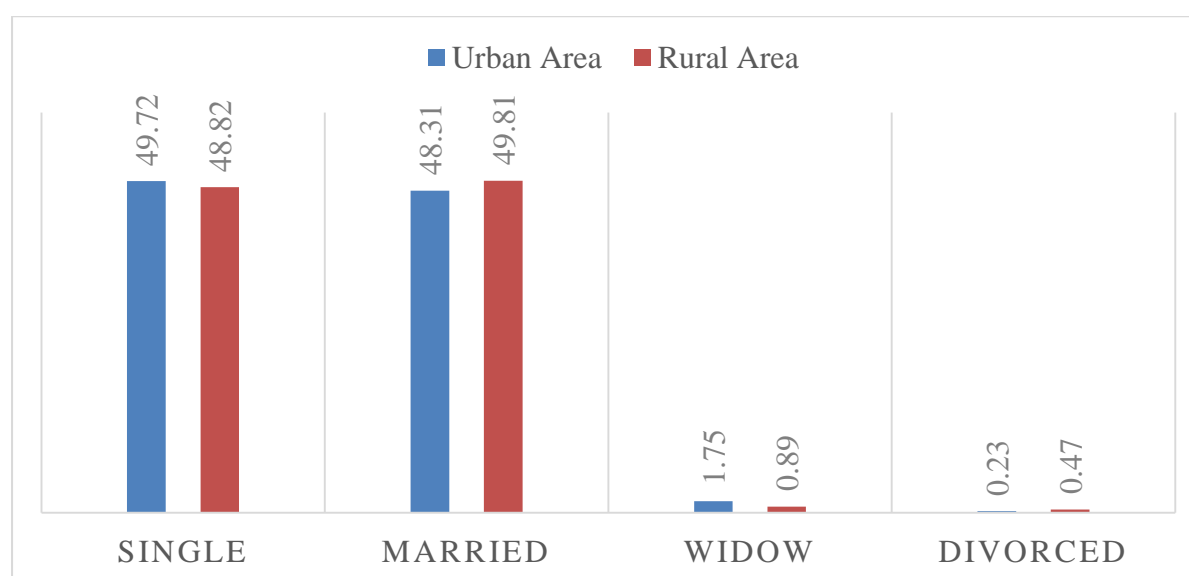
Figure 3.5: Marital Status (Source: Field Survey, 2015)

3.5   Religious Status

In Ishwarganj Upazila there isa notable difference of the percentage of people in different religions between rural and urban area(please see Figure: 3.6).
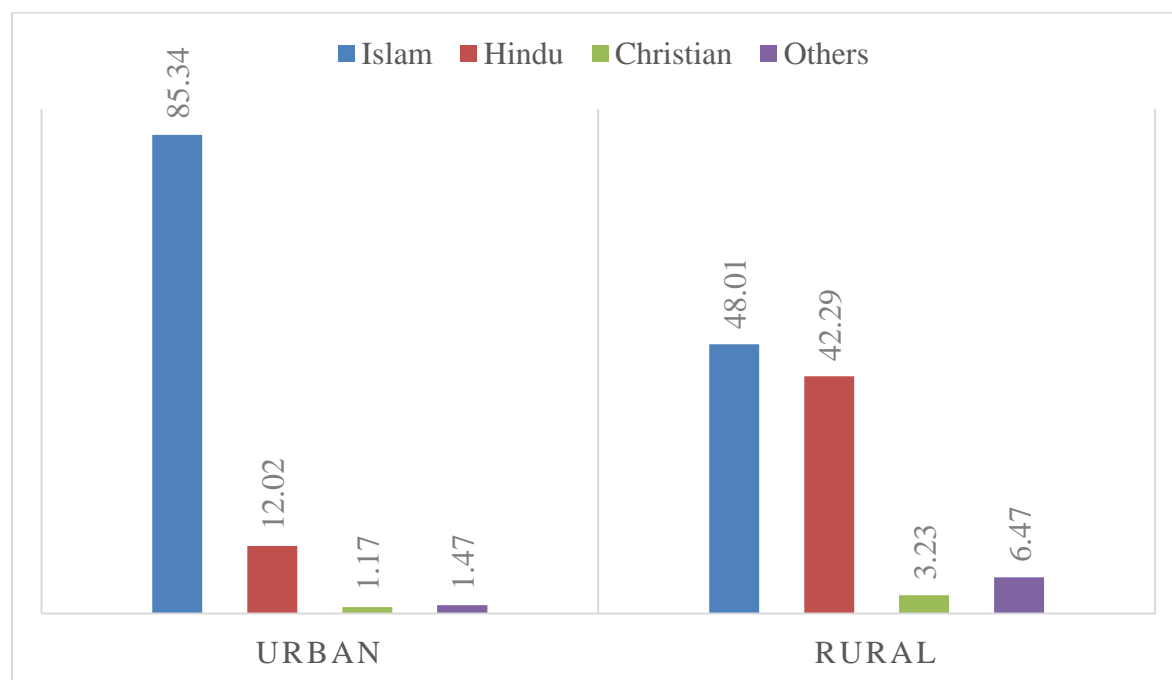
Figure 3.6: Marital Status (Source: Field Survey, 2015)

In urban area more than about two third respondents are Muslim, and a very small percentage of respondents are Hindu. Whereas, in rural area the percentage of Hindu respondents are too high (about four times higher) than urban area. The percentage of Hindu and Muslim households are about the same in rural area. Thus in rural area of Ishwarganj Upazila contains very much larger number of Hindu households than urban area.

3.6   Level of Education

In Ishwarganj 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. In addition, percentage of completing SSC level of education is higher in rural area than urban. On the other hand, the percentage that completed their HSC/Degree level of education is higher in urban area than rural area (please see Figure: 3.7). So it can be anticipated that people from urban area is more attached with higher education than in rural area. 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.
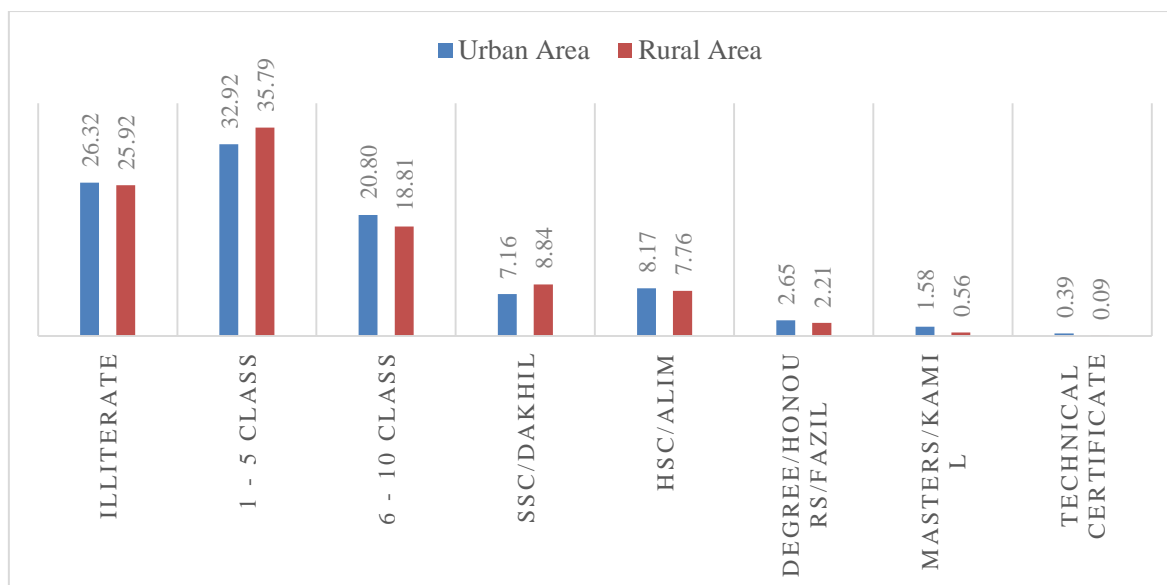
Figure 3.7: Level of Education (Source: Field Survey, 2015)

3.7   Types of Occupation

In IshwarganjUpazila, it has been found that in urban area most of the respondents (about more than 90%) are engaged in Job, Business and Labour types of occupation, the rest of them are engaged in vocational and traditional occupation. And the maximum percentage (About half of total respondents)areengaged in labour types of works in urban area whereas maximum percentage (About more than half) of total respondents are from same category in rural area. Further, in rural the second maximum percentage of respondents (about one-fourth) are doing jobs. On the other hand, the second maximum percentage of respondents in urban area are involved in business. Moreover, respondents involved in vocational and traditional occupation are found about the half in rural area than urban area (please see Figure 3.8).
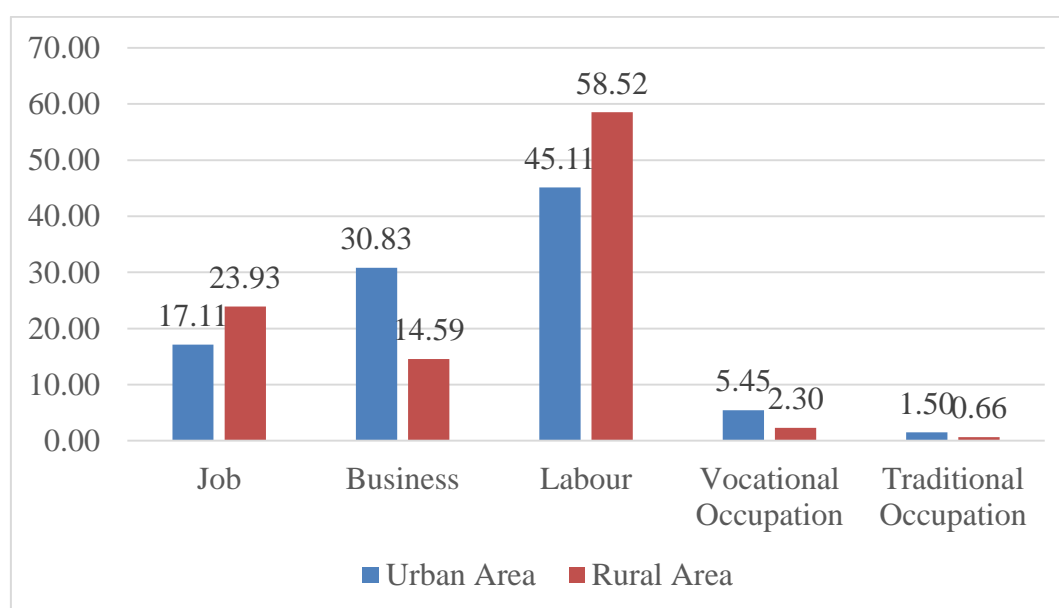
Figure 3.8: Occupation in Urban and Rural Area (Source: Field Survey, 2015)

The relations also have been studied between education level and occupation pattern in urban area. In urban areas, it has been found that people who has education level below primary school, mostly (about two third) engaged in labor types (Daily labor, Agricultural labor and service labor) of jobs. Some of them (about one-fourth) also tried to earn their living as small entrepreneurs and hawkers. Respondents who started their higher school but did not complete SSC has been found as remaining in the about same types of occupations. On the other hand, respondents who completed SSC, about two third of them are involved in Non-government job holder and small enterpreneurship. A small percentage (about 11%) of them also been successful to upgrade their enterpreneurship from small to medium. Respondents from above SSC level started to engage in Government and Non-government jobs. And for them the percentage is significantly higher for involving in non-government jobs. Respondents with technical certificate mostly got engaged in non-government jobs (please see table 3.1).

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

	Illiterate	1 - 5 Class	6 - 10 Class	SSC/ Dakhil	HSC/ Alim	Degree/Hon ours/Fazil	Masters/ Kamil	Technical Certificate
Government Job Holder	0	0	0	3.6	0	**20**	**12.5**	0
Non-Government Job Holder	0	0	7.0	**34.5**	**40**	**65.0**	**81.3**	**80**
Family Worker	0	0	0	1.8	10	0	0	0
NGO Worker	0	0	2.3	3.6	3.3	10	6.3	0
Hawker	**12.9**	**6.5**	**17.2**	0	0	0	0	0
Small Entrepreneur	**12.9**	**15.1**	**16.4**	**30.9**	**26.7**	0	0	0
Shopkeeper	0	2.9	5.5	1.8	13.3	0	0	0
Medium Entrepreneur	0	2.9	2.3	**10.9**	0	5.0	0	0
Agricultural Labour	**30.2**	**32.4**	**24.2**	0	0	0	0	0
Industrial Labour	.7	0	0	0	0	0	0	0
Construction Labour	0	.7	0	0	0	0	0	0
Transport Labour	.7	0	.8	0	0	0	0	0
Service Labour	**7.2**	**7.2**	1.6	9.1	0	0	0	20
Day Labour	**28.1**	**23.0**	**14.8**	0	0	0	0	0
Electrician	.7	1.4	.8	0	3.3	0	0	0
Mason	0	3.6	.8	0	0	0	0	0
Plumber	1.4	.7	0	0	0	0	0	0
Woodcarver	.7	.7	4.7	0	0	0	0	0
Painter	.7	.7	1.6	3.6	0	0	0	0
Fridge or AC Mechanic	0	0	0	0	3.3	0	0	0
Blacksmith	2.9	.7	0	0	0	0	0	0
Potter	.7	1.4	0	0	0	0	0	0

Source: Field Survey, 2015

On the other hand, in rural areas, respondents who has technical certificate all of them are engaged in non-government jobs. Respondents who completed Masters level of education about two third of them are engaged in same category as previous. The rest are in government jobs. Like in urban area, the percentage of engaging in Government and Non-government 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. A significant amount of them also engaged in agriculture labor as in urban area (Please see Table 3.2). The percentage of engaging in small entrepreneurship is about half in rural area than urban, which represents urban area's economy provide more option to conduct business for small entrepreneurs than rural area. Again, those who completed SSC level of education, about 13% of them are engaged in NGOs which is highest among different level of occupations. Thus, NGOs get most of their workers from this level of education.

Table 3.2: Education and Occupation Pattern in Rural Area(In Percentage)

	Illiterate	1 - 5 Class	6 - 10 Class	SSC/ Dakhil	HSC/ Alim	Degree/Honours/Fazil	Masters/ Kamil	Technical Certificate
Government Job Holder	0	0	0	**1.4**	**9.5**	**16.7**	**25.0**	0
Non-Government Job Holder	0	0	**13.8**	**47.2**	**54.0**	**66.7**	**75.0**	**100**
Family Worker	0	0	2.4	6.9	7.9	0	0	0
NGO Worker	0	0	2.4	**12.5**	4.8	11.1	0	0
Hawker	2.2	3.8	4.9	0	0	0	0	0
Small Entrepreneur	4.3	5.9	6.5	**15.3**	6.3	0	0	0
Shopkeeper	2.2	4.3	2.4	8.3	4.8	0	0	0
Medium Entrepreneur	0	2.2	2.4	1.4	3.2	0	0	0
Agricultural Labour	**33.1**	**23.1**	**17.9**	0	0	0	0	0
Industrial Labour	3.6	1.1	.8	0	0	0	0	0
Construction Labour	**26.6**	**18.8**	**13.0**	0	0	0	0	0
Transport Labour	3.6	**10.8**	7.3	0	0	0	0	0
Service Labour	**11.5**	**11.8**	7.3	5.6	4.8	0	0	0
Day Labour	**12.2**	**15.1**	**13.8**	0	0	0	0	0
Electrician	0	.5	.8	0	0	0	0	0
Plumber	.7	.5	0	0	0	0	0	0
Fridge or AC Mechanic	0	.5	.8	0	1.6	0	0	0
Electronics Mechanic	0	1.1	1.6	0	3.2	5.6	0	0
Blacksmith	0	0	.8	0	0	0	0	0
Potter	0	.5	.8	1.4	0	0	0	0

Source: Field Survey, 2015

3.8 Monthly Income and Expenditure of Households

3.8.1 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 third of total households of rural area's income is from their salary (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, in rural area some of the households leads their life from pension money. Thus, people who retired from the jobs, go to their village and lived there (please see Figure: 3.9).
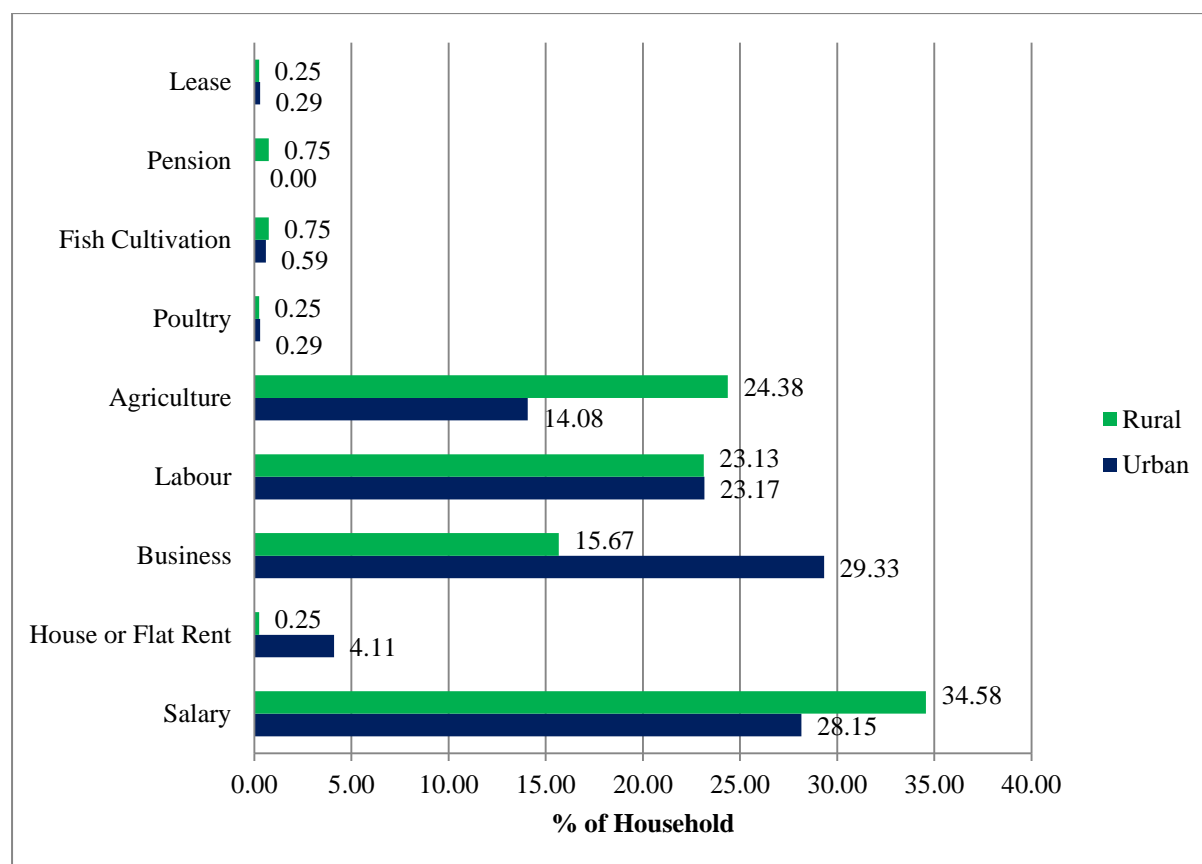
Figure 3.9: Income Source   Note: Multiple Response Counted (Source: Field Survey, 2015)

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 80% of household's income is less than 20000. Whereas in urban area about more than two third of total household's income is in this range. The percentage is always higher in urban area than rural, whose household income is more than 20000. The percentage is about double in urban area, whose income is between 20000-30000 (please see Figure:3.10). 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 is found higher than urban people.
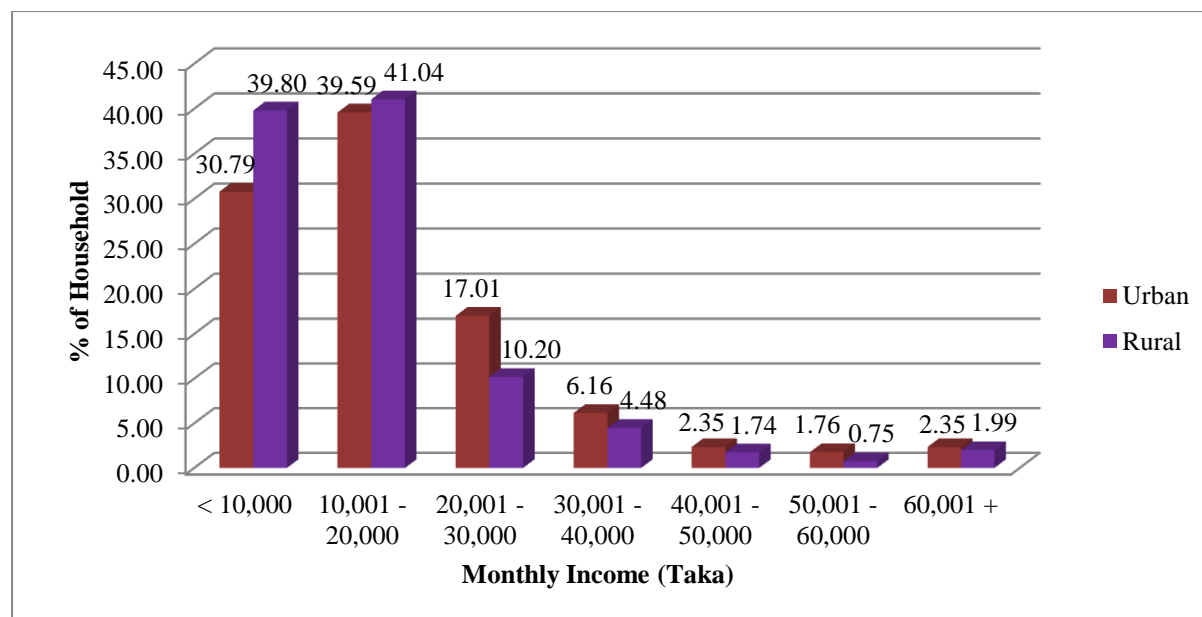
Figure 3.10: Monthly Income (Source: Field Survey, 2015)

The relationship between types of occupation and income range in urban and rural areas has been given in below table.

Table 3.3: Types of Occupation and Income Range in Urban (U) and Rural (R) Area

	U	R	U	R	U	R	U	R	U	R	U	R	U	R
	< 10,000		10,001 – 20,000		20,001 – 30,000		30,001 – 40,000		40,001 – 50,000		50,001 – 60,000		60,001 +	
Salary	9.5	14.4	28.9	44.8	43.1	56.1	52.4	61.1	25.0	42.9	66.7	33.3	62.5	50
House or Flat Rent	3.8	.6	3.7	0	3.4	0	9.5	0	0	0	16.7	0	0	0
Business	29.5	10.6	31.1	20	24.1	19.5	33.3	11.1	50	0	0	33.3	25.0	25.0
Labour	32.4	34.4	26.7	20	13.8	9.8	0	0	0	0	0	0	12.5	12.5
Agriculture	23.8	37.5	8.1	15.2	15.5	12.2	4.8	27.8	25.0	28.6	0	0	0	12.5
Poultry	0	.6	.7	0	0	0	0	0	0	0	0	0	0	0
Fish Cultivation	0	0	.7	0	0	0	0	0	0	28.6	16.7	33.3	0	0
Pension	0	1.9	0	0	0	0	0	0	0	0	0	0	0	0
Lease	1.0	0	0	0	0	2.4	0	0	0	0	0	0	0	0

Source: Field Survey, 2015

It has been found that in urban and rural area whose income is below 10000, most of them (about one third) are engaged in labor types of work. About half of people from urban area is involved in either business or agriculture. On the other hand, for the same income ranges maximum percentage (about 40%) of people are engaged in agriculture. For income range 10000-20000, most of the urban people's (about 90%) income source is either salary or business or labor. Whereas for the same income category about half of rural people's income source is salary. For income range 20000-40000, about two third of the total households of rural and urban area's income source is either salary or business. Thus, for the other income ranges also it has been found that most of their income source is salary. In urban area, whose income range is between 40 and 50 thousand, about half of them is engaged in business,

whereas in rural area for about half of them income source is salary. Again, whose income is between 50 and 60 thousand, in rural area their income source is either salary or business or fish cultivation, whereas in urban area about two third of their income source is salary. Thus it can be said that, in rural area a significant percentage of people from higher income range are involved in either agriculture or fish cultivation, whereas in urban area the significant sources are business and salary.

3.9   Monthly Expenditure

About half of total household's monthly expenditure in rural area is below 10000. More than about one third of total rural household's monthly expenditure is between 10 and 20 thousands which is about same for the urban area. On the other hand, the percentage of households expending below 10000 in urban area is about 40% which is lower than rural area. Thus, expenditure in urban area is comparatively higher than rural area (please see Figure: 3.11).
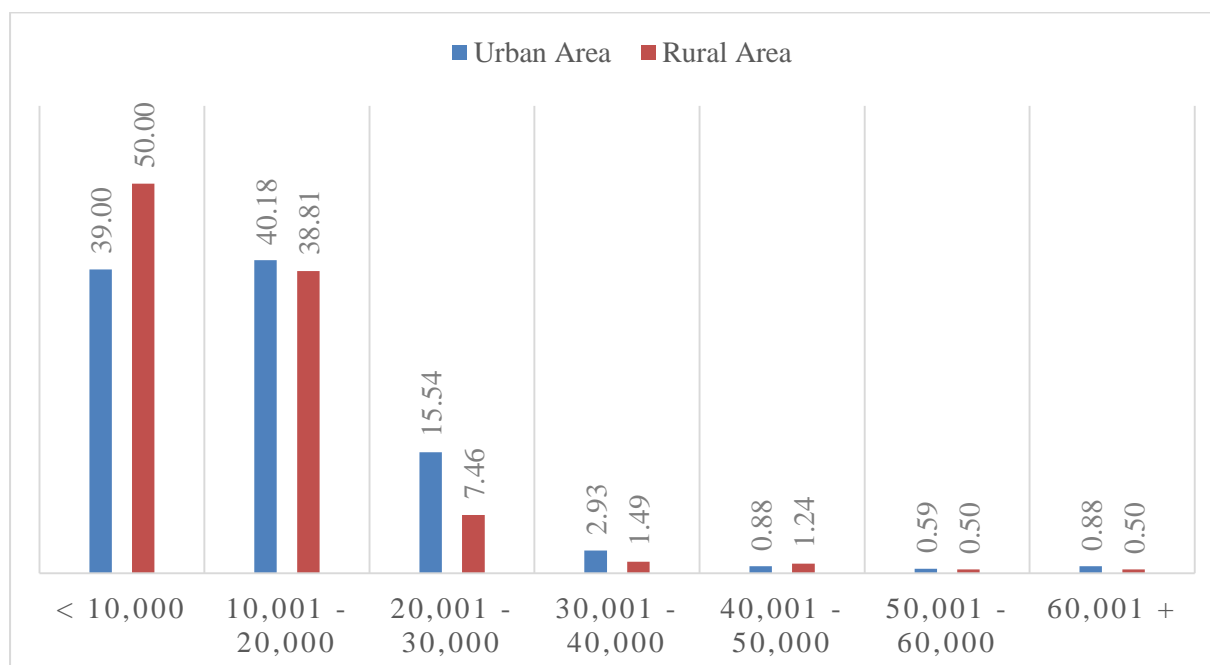
Figure 3.11: Monthly Expenditure (Source: Field Survey, 2015)

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 6000 is higher in rural area than urban area. Whereas the percentage of household expending more than 6000 on food is always higher in urban area than rural area. Thus, expenditure on food is comparatively high in urban area than rural (please see Figure 3.12)
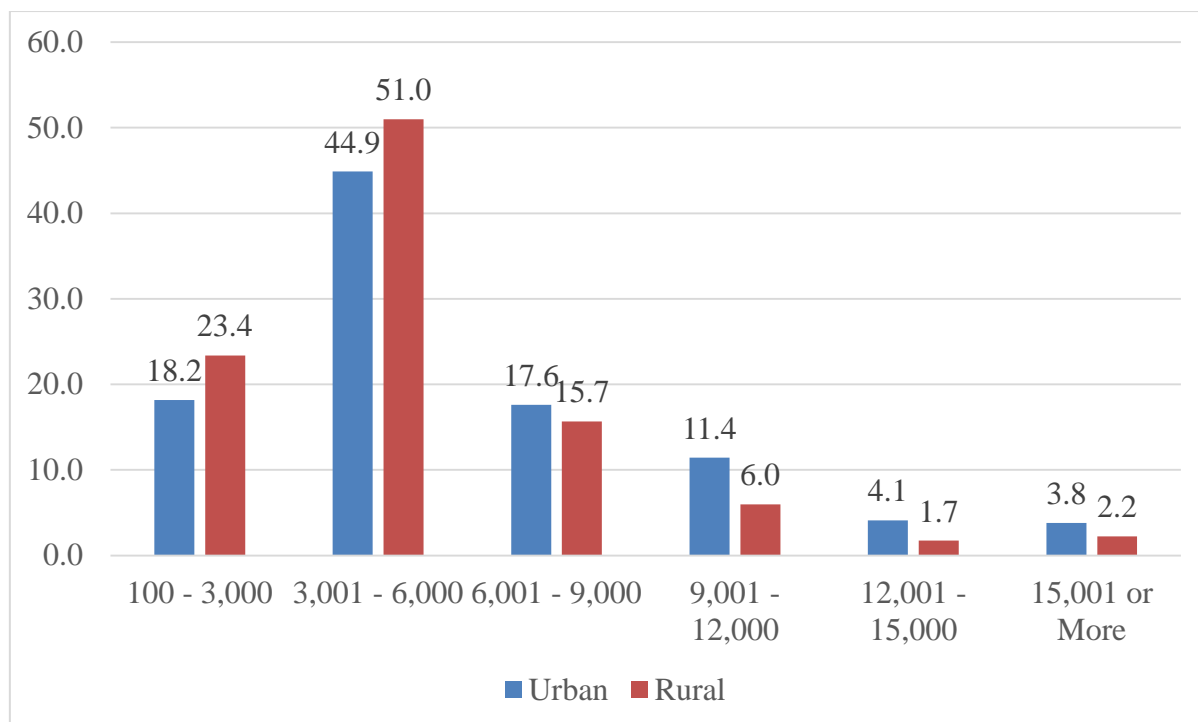
Figure 3.12: Monthly Expenditure on Food (Source: Field Survey, 2015)

The percentage of food cost per month is a vital indicator of socioeconomic situation of household. About 23 percent households' food cost within 61 to 90 percent those are poor people. About 29 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 3.13)
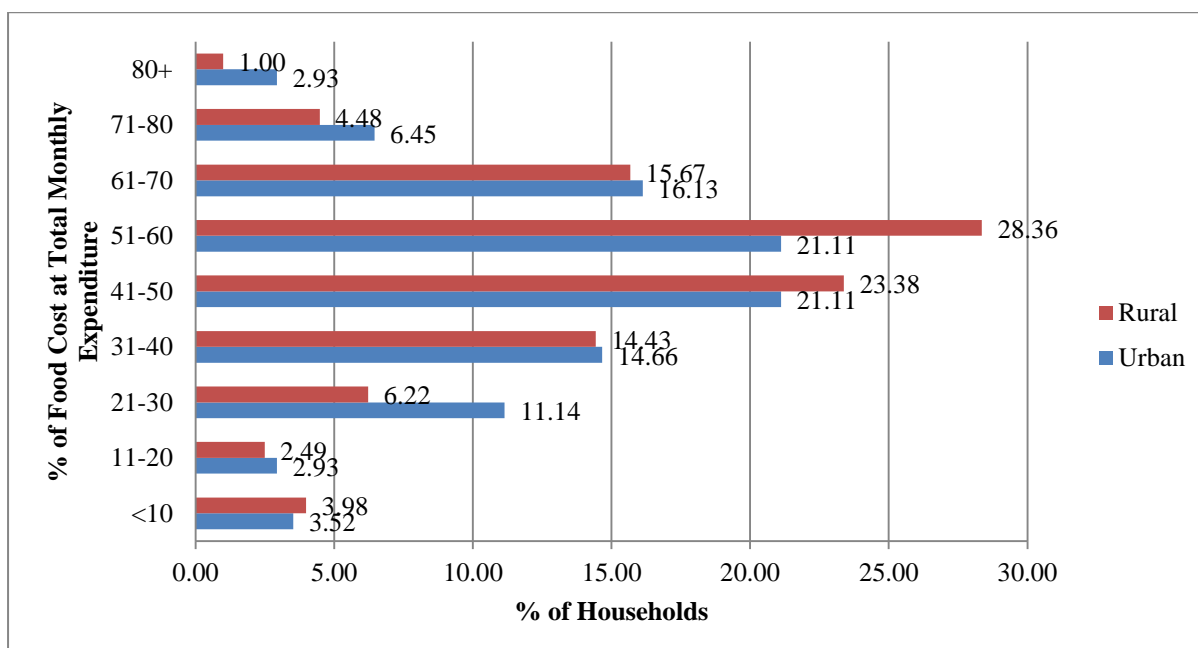
Figure 3.13: Percentage of Food Cost at Total Monthly Expenditure (Source: Field Survey, 2015)

Moreover, expenditure on education is also comparatively lower in rural area than urban area. Though about more than half of the rural and urban households' monthly expenditure on education is less than 1000, the percentage of households is higher in rural area. Most of the households who are expending more than 1000 per month on education lived in urban area. Thus, urban people is expending more on education than rural (please see Figure 3.13)
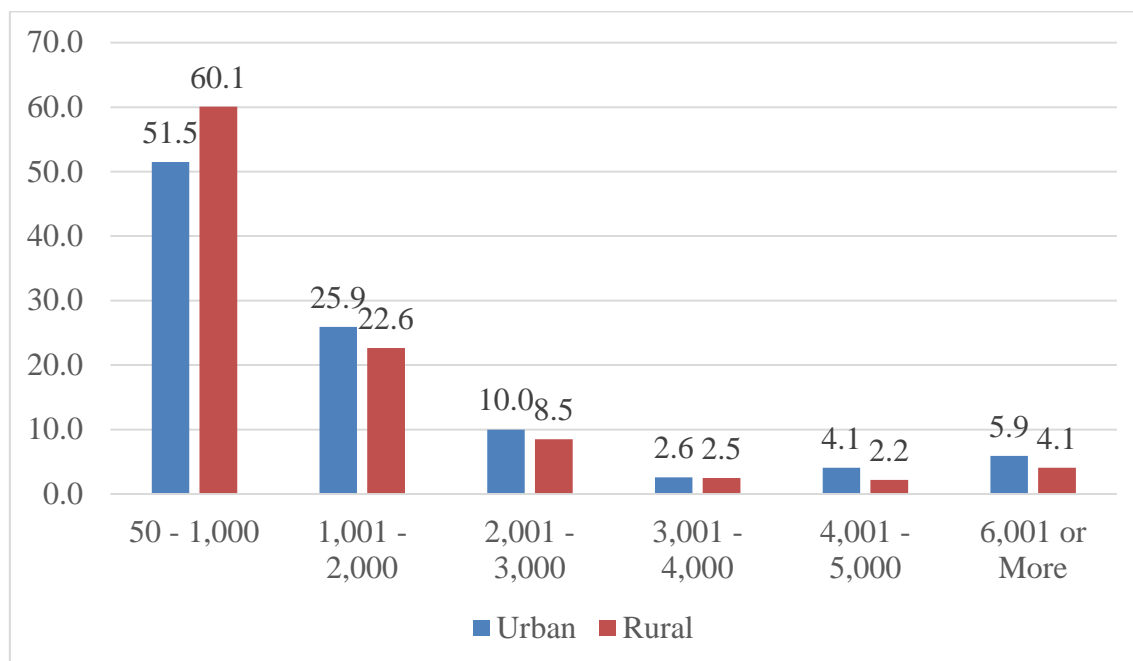
Figure 3.13: Monthly Expenditure on Education (Source: Field Survey, 2015)

3.10   Migration

Almost all of the households of rural area is non-migrant, lived in here from their birth. About 90% of urban households are non-migrant. The urban migrants came here because of family or unemployment (please see Figure: 3.14).
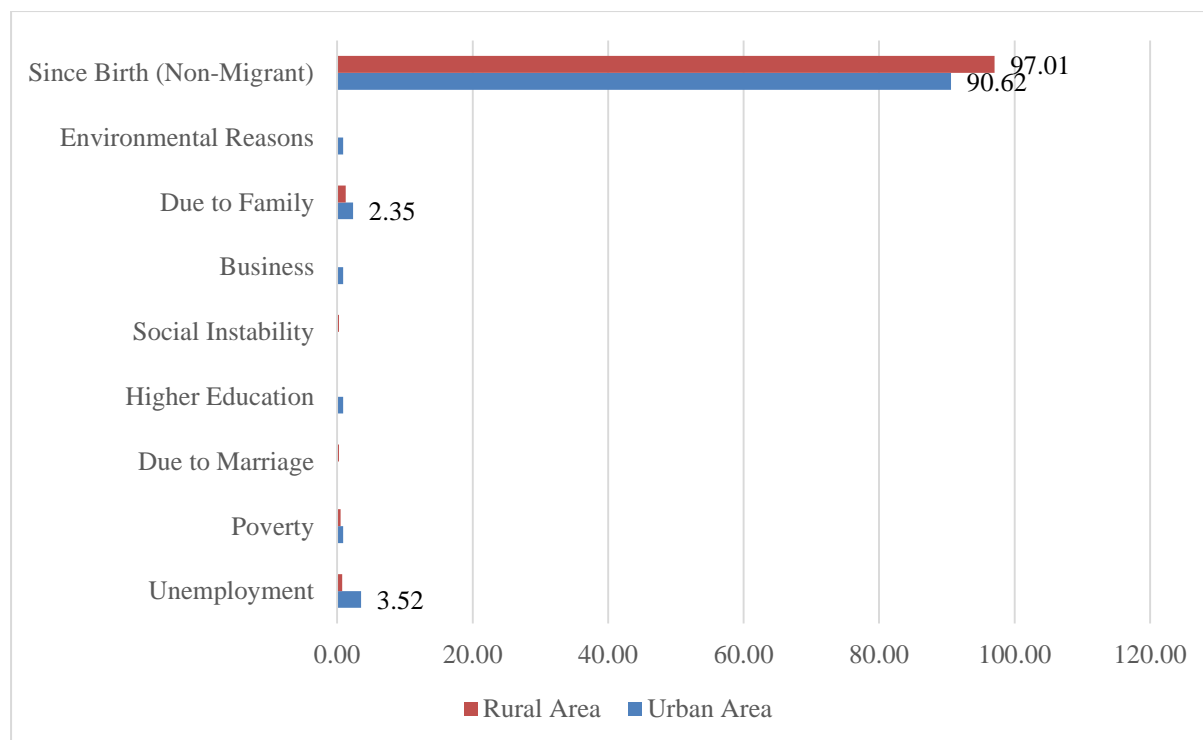
Figure3.14: Causes of Migration (in percentage) Source: Field Survey, 2015

3.11   Housing Status

3.11.1 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 Ishwarganj Upazila are there by their inheritance. The percentage of joint ownership of household is slightly higher in rural area, thus in rural area most of the households are living in their own house in extended family. These households own their household land with other members of their families. Very small percentage of people lived in rent house both in urban and rural area (please see Figure:3.15).
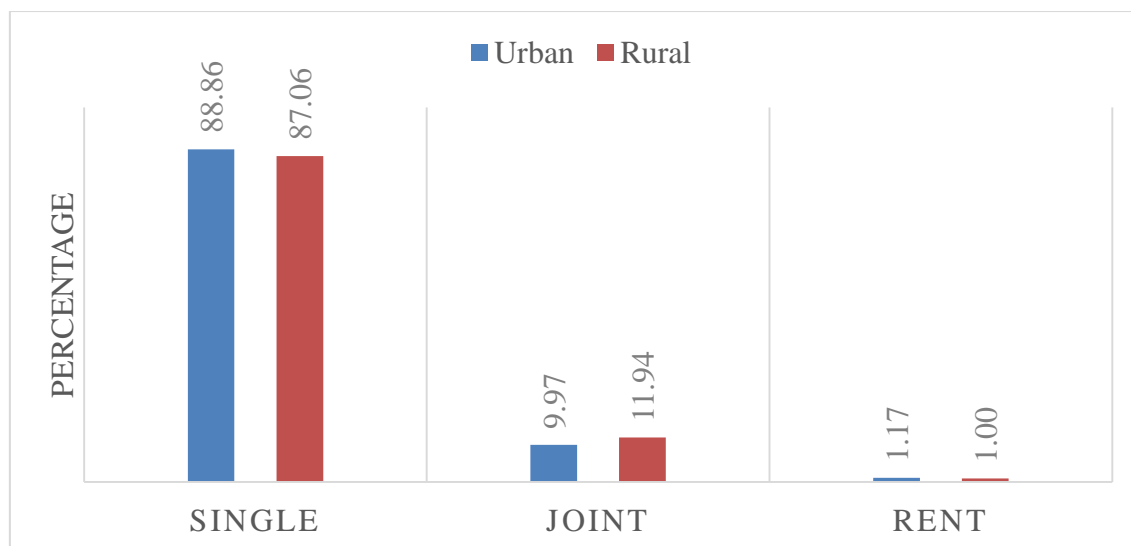
Figure 3.15: Pattern of Household Land Ownership (Source: Field Survey, 2015)

