Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works

Workshop on Preparation of Development Plan for Fourteen Upazilas Project: Urban Design Scope for Faridpur Sadar Upazila

Presented by
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Presentation Outline

1. Project Brief
2. Objectives of the Project
3. Location of Project Area & their Chracteristics
4. Conceptualization & Methodology
5. Rapport Building & People's Participation
6. Major Surveys, their Modalities and Outputs
7. Thematic Maps and Suitability Maps → Example Faridpur Sadar Upazila
8. 5-tier Plan of 14 Upazilas → Quick Go Through
9. Summary of Key Features with Statistics of Faridpur Sadar
10. Linkage of 14 Upazila Plan Proposals with SDGs
11. Scope of work on Urban Design for Faridpur Sadar Upazila

Project Brief

- Name: Preparation of Development Plan for Fourteen Upazilas
- Organization: Urban Development Directorate (UDD)
- Ministry: Monistry of Housing and Public Works
- Funding: Government of Bangladesh
- Upazilas: 14
- Planning Area: 4335.83 Sq.Km.
  [Urban: 218.82 Sq.Km. (5.05%), Rural: 4117.01 Sq.Km. (94.95%)]
- **Existing Beneficiary: 38,64,195** [Urban: 5,04,525 (13%), Rural: 33,59,670 (87%)]
- **Projected Beneficiary (2033): 57,96,292**
- Project Period: June 2013 to June 2018
- Project Budget: 2054.44 Lakh (GoB)

Objective (s) of the Project:

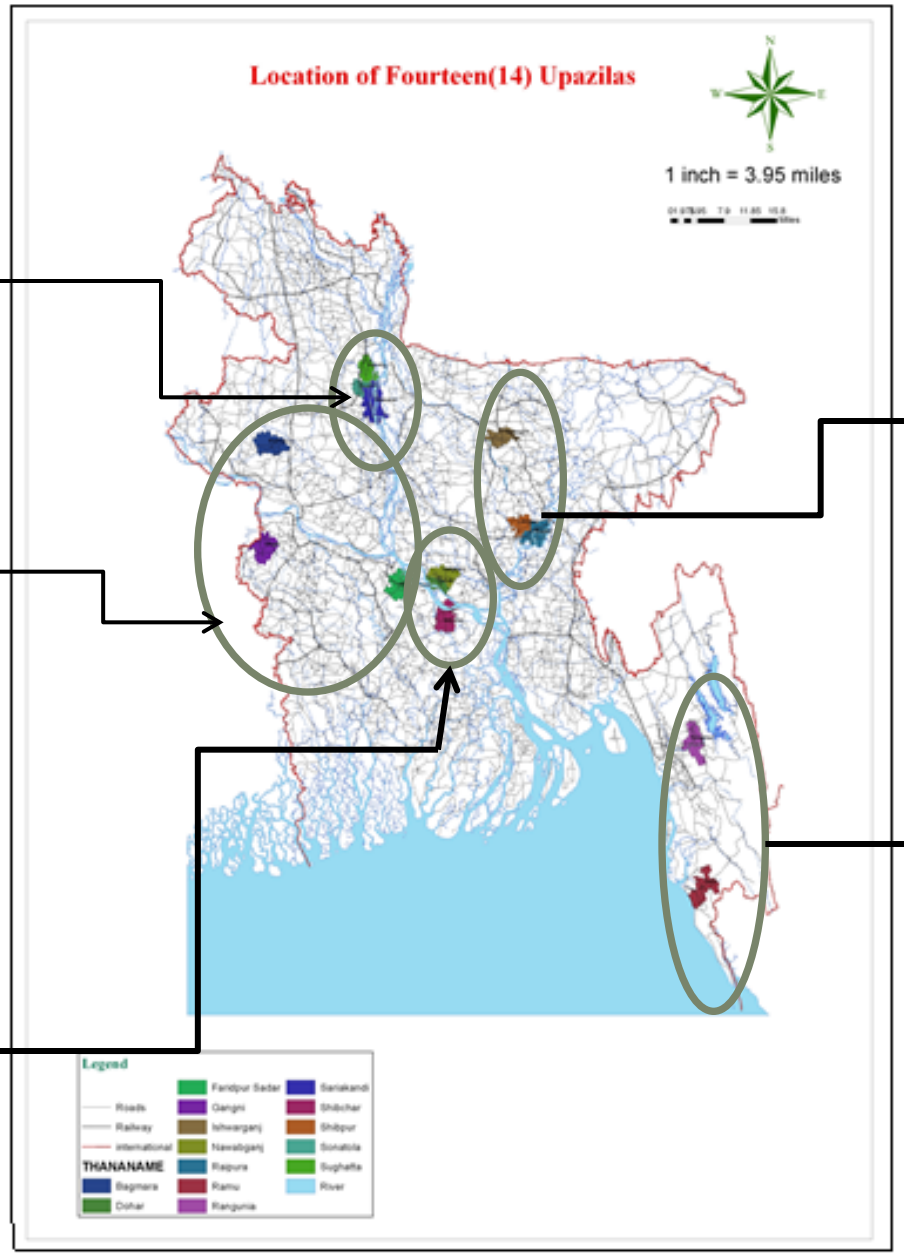
- To guide the land use transformation in an integrated and harmonic manner with a view to accelerate the economic and socio- political development of the project area.
- To protect the most valuable agricultural land from any other unplanned transformation
- To allow the towns to play their active socio-economic role within the **Physical Planning, agriculture, transportation, drainage, water Supply, housing and other important relevant sectors**
- To reduce disaster risk and vulnerability of the people of the project area through structure and non-structural interventions
- To improve awareness **of natural and man-made hazard mitigation** among the people of project area.
- To formulate 5-tier Plan (**Sub-regional plan, Structure plan, Urban area plan, Rural area Plan and Action area plan) for development planning** of the project area, additionally
- To formulate **Contingency Plan** for fourteen upazilas

Map: Location of 14 Upazilas and their Characteristics

Package-4 (Saghata, Sonatola, Sariakandi)
- Flood Prone Area
- Adjacent to Mighty Jamuna River
- Potential Char Land
- Potential Agriculture Area

Package-3 (Bagmara, Gangni, Faridpur Sadar)
- Mixed Characteristics
- Pond Excavation
- Border Upazila
- Potential Agriculture Area
- Tentative New Divisional Head Quarter

Package-1 (Dohar, Nawabganj, Shibchar)
- Adjacent to Dhaka City
- Padma Bridge impacted\ affected area
- River erosion affected area
- Potential for Industrial/Service Development



Package-2 (Ishwarganj, Shibpur, Raipura)
- Mostly Flood Free Area
- Adjacent to National Highway
- Highly Potential for Agriculture

Package-5 (Rangunia, Ramu)
- Hilly Area
- Flash Flood, Land Slide
- Potential for Tourism
- Good Agriculture on valley area

Number of Planning Packages under this Project:

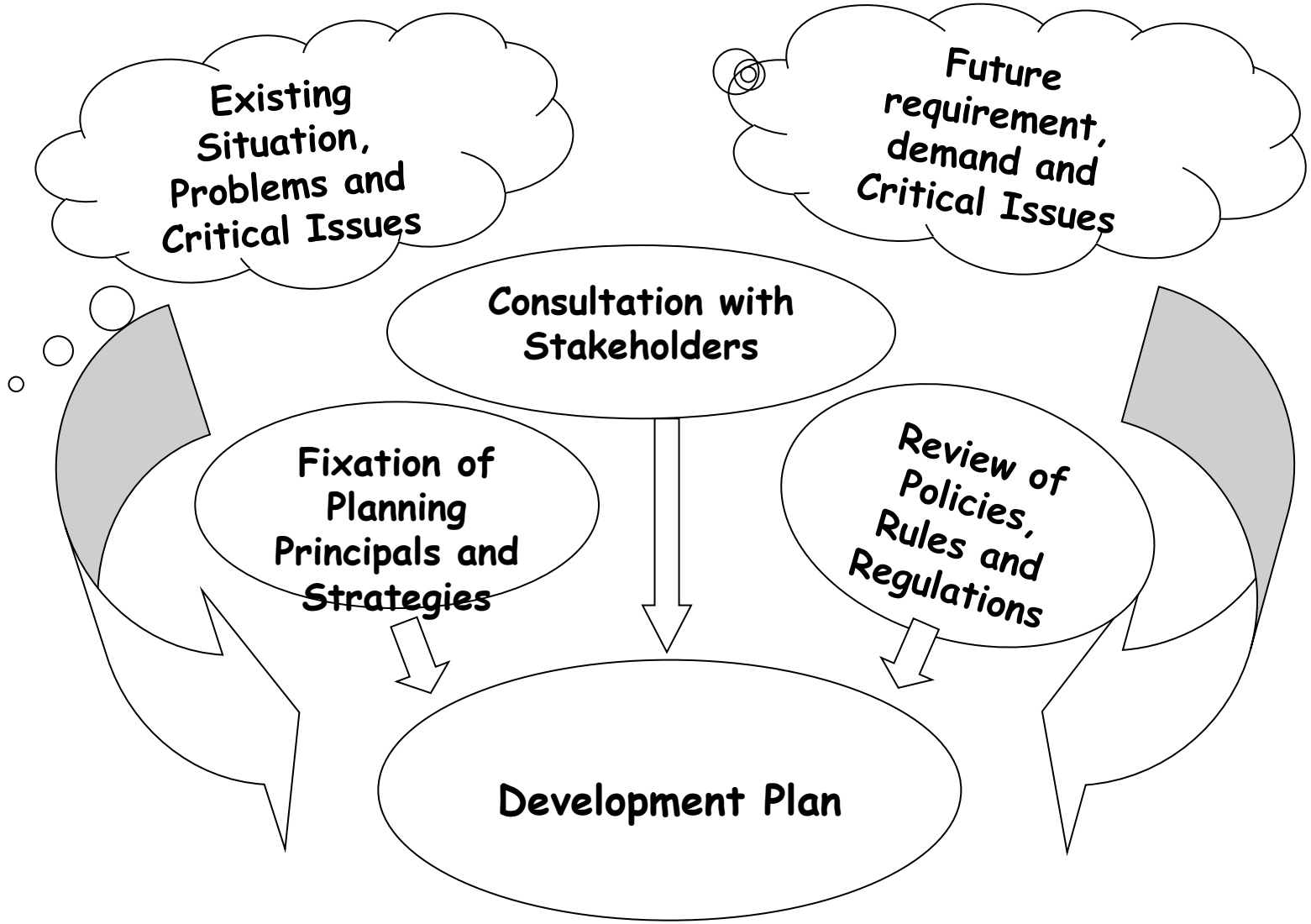
Sl. No.	Packages	Name of upazilas	Consulting Firms assigned
1.	Package-1	Nawabganj, Dohar, Shibchar	Desh-Upodesh in Association with AAima Int. BD & Texsus Ltd.
2.	Package-2	Ishwarganj, Raipura, Shibpur	JV of Sheltech (Pvt.) Ltd & Arc Bangladesh Ltd.
3.	Package-3	Bagmara, Faridpur sadar, Gangni	Engineers, Consultants and Associates Ltd. (ECAL)
4.	Package-4	Saghatta, Sonatota, Sariakandi	Modern Engineers, Planners & Consutants Ltd.
5.	Package-5	Ramu, Rangunia	JV of House of Consultants and Dm-Watch

Planning Area and Number of Beneficiary:

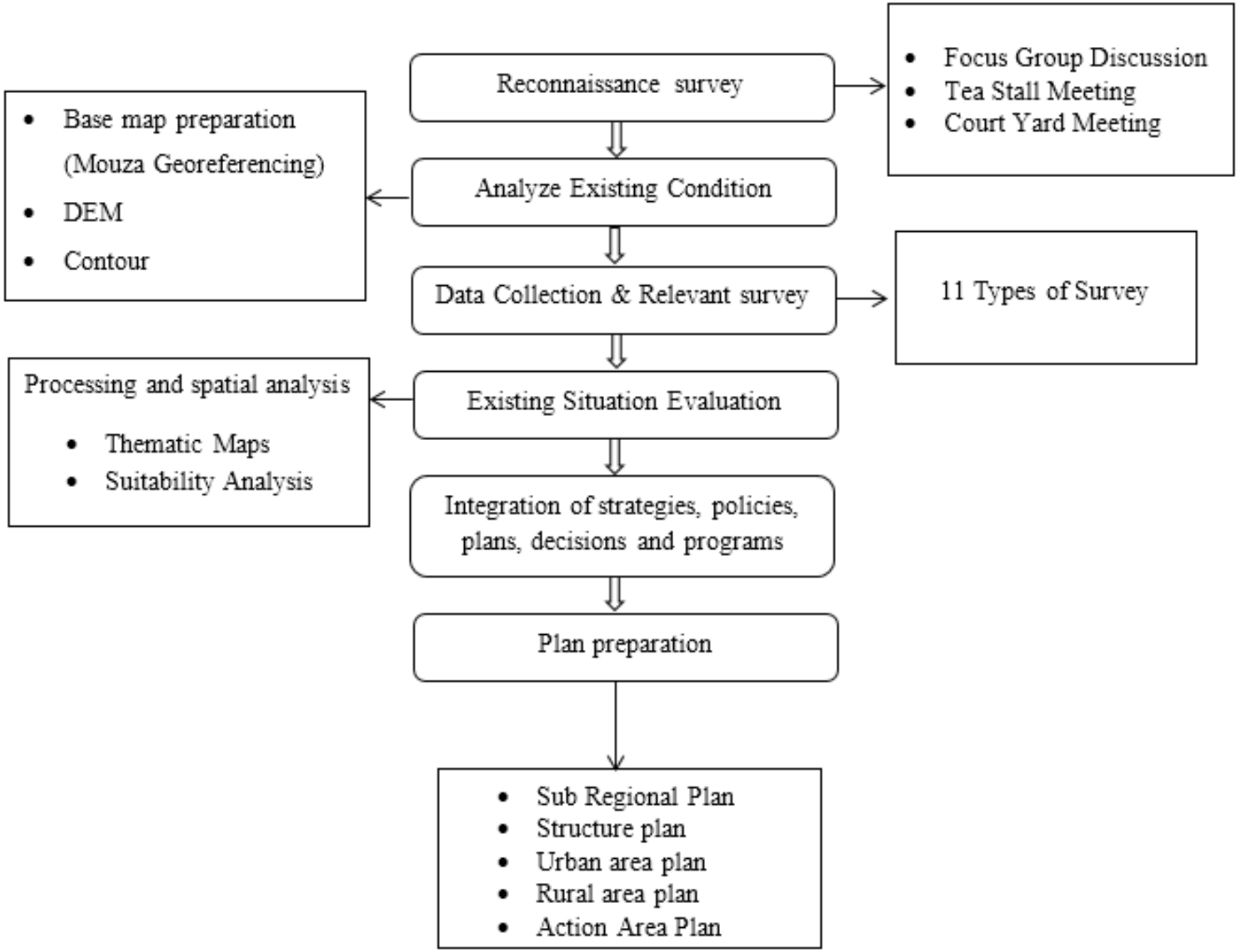
Sl. No.	Name of District	Name of upazila	Planning Area (sq.km)	Urban area	Rural area	Urban Population	Rural Population	Total Existing Beneficiary
1	Dhaka	Nawabganj	244.8	1.76	243.04	77590	410438	488028
		Dohar	161.49	20.31	141.18	61793	129630	191423
2	Chittagong	Rangunia	361.54	37.08	324.46	53035	245335	298370
3	Cox bazar	Ramu	391.71	22.03	369.68	33334	169349	202683
4	Rajshahi	Bagmara	363.3	26.58	336.72	34632	285336	319968
5	Faridpur	Faridpur	407.02	23.45	383.57	101084	312401	413485
6	Mymensingh	Ishwarganj	286.19	15.82	270.37	30948	307132	338080
7	Madaripur	Shibchar	321.88	17.02	304.86	27877	296561	324438
8	Narsingdi	Shibpur	232.47	3.52	228.95	10426	303394	313820
		Raipura	408.45	13.49	394.96	34411	420135	454546
9	Bogra	Sariakandi	432.6	3.58	429.02	17320	222763	240083
		Sonatala	156.73	4.94	151.79	11405	156142	167547
10	Gaibanda	Saghata	225.67	6.38	219.29	15549	234720	250269
11	Meherpur	Gangni	341.98	22.86	319.12	23846	245239	269085
Total			**4335.83**	**218.82**	**4117.01**	**504525**	**3359670**	**38,64,195**

Projected Beneficiary (2033): 57,96,292 (Approx.)

Conceptualization of Development Plan Preparation



Methodology



Surveys Conducted

What we have done for Faridpur Sadar Upazila, for Example.....

- Planning Package Description
- At a Glance about Faridpur Sadar Upazila
- Undertaken Surveys at Faridpur Sadar Upazila
- Survey Outputs
- Thematic Maps
- Suitability Maps
- Draft and Final Plan Preparation

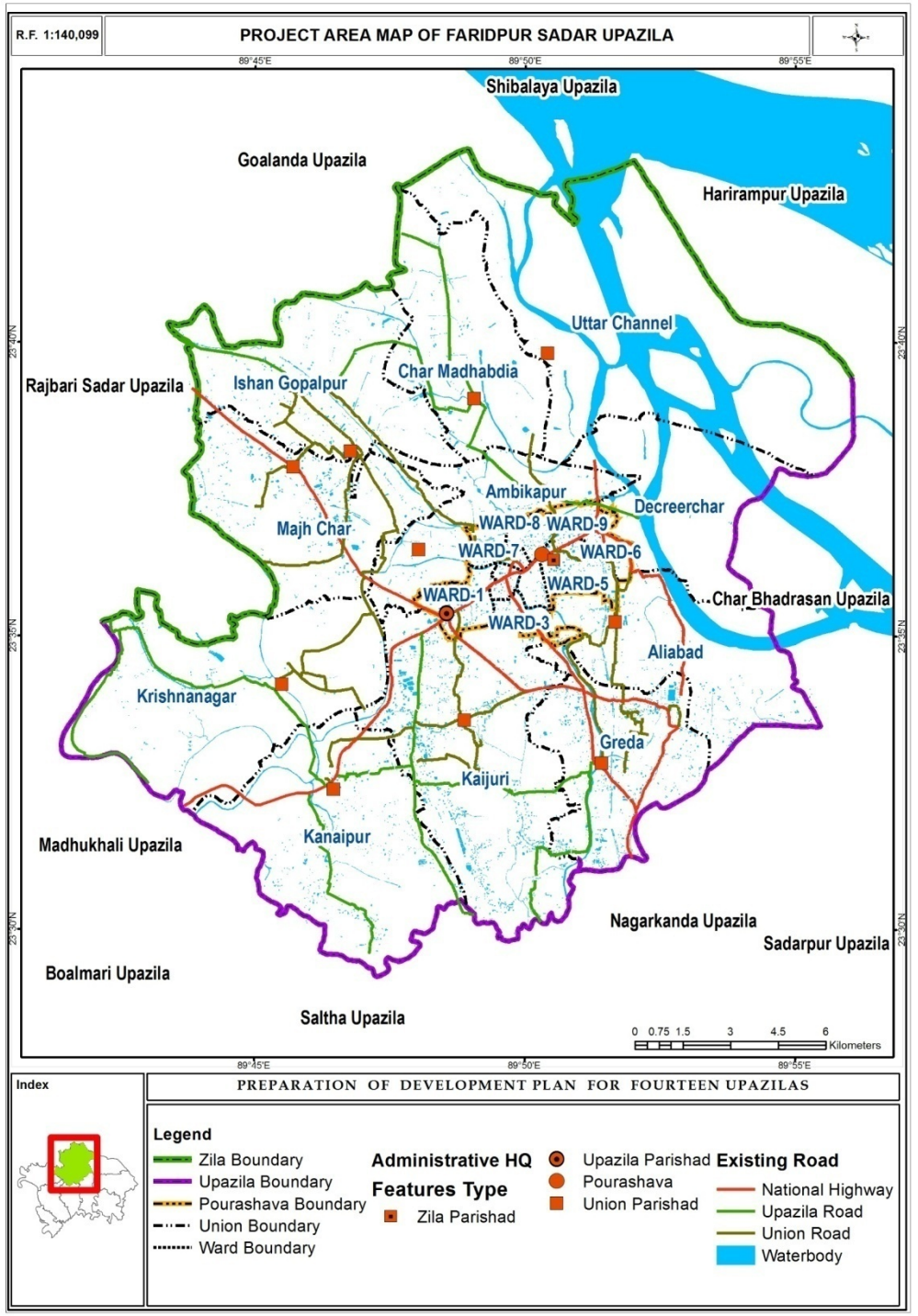
Project Area Map

Area: 407.02 sq. km.

