Presentation
On

Survey Findings Of Development Plan Of Faridpur Sadar Upazila

Presented by:

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Project Title : “Preparation of Development Plan for Fourteen Upazilas” - Package-03.

Project Authority:

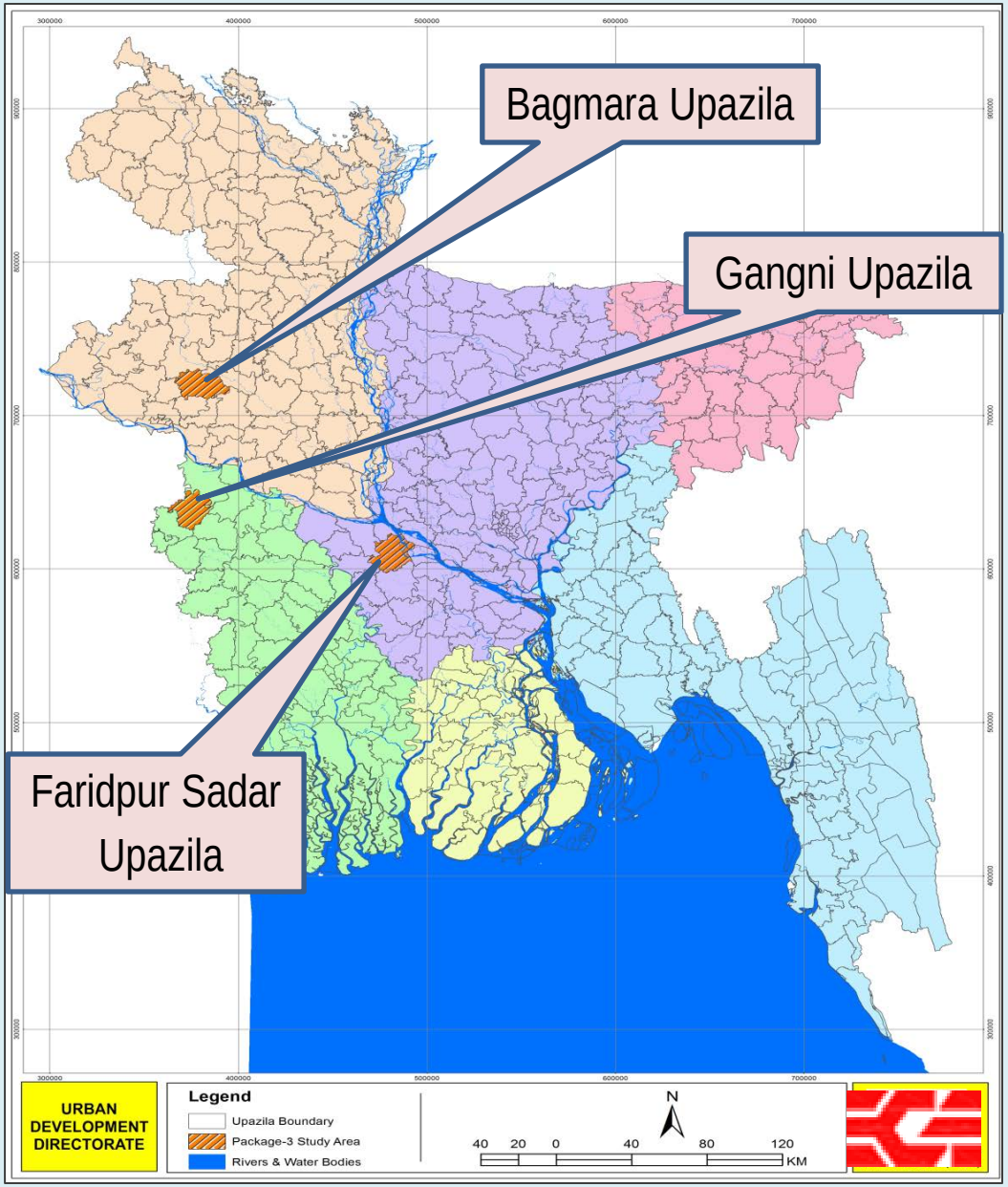
Urban Development Directorate (UDD), Ministry of Housing and Public Works, Government of the People’s Republic of Bangladesh

Project area:

- **Bagmara Upazila, Disrtct-Rajshahi**
- **Faridpur Sadar Upazila, District-Faridpur and**
- **Gangni Upazila, District-Meherpur.**

Implemented By: **Engineering Consultants and Associates Limited (ECAL)**

Location of the project Areas



Package-3

Bagmara Upazila, Disrtct-Rajshahi;

Gangni Upazila, District-Meherpur

Faridpur Sadar Upazila, District-Faridpur

Project Objectives

1. Determination of Present and Future Function of the Upazila;
2. Mechanism for Improving and Guiding Development
3. Review of Existing Problems and Propose initiatives
4. Formulation of Bankable Projects
5. Increasing Capacity/formulation of Local Authorities for Urban and Rural Management and Development

Scope of the Project

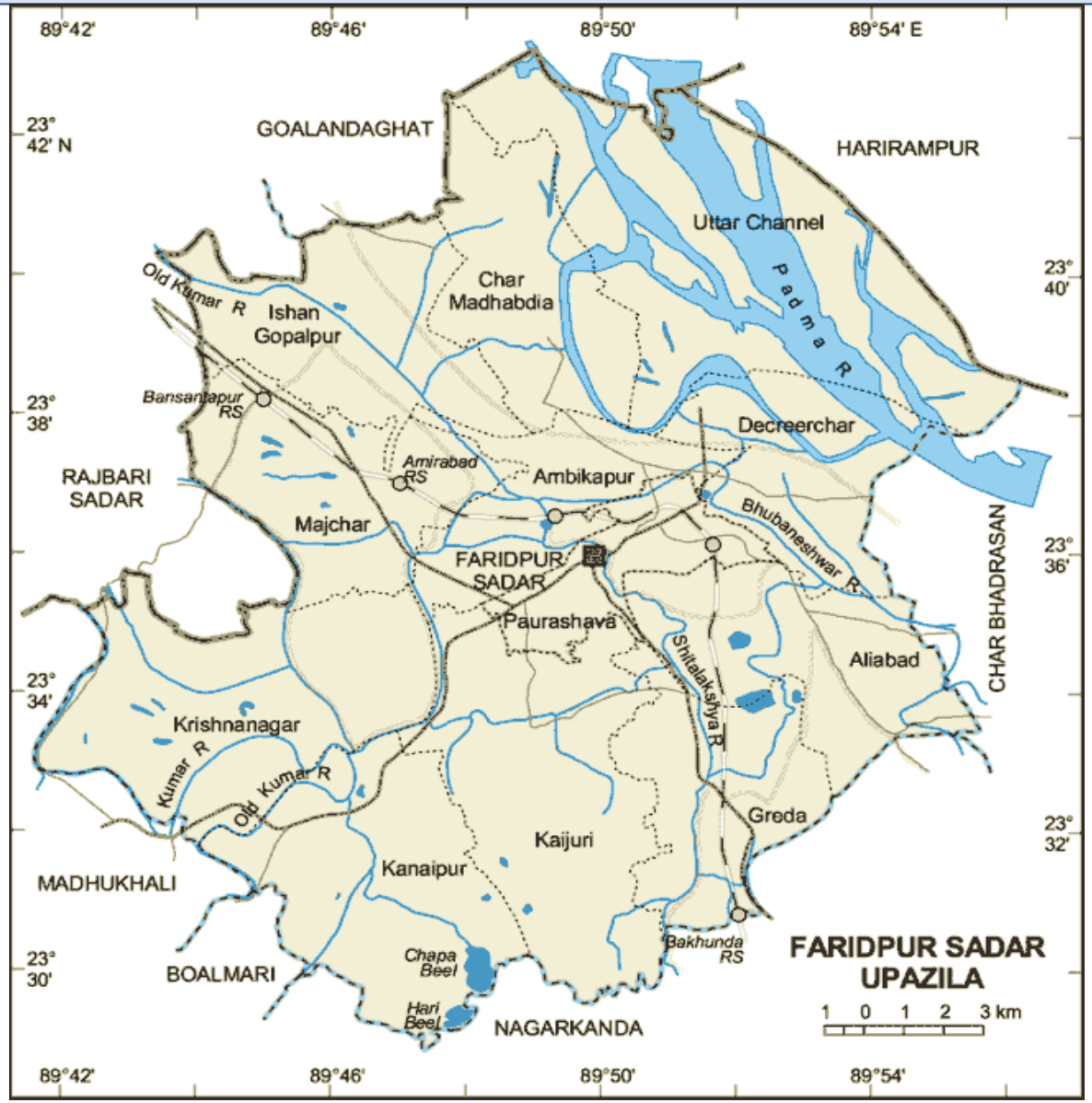
The project is planned to be completed in three stages/ five Tiers Plan:

1. First stage: Preparation of ***Structure Plan*** for the whole Upazila and surrounding areas including ***Sub-regional Plan***.

2. Second phase : Preparation of ***Urban Area Plan*** **and** ***Rural Area Plan*** for problems or opportunities, which need immediate intervention.

3. Third stage: Preparation of ***Action Area Plan/ Detailed Area Plan*** in the form of sectoral projects and programs for immediate intervention based on local need.

Introduction to Faridpur Sadar Upazila



Area = 407.02 sq km, (ToR, BBS 2001)

Thana was formed in 1896 and it was turned into an upazila in 1983.

Water Bodies:

Padma, Kumar, Old Kumar, Bhubaneshwar; Chapa Beel, Hari Beel, Shakuner Beel, Dhol Samudra etc.

Population Distribution at different Administrative Tier in Faridpur Sadar Upazila

Upazila (407.02 sq.km)								
Municipality	Union	Mouza	Village	Population		Density (per Sq. km)	Literacy Rate (%)	
				Urban	Rural		Urban	Rural
1	11	157	332	101,084	312,401	1016	73.3	41.6

Municipality (BBS, 2011)					
Area (sq. km.)	Ward	Mahalla	Population	Density (per sq. km)	Literacy rate (%)
22.65	9	36	1,21,632	5,370	73.6

Marks of the Liberation War

1. Mass Grave (Faridpur Stadium, Faridpur Housing Estate),

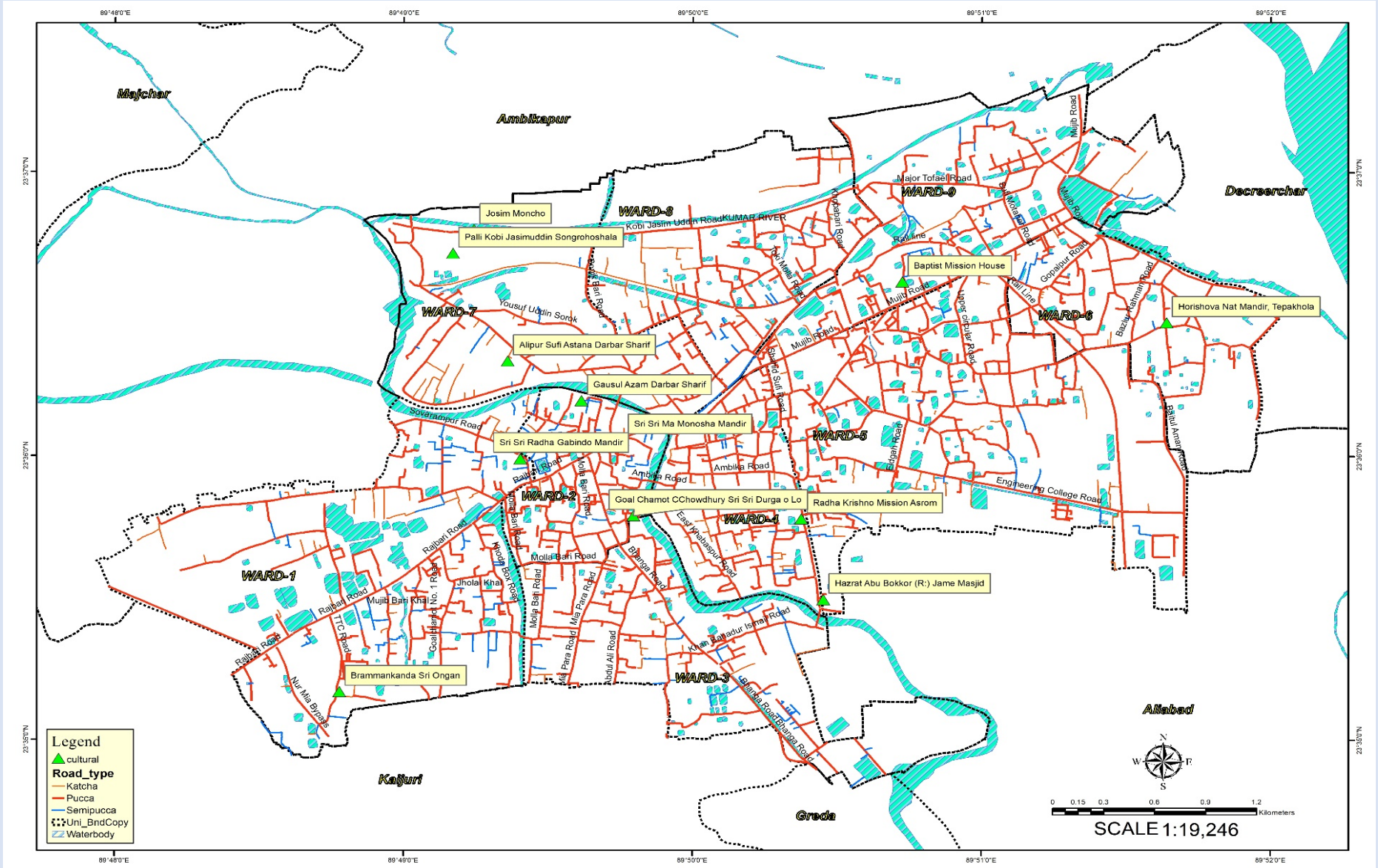
2. Memorial Sculpture,

3. Memorial Monument

Important Archaeological Sites

1. Mosque at Greda (1013 AH),
2. Dargah of Sheikh Farid,
3. Shiva Mandir at Chawkbazar,
4. Jagabandhu Ashram (Sree Angan),
5. Mazar of Bismillah Shah,
6. Court Mosque,
7. Faridpur Christian Mission,
8. Gaur Gopal Angina (courtyard),
9. House of Shah Saheb at Goalchamat,
10. Math of Mahim Babu.

Faridpur Paurasava Some Important Location Database



Important Location Pictures with GPS Coordinates

Important Location Pictures with GPS Coordinates

Project Activities (Survey)

Survey Type	
1.	Reconnaissance field visit, FGD, tea stall meeting and courtyard meeting.
2.	PRA Survey
3.	Socio-economic Survey
4.	Formal-Informal Economic Survey
5.	Geological and Geo-physical Survey
6.	Hydrological Survey
7.	Physical Feature, Land use and Topographical Survey
8.	Agricultural Survey
9.	Traffic and Transportation Survey
10	BM Pillar establishment and GCP reading for geo-referencing

Reconnaissance Faridpur Sadar Upazila

Old Kumar River

Faridpur Sadar Bazar

Focus Group Discussion

Court Yard Meeting

Court Yard Meeting at Ambikapur Union

Court Yard Meeting at Gerda union

Tea Stall Meeting

Tea stall Meeting at Ambikapur Union

Tea stall Meeting at Faridpur Sadar Upazila

Tea stall Meeting at Krishna Nagar union

Socio-economic survey

Objectives of the Survey

- Demographic and socio-economic characteristics of households and population;
- Union and Pourashava /Upazila HQ (as the case may be) service provisions, including infrastructure and social facilities;
- Access to the essential services and facilities; and
- To suggest some concrete recommendations for the development of Upazila.

Upazila	Urban Area	Rural Area	Whole Upazila
Faridpur Sadar	232	958	1190

Pictures of Socio-economic Survey

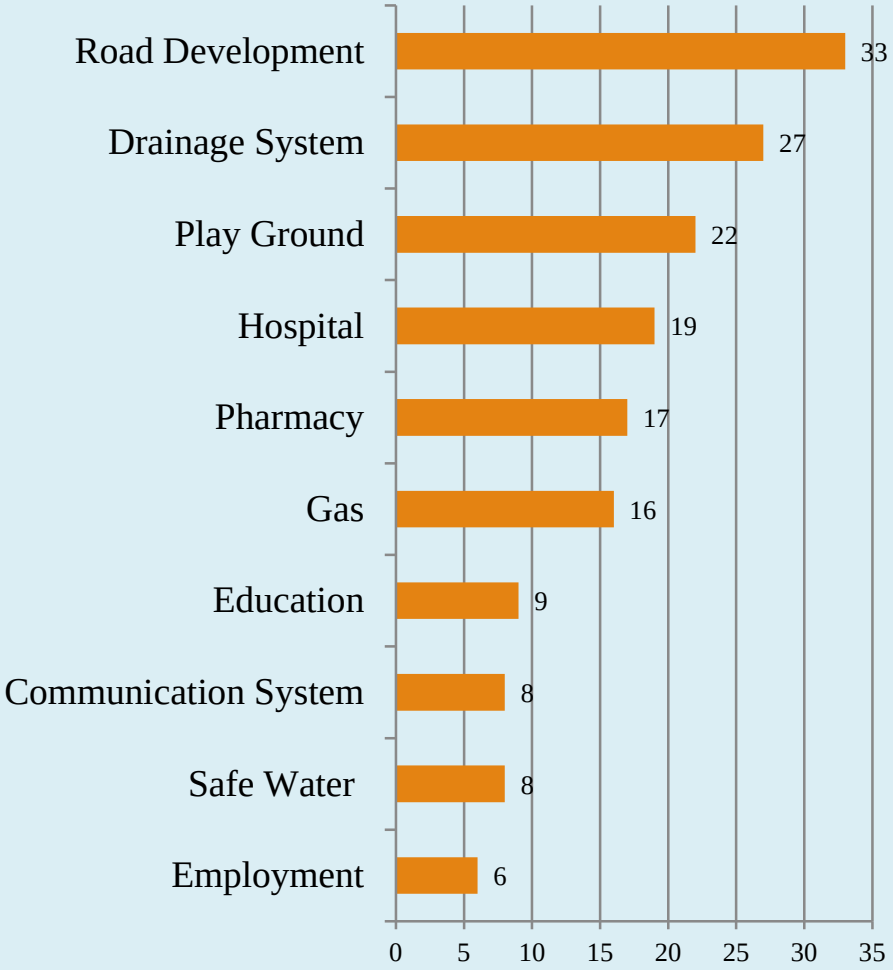
Socio-economic data collection at Union level

Socio-economic survey team at Faridpur

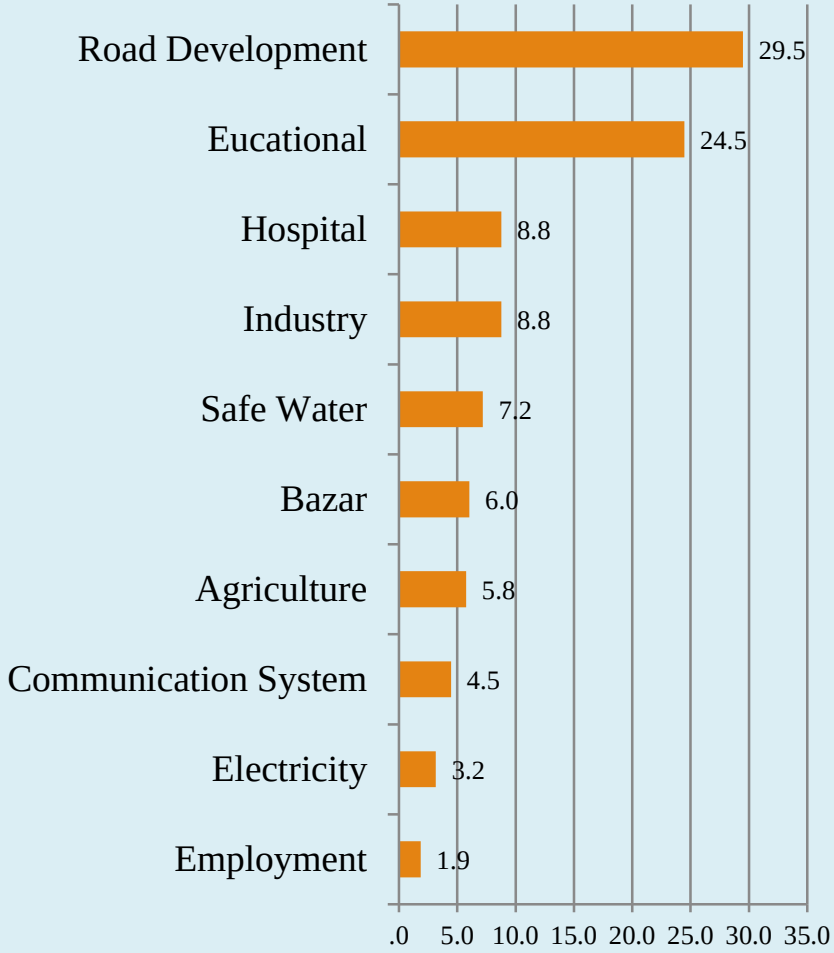
Socio-economic survey at Union Level

People's Aspiration about the Development of Faridpur Sadar Upazila

Prioritization of Development Works in urban area



Prioritization of Development Works in rural area



Participatory Rapid Appraisal (PRA) Survey

Purpose of PRA

- To involve the local people in the planning process identifying their own problems, potentials, development needs and planning priorities for next 20 years;

- Supplement and facilitate matching PRA findings with different sectoral survey findings;

- To make participants owning the project and its activities.