3.11.2 Types of House Structure

About more than 80% household of Ishwarganj Upazila is Katcha in both of urban and rural area. Which also represents the economic condition of this area. Only a significant percentage (about 14%) of households in urban area lived in semi-pucca house (please see Figure 3.16)
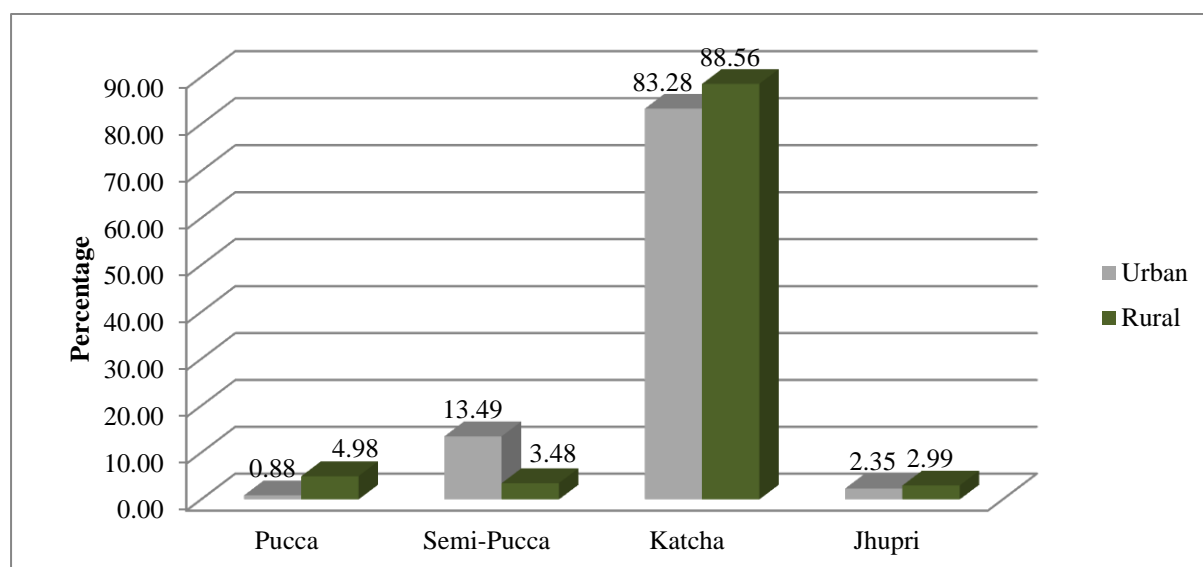
Figure 3.16: Type of Household Structure(Source: Field Survey, 2015)

3.11.3 Source of Land Ownership and Duration of Living

Both in urban and rural area most of the households owned their land by inheritance. Thus, they are living in the same house for21 or more years. 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 Ishwarganj and live with modern facilities (please see Figure: 3.17).
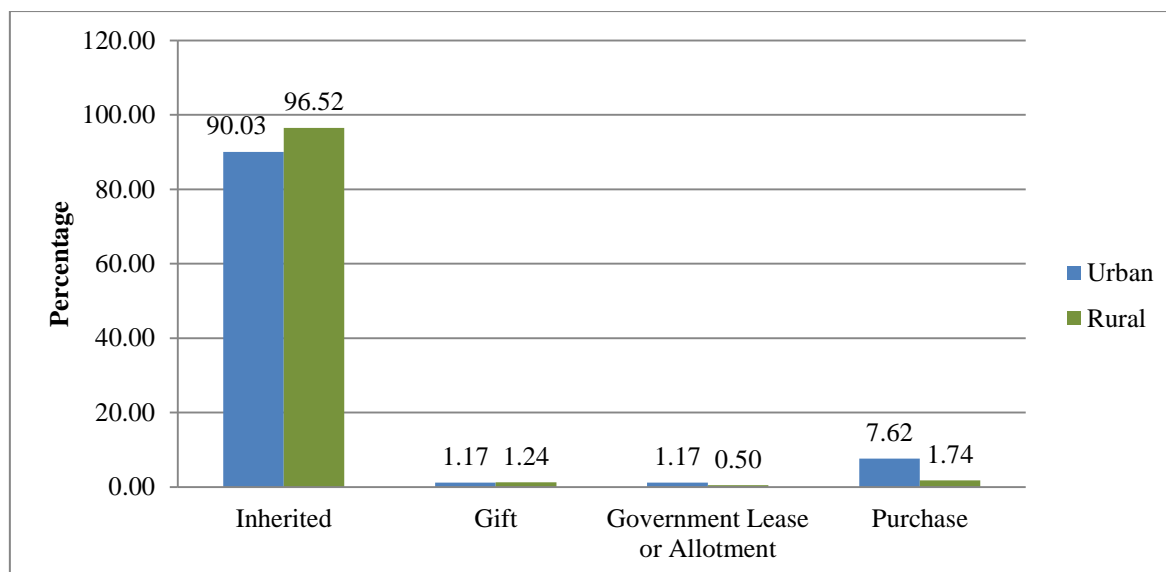
Figure3.17: Source of Household Land Ownership   (Source: Field Survey, 2015)

From Figure 3.16, it is evident that, about 80% of total respondents of both urban and rural area living in the same house 21 or more years as they got it by inheritance. The percentage is lower in urban area as in urban area a significant number of people lived there by purchasing the land and they are newly started living households as a result the ratio of living in the same households 16-20 years is about the same for both in rural and urban areas. In urban area some of new households build their own house recently because of the attraction of urban facilities (please see Figure 3.18)
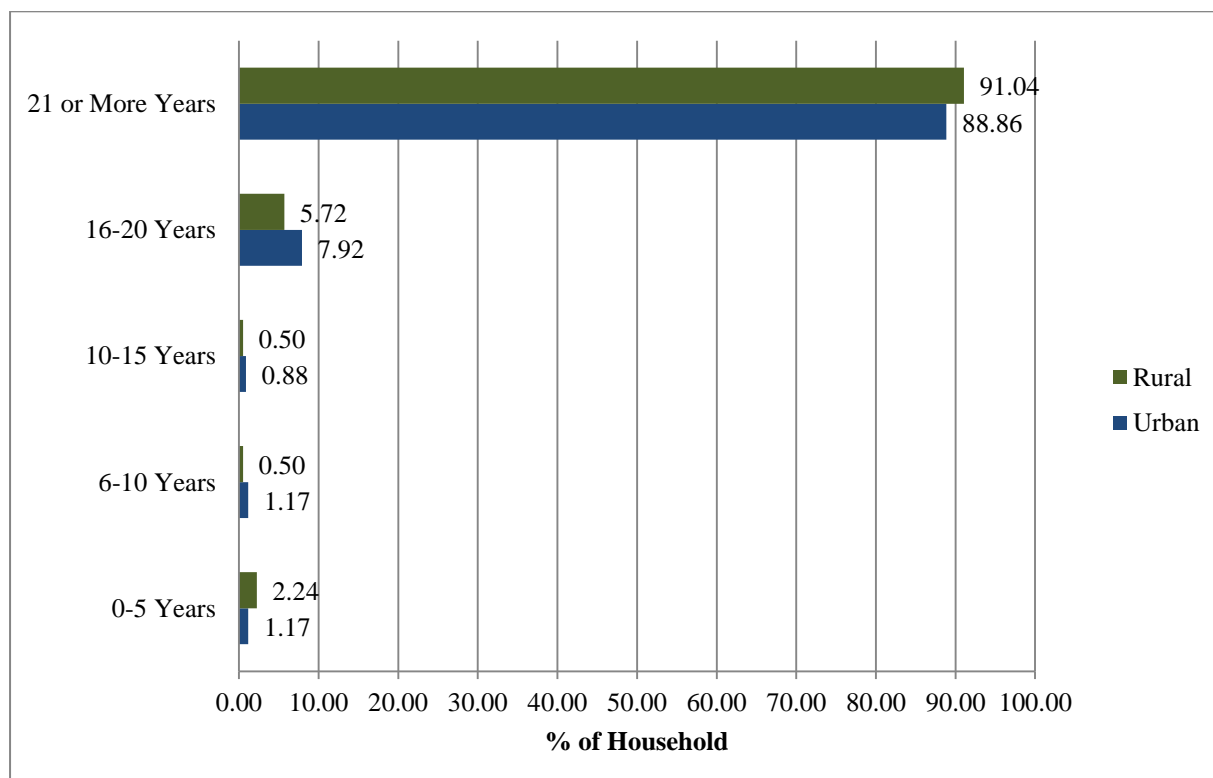
Figure 3.18: Duration of Living (Source: Field Survey, 2015)

3.12   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 more than about two third of land's price is in the same range. As land price varies with location in urban area also about one third urban land's price varies from BDT1to 5 lakhs. But only 2% land of rural area's land are in the same price range (please see Figure: 3.19). Thus the urban facilities have highly influence on land value.
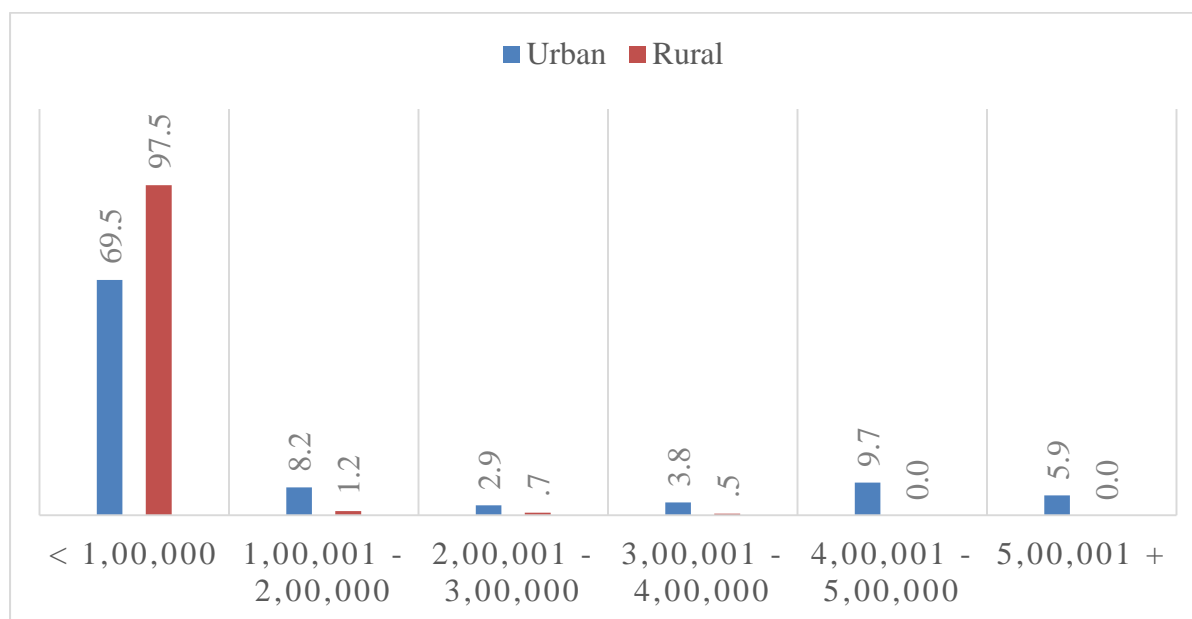
Figure 3.19: Price of Present Household Land in 2015 (Source: Field Survey, 2015)

3.13   Transport

3.13.1 Mode of Communication

As there are very limited number of waterways are available almost all of the households' main mode of communication is road. A small percentage of total households also traveled by train for long distance travel as they think it is more safe mode of communication than others (please see Figure:3.20).
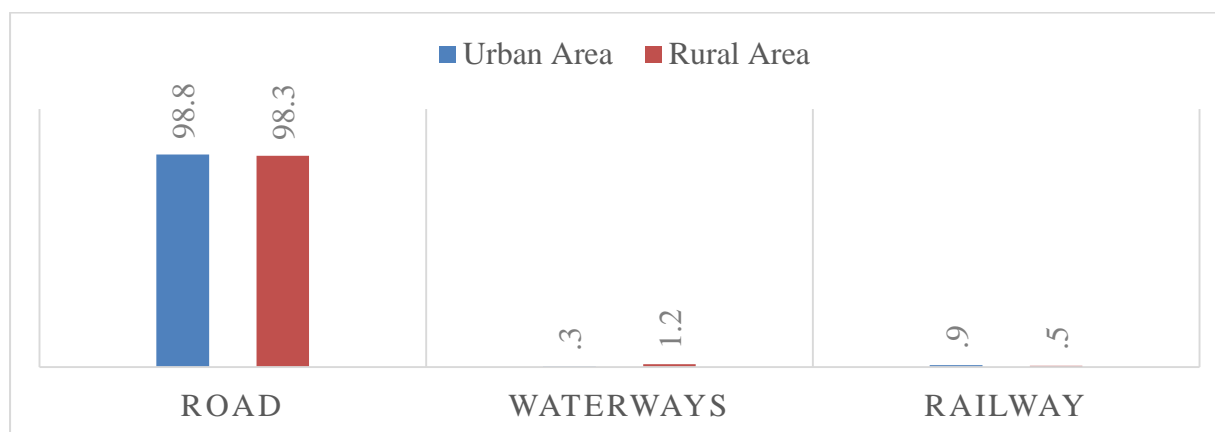
Figure 3.20: Mode of Communication (Source: Field Survey, 2015)

3.13.2 Types of Road

In urban area about half of total road is bituminous road. About same percentage of concrete and mud or katcha roads are also in urban area which altogether represents about one fourth of total road in urban area.On the other hand, more than about two third of total roads in rural areas are katcha. About one third of total rural roads are bituminous or concrete made. 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 Ishwarganj Upazila is not satisfactory (please see Figure: 3.21).
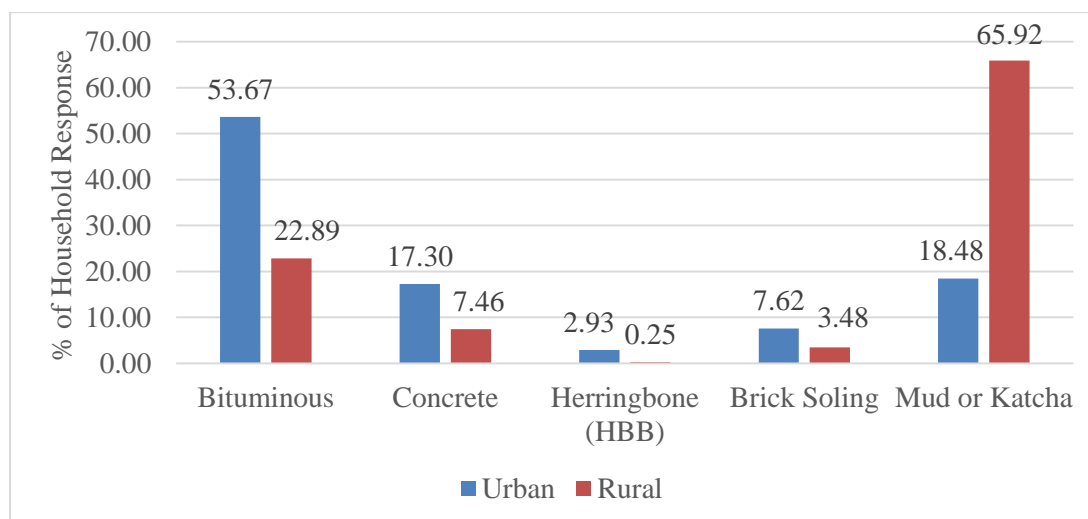
Figure 3.21: Types of Road(Source: Field Survey, 2015)

3.13.3 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 area most of the households went to main road by *Halot* or field boundary, and the percentage of using field boundary is about the double in rural area than urban. On the other hand, in urban area, more people used *halot* to get access to main road than rural area. (please see Figure: 3.22).
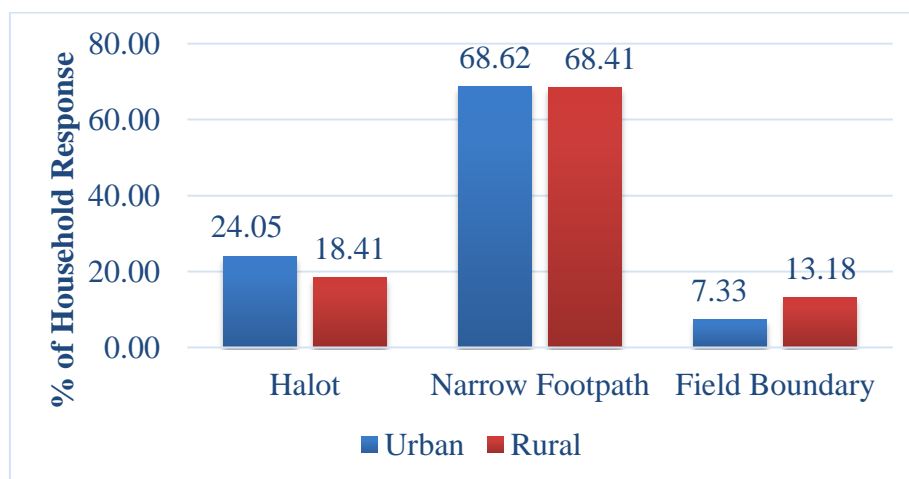
Figure 3.22: Mode of Access to Main Road (Source: Field Survey, 2015)

3.13.4 Condition of Road

In rural area about half of the roads are deteriorated,which needs quick maintenance before totally destroyed condition. Only about one fourth of total roads has been said as good. For about 20% rural roads have problem related with waterlogging. On the other hand, in urban area the percentage of having good road is comparatively higher than rural area. About more than 40% of urban roads are good. But, there are higherpercentage of roads having waterlogging related problem than rural area. Again there are about double percentage of destroyed road in urban area than rural area.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:3.23).

Figure 3.23: Condition of RoadSource: Field Survey, 2015

3.13.5 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:3.24again proved that.Only for about 10% roads get maintenance annually. For more than about two third 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.
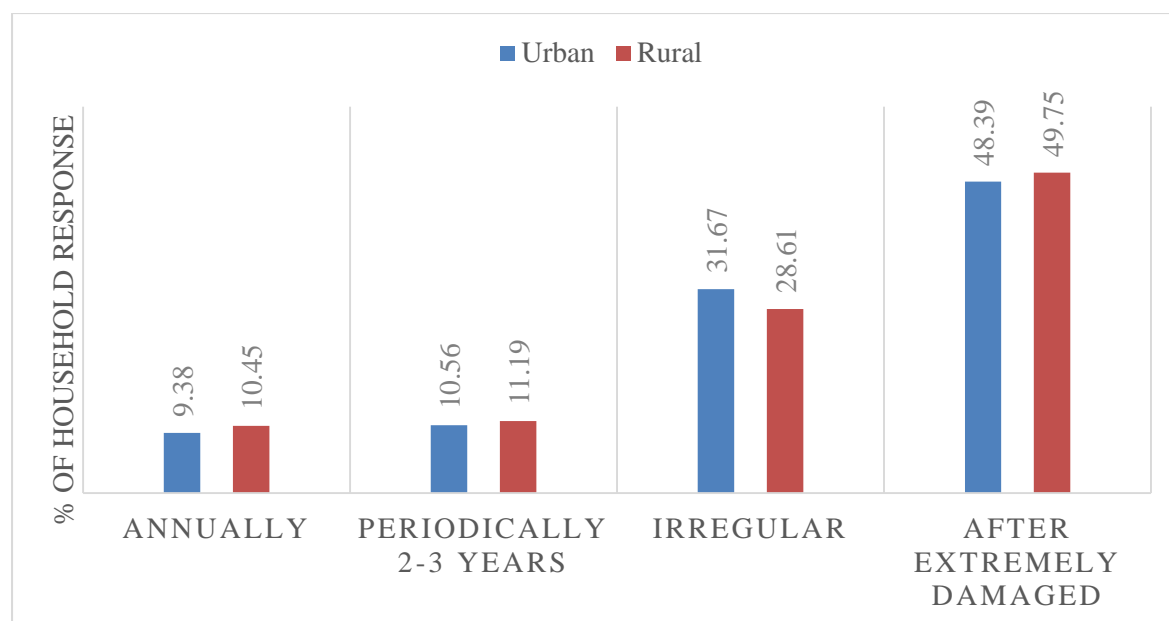
Figure 3.24: Maintenance of Road (Source: Field Survey, 2015)

3.14   Utility Service

3.14.1 Energy

a. Source of Energy for Cooking Purpose

In Ishwarganj Upazila more than about two third of total households of urban and rural area used firewood. And the ratio is about the same for urban and rural area. It represents that most of the rural households' source of energy pattern for cooking purpose is from informal sources (please see Figure: 3.25). Thus for cooking purpose most of the households of thisUpazila follow the traditional pattern.
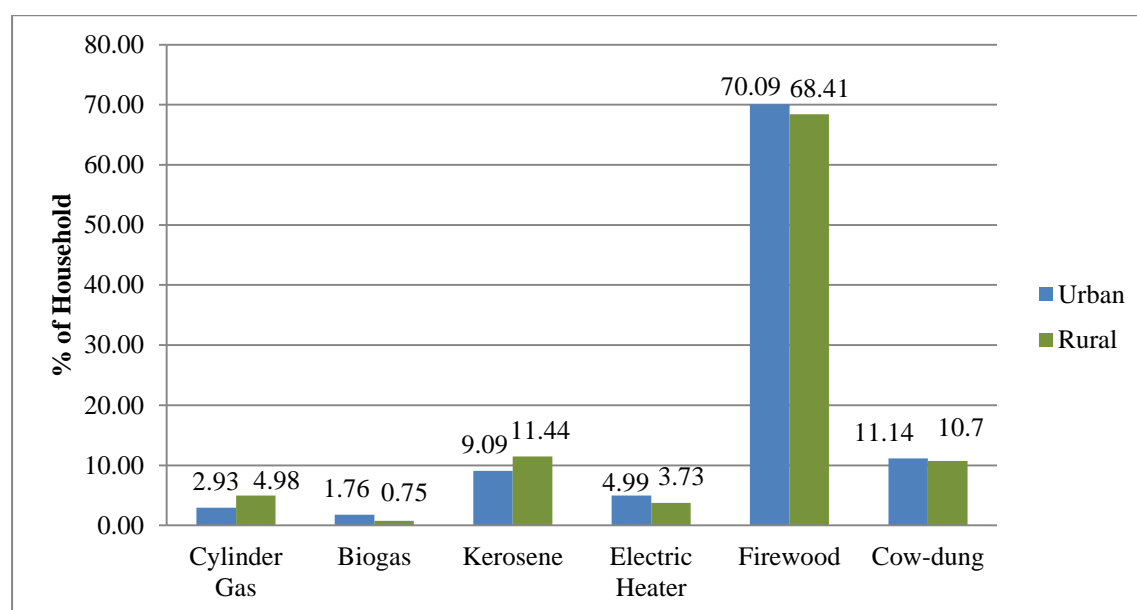
Figure 3.25: Source of Energy for Cooking Purpose (Source: Field Survey, 2015)

b. Source of Lighting

In urban area of this Upazila about 40% total of households use electricity as source of lighting. And the rest use kerosene light and solar power and the percentage is about the same for both types. In rural area, those who are not getting electricity supply use alternative lighting source like kerosene light as light source, thus the percentage is about one and half than in urban area. In rural areas about half of total households use kerosene light. About one third of total rural households used electricity as source of lighting. The percentage is lower for rural area as in rural area electricity provider Bangladesh Rural Electrification Board (BREB) faced high demand but lesser supply. Moreover, electricity connection costs more in rural area than urban area as households in rural area are scattered. Solar power needs high installment cost as the percentage of using solar power is lower in rural than urban area (please see Figure: 3.24).
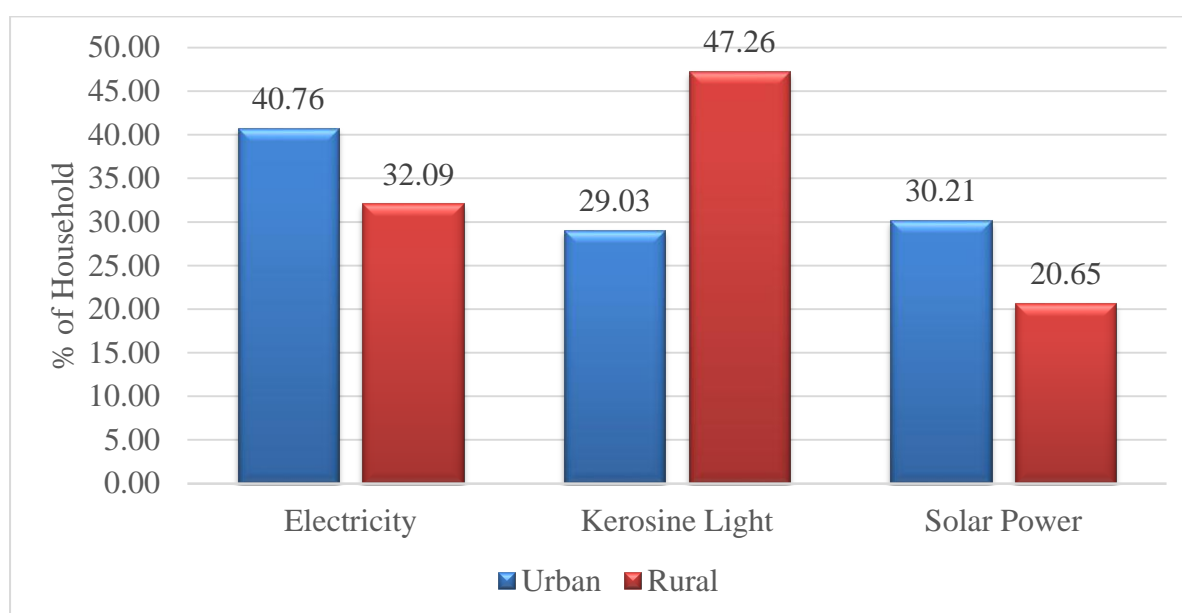
Figure 3.26: Source of Lighting(Source: Field Survey, 2015)

c. Electricity Supply Status

Because of high load shedding and high pressure in peak period with insufficient electricity, supply both in urban and rural area very small percentage households has said that they enjoy uninterrupted electricity supply. Otherwise about one fourth of the total respondents in urban area said that electricity is irregular in their areas. In rural area, a significant percentage of households (about three fourth) still do not have or experience electricity facility in their households. In urban area about more than half of the households also have no electricity (please see Figure: 3.27).
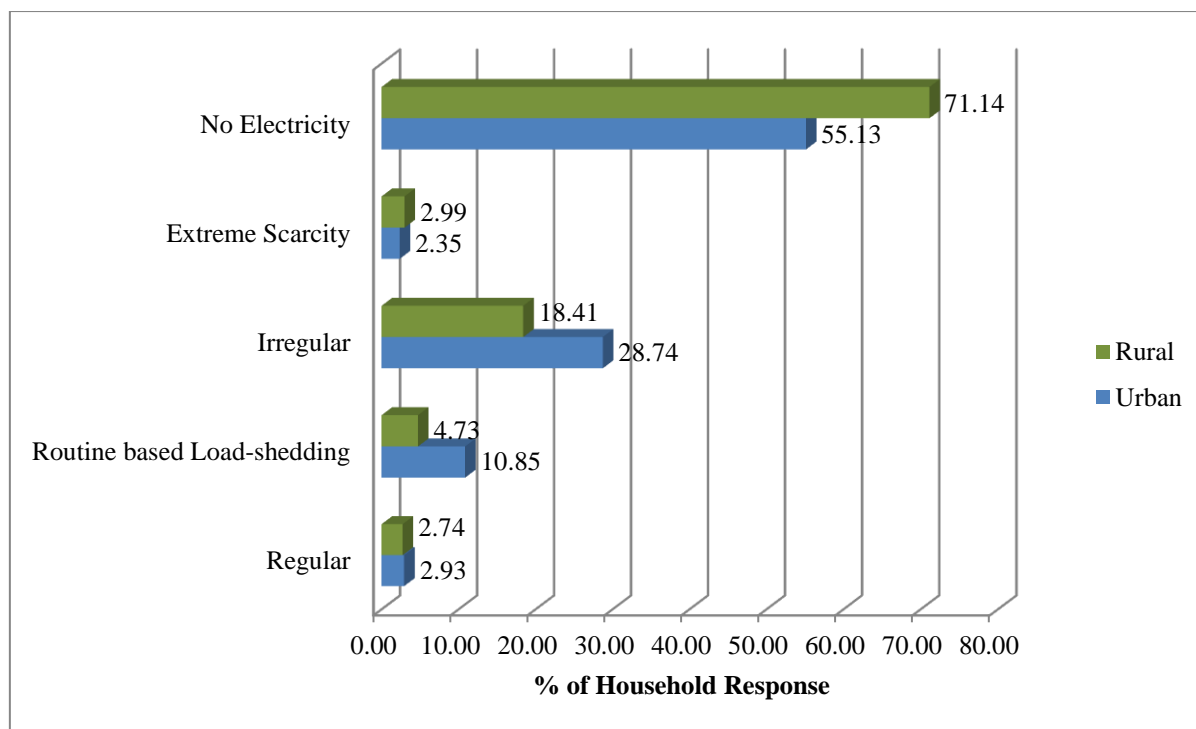
Figure 3.27: Electricity Supply Status (Source: Field Survey, 2015)

3.15   Drinking Water

a.   Source of Drinking Water

In Ishwarganj 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 5%) 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 both of urban and rural area who used public tube-well (please see Figure: 3.28).
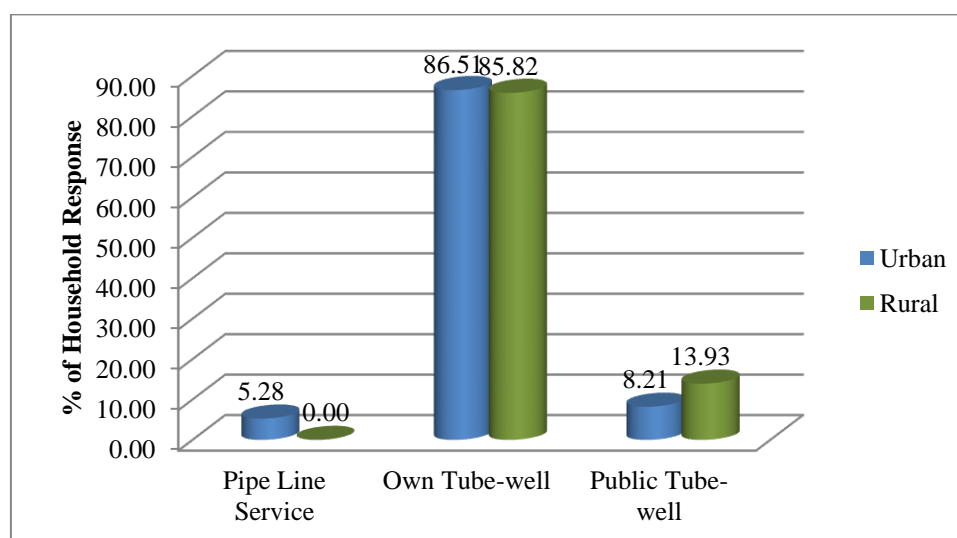
Figure 3.28: Source of Drinking Water (Source: Field Survey, 2015)

b. Drinking Water Quality

Overall drinking water quality at both urban and rural areas at Ishwarganj is satisfactory. About 90% 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 three times higher percentage of households than urban area, mentioned that, they get acceptable drinking water quality. On the other hand, in rural area some of the households also said 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: 3.29).
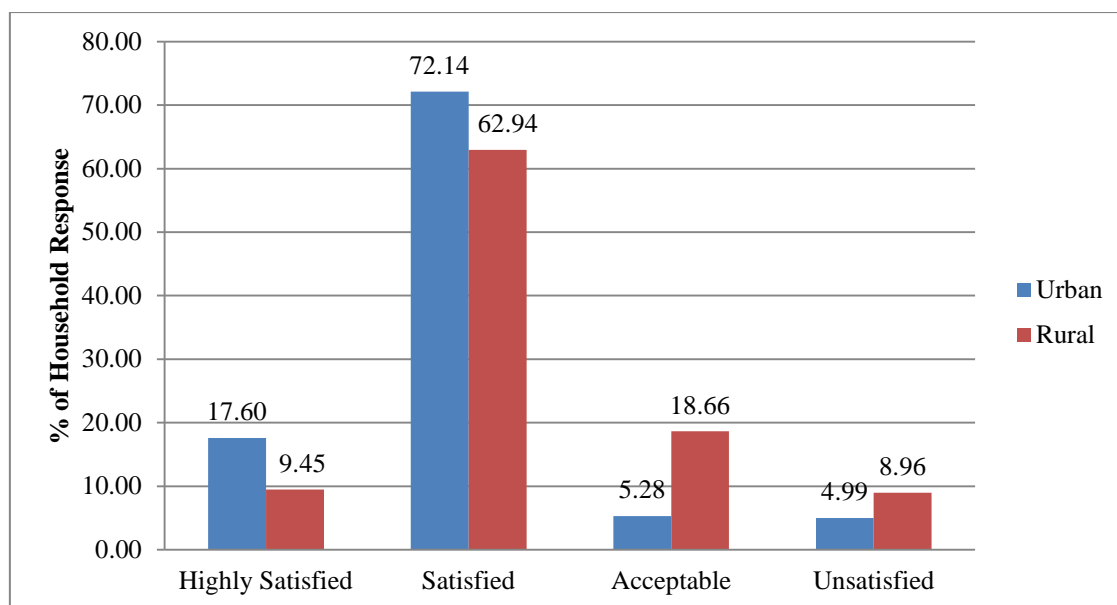
Figure3.29: Drinking Water Quality(Source: Field Survey, 2015)

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: 3.30).
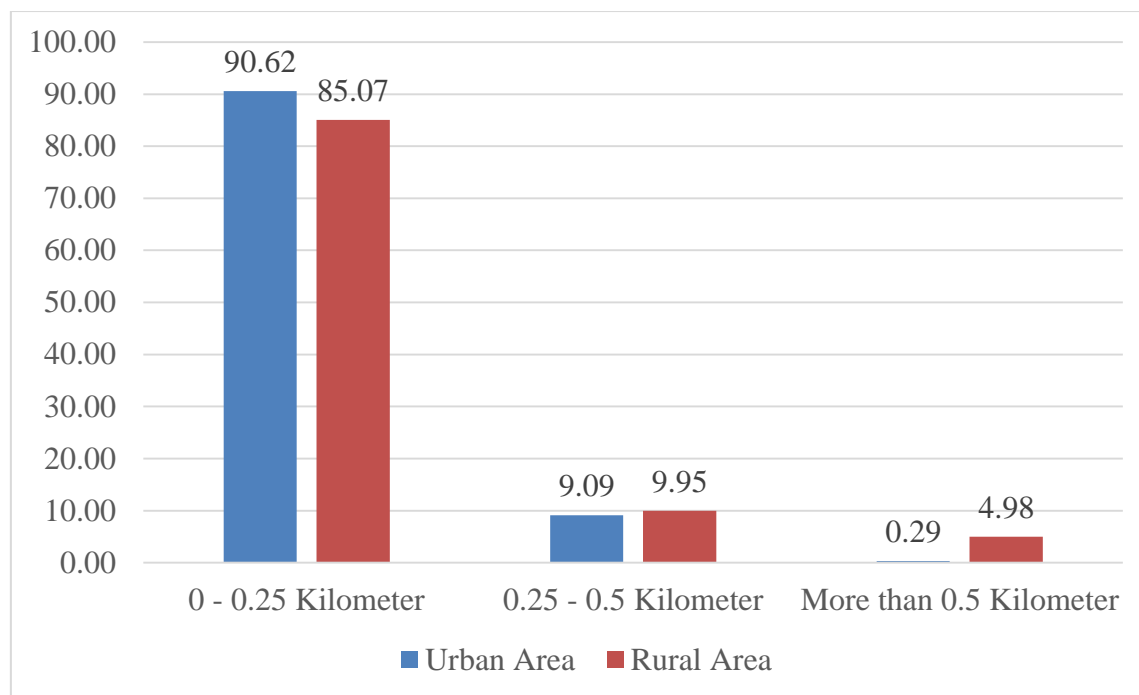
Figure 3.30: Distance of Water Source(Source: Field Survey, 2015)

3.15.1 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: 3.31).
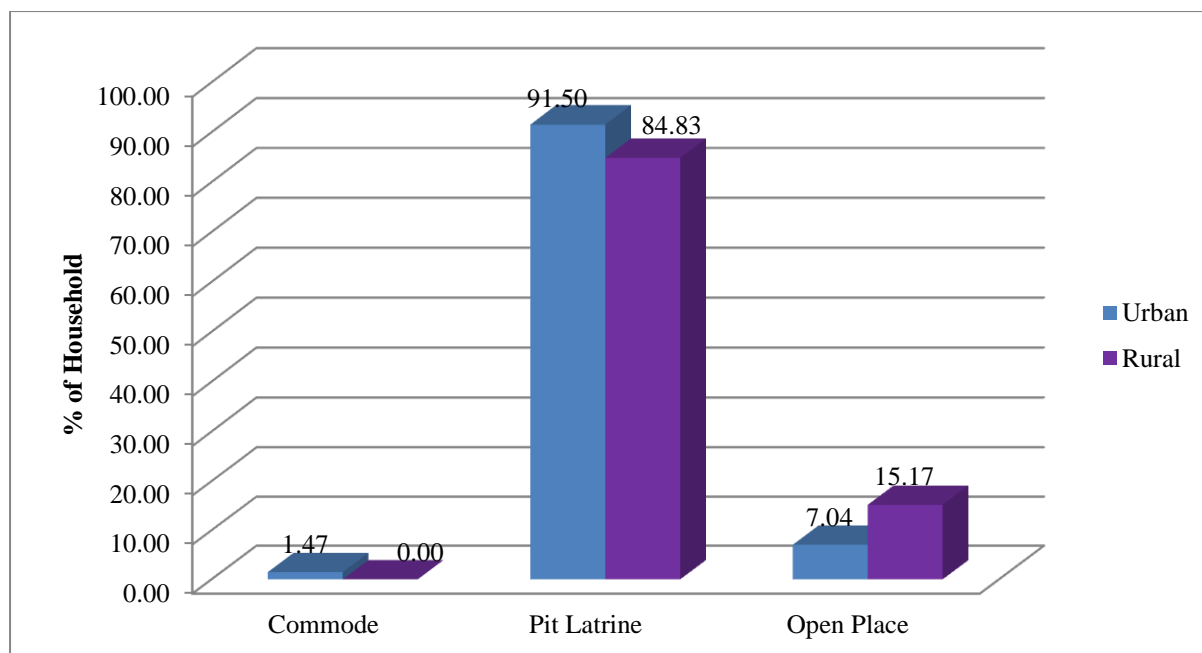
Figure 3.31: Sanitation System (Source: Field Survey, 2015)