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.



Faridpur Sadar Upazila

- Planning Package: 03-(Bagmara Upazila, District- Rajshahi, Faridpur Sadar Upazila, District- Faridpur and Gangni Upazila, District- Meherpur)
- Planning Area: Faridpur Sadar Upazila : 412.86 Sq. kilometer (BBS,2011)
- Main Goal of Development Plan: Preparation of Five Tiers Development Plan
- Sub Regional Plan, Structure Plan, Urban Area Plan, Rural Area Plan and Action Area Plan
- Contingency Plan

At a Glance about Faridpur Sadar Upazila

Upazila (412.86 sq.km.)									
Municipality	Union	Mouza	Village	Population (4,69,410)		Density (per Sq. km)	Literacy Rate (%)		Annual Growth Rate
				Urban	Rural		Urban	Rural	
1 (Ward-9)	11 (*12)	157	332	1,21,632	3,47,778	1016	73.3	41.6	1.26

- Chadpur Union has been added as 12th Union in the project area
- Pourashva has been redesigned to 27 wards.

(Source: BBS, 2011)

Population Projection

	Ward No.	Population in 2011	Population in 2033
Population Projection of Faridpur Paurashava according to wads. Existing Population 4,69,400 (BBS, 2011)	Ward No. 1	15644	20921
	Ward No. 2	12715	17004
	Ward No. 3	13867	18545
	Ward No. 4	16686	22315
	Ward No. 5	15401	20596
	Ward No. 6	9689	12958
	Ward No. 7	11102	14847
	Ward No. 8	13919	18614
	Ward No. 9	12599	16849
	Urban	**121622**	**162649**
Population Projection according to 11 Unions of Faridpur Sadar Upazila **Projected Population (2033)** **6,24,721** **Estimated Growth Rate:** **1.33 (Urban)** **1.3 (Rural)**	Union	Population in 2011	Population in 2033
	Aliabad	33944	45099
	Ambikapur	27477	36507
	Char Madhabdia	28476	37834
	Decreerchar	21195	28161
	Greda	29242	38852
	Ishan Gopalpur	28861	38346
	Kaijuri	42153	56006
	Kanaipur	48559	64518
	Krishnanagar	37667	50046
	Majh Char	29118	38687
	North Channel	21086	28016
	Union	**347778**	**462072**

Survey Conducted in the whole Upazila……

Participatory Rapid Appraisal (PRA)

- Purpose of PRA
  - 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;
  - Supplement and facilitate matching PRA findings with different sectoral findings, particularly spatial analysis;
  - Make participants To make participants own the project and its activities towards realizing participatory planning approach.
- PRA Tools
  - Social/Resource Mapping
  - Problems and Potentials Venn Diagram
  - Technology of Participation (ToP)/Consensus Workshop.
- PRA Sessions-20 (Union: 11 and Pourashava Wards : 9)

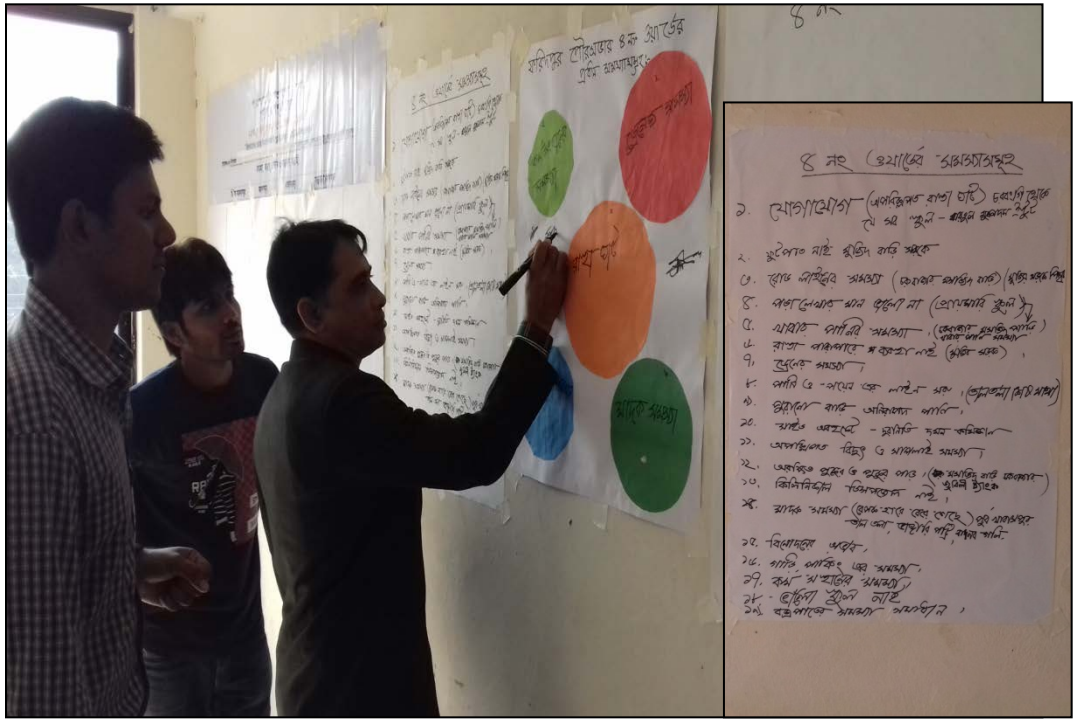
Participatory Rural Appraisal (PRA)

PRA Briefing

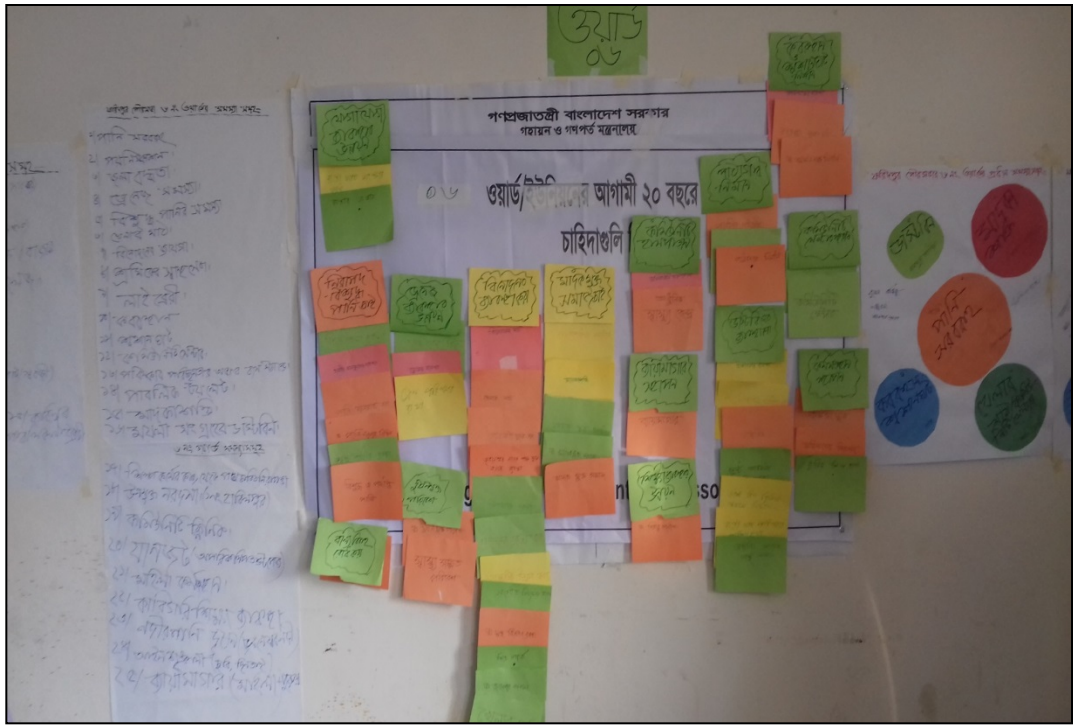
PRA Session in Ward 5

(Source: Field Survey ,2016)

Participatory Rural Appraisal (PRA)



Problem Identification



Categorization of the Demand

(Source: Field Survey ,2016)

Participatory Rural Appraisal (PRA)

Women Involvement in Problem Identification

PRA Session in Ward No.3

(Source: Field Survey ,2016)

Participatory Rural Appraisal (PRA)

Social Mapping

PRA Session in Faridpur Paurashava

(Source: Field Survey ,2016)

Participatory Rural Appraisal (PRA) Findings

Union Name	Problems	Potentials
Aliabad	• Sanitation • Communication problem • Lack of educational infrastructure • Lack of pure drinking water • Weak local government • Unemployment • Water logging • Lack of agricultural training • No hospital • Lack of drainage system	• Agricultural land (Chili, Jute, Paddy, Cucumber) • Manpower • Livestock • Foreign remittance • Hat /Bazar
Ambikapur	• Drug addiction • Lack of educational infrastructure • Lack of local Govt. empowerment • Water logging, Unemployment • Communication problem • Unhealthy drinking water and sanitation	• Agricultural Crop (onion, jute, paddy) • Man power • Poet Jasim Uddin's house • Educational institute • Muslim mission school • Marine academy • Remittance
Char Madhabdia	• Lack of educational infrastructure • Sanitation, Banking, Communication • Pure drinking water, Early Marriage	• Agricultural land, Vegetables, Active manpower • Expatriates • Educated man power

Participatory Rural Appraisal (PRA) Findings

Union Name	Problems	Potentials
Dicrirchar	• Education, Sanitation, Health service • Communication problem • Lack of pure drinking water	• Agricultural land, Vegetables • Active manpower • Expatriates • Educated man power
Greda	• Education, Sanitation problem • Water logging, Health service • Lack of pure drinking water	• Agricultural land • Proposed EPZ, Cattle farm • Kumar river, Educated man power
Ishan Gopalpur	• Communication Problem • Health facility problem • Lack of security • Lack of education, electricity • Lack of River and canal erosion • Unplanned market, Drug addiction • Lack of cold storage	• Agricultural land (onion, jute, paddy) • Fisheries • Medicinal and forest tree • Remittance • Livestock • Brick Industry
Kaijuri	• Communication problem • Sanitation problem • Unemployment • Lack of Agricultural equipment • Lack of Pure drinking water	• Agricultural land • Market • Poultry farm • Water body Active man power

Participatory Rural Appraisal (PRA) Findings

Union Name	Problems	Potentials
Kanaipur	• Lack of education • Market • Health service problem • Lack of Fire service • Lack of pure drinking water	• Agricultural land • Cattle farming • Industry • Expatriates Business
Krishnanagar	• Lack of education • Lack of electricity • Health service • Lack of communication • Law and order	• Agricultural land • Market • Industry • River • Educated manpower
Majhchar	• Communication Problem • Sanitation problem • Lack of education • Lack of health facility • Unemployment	• Agricultural land (onion, jute, paddy, vegetable) • Fisheries • Industry • Remittance • Home cattle
North Channel	• Unemployment • Lack of education • Communication problem • Lack of health facility • Sanitation problem • Natural river	• Agricultural land (onion, jute, paddy, vegetable) • Sand • Fisheries • Remittance • Home cattle

Development Priorities through PRA

- **Short Term (1-5 Years):** Communicational development, Improved drainage, Educational development, Water supply, Electricity, Drug eradication , Development of agriculture, Employment opportunity, Sanitation, Health Facilities

- **Mid Term (5-10 Years):** Development in communication, Agricultural development, Employment, Sanitation, Quality education, Food management, Improved drainage

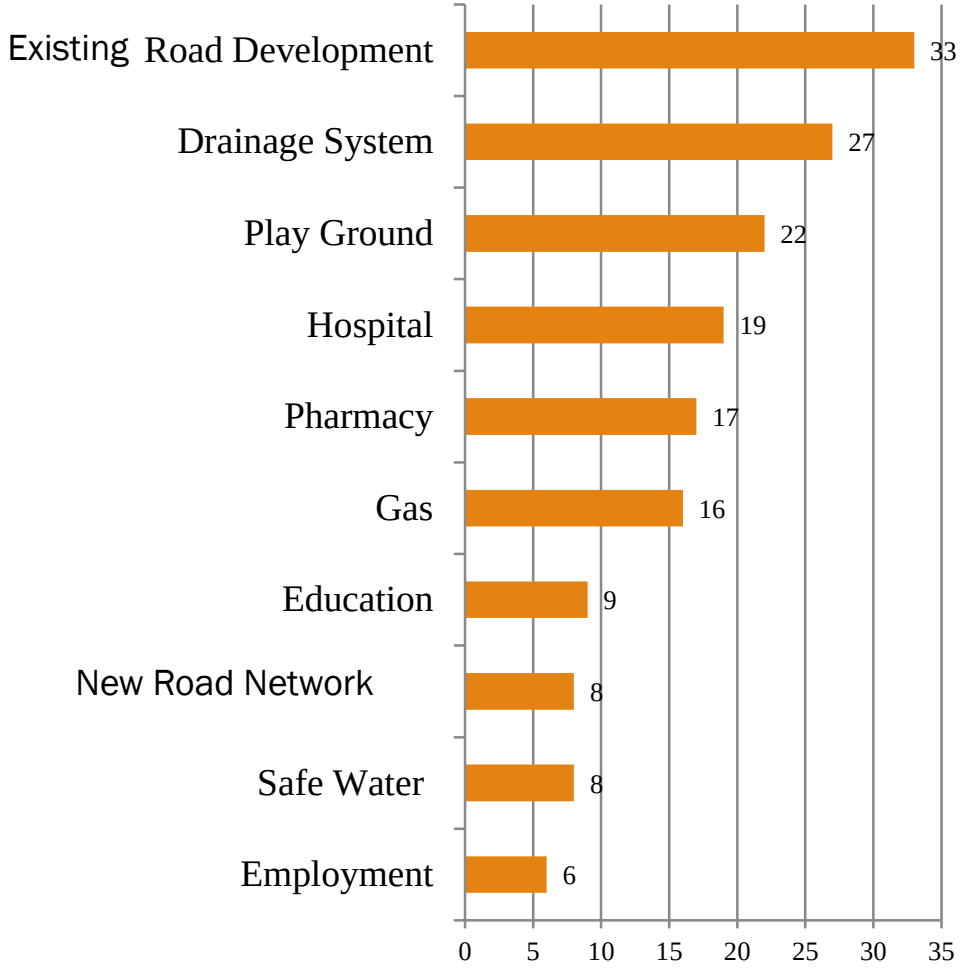
- **Long Term (10-20 Years):** Better communication, Agricultural development, Model union

Socio Economic Survey

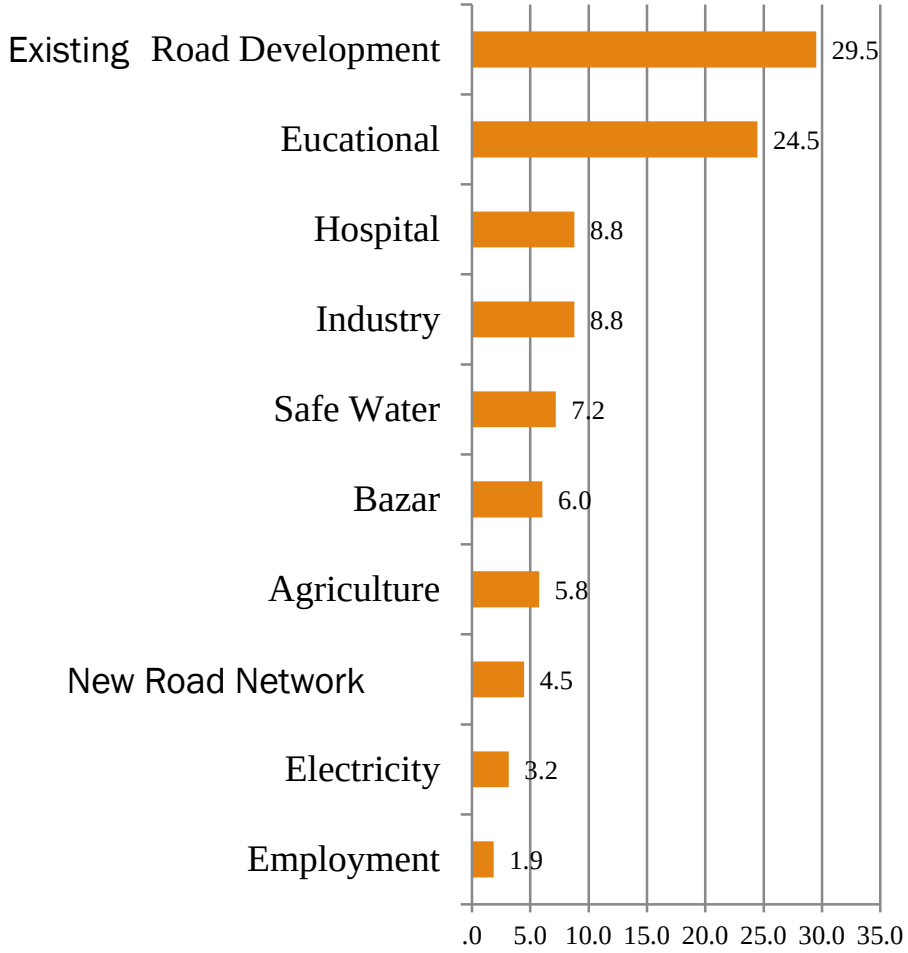
- **Objectives of the Survey**
  - **Demographic and socio-economic characteristics of households and population;**
  - **Union and Pourashava/Upazila HQ (as the case may be) service provisions, including infrastructure and social facilities;**
  - **Access to the essential services and facilities required;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

Questionnaire	Urban Area	Rural Area	Sample Size
Faridpur Sadar	232	958	1190

Socio Economic Survey



Prioritization of Development Needs in Urban Area



Prioritization of Development Needs in Rural Area

Formal and Informal Economic Survey

To analyze the present economic base of the Upazila how the significance of its economic base is changing compared to the national economy

Name of Upazila	Method	Sample Size
Faridpur Sadar	Questionnaire	313

Formal Industries
1. Jute Mills & Stores
2. Brick Field
3. Ice cream factory
4. Workshop
5. Building materials
6. Cottage
7. Cottage and Handicrafts
8. Rice mill
9. Workshop
10. Yarn and Fabrics industry
11. Flour mill
12. Goor processing
13. Handicrafts
14. Yarn and Fabrics industry

Formal and Informal Economic Survey

(Source: Field Survey ,2016)

Participants of Formal Informal survey

Traffic and Transportation Survey

- Traffic Volume Count Survey
- Origin & Destination (O-D) Survey
- Passenger Interview Survey and
- Regional Transportation Survey