PRA Tools

- Social/Resource Mapping
- Problems and Potentials Venn Diagram
- Technology of Participation (ToP)/Consensus Workshop.

Participants of PRA

Each PRA included 15-20 persons on an average.

Types of Participants:

- ❑ Community People
- ❑ Members of Local Government Institutions
- ❑ Community Leaders
- ❑ Members of Civil Society Organization
- ❑ Representatives of Social Strata
- ❑ Representatives from Upazila Parishad
- ❑ Farmer
- ❑ Doctor
- ❑ Journalist
- ❑ Representatives from professionals
- ❑ Representatives from Religious Institute

Participatory Rapid Appraisal (PRA) survey

Area	Rural PRA (nos.)	Urban PRA (nos.)
Faridpur Sadar Upazila	11	9
Total	11	9

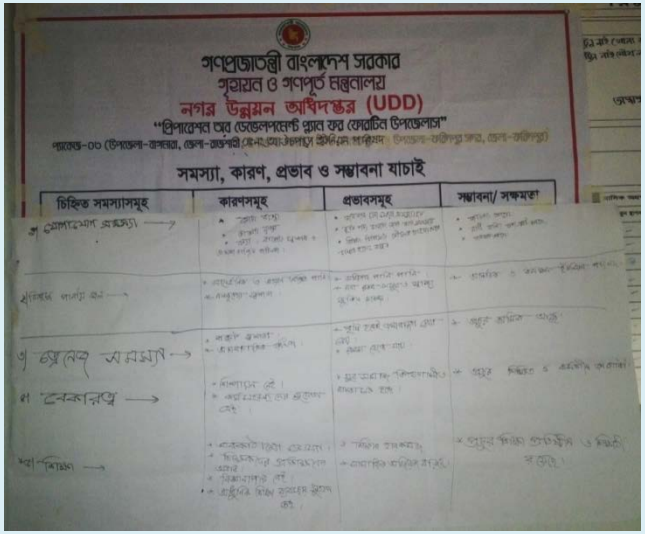
PRA: Process and Documentation

Problems,

Causes &

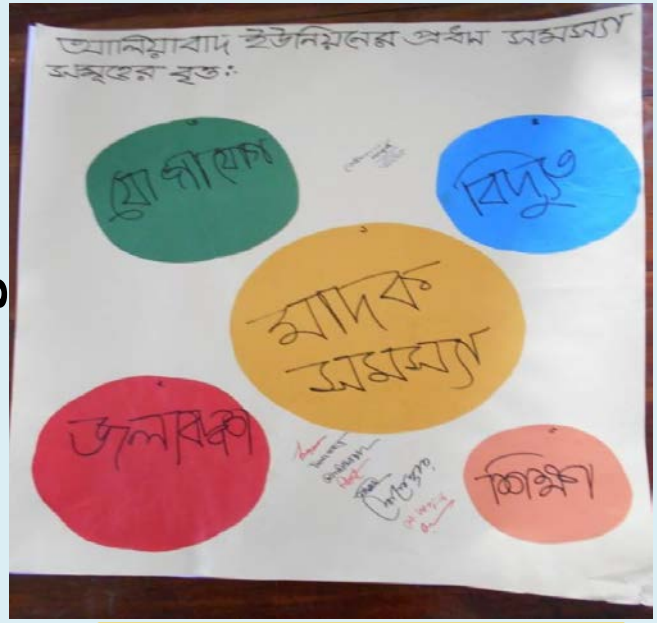
Effects,

Potentials

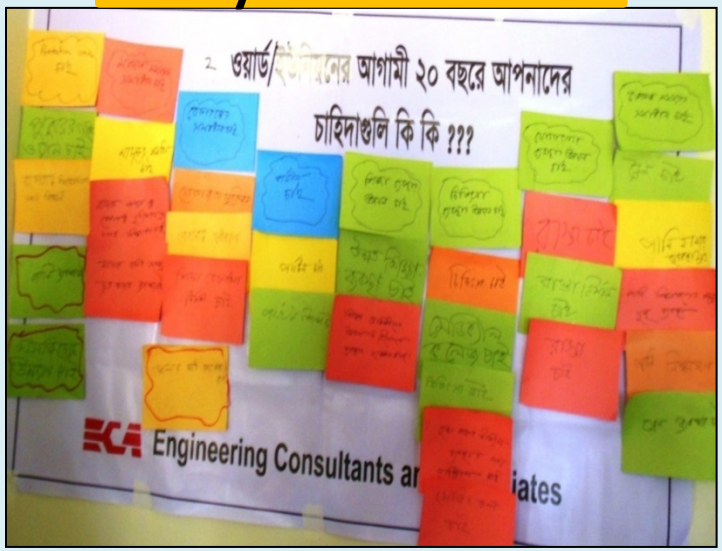


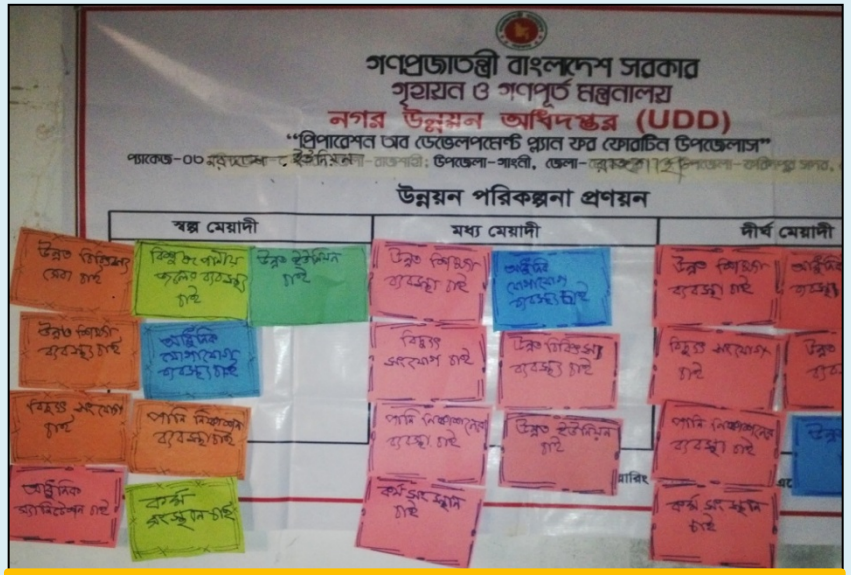
PRA: Process, Findings and Documentation

Venn Diagram

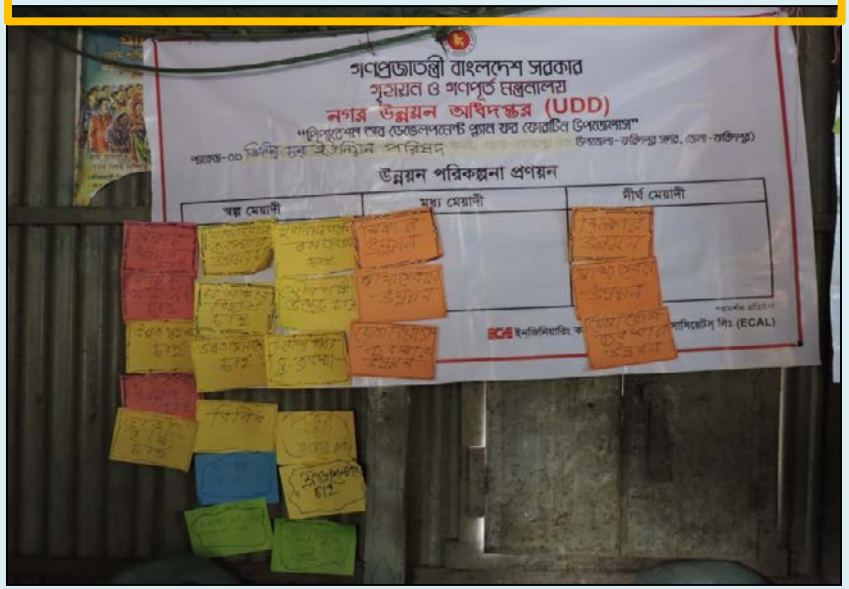


20 years Demand





Demand for different time frame



Participatory Rapid Appraisal (PRA)

PRA Faridpur Paurashava, Faridpur

PRA Majhchar Union, Faridpur

PRA: Process and Documentation

Closing PRA session

PRA Findings: Perceived Development Priorities..

Faridpur Sadar Upazila

Short Term:

Communication development, Improved drainage, Educational development, Water supply, Electricity, Drug eradication, Development of agriculture, Employment opportunity, Sanitation, Health Facilities

Mid Term: Development in communication, Agricultural development, Employment, Sanitation, Quality education, Food management, Improved drainage

Long Term: Better communication, Agricultural development, Model Upazila

Formal-Informal Economic Survey

Name of Upazila	Survey Types	Quantity
Faridpur sadar	Questionnaire	313

Formal-Informal Survey

Production amount and their yearly price (Faridpur Sadar)

Formal

Industries	Production	Unit	Avg. Price in BDT
Jute Mills & Stores	1,05,000	tons per year	13,16,00,000
Brick Field	25,12,500	pcs in year	1,96,65,000
Ice cream factory	41,000	pcs in year	4,41,000
Workshop	152	pcs in year	5,30,000
Building materials	6130	pcs in year	36,90,000
Cottage	6025	pcs in year	42,500
Cottage and Handicrafts	27500	pcs in year	2,87,500
Rice mill	1230	tons per year	2,26,00,000
Workshop	13	tons per year	8,30,000
Yarn and Fabrics industry	2.3	tons per year	6,36,000
Flour mill	21.95	tons per year	4,03,000
Goor processing	107	tons per year	65,60,000
Handicrafts	750	gauge/meter per year	45,000
Yarn and Fabrics industry	32,250	gauge/meter per year	6,88,000

Informal

	Production	Units	Yearly price in BDT
Nursury	5,35,800.0	Pcs per year	15,13,2400
Poultry	95,200.0	Pcs per year	13,12,000
Saw mill	17,350.0	gauge/meter per year	21,23,000
Dairy farm	16.2	tons per year	10,57,000
Furniture making	213.0	Pcs per year	44,20,000

Source: *Field Survey, 2016*

Traffic
and
Transport survey

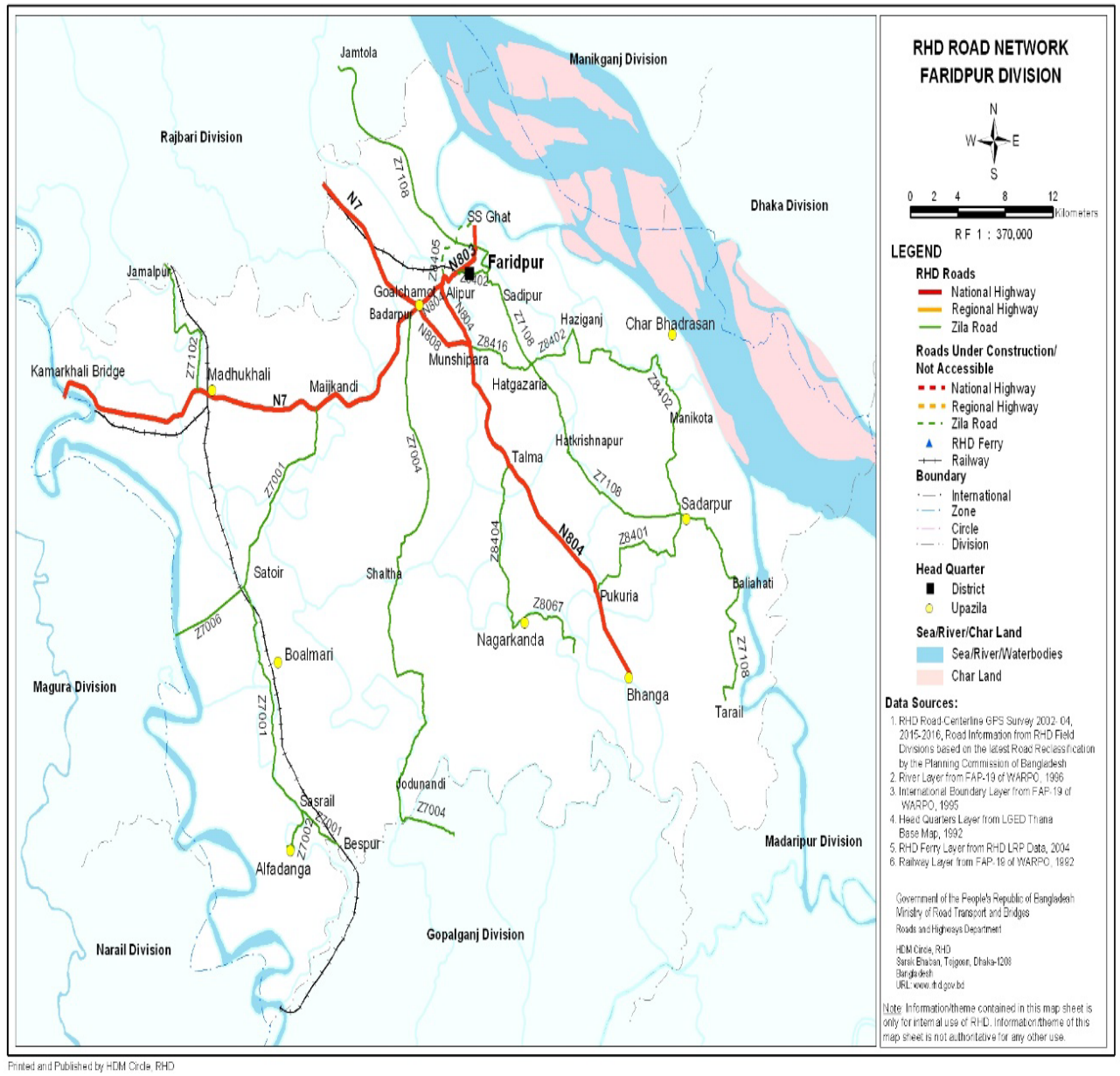
Transportation survey
(O-D, Traffic Volume/Inter regional Trip/Passenger Inter view)

Upazila	Name of Work	Quantity
Faridpur Sadar	Origin & Destination (O-D) Survey	150
	Traffic Volume Count Survey	38
	Regional transportation Survey	100
	Passenger Interview Survey	200

Pictures of Transportation Survey

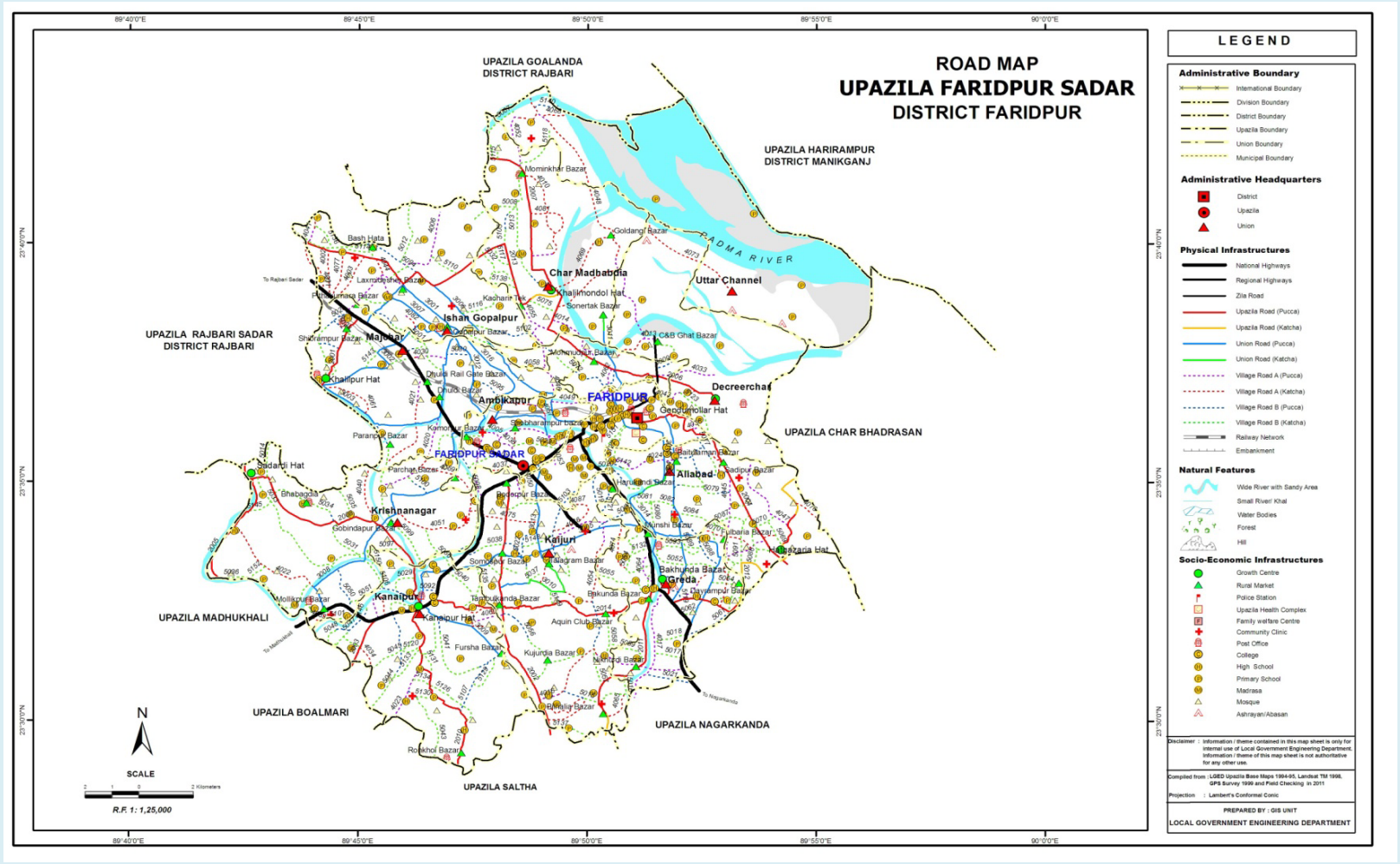
Regional Connectivity of Faridpur Sadar Upazila

Well connected by National and Regional Highway originating from different Districts/Upazilas like Dhaka, Rajshahi, Gopalganj, Khulna etc.