About more than half of the urban households used sewage network. About one fourth of total rural respondents also used septic tank sanitation system though the system's installation cost is comparatively high. In rural area the percentage of using both of absorb well and septic tank is about double than urban area. Thus, there are significant differences in using sanitation system between urban and rural areas. (please see Figure: 3.32).
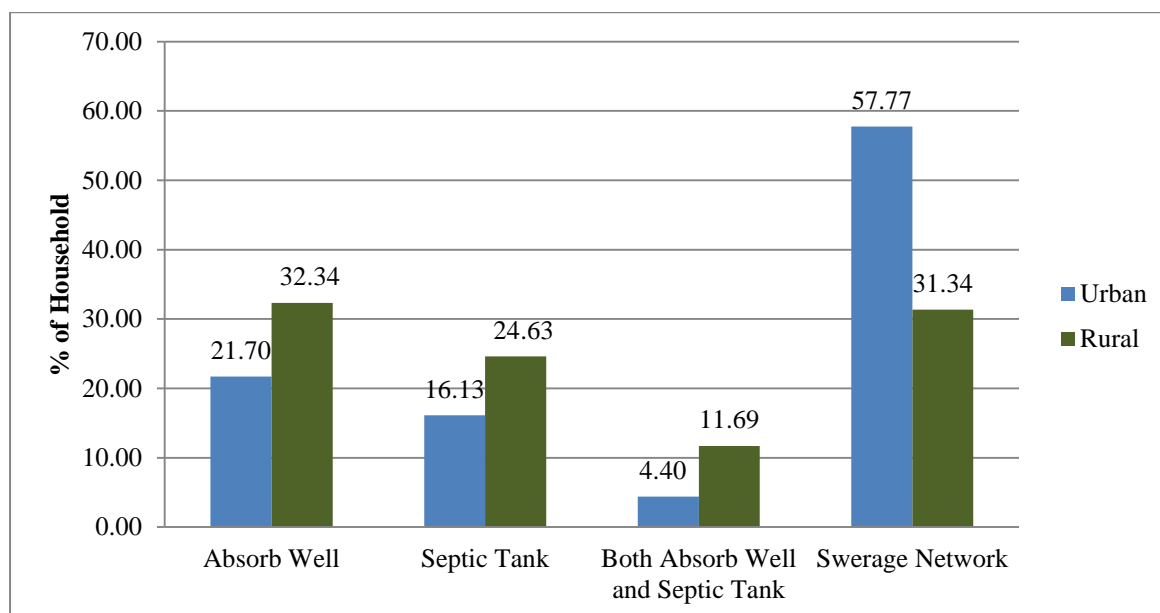
Figure 3.32: Type of Sanitation Management System (Source: Field Survey, 2015)

3.15.2 Waste Management

a. Waste Management System

From table 3.4, it is found that, in this Upazila, most of the households manage their waste through their own management. Among them, more than half of them use lowland besides their house. About one third of them also use hole within their yard for waste management. Only small percentage (about 3%) of them 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 3.4: Distribution of Waste Management System (In percentage)

Waste Management	Urban	Rural
Door to Door Collection	9.68	3.97
Own Management	90.32	96.03
Dustbin	3.25	3.23
Hole Within Yard	75.00	74.88
Lowland Beside House	18.83	21.64
Canal or River or Small Water-body	1.62	0.25
Beside Road	1.30	0.00
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: 3.33). 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.
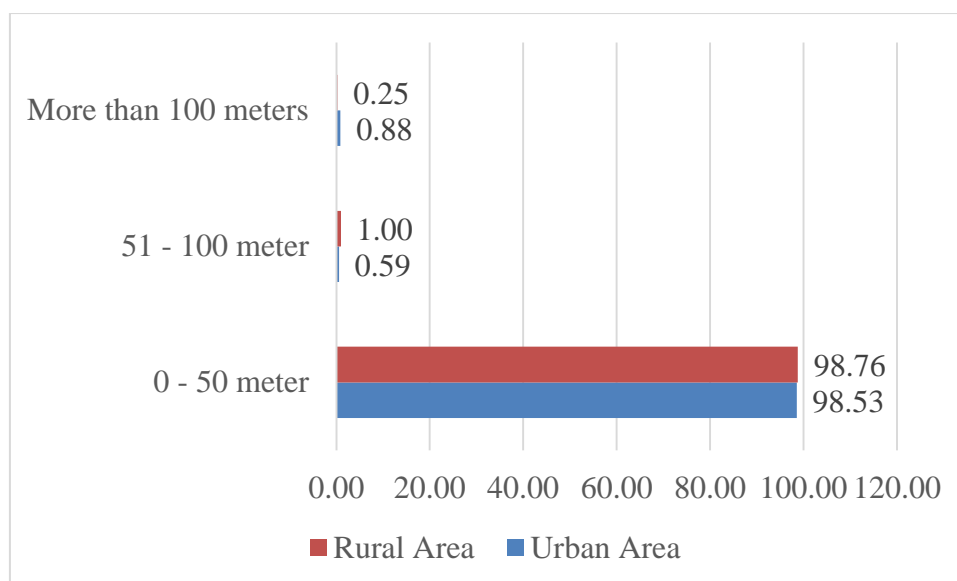
Figure 3.33: Distance to Waste Disposal Place (Source: Field Survey, 2015)

3.16   Medical Facility

From Figure, it is found that, in Ishwarganj Upazila, most common disease is fever in both urban and rural area. The percentage is lower 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 lower in urban area than rural area. Thus the environmental condition is worse in rural area than urban area which results into more disease affected people are found in rural area. Water borne diseases like diarrhea, dysentery, Jaundice etc. also are more common in rural area. This could be because of lack of water quality in rural area. (please see Figure 3.34)
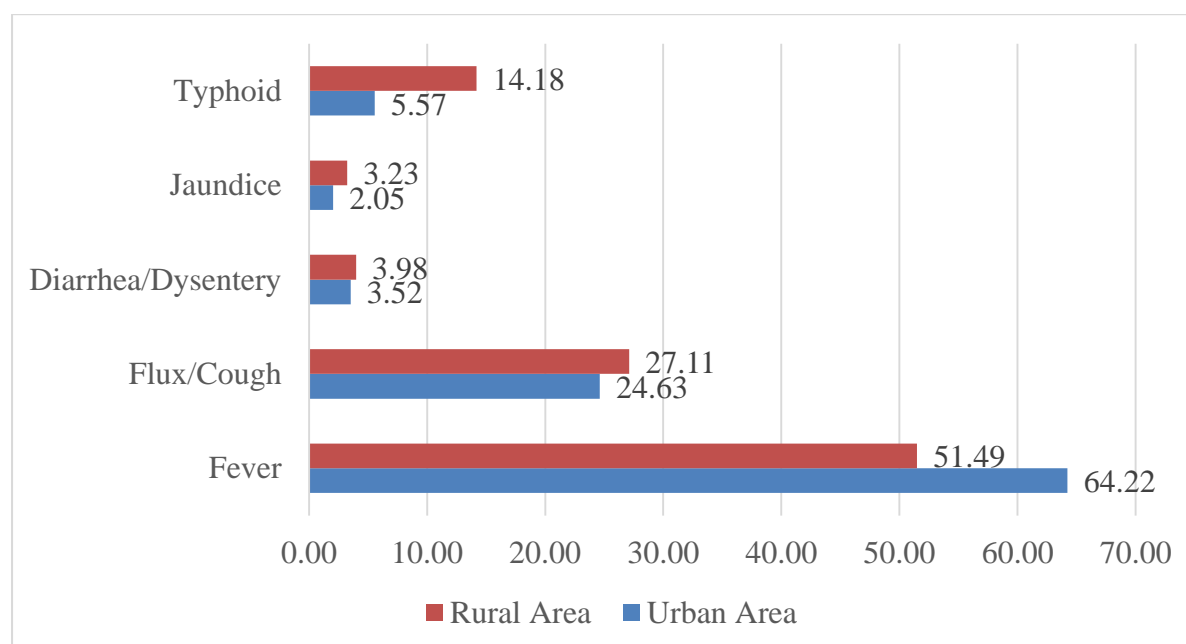
Figure 3.34: Type of Sickness (Source: Field Survey, 2015)

In urban area, according to Figure 3.35, it is found that abouthalf of the total urban households said that the expertise health service is found at nearest health service centers and Upazila Health Complex is providing good operation facilities for both urban and rural people. The percentage is low in rural area, thus about one third of rural households get the expertise health service at nearest health service centers. On the other hand, about half of total rural households get general health service at nearest health service centers, whereas the percentage is low for urban households. Overall, the percentage of getting quality health service in nearest health service centers is better in urban area in comparison to rural area. The mother and child health care service is almost close in urban and rural area. But the alarming situation is that most of the households' nearest health service center is not able to provide enough medical service facilities for mother and child health.
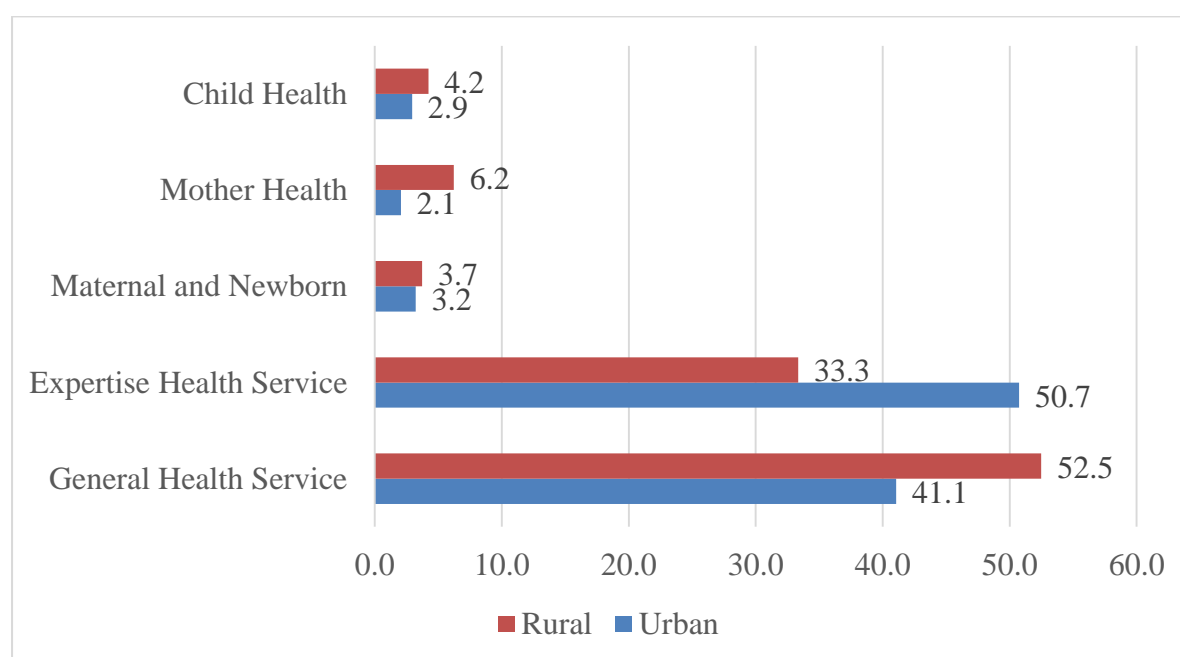
Figure 3.35: Type of Treatment Facility (Source: Field Survey, 2015)

On the other hand, despite of such shortcomings discussed in earlier section about half of total household in both of urban and rural area anticipated that, they are satisfied with the treatment quality provided by the health service centers. Urban people generally are highly satisfied with their services as the percentage for "Highly Satisfied" is higher (about double) than rural area. In rural area more percentage of households than urban area, said that, they are receiving "Acceptable" treatment quality which represents the fact that though the medical centers could not have enough expertise for maternal and child health, but they are providing a satisfactory service for general health issues (please see Figure: 3.36).
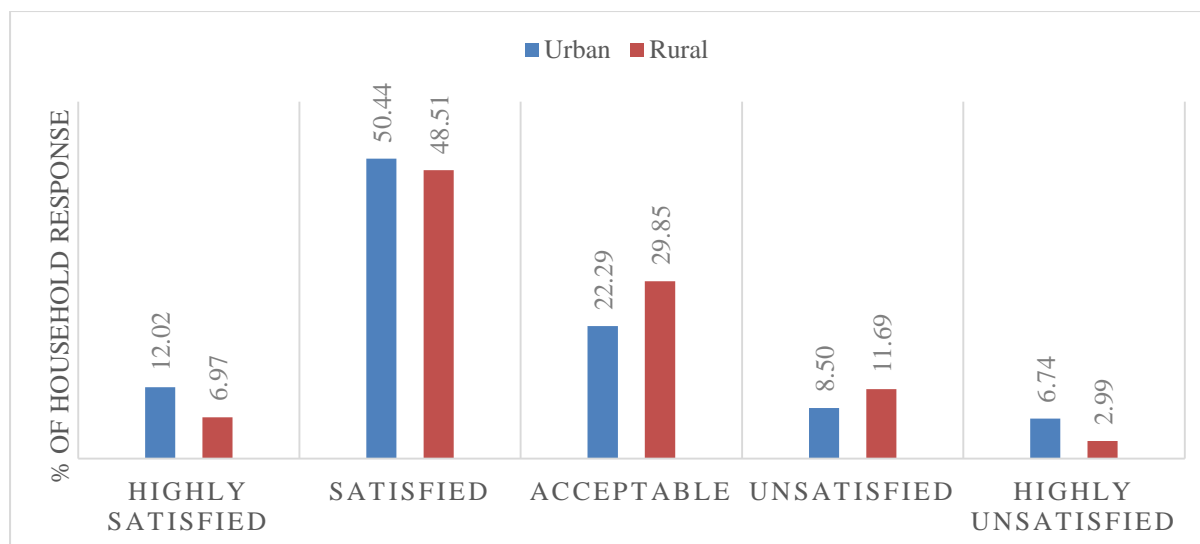
Figure 3.36: Quality of Treatment Facility(Source: Field Survey, 2015)

Apart from these positive situations of treatment facilities of thus Upazila, the most important drawbacks of this upazila is lacking of community clinic in both rural and urban area. And the percentage is higher in rural area(please see Figure: 3.37). Moreover, there is also lack of enough free medical center services. Thus steps for establishing new community clinic and government clinic should be taken by proper authorities. Moreover, there are also lack of necessary medicines, for which immediate measurements should be taken.
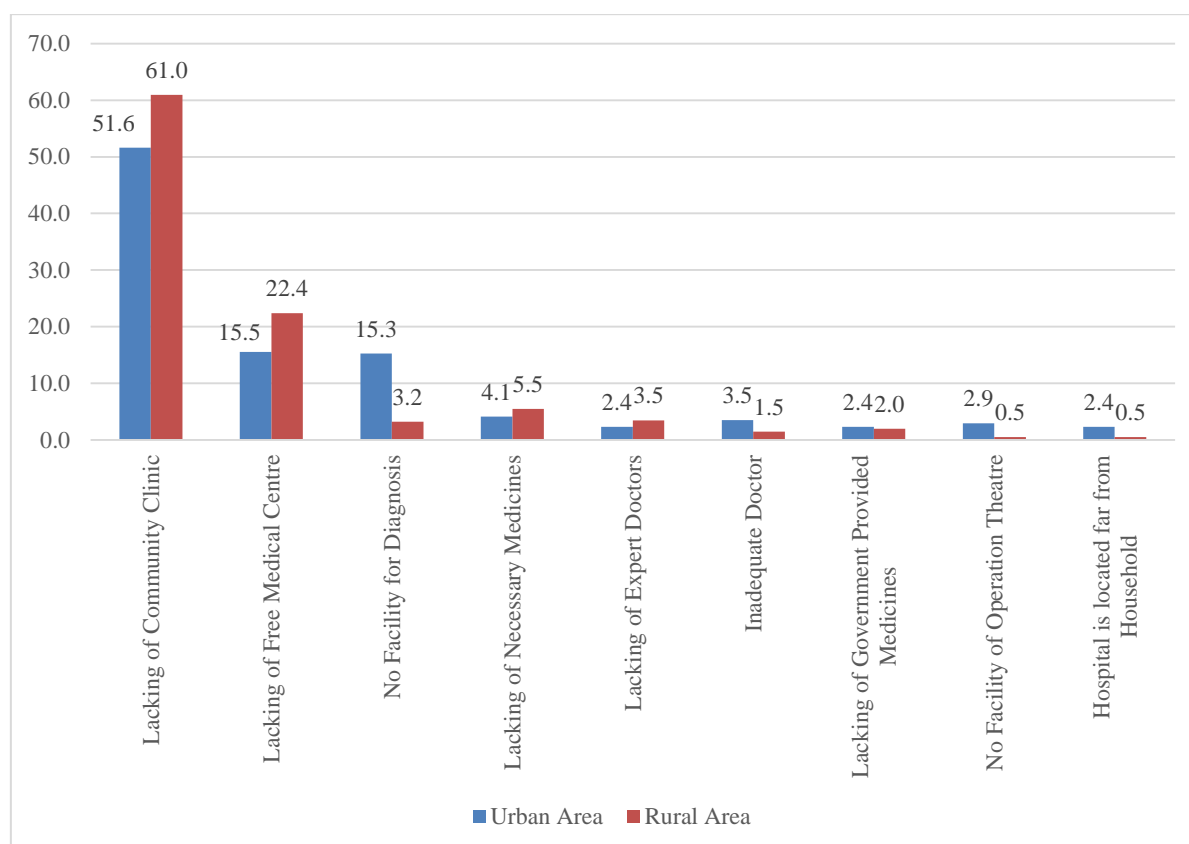
Figure 3.37: Drawbacks of Treatment Facility (Source: Field Survey, 2015)

3.17 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: 3.38).
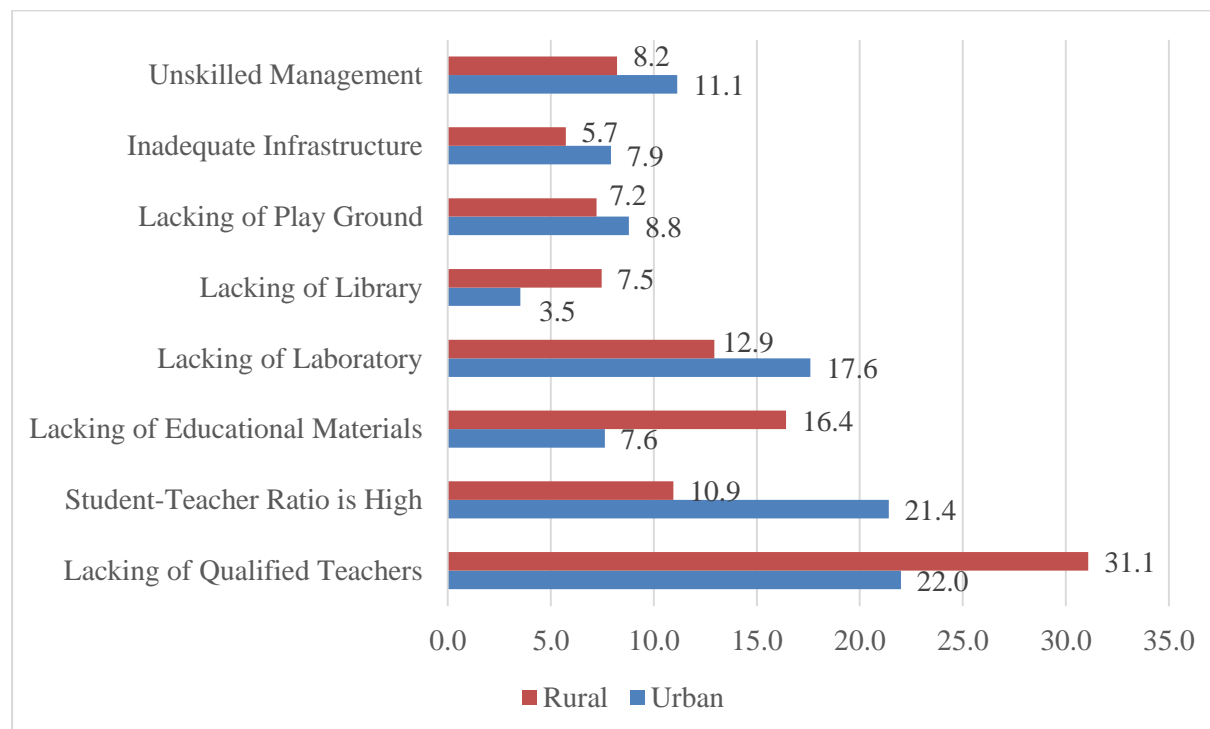
Figure 3.38: Problems of Educational Service (Source: Field Survey, 2015)

3.18 Recreational Facility

In thisUpazila about two third of total households' source of outdoor recreation is sports/playing in the field both in urban and rural area. A significant number of households also watch the sports as their recreation. In rural and urban area fishing is another important source of recreation for some of the households (please see Figure: 3.39).
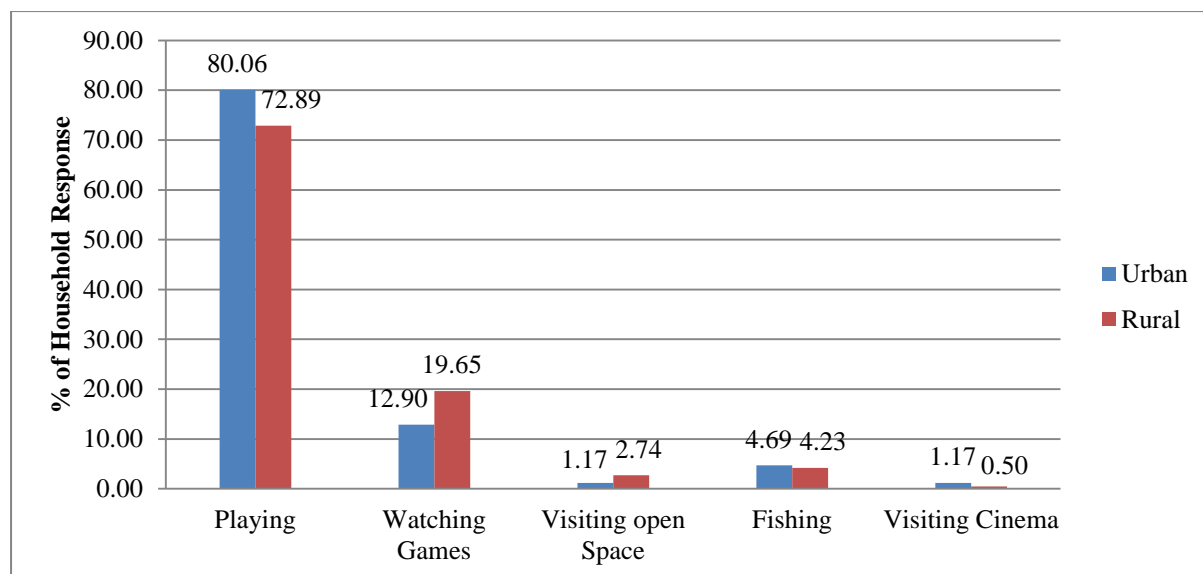
Figure 3.39: Out-Door Recreation (Source: Field Survey, 2015)

It is evident from Figure 3.40 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. On the other hand, economic insolvency is one of the important reasons for hindering outdoor reaction for some of the households of rural area, whereas in urban area lack of proper recreational environment and management of recreational areas are the prime drawbacks of recreational facilities.
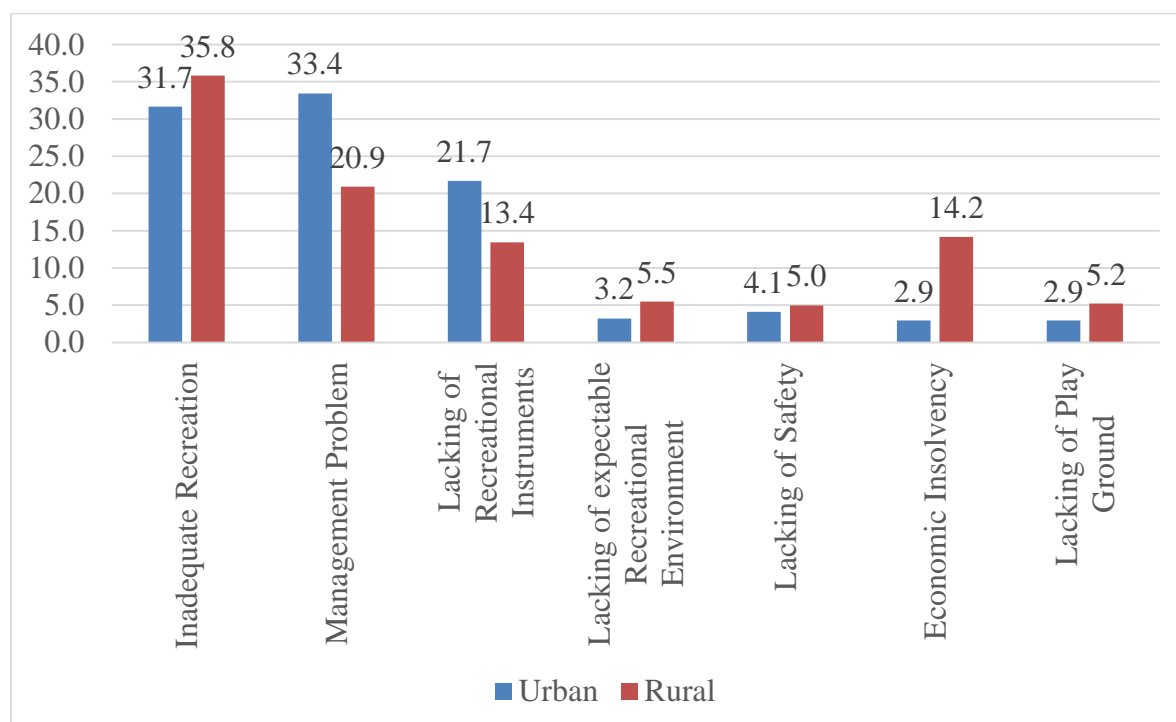
Figure 3.40: Drawbacks of Recreation Facilities (Source: Field Survey, 2015)

3.19   Law and Order Situation

Sneaking is the most common crime in thus Upazila both in rural and urban area. In urban area the percentage (about one third) is significantly lower than rural area (about more than 40%). Heinous crimes like drugs, acid terrorism, robbery, snatching, land or resource grabbing occurred in rural area more frequently than urban area (please see Figure: 3.41). On the other hand, occurrence of eve-teasing is about double in urban area than rural. Thus, law enforcing agency should take necessary steps regarding this.Overall, security condition in urban area is better from some perspectives than the rural area.
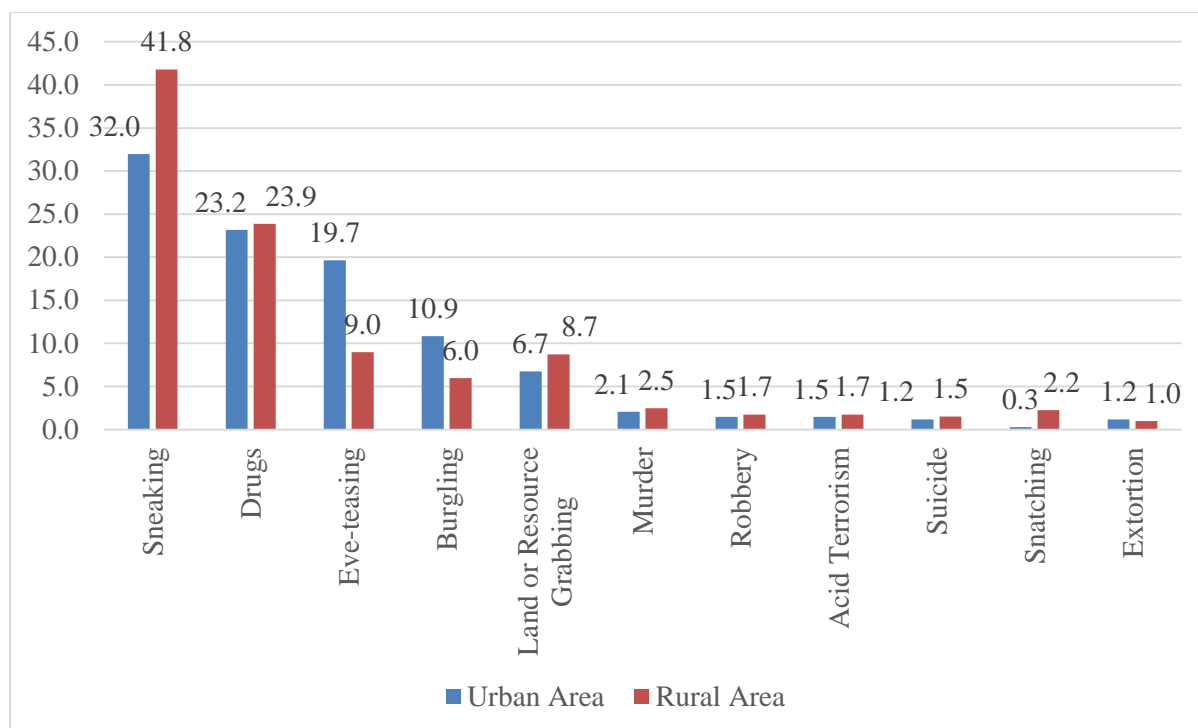
Figure 3.41: Types of Crimes (Source: Field Survey, 2015)

3.20   Available Services in Ishwarganj Upazila

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

3.20.1 Service Quality of Retail Market

The service of retail markets could easily be taken by most of the households as the distance is not too far. Also, both in urban area more than about two third of total households said that they are highly satisfied with the service of it. The ratio is higher in urban area. On the other hand, the percentage of unsatisfied and highly unsatisfied is higher in rural area than the urban area. Thus though the service of retail market is overall satisfactory but, in rural area more services is required (please see Figure: 3.42).
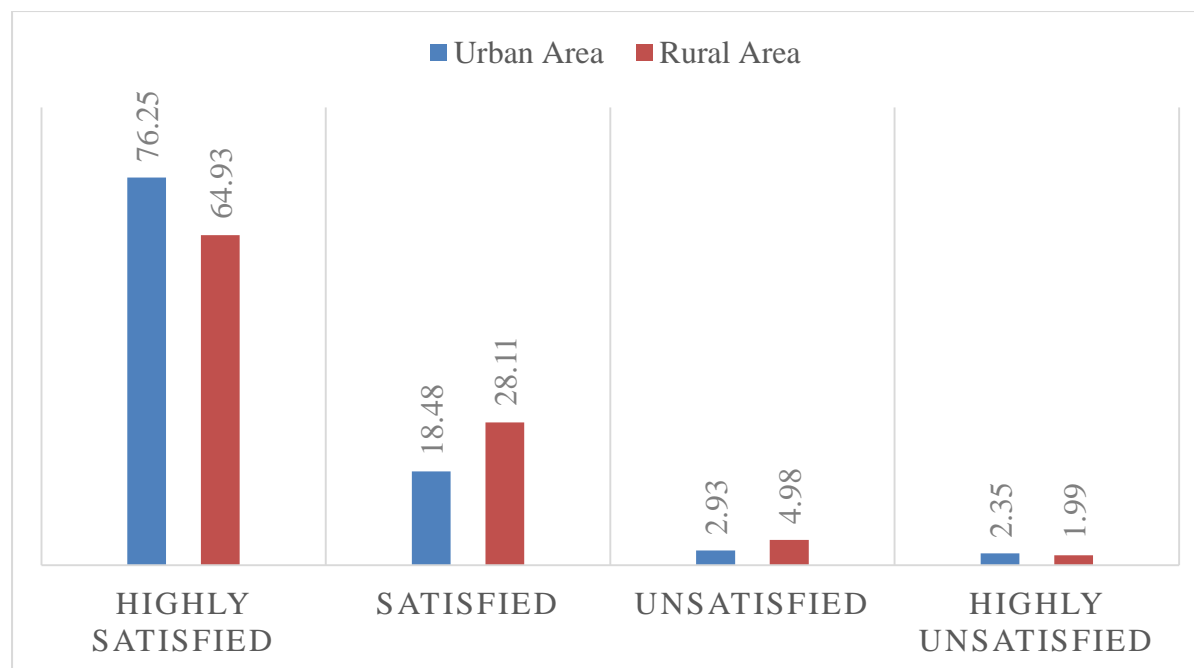
Figure 3.42: Service Quality of Retail Market(Source: Field Survey, 2015)

3.20.2 Distance and Service Quality of Post Office

Again, there are14 post offices in this Upazila. In urban area, more than two third of total households are satisfied about the service quality of post office, but in rural areas the percentage is significantly low compared to the urban area (please see Figure: 3.43). So, the service facilities highly varied with the regions. In rural area, the percentage, thosewho are unsatisfied with the service of post office or even did not know about it as they did not get any service from post office, is significantly higher than in urban area. Thus, appropriate steps should be taken to improve the service facilities in rural area.
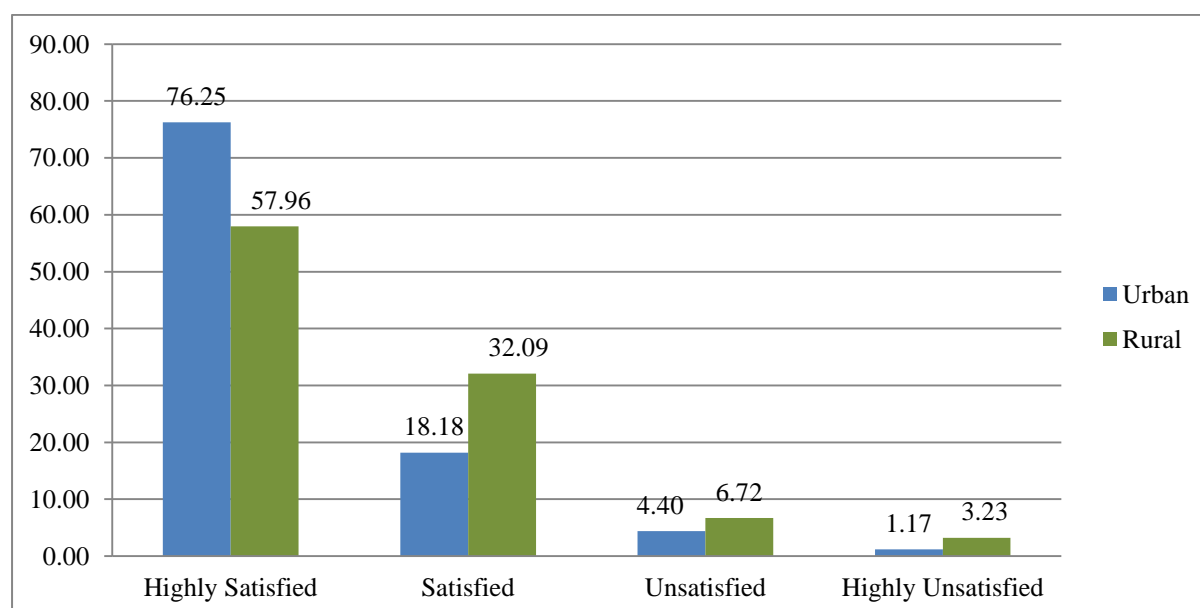
Figure 3.43: Service Quality of Post Office(Source: Field Survey, 2015)

3.20.3 Distance and Service Quality of Fire Service Station

There is a fire service station in this Upazila (BBS, 2011). It is located at Mymensingh - Voirob Rd, Ishwarganj.And in urban area, more than about threefourth of total households said that they are highly satisfied with the service of fire station (please see Figure: 3.44). On the other hand, in rural area the percentage is quite low as most of them said that they are not satisfied or did not even know about the service of fire station. This is because there is only one fire station and they give priority to the urban people than rural.
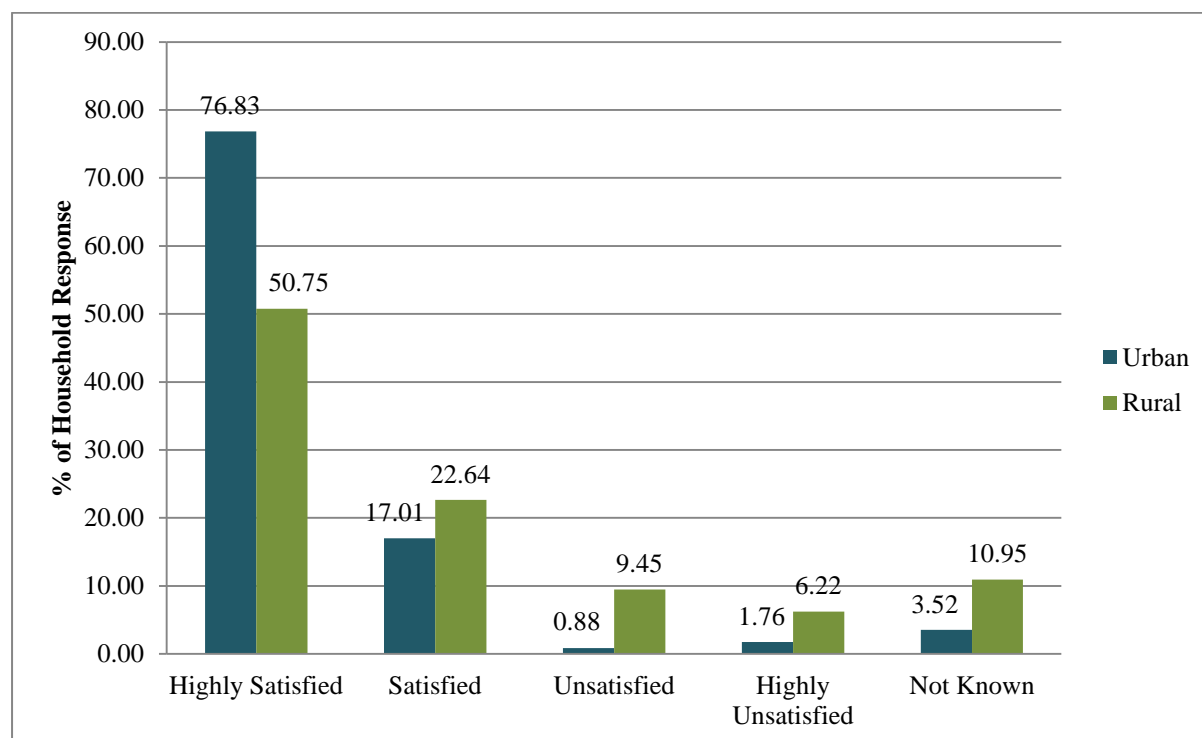
Figure 3.44: Service Quality of Fire Service (Source: Field Survey, 2015)

3.20.4 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 (please see Figure: 3.45).
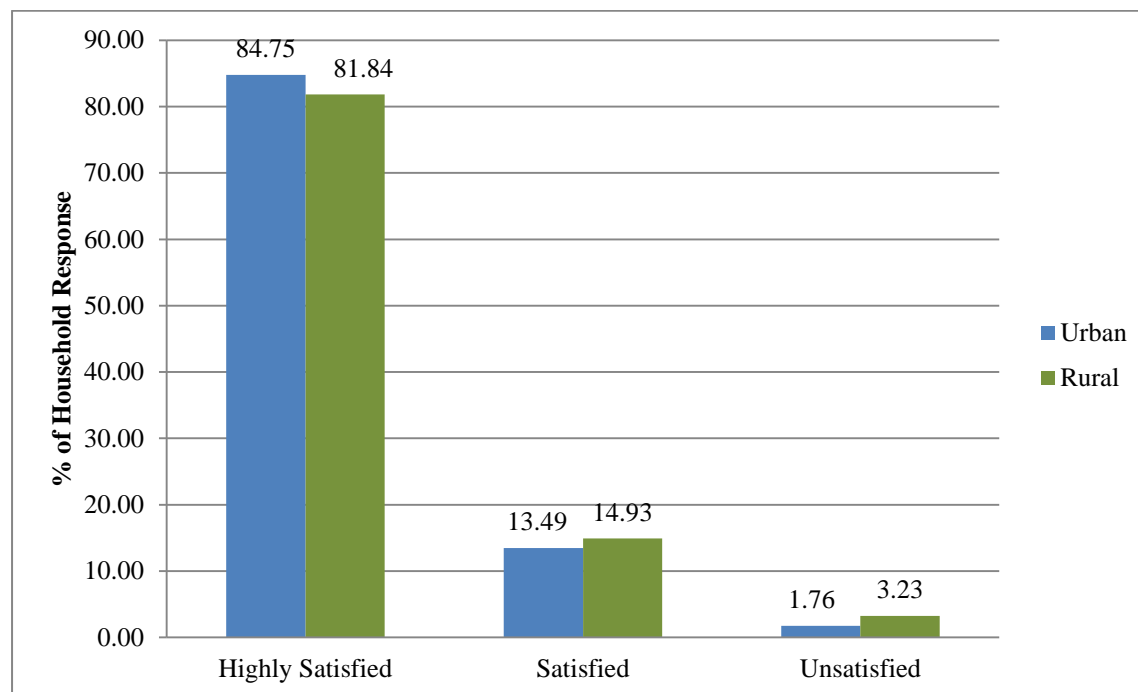
Figure 3.45: Service Quality of Play Ground (Source: Field Survey, 2015)