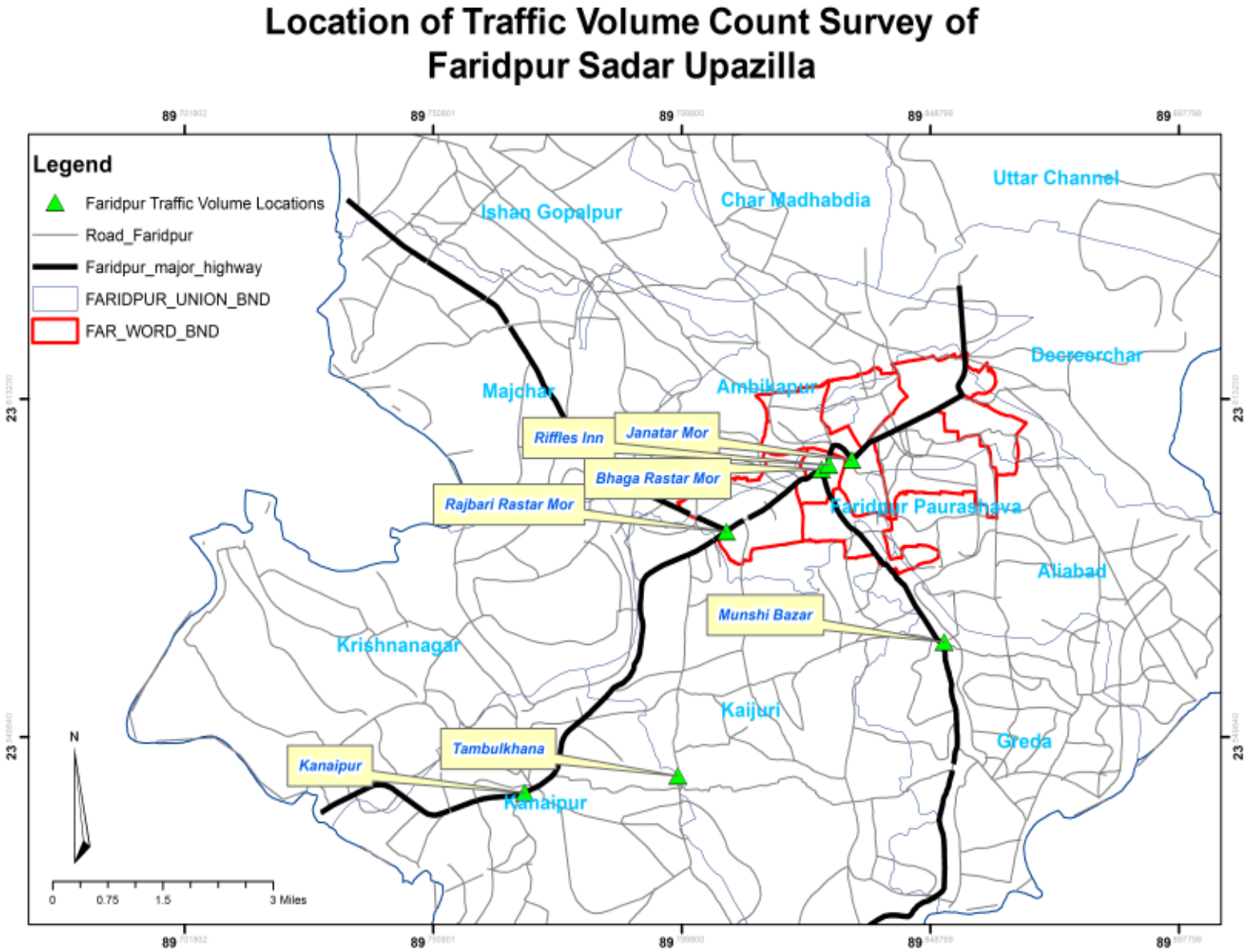
Method	Type of Survey	Sample Size
Questionnaire	O-D Survey	150
	Regional Survey	100
	Passenger Inter view	200

Traffic and Transportation Survey

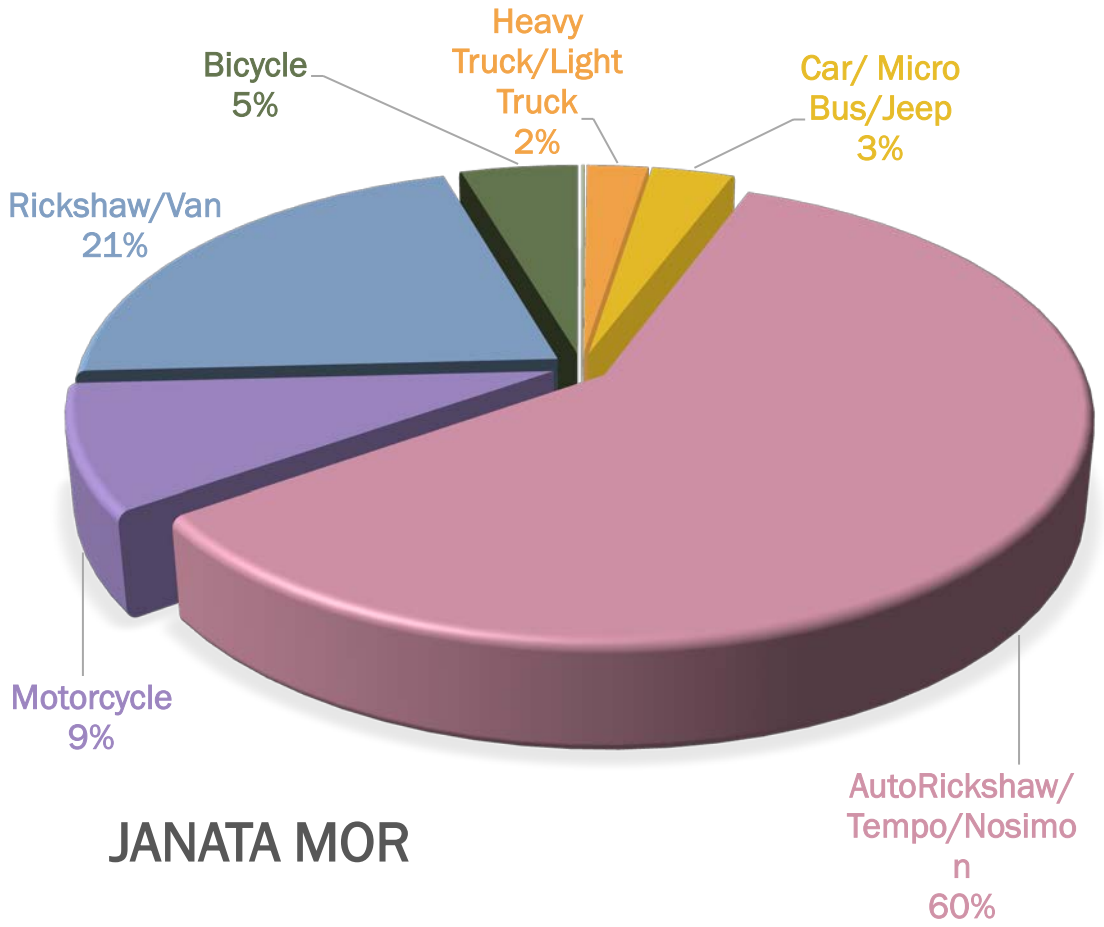
Traffic Volume Count Survey Locations

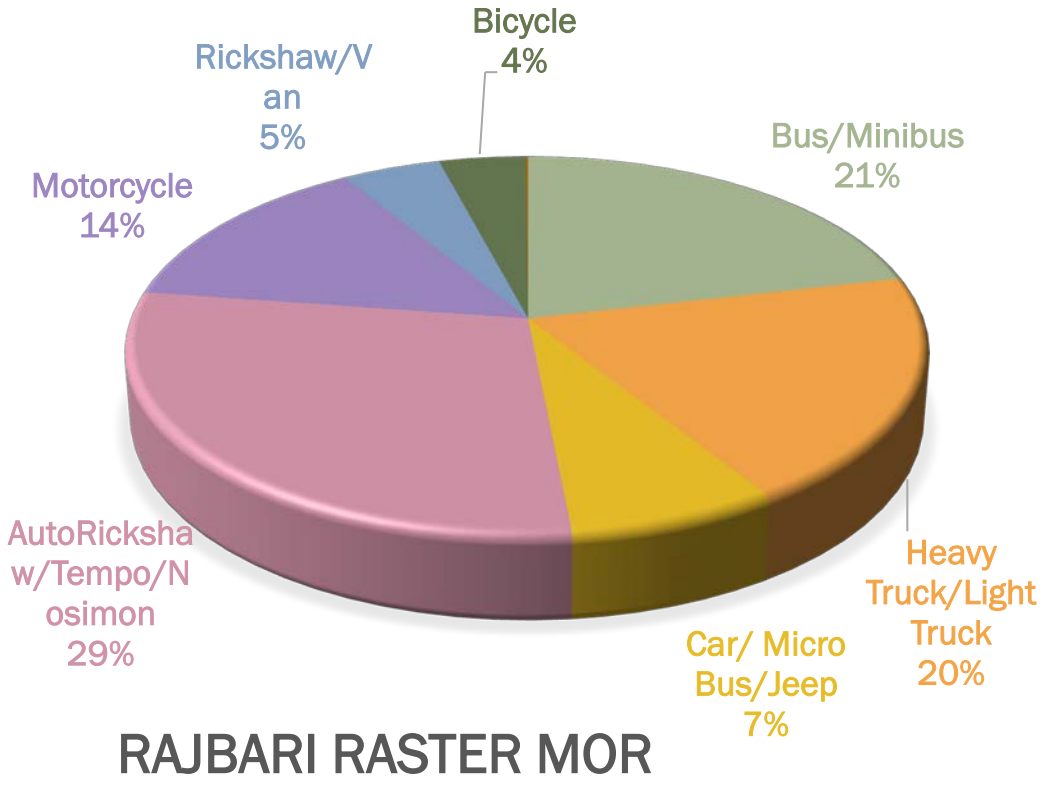
Intersection	Date	Remarks
• Rajbari Raster Mor	7-Mar-16	On Day
• Vanga to raffle in • Janata Mor	4-Mar-16	Off Day
• Bhanga Rastar Mor	10-Mar-16	On Day
• Munshi Bazar • Tambulkhana	7-Mar-16	Off Day
	10-Mar-16	On Day
• Kanaipur	11-Mar-16	Off Day

Traffic and Transportation Survey



Traffic and Transportation Survey

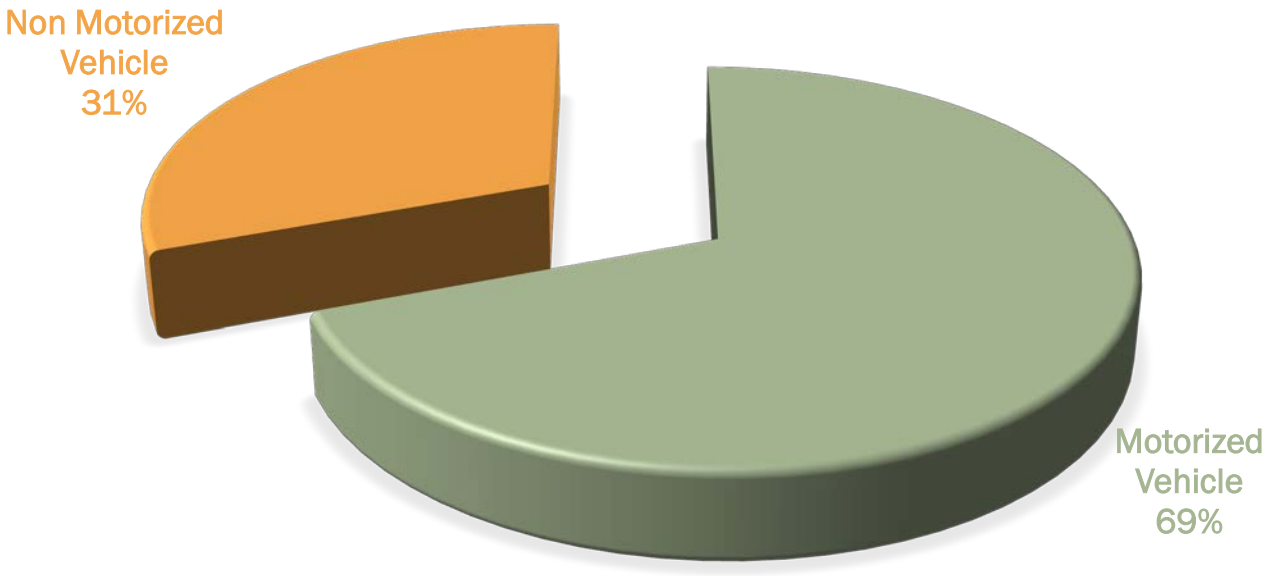




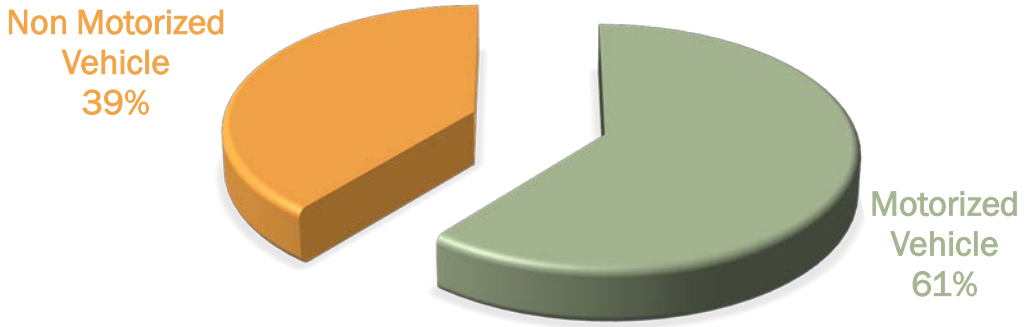
(Source: Field Survey ,2016)

Output of Traffic Volume Count Survey

BHANGA RASTAR MOR



MV AND NMV AT KANAIPUR



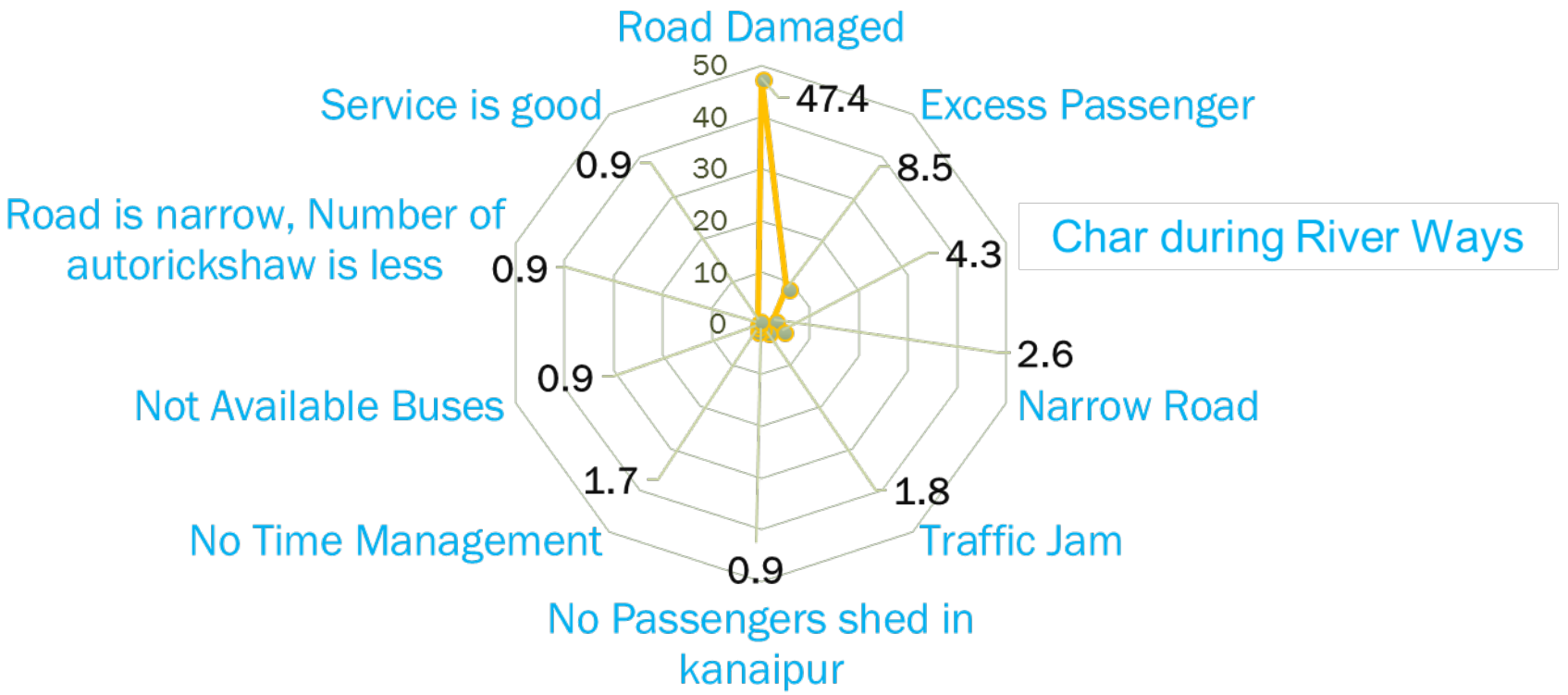
Traffic and Transportation Survey

Destination / Origin	Bodorpur	CMB Ghat	Faridpur	Kanaipur	Munshibazar	Shibrampur	Somespur bazar	Tepakhola	Chandpur	Gopalganj	Hajiganj	Tambulkhana	Total
Bodorpur	0	0	0	1	0	0	0	0	0	0	0	0	1
CMB Ghat	0	0	1	0	0	0	0	2	0	0	0	0	3
Faridpur	1	0	0	0	2	0	0	0	0	1	0	1	5
Kanaipur	0	1	3	0	0	1	0	0	3	0	0	1	9
Munshibazar	0	0	4	0	0	0	0	0	0	0	0	0	4
Shibrampur	0	0	1	0	0	0	0	0	0	0	0	0	1
Somespur bazar	0	0	0	0	0	0	0	0	0	0	0	3	3
Tepakhola	0	5	7	0	0	0	1	0	0	0	2	0	15
Chandpur	0	0	0	1	0	0	0	0	0	0	0	0	1
Gopalganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Hajiganj	0	0	0	0	0	0	0	0	0	0	0	0	0
Tambulkhana	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	6	16	2	2	1	1	2	3	1	2	5	42

Origin Destination Matrix

(Source: Field Survey ,2016)

Traffic and Transportation Survey



Percentage of Facing Problems

(Source: Field Survey ,2016)

Agricultural Survey

(Source: Field Survey ,2016)

Some Pictures of Agriculture Survey

Discourses with SAAOs to identify..