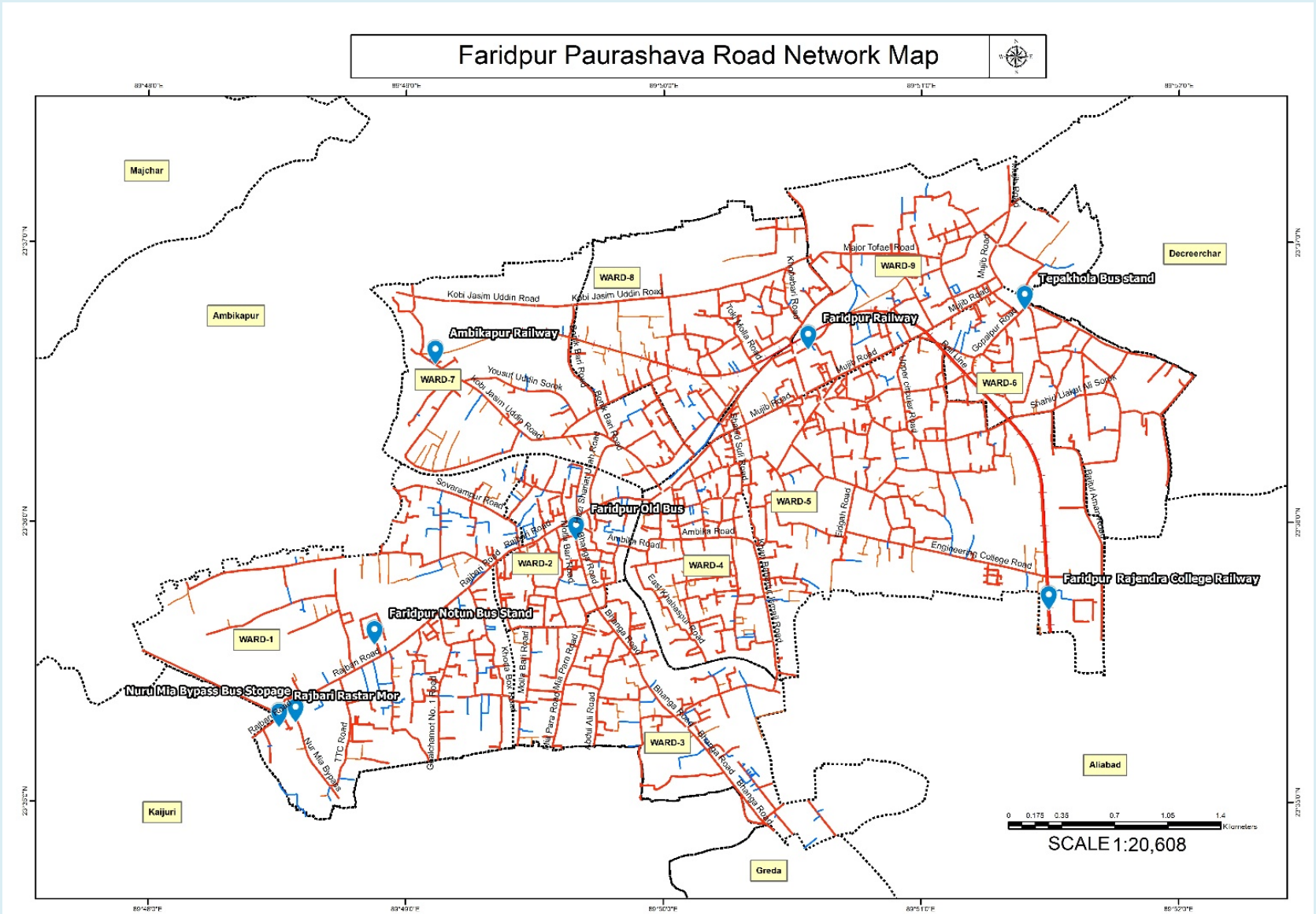


Existing road network (Faridpur Sadar Upazila)

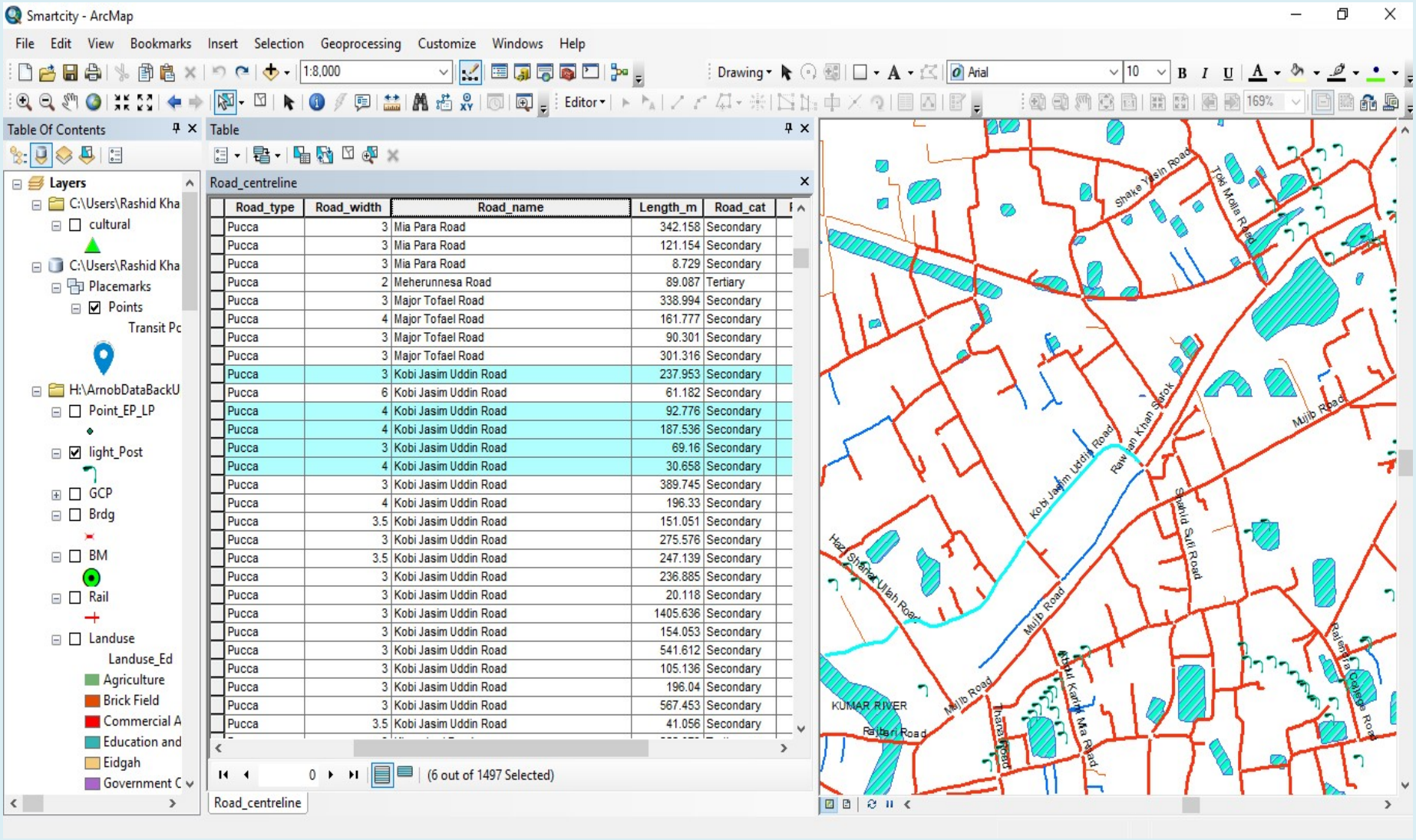
Road Type	Earthen Road (km)	Pavement Road (km)	Total Length (km)
Upazila Road	11.27	121.72	132.98
Union Road	30.33	118.16	148.48
Vill. Road-A	169.96	168.84	338.79
Vill. Road-B	275.93	100.73	376.66



Faridpur Paurasava Road Network



Existing road network database (Faridpur Paurasava)



Agriculture survey

Agriculture survey

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.
- 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.
- To determine the present scenario in agriculture practices and assessment of potential sustainable future development of the sector.

Agriculture survey (Faridpur Sadar Upazila)

Faridpur Sadar Upazila Present Land Use

Sl. No.	Upazila Land use	Total Area (ha)
1.	Total Agricultural land	24588
2.	High land	7025
3.	Medium high land	9990
4.	Medium low land	4677
5.	Low land	2830
6.	Very Low land	66
7.	Single cropped area	1250
8.	Double cropped area	14257
9.	Triple cropped area	9037
10.	More than three cropped area	4
11.	Net Cropped area	24548
12.	Total cropped area	56891

Source Upazila Agriculture Office Faridpur Sadar Upazila, DAE 2016

Cont…….

Sl. No.	Upazila Land use	Total Area (ha)
13.	Cropping Intensity (%)	232
14.	Permanent Fallow Land	956
15.	Current/seasonal fallow land(with fallow period) → Rabi Season fallow	40
16.	→ Kharif-1 seasonal fallow	90
17.	→Kharif-11 seasonal fallow	205
18.	Irrigated land area	4550
19	Water land (River, Ponds and others)	4753.35
20.	Forest Area	2250
21.	Permanent Fruit Garden	1610
22.	Roads	723Km

Source Upazila Agriculture Office Faridpur Sadar Upazila, DAE 2016

Proposed Land Zoning for Faridpur Sadar Upazila

Name of Zone	Union	Remarks
1. Agriculture Zone	Char Madhabdia, Greda, Ishan Gopalpur and Kaijuri	Considering present agriculture land use, land suitability analysis and as per opinion of local people these unions are identified as agriculture zone
2. Agriculture-Historical Place Zone (Poet Jashimuddin)	Ambikapur	Jasimuddin, the popular Bengali poet known for his poems about the folk lore culture is situated in this union which is a very famous historical place and picnic spot in the area
3. Mixed Use Zone (Agriculture-Semi Urban and Commercial)	Aliabad and Kanaipur	River Research Institute, housing estate etc. are situated along the highway in Aliabad union, industrial and commercial zone other commercial infrastructure are increasing at Kanaipur union
4. Agriculture-Farm Land Forest Zone	Krishnanagar and Majchar	Plantation forest in the farm land has been increased remarkably reducing the fertile agricultural land in the area
5. Agriculture-Erosion Prone Char Land Zone	Decreerchar and Uttar Channel	These unions are consisting of newly accreted char land which is vulnerable due to river erosion and other natural hazards
6. Paurashava Area	Faridpur Paurashava	Paurashava urban development activities should be carried out without degrading fertile agriculture land

Source: National Land Zoning Project Report, August 2015)

Survey Photo presentation

Discussion with UAO on PDPFUP-03

SAAOs of Faridpur Sadar Upazila

Agri-Consultant briefing to SAAOs

Discussion with Fisheries Officer

Hydrology & Drainage survey

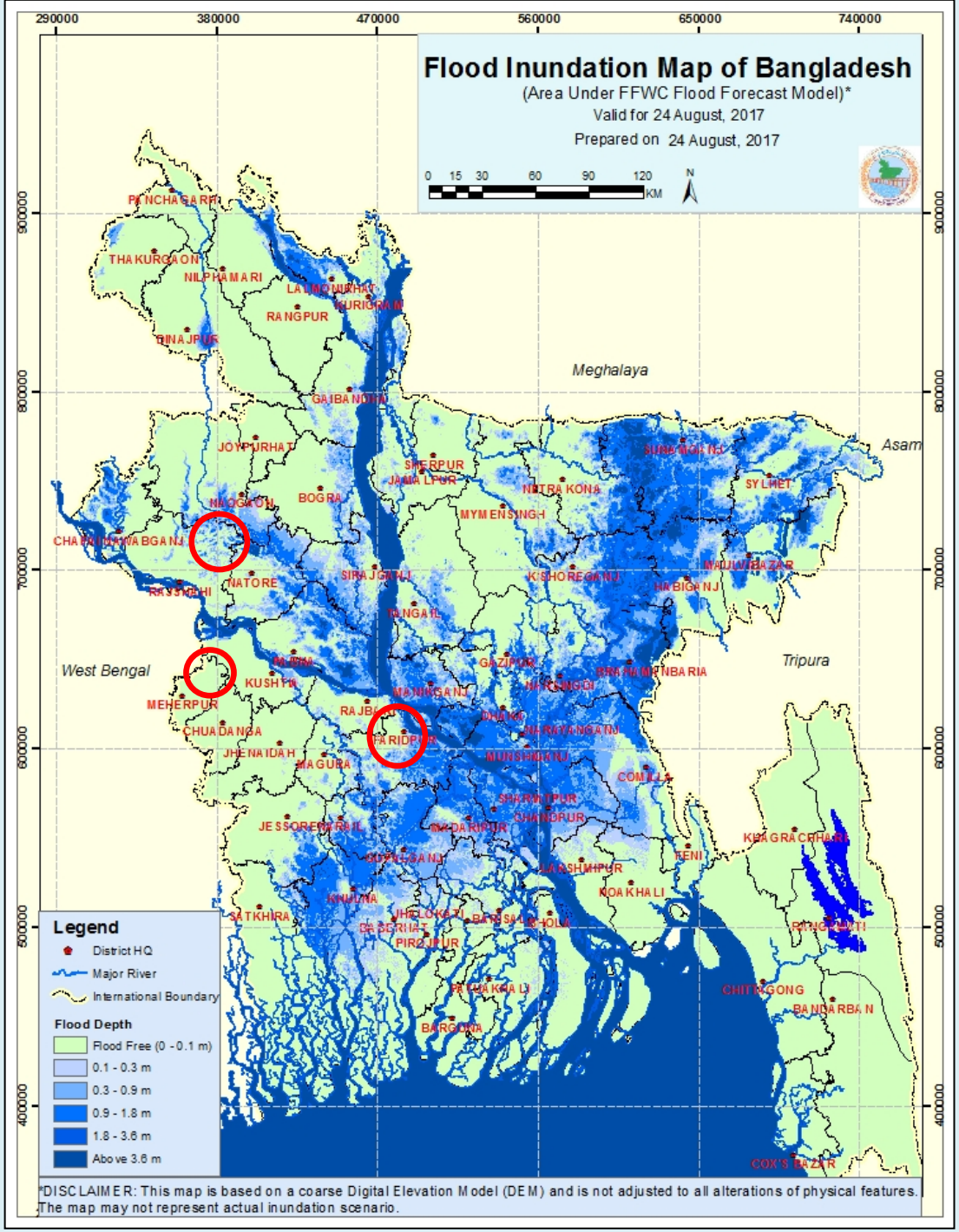
Objectives

- To assess the hydrological aspect of these area

Collection Review of Data & Reports	• Collection and Review of Data and Reports • Assess Hydro-meteorological trend of study area
Survey & Mapping	• Drainage Inventory • Catchment Delineation and Baseline Hydrology & Hydraulics
Drainage Improvement Projects	• Assess major-minor drainage system using HD Modeling • Develop structural, non structural interventions
Data Analysis & Recommendations	• Hydrology and hydrodynamic Modeling, Analyze existing and future plans

Canal/ Khal Survey

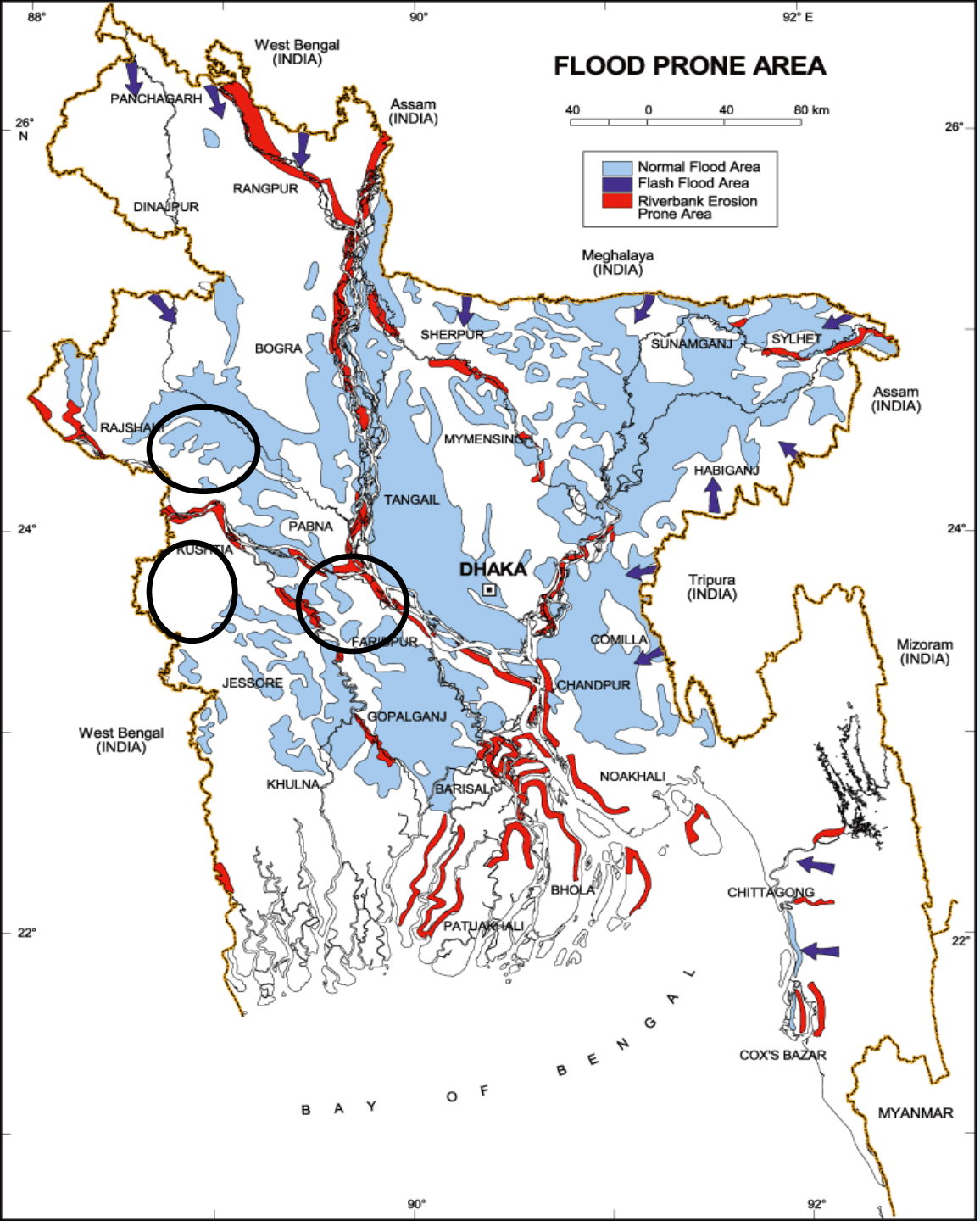
Drainage Inventory



Bangladesh 24 August 2017 Flood Map

Courtesy: Flood Forecasting and Warning Centre

- Map showing moderate flooding at low lands (Char area) of Faridpur Sadar Upazila