3.21   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. The percentage of having road related problems and water logging problem is almost the same for both areas. which represents the fact that, situation of those problemsis about the same in rural and urban areas both. Moreover, in rural area drinking water based problem and flood are also significant. The alarming finding is, in rural 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: 3.46).
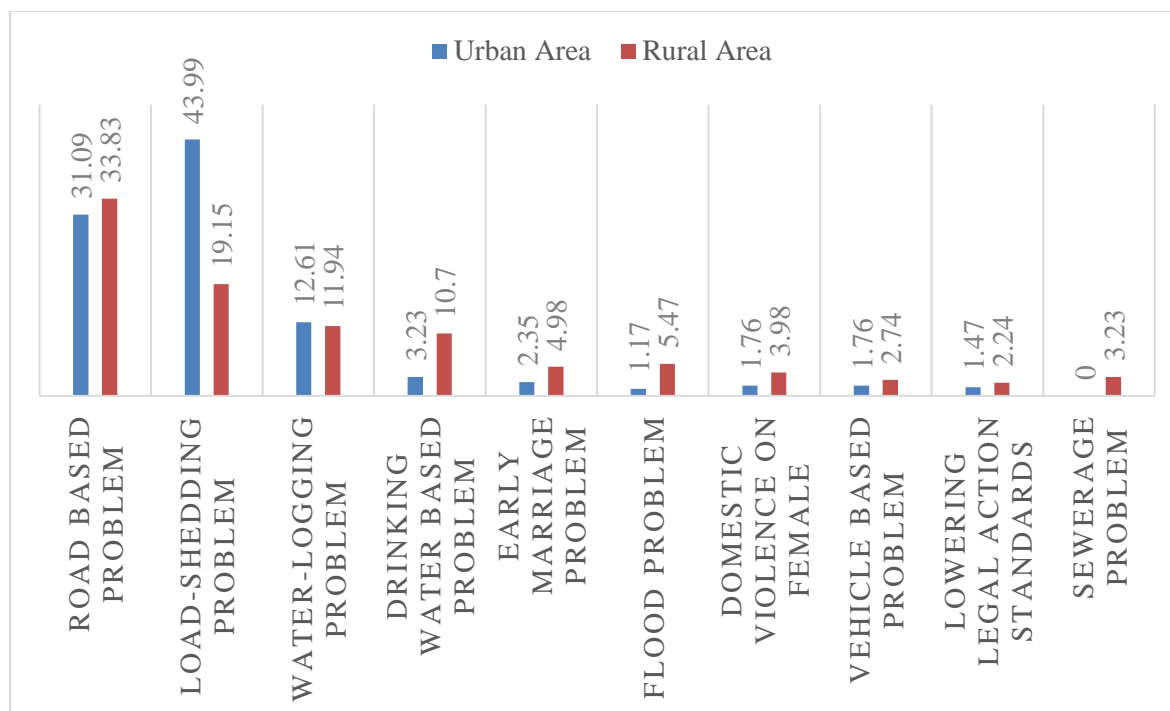
Figure3.46: Problems of the Area(Source: Field Survey, 2015)

3.22   Traditional Cultural Festival of the Area

The traditional cultural festivals data of the area collected from multiple ranks method. From Figure: 3.47, it is found that in this Upazila, about one third of total respondents celebrate "International Mother Language Day" as their first choice of traditional culture festival. About one fourth of total respondents also described "literature and cultural competitions" as most important traditional cultural festival activities.
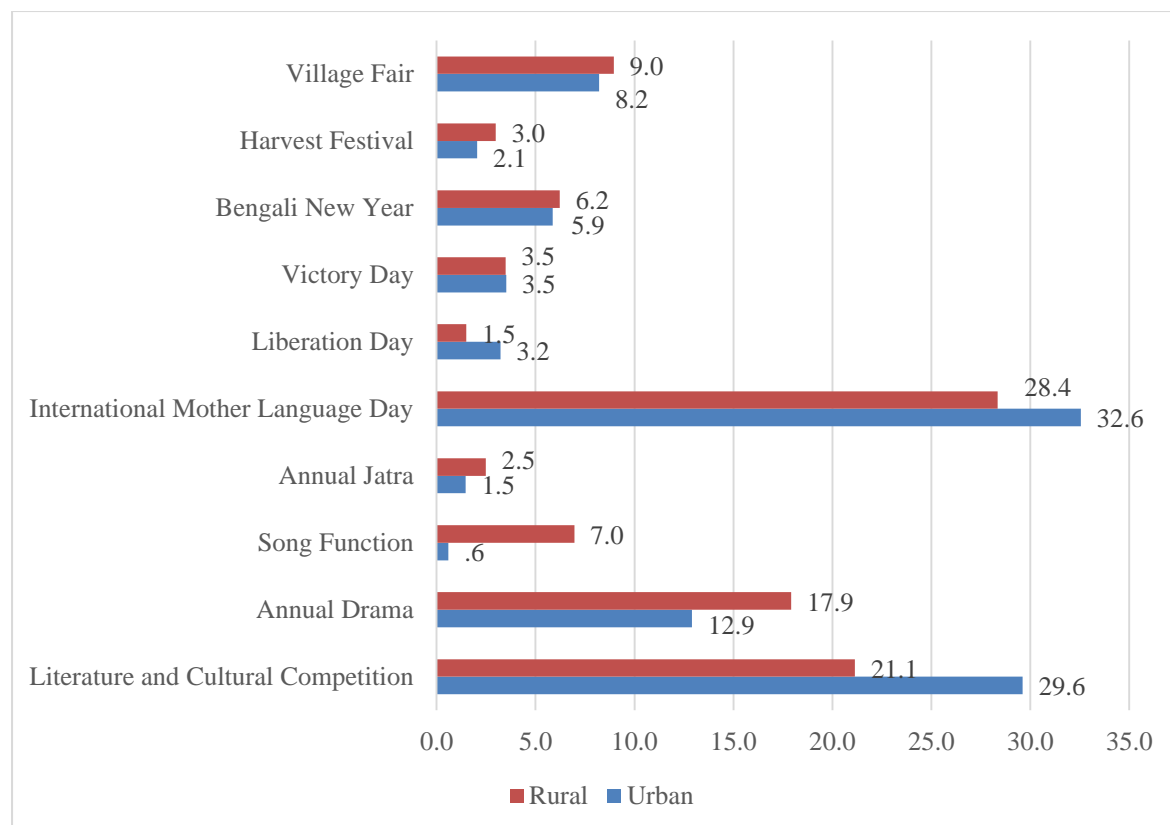
Figure3.47: Traditional Cultural Festival of the Area (Source: Field Survey, 2015)

3.23 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 40% of urban households want improvement of their road condition and the percentage is lower (about one third) in rural area. In rural area, more people (about one third) want the improvement of community services than urban area (about one fourth). About 20% rural people want to improve their electricity facilities and increase number of educational institutions with facilities. Whereas urban households' next priority is to improve drainage system and develop water supply and sanitation facility (please see Figure: 3.48).
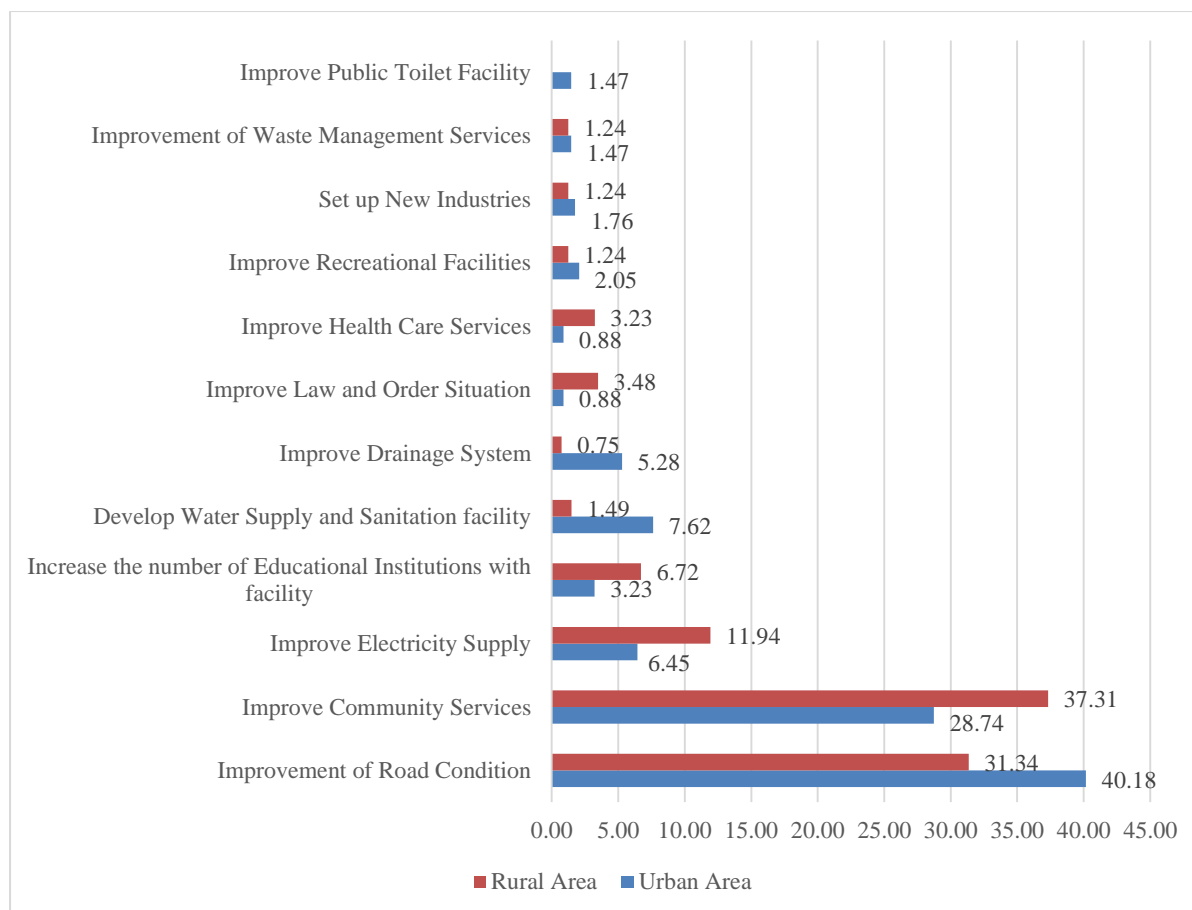
Figure3.48: Prioritization of Development Works (Source: Field Survey, 2015)

Chapter 4: Conclusion and Policy Framework

Ishwarganj 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. 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. Moreover, there is not enough vocational and youth training centers. One of the main reasons behind it is the very high student-teacher ratio and lacking of qualified teachers. So, concerned authorities should pay attention to the issues of the Upazila. Moreover, the Upazila's main mode of communication is by road, and the condition of road is 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. Drinking water quality is also not yet upto 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.

Reference:

BBS (2012) *Population and Housing Census, Community Report:Mymensingh Zila, 2011*. Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Dhaka.

Banglapedia (2016)http://en.banglapedia.org/index.php?title=Ishwarganj_Upazila, Accessed on 15th August, 2016

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Annexure-I

গৃহায়ন ও গনপূর্ত মন্ত্রনালয়
নগর উন্নয়ন অধিদপ্তর (ইউ ডি ডি)
প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিন উপজেলাস -প্যাকেজ-০২এর 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 নং হোল্ডিং নং
....

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-৩ঃপেশা 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 প্রস্তুতকারী
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. ইলেক্ট্রনিক 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 ব্যয়														

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 অন্যান্য:......

কোড: ৪.১: 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 ধরণ:

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? ☐ হ্যা ☐ না

৪.৩.১ উত্তর হ্যা হলে ক্ষয়ক্ষতির পরিমাণ (টাকায়):

অধ্যায়-৫ঃঅবকাঠামোগত 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 উহবৎ্যম্/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)ঃ .... অন্যান্যঃ .... 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 ডাস্টবিন	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

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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

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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 সেবাও 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 বহির্বিনোদনের সমস্যাসমূহ (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐   ৭.১.৪.১ অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৭.১.৪ ঃ বহির্বিনোদনের 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?   ১. ☐ হ্যাঁ   ২. ☐ 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	স্বাস্থসেবা 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. সিঁধেল 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 রক্ষণাবেক্ষণ	
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 উপজেলারউন্নয়ন পরিকল্পনা প্রণয়ন সম্পর্কে অবহিত আছেন কি?হ্যা ☐ 1.   ☐ 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

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/ গ্রাম ঃ .... রোড নং/ রাস্তার নাম/ ল্যান্ডমার্ক .... হোল্ডিং নংঃ ....

মৌজাঃ .... ইউনিয়ন/ পৌরসভা ঃ .... উপজেলাঃ .... জেলাঃ ....

অধ্যায়-২ঃ তথ্যপ্রদানকারীর পারিবারিক তথ্যঃ

২.১ তথ্যপ্রদানকারীর নাম ঃ .... ২.২ তথ্যপ্রদানকারীর মোবাইল নম্বরঃ ....

২.৩ খানা/পরিবার প্রধানের নাম ঃ ....

২.৪ খানা প্রধানের পৈত্রিক বাড়ী এই এলাকায় কিনা? (ইউনিয়ন/ওয়ার্ড/পৌরসভা)ঃ ☐ ১. হ্যাঁ ☐ ২. না;

২.৫ ‘না’ হলে কোথায়ঃ ....

অধ্যায়-৩ঃ মাইগ্রেশন

৩.১ কত বছর যাবৎ খানা প্রধান এখানে বসবাস করেনঃ ....

৩.২ এখানে চলে আসার কারণ (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐   ৩.২.১ অন্যান্য ঃ ....

কোড ৩.২ঃ 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)

৩.৩ বসতবাড়ির ধরণ (কোড): ☐   কোড ৩.৩ ঃ বসতবাড়ির ধরণ

১.পাকা	২. আধা-পাকা	৩. কাচা(টিন)	৪. ঝুপড়ি	৫. অন্যান্য:

৩.৪ মালিকানার ধরন (কোড)ঃ ....   ৩.৪.১ অন্যান্যঃ ....   কোড ৩.৪: মালিকানার ধরন

১. একক	২. যৌথ	৩. সরকারি	৪. ভাড়া (লীজ)

৩.৫ মালিকানার উৎস (কোড)ঃ ....   ৩.৫.১ অন্যান্যঃ ....   কোড ৩.৫: মালিকানার উৎস

১.উত্তরাধিকার	২. দান	৩. সরকারি লিজ/বরাদ্দ	৪. ক্রয়

৩.৬ বসবাসের মেয়াদকাল (কোড)ঃ ....   কোড ৩.৬: বসবাসের মেয়াদকাল (বছর)

১. ০-৫	২. ৬-১০	৩. ১১-১৫	৪. ১৬-২০	৫) ২০ এর অধিক

অধ্যায়-৪ ঃ জমি এবং বসতবাড়ী (Land and Housing)

৪.১ নিজস্ব জমির পরিমান (শতাংশ)ঃ............ ৪.১.১ বসত বাড়ীর জমির পরিমান (শতাংশ)ঃ........... ৪.১.২ কৃষি জমির পরিমান (শতাংশ)ঃ..............

৪.১.৩ অন্যান্য(বাগান,পুকুর) জমির পরিমান (শতাংশ)ঃ..........

৪.২ ভূমিহীন হলে কি ভাবে থাকে?ঃ......................

৪.৩ নিচে উল্লিখিত বছরগুলোতে বর্তমান বসবাসস্থানের জমির দাম প্রতি শতাংশ / কাঠা কেমন ছিল?

২০০৭ [৪.৩.১]	২০০৯ [৪.৩.২]	২০১১ [৪.৩.৩]	২০১৩ [৪.৩.৪]	২০১৫ [৪.৩.৫]

৪.৪ খানার সদস্যদের জনমিতিক তথ্যঃ

সদস্য নং	নাম	খানা প্রধানের সাথে সম্পর্ক (কোড) ৪.৪.*.১	বয়স (বছর) ৪.৪.*.২	লিঙ্গ (কোড) ৪.৪.*.৩	বৈবাহিক অবস্থা (কোড) ৪.৪.*.৪	শিক্ষা (কোড) ৪.৪.*.৫	বৃত্তি / পেশা (কোড) ৪.৪.*.৬
১							
২							
৩							
৪							
৫							
৬							
৭							
৮							
৯							
১০							
১১							
১২							
১৩							
১৪							
১৫							

নোটঃ তথ্যপ্রদানকারীর সদস্য নম্বর ও খানা প্রধান চিহ্নিত করুন

কোড ৪.৪.*.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 ৪.৪.*.৩ ঃ লিঙ্গ

১. পুরুষ	২. মহিলা	৩. হিজড়া

কোড ৪.৪.*.৪ ঃ বৈবাহিক অবস্থা

১. অবিবাহিত	২. বিবাহিত	৩. বিধবা/বিপাত্নীক	৪. তালাক প্রাপ্ত	৫. পৃথক	৬. পরিত্যক্ত	৭.অন্যান্য

কোড ৪.৪.*.৫ ঃ শিক্ষা

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

*(উল্লেখ করুনঃ প্রকৌশলী/ডাক্তার/কৃষিবিদ/এডভোকেট/নগর পরিকল্পনাবিদ, প্রভৃতি)

কোড ৪.৪.*.৬ ঃ বৃত্তি /পেশা

১. ছাত্র / ছাত্রী	২.গৃহিণী	৩.কর্মজীবী	৪. অবসর প্রাপ্ত	৫. বেকার	৬. অন্যান্য

অধ্যায়-৫ ঃ পেশা ও আয়-ব্যয় সম্পর্কিত তথ্য

৫.১. পেশা ও উপার্জনের তথ্য

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		কোড	নাম	ধরন		কোড	নাম	ধরন	
	৫.১*.১	৫.১*.২	৫.১*.৩	৫.১*.৪	৫.১*.৫	৫.১*.৬	৫.১*.৭	৫.১*.৮	৫.১*.৯	৫.১*.১০	৫.১*.১১	৫.১*.১২

কোড ৫.১*.১, ৫.১*.৬, ৫.১.*.১১ ঃ পেশা

১. চাকরি	২.৫. বৃহৎ ব্যবসায়ী	৫.কারিগরি পেশা	৬. ঐতিহ্যগত পেশা
১.১. সরকারি/স্বায়ত্তশাসিত সংস্থায় কর্মরত	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
১.৪. এনজিও			
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 প্রস্তুতকারী
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 মিস্ত্রি	৬.৮. গাছি

২

১. মাসিক বেতন	২. দৈনিক মজুরী	৩. কাজ অনুযায়ী মূল্য	৪. নিজস্ব প্রতিষ্ঠানে কর্মরত	৫. খাবার বিনিময়ে কর্মরত	৬. অন্যান্য

কোড ৫.১*.৪, ৫.১*.৮, ৫.১*.১২ ঃ কর্মস্থলের দূরত্ব

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

৫.২. পারিবারিক আয়ের তথ্যঃ

৫.২.১ আয়ের উৎস (কোড)ঃ ☐ , ☐ , ☐ , ☐ ☐ ☐ ☐   ৫.২.১.১ অন্যান্য ঃ ....

কোড ৫.২.১ ঃ 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

৫.২.২ মাসিক আয়ঃ

উৎস	৫.২.২.১	৫.২.২.২	৫.২.২.৩	৫.২.২.৪	৫.২.২.৫	৫.২.২.৬	৫.২.২.৭	৫.২.২.৮	৫.২.২.৯	৫.২.২.১০	৫.২.২.১১	৫.২.২.১২	৫.২.২.১৩	মোট
মাসিক আয়														

৫.৩ পারিবারিক ব্যয়ের তথ্যঃ

৫.৩.১ ব্যয়ের খাত (কোড) ☐ ☐ ☐ ☐ ☐ ☐   ৫.৩.১.১. অন্যান্য ঃ ....

কোড ৫.৩.১ ঃ ব্যয়ের খাত

১. নিজস্ব বাড়ি রক্ষণাবেক্ষণ	২. বাড়ি ভাড়া (সার্ভিস চার্জসহ)	৩. ইউটিলিটি	৪. সংবাদপ		৫. খাদ্য
৬. যাতায়াত	৭. পরিচ্ছদ	৮. শিক্ষা	৯. স্বাস্থ্য	১০. উৎসব	১১. বিনোদন	১২. কিস্তি পরিশোধ	১৩. অন্যান্য

৫.৩.২ মাসিক ব্যয়ঃ

খাত	৫.৩.২.১	৫.৩.২.২	৫.৩.২.৩	৫.৩.২.৪	৫.৩.২.৫	৫.৩.২.৬	৫.৩.২.৭	৫.৩.২.৮	৫.৩.২.৯	৫.৩.২.১০	৫.৩.২.১১	৫.৩.২.১২	৫.৩.২.১৩	মোট
মাসিক ব্যয়														

৫.৩.৩ বিনিয়োগ করেন কিনা? ☐ হ্যা ☐ না   ৫.৩.৩.১ উত্তর হ্যা হলে বিনিয়োগের পরিমান বৎসরে টাকায়)ঃ

৫.৩.৪ সঞ্চয় করেন কিনা? ? ☐ হ্যা ☐ না   ৫.৩.৪.১ উত্তর হ্যা হলে সঞ্চয়ের পরিমান বৎসরে(টাকায়)

অধ্যায় ৬: প্রাকৃতিক দুর্যোগ বিষয়ক প্রশ্নাবলী

৬.১ প্রাকৃতিক দুর্যোগের নাম (কোড): ☐ , ☐ , ☐ , ☐ , ☐ , ☐   ৬.১.১ অন্যান্য:......

কোড: ৬.১ প্রাকৃতিক দুর্যোগের নাম

১.বন্যা	২. খরা	৩. অতিবৃষ্টি	৪. অনাবৃষ্টি	৫. মঙ্গা	৬. ঘূর্ণিঝড়	৭. টর্নেডো	৮. নদীভাঙ্গন	৯. জলাবদ্ধতা
১০. অগ্নিকাড	১১. ভূমিকম্প	১২. অন্যান্য						

৬.২ সর্বশেষ দুর্যোগের বছর (সাল):

৬.৩ আপনার ইউনিয়নে/ওয়ার্ডে দুর্যোগ আক্রান্ত এলাকা.........................

৬.৪ আপনার এলাকায় দুর্যোগে কোন ক্ষয়ক্ষতি হয়েছে কি না? ☐ হ্যাঁ ☐ না   ৬.৫.১ উত্তর হ্যাঁ হলে ক্ষয়ক্ষতির পরিমাণ (টাকায়): ....

৬.৫ আপনার এলাকায় জলাবদ্ধতা আছে কি? ☐ হ্যাঁ ☐ না

৬.৬ হ্যাঁ হলে জলাবদ্ধতার কারন ঃ

১.

২.

৩.

৪.

৬.৮. দুর্যোগ মোকাবেলার পদক্ষেপ সমূহ উল্লেখ করুন

১.

২.

৩.

৪.

অধ্যায়-৭ঃ অবকাঠামোগত সুবিধাদি

৭.১ যাতায়াত সুবিধাদির তথ্যঃ

৭.১.১ বাসস্থানের নিকটতম যাতায়াত মাধ্যমঃ ⬚ ১. সড়কপথ ⬚ ২. জলপথ ⬚ ৩. রেলপথ

৭.১.১.১ উত্তর সড়কপথ হলে, রাস্তার ধরন (কোড)ঃ ....

১. বিটুমিনাস	২. ঢালাই	৩. হেরিংবোন	৪. ব্রিকসোলিং	৫. কাঁচা

৭.১.১.২ রাস্তার নামঃ ....

৭.১.১.৩ উত্তর জলপথ হলে, পথের ধরন (কোড)ঃ ....   কোড ৭.১.১.৩ ঃ জলপথের ধরন

১. বছরব্যপি নাব্য নদী/খাল	২. ঋতুভিত্তিক নাব্য নদী/খাল	৩. বদ্ধজলাশয়/বিল

৭.১.১.৪ জলপথের নামঃ ....

৭.১.২ বাসস্থান হতে নিকটতম পথে যাতায়াতের সংযোগ (কোড)ঃ ....   কোড ৭.১.২ ঃ যাতায়াতের সংযোগ

১. হালট	২. সরু হাটাপথ	৩. ক্ষেতের আইল	৪. সাঁকো	৫. নৌ-পথ

৭.১.৩ রাস্তার অবস্থা (কোড)ঃ ....   কোড ৭.১.৩ ঃ রাস্তার অবস্থা

১. ভালো	২. সাময়িক জলমগ্ন	৩. ঋতুভিত্তিক জলমগ্ন	৪.ভাঙ্গাচোরা	৫. বৃষ্টি-গর্তবহুল	৬. ধ্বসবহুল

৭.১.৪ মেরামতের সময়কাল (কোড)ঃ ....   কোড ৭.১.৪ ঃ মেরামতের সময়কাল

১. প্রতিবছর	২. দুই তিন বছর পর পর	৩. অনিয়মিত	৪. চরম দুরবস্থায় পৌছালে

অত্যাবশ্যকীয় ইউটিলিটি সার্ভিস সমুহের তথ্যঃ
৭.২ Energy/শক্তির উৎস/তথ্যঃ

৭.২.১ জ্বালানির উৎস (কোড)ঃ ....   ৭.২.১.১ অন্যান্যঃ ....   কোড ৭.২.১ ঃ জ্বালানির উৎস

১. সিলিন্ডার গ্যাস	২. বায়োগ্যাস	৩. প্রাকৃতিক	৪. কেরোসিন	৫. বৈদ্যুতিক হিটার	৫. লাকড়ি/ভূষি	৬. গোবর	৭. অন্যান্য

৭.২.২ আলোর উৎস (কোড)ঃ ....   ৭.২.২.১ অন্যান্যঃ ....   কোড ৭.২.২ ঃ আলোর উৎস

১. বিদ্যুৎ	২. কেরোসিন বাতি	৩. বায়োগ্যাস বাতি	৪. সৌরশক্তি	৫. অন্যান্য

৭.২.৩ উত্তর বিদ্যুৎ হলে, বিদ্যুৎ প্রাপ্যতা (কোড)ঃ ....   ৭.২.৩.১ অন্যান্য ....   কোড ৭.২.৩ ঃ বিদ্যুৎ প্রাপ্যতা

১. নিরবচ্ছিন্ন	২. রুটিন লোডশেডিং	৩. অনিয়মিত	৪. চরম অপ্রাপ্যতা

৭.৩ খাবার পানির তথ্যঃ

৭.৩.১ খাবার পানির উৎস (কোড)ঃ ....   ৭.৩.১.১ অন্যান্য ....   কোড ৭.৩.১ ঃ খাবার পানির উৎস

১. পাইপ লাইন সরবরাহ	২. নিজস্ব চাপকল	৩. গণ চাপকল	৪. গণ কল ব্যবস্থা	৫. কুয়া	৬. খোলা জলাশয়

৭.৩.২ খাবার পানির মান (কোড)ঃ ....   কোড ৭.৩.২ ঃ খাবার পানির মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক

৭.৩.৩ উত্তর অসন্তোষজনক হলে (কোড)ঃ ....   কোড ৭.৩.৩ ঃ অসন্তোষের কারণ

১. আর্সেনিক	২. আয়রন/লোহ	৩ দুর্গন্ধ	৪. জীবাণু/ প্রাণী

৭.৩.৪ পানির উৎসের দূরত্ব (কোড)ঃ ....   কোড ৭.৩.৪ ঃ পানির উৎসের দূরত্ব

১. ০-০.২৫ মি	২. ০.২৫-০.৫ মি	৩. ০.৫ মি এর অধিক

৭.৪ পয়নিষ্কাশন তথ্যঃ

৭.৪.১ পয়নিষ্কাশন ব্যবস্থা (কোড)ঃ ....   কোড ৭.৪.১ ঃ পয়নিষ্কাশন ব্যবস্থা

১. জলাবদ্ধ পায়খানা (কমোড)	২. পিট ল্যাট্রিন	৩. খোলা জায়গা

৭.৪.২ পয়নিষ্কাশন ব্যবস্থার ধরন (কোড)ঃ ....   ৭.৪.৩.১.অন্যান্যঃ ....   কোড ৭.৪.৩ ঃ শোধন ব্যবস্থার ধরন

১. শোষণ কূপ	২. সেপটিক ট্যাংক	৩. সেপটিক ট্যাংক ও শোষণ কূপ	৪. সুয়ারেজ নেটওয়ার্ক	৫. অন্যান্য

৭.৫ আবর্জনা ব্যবস্থাপনা তথ্যঃ

৭.৫.১ আবর্জনা অপসারণ ব্যবস্থাঃ ⬚ ১. বাড়ি থেকে সংগ্রহ ⬚ ২. নিজস্ব ব্যবস্থাপনা

৭.৫.২ নিজস্ব ব্যবস্থাপনা হলে, ময়লা ফেলার স্থান (কোড)ঃ ....   ৭.৫.২.১ অন্যান্যঃ ....   কোড ৭.৫.২ ঃ ময়লা ফেলার স্থান

১. নির্দিষ্ট ডাস্টবিন	২. বাড়ির সীমানায় মাটির গর্ত	৩. বাড়ির আশে পাশের নীচু জমি	৪. খাল/নদী/ডোবা	৫. রাস্তার ধার	৬. অন্যান্য

৭.৫.৩ বাড়ি থেকে সংগৃহীত হলে, আবর্জনা সংগ্রহের সময়সূচী (কোড)ঃ ....   ৭.৫.৩.১ অন্যান্যঃ ....   কোড ৭.৫.৩ ঃ সংগ্রহের সময়

১. প্রতি দিন	২. প্রতি ২ দিন পর পর	৩. অনিয়মিত	৪. অন্যান্য

৭.৫.৪ আবর্জনা ফেলার স্থানের দূরত্ব (কোড) ঃ ....   কোড ৭.৫.৪ ঃ আবর্জনা ফেলার স্থানের দূরত্ব

১. নিজ বাড়ির সীমানায়	২. ০-৫০ মিঃ	৩. ৫১-১০০ মিঃ	৪. ১০০ মিঃ এর উপরে

অধ্যায়-৮ঃ সামাজিক সুবিধাদি

স্বাস্থ্য বিষয়ক তথ্যঃ

৮.১ গত ৬ মাসে আপনার পরিবারের কেউ অসুস্থ হয়েছিল কি? ১. হ্যাঁ ২. না ৩. অবগত নন

৮.১.১ উত্তর 'হ্যাঁ' হলে,

সদস্য (ID)	অসুস্থতা (কোড)	চিকিৎসা নিয়েছিলেন কি? হ্যাঁ = ১; না = ২	হ্যাঁ হলে কোথায় গিয়েছিলেন (কোড)	না হলে কেন যাননি (কোড)
৮.১.১.*.১	৮.১.১.*.২	৮.১.১.*.৩	৮.১.১.*.৪	৮.১.১.*.৫

কোড ৮.১.১.*.২ ঃ অসুস্থতা

১. জ্বর	২. সর্দি/কাশি	৩. ডাইরিয়া/আমাশয়	৪. জন্ডিস	৫. টাইফয়েড	৬. নিউমোনিয়া	২৫. আলসার
৭. হাম	৮. পোলিও	৯. ম্যালেরিয়া	১০. জল বসন্ত	১১. ডেঙ্গু জ্বর	১২. হৃদরোগ	২৬. যক্ষা
১৩. ধনুস্টংকার	১৪. কৃমিরোগ	১৫. বাত জ্বর	১৬. হাপানী/শ্বাস কষ্ট	১৭. যৌন রোগ	১৮. গলগন্ড	২৭. পাইলস
১৯. হাড় ক্ষয় রোগ	২০. ডায়াবেটিস	২১. চর্মরোগ/ চুলকানি/পাচড়া	২২. স্ত্রীরোগ	২৩. জলাতঙ্ক	২৪. গ্যাসট্রিক	২৮. অন্যান্য

কোড ৮.১.১.*.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 ৮.১.১.*.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

৮.২ চিকিৎসালয়ের তথ্য

ধরন (কোড)	অবস্থান	দূরত্ব	সেবাসমূহ (কোড)	সেবার মান (কোড)	স্থান সংকুলান (কোড)	অবকাঠামোর ধরন (কোড)
৮.২.*.১	৮.২.*.২	৮.২.*.৩	৮.২.*.৪	৮.২.*.৫	৮.২.*.৬	৮.২.*.৭

কোড ৮.২.*.১ ঃ চিকিৎসালয়ের ধরন

১. সরকার হাসপাতাল	২. প্রাইভেট ক্লিনিক	৩. ডাক্তারের চেম্বার	৪. দাতব্য চিকিৎসালয়	৫. কমিউনিটি ক্লিনিক	৬. কবিরাজ ঘর	৭. অন্যান্য

কোড ৮.২.*.৩ঃ দূরত্ব(কি.মি.)

১. 0-৫	২. ৫-১0	৩. ১0-১৫	৪. ১৫-২0	৫. ২0-২৫	৬. ২৫-৩0

কোড ৮.২.*.৪ ঃ চিকিৎসালয়ের সেবাসমূহ

১. সাধারণ চিকিৎসা	২. বিশেষজ্ঞ চিকিৎসা	৩. প্রসূত ও নবজাতক	৪. মাতৃ স্বাস্থ্য	৫. শিশু স্বাস্থ্য	৬. অন্যান্য

কোড ৮.২.*.৫ ঃ সেবার মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক	৫. হতাশাজনক

কোড ৮.২.*.৬ ঃ স্থান সংকুলান

১. পর্যাপ্ত	২. কার্যোপযোগী	৩. অপ্রতুল	৪. অত্যন্ত অপ্রতুল

কোড ৮.২.*.৭ঃ 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

৮.৩ চিকিৎসা প্রাপ্তির সমস্যাসমূহ (কোড)ঃ ☐ , ☐ ☐ , ☐ , ☐   কোড ৮.৩ ঃ চিকিৎসা প্রাপ্তির সমস্যা

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)ঃ				

৮.৪ স্থানীয় চিকিৎসালয়ের অবকাঠামোর অবস্থা (কোড) ঃ   কোড ৮.৪ ঃ অবকাঠামোর অবস্থা

১. চমৎকার	২. ভালো	৩. পুরাতন	৪. ঝুঁকিপূর্ণ

৫

শিক্ষা বিষয়ক তথ্যঃ

৮.৫ পরিবারের সদস্যদের শিক্ষা ব্যবস্থাঃ

সদস্য (ID)	শ্রেণী	শিক্ষা প্রতিষ্ঠান		বাসস্থান থেকে দূরত্ব	যাওয়ার মাধ্যম (কোড)
		সরকারি (কোড)	বেসরকারি (কোড)		
	৮.৫.*.১	৮.৫.*.২	৮.৫.*.৩	৮.৫.*.৪	৮.৫.*.৫

কোড ৮.৫.*.২, ৮.৫.*.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/ কামিল	৮. কারিগরি শিক্ষা প্রতিষ্ঠান	৯. প্রশিক্ষণ কেন্দ্র	১০. মেডিকেল

কোড ৮.৫.*.৪ঃ দূরত্ব (কি.মি)

১. ০-০.৫	২. ০.৫-১.০	৩. ১.০-১.৫	৪. ১.৫-২.০	৫. ২.০-২.৫	৬. ২.৫-৩.০	৭. ৩.০+

কোড ৮.৫.*.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

৮.৭ শিক্ষা প্রতিষ্ঠানের সমস্যা (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐ , ☐   কোড ৮.৭ ঃ 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)ঃ	

৮.৮ আপনার গমনের উপযোগী বয়সের ছেলেমেয়ের প্রাথমিক বিদ্যালয় না যাওয়ার কারণ (কোড)ঃ ☐ , ☐ , ☐

কোড ৮.৮ ঃ বিদ্যালয় না যাওয়ার কারণ

১. আর্থিক অসচ্ছলতা	২. পরিবারের জন্যে রোজগার	৩. শিক্ষায় পরিবারের অনীহা	৪. অন্যান্যঃ ....

৮.৯ প্রাথমিক/মাধ্যমিক ছাত্র-ছাত্রীদের ঝরে পড়ার কারণ (কোড) ☐ , ☐ , ☐

কোড ৮.৯ঃ ঝরে পড়ার কারণ

১. আর্থিক অসচ্ছলতা	২. পরিবারের জন্যে রোজগার	৩. পড়তে অনীহা	৪. বাল্য বিবাহ	৫. অন্যান্যঃ ....

অধ্যায়-৯ঃ সেবা ও এলাকার সমস্যাসমূহ

৯.১. বিনোদনের তথ্যঃ

৯.১.১ ঘরোয়া বিনোদনের জন্য কি করেন (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐   ৯.১.২.১ অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৯.১.১ ঃ ঘরোয়া বিনোদন

১. টেলিভিশন/রেডিও এর অনুষ্ঠান উপভোগ করেন	২. ঘরোয়া খেলা	৩. বই পড়া	৪. গান শোনা	৫. অন্যান্য

৯.১.২ বহির্বিনোদনের জন্য কি করেন (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐   ৯.১.৩.১ অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৯.১.২ ঃ 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

৯.১.৩ বহির্বিনোদনের সমস্যাসমূহ (কোড)ঃ ☐ , ☐ , ☐ , ☐ , ☐   ৯.১.৪.১ অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৯.১.৪ ঃ বহির্বিনোদনের 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. খেলার মাঠ নেই	৮. অন্যান্য

৯.১.৪ খেলার মাঠ ও পার্ক এলাকায় কোন সমস্যা আছে কী? ১. হ্যাঁ   ২. না

৯.১.৪.১ সমস্যা থাকলে সেগুলো কি কি ? ☐ ☐ ☐   কোডঃ ৯.১.৫.১ ঃ 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

৯.২ প্রয়োজনীয় সেবাসমূহের তথ্যঃ

অন্যান্য প্রয়োজনীয় সেবাসমূহের দূরত্ব (বাড়ি থেকে) ও মান ঃ

ক্রম নং	সেবা সমূহ	হ্যাঁ	না	দূরত্ব (কি.মি.) ৯.২.*.১	সেবার মান (কোড) ৯.২.*.২
৯.২.১	কাঁচা বাজার				
৯.২.২	বিপণি কেন্দ্র				
৯.২.৩	উপাসনালয় (মসজিদ/ মন্দির/গীর্জা)				
৯.২.৪	পাঠাগার				
৯.২.৫	কমিউনিটি সেন্টার				
৯.২.৬	স্বাস্থ্যসেবা কেন্দ্র				
৯.২.৭	পোস্ট অফিস				
৯.২.৮	ফায়ার সার্ভিস				
৯.২.৯	পুলিশ ফাঁড়ি/পুলিশ বক্স				
৯.২.১০	বাস/ টেম্পো স্ট্যান্ড				
৯.২.১১	পাবলিক টয়লেট				
৯.২.১২	ঈদগাহ				
৯.২.১৩	কবরস্থান/ শ্মশান				
৯.২.১৪	মোবাইল/ফোন/ফ্যাক্স/ই-মেইলের দোকান				
৯.২.১৫	মিলনায়তন				
৯.২.১৬	সিনেমা হল				
৯.২.১৭	ব্যায়ামাগার				
৯.২.১৮	যুব সংগঠন / ক্লাব				
৯.২.১৯	মহিলাদের ক্লাব				
৯.২.২০	যাদুঘর				
৯.২.২১	খেলার মাঠ				
৯.২.২২	অন্যান্য (উল্লেখ করুন)				

কোড ৯.২.*.১ঃ দূরত্ব(কি.মি.)