Cropping Intensity and Pattern Data Collection collaboration with Sub Assistant Agriculture Officers

(Source: Field Survey ,2018)

Agricultural Questionnaire Survey

MAJOR PROBLEMS OF CROP PRODUCTION IN FARIDPUR SADAR UPAZILA (UNIONS & POURASHAVA)

- Sand deposition on agricultural land affecting normal crop cultivation,
- Risk of early flood damage the field crops every year,
- Water stagnation, silted canals and Kutcha irrigation drainage system,
- Acute drought in char land area and no sustainable agricultural planned for char land areas,
- Oppression of jotdars (land grabber) and their hooligans in the char land areas,
- Less supply of cultivated and irrigation equipment,
- Kutcha road and damaged and poor transportation in some of the Unions,
- Farmers lack of knowledge on modern crop production technology,
- Shortage of cold storage & seed store and lack of wholesale market infrastructure,
- Shortage of high quality HYV & Hybrid crop seeds of spices & vegetables
- Agriculture labor crisis, high wage rate, Less market price of produce agricultural crops and production cost is high,
- Productive agricultural lands are reducing due to construction of houses and industries, expansion of market on Agricultural land,
- Lack of awareness on proper management of land and improper uses of pesticides and chemical fertilizers,

Hydrological Survey

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 Modelling • Develop structural, non structural interventions
Data Analysis & Recommendations	• Hydrology and hydrodynamic Modelling, Analyze existing and future plans

Hydrological Survey

(Source: Field Survey ,2016)

River Cross section survey

Hydrological Survey

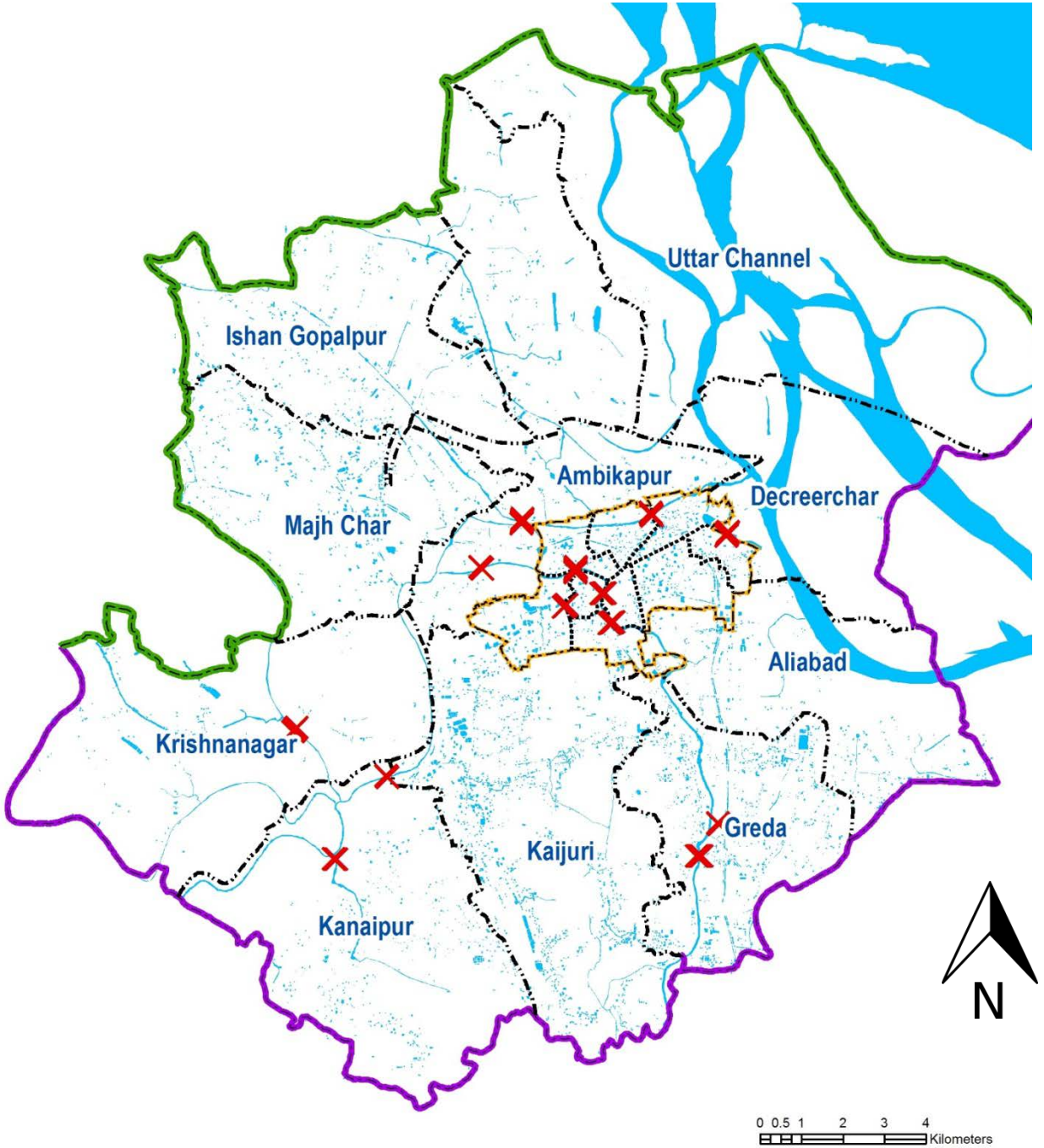
Cross section Locations

Cross section Name	River Name	Easting	Northing	RL
X-Sec-01	Tepakhola Lake	791879.2299	2614129.031	8.41
X-Sec-02	Kumar	790034.63	2614676.449	6.327
X-Sec-03	Kumar	786942.379	2614417.457	3.65
X-Sec-04	Kumar	788260.7772	2613323.712	8.02
X-Sec-05	Kumar	788916.348	2612684.048	1.17
X-Sec-06	Kumar	789099.0464	2611961.712	7.25
X-Sec-07	Jholai Khal	788049.9424	2612389.748	2.98
X-Sec-08	Kumar	786001.3321	2613221.419	5.72
X-Sec-09	Kumar	781572.0389	2609256.48	5.86
X-Sec-10	Kumar	783809.1047	2608143.036	2.39
X-Sec-11	Kumar	782616.8274	2606131.273	4.031
X-Sec-12	Kumar	791444.111	2606386.991	6.11
X-Sec-13	Mandartola Khal	791847.0783	2607163.058	6.9

(Source: Field Survey ,2016)

Hydrological Survey

Cross section Locations



Legend

Faridpur (Cross Section)

Admin Boundary

- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary

(Source: Field Survey ,2016)

Geological and Geo Physical Survey

To ensure the sustainable development, the prime objectives of this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meteorological hazards such as earthquake, ground failure and integrate the consequence into the design of the infrastructure.

Geological and Geo Physical Survey

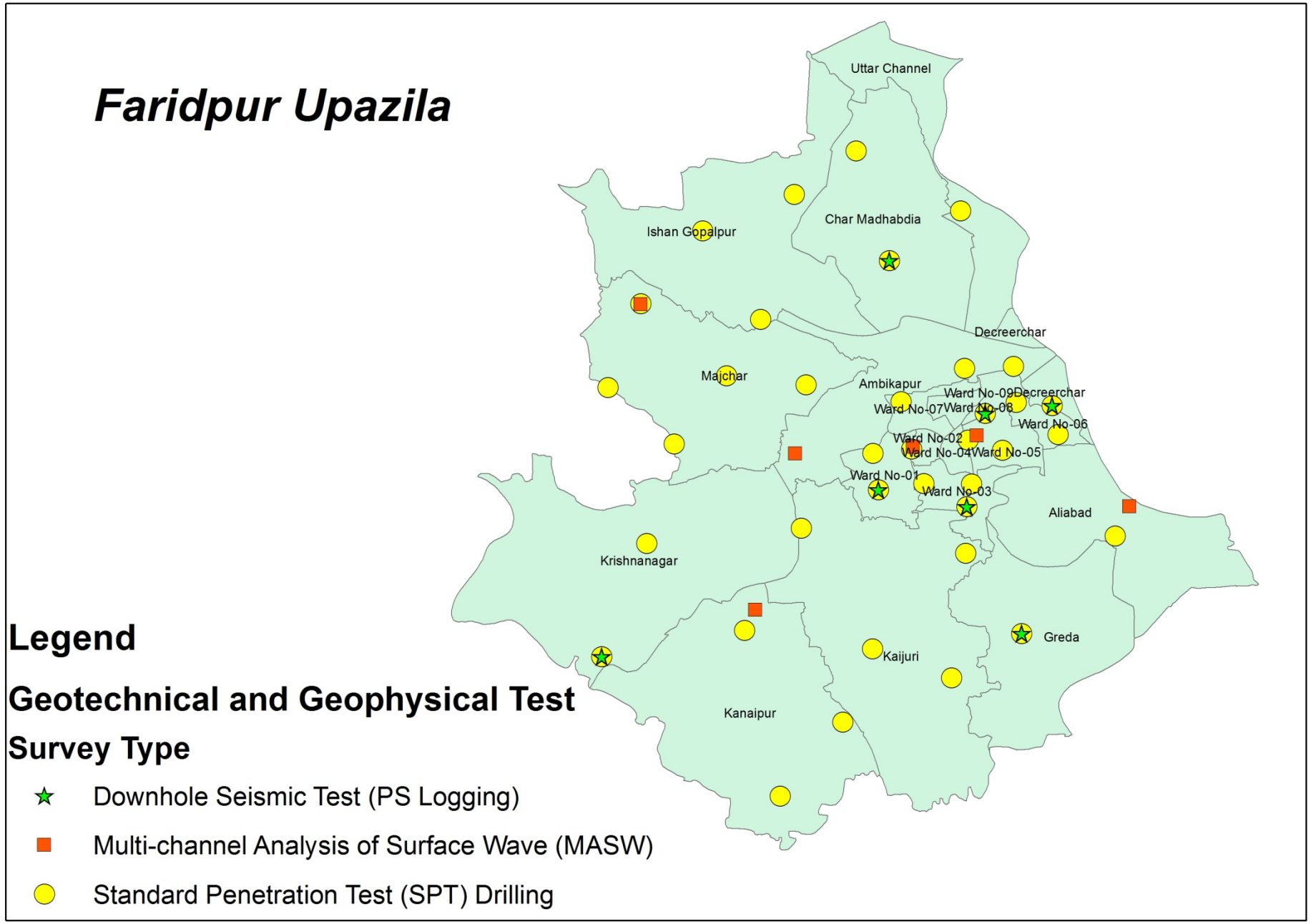
- Geomorphologic field study
- Drilling of boreholes and preparation of borehole logs;
- Collection of undisturbed and disturbed soil sample as per standard guide line;
- Conducting standard penetration tests (SPTs);
- Drilling of boreholes and casing by PVC pipe for conducting PS logging test
- Conducting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

Geological and Geo Physical Survey

Conducted Test Number

Upazila Name	SPT Boring	Down Hole Seismic (PS Logging) Test	MASW Survey
Faridpur	37	7	6

Geological and Geo Physical Survey



(Source: Field Survey ,2016)

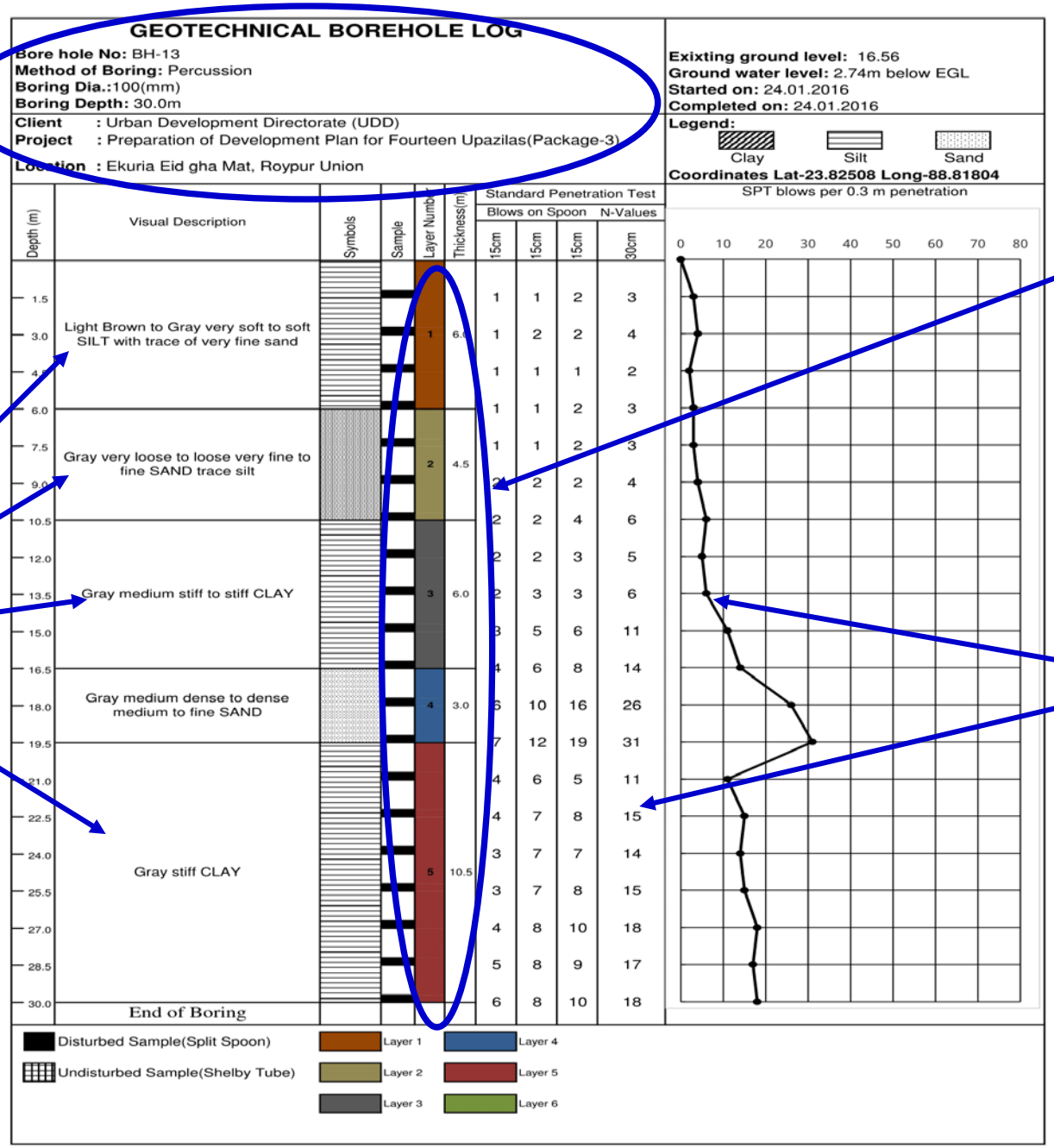
Standard penetration Test boring Data Processing and Log Format representation

Location information

Layer description/ Lithology

Layer Number and Thickness

Soil Resistance/ SPT N Values and Graph



Test details and procedure of down-hole seismic test (PS Logging)

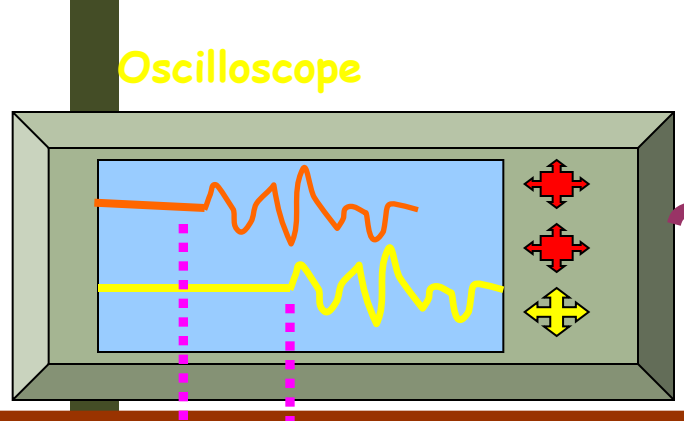
- The seismic downhole test aims to measure the travelling time of elastic wave from the ground surface to some arbitrary depths beneath the ground.

- 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.

PS Logging Test



Pump

Horizontal plank with normal load

Δt

z_1

z_2

Hammer

x

packer

Test Depth Interval

Horizontal Velocity Transducers (Geophone Receivers)

$R_1^2 = z_1^2 + x^2$

$R_2^2 = z_2^2 + x^2$

Shear Wave Velocity:

$V_s = \Delta R/\Delta t$

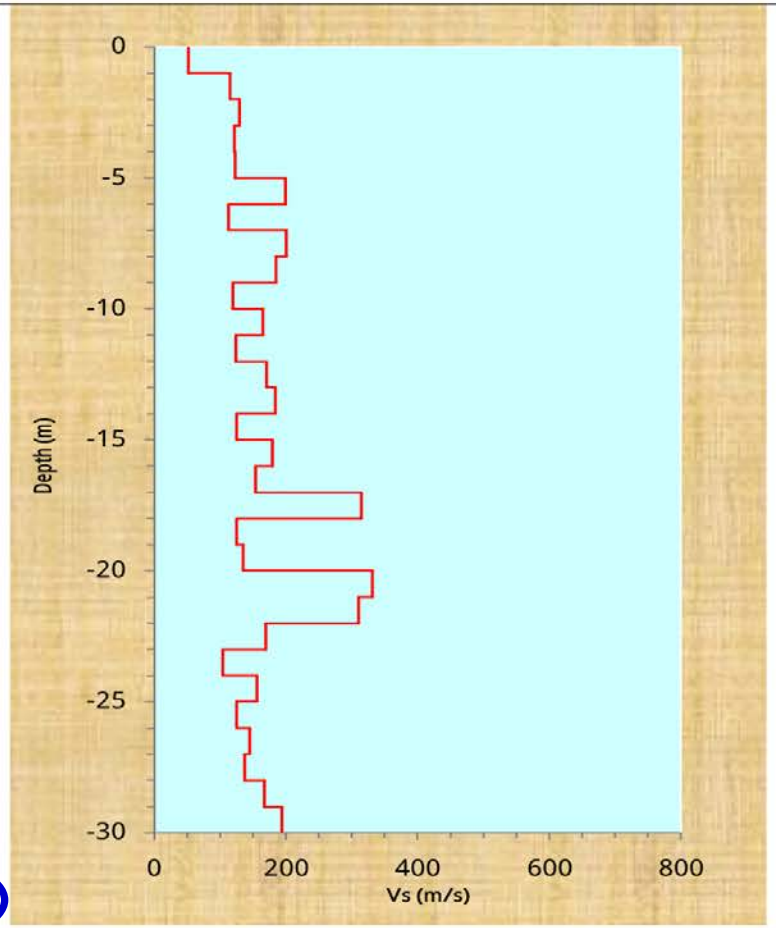
Cased Borehole

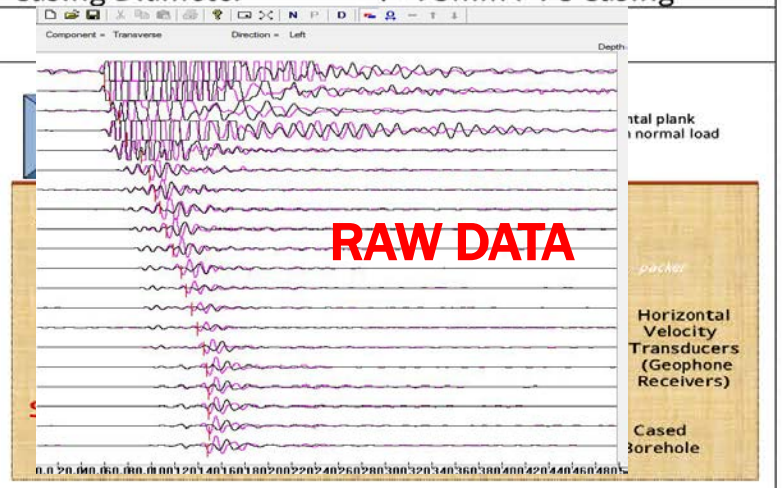
Down Hole Seismic (PS Logging) Test Data Processing and representation

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





Downhole Seismic Test Data Acquisition

Test details and procedure of Multi-channel Analysis of Surface Wave (MASW)

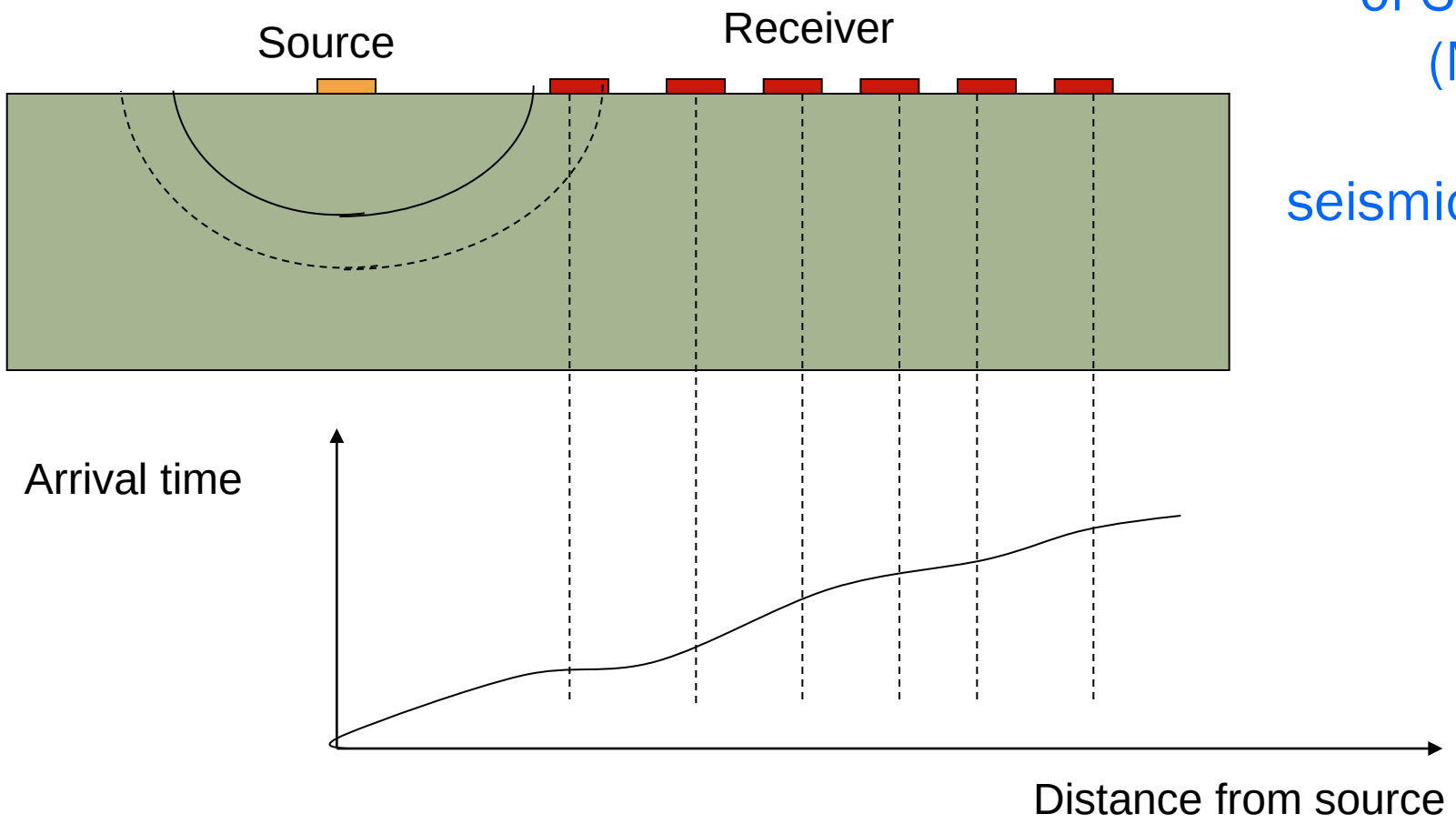
MASW is a seismic surface method, widely used for subsurface characterization and is increasingly being applied for seismic microzonation and site response studies (Anbazhagan and Sitharam, 2008).