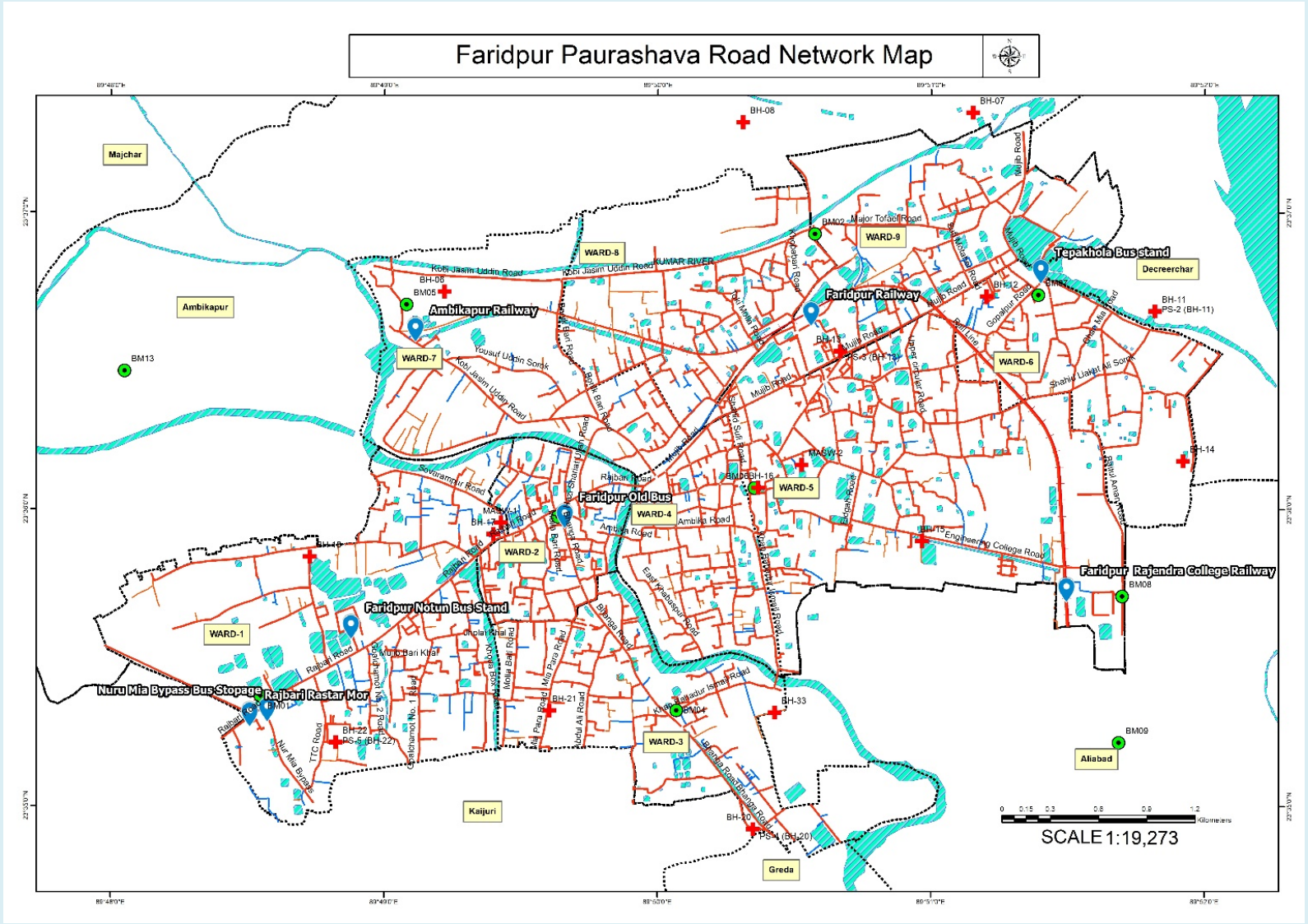


RIVER BANK EROSION

MAP SHOWING THE RIVER BANK EROSION PRONE AREAS IN BANGLADESH (BWDB)

- Faridpur Sadar Upazila experience river bank erosion being on the right bank of The Padma River.

Faridpur Paurasava Road Network with Waterbody & BM locations



Geological, Geophysical and Geotechnical Study

- Subsurface engineering properties of soil.
- Litho-logical characteristics and geological condition.
- To determine the seismic sensitivity of subsoil
- Finally, to ensure the risk sensitive infrastructure development against natural geological and hydro-meteorological hazards such as earthquake and ground failure.

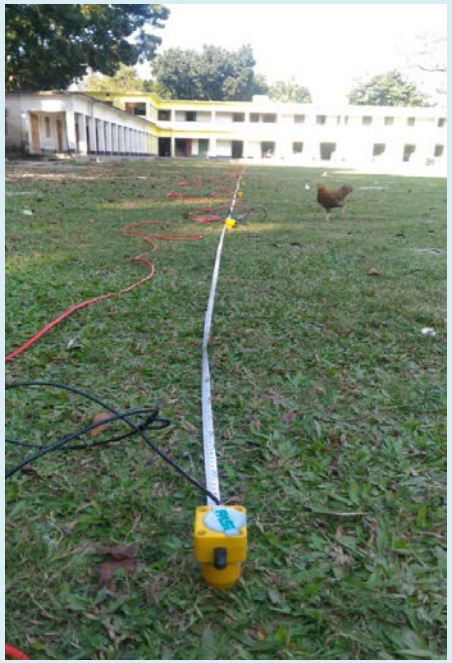
- Geomorphologic field study
- Drilling of boreholes and preparation of borehole logs;
- Collection of undisturbed and disturbed soil sample as per standard guide line;
- Conducting standard penetration tests (SPTs);
- Conducting Down-hole Seismic Test (PS Logging) and
- Conducting Multi-Channel Analysis of Surface Wave (MASW).

Geophysical and Geotechnical Survey status

Upazila Name	SPT Boring	PS Logging Test	MASW Survey	Laboratory Test	Data Process-ing and Analysis	Map Production	Report Writing
Faridpur	37	7	6	Completed	Completed	Completed	Completed

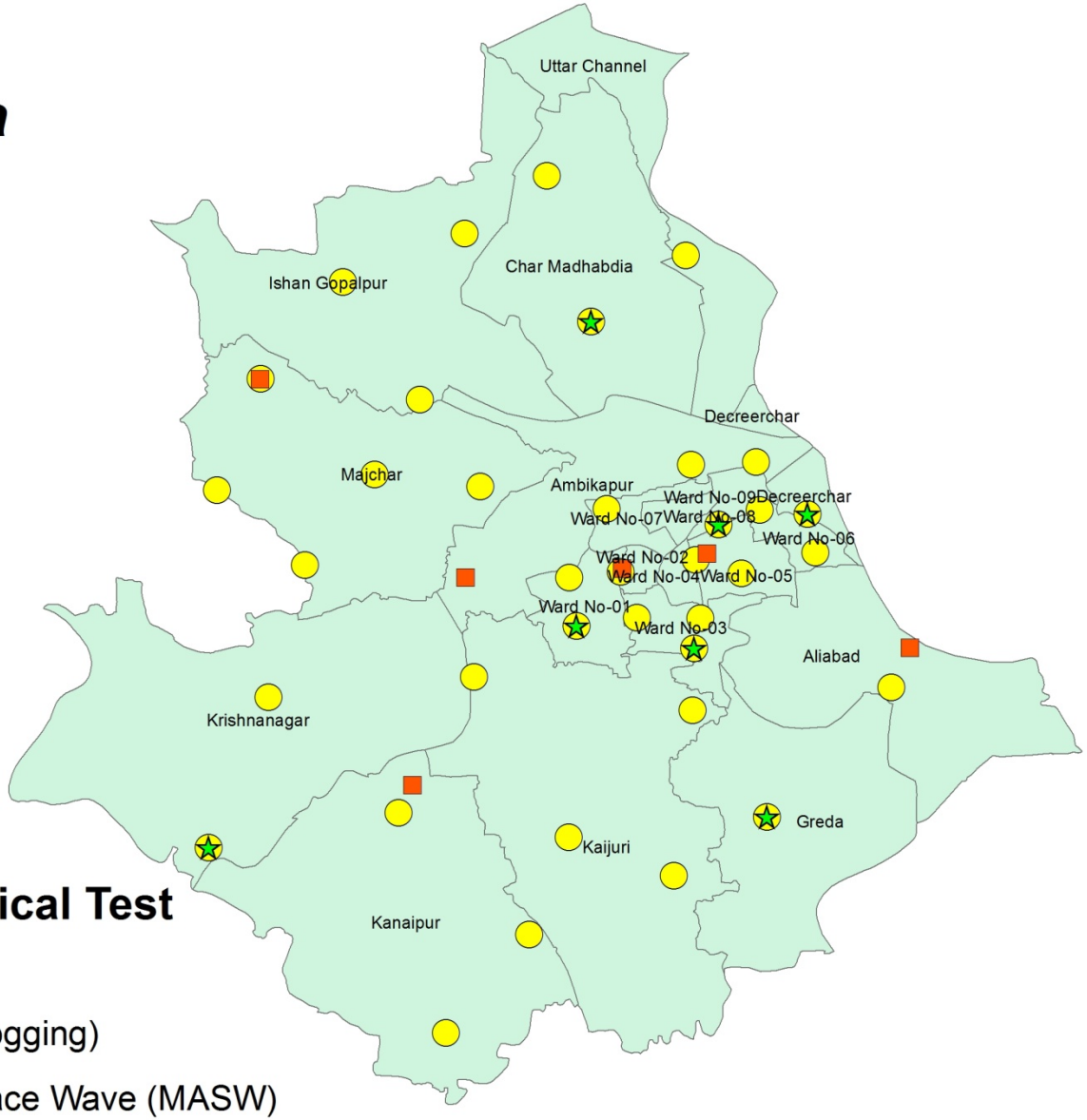
Downhole Seismic Test (PS Logging) Activities at Faridpur

MASW Survey Activities at Faridpur Upazila



SPT Boring Activities at Faridpur Upazila

Faridpur Upazila



Legend

Geotechnical and Geophysical Test

Survey Type

- ★ Downhole Seismic Test (PS Logging)
- ■ Multi-channel Analysis of Surface Wave (MASW)
- ● Standard Penetration Test (SPT) Drilling

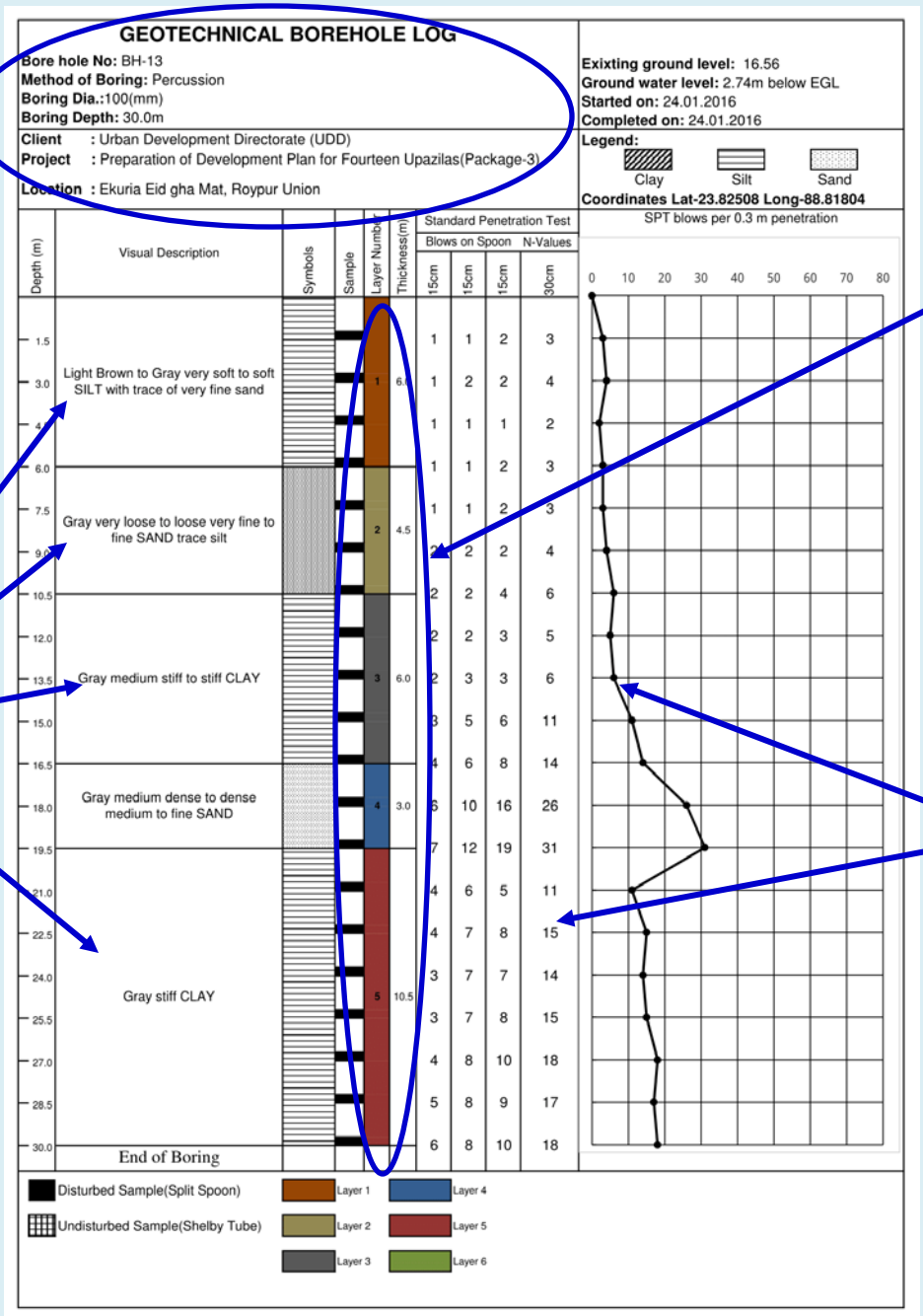
Standard penetration Test boring Data Processing and Log Format representation

Location information

Layer description/ Lithology

Layer Number and Thickness

Soil Resistance/ SPT N Values and Graph

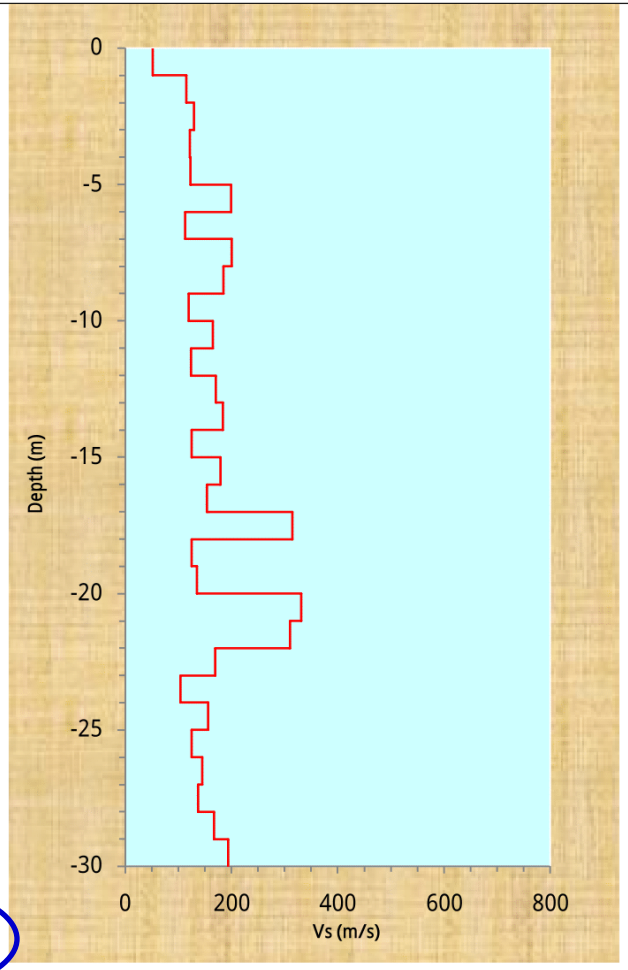


Down Hole Seismic (PS Logging) Test Data Processing and representation

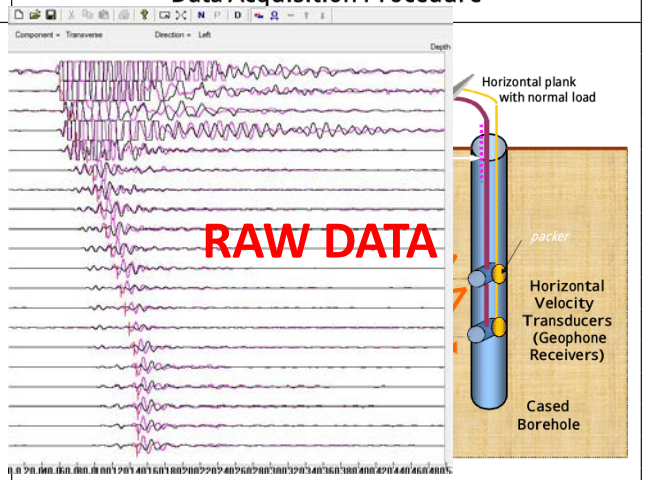
Tested Date	:	7 January 2016	Source	:	7kg Sledge Hammer
Location	:	Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar	Downhole Receiver	:	Tri-axial Geophone
Test Id	:	PS-5 (BH-22)	Recording Equipment	:	Freedom Data PC
Coordinate	:	Latitude 23.5869 Longitude 89.81373	Borehole Information	:	Grouted Cased
Operator	:	The Olson Instruments Downhole Seismic system	Casing Diameter	:	75mm PVC Casing

Depth (m) Form EGL	S-wave Velocity
-1	51
-2	115
-3	129
-4	121
-5	122
-6	199
-7	112
-8	200
-9	185
-10	119
-11	165
-12	124
-13	171
-14	184
-15	125
-16	179
-17	154
-18	314
-19	124
-20	135
-21	331
-22	310
-23	170
-24	104
-25	156
-26	124
-27	145
-28	137
-29	167
-30	193
Average Vs 30m = 142m/sec	

Graphical Representation of S-wave Velocity



Data Acquisition Procedure



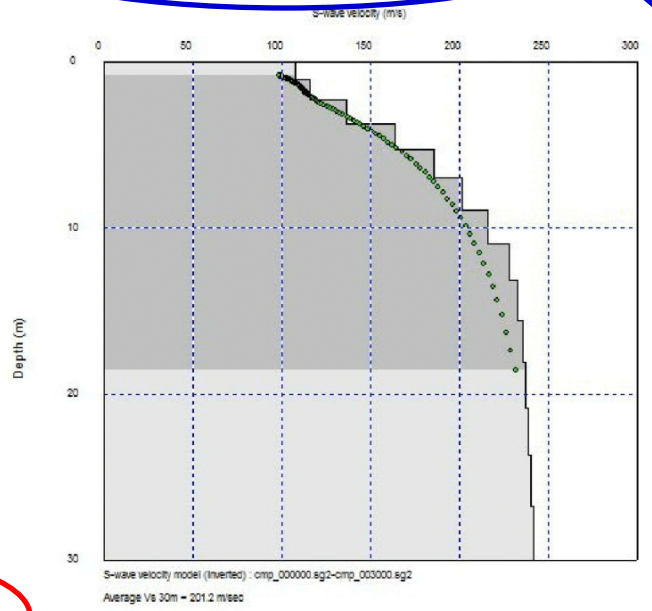
Downhole Seismic Test Data Acquisition

MASW Survey Data Processing and representation

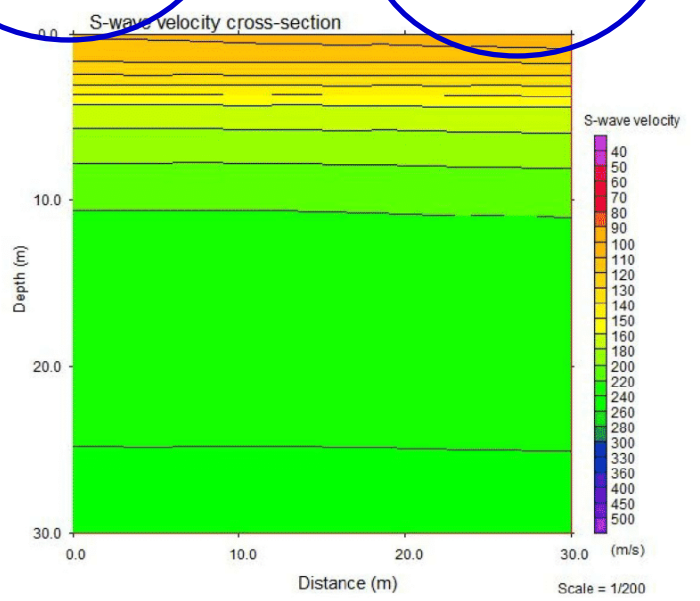
Survey ID	Location Name	Data Acquisition Date	Coordinate	
FARIDPUR MASW-2	Rajandro College field, Faridpur Sadar	27/11/2016	Latitude	Longitude
			23.60250	89.84211