১. ১-২	২. ২-৩	৩. ৩-৪	৪. ৪-৫	৫. ৫-৬	৬. ৬-৭	৭. ৭+

কোড ৯.২.*.২ ঃ সেবার মান

১. সন্তোষজনক	২. মোটামুটি	৩. সন্তোষজনক নয়	৪. হতাশাজনক	৫. জানা নাই

৯.৩ বিদ্যমান আইন-শৃঙ্খলা ও অপ-প্রথার তথ্য ঃ

৯.৩.১ প্রবনতা ক্রমান্বয়ে এলাকার আইন-শৃঙ্খলার হুমকিসমূহ (কোড)ঃ ☐, ☐, ☐, ☐, ☐, ☐ ৯.৩.১.১অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৯.৩.১ ঃ আইন-শৃঙ্খলার হুমকিসমূহ

১. ছিচকে চুরি	২. সিঁধেল 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. ইভটিজিং	
১৬.মাদক	১৭. মানব পাচার	১৮. অন্যান্য					

৯.৩.২ এলাকায় প্রচলিত অপ-প্রথাসমূহ (কোড)ঃ ☐, ☐, ☐, ☐, ☐ ৯.৩.২.১ অন্যান্য (উল্লেখ করুন)ঃ ....

কোড ৯.৩.২ ঃ 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

৯.৩.৩ আইন-শৃঙ্খলা রক্ষাকারী বাহিনীর ভূমিকা (কোড) ঃ .... কোড ৯.৩.৩ ঃ আইন-শৃঙ্খলা রক্ষাকারী বাহিনীর ভূমিকা

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক	৫. হতাশাজনক	৬. জানা নাই

৯.৩.৪ 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		স্বাস্থ্য সেবা প্রতিষ্ঠানের অভাব	
বন্যা		নদী ভাঙ্গন		অন্যান্য (উল্লেখ করুন)	

অধ্যায়-১০ঃ বিভিন্ন গুরুত্বপূর্ণ সরকারি প্রতিষ্ঠানের সেবার মান

১০.১ ইউনিয়ন পরিষদ/পৌরসভার সেবাসমূহের মান

ক্রম নং	সেবা সমূহ	হ্যাঁ	না	সেবার মান (কোড)	ক্রম নং	সেবা সমূহ	হ্যাঁ	না	সেবার মান
১০.১.১	পানি সরবারহ				১০.১.১১	পার্ক, খেলার মাঠ, কমিউনিটি স্থাপনা রক্ষণাবেক্ষণ			
১০.১.২	স্যানিটেশন				১০.১.১২	হোল্ডিং নাম্বার/ নাম			
১০.১.৩	আবর্জনা অপসারন				১০.১.১২	ভূমির সীমানা নির্ধারণ			
১০.১.৪	সড়ক বাতি				১০.১.১৪	সালিস			
১০.১.৫	ড্রেন ও রাস্তা পরিস্কার				১০.১.১৫	পারিবারিক আদালত			
১০.১.৬	ইমারতের নক্সা অনুমোদন				১০.১.১৬	পশু জবাইয়ের স্থান পরিদর্শন ও মাংশের গুণগতমান নিশ্চিতকরণ			
১০.১.৭	নাগরিকত্ব সনদ প্রদান				১০.১.১৭	মশক নিধন			
১০.১.৮	জন্ম সনদ প্রদান				১০.১.১৮	কুকুর নিধন			
১০.১.৯	মৃত্যু সনদ প্রদান				১০.১.১৯	ইপিআই (টিকা) কার্যক্রম			
১০.১.১০	উত্তরাধিকার সনদ প্রদান				৮১০.১.২০	গণসচেতনা বৃদ্ধিমূলক কর্মকান্ড			

কোড ১০.১ ঃ সেবার মান

১. অত্যন্ত সন্তোষজনক	২. সন্তোষজনক	৩.গ্রহণযোগ্য	৪. অসন্তোষজনক	৫. হতাশাজনক	৬. জানা নাই

অধ্যায়-১১ঃ সাংস্কৃতিক কর্মকান্ড

১১.১ সাংস্কৃতিক কর্মকান্ডের তথ্য ঃ

১১.১.১ এলাকার ঐতিহ্যবাহী সাংস্কৃতিক অনুষ্ঠানগুলি কী ? (কোড): ☐ , ☐ , ☐ , ☐ , ☐   ১১.১.১.১অন্যান্য (উল্লেখ করুন) ঃ ....

কোড ১১.১.১ ঃ এলাকার সাংস্কৃতিক অনুষ্ঠান

১. সাহিত্য ও সাংস্কৃতিক প্রতিযোগিতা	২. বাৎসরিক নাটক	৩.গানের অনুষ্ঠান	৪. বাৎসরিক যাত্রা/পালাগান	৫. বাৎসরিক মেলা
৬. একুশে ফেব্রুয়ারী	৭. স্বাধীনতা দিবস	৮. বিজয় দিবস	৯. বাংলা নববর্ষ	
১০. চৈত্র সংক্রান্তি	১১. নবান্ন	১২. বসন্ত বরণ	১৩. বর্ষা বরণ	
১৪. গ্রাম্য মেলা	১৫. স্বাধীনতা দিবস	১৬. অন্যান্য		

অধ্যায়-১২ঃ খানা সদস্যদের প্রতিদিনের যাতায়াত সংক্রান্ত তথ্য

১২. ১ পরিবারের সদস্যদের যাতায়াত সংক্রান্ত তথ্যঃ

সদস্য নং (ID)	ভ্রমণের গন্তব্য (স্থান)	ভ্রমণের দূরত্ব	ভ্রমণের সময়		বাহন (কোড)
			শুরু	শেষ	
	১২.১.*.১	১২.১.*.২	১২.১.*.৩	১২.১.*.৪	১২.১.*.৫

কোড ১২.১.*.২ঃ ভ্রমনের দূরত্ব(কি.মি.)

১. ১-৫	২. ৫-১০	৩. ১০-১৫	৪. ১৫-২০	৫. ২০-৩০	৬. ৩০-৪০	৭. ৪০+

কোড ১২.১.*.৪ ঃ 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				

১২.২. গণপরিবহন হিসেবে আপনি কোন বাহন পছন্দ করেন ? ....

১২.৩. আপনার এলাকায় কোথায় কখন ট্রাফিক জ্যাম হয়? ....

১২.৪. আপনার এলাকায় কোথায় বেশি সড়ক দূর্ঘটনা হয়? ....

১২.৫. গণপরিবহন সম্পর্কিত বিষয়ে আপনার মতামত দিন (যদি থাকে)। ....
....
....

অধ্যায়-১৩: সম্পদ সম্পর্কিত তথ্য

১৩.১ উল্লেখযোগ্য কি কি সম্পদ আছে?

১. টেলিভিশন	২. মোবাইল ফোন	৩.রেডিও	৪.ক্যাসেট প্লেয়ার	৫. ট্রাক্টর	৬. কম্পিউটার/ ল্যাপটপ/ডিপ ফ্রিজ
৮. অন্যান্য..					

অধ্যায়-১৪ঃ উন্নয়ন পরিকল্পনা সম্পর্কিত

১৪.১ শিবপুর/রায়পুর/ঈশ্বরগঞ্জ উপজেলার উন্নয়ন পরিকল্পনা প্রণয়ন সম্পর্কে অবহিত আছেন কি? ১. হ্যাঁ   ২.   না

১৪.২ গুরুত্ব অনুসারে প্রয়োজনীয় উন্নয়নমূলক কাজ কি কি হতে পারে?

১৪.৩ আপনার এলাকার /শহরটির অর্থনৈতিক ভিত্তি কি কি?

(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

Plate: Socio-economic survey at Ishwarganj

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
Ishwarganj Upazila, Mymensingh

August, 2016

Joint Venture

of

SCPL Sheltech Consultants Pvt. Ltd

and

Arc ARC Bangladesh Ltd

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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/Ishwarganj 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 Ishwarganj Upazila, Mymensingh.

Dear Sir,
We are pleased to submit herewith the Final Hydrological Survey Report of Ishwarganj Upazila, Mymensingh for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

(Dr. Nurul Islam Nazem)   (D S Adibul Abedin)
Team Leader, Package -2   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 Ishwarganj Upazila under Mymensing district. The task is a part of the project, "Preparation of Development Plan for Fourteen Upazilas", Package-2. Bathymetric survey of Suria River, Kachamatia River and Sofai River at Ishwarganj Upazila is still to be done when the monsoon water subsides. During rest of the survey works, information regarding any existing water control structure, river crossings, distributaries and tributaries were collected. It also presents the detailed survey data of the existing drains within the township. 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 The Old Brahmaputra River, The Suria River, The Soai River and The Kachamatia River are the main drainage channels in the vicinity. The whole system of rivers in and around the Upazila are essentially connected to the Mighty Meghna River on the south-east. The area does not face heavy flooding during the monsoon but does face a drainage congestion during monsoon and post-monsoon. 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 Suria River, Soai River and The Kachamatia River on the south of the Upazila HQ. Although flooding in the area is governed mainly by the Old Brahmaputra, as the study area can be limited within the Upazila, the bathymetric survey of these two rivers will not be necessary. The water level data of those rivers will be used as boundary conditions for model analysis. The information obtained in the field will be incorporated in the DEM through a process called "Burning". This will be necessary for analyzing the surface water flow to assess flood through flood modeling software. 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 228.5 at Mymensing and SW 311 at Atpara have been collected. The rainfall data of the stations CL 64 at Gafargaon, CL 65 at Gauripur and CL 71 at Kishoreganj 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.
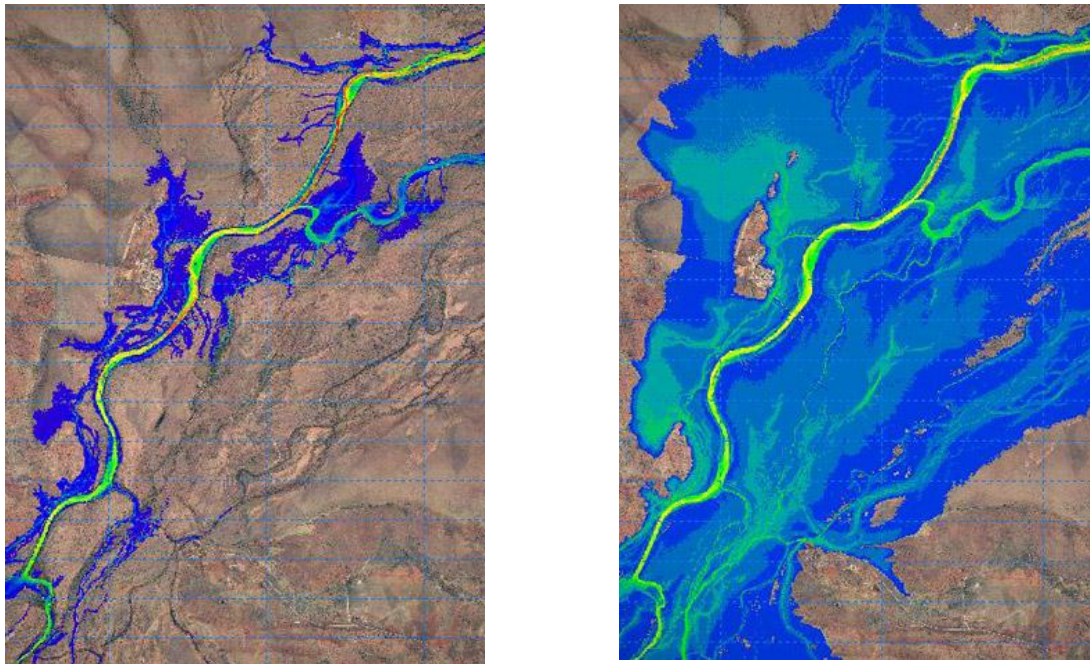
Fig-1: An integrated 1D-2D flood model on a flood plain showing flood conditions at different water level and flow time using Mike Flood (DHI)
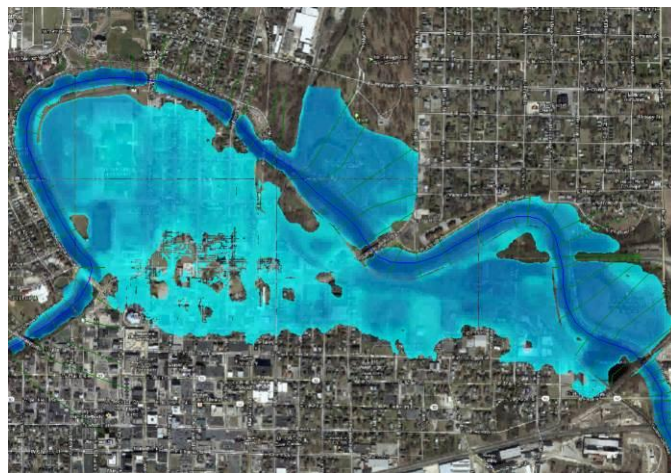
Fig-2: An integrated 1D-2D flood model showing flood conditions in a city area using HEC-RAS

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 Ishwarganj 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)*
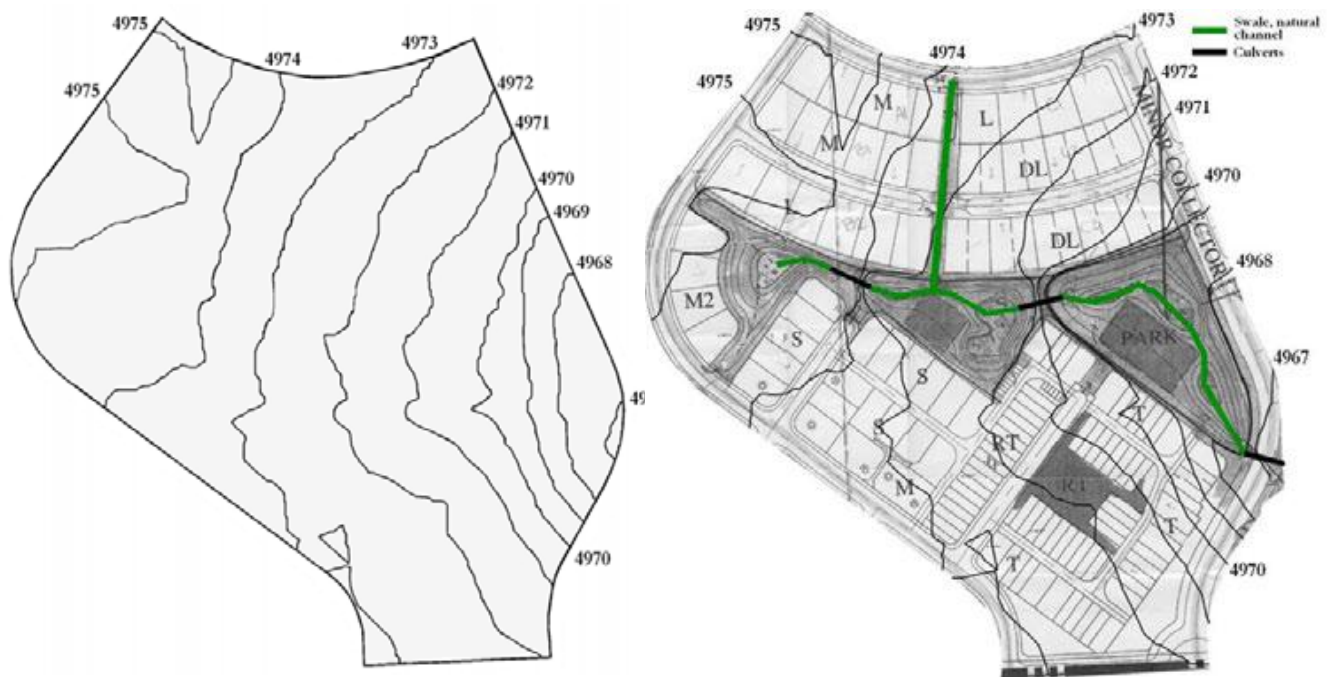
Fig-3: Model developed using EPA SWMM simulating undeveloped (left) and developed (right) conditions to calculate and compare the difference of discharge

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".

<div align="center">

CHAPTER 2
METHODOLOGY

</div>

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.
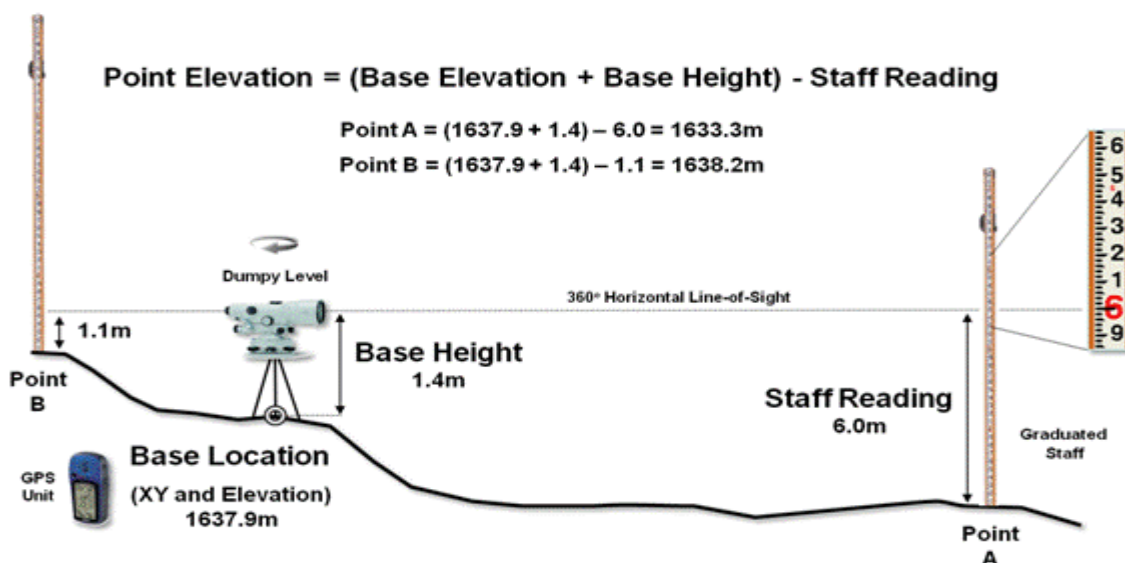
Fig-4: A Dumpy level establishes a horizontal plane to measure the relative elevation differences throughout a project area. A hand GPS is used to get the location of the base.

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* Shows bridge over Kachamatia River on the southern periphery of Ishwarganj Upazila HQ and *Plate-2* shows a culvert on Suria River near at Madha Datta Para at Ishwarganj.

Plate-1: Bazar Bridge on Kachamatia River

Plate-2: Bridge on Suria River at Maddha Datta para

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 228.5 and SW 311 of Bangladesh water development are collected. Daily Rainfall data of BWDB gauge CL 64, CL 65 and CL 71 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 Soai River, Suria River and The Kachamatia River are 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 proposed locations of cross-sections to be taken are shown in *Map – 1.* 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 Ishwarganj. 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.

HYDROLOGICAL MAP OF ISHWARGANJ UPAZILA

Map-1: Map showing the main drainage channels as identified at Ishwarganj Upazila under Mymensing District.
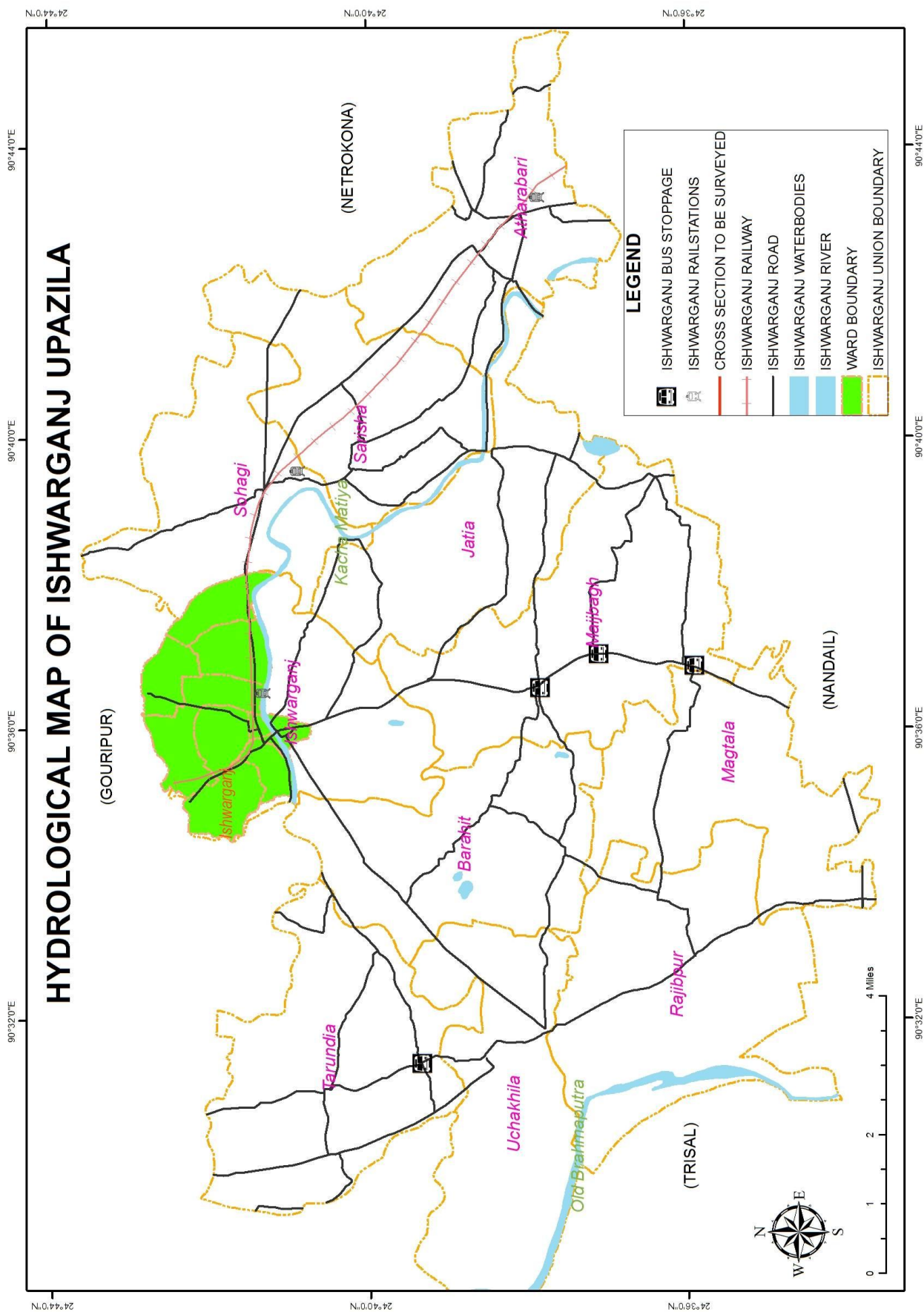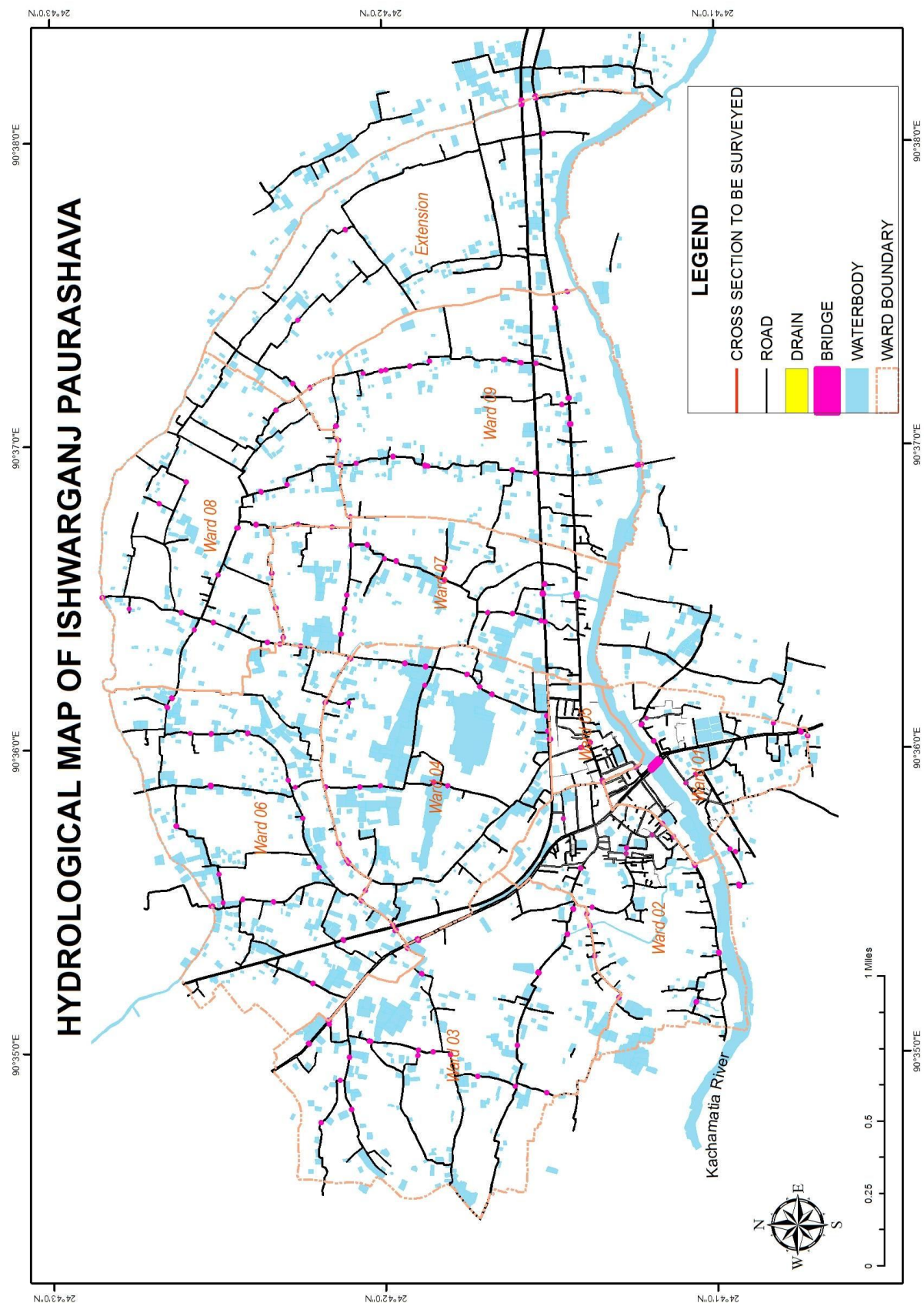
Map-2: Map showing the main drainage channels as identified at Ishwarganj Paurashava under Mymensing District.

3.3   Survey of the Existing Drainage Systems

Information of existing drains at Ishwarganj 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**
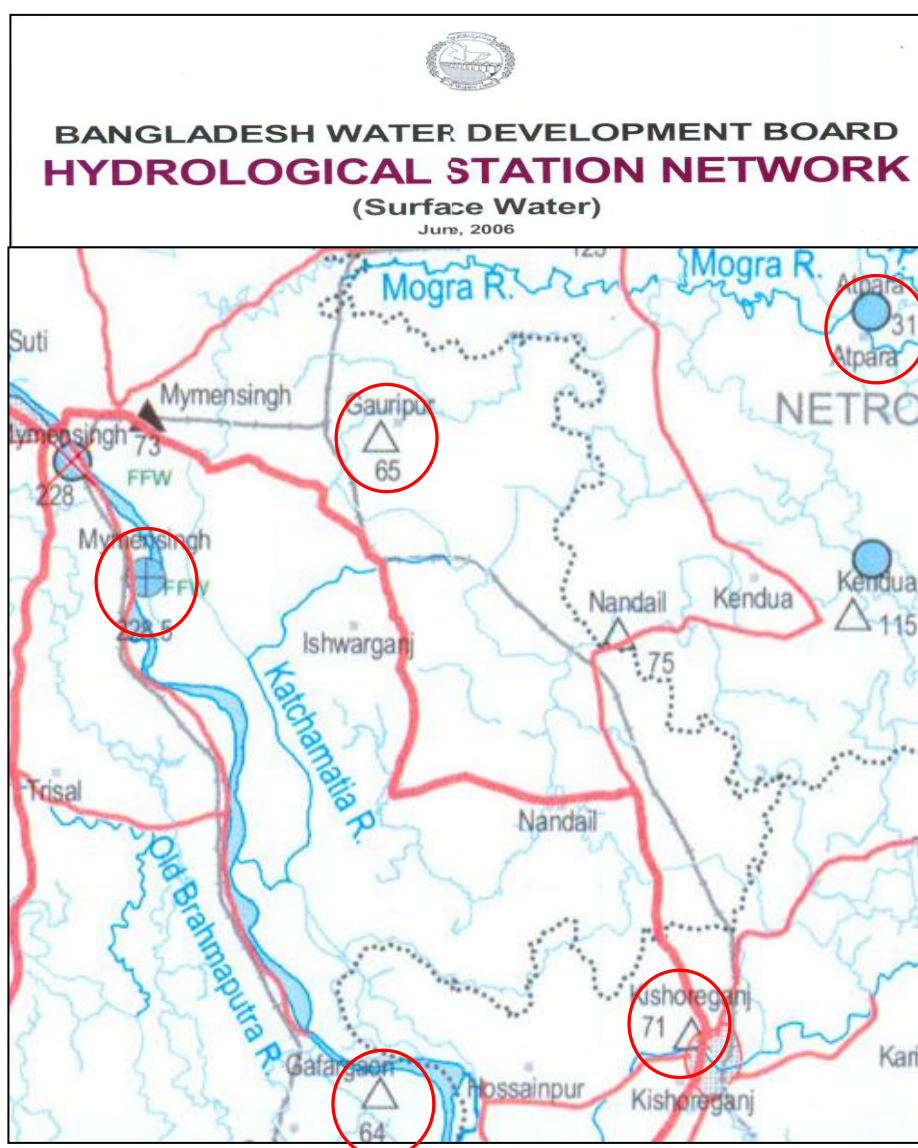
Map-3: Locations of BWDB Water Level, Discharge and Rainfall gauge stations at and around Ishwarganj, Mymensing, of which the data has been collected (SW 228.5, SW 311, CL 64, CL 65, CL 71).

Table 3.1:   Sample of Collected Rainfall data of BWDB station CL 64, CL 65 & CL 71

District	StationID	StationName	DateTime	Rainfall	District	StationID	StationName	DateTime	Rainfall	District	StationID	StationName	DateTime	Rainfall
Mymensingh	CL64	Gafargaon	29587.00	0.00	Mymensingh	CL65	Gauripur	29587.00	0.00	Kishoreganj	CL71	Kishoreganj	29587.00	0.00
Mymensingh	CL64	Gafargaon	29588.00	0.00	Mymensingh	CL65	Gauripur	29588.00	0.00	Kishoreganj	CL71	Kishoreganj	29588.00	0.00
Mymensingh	CL64	Gafargaon	29589.00	0.00	Mymensingh	CL65	Gauripur	29589.00	0.00	Kishoreganj	CL71	Kishoreganj	29589.00	0.00
Mymensingh	CL64	Gafargaon	29590.00	0.00	Mymensingh	CL65	Gauripur	29590.00	0.00	Kishoreganj	CL71	Kishoreganj	29590.00	0.00
Mymensingh	CL64	Gafargaon	29591.00	0.00	Mymensingh	CL65	Gauripur	29591.00	0.00	Kishoreganj	CL71	Kishoreganj	29591.00	0.00
Mymensingh	CL64	Gafargaon	29592.00	0.00	Mymensingh	CL65	Gauripur	29592.00	0.00	Kishoreganj	CL71	Kishoreganj	29592.00	0.00
Mymensingh	CL64	Gafargaon	29593.00	0.00	Mymensingh	CL65	Gauripur	29593.00	0.00	Kishoreganj	CL71	Kishoreganj	29593.00	0.00
Mymensingh	CL64	Gafargaon	29594.00	0.00	Mymensingh	CL65	Gauripur	29594.00	0.00	Kishoreganj	CL71	Kishoreganj	29594.00	6.30
Mymensingh	CL64	Gafargaon	29595.00	0.00	Mymensingh	CL65	Gauripur	29595.00	0.00	Kishoreganj	CL71	Kishoreganj	29595.00	0.00
Mymensingh	CL64	Gafargaon	29596.00	0.00	Mymensingh	CL65	Gauripur	29596.00	0.00	Kishoreganj	CL71	Kishoreganj	29596.00	0.00
Mymensingh	CL64	Gafargaon	29597.00	0.00	Mymensingh	CL65	Gauripur	29597.00	0.00	Kishoreganj	CL71	Kishoreganj	29597.00	0.00
Mymensingh	CL64	Gafargaon	29598.00	0.00	Mymensingh	CL65	Gauripur	29598.00	0.00	Kishoreganj	CL71	Kishoreganj	29598.00	0.00
Mymensingh	CL64	Gafargaon	29599.00	0.00	Mymensingh	CL65	Gauripur	29599.00	0.00	Kishoreganj	CL71	Kishoreganj	29599.00	0.00
Mymensingh	CL64	Gafargaon	29600.00	0.00	Mymensingh	CL65	Gauripur	29600.00	0.00	Kishoreganj	CL71	Kishoreganj	29600.00	0.00
Mymensingh	CL64	Gafargaon	29601.00	0.00	Mymensingh	CL65	Gauripur	29601.00	0.00	Kishoreganj	CL71	Kishoreganj	29601.00	0.00
Mymensingh	CL64	Gafargaon	29602.00	0.00	Mymensingh	CL65	Gauripur	29602.00	0.00	Kishoreganj	CL71	Kishoreganj	29602.00	0.00
Mymensingh	CL64	Gafargaon	29603.00	0.00	Mymensingh	CL65	Gauripur	29603.00	0.00	Kishoreganj	CL71	Kishoreganj	29603.00	0.00
Mymensingh	CL64	Gafargaon	29604.00	0.00	Mymensingh	CL65	Gauripur	29604.00	0.00	Kishoreganj	CL71	Kishoreganj	29604.00	0.00
Mymensingh	CL64	Gafargaon	29605.00	0.00	Mymensingh	CL65	Gauripur	29605.00	0.00	Kishoreganj	CL71	Kishoreganj	29605.00	0.00
Mymensingh	CL64	Gafargaon	29606.00	0.00	Mymensingh	CL65	Gauripur	29606.00	0.00	Kishoreganj	CL71	Kishoreganj	29606.00	0.00
Mymensingh	CL64	Gafargaon	29607.00	0.00	Mymensingh	CL65	Gauripur	29607.00	0.00	Kishoreganj	CL71	Kishoreganj	29607.00	0.00
Mymensingh	CL64	Gafargaon	29608.00	0.00	Mymensingh	CL65	Gauripur	29608.00	0.00	Kishoreganj	CL71	Kishoreganj	29608.00	0.00
Mymensingh	CL64	Gafargaon	29609.00	0.00	Mymensingh	CL65	Gauripur	29609.00	0.00	Kishoreganj	CL71	Kishoreganj	29609.00	0.00
Mymensingh	CL64	Gafargaon	29610.00	0.00	Mymensingh	CL65	Gauripur	29610.00	0.00	Kishoreganj	CL71	Kishoreganj	29610.00	0.00
Mymensingh	CL64	Gafargaon	29611.00	0.00	Mymensingh	CL65	Gauripur	29611.00	0.00	Kishoreganj	CL71	Kishoreganj	29611.00	0.00
Mymensingh	CL64	Gafargaon	29612.00	0.00	Mymensingh	CL65	Gauripur	29612.00	0.00	Kishoreganj	CL71	Kishoreganj	29612.00	0.00
Mymensingh	CL64	Gafargaon	29613.00	0.00	Mymensingh	CL65	Gauripur	29613.00	0.00	Kishoreganj	CL71	Kishoreganj	29613.00	0.00
Mymensingh	CL64	Gafargaon	29614.00	0.00	Mymensingh	CL65	Gauripur	29614.00	0.00	Kishoreganj	CL71	Kishoreganj	29614.00	0.00
Mymensingh	CL64	Gafargaon	29615.00	0.00	Mymensingh	CL65	Gauripur	29615.00	0.00	Kishoreganj	CL71	Kishoreganj	29615.00	0.00
Mymensingh	CL64	Gafargaon	29616.00	0.00	Mymensingh	CL65	Gauripur	29616.00	0.00	Kishoreganj	CL71	Kishoreganj	29616.00	0.00
Mymensingh	CL64	Gafargaon	29617.00	7.40	Mymensingh	CL65	Gauripur	29617.00	10.70	Kishoreganj	CL71	Kishoreganj	29617.00	8.40
Mymensingh	CL64	Gafargaon	29618.00	25.90	Mymensingh	CL65	Gauripur	29618.00	5.30	Kishoreganj	CL71	Kishoreganj	29618.00	22.10
Mymensingh	CL64	Gafargaon	29619.00	0.00	Mymensingh	CL65	Gauripur	29619.00	0.00	Kishoreganj	CL71	Kishoreganj	29619.00	0.00

Table 3.2:   Sample of Collected Water level Data of BWDB Station SW228.5 & SW 311

RiverName	StationName	StationID	Date	MDWL	RiverName	StationName	StationID	Date	MDWL
Old Brahmaputra	Mymensingh	SW228.5	01-Jan-81	7.01	Mogra	Atpara	SW311	01-Apr-82	6.55
Old Brahmaputra	Mymensingh	SW228.5	02-Jan-81	7.01	Mogra	Atpara	SW311	02-Apr-82	6.51
Old Brahmaputra	Mymensingh	SW228.5	03-Jan-81	7.01	Mogra	Atpara	SW311	03-Apr-82	6.47
Old Brahmaputra	Mymensingh	SW228.5	04-Jan-81	6.99	Mogra	Atpara	SW311	04-Apr-82	6.44
Old Brahmaputra	Mymensingh	SW228.5	05-Jan-81	6.99	Mogra	Atpara	SW311	05-Apr-82	6.44
Old Brahmaputra	Mymensingh	SW228.5	06-Jan-81	6.99	Mogra	Atpara	SW311	06-Apr-82	6.47
Old Brahmaputra	Mymensingh	SW228.5	07-Jan-81	6.99	Mogra	Atpara	SW311	07-Apr-82	6.52
Old Brahmaputra	Mymensingh	SW228.5	08-Jan-81	6.99	Mogra	Atpara	SW311	08-Apr-82	6.54
Old Brahmaputra	Mymensingh	SW228.5	09-Jan-81	6.99	Mogra	Atpara	SW311	09-Apr-82	6.60
Old Brahmaputra	Mymensingh	SW228.5	10-Jan-81	6.99	Mogra	Atpara	SW311	10-Apr-82	6.69
Old Brahmaputra	Mymensingh	SW228.5	11-Jan-81	6.99	Mogra	Atpara	SW311	11-Apr-82	6.82
Old Brahmaputra	Mymensingh	SW228.5	12-Jan-81	6.98	Mogra	Atpara	SW311	12-Apr-82	6.89
Old Brahmaputra	Mymensingh	SW228.5	13-Jan-81	6.98	Mogra	Atpara	SW311	13-Apr-82	6.92
Old Brahmaputra	Mymensingh	SW228.5	14-Jan-81	6.98	Mogra	Atpara	SW311	14-Apr-82	7.65
Old Brahmaputra	Mymensingh	SW228.5	15-Jan-81	6.97	Mogra	Atpara	SW311	15-Apr-82	7.16
Old Brahmaputra	Mymensingh	SW228.5	16-Jan-81	6.97	Mogra	Atpara	SW311	16-Apr-82	7.24
Old Brahmaputra	Mymensingh	SW228.5	17-Jan-81	6.97	Mogra	Atpara	SW311	17-Apr-82	7.39
Old Brahmaputra	Mymensingh	SW228.5	18-Jan-81	6.97	Mogra	Atpara	SW311	18-Apr-82	7.50
Old Brahmaputra	Mymensingh	SW228.5	19-Jan-81	6.95	Mogra	Atpara	SW311	19-Apr-82	7.62
Old Brahmaputra	Mymensingh	SW228.5	20-Jan-81	6.95	Mogra	Atpara	SW311	20-Apr-82	7.73
Old Brahmaputra	Mymensingh	SW228.5	21-Jan-81	6.95	Mogra	Atpara	SW311	21-Apr-82	7.75
Old Brahmaputra	Mymensingh	SW228.5	22-Jan-81	6.95	Mogra	Atpara	SW311	22-Apr-82	7.74
Old Brahmaputra	Mymensingh	SW228.5	23-Jan-81	6.95	Mogra	Atpara	SW311	23-Apr-82	7.78
Old Brahmaputra	Mymensingh	SW228.5	24-Jan-81	6.95	Mogra	Atpara	SW311	24-Apr-82	7.82
Old Brahmaputra	Mymensingh	SW228.5	25-Jan-81	6.95	Mogra	Atpara	SW311	25-Apr-82	7.86
Old Brahmaputra	Mymensingh	SW228.5	26-Jan-81	6.95	Mogra	Atpara	SW311	26-Apr-82	7.95
Old Brahmaputra	Mymensingh	SW228.5	27-Jan-81	6.95	Mogra	Atpara	SW311	27-Apr-82	7.95
Old Brahmaputra	Mymensingh	SW228.5	28-Jan-81	6.94	Mogra	Atpara	SW311	28-Apr-82	7.96
Old Brahmaputra	Mymensingh	SW228.5	29-Jan-81	6.93	Mogra	Atpara	SW311	29-Apr-82	7.91
Old Brahmaputra	Mymensingh	SW228.5	30-Jan-81	6.93	Mogra	Atpara	SW311	30-Apr-82	7.92
Old Brahmaputra	Mymensingh	SW228.5	31-Jan-81	6.93	Mogra	Atpara	SW311	01-May-82	7.94
Old Brahmaputra	Mymensingh	SW228.5	01-Feb-81	6.95	Mogra	Atpara	SW311	02-May-82	7.85

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, $T = \dfrac{1}{P(F)}$. 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:

$$F(x) = \exp\left[-\left(1 - \kappa \frac{x-u}{\alpha}\right)^{1/\kappa}\right]$$

(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:

$$F(x) = \exp\left[-\exp\left(-\frac{x-u}{\alpha}\right)\right] \qquad -\infty \leq x \leq \infty \qquad (2)$$

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

$$K_T = \frac{x_T - \overline{x}}{s} = z \tag{10}$$

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) $\quad y_i = \log x_i$

2) $\quad$ Compute the mean, $\overline{y}$ and standard deviation s_y

3) $\quad$ Compute $y_T = \overline{y} + K_T s_y$

$$K_T = \frac{y_T - \overline{y}}{s_y} = z$$

So, K_T can be taken from Table 1 in ANNEXURE – I(a).