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.

Field Measurement of MASW



Multichannel Analysis of Surface Wave (MASW)-

seismic refraction test

- surface wave test

Field Data Acquisition Parameters

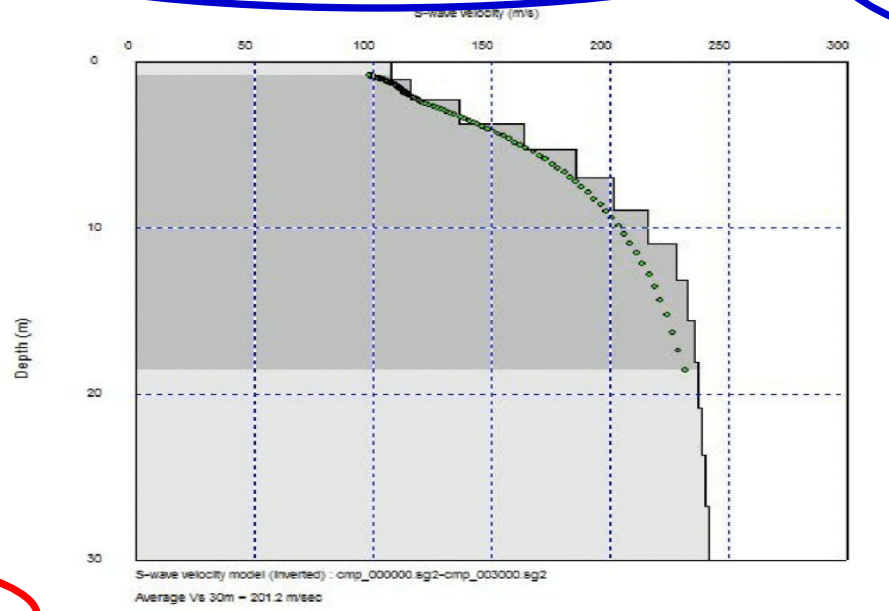
Seismic refraction (MASW) Test	
Number of channels	12
Geophone spacing	3m
Array length	33m
Sampling rate	1ms
Record length	2 sec
Natural frequency of Geophone	10 Hz
Source	8 kg hammer
Shot number	13 points, 11 between geophones and 2 outside of measuring line

MASW Survey Data Processing and Representation

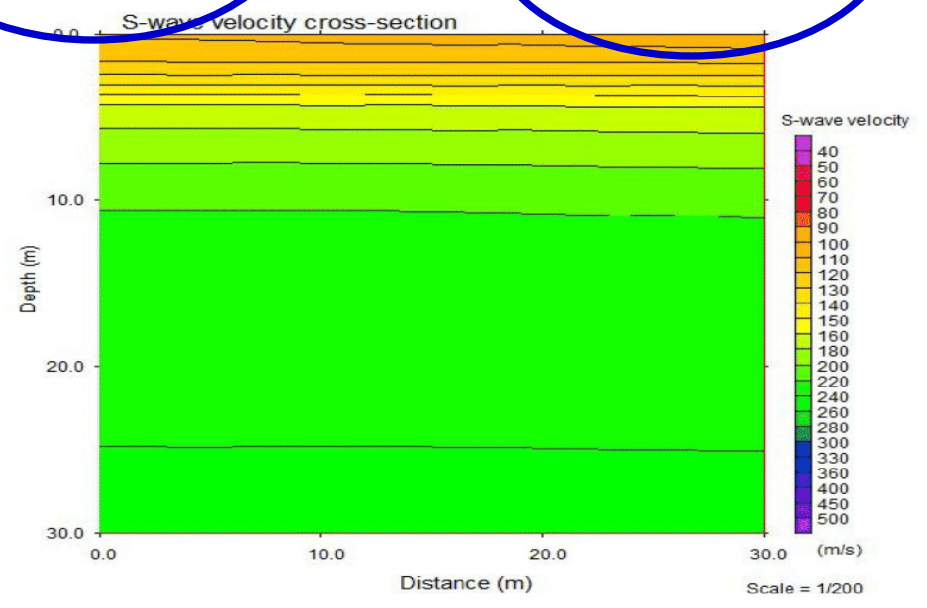
Survey ID	Location Name	Data Acquisition Date	Coordinate	
FARIDPUR MASW-2	Rajandro College field, Faridpur Sadar	27/11/2016	Latitude	Longitude
			23.60250	89.84211

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



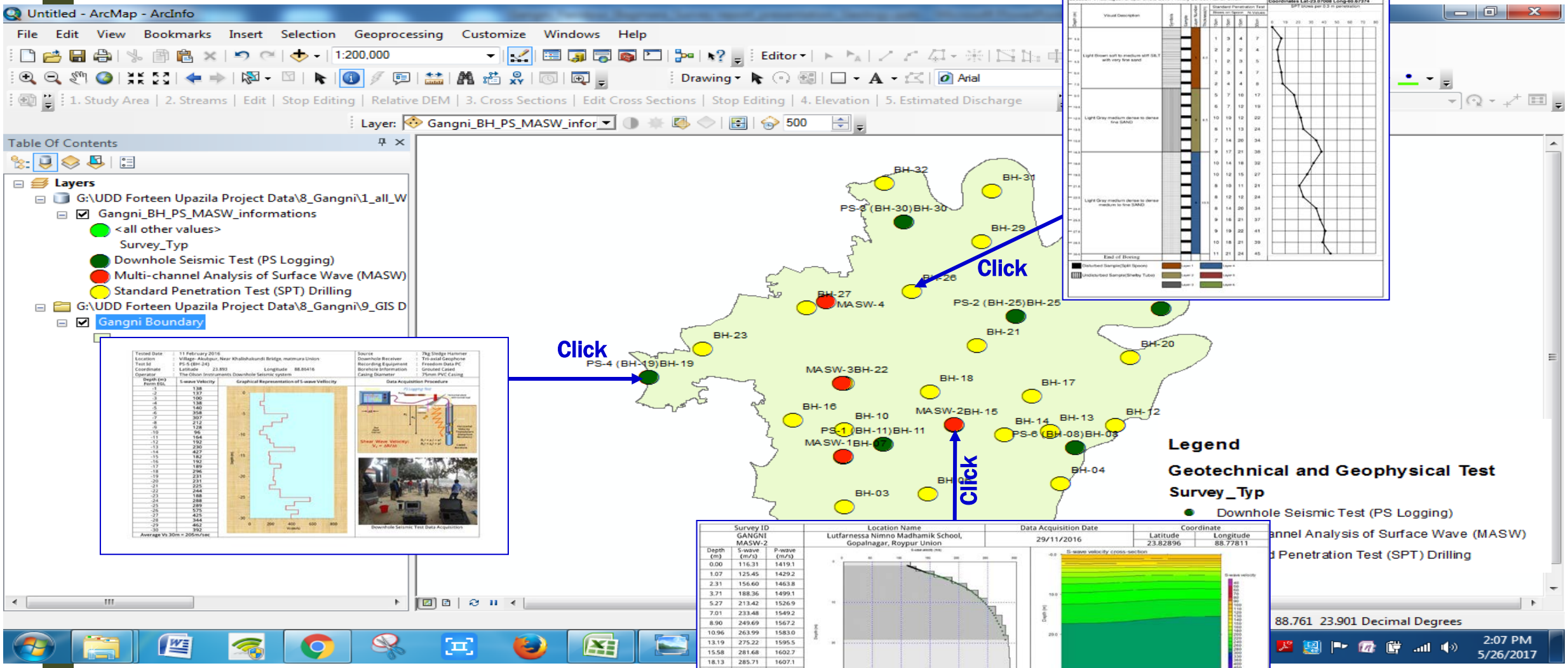
One Directional S-wave Velocity Profile



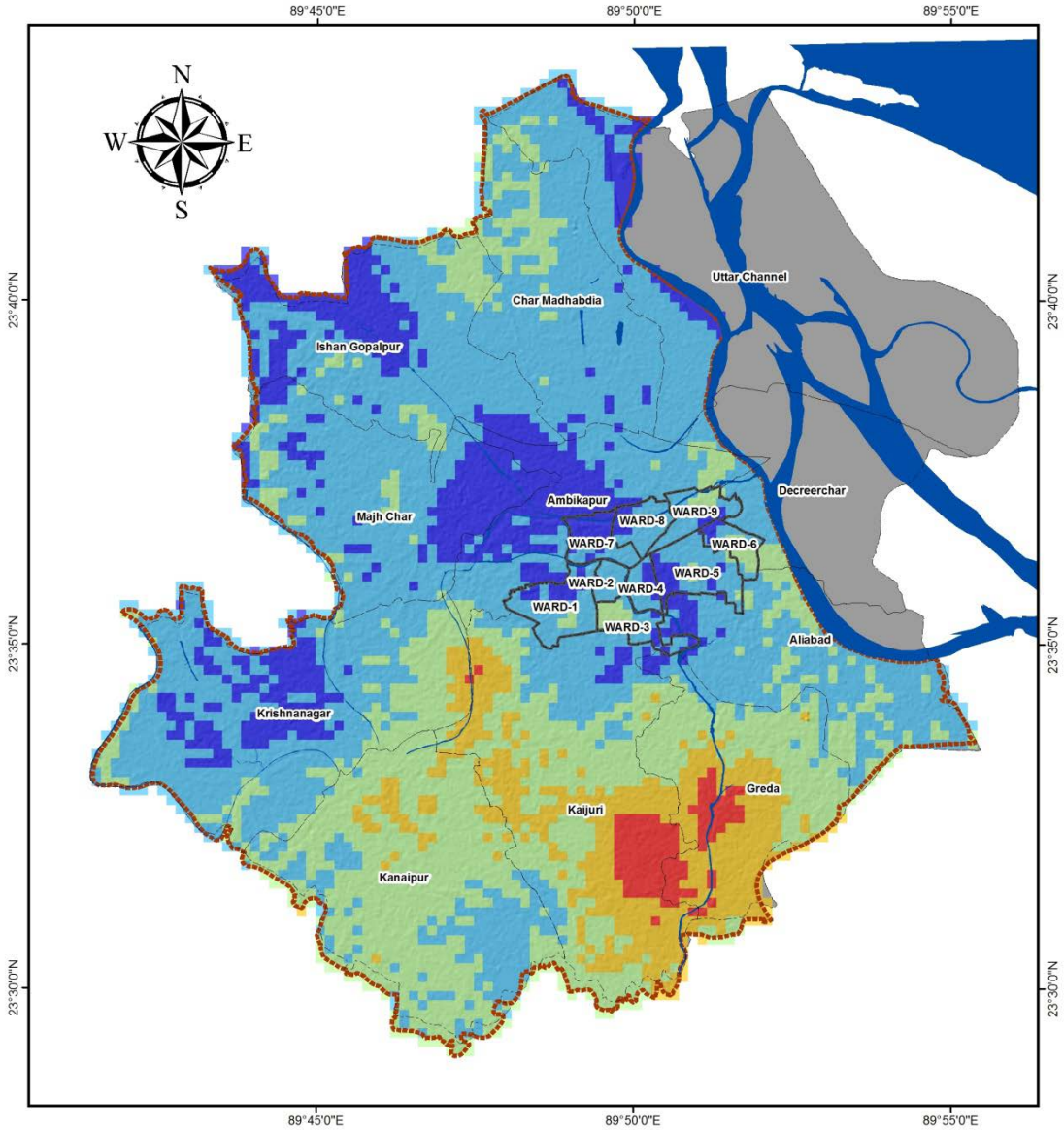
Two Directional S-wave Velocity Profile

MASW Survey Data Acquisition at Rajandro College field

GIS BASED DATA SET



Foundation Layer Recommendation Map



Legend

Upazila Boundary

Engineering Soil Layers

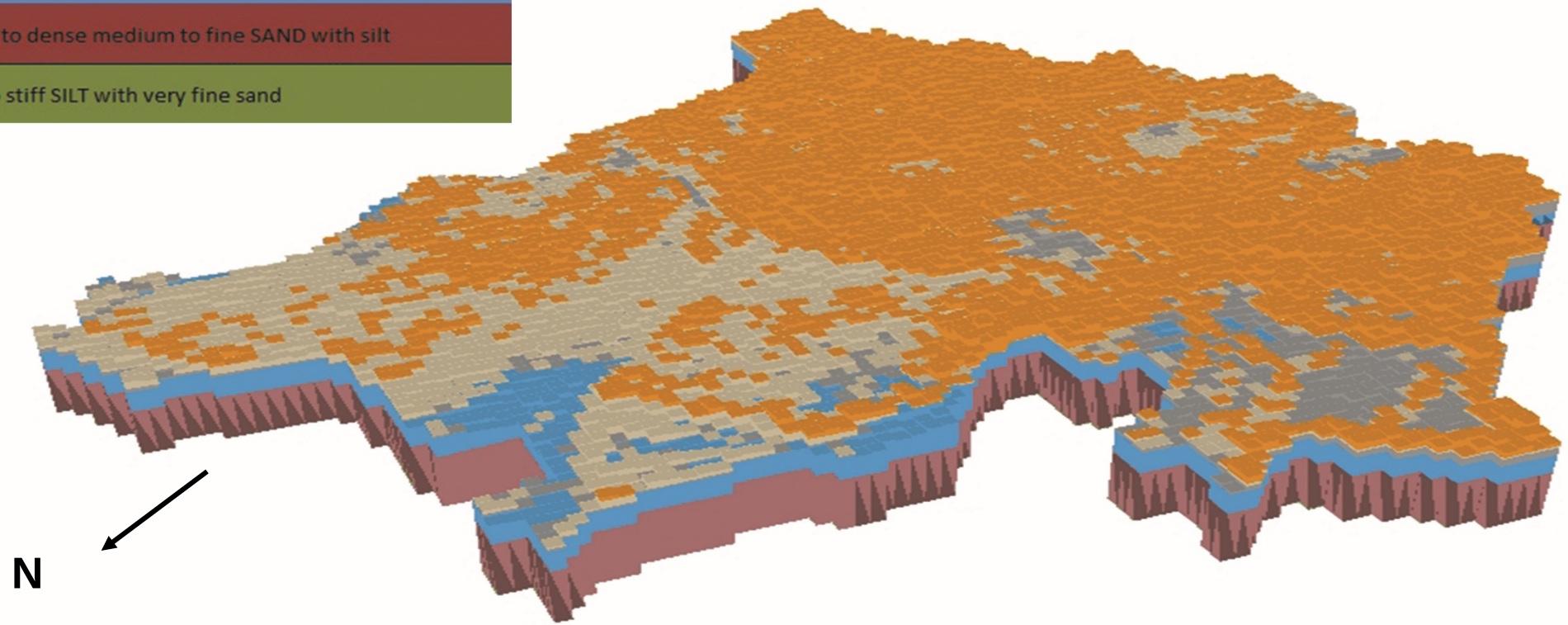
Foundation Depth (m) from EGL

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

Faridpur Sadar Upazila

GIS base Subsurface Lithological 3D Model

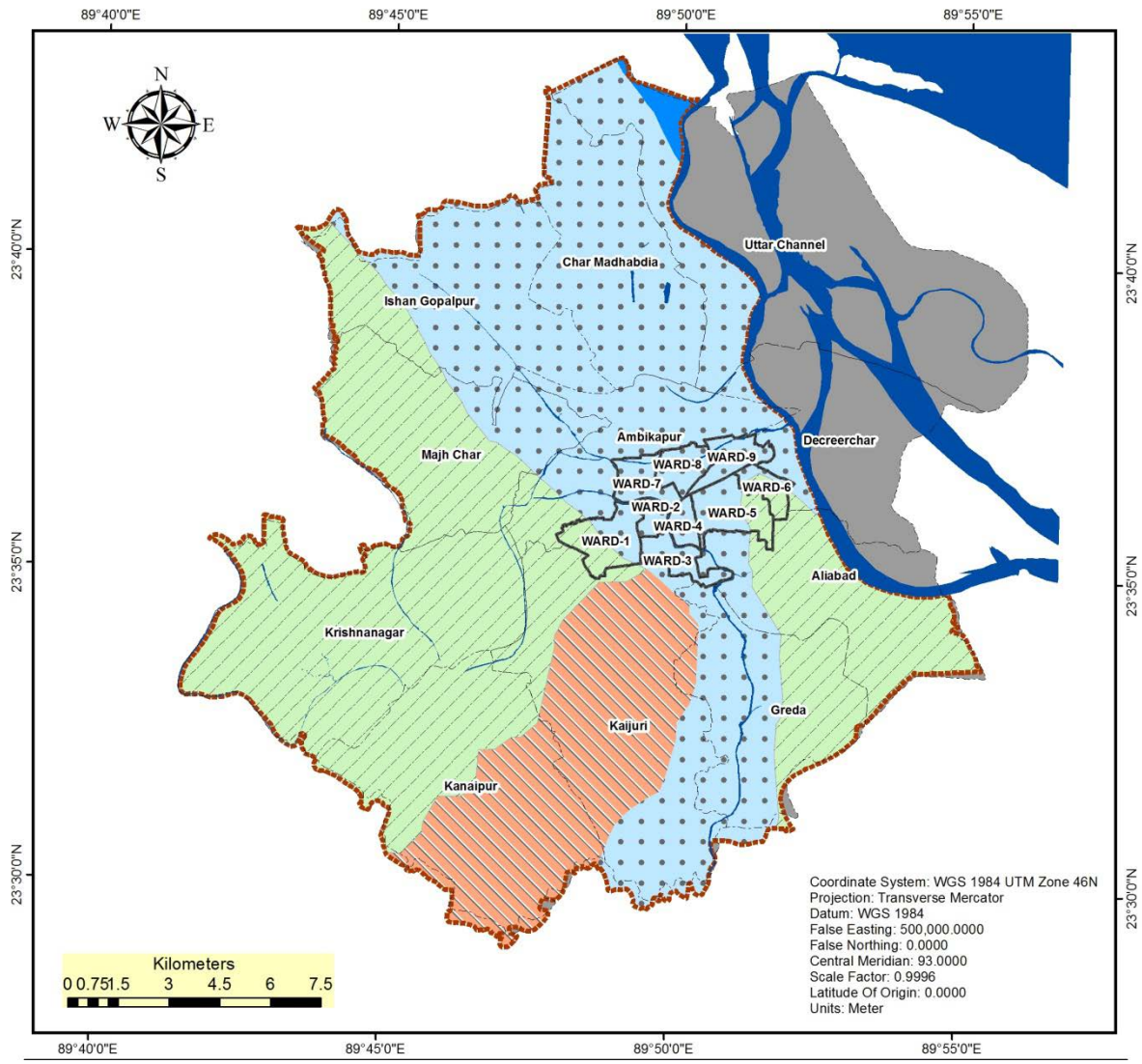
Lithological description
Layer 1: Brown soft silty CLAY/clayey SILT
Layer 2: Gray loose/medium Dense very fine to fine SAND
Layer 3: Light Grey soft to medium stiff SILT with Clay and Sand
Layer 4: Light Brown to Grey loose to medium dense fine SAND with silt
Layer 5: Light Grey medium dense to dense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



Faridpur Upazila

Thematic Maps 3

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.