Depth (m)	S-wave (m/s)	P-wave (m/s)
0.00	107.20	1409.0
1.07	116.33	1419.1
2.31	136.31	1441.3
3.71	163.52	1471.5
5.27	185.94	1496.4
7.01	201.68	1513.9
8.90	215.88	1529.6
10.96	228.17	1543.3
13.19	232.95	1548.6
15.58	235.65	1551.6
18.13	237.52	1553.6
20.85	238.91	1555.2
23.74	240.09	1556.5
26.79	241.72	1558.3

Average Vs 30m = 201.2m/sec



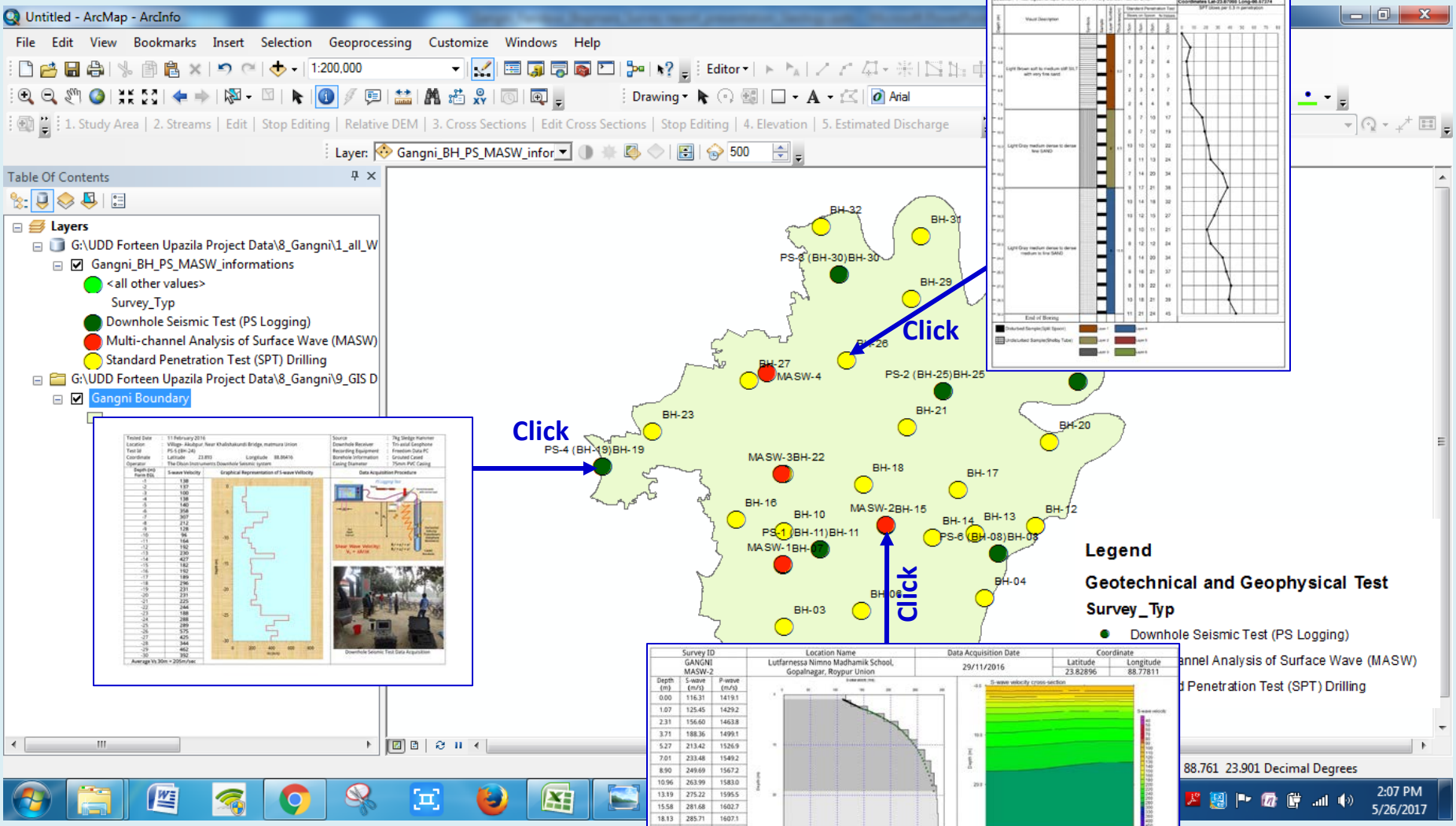
One Directional S-wave Velocity Profile



Two Directional S-wave Velocity Profile

MASW Survey Data Acquisition at Rajandro College field

GIS BASED DATA SET



Thematic Maps

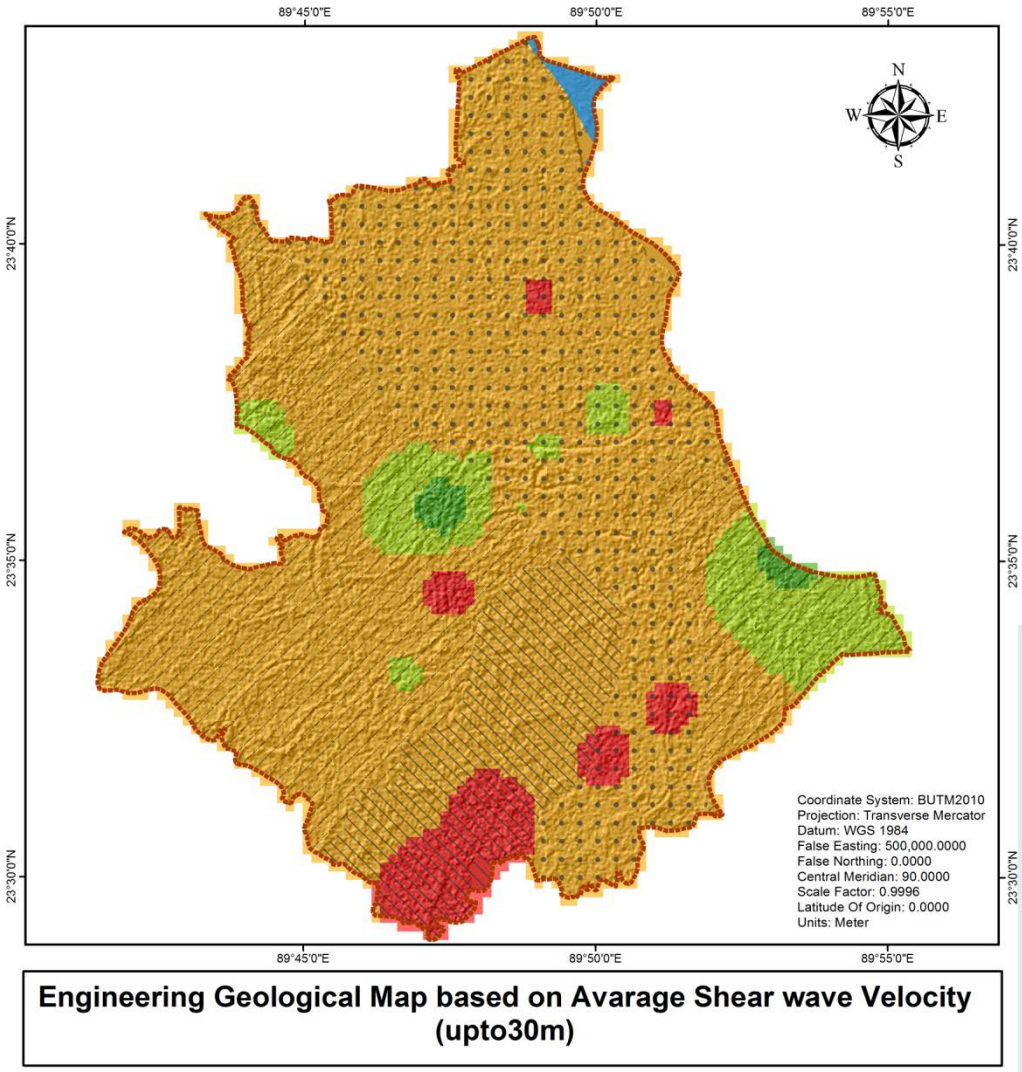
1. Engineering Geological Map Based on Average Shear wave Velocity (depth upto 30m)
2. Foundation Layer Recommendation Map
3. GIS base Subsurface Lithological 3D Model
4. Surface Geology Map
5. Peak Ground Acceleration (PGA (g) and Spectral Acceleration (SA) at engineering seismic ground surface corresponding to a probability of exceedance of 10% in 50 years

Infrastructure Suitability Map

•Infrastructure foundation suitability

•Suggested land use suitability

Engineering Geological Map Based on Average Shear wave Velocity (depth up to 30m)



Engineering Geological Map based on Avarage Shear wave Velocity (upto30m)

Legend

Upazila Boundary

Surface Geology Units

Map Units

- Deltaic sand
- Deltaic silt
- Marsh clay and peat
- Water

Soil Classification Type

- D3 - Medium Stiff to Stiff/Medium Dense to Dense Soil
- D4 - Medium Stiff/Medium Dense Soil
- D5 - Soft/Loose to Medium Stiff/Medium Dense Soil
- E- Very Soft to Soft/ Very Loose to Loose Soil

Site Class	Site class description	Shear wave velocity (m/sec) Min	Max
A	**HARD ROCK** Eastern United States only	1500	
B	**ROCK**	760	1500
C	**VERY DENSE SOIL AND SOFT ROCK** Unstrained shear strength u_s> 2000psf (u_s= 100kPa) or N = 50 blows/ft	360	760
D	**STIFF SOILS** Stiff soil with undrained shear strength 1000psf = u_s = 2000psf (50KPa < u_s< 100KPa) or 15 = N = 50 blows/ft	180	360
E	**SOFT SOILS** Profile with more than 10 ft (3m) of soft clay defined as soil with plasticity index PI > 20, moisture content w > 40% and undrained shear strength u_s< 1000psf (50kpa) (N = 15 blows/ft)		180
F	**SOILS REQUIRING SITE SPECIFIC EVALUATIONS** **1. Soils vulnerable potential failures or collapse under seismic loading:** e.g., liquefiable soils, quick and highly sensitive clays, collapse weakly connected soils. **2. Peats and/or highly organic clays:** (10ft (3m) or thicker layer) **3. Very high plasticity clays:** (25ft (8m) or thicker layer with plasticity index > 75) **4. Very thick soft/medium stiff clays:** (120ft (36m) or thicker layer)		

Site class based on V_{s30} — according to NEHRP (National Earthquake Hazard Reduction Program, USA) provisions

This map was produced by interpolating velocity of the soil layer in different Bore hole. Afterward it was classified by their velocity range according to according to a method provided by NEHRP (stands for National Earthquake Hazard Reduction Program, USA) Provisions but as most of the shear wave velocity of soil is within 168-244m/s the classification was modified as follows.

Ground Class	V_{s30}	Soil Type
C	360 - 760 m/sec	Very Dense/ Hard Soil and Soft rock
D1	300 - 360 m/sec	Stiff / Dense to very dense/Hard Soil
D2	250 - 300 m/sec	Stiff / Dense Soil
D3	220 - 250 m/sec	Medium Stiff to Stiff / Medium Dense to Dense Soil
D4	200 - 220 m/sec	Medium Stiff / Medium Dense Soil
D5	180 - 200 m/sec	Soft/Loose to Medium Stiff/ Medium Dense Soil
E	- 180 m/sec	Very Soft to Soft / Very Loose to Loose Soil

Modified classification of the soils applied in this study

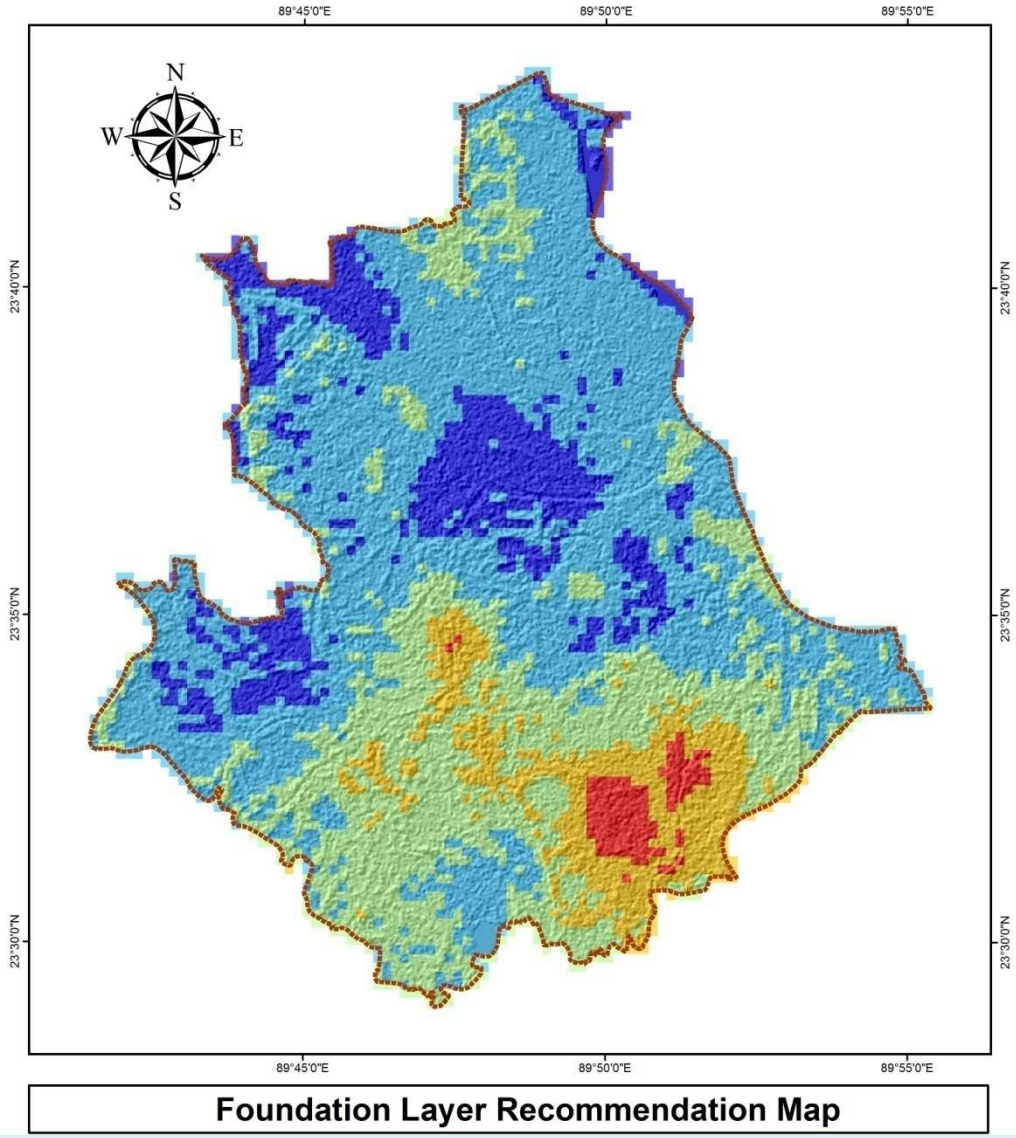
Scale:

1 centimeter = 1 kilometers

4 2 0 4 Km

Thematic Maps 1

Foundation Layer Recommendation Map



Legend

Upazila Boundary

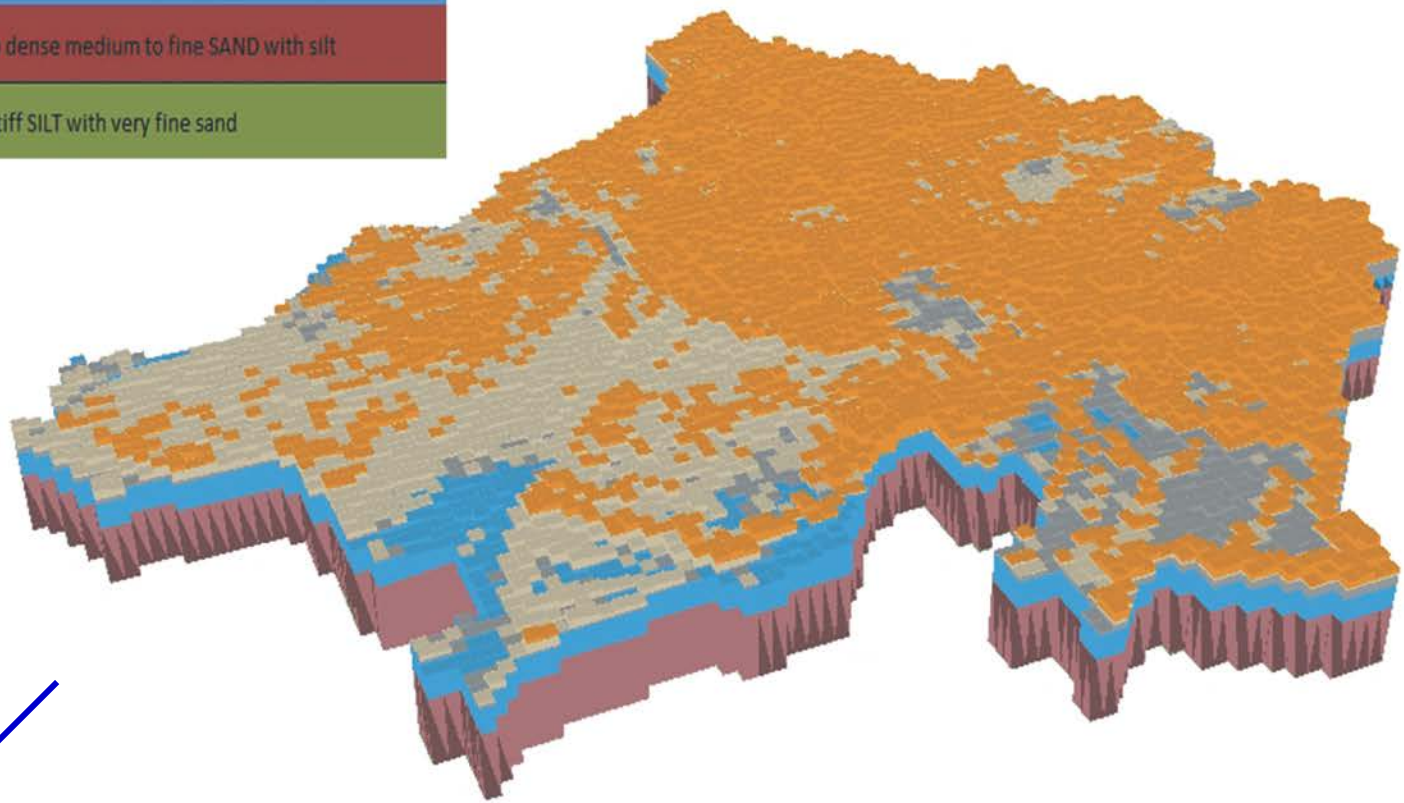
Engineering Soil Layers

Foundation Depth (m) from EGL

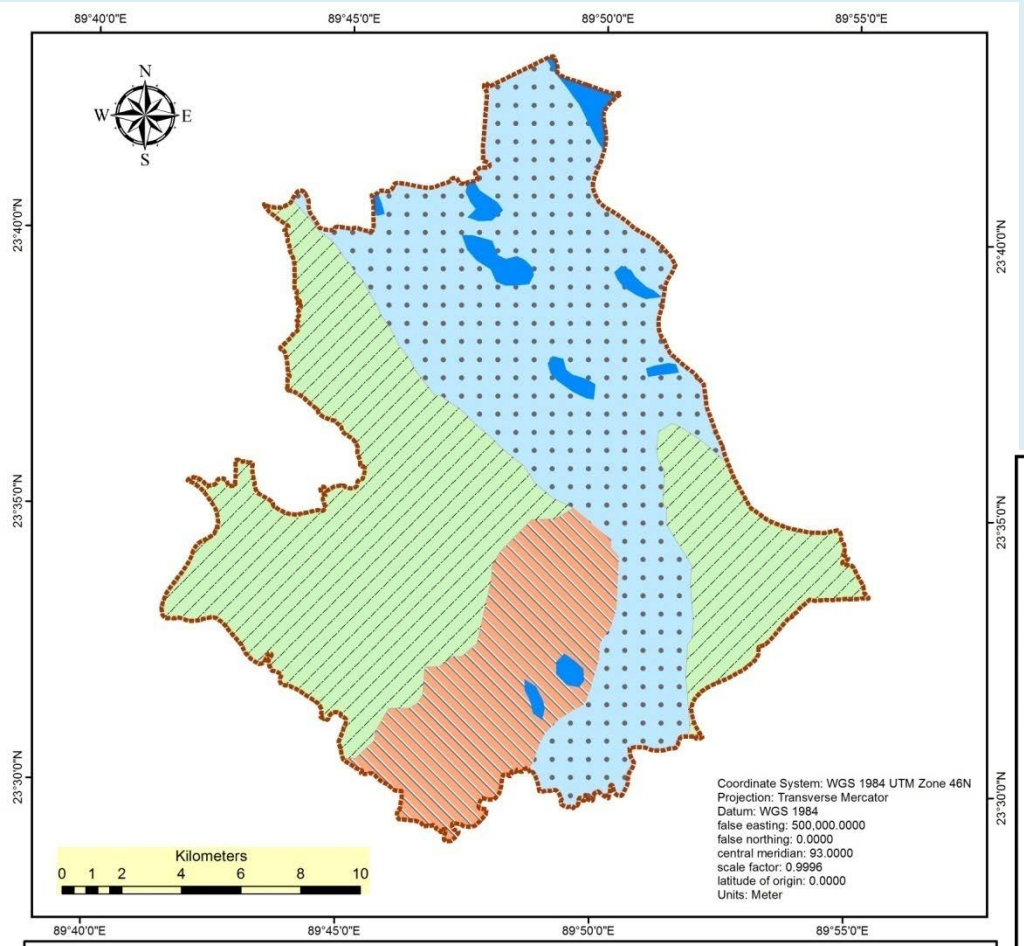
- 1.54 - 10.00
- 10.01 - 15.00
- 15.01 - 20.00
- 20.01 - 25.00
- 25.01 - 35.23

GIS base Subsurface Lithological 3D Model

Lithological description
Layer 1: Brown soft silty CLAY/clayey SILT
Layer 2: Gray loose/medium Dense very fine to fine SAND
Layer 3: Light Grey soft to medium stiff SILT with Clay and Sand
Layer 4: Light Brown to Grey loose to medium dense fine SAND with silt
Layer 5: Light Grey medium dense to dense medium to fine SAND with silt
Layer 6: Light Grey medium stiff to stiff SILT with very fine sand



Surface Geology of Faridpur Sadar Upazila



Surface Geology of Faridpur Sadar Upazila

Surface Geology Units

Map Unit

- Deltaic sand
- Deltaic silt
- Marsh clay and peat
- Water

Deltaic Sand and Deltaic Silt:

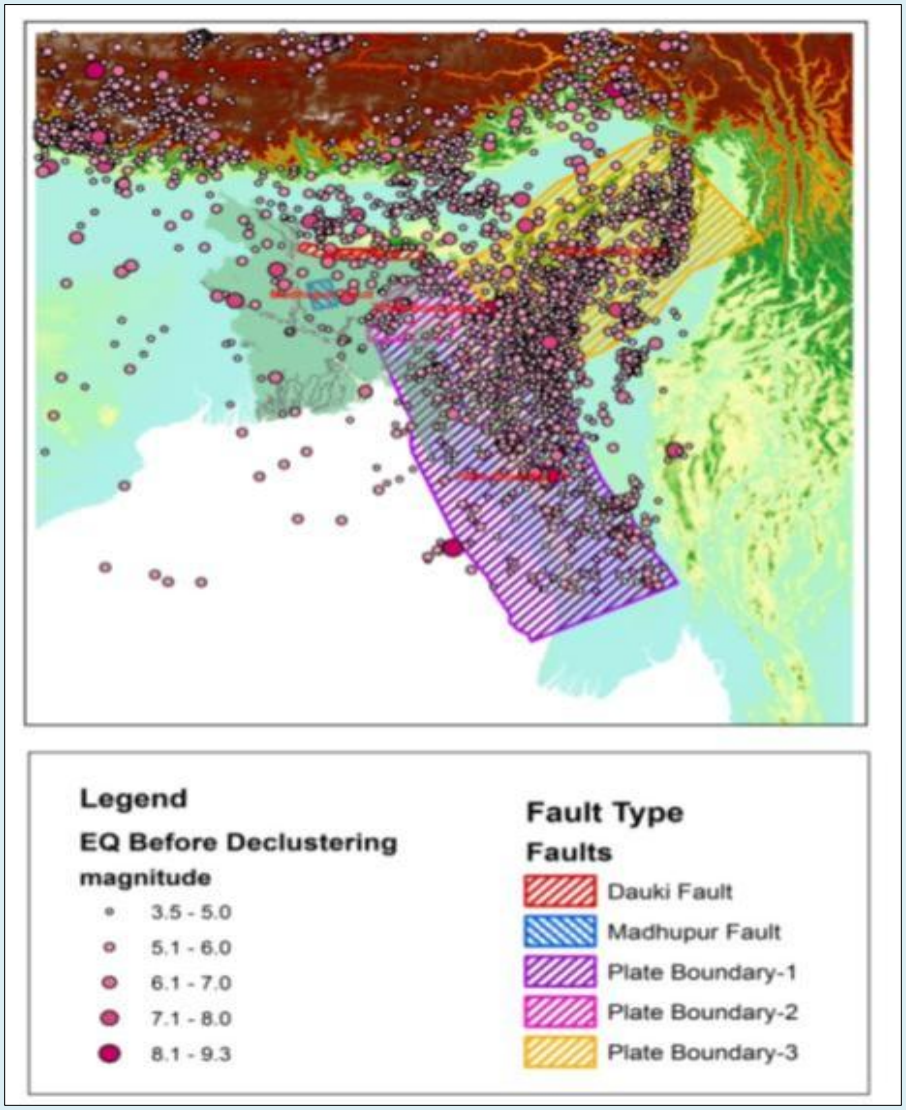
Deltaic sands accumulate in fluvial and tidal channels, distributary-mouth bars, beach ridges, barrier islands, and on delta-front platforms. It consists of sand, slit, clay and organic matters. The deposit may be sand or slit depending on the river water energy. Sands are particle sizes having 1/16 to 2 mm diameter. Sediment particles ranging from 0.004 to 0.06 mm (0.00016 to 0.0024 inch) in diameter irrespective of mineral type are called Silt. Silt is easily transported by moving currents but settles in still water. Hence river deposits are ideally rich in silty deposits. Energy content for silt deposition is slightly lower than sand body.

Marshy Clay and Peat:

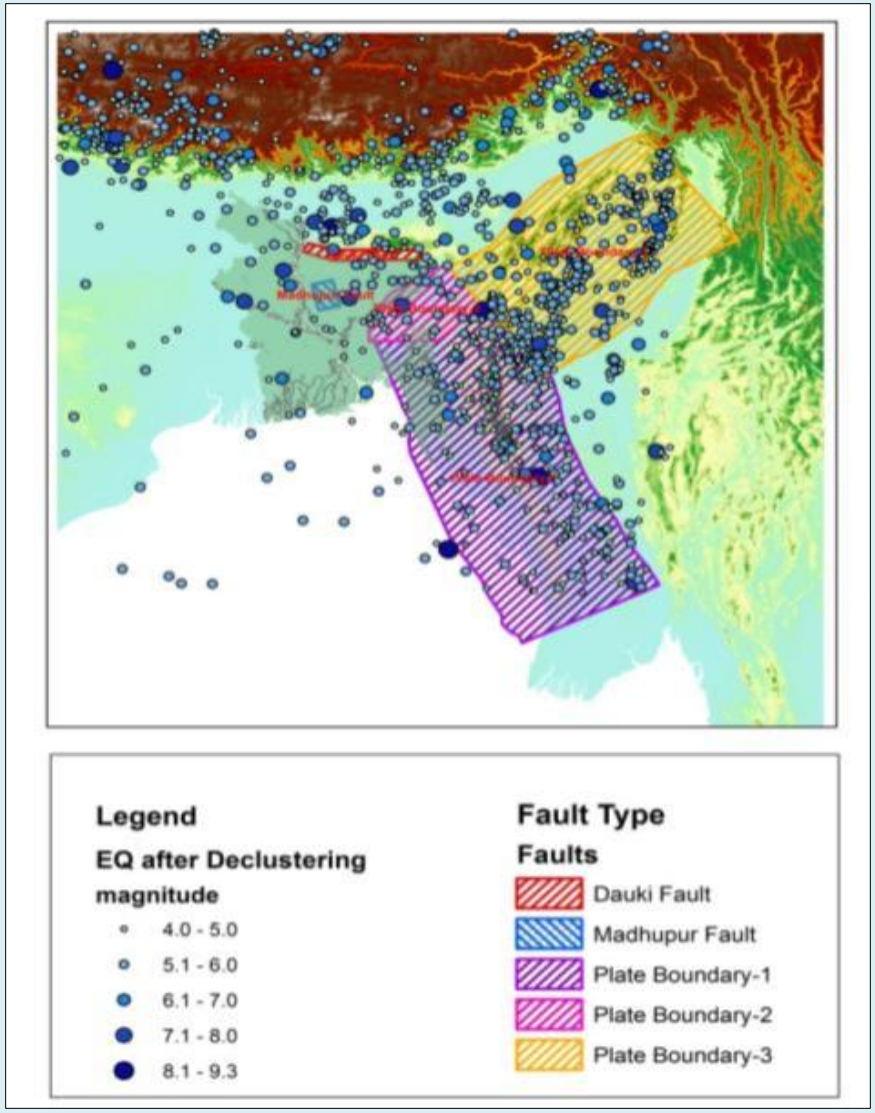
Peat soils and Marshy clays in the surface geology of the area is indication of swampy and humid environment of present active river plain deposits. In these soils, partially or wholly decomposed organic matters are present. These soils have a low infrastructure and of low quality on engineering value. Peat and muck layers are black to dark brown, strongly reduced, and neutral in reaction under persisting conditions. When these layers are allowed to dry, they become extensively acidic. The unit is seasonally flooded by both increased river water and rainwater hence, remains wet around this time. During the dry season where mineral topsoil is present they become dry. Under dry condition mineral top-soils are mainly grey or dark grey and become strongly acidic.

The seismicity of seismic sources

EQ Data (1822-2016) Before Declustering

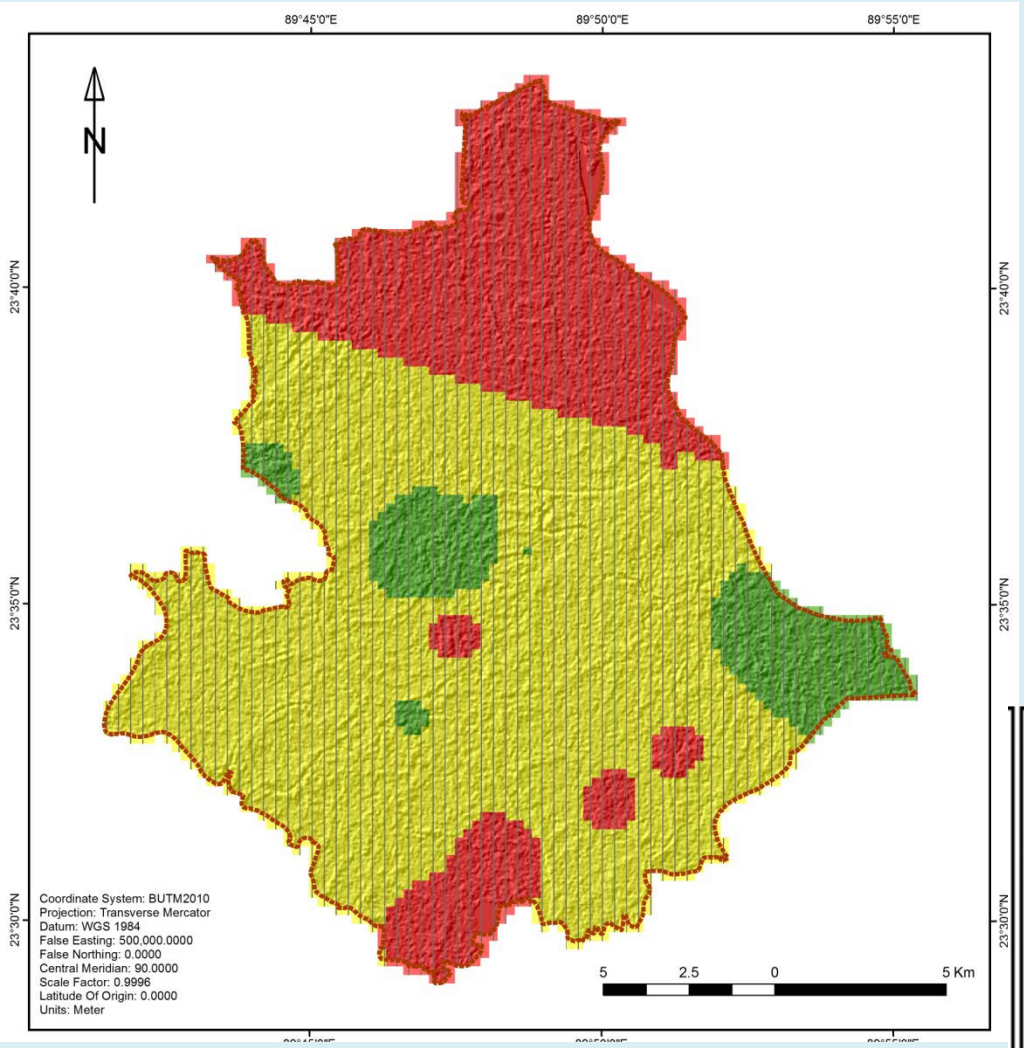


EQ Data (1822-2016 After Declustering



Data Source:*(i)Bangladesh Meteorological Dept. (BMD) , (ii) BSSA, 100:2, Electronic Supplement to Szeliga et al. Intensity, Magnitude, Location and Attenuation in India for Felt Earthquakes , (iii) US Geological Survey(USGS), (iv)International seismological Centre (ISC).*

Peak Ground Acceleration (PGA) (g) at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probabillity of Exceedance of 10% in 50 years



Upazila Boundary

Provable Earthquake Intensity

Intensity and Shaking

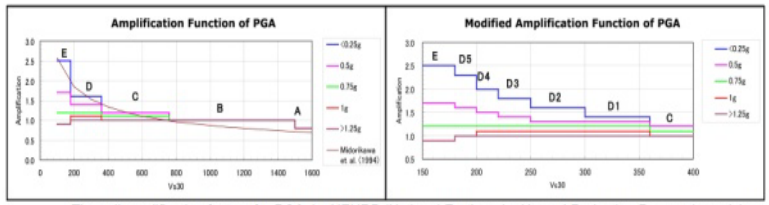
VIII, Severe

Probabilities Seismic Hazard Assessment (PSHA)

Earthquake Sensittivity with Peak Ground Acceleration (PGA)

1st Degree Sensetive	**PGA 0.47 – 0.50 g**
2nd Degree Sensetive	**PGA 0.44 – 0.47 g**
3rd Degree Sensetive	**PGA 0.40 – 0.44 g**

This map was produced by multiplying PGA values with Amplification factors corresponded for different soil type. as the Vs is within 168-244m/s so soil was classified as (E,D5,D4,D3). thus the amplification factor was also modified. Spectral Accelaration (PGA) (g) at Engneering Ground Surface(Depth upto 30) corresponging to probalility of exceedance of 10% in 50 year was count for each grid.