4) $\quad$ 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) $\quad y_i = \log x_i$

2) $\quad$ Compute the mean, $\overline{y}$ and standard deviation s_y

3) $\quad$ Compute coefficient of skewness

$$C_s = \frac{n\sum(y_i - \overline{y})^3}{(n-1)(n-2)s_y^3}$$

4) $\quad$ Compute $y_T = \overline{y} + K_T s_y \tag{11}$

$\quad$ Where K_T is taken from Table 2 in ANNEXURE – I(a)..

5) $\quad$ 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

$$K_T = -\frac{\sqrt{6}}{\pi}\left[0.5772 + \ln\left\{\ln\left(\frac{T}{T-1}\right)\right\}\right] \tag{12}$$

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

$$\chi^2 = \sum_{i=1}^{k} \frac{n[f_s(x_i) - p(x_i)]^2}{p(x_i)} \qquad (13)$$

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 $u = k\text{-}l\text{-}1$ degrees of freedom (l is the number of parameters used in fitting the proposed distribution) is the distribution for the sum of squares of u 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:

$$D = \max|P(x) - P_o(x)|$$

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, $P_1 = P_d W_1$ is the precipitation amount assigned to the first half of the day, and $P_2 = P_d W_2$ 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. <u>1998</u>) [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:

$$V = \frac{K_n}{n} R^{\frac{2}{3}} s^{\frac{1}{2}} \tag{20}$$

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.

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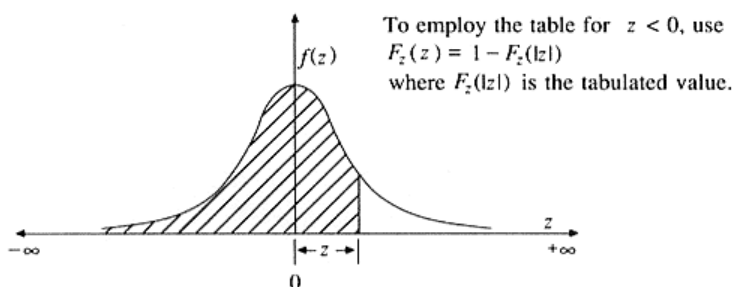
Table 2: Frequency factors for Pearson Type III Distribution

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

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

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).

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

Table 3: Frequency factors for Pearson Type III Distribution

Sample	Return Period								
	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.

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

Table 4: χ² Distribution

$X^2_{a, v}$
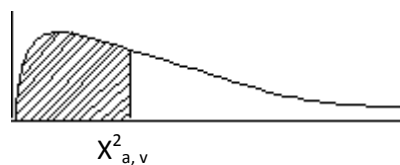
DOF v	$x^2_{.995}$	$x^2_{.99}$	$x^2_{.975}$	$x^2_{.95}$	$x^2_{.90}$	$x^2_{.75}$	$x^2_{.50}$	$x^2_{.25}$	$x^2_{.10}$	$x^2_{.05}$	$x^2_{.025}$	$x^2_{.01}$	$x^2_{.005}$
1	7.88	6.63	5.02	3.84	2.71	1.32	0.455	0.102	0.0158	0.0039	0.0010	0.0002	0.0000
2	10.6	9.21	7.38	5.99	4.61	2.77	1.39	0.575	.211	.103	.0506	.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

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

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	$\dfrac{1.70}{\sqrt{n}}$	$\dfrac{1.14}{\sqrt{n}}$	$\dfrac{1.22}{\sqrt{n}}$	$\dfrac{1.36}{\sqrt{n}}$	$\dfrac{1.63}{\sqrt{n}}$

Source: Journal American Statistical Association 47:425-441, 1952.Z.W. Birnbaum.

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

A.1b.1 ANALYSED RESULTS OF BWDB WATER LEVEL GAUGE STATION SW 228.5 ON THE OLD BRAHMAPUTRA RIVER

DAILY BASIS WATER LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW228.5 AT MYMENSING (EV I - DISTRIBUTION)

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

ANNEXURE - 1

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 228.5

Year	\<Max\> Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	\<Min\> Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Monthly Maximum WL (mPWD)												Monthly Minimum WL (mPWD)											
1981	07.01	06.95	06.86	07.10	07.90	09.69	11.78	11.51	11.44	09.60	07.63	07.13	06.93	06.86	06.80	06.77	06.97	07.74	10.06	10.70	09.59	07.68	07.12	06.98
1982	06.97	06.92	06.87	07.23	08.90	10.98	11.58	12.00	11.44	10.26	07.70	07.05	06.92	06.86	06.77	06.73	07.24	07.72	10.75	09.53	09.45	07.70	07.05	06.95
1983	06.95	06.91	06.86										06.91	06.86	06.79									
1984				06.83	09.42	10.72	12.15	12.47	12.82	11.60	08.88	07.52				06.68	06.83	08.69	09.85	09.86	10.07	08.86	07.54	07.19
1985	07.18	07.03	06.95	07.86	08.42	10.93	12.47	12.50	11.51	10.46	08.01	07.31	06.97	06.84	06.75	06.97	07.69	08.00	10.56	09.94	10.28	08.05	07.32	07.13
1986	07.12	06.97	06.82	07.52	07.66	09.92	10.89	10.93	11.36	10.81	08.03	07.27	06.98	06.82	06.72	06.71	07.30	07.23	09.68	08.99	10.29	08.12	07.28	07.02
1987	07.01	06.84	06.74	06.88	07.52	09.86	12.22	12.72	11.59	11.49	08.33	07.37	06.85	06.66	06.62	06.58	06.90	07.79	10.07	10.63	10.56	08.49	07.39	07.12
1988	07.11	06.92	06.85	07.20	09.71	11.13	12.51	13.64	13.70	10.55	08.32	07.49	06.93	06.76	06.65	06.55	07.20	08.55	09.78	10.46	09.17	08.49	07.32	07.14
1989	07.14	06.95	06.81	06.62	09.26	10.48	11.84	10.87	11.24	10.74	08.31	07.19	06.96	06.80	06.62	06.48	06.52	08.93	09.29	09.58	09.92	08.43	07.20	06.93
1990	06.92	06.75	06.63	07.33	08.36	11.04	11.68	11.69	10.98	11.34	08.26	07.04	06.76	06.63	06.52	06.50	07.28	08.55	10.24	09.47	09.35	08.37	07.05	06.77
1991	06.77	06.63	06.43	06.74	09.33	11.37	12.68	11.67	10.74	10.74	08.47	07.27	06.64	06.44	06.33	06.30	06.39	08.94	10.50	10.36	10.65	08.57	07.28	07.09
1992	07.14	06.95	06.73	07.61	08.36	10.44	11.00	10.50	10.15	09.56	07.71	07.08	06.92	06.74	06.58	06.58	07.28	07.64	10.27	09.19	09.07	07.75	07.09	06.87
1993	07.00	06.76	06.51	06.52	08.37	10.36	12.03	11.61	11.87	10.11	07.89	07.11	06.76	06.52	06.37	06.35	06.52	07.60	10.26	10.63	09.29	07.97	07.12	06.84
1994	06.83	06.69	06.54	06.52	07.47	09.85	09.86	09.60	09.24	08.64	07.32	06.81	06.70	06.52	06.41	06.40	06.45	06.99	08.33	08.82	08.47	07.35	06.81	06.68
1995	06.67	06.59	06.33	06.28	09.07	11.06	12.97	12.08	11.10	11.25	07.69	07.19	06.59	06.35	06.22	06.14	06.12	08.20	10.88	09.88	09.45	07.76	07.20	06.98
1996	06.97	06.82	06.60	06.44	09.19	09.86	12.13	11.34	10.57	09.46	08.22	07.20	06.82	06.62	06.41	06.31	06.35	07.78	10.17	09.77	08.68	07.65	07.22	06.94
1997	06.94	06.76	06.54	06.64	07.40	10.09	11.66	10.41	10.65	10.43	07.45	06.97	06.76	06.55	06.40	06.41	06.48	07.24	09.52	08.98	08.98	07.48	06.97	06.82
1998	06.82	06.65	06.29	06.47	08.87	10.91	12.62	12.86	13.03	09.61	09.11	07.31	06.66	06.30	06.14	06.27	06.46	08.67	10.95	11.92	09.48	08.08	07.33	07.00
1999	06.99	06.75	06.39	06.39	07.93	10.72	11.39	11.87	11.97	09.14	08.32	07.10	06.76	06.40	06.19	06.16	06.21	07.99	10.42	09.35	09.24	08.49	07.11	06.82
2000	06.81	06.62	06.41	07.10	08.76	11.05	11.11	11.91	11.34	10.30	07.41	06.95	06.63	06.32	06.28	06.23	06.76	08.87	09.88	09.97	10.45	07.45	06.96	06.75
2001	06.74	06.53	06.29	06.13	07.90	09.32	09.61	10.82	10.75	10.27	07.53	06.97	06.54	06.29	06.13	06.02	06.11	07.88	08.34	08.93	09.12	07.57	06.98	06.72
2002	06.72	06.54	06.21	07.61	08.21	10.30	12.51	12.64	09.82	09.76	07.23		06.55	06.22	06.12	06.18	07.21	07.41	09.96	10.04	08.13	07.26	06.91	
2003																								
2004																								
2005																								
2006																								
2007																								
2008																								
2009																								
2010																								
2011																								
2012																								
2013																								
2014																								
2015																								
MAX	07.18	07.03	06.95	07.86	09.71	11.37	12.97	13.64	13.70	11.60	09.11	07.52	06.98	06.86	06.80	06.97	07.69	08.94	10.95	11.92	10.65	08.86	07.54	07.19
MIN	06.67	06.53	06.21	06.13	07.40	09.32	09.61	09.60	09.24	08.64	07.23	06.81	06.54	06.22	06.12	06.02	06.11	06.99	08.33	08.82	08.13	07.26	06.81	06.68
N	21	21	21	21	21	21	21	21	21	21	21	20	21	21	21	21	21	21	21	21	21	21	21	20
AVE.	06.94	06.79	06.60	06.91	08.48	10.48	11.75	11.70	11.34	10.29	07.99	07.17	06.79	06.59	06.47	06.44	06.78	08.02	09.99	09.86	09.51	07.98	07.15	06.94
σ	00.15	00.15	00.23	00.49	00.70	00.57	00.88	00.96	01.03	00.79	00.51	00.18	00.15	00.22	00.23	00.24	00.46	00.60	00.70	00.75	00.69	00.46	00.18	00.15

ANALYSED DATA:

T	K	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
T = 1/1.11yrs.	$K_{1.11}$ = -1.10	06.78	06.62	06.35	06.36	07.70	09.85	10.78	10.64	10.21	09.42	07.43	06.96	06.63	06.35	06.21	06.17	06.27	07.36	09.22	09.03	08.75	07.47	06.96	06.77
T = 1/2.00yrs.	$K_{2.00}$ = -0.16	06.92	06.76	06.57	06.82	08.36	10.38	11.60	11.54	11.17	10.16	07.91	07.14	06.76	06.55	06.43	06.40	06.70	07.92	09.87	09.73	09.40	07.90	07.13	06.91
T = 1/2.33yrs.	$K_{2.33}$ = 0.00	06.94	06.79	06.60	06.91	08.48	10.48	11.75	11.70	11.34	10.29	07.99	07.17	06.79	06.59	06.47	06.44	06.78	08.02	09.99	09.86	09.51	07.98	07.16	06.94
T = 1/5.00yrs.	$K_{5.00}$ = 0.72	07.05	06.90	06.77	07.26	08.98	10.89	12.38	12.39	12.08	10.86	08.35	07.30	06.89	06.74	06.64	06.62	07.11	08.45	10.49	10.40	10.01	08.31	07.28	07.05
T = 1/10.00yrs.	$K_{10.00}$ = 1.30	07.14	06.99	06.91	07.55	09.39	11.23	12.89	12.95	12.69	11.32	08.65	07.41	06.98	06.87	06.77	06.76	07.37	08.80	10.90	10.84	10.41	08.58	07.39	07.13
T = 1/20.00yrs.	$K_{20.00}$ = 1.87	07.22	07.08	07.04	07.83	09.79	11.55	13.39	13.48	13.26	11.77	08.93	07.51	07.06	06.99	06.90	06.90	07.63	09.13	11.29	11.26	10.80	08.84	07.49	07.22
T = 1/30.00yrs.	$K_{30.00}$ = 2.19	07.27	07.13	07.11	07.99	10.02	11.74	13.67	13.79	13.60	12.02	09.10	07.57	07.11	07.07	06.98	06.98	07.78	09.33	11.51	11.51	11.02	08.99	07.55	07.27
T = 1/50.00yrs.	$K_{50.00}$ = 2.59	07.33	07.19	07.20	08.18	10.30	11.97	14.02	14.18	14.01	12.34	09.30	07.64	07.17	07.15	07.07	07.08	07.97	09.57	11.79	11.81	11.30	09.18	07.62	07.33

9

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 228.5

HWL of Different Return period: SW 228.5 (NT)

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 228.5

LWL of Different Return period: SW 228.5 (NT)
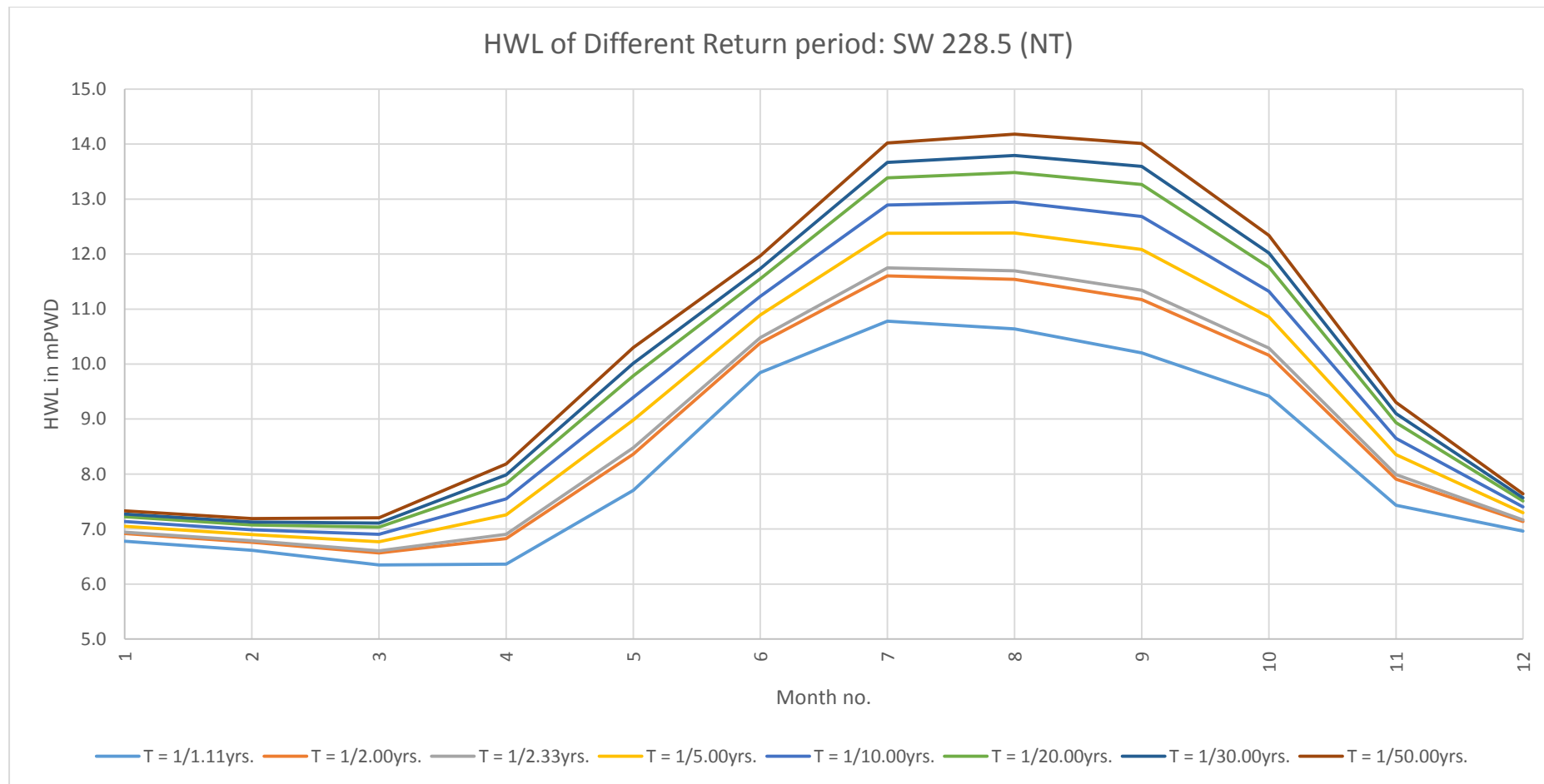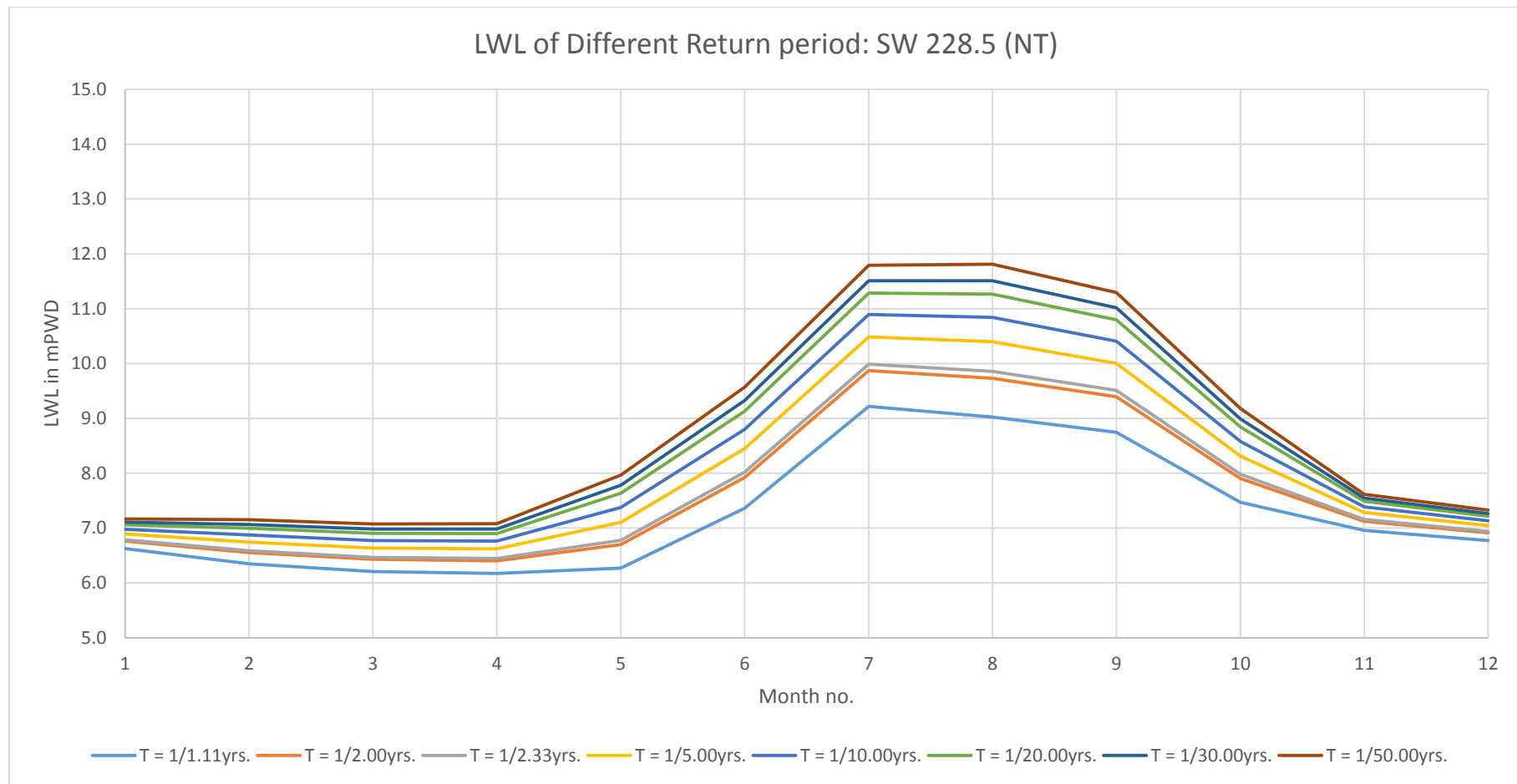
A.1b.2 ANALYSED RESULTS OF BWDB WATER LEVEL GAUGE STATION SW 311 ON THE MOGRA RIVER

DAILY BASIS WATER LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW311 AT ATPARA, NETROKONA (EV I - DISTRIBUTION)

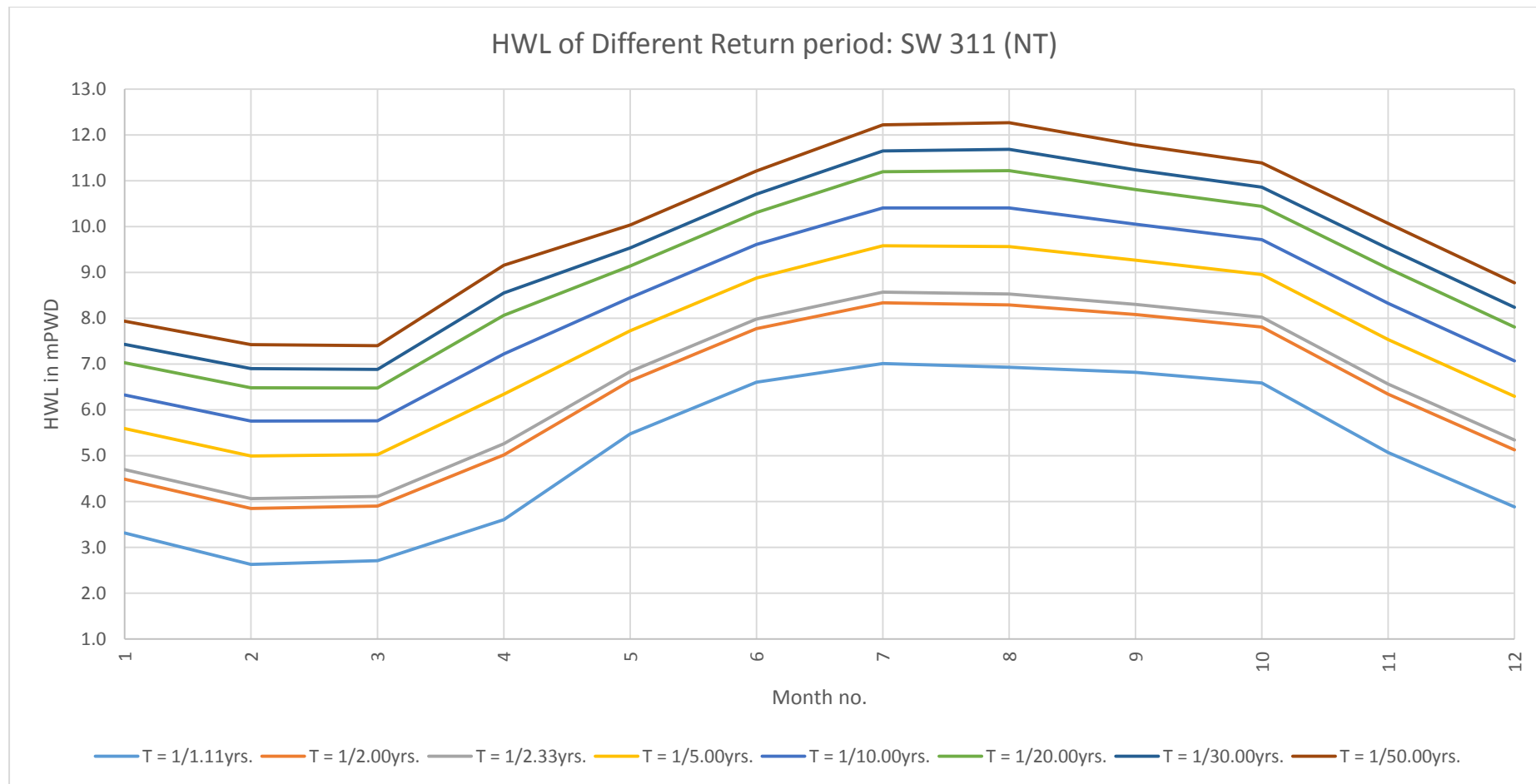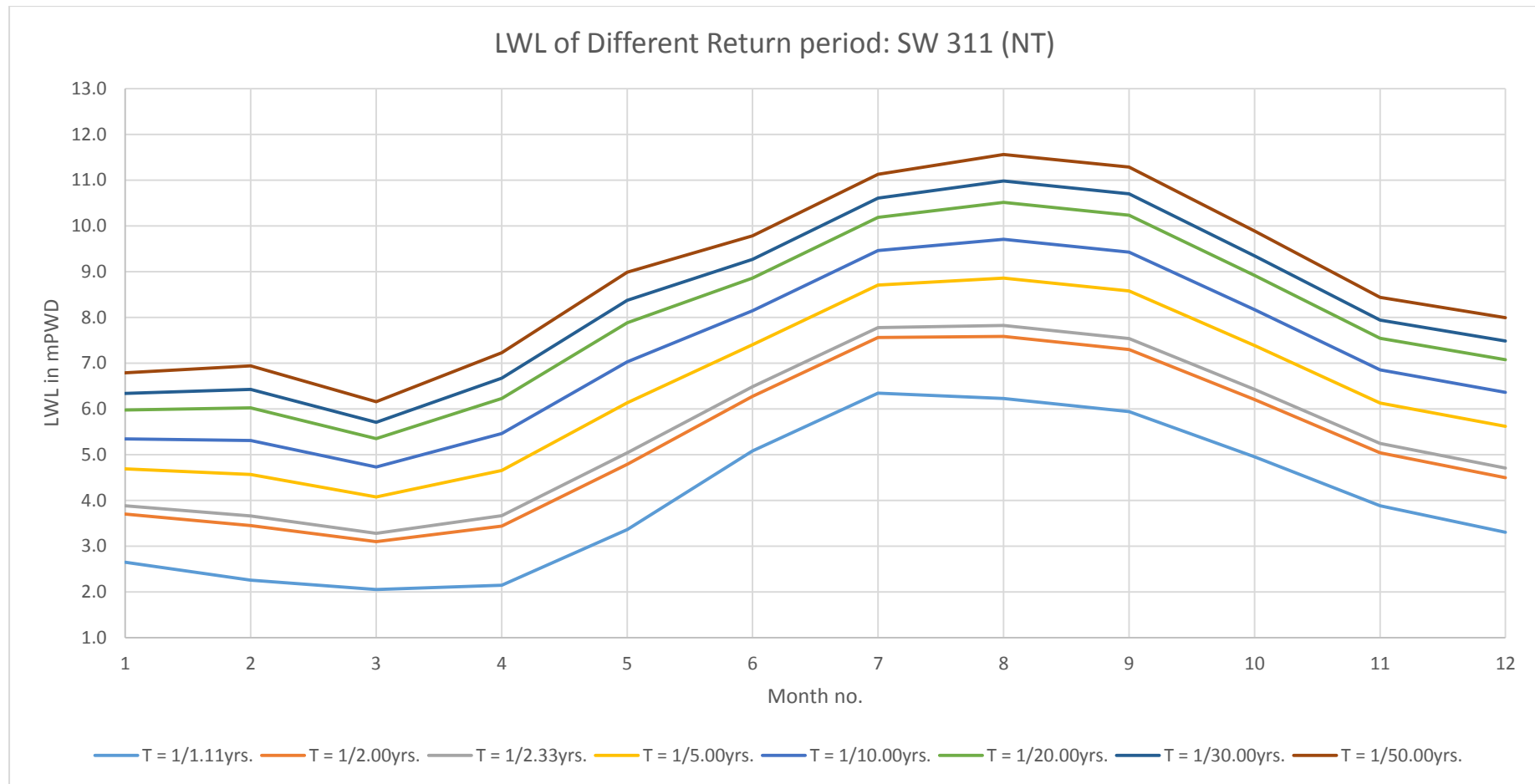*JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.*
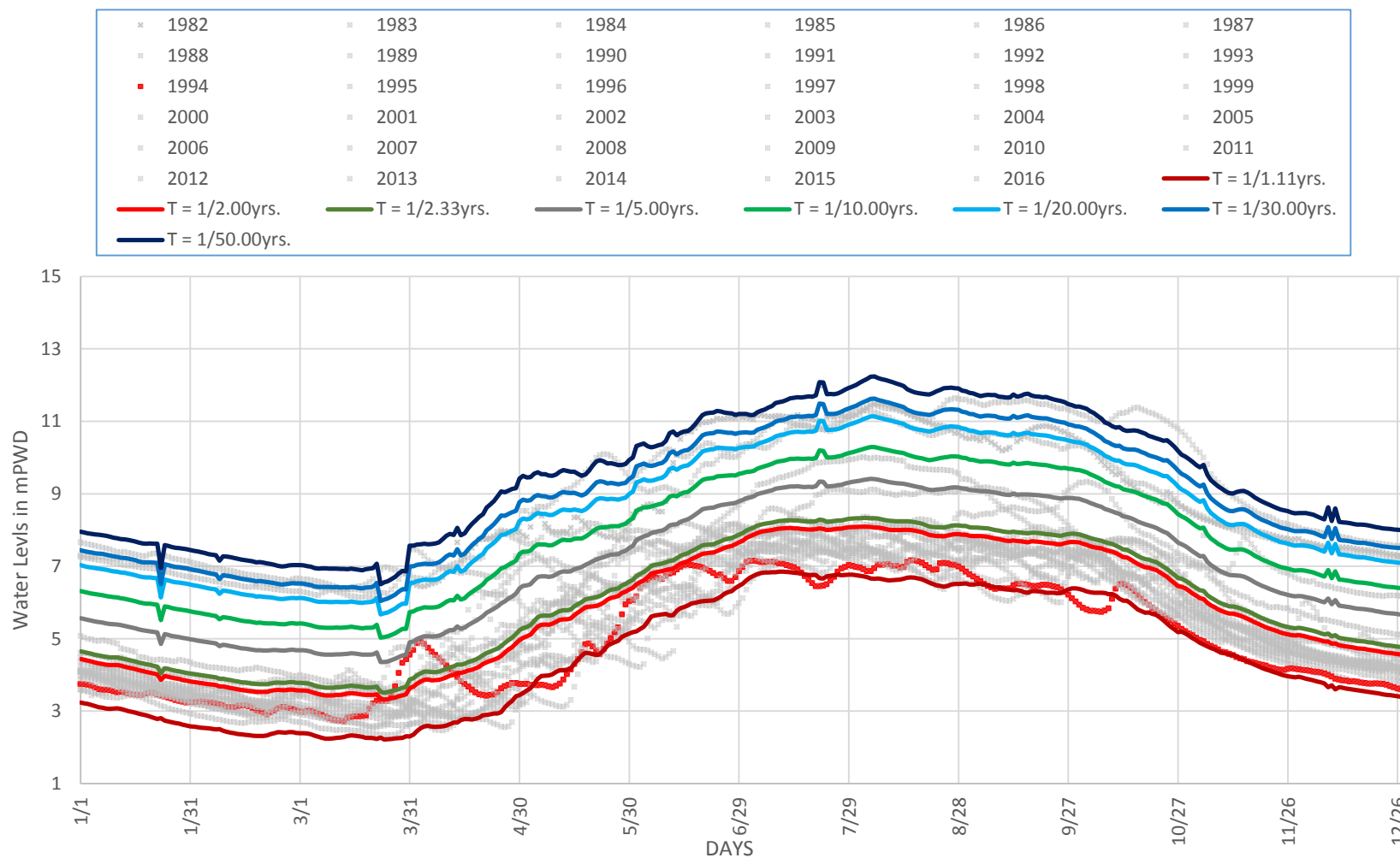
MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 311

Monthly Maximum WL (mPWD)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1982				07.96	08.52	11.15	12.00	11.49	10.87	10.47	08.44	08.53
1983	07.29	06.89	06.99	07.28	10.09	10.06	11.17	11.64	11.58	11.37	10.35	08.02
1984	07.67	07.08	06.80									
1985				08.00	08.19	10.39	11.28	11.35	10.69	10.34	08.51	07.57
1986	07.25	06.69	06.33	04.68	05.80	06.08	07.49	07.49	07.36	07.76	06.41	04.74
1987	04.11	03.57	04.13	05.01	05.58	07.14	08.02	08.36	07.86	07.81	05.81	04.54
1988	04.10	03.68	03.90	04.87	07.78	08.16	08.60	08.48	08.57	07.29	05.73	06.04
1989	04.23	03.78	03.46	04.10	06.55	07.36	08.00	08.03	07.49	07.41	06.01	04.54
1990	04.13	03.57	03.77	06.29	07.38	07.48	07.49	07.50	07.41	07.71	05.91	04.66
1991	04.08	03.46	03.00	04.17	07.37	07.70	07.57	07.38	07.68	07.73	06.25	04.64
1992	04.46	03.71	03.42	03.30	05.92	06.99	07.55	07.21	07.20	07.34	05.55	04.16
1993	04.48	03.26	03.08	04.60	06.73	08.01	08.22	07.96	07.61	07.25	05.39	04.32
1994	03.75	03.27	04.43	04.91	06.04	07.05	07.15	07.16	06.77	06.51	05.10	04.14
1995	03.59	02.91	02.70	03.03	05.12	07.58	07.95	07.75	07.45	07.44	05.71	04.71
1996	04.08	03.26	03.12	03.50	05.60	06.95	07.67	07.39	07.62	07.00	07.11	05.07
1997	04.38	03.77	03.57	04.48	05.61	07.36	08.32	08.04	08.00	07.83	05.61	05.12
1998	04.61	04.00	04.77	05.38	06.39	08.01	09.12	09.13	09.18	07.87	07.84	05.69
1999	05.07	04.30	04.00	05.18	06.42	07.41	07.88	07.73	07.70	07.03	06.10	04.61
2000	03.97	03.41	03.71	07.19	07.96	08.21	08.11	08.30	07.52	07.19	05.91	04.44
2001	03.89	03.39	03.87	04.52	06.51	07.84	07.82	08.14	08.08	07.72	05.74	04.77
2002	04.08	03.19	03.05	06.83	07.22	08.69	09.96	10.01	09.38	09.33	07.80	06.60
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
MAX	07.67	07.08	06.99	08.00	10.09	11.15	12.00	11.64	11.58	11.37	10.35	08.53
MIN	03.59	02.91	02.70	03.03	05.12	06.08	07.15	07.16	06.77	06.51	05.10	04.14
N	19	19	19	20	20	20	20	20	20	20	20	20
AVE.	04.70	04.06	04.11	05.26	06.84	07.98	08.57	08.53	08.30	08.02	06.56	05.34
σ	01.25	01.30	01.27	01.50	01.23	01.25	01.41	01.44	01.34	01.30	01.35	01.32

ANALYSED DATA:

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
T = 1/1.11yrs.	$K_{1.11}$ =	-1.10	03.32	02.63	02.71	03.61	05.48	06.60	07.01	06.93	06.82	06.59	05.07	03.89
T = 1/2.00yrs.	$K_{2.00}$ =	-0.16	04.49	03.85	03.90	05.02	06.64	07.77	08.34	08.29	08.08	07.81	06.34	05.13
T = 1/2.33yrs.	$K_{2.33}$ =	0.00	04.70	04.06	04.11	05.26	06.84	07.98	08.57	08.53	08.30	08.02	06.57	05.35
T = 1/5.00yrs.	$K_{5.00}$ =	0.72	05.59	04.99	05.02	06.34	07.73	08.88	09.58	09.56	09.27	08.95	07.54	06.30
T = 1/10.00yrs.	$K_{10.00}$ =	1.30	06.33	05.75	05.76	07.22	08.45	09.61	10.40	10.41	10.05	09.71	08.33	07.07
T = 1/20.00yrs.	$K_{20.00}$ =	1.87	07.03	06.48	06.48	08.07	09.14	10.31	11.20	11.22	10.81	10.44	09.09	07.81
T = 1/30.00yrs.	$K_{30.00}$ =	2.19	07.43	06.90	06.89	08.55	09.54	10.71	11.65	11.69	11.24	10.86	09.52	08.24
T = 1/50.00yrs.	$K_{50.00}$ =	2.59	07.94	07.42	07.40	09.16	10.03	11.22	12.22	12.27	11.78	11.39	10.07	08.77

Monthly Minimum WL (mPWD)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1982				06.44	07.73	08.43	11.02	10.54	10.19	08.50	07.73	07.26
1983	04.03	06.38	06.36	06.63	08.20	08.96	10.16	11.00	11.24	10.49	08.06	07.54
1984	07.12	06.56	06.24									
1985				06.96	07.60	08.33	10.25	10.61	10.23	08.55	07.59	07.24
1986	06.70	06.31	02.60	02.64	04.76	04.44	06.11	06.56	07.06	06.55	04.79	04.10
1987	03.53	03.12	03.01	03.21	04.58	05.42	07.11	07.68	07.26	05.93	04.57	04.12
1988	03.51	03.18	03.30	02.92	04.69	06.98	07.74	07.45	07.22	05.79	04.50	04.24
1989	03.65	03.23	02.90	02.80	04.09	06.66	06.85	07.07	07.05	06.07	04.55	04.15
1990	03.43	03.09	03.21	03.61	05.47	07.11	07.30	06.85	06.49	06.00	04.69	04.10
1991	03.45	02.99	02.78	02.92	03.60	07.38	07.23	06.65	06.91	06.43	04.55	04.10
1992	03.59	03.25	02.89	02.77	03.16	05.29	07.03	06.36	05.99	05.59	04.21	03.60
1993	03.29	02.92	02.58	02.63	04.61	05.97	07.63	07.33	06.47	05.45	04.35	03.74
1994	03.23	02.90	02.72	03.43	03.66	06.07	06.45	06.85	06.02	05.15	04.13	03.59
1995	02.92	02.67	02.34	02.45	03.12	04.22	07.31	07.07	06.35	05.35	04.74	04.07
1996	03.26	02.89	02.83	02.94	03.31	05.80	07.02	06.87	06.71	05.62	05.10	04.39
1997	03.80	03.39	03.14	03.70	04.27	05.56	07.68	07.31	07.42	05.65	04.96	04.63
1998	04.00	03.75	03.55	04.34	05.06	06.09	07.82	08.96	07.95	06.64	05.73	05.10
1999	04.35	03.98	03.46	03.67	05.33	06.03	07.52	07.22	06.89	06.19	04.65	03.99
2000	03.30	02.95	02.94	03.24	06.29	07.89	07.34	07.40	07.22	05.53	04.47	03.87
2001	03.40	03.08	02.89	02.90	04.76	06.64	07.12	07.25	07.57	05.78	04.84	04.11
2002	03.21	02.81	02.54	03.10	06.49	06.44	08.79	09.41	08.51	07.20	06.64	06.13
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
MAX	07.12	06.56	06.36	06.96	08.20	08.96	11.02	11.00	11.24	10.49	08.06	07.54
MIN	02.92	02.67	02.34	02.45	03.12	04.22	06.11	06.36	05.99	05.15	04.13	03.59
N	19	19	19	20	20	20	20	20	20	20	20	20
AVE.	03.88	03.65	03.28	03.66	05.04	06.48	07.77	07.82	07.54	06.42	05.24	04.70
σ	01.12	01.27	01.11	01.38	01.52	01.27	01.29	01.44	01.45	01.34	01.23	01.27

ANALYSED DATA:

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
T = 1/1.11yrs.	$K_{1.11}$ =	-1.10	02.65	02.26	02.05	02.15	03.36	05.08	06.35	06.23	05.94	04.95	03.88	03.30
T = 1/2.00yrs.	$K_{2.00}$ =	-0.16	03.70	03.45	03.10	03.44	04.79	06.28	07.56	07.58	07.30	06.20	05.04	04.49
T = 1/2.33yrs.	$K_{2.33}$ =	0.00	03.88	03.66	03.28	03.67	05.04	06.49	07.77	07.82	07.54	06.43	05.24	04.70
T = 1/5.00yrs.	$K_{5.00}$ =	0.72	04.69	04.57	04.08	04.65	06.14	07.40	08.70	08.86	08.58	07.38	06.13	05.62
T = 1/10.00yrs.	$K_{10.00}$ =	1.30	05.35	05.31	04.73	05.46	07.03	08.15	09.46	09.71	09.42	08.17	06.85	06.36
T = 1/20.00yrs.	$K_{20.00}$ =	1.87	05.97	06.02	05.35	06.23	07.88	08.86	10.19	10.52	10.24	08.92	07.54	07.07
T = 1/30.00yrs.	$K_{30.00}$ =	2.19	06.34	06.43	05.71	06.67	08.37	09.27	10.61	10.98	10.70	09.35	07.94	07.48
T = 1/50.00yrs.	$K_{50.00}$ =	2.59	06.79	06.94	06.16	07.23	08.99	09.79	11.13	11.56	11.29	09.89	08.44	08.00

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JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 311

HWL of Different Return period: SW 311 (NT)

MONTHLY BASIS ANALYSIS OF DATA OF WATER LEVEL GAUGE STATION SW 311

LWL of Different Return period: SW 311 (NT)

JOINT VENTURE OF SHELTECH PRIVATE LTD. & ARCBANGLADESH PRIVATE LTD.