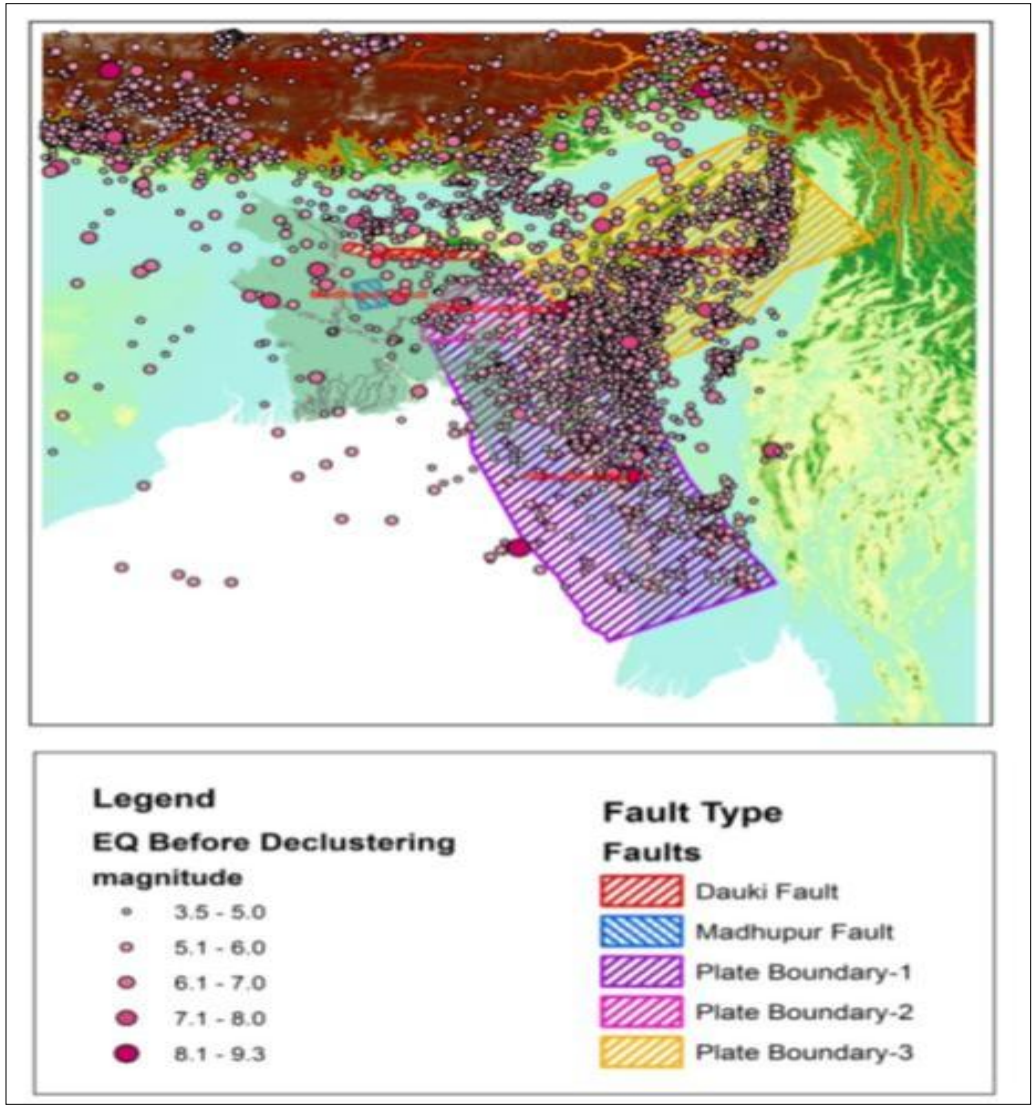
Marshy Clay and Peat:

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.

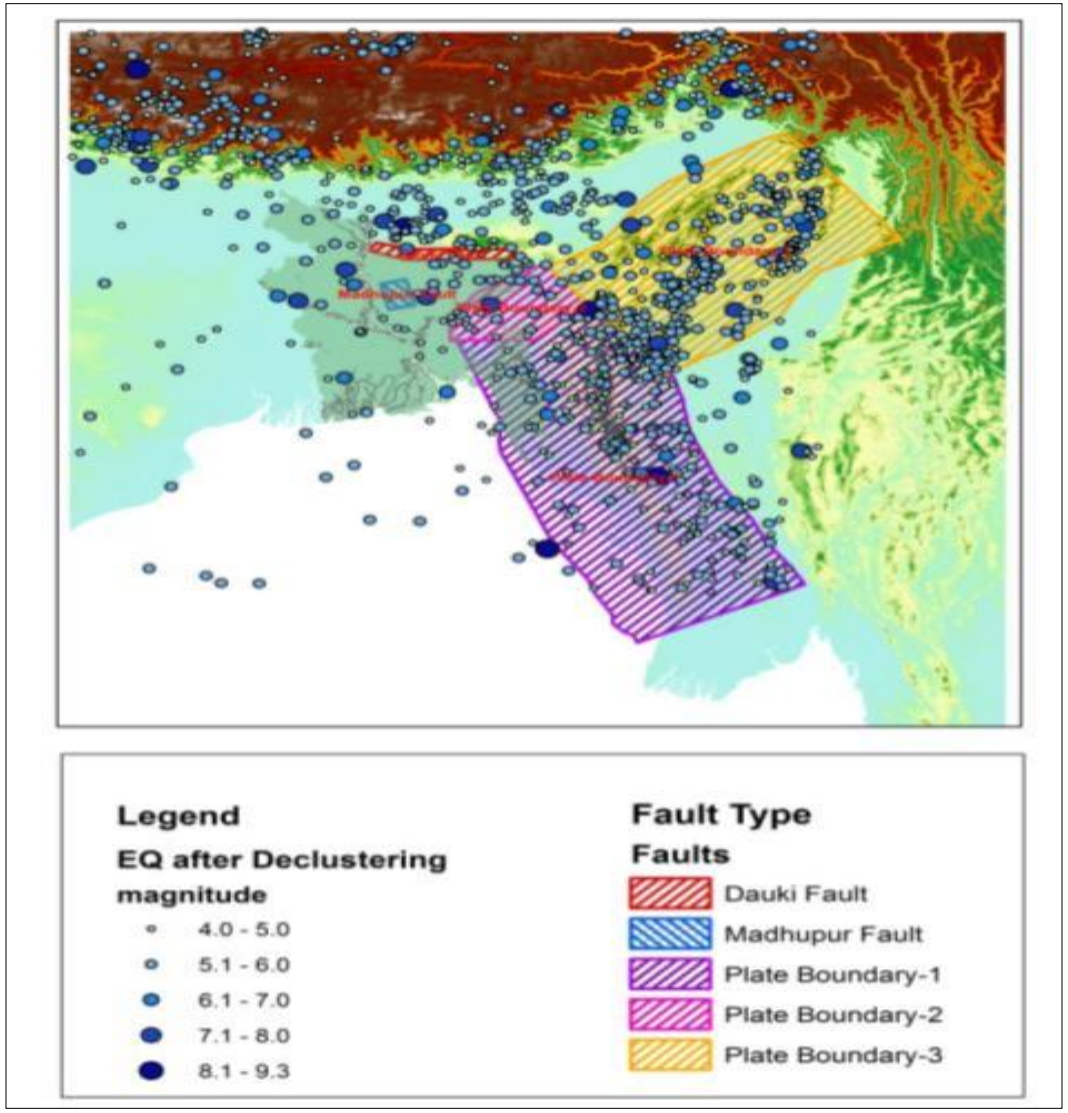
Faridpur Sadar Upazila

THE SEISMICITY OF SEISMIC SOURCES

EQ Data (1822-2016) Before Declustering

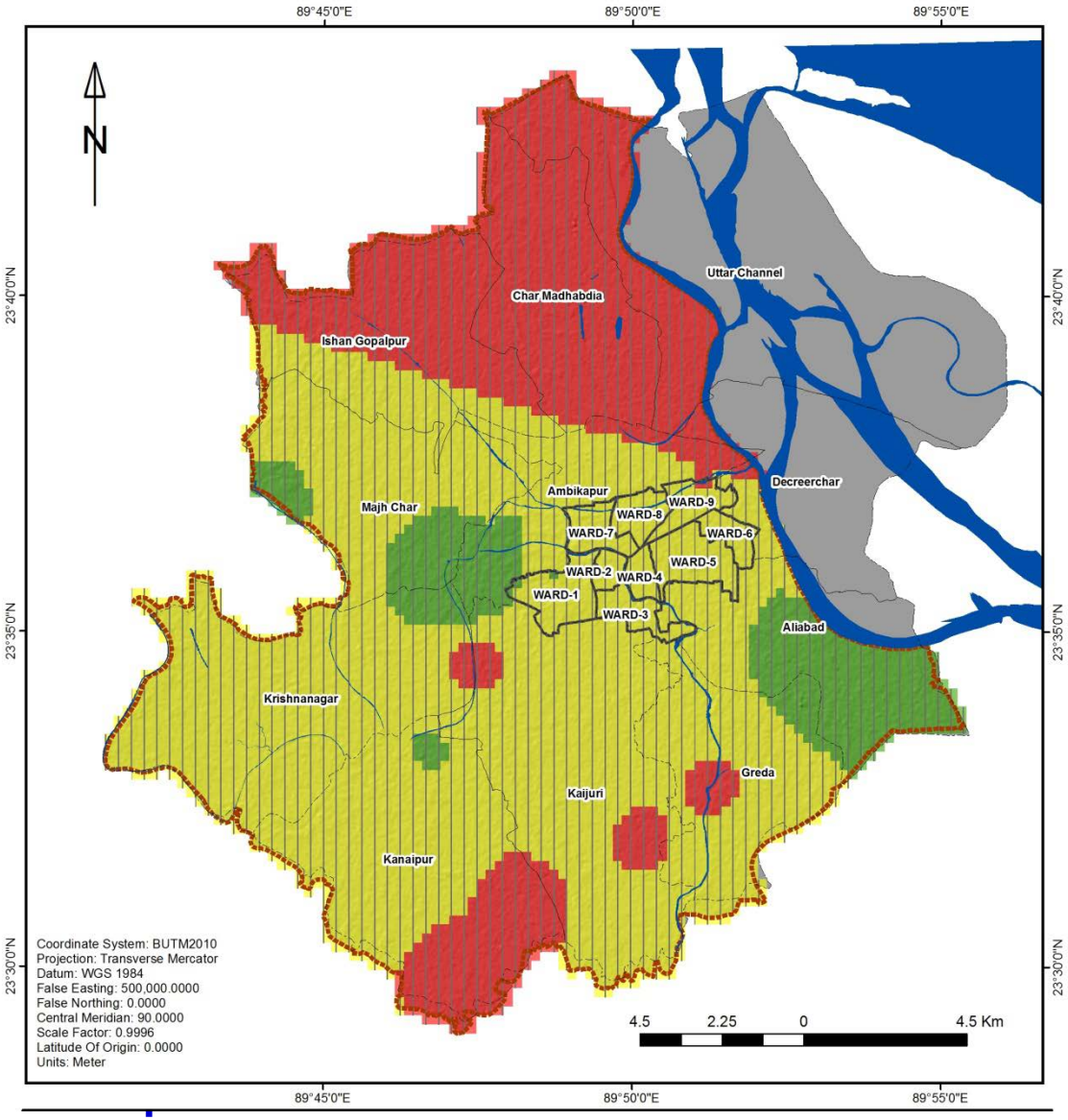


EQ Data (1822-2016 After Declustering



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



Faridpur Sadar Upazila

Upazila Boundary

Provable Earthquake Intensity

Intensity and Shaking

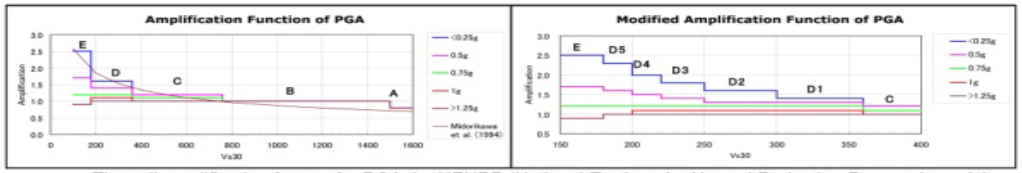
VIII, Severe

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.

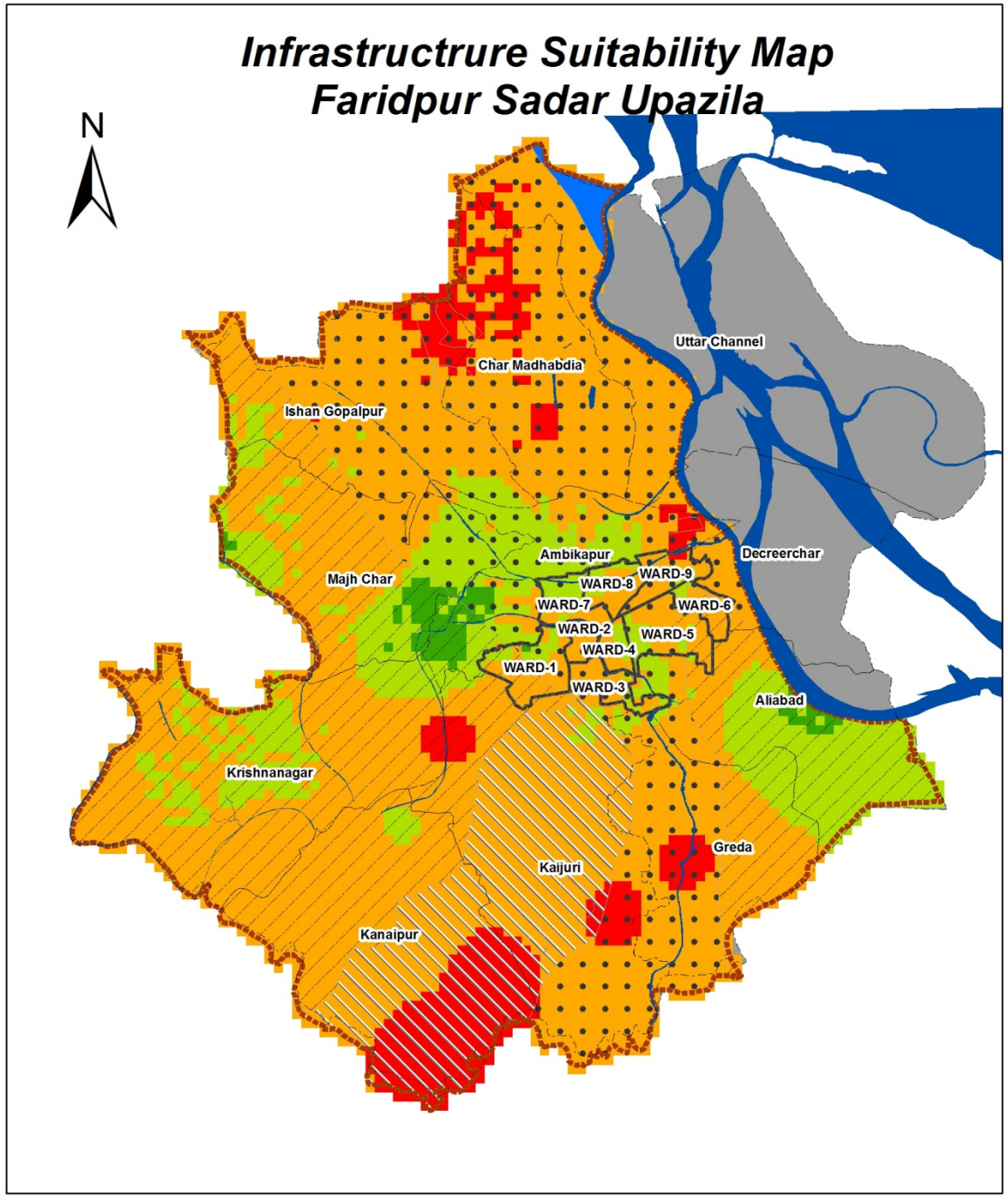


The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions

Thema

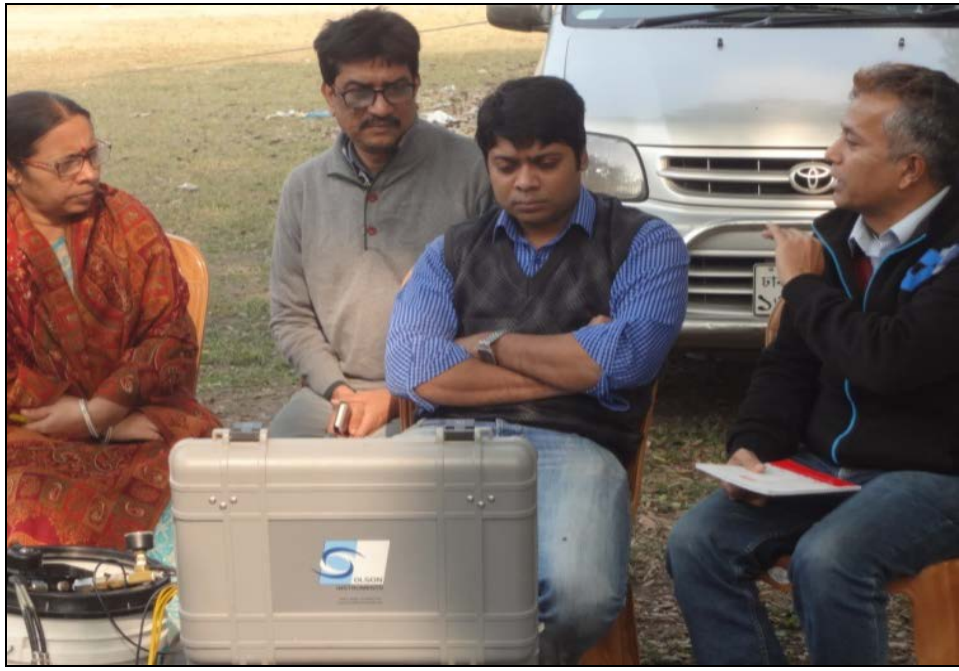
Modified Mercalli Intensity Scale

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.