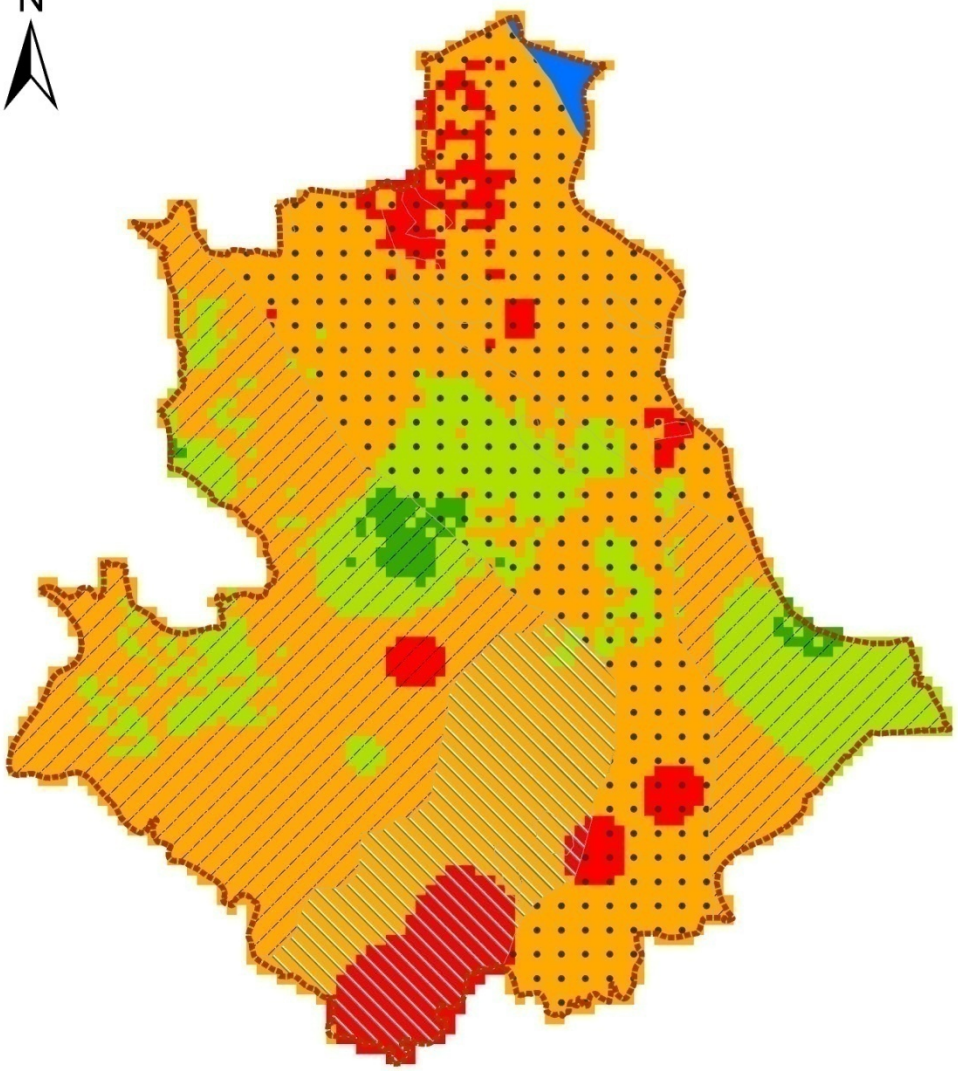
The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions

Thematic Maps 5

Modified Mercalli Intensity Scale

PGA (g)	Intensity	Shaking	Description/Damage
< 0.001	I	Not felt	Not felt except by a very few under especially favorable conditions.
0.0017 - 0.014	II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
0.0017 - 0.014	III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
0.014 - 0.039	IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
0.039 - 0.092	V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
0.092 - 0.18	VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
0.18 - 0.34	VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
0.34 - 0.65	VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
0.65 - 1.24	IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
> 1.24	X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Infrastructrure Suitability Map
Faridpur Sadar Upazila



Landuse Suggestions Map

Legend

Upazila Boundary

Infrastructure Suitibility Class

- Very Good
- Good
- Moderate
- Poor

Surface Geology

Map Unit

- Deltaic sand
- Deltaic silt
- Marsh clay and peat
- Water

1 cm = 1 km

6 3 0 6 Km

Infrastructure Suitability	Infrastructure Foundation Suitability	Suggested Land Use Suitability
Very Good	4-6 story light infrastructure is suitable with a foundation depth of up to 2 m. Large and tail infrastructure requires pile foundation placed on Soil layer no 3 or 5.	Commercial area Residential area Industrial zone
Good	4-6 story light infrastructure is suitable in Madhupur Clay. General foundation depth is within 5 m, at places higher Large and tall infrastructure requires pile foundation placed on layer no 3 or 5	Commercial area Residential area Industrial zone
Moderate	4-6 story light infrastructure requires on-site subsoil investigation and proper foundation design. Deep pile foundation is needed for large and tail infrastructure	Industrial zone Residential area Commercial area Agricultural Zone Park and Recreation
Poor	Detail subsoil investigation and proper foundation design is required for all types of infrastructure, due to low bearing capacity with hazard potential.	Agricultural zone Flood flow zone Wetland Rural settlement Park and Recreation
Very Poor	Detail subsoil investigation for deep pile foundation is essential, due to very low bearing capacity and high hazard potential. Shallow foundation is not preferred.	Agricultural zone Flood flow zone Wetland Rural settlement Park and Recreation

BM Pillar Establishment and GCP Survey

Name of Upazila	Establishment of BM Pillar	GCP
Faridpur Sadar	19	46

Latitude	Longitude	Northing	Easting	RL	Note	Locations
23.589546	89.809134	2611598.8126	786697.5781	8.968	BM01	Faridpur Sadar upazilla Office
23.615466	89.842921	2614538.956	790090.6195	8.6525	BM02	Vatilakshmipur Govt Primary school
23.599571	89.827247	2612746.085	788525.2379	8.6287	BM03	Goalchamot Govt Primary School
23.58871	89.834487	2611557.3212	789288.2939	7.8814	BM04	Al-Amin Primary Govt School
23.611482	89.818022	2614047.1966	787557.2509	8.8785	BM05	Gobindapur Govt Primary School
23.601201	89.839238	2612950.9635	789745.9908	7.369	BM06	Jhiltuli Govt Primary School
23.612044	89.856541	2614187.5601	791488.7393	9.1191	BM07	Tepakhola Govt. Primary school
23.595128	89.861653	2612323.6184	792048.2182	7.9221	BM08	Rajendra College, Baitul aman
23.586917	89.861455	2611413.4393	792046.2553	8.0927	BM09	Aliabad UP
23.559565	89.814432	2608287.6447	787303.8106	7.271	BM10	Koijuri UP
23.547002	89.856976	2606981.7044	791677.0239	7.338	BM11	Gerda UP
23.635816	89.779581	2616666.5546	783580.025	8.6057	BM12	Ishan Gopalpur UP
23.607754	89.800826	2613599.6533	785809.6968	8.087	BM13	Ambikapur UP
23.569689	89.758778	2609298.7379	781597.9397	9.3586	BM14	Krishnanagar UP
23.539804	89.774316	2606018.2332	783248.8894	7.0817	BM15	Kanaipur UP
23.631276	89.761807	2616128.2703	781775.4749	9.6791	BM16	Machchor UP
23.650899	89.817656	2618413.9164	787433.733	9.2435	BM17	Char Madhobdi UP
23.663447	89.840114	2619849.6223	789698.2977	8.7167	BM18	North Channel UP
23.630535	89.85471	2616232.6633	791260.8879	8.0463	BM19	Aij Uddin Matobbor Kandi Primary school
23.552047	89.777757	2607381.4875	783574.1118	7.673	SOB 6181	BSIC office Mirgi Village, Faridpur Sadar

BM installation Pictures (Faridpur)

SoB Base set up & RTK GPS data collection

GCP collection for image referencing

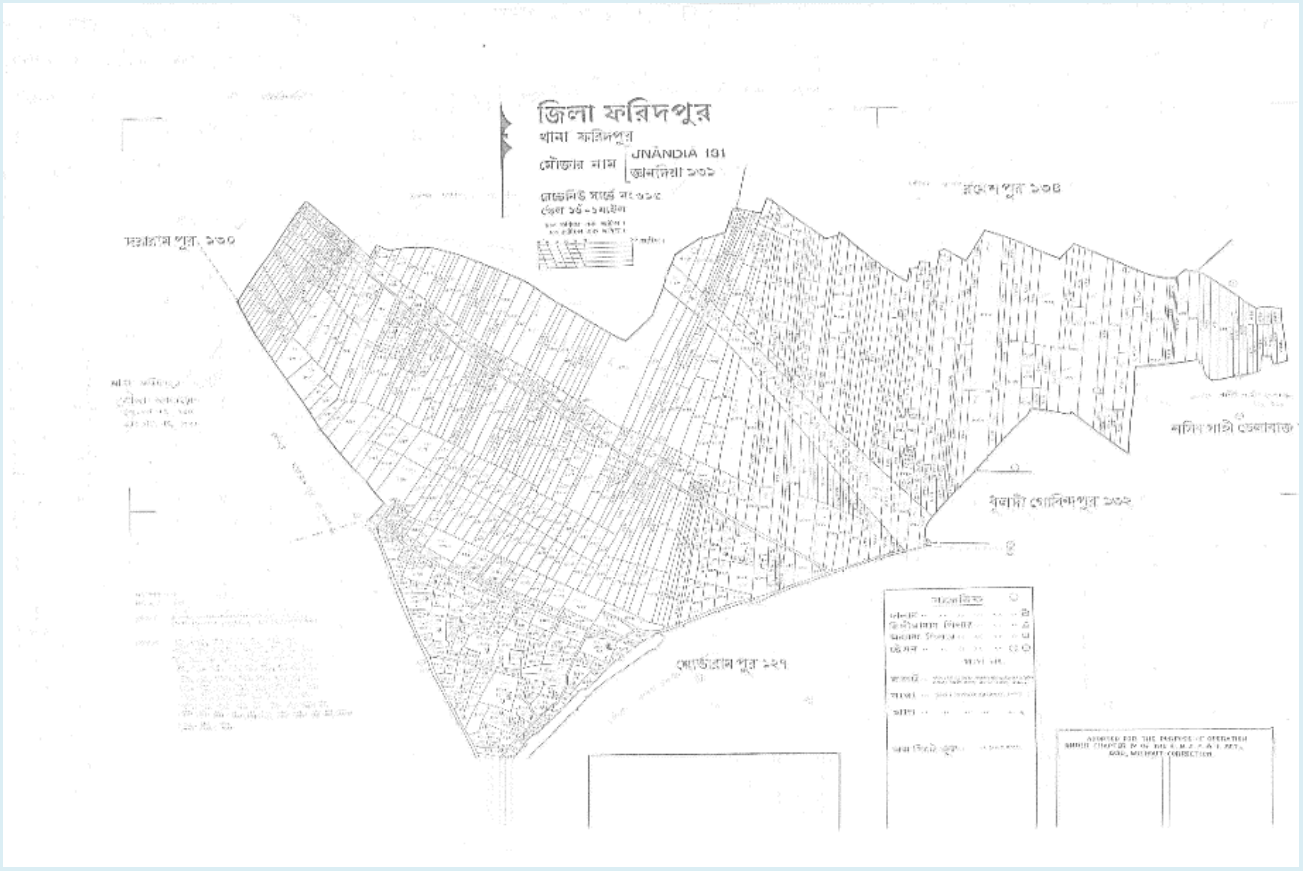
BM data collection by RTK (Faridpur Sadar)

UNO, Faridpur Sadar Upazila is looking after the RTK reading

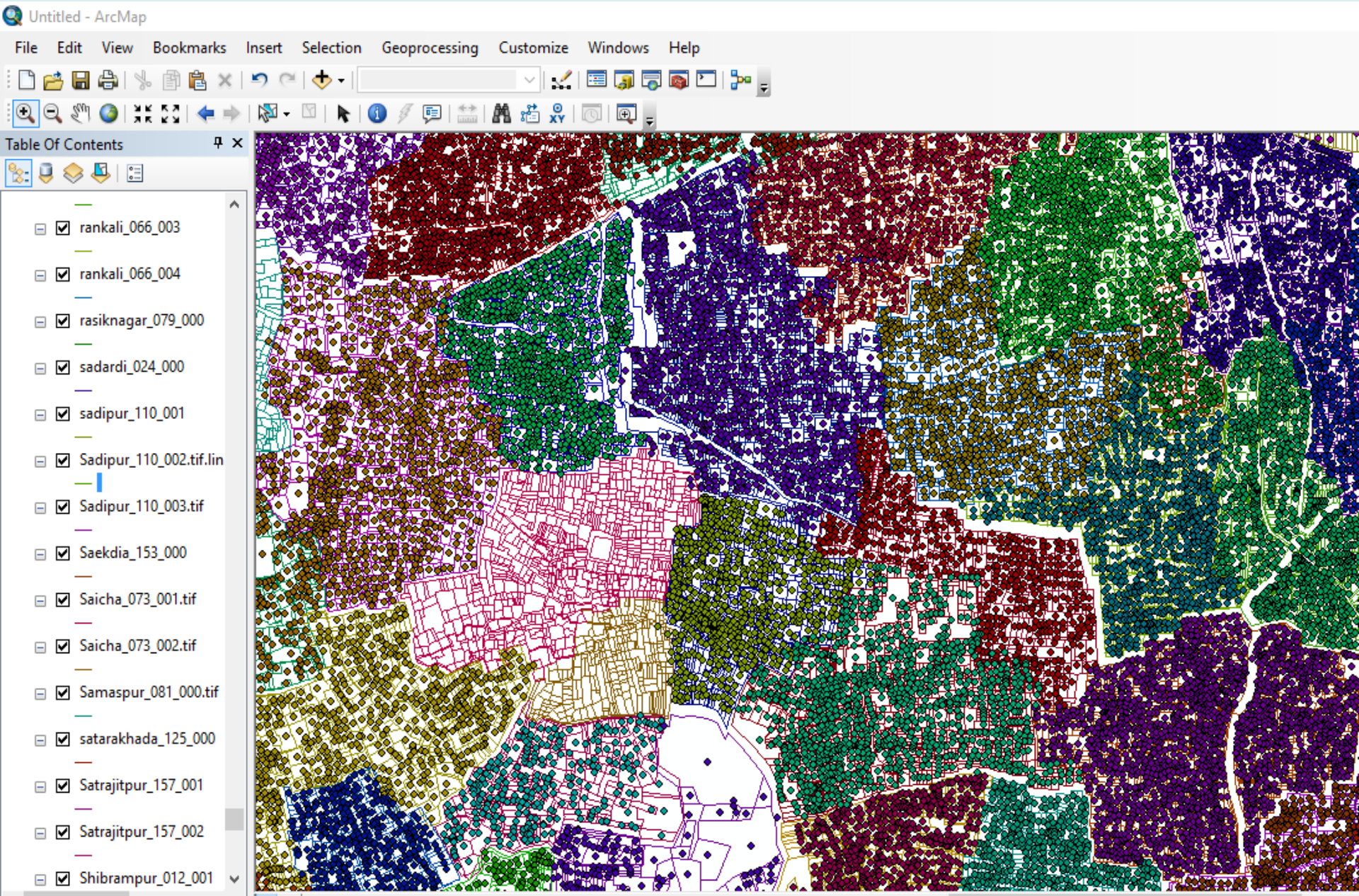
Mouza Map collection, Scanning, Digitization and Edge mathch

Mouza Sheet collection and Digitization

Area	Total Mouza	Digitized	Edge-matching	Geo-referenced
Faridpur Sadar	326	326	326	Done



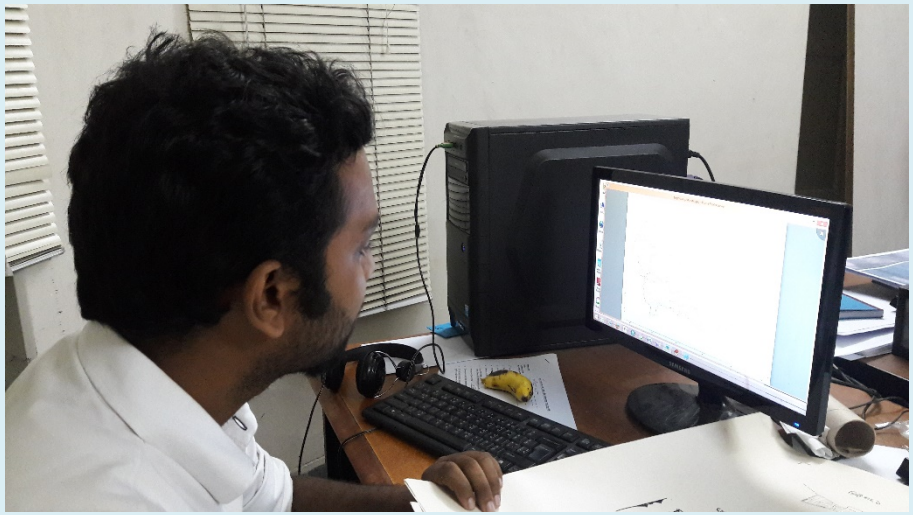
Mouza Database (Faridpur)

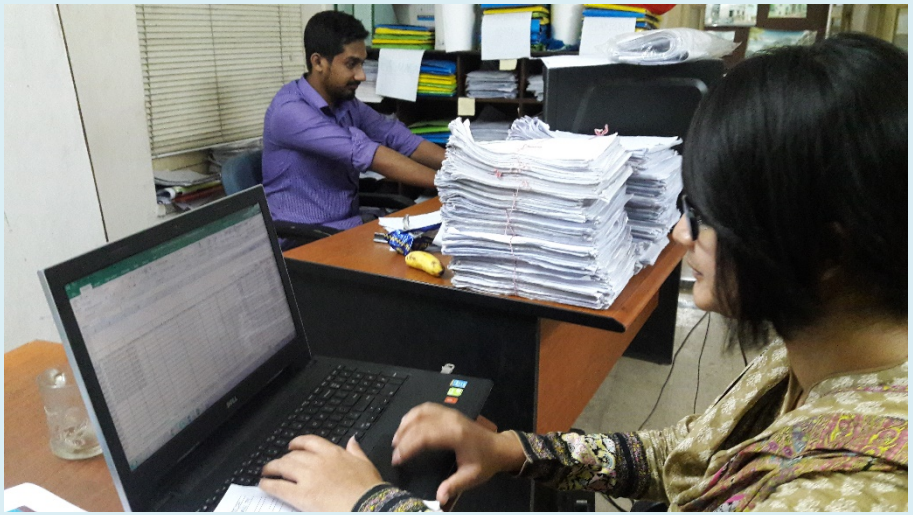


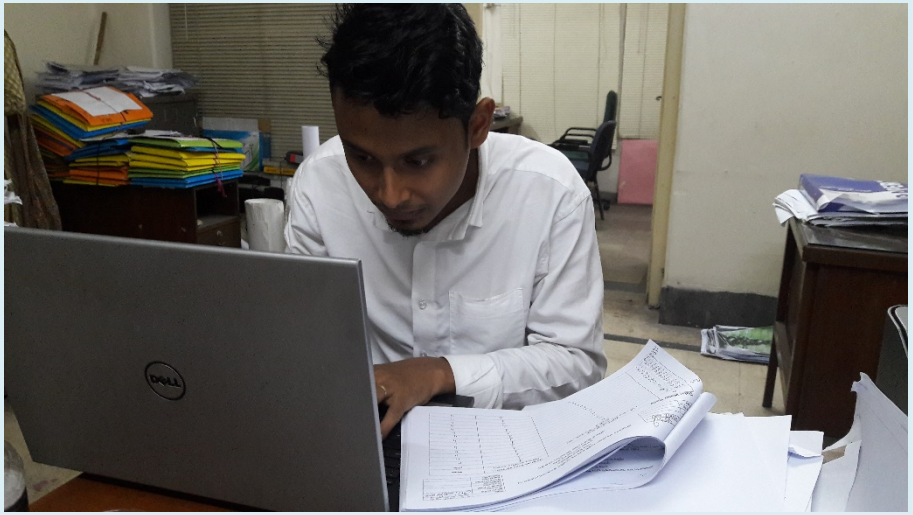
Field Survey
(Physical Features, Land Use & Topographic)

Land-Use and Physical Feature Survey (Faridpur)