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

Page No.

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

Ref: SCPL-ABL/UDD/2016/ Agriculture Survey Report/Ishwarganj 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 Survey Report of Ishwarganj Upazila, Mymensingh.

Dear Sir,
We are pleased to submit herewith the Final Agriculture Survey Report of Ishwarganj Upazila, Mymensingh for your kind information and further action.

Thanking you and assuring you of our best services.

Your Sincerely,

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

_____

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

Land resources of Ishwarganj Upazila have been brought into seed production and fish farms as commercial basis. It is reported that natural disasters like drought, flood, decreasing ground water, heavy rain, early rain, erosion, cold, fog and hail-storm damage crops of 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**.**

Ishwarganj Upazila falls into 02 Agro Ecological Zones: Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. Ishwarganj Upazila has 11 Unions and 1 Municipality. It has 50 agricultural blocks under DAE.
The highest percentage is double cropped area (64.13%) followed by triple cropped area (22.81%), single crop area (11.86%) and four cropped area 1.19% under Ishwarganj Upazila. The cropping intensity of Upazila Ishwarganj is 213% which is less than Mymensingh district cropping Intensity (215%) and higher than average National cropping Intensities (190%).

The scenario of existing cropping pattern within Ishwarganj Upazila predominantly Boro and T. Aman Rice, Wheat, Vegetables, Oilseeds, Spices, Betel Leaf and Orchard based. About 12 different cropping pattern are practiced by Ishwarganj upazila farmers. Ishwarganj Upazila present one main cropping pattern area is Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 70% of the Net Cultivable Area (NCA). Boro (HYV/Hybrid)→-Fallow-→Fallow which is practiced 14% of the Net Cultivable Area (NCA). Boro (HYV)→T.Aus→T. Aman (HYV)) is the cropping pattern covering about 2% of the NCA. Wheat→Jute→T. Aman (HYV) is the cropping pattern covering 2% of the net crop area. Similarly, winter vegetables→KHarif-1 vegetables→Kharif-2 summer vegetables which are practiced about 2% of the Net Cultivable Area (NCA).

The present total different cropped area is **47191** ha of which rice cropped area are **41460** ha and the rest **5731** ha is covered by non-rice crops (Jute, Wheat, Maize, Potato, W & S. vegetables, pulses, oilseeds etc.). The rice and non-rice cropped area are about 87.86% and 12.14% respectively of the total cropped area. Total crop production is **224763.1** metric tons of which rice production is **142897.95** metric tons and non-rice production is **81865.15** metric tons.

The main source of water is both surface and ground water. Different Unions and Municipality 216 DTW used for irrigation. A total 205 DTW has electricity facilities but 11 DTW were operated by diesel. Different Unions a total of 5211 STW and also 140 LLP used for irrigation under Ishwarganj Upazila. Total 2431 STW and 45 LLP has electricity facilities, whereas, 2780 STW and 95 LLP has no electricity facilities for irrigation. Electricity user's farmers reported that failed or disruption of electricity supply during Boro season were acute problems under Ishwarganj Upazila. Framers wanted nonstop electricity supply during Boro season.

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 and Potato vegetables production under Ishwarganj Upazila. Finding shows that brinjal cultivation is more profitable (Tk525000/- per ha) than tomato (Tk242000/- per ha) and potato (Tk189000/- per ha).

Local variety rice 98% was decreased during last ten years. The HYV paddy cultivation area 277% was increased. Remarkable changed were occurred in poultry farm (350%) and housing (107%) Brick field (60%) and followed by fish/shrimp culture (33%) respectively.

 Major problems to crop production in 11 Unions and 1 Municipality under Ishwarganj Upazila are

natural disaster such as heavy rain, flood, drought, and river erosion, electricity power failure during Boro crop season, Shortage of irrigation water and Ground water level declining, Post-harvest loss of tomato and potato, Top-soil cutting and decrease of agricultural land.

The following systems may be adapted in an innovated way for sustainable crop production and environmental conditions of Ishwarganj 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.

DAE may arrange joint collaborative soil testing and recommendation and training program for beneficiaries. Financial support needs to be provided to DAE from project.

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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Chapter-01:
Introduction

1.1 Background of the Study

Land is the most valuable resource among all the natural resources of a country which provides food, shelter including life saving elements to her ever increasing population. Ishwarganj Upazila having total area of 28,055 hectare is located in the Young Brahmaputra Jamuna and Old Brahmaputra Floodplain influenced by its geomorphology and dynamics. It is under Mymensingh District. Ishwarganj Upazilla consists of one Municipality and 11 Unions. Ishwarganj is located at 24.6833°N 90.6250°E. The total area of the Upazilla is 286.19 km². It borders Gaurepur Upozila to the North, Nandail to the South, Kendowa to the East and Trisal Upazila to the West. It is 147 km from Dhaka and 24 km from Mymensingh. Kancha Matia River flows through the Upazila.

It has productive plain land, agriculture, housing, rural settlement, urban built-up area, forestry, water bodies, capture and culture fisheries etc. These diversified uses of land have been giving financial benefits in one hand but on the other creating many problems in respect of criteria based uses and conflicts among the users. Most of the people of this Upazila are directly or indirectly dependent on agriculture. The lands and soils of Ishwarganj Upazila are very suitable for rice and vegetable cultivation. Land resources of this Upazila have been brought into seed production and fish farms as commercial basis. It is reported that natural disasters like drought, flood, decreasing ground water, heavy rain, early rain, erosion, cold, fog and hail-storm damage crops of this Upazila. Shifting agricultural land to non-agricultural purposes and land degradation is common phenomenon in this Upazila. 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 Ishwarganj 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 34 Sub-Assistant Agriculture Officers under 1 Municipality and 11 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 is 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 have been designed in line with this Plan and address its key objectives for the water resource management in the Ishwarganj Upazila under Mymensingh 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 Ishwarganj Upazila.

2.4   National Land Use Policy (MoL, 2001)

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 Ishwarganj Upazila under coastal 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

The land of Ishwarganj Upazila under Mymensingh district is intensively used for agriculture, housing & settlements, fisheries and other infrastructural development. Ishwarganj Upazila falls into 02 Agro Ecological Zones: Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The landscape is complex. General soil color of Ishwarganj Upazila is grey to dark grey. The top soil is occupied by non-calcareous, permeable loamy soils and some parts are clayey. In Ishwarganj organic matter contents are low in the high land, but moderate in the lower parts. Moisture holding capacity of soil is medium. General fertility is relatively low .The top soil pH level ranges from 4.5-6.9 (**SRDI 2013 and UAO 2016).**

3.2   Ishwarganj Upazila and Union Wise Farm Families

Farmers in Ishwarganj Upazila lead their livelihood from agricultural activities. It is the main source of their employment and income. Ishwarganj Upazila has 11 Unions and 1 Municipality. It has 50 agricultural blocks under DAE. Union and category wise farm family under Ishwarganj Upazila is shown in Table 1. 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). On an average about land less 13251, marginal 29213, small 24681, medium large 8901 farm families and remaining 1212 are larger farmers under Ishwarganj Upazila. The highest percentage of farm families are marginal farmers (38%) followed by Small (32.00%), landless (17%), medium farmers (11%) and remaining are larger farmers (Fig-1).

Table 1: Union and Category Wise Farm Family under Ishwarganj Upazila

Name of Union	Landless (%)	Marginal (%)	Small (%)	Medium (%)	Larger (%)	Total
	(.05-.50 acre)	(.51-1.50 acre)	(1.51-2.50acre)	(2.51-7.50 acre)	(above 7.50 acre)	
Atharabari Union	805(12.53)	1505(23.43)	3059(47.62)	1038 (16.16)	17(0.26)	6424
Barahit Union	760(10.24)	3536(47.61)	2544(34.21)	541(7.28)	46(0.62)	7427
Ishwarganj Union	987(26.36)	1652(44.13)	638(17.04)	443(11.83)	24(o.64)	3744
Jatia Union	1350 (22.08)	1630(26.65)	2045(33.44)	922(15.08)	168(2.75)	6115

Maijbagh Union	2260(24.15)	5595(59.78)	935(9.99)	520(5.55)	50(0.53)	9360
Magtola Union	1039(23.66)	2192(49.92)	895(20.38)	234(5.33)	31(0.71)	4391
Rajibpur Union	1493(18.95)	2584(32.80)	3005(38.13)	712(9.04)	85(1.08)	7879
Sarisha Union	545(9.44)	2891(50.09)	2250(38.98)	70(1.21)	16(0.28)	5772
Sohagi Union	910(11.04)	2182(26.46)	4279 (51.89)	795(9.64)	80(0.97)	8246
Tarundia Union	800(10.55)	1830(24.14)	1740(22.96)	2640 (34.83)	570(7.52)	7580
Uchakhila Union	1282(20.16)	2076(32.64)	2091(32.88)	806(12.67)	105 (1.65)	6360
Ishwarganj Paurashova	1020(25.76)	1540(38.89)	1200(30.30)	180(4.55)	20(0.50)	3960
Total	13251(17)	29213 (38)	24681(32)	8901(11)	1212 (2)	77258

Source: Sub-Assistant Agriculture Officers under Ishwarganj Upazia, DAE 2016
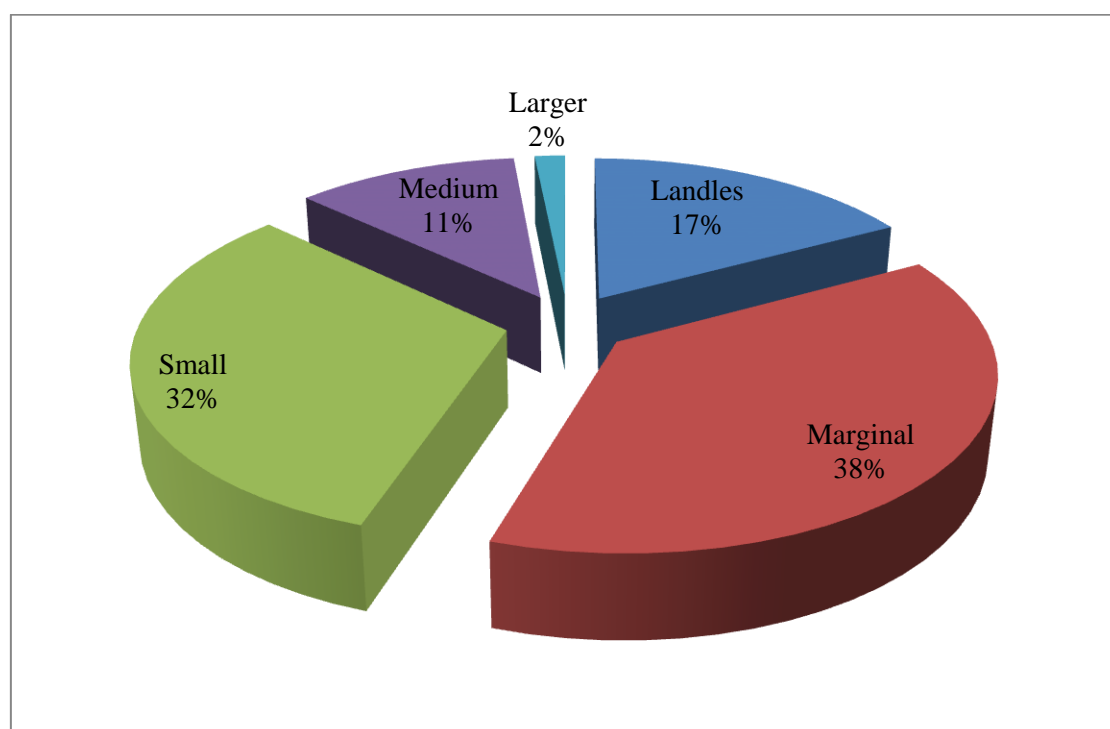
Fig.1 Percentage of category wise Farm Family under Ishwarganj Upazila
Source: SAAOs Ishwarganj Upazila, DAE 2016

3.3   Present Agricultural Land Use

3.3.1   Present Upazila Land Use

It is predicted that, the Upazila may face extreme impacts of climate change in future hampering present uses of land and livelihood of the people. The other possible impacts might be the change in hydrological condition including inundation and water logging and incidence of more natural hazards. The scenario of Ishwarganj Upazila present different land utilized is shown in **Table 2.**Types of lands are 4189 ha high land, 14328 ha medium high land, 1020 ha medium low land and 4560ha low land respectively. Ishwarganj Upazila covers 50260 ha of net cropped area of which about cultivated area is 23560 ha. The highest land area is15110 ha is used as double crop and followed by triple crop of 5375 ha and remaining 2795 ha is used as single crops and 280 ha also used as four or more crops under Ishwarganj Upazila. Other land use: forest land 100ha, Fish cultivation pond 3873.6 ha. There are two types of fallow land under Ishwarganj Upazila. These are Permanent fallow land 200 ha and Temporary fallow land 537 ha. Percentage of single, double, triple and four cropped area used in Ishwarganj Upazila is shown in **Fig 2**. The highest percentage is double cropped area (64.13%) followed by triple cropped area (22.81%), single crop area (11.86%) and four cropped area 1.19% under Ishwarganj Upazila. The cropping intensity of Upazila Ishwarganj is 213%. Union-wise Present Agriculture Land Use Information and Identified land Zoning of Ishwarganj Upazila are shown in **Table 3** and **Table 4** and **Fig 1.**

Table-2: Ishwarganj Upazila Present Land Use

Sl. No	Upazila Land use	Total Area (ha)
1.	Cultivable land	23560
2.	Single cropped area	2795
3.	Double cropped area	15110
4.	Triple cropped area	5375
5.	Four cropped area	280
6.	Total crops land	50260
7.	Cropping Intensity	213%
8.	Water land (River, Ponds and others)	3873.6
9.	Forest land	100
10.	Household area	1373.28
11.	High land	4189
12.	Medium high land	14328
13.	Medium low land	1020
14	Low land	4560
15.	Permanent fallow land	200
16.	Temporary fallow land	537
17.	Road	137.25

Source Upazila Agriculture Office   Ishwarganj, DAE 2016
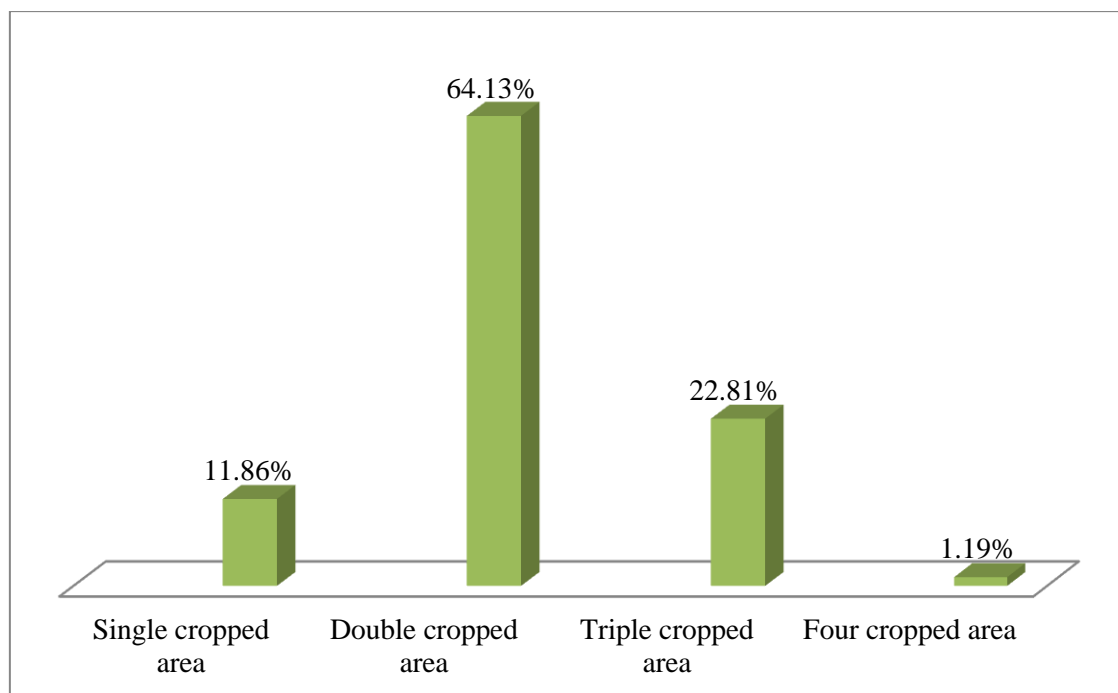
Fig.2: Percentage of single, double, triple and four cropped area under Ishwarganj Upazila

Source: Upazila Agriculture Office, Ishwarganj DAE 2016

3: Union-wise Present Agriculture Land Use Information and Identified land of adjoining Ishwarganj Upazila

Name of Union	Total Area (HA)	NCA (ha)	Land Type (%) NCA	Soil P^H	Soil Texture	Present land Use (%)	Identified Land Zoning
Atharabari Union	3817	1867	HL=56 MHL=22 MLL=16 LL =5 VLL =1	4.9-6.4	Silt loam to Silty clay loam	**Agriculture=61 Road = 1** Settlement= 36 Water bodies=2	Agriculture Zone
Barahit Union	4137	2010	HL=52 MHL=27 MLL=11 LL = 9 VLL=1	5.0-6.5	Silt loam to Silty clay loam	**Agriculture=52** Road= 1 Settlement= 41 Water bodies=6	Agro-Fisheries Zone
Ishwarganj Union	2580	1293	HL=68 MHL=30 MLL=2	4.5-6.4	Silt loam to Silty clay loam	**Agriculture=55 Road=1** Settlement=38 Water bodies=5	Agriculture Zone
Jatia Union	3647	1913	HL=74 MHL=12	4.8-6.5	Silt loam to Silty clay	**Agriculture=54 Road=1**	Agriculture Zone

Name of Union	Total Area (HA)	NCA (ha)	Land Type (%) NCA	Soil P^H	Soil Texture	Present land Use (%)	Identified Land Zoning
			MLL=2 LL=3 VLL=9		loam	Settlement=41 Water bodies=4	
Maijbagh Union	5404	2542	HL=26 MHL=64 MLL=10	4.5-6.5	Silt loam to Silty clay loam	**Agriculture=57 Road= 1** Settlement=38 Water bodies=4	Agriculture Zone
Magtola Union	3468	1695	HL=17 MHL=41 MLL=36 LL=4 VLL=2	5.0-6.5	Silt loam to Silty clay loam	**Agriculture=60 Road=1** Settlement=37 Water bodies=2	Agriculture Zone
Rajibpur Union	6316	2894	HL=70 MHL=10 MLL=10 LL=8 VLL=2	5.5-6.5	Silt loam to Silty clay loam	**Agriculture=65** Road=1 Settlement=24 Char=4 Water bodies=5	Agriculture Char land Zone
Sarisha Union	3943	1838	HL=8 MHL=49 MLL=39 L L=4	5.0-6.0	Silt loam to Silty clay loam	**Agriculture=58** Road=1 Settlement=40 Water bodies=1	Agriculture Zone
Sohagi Union	3478	1719	HL=10 MHL=75 MLL=12 LL=3	5.0-6.5	Silt loam to Silty clay loam	**Agriculture=61 Road=1** Settlement=33 Water bodies=4 Urban=1	Agriculture Zone
Tarundia Union	4504	2221	HL=18 MHL=53 MLL=18 LL=6 VLL=5	5.1-6.4	Silt loam to Silty clay loam	**Agriculture=61 Road=1** Settlement=27 Water bodies=11 Urban=1	Agro-Fisheries Zone
Uchakhila Union	4578	2282	HL=6 MHL=83 MLL=8 LL=3	5.0-6.4	Silt loam to Silty clay loam	**Agriculture=65 Forest=1** Settlement=23 Char=4 Road=1 Water bodies=6	Agriculture Zone
Ishwarganj Paurashava	1840	930	HL= 6	4.5-6.4	Silt loam to Silty clay	**Agriculture=54 Road=2**	Paurashava Area

Name of Union	Total Area (HA)	NCA (ha)	Land Type (%) NCA	Soil P^H	Soil Texture	Present land Use (%)	Identified Land Zoning
			MHL=83 MLL=8 LL=3		loam	Settlement=30 Urban area=9 Water bodies=5	

Source: Land Zoning Report December 2014 of Ishwarganj Upazila under Mymensingh

Table 4: Unions Identified Land Zoning under Ishwarganj Upazila

Name of Zone	Union	Remarks
1. Agriculture Zone	Atharabari, Ishwarganj, Jatia, Maijbagh,Magtola,Sohagi & Uchakhila	Considering the present agricultural land use, land suitability and peoples opinion these Union are recommended as agricultural Zone
2. Agro-Fisheries Zone	Barahit and Tarundia	Some area is potential for capture and culture fisheries and high production of fisheries
3. Agriculture Char Land Zone	Rajibpur	This Upazila lie on the bank of Old Brahmaputra & consist of unstable Char land
4. Paurashava Area	Ishwarganj Paurashava	Development of Paurashava area should be done without degradation of fertile agricultural land.

Source: Land Zoning Report December 2014 of Ishwarganj Upazila under Mymensingh
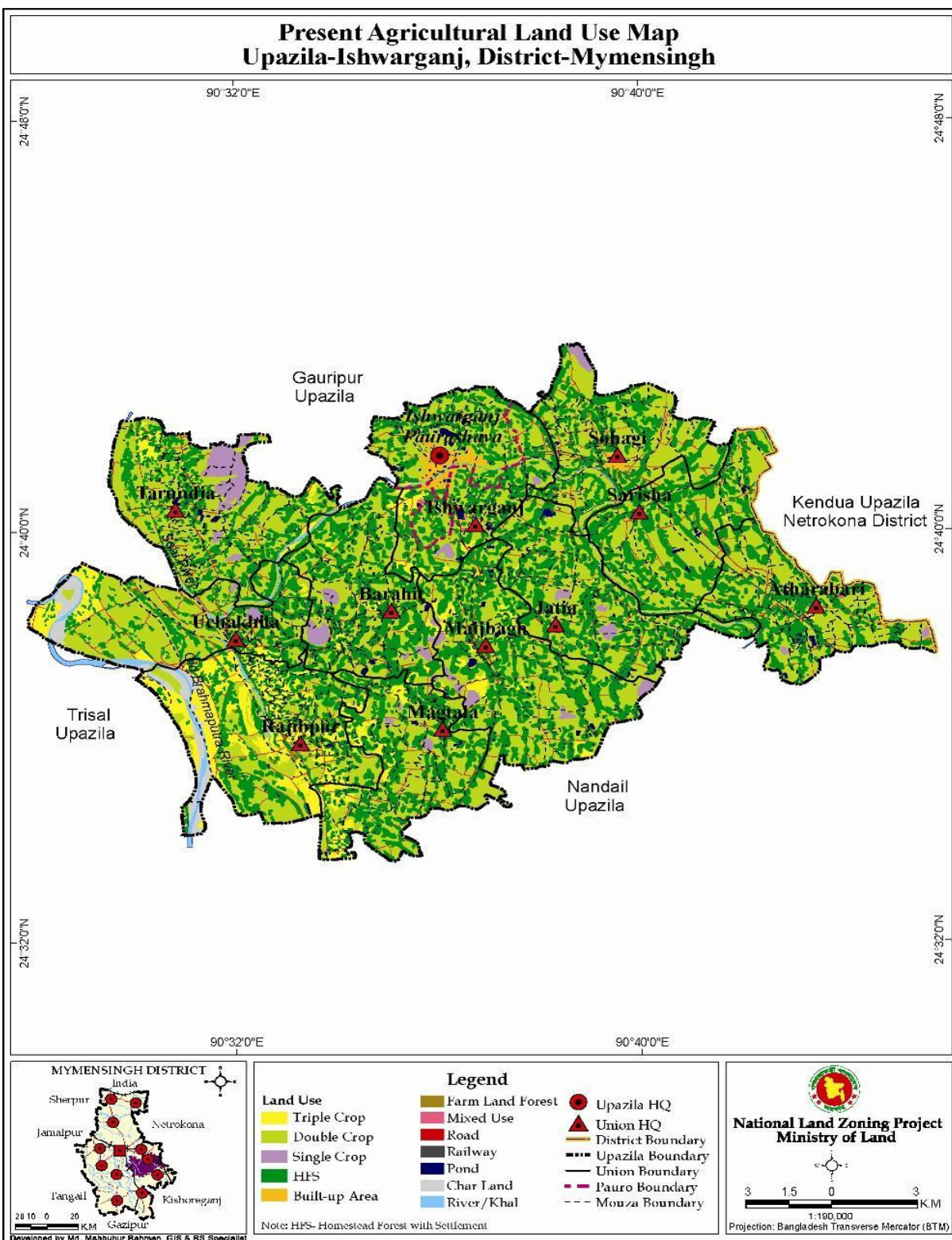
Fig 3: Agricultural Land Use Map of Ishwarganj Upazila
Source: National Land Zoning Report, December, 2014

3.4 Union-Wise Present Agriculture Land Use

Ishwarganj Upazila has 11 Unions and lands used of all the 11 unions are given below.

3.4.1   Atharabari Union Land Use

General Description

Land type is the dominant factor guiding choice of crops and cropping pattern of any area. Selection of crops or cropping patterns largely depends on the topographic position of land in relation to inundation depth and its duration. Lands which are above normal inundation level, can wide range of opportunities for growing year round crops. Atharabari Union is comprised of 32 mouzas having an area of 3817ha of land of which cultivable area is 1867 ha. The land types of this union are highland (56%), medium high land (22%), Medium low land (16%) , Low land (5%) and very low land (1%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016). This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 4.9-6.4. The agricultural potentiality of these soils is high for field crops and Agro-forestry species (**Land Zoning Report, December 2014).**

Present Agriculture Land Use: Atharabari Union dominant land use is agriculture followed by homestead garden and pond. From the agriculture point of view, this union is suitable for agriculture. Boro(HYV) is the main irrigated crops cultivated by using ground water . There are Seven cropping pattern are practiced in Atharabari Union which is shown in Table 5. The cropping intensity of this union is 204%. Major crops cultivated in this union are: paddy, Jute, potato, wheat, pulses and vegetables, tomato etc.

Table-5: Present Cropping Patterns of Atharabari **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Atharabari	1867	Boro(HYV)➔Fallow➔T.Aman(HYV)	204	81.63	1524.0
		Boro➔Fallow-----Fallow		2.68	50
		RC➔ Aus/Jute➔T.Aman(HYV)		3.75	70.0
		Mustard➔Boro➔ T.Aman		2.95	55.0
		Vegetable➔Vegetable➔Vegetable		4.28	80.0
		Vegetables➔Jute➔T.Aman(HYV)		2.30	43
		Wheat/Maize➔Fallow➔T.Aman		2.41	45
		Total		100	1867

Source: SAAOs of Atharabari Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

>Adapt modern farming techniques.

>Choose high yields and drought tolerant and cold susceptible varieties.

>Information on quality seed.

>Follow fertilizer recommendation by soil testing.

>Select best available seeds from market.

>Monitor ground water table.

>Integrated effort for water conservation and misuse of groundwater.

>Improve jute-retting facilities.

>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

>Re-excavation of canals.

>Reconstruction of damaged water management infrastructures.

>Develop market infrastructures and road communication at local level.

>Uninterrupted power supply to irrigation pumps.

>Construction of new cold storage and food godown.

>Arrange and allocate sufficient credit.

3.4.2   Barahit Union Land Use

General Description
Lands which are above normal inundation level can wide range of opportunities for growing year round crops. This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 4.9-6.4. The agricultural potentiality of these soils is high for field crops and Agro-forestry species (**Land Zoning Report, December 2014).** Barahit Union is comprised of 34 mauzas having an area of 4137ha of land of which cultivable area is 2010 ha. The land types of this union are highland (52%), medium high land (27%), Medium low land (11%) , Low land (9%) and very low land (1%)which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: There are seven cropping pattern is practiced in Barahit Union which is shown in Table 6. The cropping intensity of this union is 206%.Barahit Union dominant land use is agriculture followed by Fisheries. Boro(HYV) is the main irrigated crops cultivated by using ground water . Major crops cultivated in this union are: paddy, Jute, potato, wheat, Maize, spices and vegetables, tomato etc.

Table-6: Present Cropping Patterns of Barahit **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Barahit	2010	Boro(HYV)→Fallow→T.Aman(HYV)	206	83.48	1678
		Boro→Fallow-----Fallow		7.71	155
		Wheat/Maize→ Jute→T.Aman(HYV)		4.23	85
		Mustard→Boro→ T.Aman		0.75	15
		Vegetable→Vegetable→Vegetable		2.14	43
		Potato→Til→T.Aman(HYV)		1.19	24
		Spices→Fallow→T.Aman		0.50	10
		Total		100	2010

Source: SAAOs of Barahit Union 2016

 Major Problems of Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pests and diseases (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

> =>Adapt modern farming techniques.

> =>Choose high yields and drought tolerant and cold susceptible varieties.

> =>Information on quality seed.

> =>Follow fertilizer recommendation by soil testing.

> =>Select best available seeds from market.
> =>Monitor ground water table.

> =>Integrated effort for water conservation and misuse of groundwater.

> =>Improve jute-retting facilities.

> =>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

> =>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

> =>Re-excavation of canals.

> =>Reconstruction of damaged water management infrastructures.

> =>Develop market infrastructures and road communication at local level.

> =>Uninterrupted power supply to irrigation pumps.

> =>Construction of new cold storage and food godown.

> =>Arrange and allocate sufficient credit.

3.4.3   Ishwarganj Union Land Use

General Description

The land of Ishwarganj Union is intensively used for agriculture, housing and settlements, fisheries and other infrastructural development. This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 4.5-6.4. The agricultural potentiality of these soils is high suitable for agriculture crop production (**Land Zoning Report, December 2014).** Ishwarganj Union is comprised of 17 mauzas having an area of

2580ha of land of which cultivable area is 1293 ha. The land types of this union are highland (68%), medium high land (30%), Medium low land (2%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Pulses, Mustard and different winter & summer vegetables . The cropping intensity of this union is 199%. Boro(HYV) is the main irrigated crops cultivated by using ground water. There are seven cropping pattern are practiced in Ishwarganj Union which is shown in Table 7.

Table-7: Present Cropping Patterns of Ishwarganj **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Ishwarganj	1293	Boro(HYV)→Fallow→T.Aman(HYV)	199.53	89.95	1163
		Boro→Fallow-----Fallow		4.25	55
		Wheat/Maize→ Jute→T.Aman(HYV)		1.39	18
		Mustard→Jute→ T.Aman		1.16	15
		Vegetable→Vegetable→Vegetable		1.55	20
		Pulses→Fallow→T.Aman(HYV)		0.77	10
		Vegetables→Jute→T. Aman		0.93	12
		Total		100	1293

Source: SAAOs of Ishwarganj Union 2016

Major Problems of Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pests and diseases (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.4   Jatia Union Land Use

General Description
Land type is the dominant factor for crops and cropping pattern of any area. Lands which are above normal inundation level can wide range of opportunities for growing year round crops. Jatia Union is comprised of 27 mouzas having an area of 3647 ha of land of which cultivable area is 1913 ha. The land types of this union are highland (74%), medium high land (12%), Medium low land (2%), Low land (3%) and very low land(9%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman cultivation(SAAO,2016). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 4.8-6.5.The soil texture is Silt loam to Silty clay loam. The agricultural potentiality of these soils is high suitable for agriculture crop production (**Land Zoning Report, December 2014).**

Present Agriculture Land Use: There are five cropping pattern are practiced in Jatia Union which is shown in Table 8. Boro (HYV) is the main irrigated crops cultivated by using ground water. The cropping intensity of this union is 191%. Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Pulses, Mustard and different winter & summer vegetables.

Table-8: Present Cropping Patterns of Jatia **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Jatia	1913	Boro(HYV)→Fallow→T.Aman(HYV)	191	91.79	1755.90
		Boro→Fallow-----Fallow		2.21	42.26
		Wheat/Maize→ Jute→T.Aman(HYV)		2.11	40.29
		Vegetable→Vegetable→Vegetable		2.00	38.26
		Spices→Fallow→T.Aman(HYV)		1.90	36.29
		Total		100	1913

Source: SAAOs of Jatia Union 2016

Major Problems of Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pests and diseases (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.5 Maijbagh Union Land Use

General Description
Most of the people of this Union are directly and indirectly dependent on agriculture. It is reported that natural disasters like drought, flood, decreasing ground water, heavy rain, early rain, cold, fog and hail-storm damage crops of this union. Shifting agricultural land to non-agricultural purposes and land degradation is common phenomenon in this Union. Maijbagh Union is comprised of 21 mauzas having an area of 5404ha of land of which cultivable area is 2542 ha. The land types of this union are highland (25%), medium high land (64%), Medium low land (10%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016). This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 4.5-6.5. The agricultural potentiality of these soils is high for field crops, vegetables and fruits production (**Land Zoning Report, December 2014).**

Present Agriculture Land Use: There are eight cropping pattern is practiced in Maijbagh Union which is shown in Table 9. From the agriculture point of view, this union is suitable for agriculture. Boro (HYV) is the main irrigated crops cultivated by using ground water. The cropping intensity of this union is 212%. Major crops cultivated in this union are: paddy, Jute, potato, wheat, Maize, Pulses, Mustard, Spices and vegetables etc.

Table-9: Present Cropping Patterns of Maijbagh Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Maijbagh	2542	Boro(HYV)→Fallow→T.Aman(HYV)	212	67.40	1538
		Boro→Fallow-----Fallow		7.06	161
		Wheat/Maize→ Jute→T.Aman(HYV)		7.67	175
		Mustard→Boro→ T.Aman		6.79	155
		Vegetable→Vegetable→Vegetable		2.72	62
		S. potato→Fallow→T.Aman(HYV)		3.51	80
		Pulses→Fallow→T.Aman (HYV)		1.97	45
		Spices→Fallow----T.Aman		2.89	66
		Total		100	22542

Source: SAAOs of Maijbagh Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

       =>Adapt modern farming techniques.

       =>Choose high yields and drought tolerant and cold susceptible varieties.

       =>Information on quality seed.

       =>Follow fertilizer recommendation by soil testing.

       =>Select best available seeds from market.

       =>Monitor ground water table.

       =>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.6   Magtola Union Land Use

General Description

Shifting agricultural land to non-agricultural purposes and land degradation is common phenomenon in this Union. This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 5.0-6.5. The agricultural potentiality of these soils is high for field crops, vegetables and fruits production (**Land Zoning Report, December 2014).** Maijbagh Union is comprised of 25 mouzas having an area of 3468ha of land of which cultivable area is 1695 ha. The land types of this union are highland (17%), medium high land (41%), Medium low land (36%),Low land (4%) and very low land(2%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: Boro (HYV) is the principal irrigated crops cultivated by using ground water. There are five cropping pattern are practiced in Magtola Union which is shown in Table 10. The cropping intensity of this union is 80.57%. Major crops cultivated in this union are: paddy, Jute, , wheat, Maize, Pulses, potato and vegetables etc.

Table-10: Present Cropping Patterns of Magtola Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Magtola	1695	Boro(HYV)→Fallow→T.Aman(HYV)	205	69.97	1277
		Boro→Fallow-----Fallow		9.97	182
		Wheat/Maize→ Jute→T.Aman(HYV)		5.10	93
		Vegetable→Vegetable→Vegetable		9.97	182
		Pulses→Fallow→T.Aman (HYV)		4.99	91
		Total		100	1695

Source: SAAOs of Magtola Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.7   Rajibpur Union Land Use

General Description
Majority farmers depend on agriculture. This union lies under Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 5.5-6.5. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).** Lands which are above normal inundation level can wide range of opportunities for growing year round crops. Rajibpur Union is comprised of 41 mauzas having an area of 6316ha of land of which cultivable area is 2894 ha. The land types of this union are highland (70%), medium high land (10%), Medium low land (10%),Low land (8%) and very low land(2%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: Rajibpur Union dominant land use is agriculture followed by homestead garden and vegetables production.There are six cropping pattern are practiced in Rajibpur Union which is shown in Table 11. The cropping intensity of this union is 218%. Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Pulses, potato and vegetables etc.

Table-11: Present Cropping Patterns of Rajibpur **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Rajibpur	2894	Boro(HYV)➔Fallow➔T.Aman(HYV)	218	56.25	1628
		Boro➔Fallow-----Fallow		12.34	357
		Mustard➔Boro(HYV)➔T.Aman		6.29	182
		Wheat/Maize➔ Jute➔T.Aman(HYV)		6.22	180
		Vegetable➔Vegetable➔Vegetable		14.93	432
		Spices➔Fallow➔T.Aman (HYV)		3.97	115
		Total		100	2894

Source: SAAOs of Rajibpur Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.8 Sarisha Union Land Use

General Description

This union lies under Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 5.0-6.0. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).**

Sarisha Union is comprised of 13 mauzas having an area of3943 ha of land of which cultivable area is 1838 ha. The land types of this union are highland (8%), medium high land (49%), Medium low land (39%), and Low land (4%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016). **Present Agriculture Land Use:** Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Sweet potato and vegetables etc. The cropping intensity of this union is 214%. Boro (HYV) is the principal irrigated crops cultivated by using ground water. There are six cropping pattern are practiced in Sarisha Union which is shown in Table 12.