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

Downhole Seismic Test (PS Logging) Activities at Faridpur



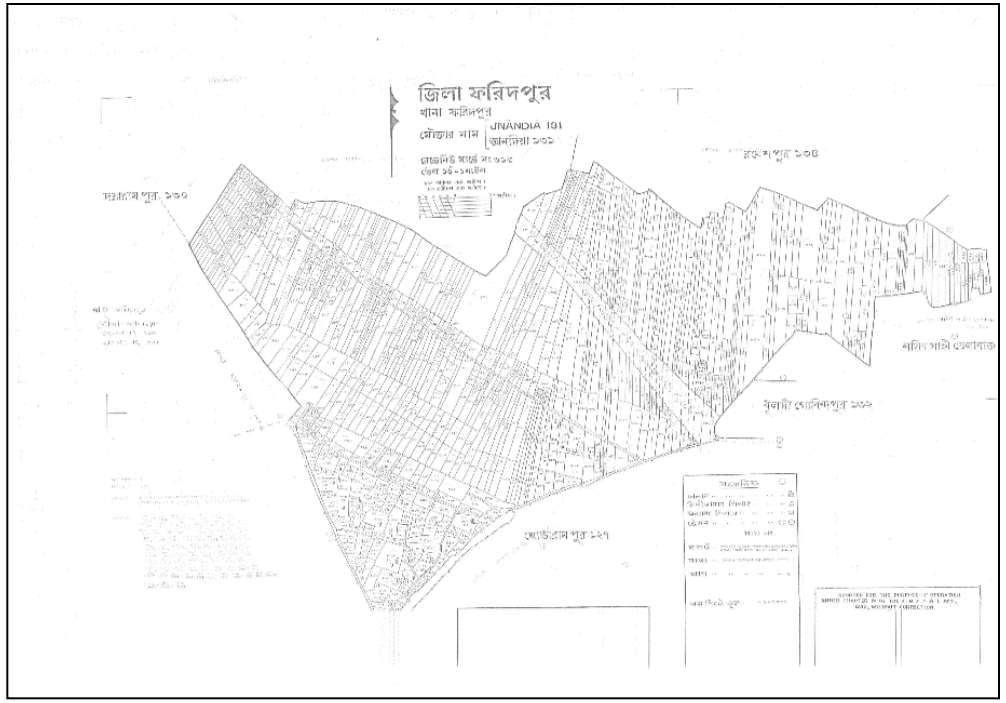
MASW Survey Activities at Faridpur

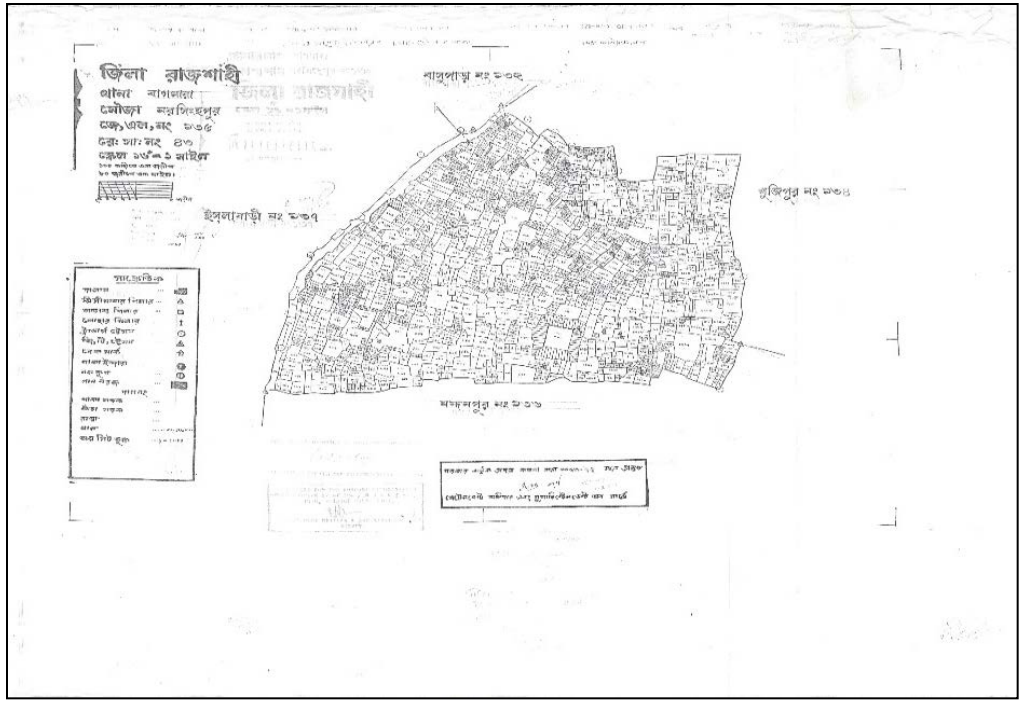
Findings

- This geological investigations has been given us 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.

Mouza Map Collection, Scanning and Digitization

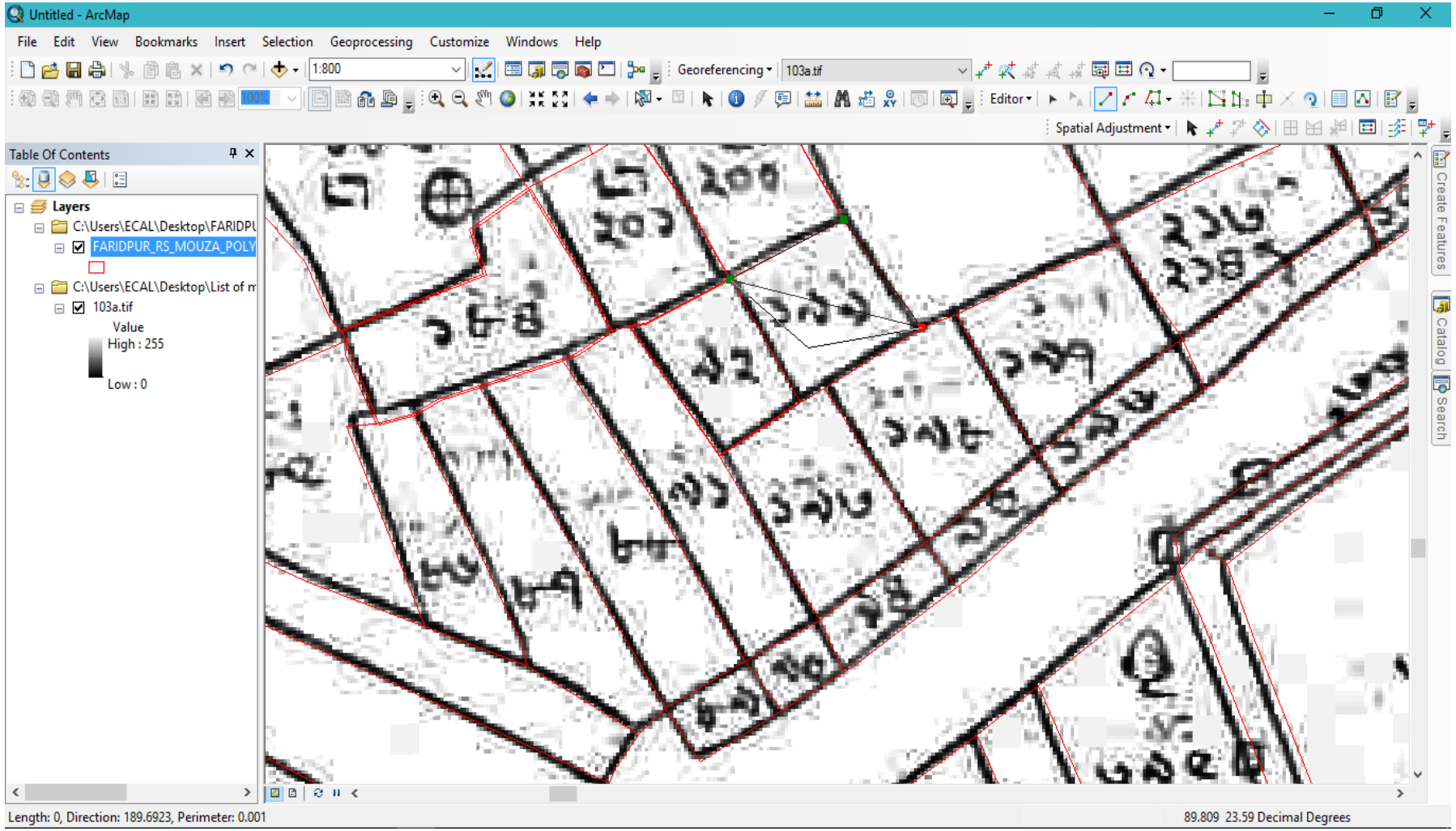




Upazila	Mauza Maps		Digitization Percentage
	Total No. of Mauza Sheets	Total No of Digitized Sheets	
Faridpur Sadar	329	326	99.08%

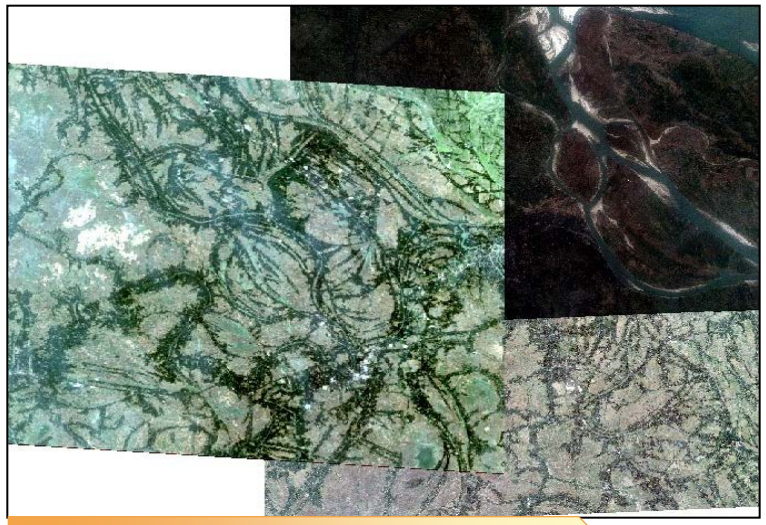
Mouza Map Collection, Scanning and Digitization

Digitization of Mouza Maps

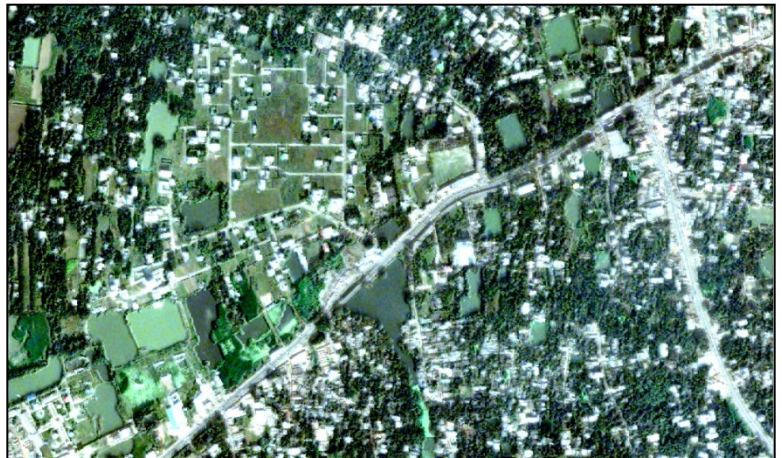


Processing of Satellite Image

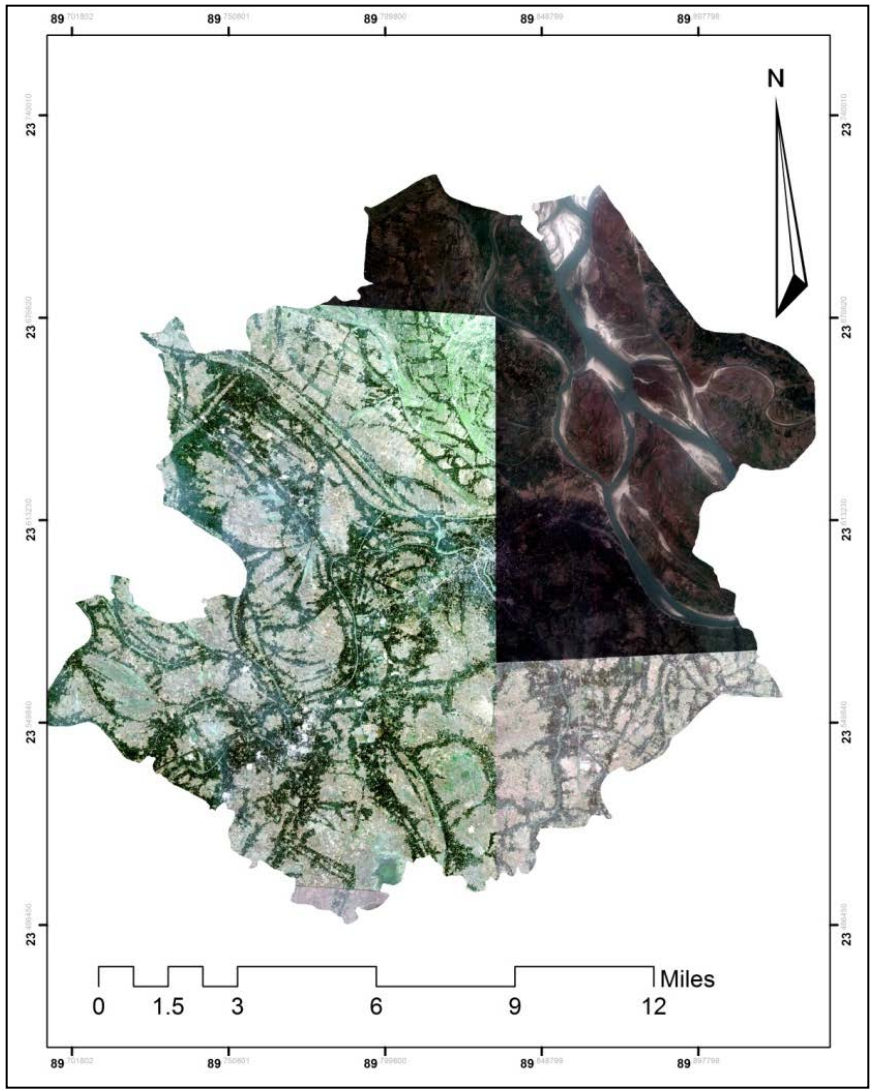
Tiles



Pan-sharpen Image

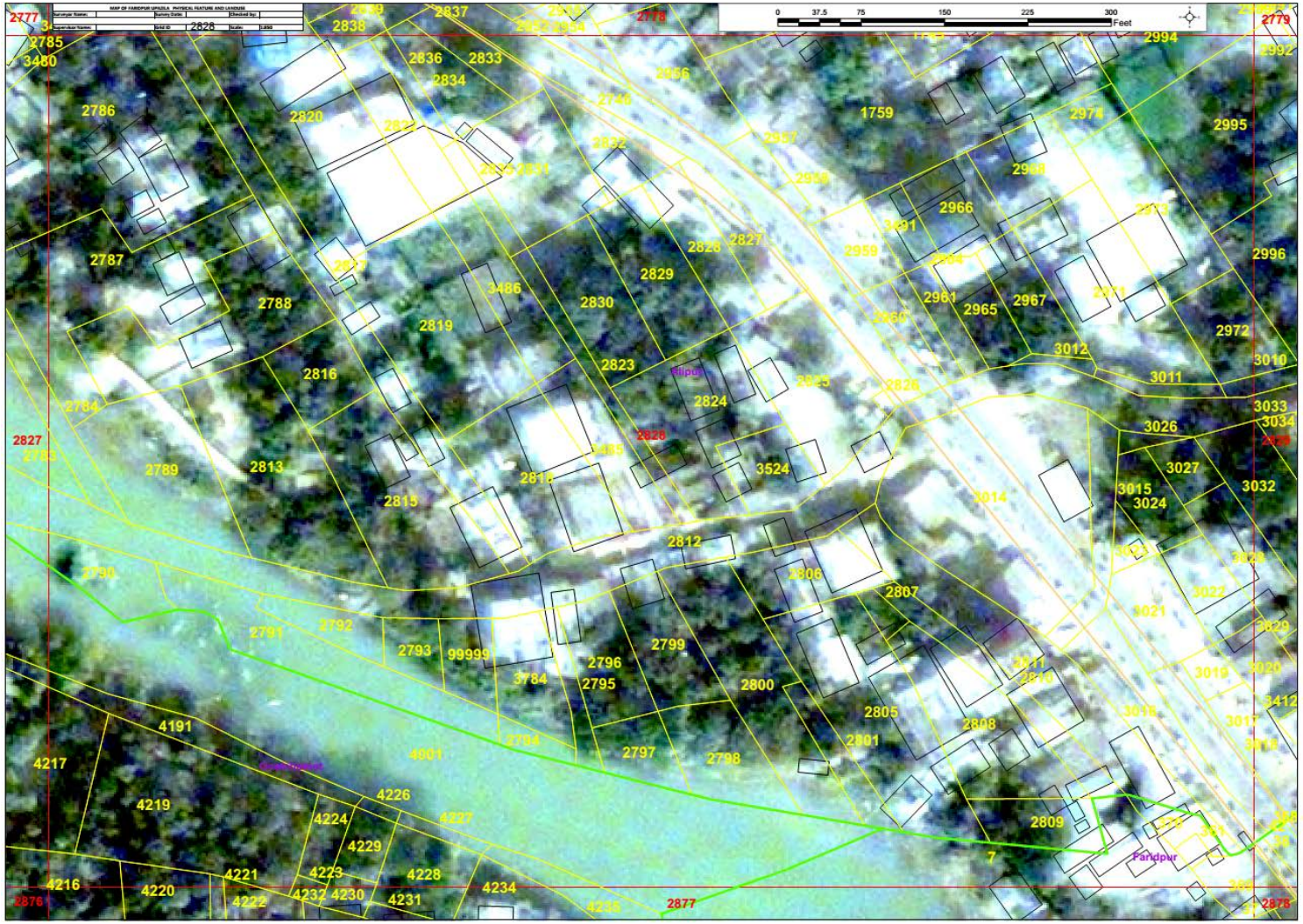


Merged satellite image



Mouza Map Collection, Scanning and Digitization

GEOREFERENCED MOUZA MAPS



Bench Mark (BM) Pillar Installation

Construction of and Installation BM Pillars

Marking of BM Pillars

(Source: Field Survey ,2016)

Bench Mark (BM) Pillar Installation

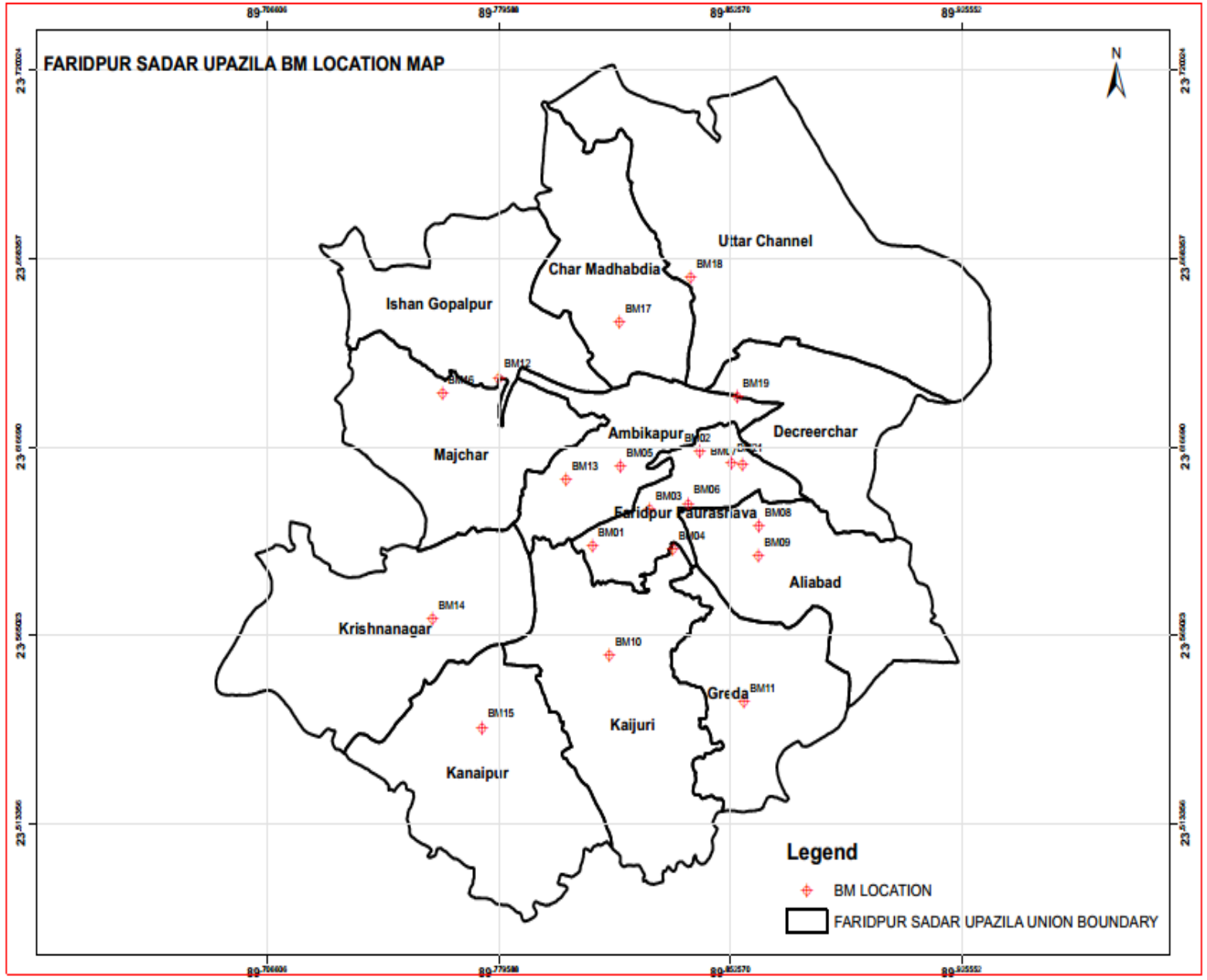
Reference BM Pillar

RTK-GPS Observations on BM Pillars

(Source: Field Survey ,2016)