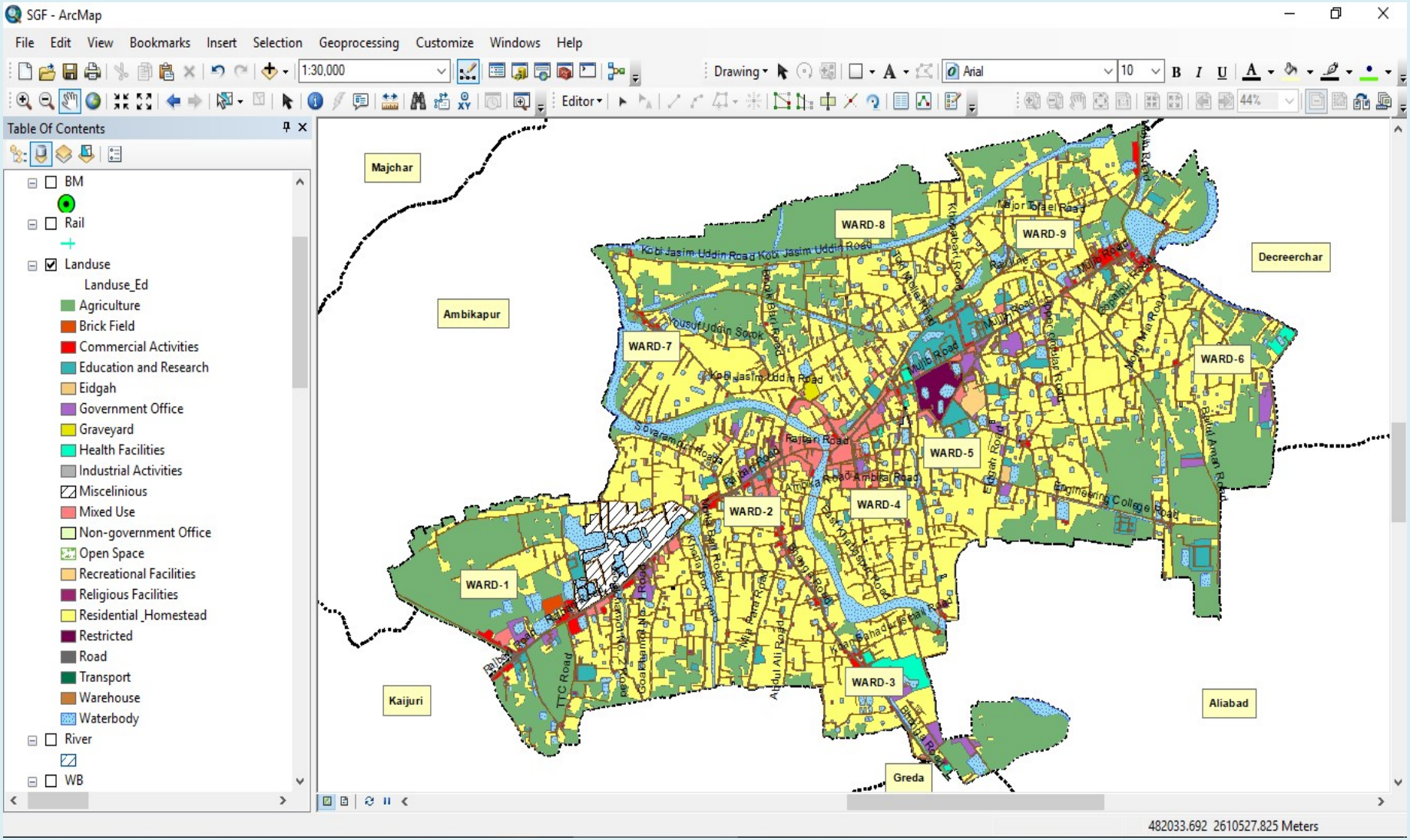
Land-Use and Physical Feature Data Entry



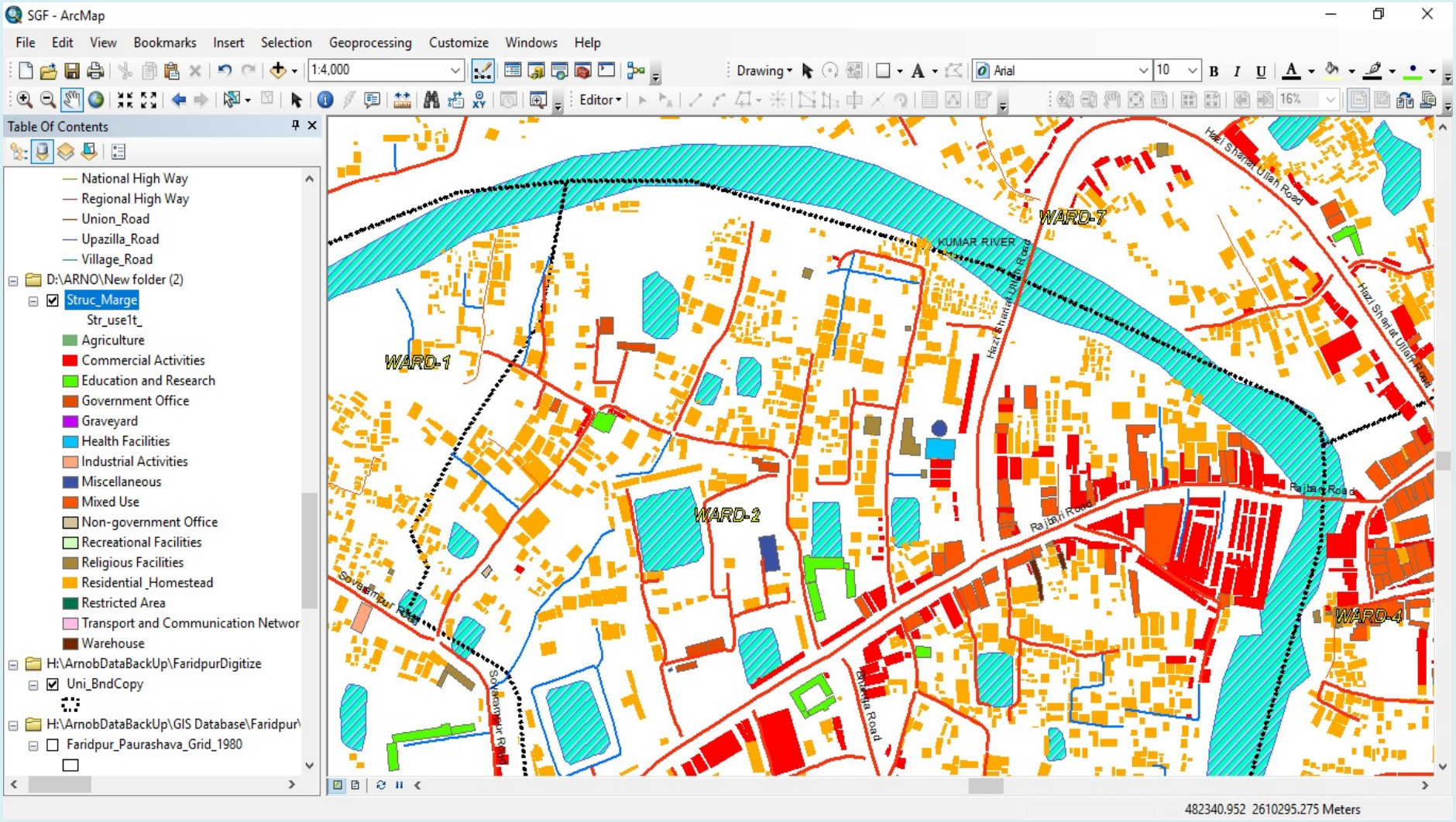




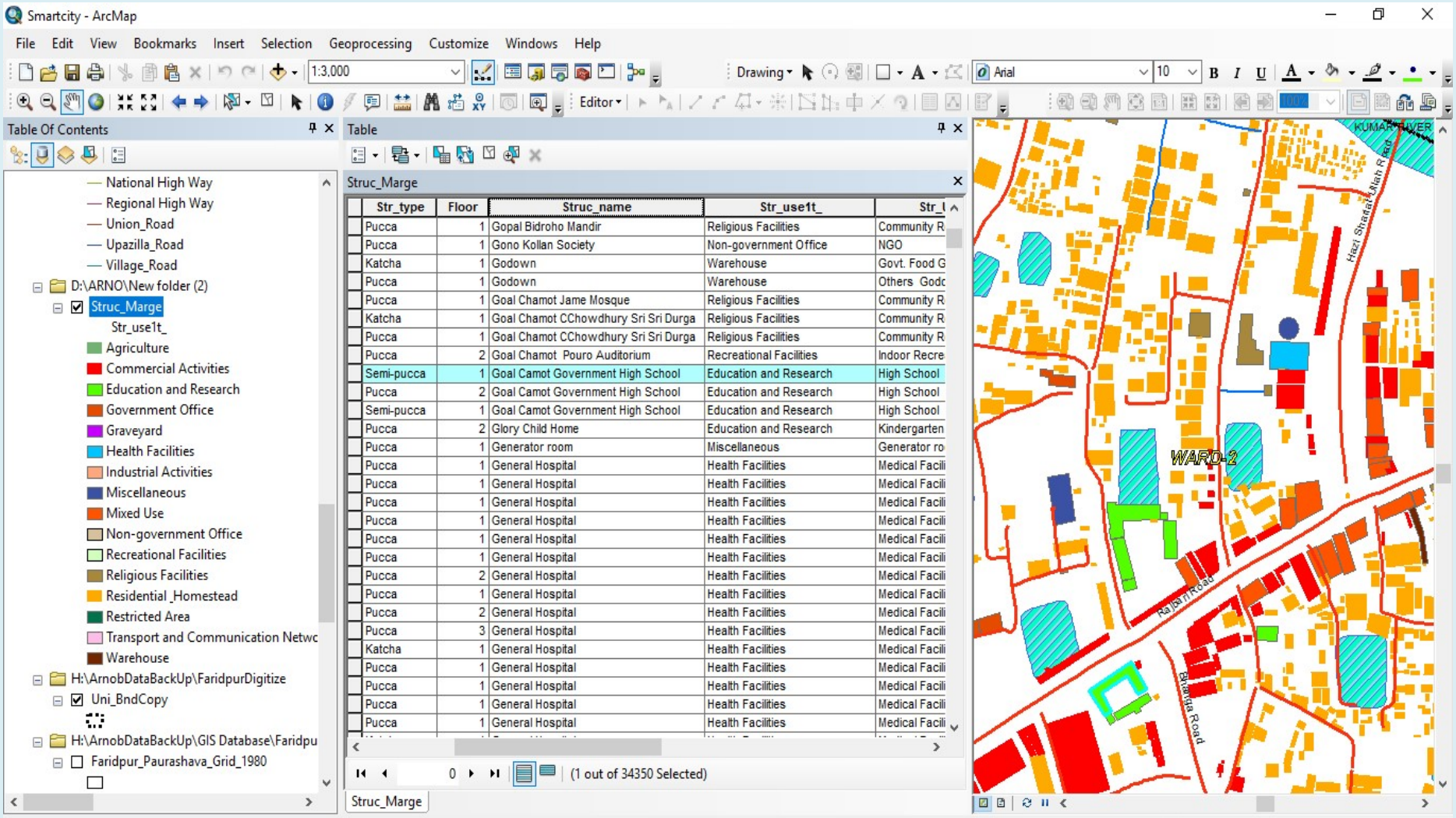
Faridpur Paurasava Landuse



Structure Use of Faridpur Paurasava



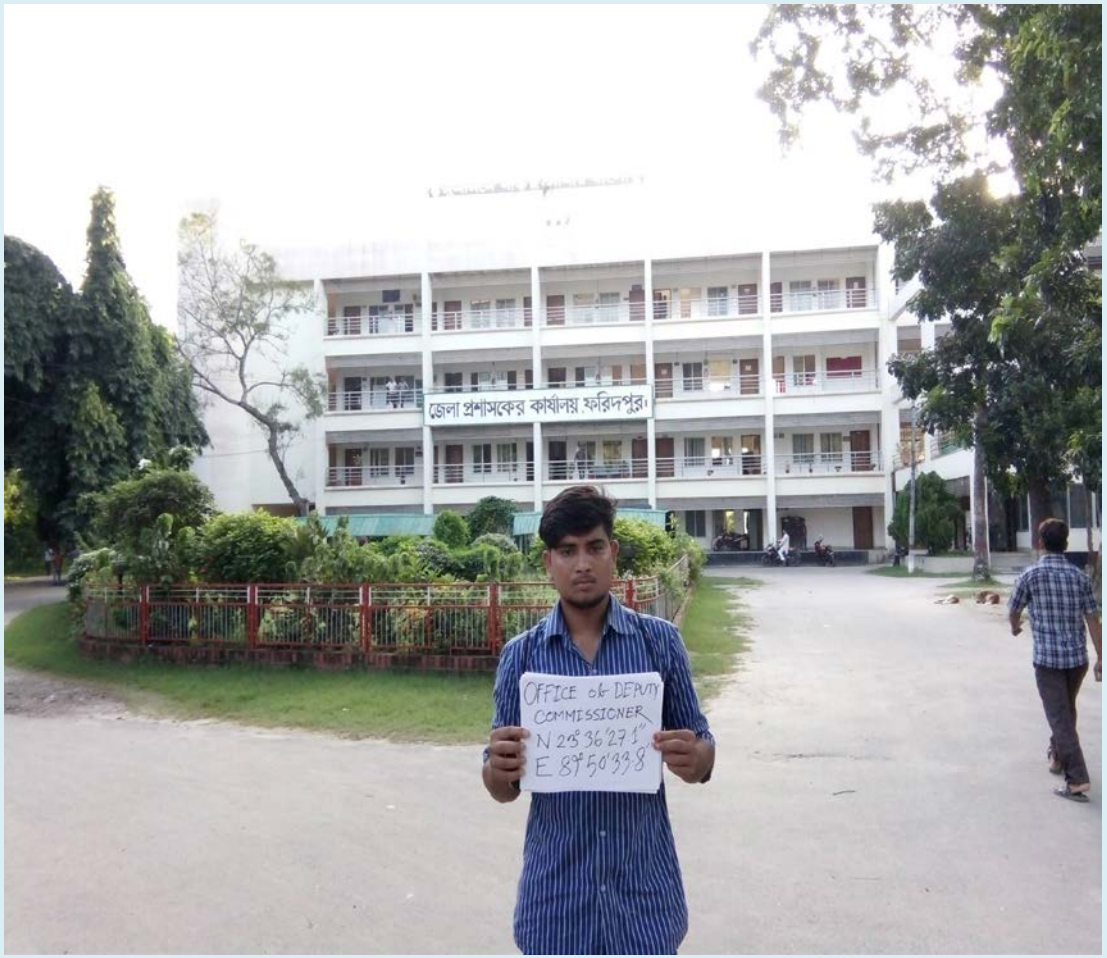
Structure Use of Faridpur Paurasava (Database)



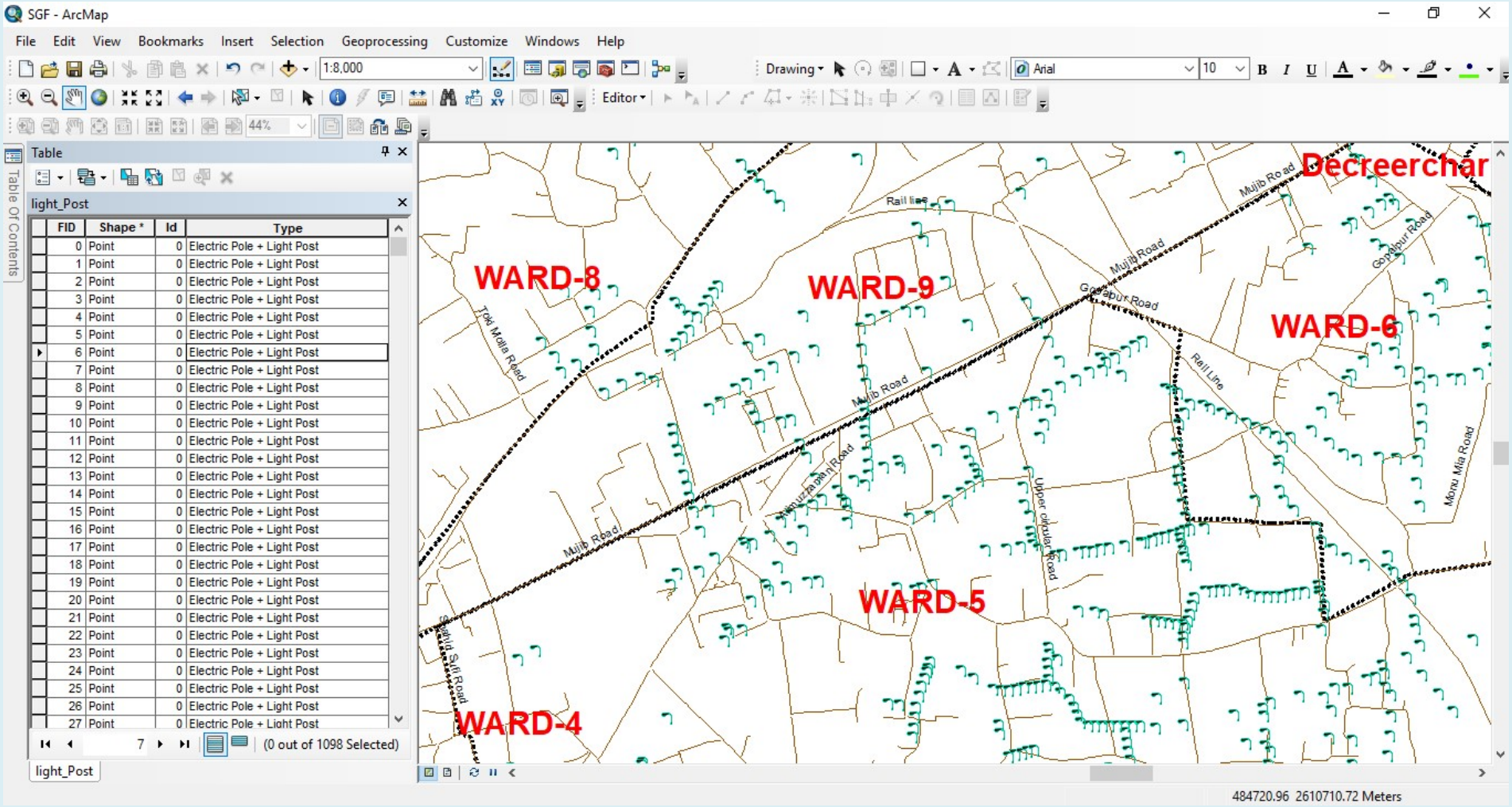
Structure Use With Vulnerable building picture & Location in Database

Important Structure picture & Location in Database

Taking GPS readings of Important Locations & Adding them in database



Utility locations of Faridpur Paurasava with database



Development Plan

and

Smart City concept

Understanding of Smart City

*A **smart city*** is an urban development vision to integrate information and communication technology (ICT) and Internet of things (IoT) technology in a secure fashion to manage a city's assets.

These assets include local departments' information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services.

Cont……

A smart city is promoted to use urban informatics and technology to improve the efficiency of services.

ICT allows city officials to interact directly with the community and the city infrastructure and to monitor

- what is happening in the city,
- how the city is evolving, and
- how to enable a better quality of life.

Through the use of sensors integrated with real-time monitoring systems, data are collected from citizens and devices – then processed and analyzed.

The information and knowledge gathered are keys to tackling inefficiency.[

Cont.....

•Information and communication technology (ICT) is used to enhance quality, performance and interactivity of urban services, to reduce costs and resource consumption and to improve contact between citizens and government.

•Smart city applications are developed to manage urban flows and allow for real-time responses.

•A smart city may therefore be more prepared to respond to challenges than one with a simple "transactional" relationship with its citizens.

•Yet, the term itself remains unclear to its specifics and therefore, open to many interpretations.

Other terms that have been used for similar concepts include *cyberville*, *digital city*, *electronic communities*, *flexicity*, *information city*, *intelligent city*, *knowledge-based city*, *MESH city*, *telecity*, *teletopia*, *Ubiquitous city*, *wired city.* *etc*

Characteristics of Smart City

A smart city uses information technologies to:

- Make more efficient use of physical infrastructure (roads, built environment and other physical assets) through artificial intelligence and data analytics to support a strong and healthy economic, social, cultural development.

- Engage effectively with local people in local governance and decision by use of open innovation processes and e-participation, improving the collective intelligence of the city's institutions through e-governance, with emphasis placed on citizen participation and co-design.

- Learn, adapt and innovate and thereby respond more effectively and promptly to changing circumstances by improving the intelligence of the city.

They evolve towards a strong integration of all dimensions of human intelligence, collective intelligence, and also artificial intelligence within the city.

Some major fields of intelligent city activation

Innovation economy	Urban infrastructure	Governance
Innovation in industries, clusters, districts of a city	Transport	Administration services to the citizen
Knowledge workforce: Education and employment	Energy / Utilities	Participatory and direct democracy
Creation of knowledge-intensive companies	Protection of the environment / Safety	Services to the citizen: Quality of life

Is it Smart city…….. ????

But We want …???

Conclusion

A Smart city concept can be a dream of Faridpur City Corporation and its Inhabitant.

But the ‘Dream’ come up in reality through the processes of this development plan activities and these data base will be act as a basis for future journey of development process by which Faridpur can be emerge as a Smart City in the next.


THANK YOU ALL