Table-12: Present Cropping Patterns of Sarisha **Union**

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Sarisha	1838	Boro(HYV)→Fallow→T.Aman(HYV)	214	83.51	1535
		Boro→Fallow-----Fallow		7.34	135
		S. potato→Jute→T.Aman		2.45	45
		Wheat/Maize→ Jute→T.Aman(HYV)		3.16	58
		Vegetable→Vegetable→Vegetable		3.26	60
		Vegetables→Fallow→T. Aman		0.27	5
		Total		100	1838

Source: SAAOs of Sarisha Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3.4.9   Sohagi Union Land Use

General Description

The land of this Union used for agriculture, settlements, fisheries and other infrastructure activities. Farmers in Sohagi Union lead their livelihood from agricultural activities. It is the main source of their employment and income. Sohagi Union is comprised of 22 mauzas having an area of3478 ha of land of which cultivable area is 1719 ha. Lands which are above normal inundation level can wide range of opportunities for growing year round crops. The land types of this union are highland (10%), medium high land (75%), Medium low land (12%), and Low land (3%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016). This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil P^H is 5.0-6.5. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).**

Present Agriculture Land Use: The cropping intensity of this union is 202%. Boro (HYV) is the principal irrigated crops cultivated by using ground water. There are seven cropping pattern are practiced in Sohagi Union which is shown in Table 13. Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Mustard, Pulses and vegetables etc.

Table-13: Present Cropping Patterns of Sohagi Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Sohagi	1719	Boro(HYV)→Fallow→T.Aman(HYV)	202	80.63	1386
		Boro→Fallow-----Fallow		4.94	85
		Vegetable→Vegetable→Vegetable		1.57	27
		Mustard→Boro (HYV)→T. Aman		1.16	20
		Wheat/Maize→ Jute→T.Aman(HYV)		0.99	17
		Pulses→Fallow→T.Aman		0.81	14
		Spices→Fallow→T. Aman		9.89	170
		Total		100	1719

Source: SAAOs of Sohagi Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3. 4.10 Tarundia Union Land Use

General Description
This union gets high potential for its land and agricultural production. This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil texture is Silt loam to Silty clay loam. The soil P^H is 5.1-6.4. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).**

Tarundia Union is comprised of 29 mauzas having an area of4504 ha of land of which cultivable area is 2221 ha. The land types of this union are highland (18%), medium high land (53%), Medium low land (18%), Low land (6%)and very low land (5%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: This Union dominant land use is agriculture followed by fish production. Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Mustard, Pulses, Spices, potato and vegetables etc. Boro (HYV) is the principal irrigated crops cultivated by using ground water. There are eight cropping pattern are practiced in Tarundia Union which is shown in Table 14. The cropping intensity of this union is 202%.

Table-14: Present Cropping Patterns of Tarundia Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Tarundia	2221	Boro(HYV)→Fallow→T.Aman(HYV)	202	91.04	2022
		Boro→Fallow-----Fallow		0.90	20
		Vegetable→Vegetable→Vegetable		2.93	65
		Mustard→Boro (HYV)→T. Aman		0.54	12
		Wheat/Maize→ Jute→T.Aman(HYV)		3.60	80
		Potato→Til→Fallow		0.50	11
		Pulses→Fallow→T.Aman		0.18	4
		Spices→Fallow→T. Aman		0.32	7
		Total		100	2221

Source: SAAOs of Tarundia Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3. 4.11 Uchakhila Union Land Use

General Description
Cultivation of crops and cropping patterns depends on the topographic position of land & seasonal inundation time. The land of this Union is potential for multiple crops cultivation. This union is lies under Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9). Most of the areas of this Upazila are developed from transformed alluvial deposit by the Brahmaputra and Jamuna rivers. The soil texture is Silt loam to Silty clay loam. The soil P^H is 5.0-6.4. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).** Uchakhila Union is comprised of 22 mauzas having an area of 4578 ha of land of which cultivable area is 2282 ha. The land types of this union are highland (6%), medium high land (83%), Medium low land (8%), and Low land (3%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016).

Present Agriculture Land Use: Uchakhila Union dominant land use is agriculture followed by vegetables and fruit crops production. There are nine cropping pattern are practiced in Uchakhila Union which is shown in Table 15. The cropping intensity of this union is 200%.

 Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Mustard, Pulses, Spices, potato and vegetables etc. Boro (HYV) is the main irrigated crops cultivated by using ground water.

Table-15: Present Cropping Patterns of Uchakhila Union

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Uchakhila	2282	Boro(HYV)→Fallow→T.Aman (HYV)	200	75.37	1720
		Boro→Fallow-----Fallow		1.31	30
		Vegetable→Vegetable→Vegetable		2.19	50
		Mustard→Boro (HYV)→T. Aman		1.75	40
		Wheat→ Jute→T.Aman(HYV)		0.88	20
		Boro(HYV)→Fallow→Vegetables		8.76	200
		Vegetables→Fallow→T.Aman		7.32	167
		Pulses→Fallow----- Aman		1.75	40
		Spices→Fallow→T. Aman		0.66	15
		Total		100	2282

Source: SAAOs of Uchakhila Union 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

       =>Adapt modern farming techniques.

       =>Choose high yields and drought tolerant and cold susceptible varieties.

       =>Information on quality seed.

       =>Follow fertilizer recommendation by soil testing.

       =>Select best available seeds from market.

       =>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

3. 4. 12 Ishwarganj Paurashava Land Use

General Description

The land of Ishwarganj Paurashava is intensively used for agriculture, housing, market, fisheries and brickfield and other infrastructural development. There are manmade hazards on land resources and bio-diversity of the Municipality area. Ishwarganj Paurashava is comprised of 9 wards and 13 Paura Mahalla having an area of 1840 ha of land of which cultivable area is 930 ha. The land types of this union are highland (6%), medium high land (83%), Medium low land (8%), and Low land (3%) which indicates lands are free from monsoon flood and suitable for different crops and T. Aman Cultivation(SAAO,2016). This union is covered by Young Brahmaputra and Jamuna Floodplain (AEZ-8).and Old Brahmaputra Floodplain (AEZ-9).
The soil texture is Silt loam to Silty clay loam. The soil P^H is 4. 5.0-6.4. The agricultural potentiality of these soils is high for field crops, Wheat, Maize, Mustard, vegetables and spices production (**Land Zoning Report, December 2014).**

Present Agriculture Land Use: Ishwarganj Paurashava dominant land use is agriculture followed by vegetables and fruit crops production. There are nine cropping pattern are practiced in Ishwarganj Paurashava which is shown in Table 16. The cropping intensity of this Ishwarganj Paurashava is 198%. Major crops cultivated in this union are: paddy, Jute, wheat, Maize, Mustard, Pulses, Spices, potato and vegetables etc.

Table-16: Present Cropping Patterns of Ishwarganj Paurashava

Name of Union	Net Cultivable Area (ha)	Major Cropping Patterns	Cropping Intensity (%)	% of NCA	Area(ha)
Ishwarganj Paurashava	930	Boro (HYV)→Fallow→T. Aman(HYV)	198	80.65	750
		Boro→Fallow-----Fallow		10.75	100
		Vegetable→Vegetable→Vegetable		0.54	5
		Mustard→Boro (HYV)→T. Aman		1.08	10
		Wheat/Maize→ Jute→T.Aman(HYV)		0.75	7
		Boro(HYV)→Fallow→T.Aman(HYV)		5.38	50
		Vegetables→ Jute→T. Aman(HYV)		0.86	8
		Total		100	930

Source: SAAOs of Ishwarganj Paurashava 2016

Major Problems and Impacts on Crop Cultivation

The major problems here in crop cultivation are as follows: (i) Drought(ii) River erosion (iii) Changes in rainfall pattern (iv) Silted river and canals (v) Lack of improved varieties and quality crop seeds (vi) Pest and disease (vii) Electricity power failure (viii) Shortage of irrigation (ix) Ground water level declining (x) Water logging,(xi) kutcha drainage system(xi) Lack of Cold storage for vegetables (xii) Agriculture labor crisis and high wage rate (xiii) decreasing fruit setting (xiv) Shortage of mechanical tools and equipment (xv) Post-harvest loss of tomato and potato (xvi) Top-soil cutting (xvii) Decrease of agricultural land.

Recommendations

The remedial measures are given below:

=>Adapt modern farming techniques.

=>Choose high yields and drought tolerant and cold susceptible varieties.

=>Information on quality seed.

=>Follow fertilizer recommendation by soil testing.

=>Select best available seeds from market.

=>Monitor ground water table.

=>Integrated effort for water conservation and misuse of groundwater.

=>Improve jute-retting facilities.

=>Incorporate organic manure in the soil by changing cropping pattern /crop rotation system.

=>Grow one leguminous crop (Dhaincha / Pulses/Fodder etc.) between two cereal crops.

=>Re-excavation of canals.

=>Reconstruction of damaged water management infrastructures.

=>Develop market infrastructures and road communication at local level.

=>Uninterrupted power supply to irrigation pumps.

=>Construction of new cold storage and food godown.

=>Arrange and allocate sufficient credit.

All Unions (11) and Municipality (1) percentage of present single, double and triple cultivated cropped areas are shown in Figure 2.
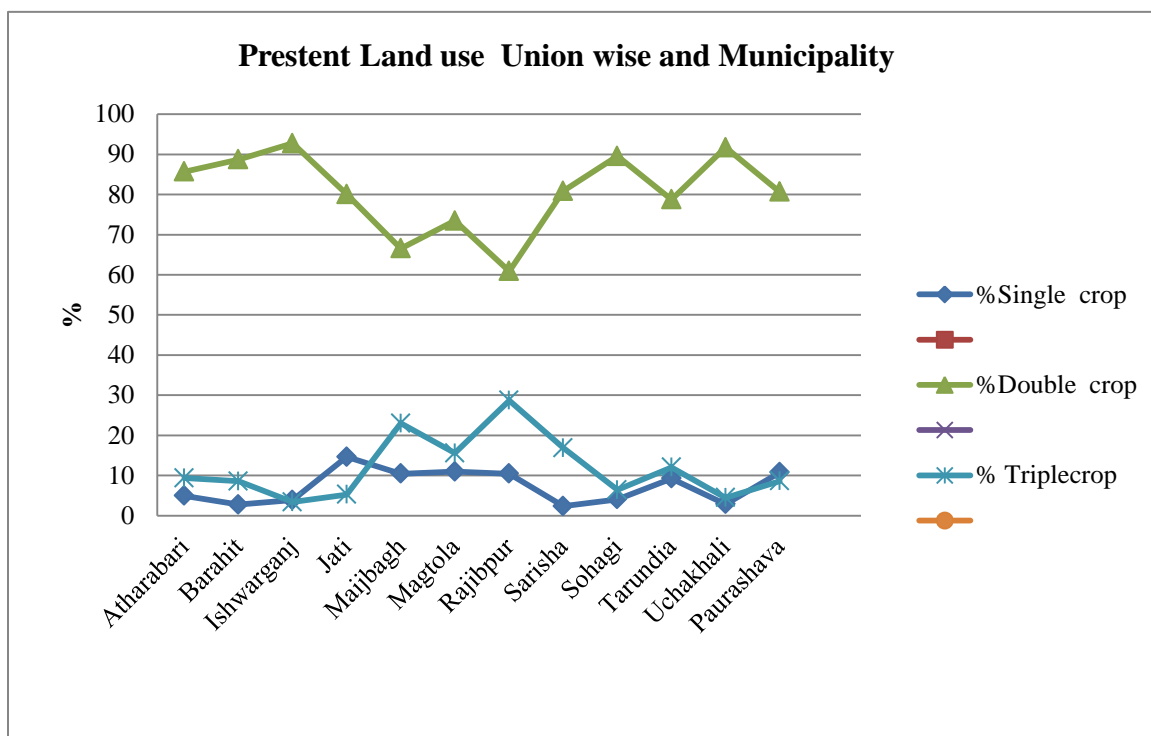
Figure 4 Unions & Municipality present lands used % of single, double & triple crop area
Source: SAAOs Ishwarganj Upazila, DAE 2016

The **Atharabari, Barahit, Ishwarganj and Jatia Unions** present land use under Ishwarganj Upazila obtained from the field survey is shown in Table 17. The **Atharabari** Union covers cultivated cropped area 3817ha of which about net cropped area 1867 ha. The highest percentage is double cropped area (86%) and followed by triple (9%) and single cropped area (5%) under **Atharabari,** Union. Similarly, the **Barahit** Union covers a net cropped area2010 ha of which about cultivated area 4137 ha. The highest percentage is double cropped area (89%) and followed by triple cropped area (8%) and single crop area (3%) under **Barahit** Union. Further, the **Ishwarganj** Union covers a net cropped area 1293 ha of which about cultivated area 2580 ha. The highest percentage is double cropped area (93%) and followed by single cropped area (4%) and triple cropped area (12%) under **Ishwarganj** Union. **Jatia** Union covers a net cropped area 1913 ha of which about cultivated area 3647 ha. The highest percentage is double cropped area (80%) and followed by single cropped area (15%) and triple cropped area (5%) under **Jatia** Union **(Concern Union SAAOs, DAE 2016).**

Table-17: Present Land Use under Atharabari, Barahit, Ishwarganj and Jatia Unions

Sl. No.	Types of Land use	Present land used in ha (%)			
		Atharabari,	Barahit,	Ishwarganj	Jatia
1	Cultivated area	3817	4137	2580	3647
2	Single cropped area	92 (4.93)	55(2.73)	50(3.87)	280(14.64)
3	Double cropped area	1600(85.70)	1783(88.71	1199(92.73)	1532(80.08)
4	Triple Cropped area	175 (9.37)	172(8.56)	44(3.40)	101(5.28)
5	Net cropped area	1867	2010	1293	1913
	Cropping Intensity (%)	204	206	199	191

Source: Concern 4 Union SAAOs, DAE 2016.

The Maijbagh, Magtola, Rajibpur, and Sarisha unions present land use obtained from the field survey is shown in Table 18. Maijbagh Union covers a net cropped area 2542 ha of which about cultivated area 5404 ha. The highest percentage is double cropped area (66%) and followed by triple cropped area (23%) and single cropped area (11%) under Maijbagh Union. Similarly, Magtola Union covers a net cropped area 1695 ha of which about cultivated area 3468 ha. The highest percentage is double cropped area (73%) and followed by triple cropped area (15%) and single cropped area (11%) under Magtola Union. Further, Rajibpur Union covers a net cropped area 2894 ha of which about cultivated area 6316 ha. The highest percentage is double cropped area (61%) and followed by triple cropped area (29%) and single crop area (10%) under Rajibpur Union. Finally, Sarisha Union covers a net cropped area 1838 ha of which about cultivated area 1838 ha. The highest percentage is double cropped area (81%) and followed by triple cropped area (17%) and single crop area (2%) under Sarisha Union **(Concern Union SAAOs, DAE 2016).**

Table-18: Present Land Use under Maijbagh, Magtola, Rajibpur, and Sarisha Unions

Sl. No.	Types of Land use	Present land used in ha (%)			
		Maijbagh	Magtola,	Rajibpur,	Sarisha
1	Cultivated area	5404	3468	6316	3943
2	Single cropped area	265(10.43)	186(10.97)	302(10.44)	43(2.34)
3	Double cropped area	1692(66.56)	1245(73.45)	1762(60.88)	1485(80.79)
4	Triple Cropped area	585(23.01)	264 (15.58)	830(28.68)	310(16.87)
5	Net cropped area	2542	1695	2894	1838
	Cropping Intensity (%)	212	204	218	214

Source: Concern 4 Union SAAOs, DAE 2016.

The Sohagi, Tarundia, Uchakhali Unions and Ishwarganj paurshava present land use obtained from the field survey is shown in Table 19. Sohagi Union covers a net cropped area 1719 ha of which about cultivated area 3478 ha. The highest percentage is double cropped area (90%) and followed by triple cropped area (6%) and single crop area (4%) under Sohagi Union. Tarundia Union covers a net cropped area 2221 ha of which about cultivated area 4504 ha. The highest percentage is double cropped area (79%) and followed by triple crop area (12%) and single cropped area (9%) under Tarundia Union. Uchakhali Union covers a net cropped area 2282 ha of which about cultivated area 4578 ha. The highest percentage is double cropped area (92%) and followed by triple cropped area (4%) and single crop area (4%) under Uchakhali Union. Ishwarganj paurshava covers a net cropped area 930 ha of which about cultivated area 930 ha. The highest percentage is double cropped area (81%) and followed by single cropped area (11%) and triple cropped area (8%) under Ishwarganj paurshava (**Concern Union SAAOs, DAE 2016).**

Table-19: Present Land Use under Sohagi, Tarundia, Uchakhali Unions and Ishwarganj paurshava

Sl. No.	Types of Land use	Present land used in ha (%)			
		Sohagi	**Tarundia**	**Uchakhali**	**Ishwarganj paurshava**
1	Cultivated area	3478	4504	4578	1840
2	Single cropped area	70(4.07)	205(9.23)	88(3.85)	100(10.75)
3	Double cropped area	1539(89.53)	1749(78.75)	2092(91.68)	750 (80.65)
4	Triple Cropped area	110(6.40)	267(12.02	102(4.47)	240 (8.60)
5	Net cropped area	1719	2221	2282	930
	Cropping Intensity (%)	202	202	200	198

Source: Concern 4 Union SAAOs, 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 pattern of any area. Selection of crops or cropping patterns largely depends on the topographic position of land in relation to inundation depth and its duration. Lands which are above normal inundation level, can wide range of opportunities for growing year round crops. 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 scenario of existing cropping pattern within Ishwarganj Upazila predominantly Boro and T. Aman Rice, Wheat, Vegetables, Oilseeds, Spices, Betel Leaf and Orchard based. Detailed Upazila cropping patterns by season are presented in Table 20. Study finding shows that 12 different cropping pattern are practiced by Ishwarganj upazila farmers. Ishwarganj Upazila present one main cropping pattern area is Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 70% of the Net Cultivable Area (NCA). Boro(HYV/Hybrid)→-Fallow-→Fallow which is practiced 14% of the Net Cultivable Area (NCA). Boro (HYV)→T.Aus→T. Aman (HYV)) is the cropping pattern covering about 2% of the NCA.

Wheat→Jute→T. Aman (HYV) is the cropping pattern covering 2% of the net crop area. Similarly, winter vegetables→KHarif-1 vegetables→Kharif-2 summer vegetables which are practiced about 2% of the Net Cultivable Area (NCA). Mustard→Jute→T. Aman (HYV/LV) is covering about1 % of the NCA. Mustard →T.Aus→T. Aman (HYV)) is the cropping pattern covering about 1% of the NCA.

Potato/Sweet potato→Jute→ T. Aman (HYV) is practiced about 2% of the Net Cultivable Area. Vegetables→Fallow→T. Aman (HYV) is practiced about 2% Net Cultivable Area **(Table 20).** This finding clearly indicated that HYV/Hybrid rice and high value vegetables cropped area and multiples crops cultivation switchover gradually increased in this Upazila.

Table-20: Present Cropping pattern under Ishwarganj Upazila

Major Cropping Pattern			Area (ha)	Contribution %
Rabi	**Kharif-1**	**Khari-2**		
Boro (HYV/Hybrid)	Fallow	T. Aman (HYV)	16800	70
Boro (HYV/Hybrid)	Fallow	Fallow	3600	15
Boro(HYV/Hybrid)	T.Aus	T. Aman (HYV/LV)	480	2
Wheat	Jute	T.Aman (HYV/LIV)	240	1
Wheat	T. Aus	T. Aman (HYV/LV)	480	2
Potato/Sweet Potato	Jute	T. Aman (HYV/LV)	480	2
Potato	T.Aus	T. Aman (HYV/LV)	480	2
Mustard	Jute	T. Aman (HYV/LV)	240	1
Mustard	T. Aus	T. Aman (LV)	240	1
Vegetables	Vegetables	Vegetables	480	2
Vegetables + Boro	Fallow	Fallow	240	1
Vegetables	Fallow	T. Aman (HYV/LV)	480	2
Total			**24240**	100

Source: SAAOs and UAO Ishwarganj 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.

Different cropping pattern are practiced in Ishwarganj Upazila. Union wise (11 Unions) and Paurashava present cropping intensity is shown in Figure-5. The average cropping intensity under Ishwarganj Upazila is 213% which is less than cropping intensity of Unions of Rajibpur (218%) & Sarisha (214%) respectively. Further, Fig 5 shows that Ishwarganj Upazila cropping intensity which is higher than other 9 Unions and Paurashava cropping intensities **(Fig.5).** There is an ample scope of increasing double and triple cropped areas under each Union and Paurashava after development irrigation facilities, ensure availability of quality crop production inputs and market infrastructure through intervention of Urban Development project. The average cropping intensity under Ishwarganj Upazila is 213% which is less than Mymensingh district (215%) and higher than national average cropping intensity (190%) (Krishi Diary 2016).

Fig 5 Union wise % of Cropping Intensities
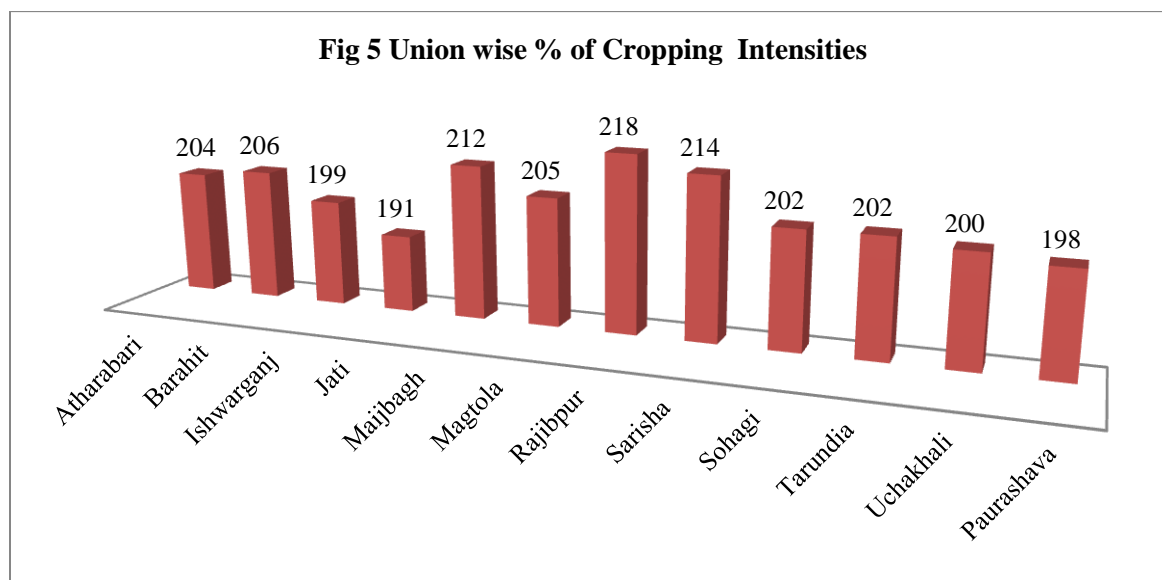
Source: SAAOs of 11 Unions and 1 Municipality under Ishwarganj Upazila, DAE 2016

4.3 Present Cropped Area

Rice, Wheat, Maize Jute, winter and summer vegetables, potato, mustard, groundnut and pulses etc crops are grown in 11 Unions and 1 Municipality under Ishwarganj Upazila. Ishwarganj Upazila present scenario of different cropped area, yield rate and production levels are shown in Table 21. The present total different cropped area is **47191** ha of which rice cropped area are **41460** ha and the rest **5731** ha is covered by non-rice crops (Jute, Wheat, Maize, Potato, W & S. vegetables, pulses, oilseeds etc.). The rice and non-rice cropped area are about 87.86% and 12.14% 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

HYV/Hybrid rice or others crops gives higher yield in compared to local variety crops. Total crop production is **224763.1** metric tons of which rice production is **142897.95** metric tons and non-rice production is **81865.15** metric tons **(Table-21).** Among the rice crops the contributions of T. Aman (LV), T. Aman (HYV) and Boro (HYV & Hybrid) are about less than1%, 35%, & 64% respectively. The highest contribution among the non-rice crops are summer vegetables (28%) & winter vegetables (37%) followed by Jute (24%) and Potato (8%) respectively **(Table-21).**

Table-21: Present Cultivated Area, Yield and Production under Ishwarganj

Crop Grown	Crop area(ha)	Yield/ha (mt)	Production (mt)	Contribution (%)
T. Aman(LV)	650	1.6	1040	0.73
T. Aman(HYV)	19200	2.57	49344	34.53
T.Aus (HYV)	500	2.67	1335	0.93
Boro (LV)	5	2.15	10.75	0.01
Boro (HYV)	19405	4.24	82277.2	57.58
Boro (Hybrid)	1700	5.23	8891	6.22
Sub Total Rice	41460		142897.95	100
S. Vegetables	1100	21.1	23210	28.35
W. vegetables	1320	22.9	30228	36.92
Jute	1955	10.25	20038.75	24.48
Potato	320	19.34	6188.8	7.56
Maize	5	7	35	0.04
Wheat	280	2.58	722.4	0.88
Sweet Potato	25	16.5	412.5	0.50
Oil seeds (Mustard, Til, Groundnut	266	1.55	412.3	0.50
Pulses	455	1.28	582.4	0.71
Maize	5	7	35	0.04
Sub-Total	5731		81865.15	100
Total	47191		224763.1	

Source: UAO Ishwarganj, 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 Rabi crops 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) and Low Lift Pump (LLP) are used. Union wise DTW, STW and LLP under Ishwarganj Upazila is shown in Table 22. Different Unions and Municipality 216 DTW used for irrigation.

A total 205 DTW has electricity facilities but 11 DTW were operated by diesel. Different Unions a total of 5211 STW and also 140 LLP used for irrigation under Ishwarganj Upazila. Table 22 Field data shows that 2431 STW and 45 LLP has electricity facilities, whereas, 2780 STW and 95 LLP has no electricity facilities for irrigation. Electricity user's farmers reported that failed or disruption of electricity supply during Boro season were acute problems under Ishwarganj Upazila. Framers wanted

nonstop electricity supply during Boro season. Majority of the Farmers (98%) reported   irrigation drainage system is not pucca which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Table 22 Union Wise Irrigation Machine under Ishwarganj Upazila

Name of Union	DTW		STW		LLP		Remarks
	Electricity	Diesel	Electricity	Diesel	Electricity	Diesel	% kutcha drain
Atharabari Union	2	0	120	460	0	0	98
Barahit Union	29	0	118	79	0	17	97
Ishwarganj Union	11	0	293	33	0	8	95
Jatia Union	37	2	51	115	0	12	100
Maijbagh Union	36	2	390	315	35	0	95
Mogtola Union	18	4	132	115	0	50	100
Rajibpur Union	16	0	170	605	0	0	98
Sarisha Union	0	0	170	444	0	0	100
Sohagi Union	0	0	225	260	0	0	100
Tarundia Union	30	3	137	84	0	0	100
Uchakhila Union	23	0	525	225	10	8	97
Ishwarganj Paurashova	3	0	100	45	0	0	90*
Total	**205**	**11**	**2431**	**2780**	**45**	**95**	

Source : SAAOs under Ishwarganj Upazila, DAE 2016

For crop cultivation ground water conservation and utilization in Ishwarganj 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 and also area cover under LLP and STW under Ishwarganj Upazila are shown in Table 23. In rabi season maximum (86-100%) cultivated area are covered by irrigation water under different Unions (**Table 23).** 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 23: Status of Union wise Irrigation and Ground& Surface Water Used Area under Ishwarganj Upazila

Union	Irrigated Area (%)	Irrigated Area (%)	Ground				Surface		Char Land	Remarks
			DTW		STW		LLP			
			No	Area (%)	No	Area (%)	No	Area (%)		
Atharabari	100	-	-	-	639	100	-	-	-	
Barahit	88	12	25	55	245	38	40	7	-	
Ishwarganj	95	5	15	6	317	92	9	2	-	
Jatia	90	10	39	25	75	60	25	15	√	
Maijbagh	93	7	39	4	331	84	46	12	-	
Mogtola	93	7	45	12	211	85	22	3	-	Rain fed crops need Supplemental Irrigation
Rajibpur	95	5	20	8	535	89	15	3	√	
Sarisha	86	14	-	-	320	100	-	-	-	
Sohagi	98	2	-	-	325	100	-	-	-	
Tarundia	97	3	47	4	155	82	57	14	√	
Uchakhila	100	-	21	4	641	90	29	6	√	
Ishwarganj Paurashava	92	8	4	7	232	83	8	10	-	

Source: National Land Zoning Project Report January 2014

4.6   Cultivation Practices

All the Unions are dominated by agriculture crops are: Boro HYV/Hybrid variety of rice, Transplanted Aus and Transplanted Aman rice, potato, Jute, Wheat, Maize and different kinds of winter and summer vegetables, spices which are cultivated under both rain fed and irrigation condition. Farmers are cultivated different vegetables such as Brinjal, Potato, and Cabbage etc. All the SAAOs and UAO reported that about 98-100% farmers used power tiller and tractor during land preparation. Boro, T.Aus 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: Paddy (Boro rice (HYV/Hybrid), T.Aus (HYV) and T. Aman (HYV/LIV), Jute, Wheat, Maize, Vegetables, Maize, Mustard, Groundnut, Felon 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.

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. In the context of nutrient, potatoes are comparable with rice and wheat. Potato is considered as an alternative food of rice. It is widely cultivated in winter with huge potential in Ishwarganj area. The soil and climate conditions of this Ishwarganj area are favorable for potato production. Sunny land with cool and moisture in soil is appropriate for potato cultivation. But unavailability of quality inputs (seeds, fertilizer and pesticide), lack of knowledge on proper cultivation techniques and finally low investment capacity of the farmers are some of the major challenges in potato farming.

Spices: Chili, Turmeric, Ginger, Onion & Garlic etc.
Fruits: Mango, Jackfruit, Litchi, Banana, Wood Apple, Coconut, Betel Nut, Country Goose Berry, GolapJum. Guava, Plum, Kul, Pineapple & Papaya etc.

Plate 1: Crop Field converted into Brick Field

Plate 2: Jute Field

Plate 3: Transplanted Aman Rice Field rice Field

Plate 4: STW used for Irrigation in

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(Table24).

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. Ishwarganj 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-24: 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.
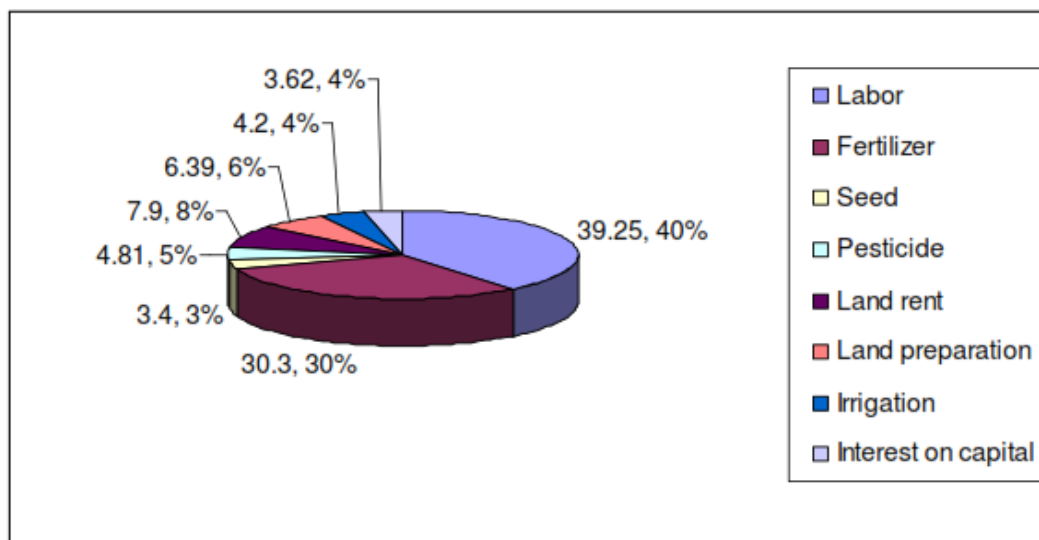
Fig 6: Percentage of Major Types of Production Costs for Vegetables.
Source: ASA University Review, Vol. 4 No. 1, January–June, 2010

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 Ishwarganj 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. 8000-9000/- *(Upazila Agriculture Office, Ishwarganj).* Generally, supplementary irrigation provided potatoes, Wheat, Chili and winter vegetables. Supplementary irrigation cost is 1000-15000 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 1000-1500/ha). Labor cost day by day increased and per day labor cost more or less Tk. 450-500 depends on crop season.

Brinjal is one of the most popular and important vegetable in Ishwarganj Upazila. Farmers are cultivated this vegetables throughout year. Some farmer's brinjal vegetable is cultivated commercial basis in Ishwarganj Upazila. 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 25). 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.

The present study was assessed financial profitability of Brinjal, Tomato and Potato vegetables production under Ishwarganj Upazila which is shown in Table 26. Finding shows that brinjal cultivation is more profitable (Tk525000/- per ha) followed by tomato (Tk242000/- per ha) and potato (Tk189000/- per ha).

Table 25: 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	,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

Table 26: Financial Profitability of 3 Vegetables Production in Ishwarganj Upazila

Vegetables	Yield (Kg/ha)	Price (Tk/Kg)	Gross Return (Tk/ha)	TotalCost (Tk./ha)	Net Return (Tk/ha)
Brinjal	45000	20	900000	375000	525000
Tomato	40000	15	600000	358000	242000
Potato	32000	12	384000	195000	189000

Source: SAAOs Ishwarganj 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 11 Unions and 1 Municipality all Sub- Assistan Agriculture Officers of Ishwarganj Upazila and review the other documents. The growth or decline of agricultural land use during last ten years under Ishwarganj Upazila is shown in Table 27. Table 27 findings show about 98% local variety rice were decreased during last ten years. The main reason for decreased local variety rice area due to yield is less in compared to HYV rice and farmers dictated to switchover cultivated HYV rice. The HYV paddy cultivation area 277% was increased. The reason for increased HYV rice cultivated area due to higher yield many farmers were cultivated HYV and Hybrid rice. Remarkable significant changed or increased during 10 years was occurred in Tuber crops (41%), Summer vegetables (38%),Winter vegetables (50%), oilseeds (37%),Spices(39%) and Maize (67%) & fruits (114%) land use. The main reasons for increases are tuber crops, vegetables, fruits and maize market demand and price is high. Table 26 shows, among the other purposes remarkable changed were occurred in and poultry farm (350%) and housing (107%), Brick field (60%) and followed by fish/shrimp culture (33%) respectively. This finding clearly indicated crop land day by day has gradually decreased which will be reflected on crop production.

Table-27: 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)	30644	655	-97.86
2	Paddy (HYV)	10816	40805	+277.27
3	Vegetables (Summer)	798	1100	+37.84
4	Vegetables (Winter)	878	1320	+50.34
5	Tuber crops	245	345	+40.82
6	Pulse crops	450	465	+3.33
7	Oilseed crops	194	266	+37.11
8	Spice crops	290	475	+38.95
9	Fruit crops	14	30	+114.29
10	Maize	3	6	+66.67
11	Sugarcane	1	1	0
12	**Other purposes**			
	-Brick field	20(#10)	32(#16)	+60

-Poultry farm	1.50 (#25)	6.75 (#153)	+350
-Fish/shrimp culture	2590.6	3873.6	+33.12
-Gardening/forestry	74	100	+35.14
-Housing	1373	2850	+107.57

Source: SAAOs and UAO Ishwarganj Upazila, 2016.

Chapter-07:
Major Problems of Crop Production in Ishwarganj Upazila (11 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 Ishwarganj Upazila such as drought, bad communication and wholesale market and infrastructure. Major problems are:

1. Natural disaster, such as heavy rain, flood, drought, and river erosion;
2. Electricity power failure during Boro crop season
3. Shortage of irrigation water and Ground water level declining
4. Post-harvest loss of tomato and potato
5. Top-soil cutting and decrease of agricultural land.
6. Decreasing fruit setting
7. Bad communications due to many roads are damaged by floods.
8. About 95-100% irrigation canals are kutcha which is increase the wastage of irrigation water and crop area is not possible to increase.
9. There is no wholesale market and infrastructure for agriculture product under11 Unions.
10. No cold storage and large vegetables selling center or market in Unions
11. Produce rice crops market price is less but production cost is high & market control by local foria.
12. Agricultural labor is not available in crop seasons.
13. Farmers did not interest to invest recommended doses of inputs (fertilizer and seeds) in crop production.
14. Crop production inputs (seeds, fertilizers, pesticides, power tiller) are partly available and price is high.
15. Insects, diseases, rodents and weeds are acute problem causes 25-30% damage every year. Farmers were applied pesticides over and under dose haphazardly for controlled pests due to lack of technological knowledge.
16. Farmer's lack of knowledge on modern crop production technology.
17. Poor use of organic matter and soil nutrients deficiency
18. There is no agro processing center and industries under Unions.
19. Agriculture is very important to local communities in Ishwarganj. They are losing agricultural lands and farming opportunities at an alarming rate. This dramatically alters the traditional landscape. It is creating a growing dependence on imported food products. Fallow and grazing land has been converted into Banana, Papaya, orchard and vegetable cultivation.
20. Farmers are facing increasing pressures of infrastructural development that may encumber agricultural practices. Change in land morphology and Negative impact on food security.

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 Ishwarganj Upazila.

1. Developing Infrastructural Facilities: Road network, agro-processing and marketing infrastructure, canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Each Union one wholesale market infrastructure need to be constructed.

2. To Reduce the Irrigation water Wastage, proper utilization and increase the irrigated command crop area the DTW, STW and, LLP kutcha drain need to be converted into pucca drainage system or introduce underground pipe irrigation system.

3. Farming and Adaptation Practices: There is need for conducting, strengthening and expanding crop demonstrations and block farming based on adaptation practices. Introduction of risk resistant crop varieties in agriculture with emphasis on crop diversification should be an integral part of the TOT, farmers training and demonstrations.

4. Vegetables Production: Different types of winter and summer vegetables are grown under 11 unions and 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) under11 Unions. 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 quality HYV and Hybrid crop seeds, fertilizer, pesticides and cultivation equipments.

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.

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 11 unions and Municipality. There is a need for construction of infrastructure for some agro-base processing center.

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 Ishwarganj 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.

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 suitable for different vegetables and other high value crops cultivation round the year in Ishwarganj Upazila. There is a need to develop vegetables wholesale market and improvement of communication system different Unions to Upazila. Farmers need modern crop production technological training which will be helpful for crop diversification and proper utilization land and increase crop production. For improvement of irrigation facilities kutcha drain are to be made lined channel which will reduced irrigation water wastage and increase crop production. Fallow and grazing land has been converted into Banana, Papaya, orchard and vegetable cultivation. Electricity power supply should be ensured during Boro crop season.

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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-	

Season	Farming Practices
OctoberMid March)	
Kharif-I (Mid March- Mid July)	
Kharif-II (Mid July- Mid October)	
Name major cropping patterns	1. 2. 3. 4.

5. Crop cultivated and variety in polder area

Crop area	Name of crop	Name of variety
Cultivated crops under single crop area=		
Cultivated crops under double crop area=		
Cultivated crops under triple crop area=		
Cultivated crops under irrigated crop area=		
Cultivated crops under non crop area=		

Cultivated crops under homestead garden area=	
Orchard area=	

Seasonal Fallow land =	

How many commercial fruit garden within polder area? Yes ----------------- No----------------------	Name of fruits garden Banana: Papaya: Coconuts: Mango: Others:	Number:
In future which crops will be profitable in your 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=		

Crop Area(ha)	Yield/ha	Total Production(MT)	Crop Area(ha)	Yield/ha	Total Production(MT)
Cowpea =			Species=		
Chickpea=			Chili=		
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.

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

Agriculture Survey
of
Ishwarganj Upazila, Mymensingh

August, 2016

Joint Venture
of
SCPL Sheltech Consultants Pvt. Ltd
and
Arc ARC Bangladesh Ltd