Bench Mark (BM) Pillar Installation

Locations of Installed BM Pillars



(Source: Field Survey ,2016)

Bench Mark (BM) Pillar Installation

(Source: Field Survey ,2016)

BM No.	RL (m)	Lat.	Long.	Northing	Easting	Location
1	8.968	23.58954551944	89.80913437222	2611598.813	786697.578	Faridpur Sadar upazila Complex, in front of the main building
2	8.653	23.61546563333	89.84292089167	2614538.956	790090.620	Vati-lokkhipur Govt. Primary school, front right side of entry gate
3	8.629	23.59957107778	89.82724735833	2612746.085	788525.238	Goalchamot primary school, right corner of the school building in back
4	7.881	23.58871016944	89.83448678889	2611557.321	789288.294	Al-amin Govt. primary school, right corner of the school area
5	8.879	23.61148178333	89.81802208889	2614047.197	787557.251	Gobindapur Primary school, at the front of school compound
6	7.369	23.60120120833	89.83923790833	2612950.964	789745.991	Jhiltuli Govt. primary school
7	9.119	23.61204400556	89.85654066389	2614187.560	791488.739	Tepakhola Govt. Primary school, front of school building
8	7.922	23.59512760833	89.86165290278	2612323.618	792048.218	Rajendra College, Baitul aman, left side of entry to college
9	8.093	23.58691682500	89.86145545833	2611413.439	792046.255	Aliabad UP complex, right corner of UP compound to the front
10	7.271	23.55956519444	89.81443153333	2608287.645	787303.811	Koijuri UP complex, Left side of the entry of UP complex area
11	7.338	23.54700246389	89.85697566667	2606981.704	791677.024	Gerda UP complex, front of UP
12	8.606	23.63581633056	89.77958065833	2616666.555	783580.025	Ishan Gopalpur UP complex, at the right end corner of UP area
13	8.087	23.60775399167	89.80082638333	2613599.653	785809.697	Ambikapur UP complex, Left side of the entry of UP complex area
14	9.359	23.56968907778	89.75877820556	2609298.738	781597.940	Krishnanagar UP complex, Left side of the entry of UP complex area
15	7.082	23.53980396111	89.77431584722	2606018.233	783248.889	Kanaipur UP complex, in front of the UP building
16	9.679	23.63127574167	89.76180698333	2616128.270	781775.475	Machchor UP complex, Left side of UP main building
17	9.244	23.65089920833	89.81765623333	2618413.916	787433.733	Char Madhobdi UP complex, Left back side corner of UP building
18	8.717	23.66344652778	89.84011410278	2619849.622	789698.298	North Channel UP complex, front right corner of UP building
19	8.046	23.63053491111	89.85470997222	2616232.663	791260.888	Aij Uddin Matobbor Kandi Primary school, right end corner of playing field

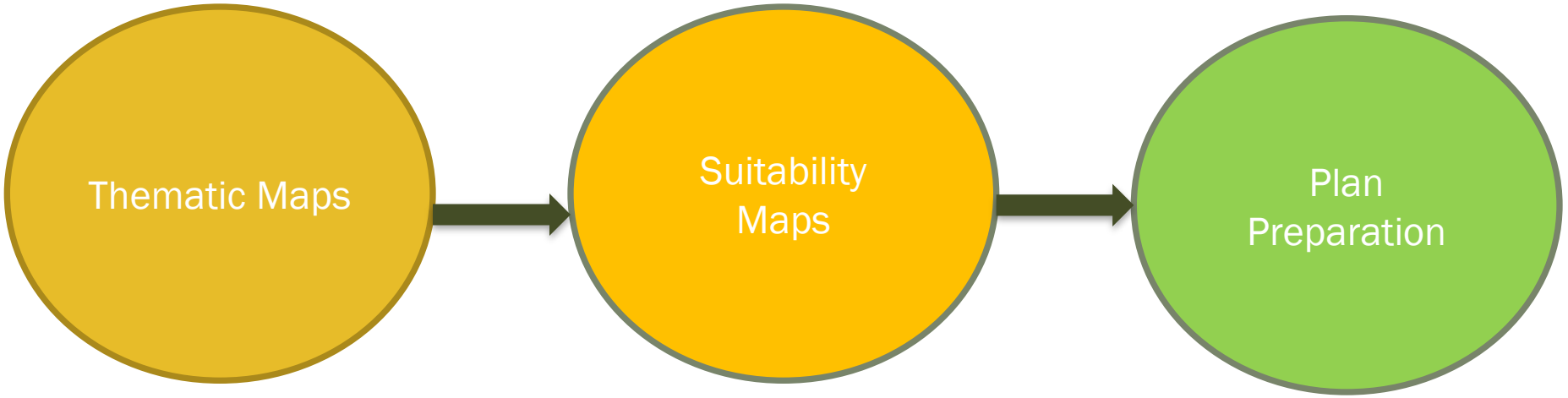
Physical Feature Survey

Field Survey Instruction

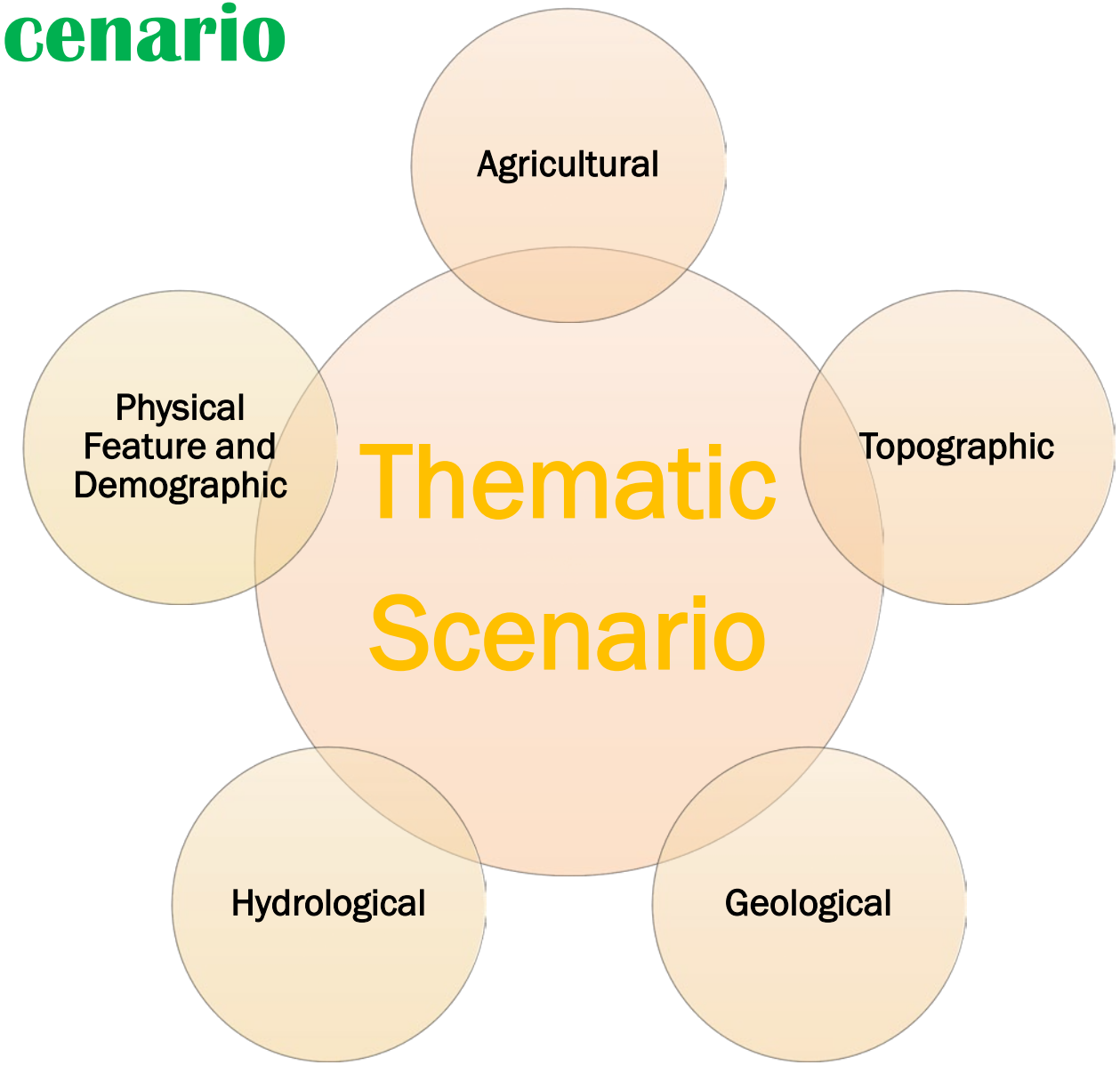
(Source: Field Survey ,2016)

Planning Stage

Plan Preparation Process

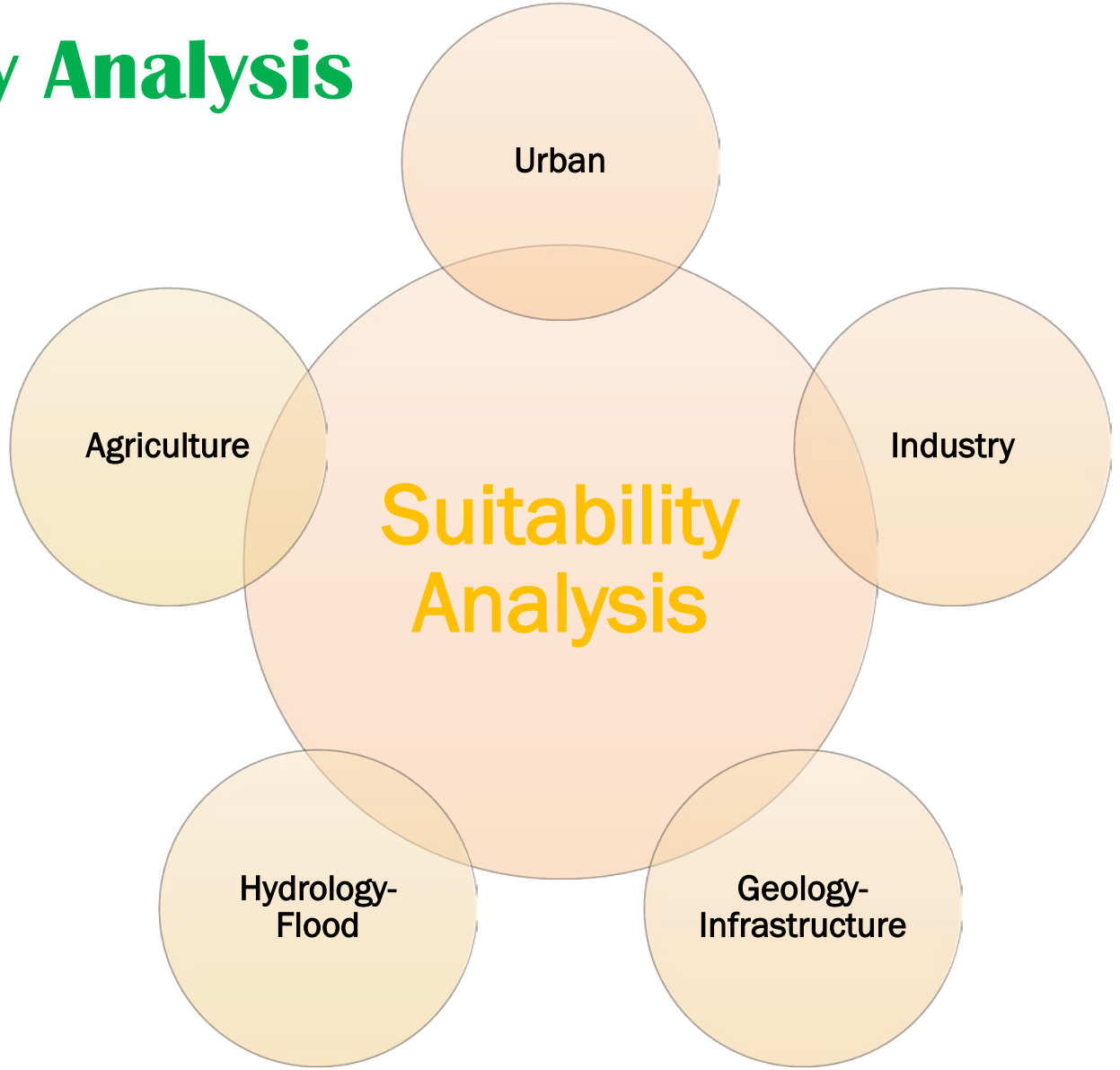


Thematic Scenario



19 Thematic maps

Suitability Analysis

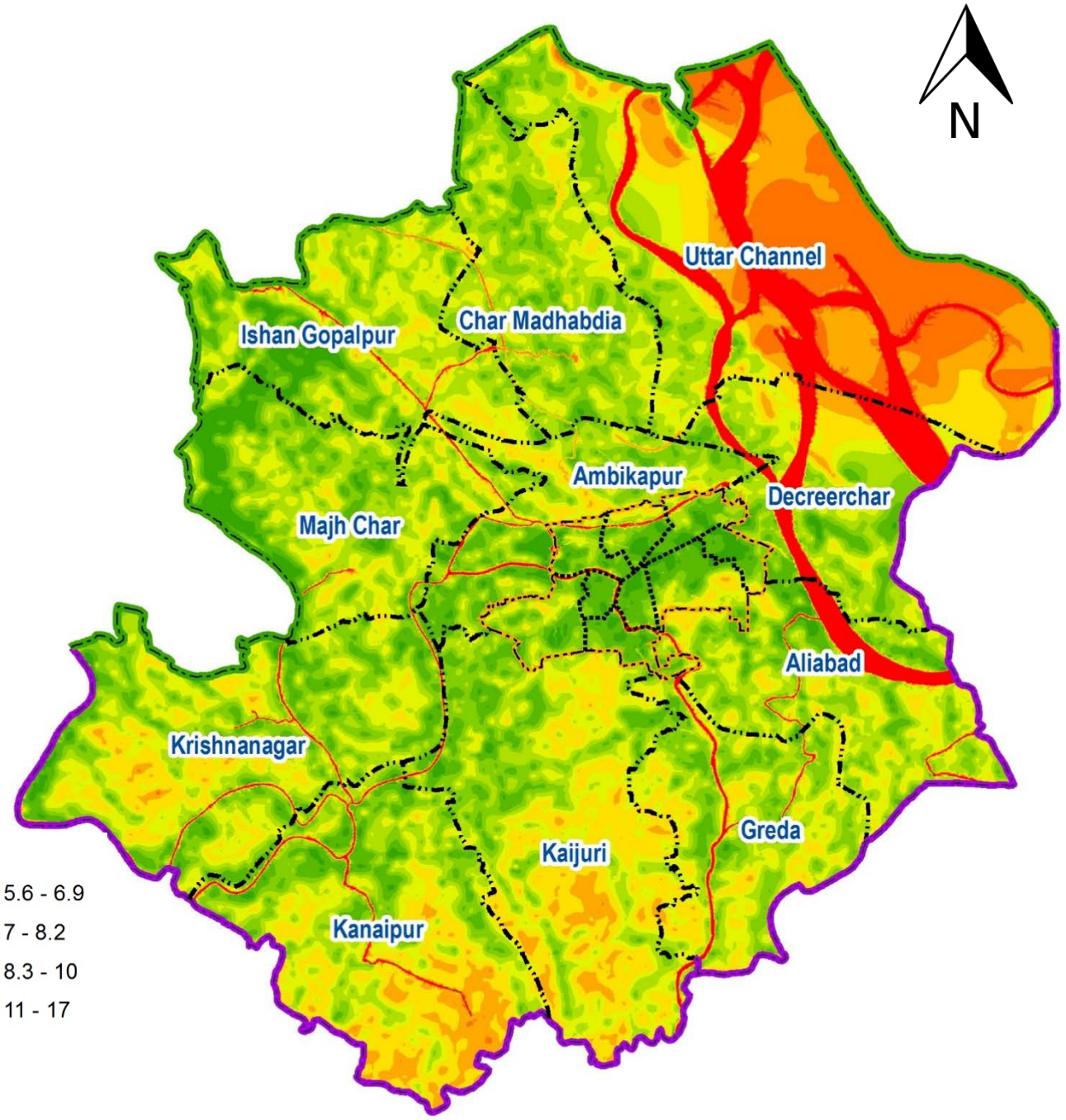


5 Suitability maps

Thematic Maps

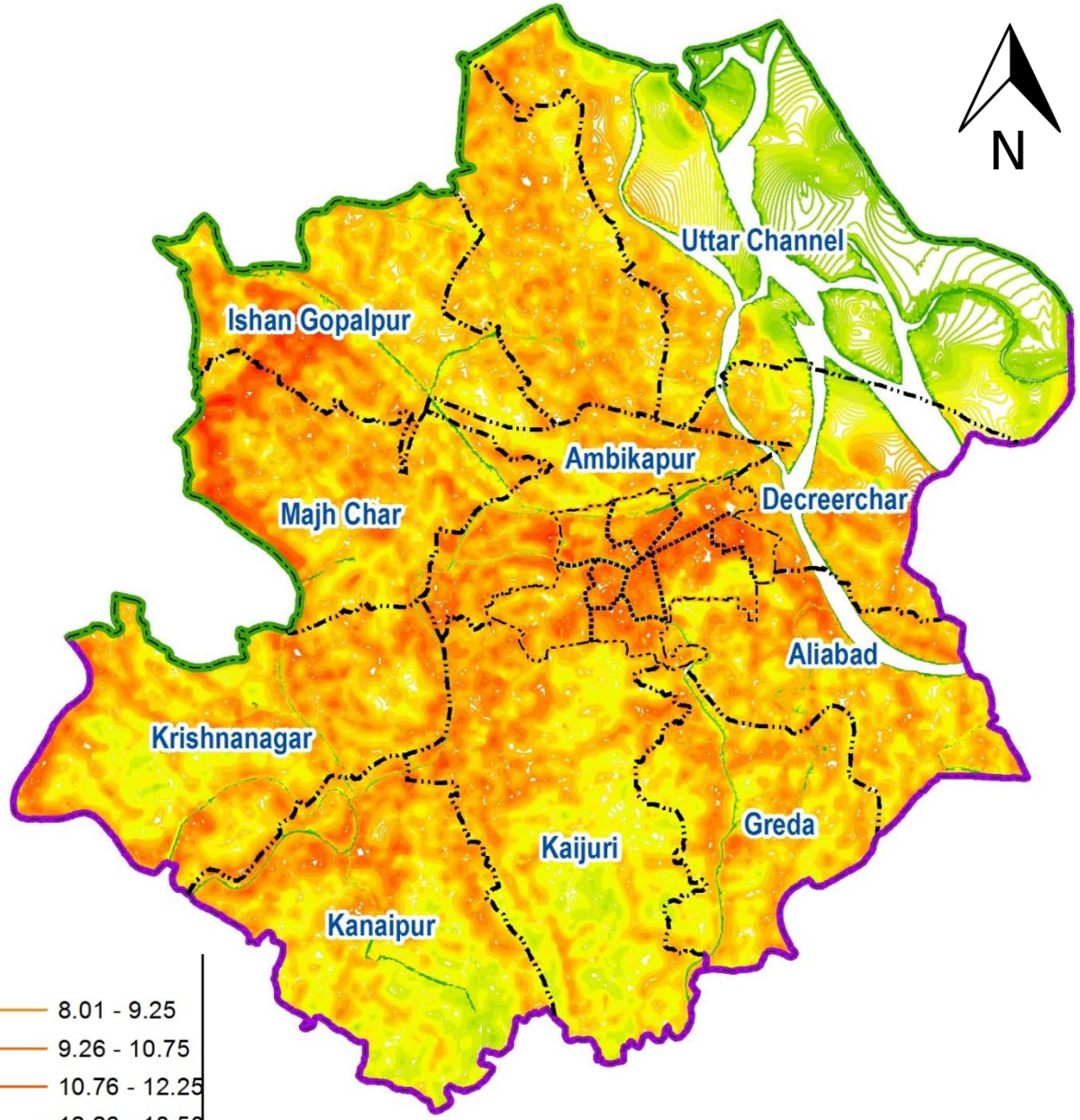
Digital Elevation Model (DEM)

Thematic Maps



Contour Map

Thematic Maps

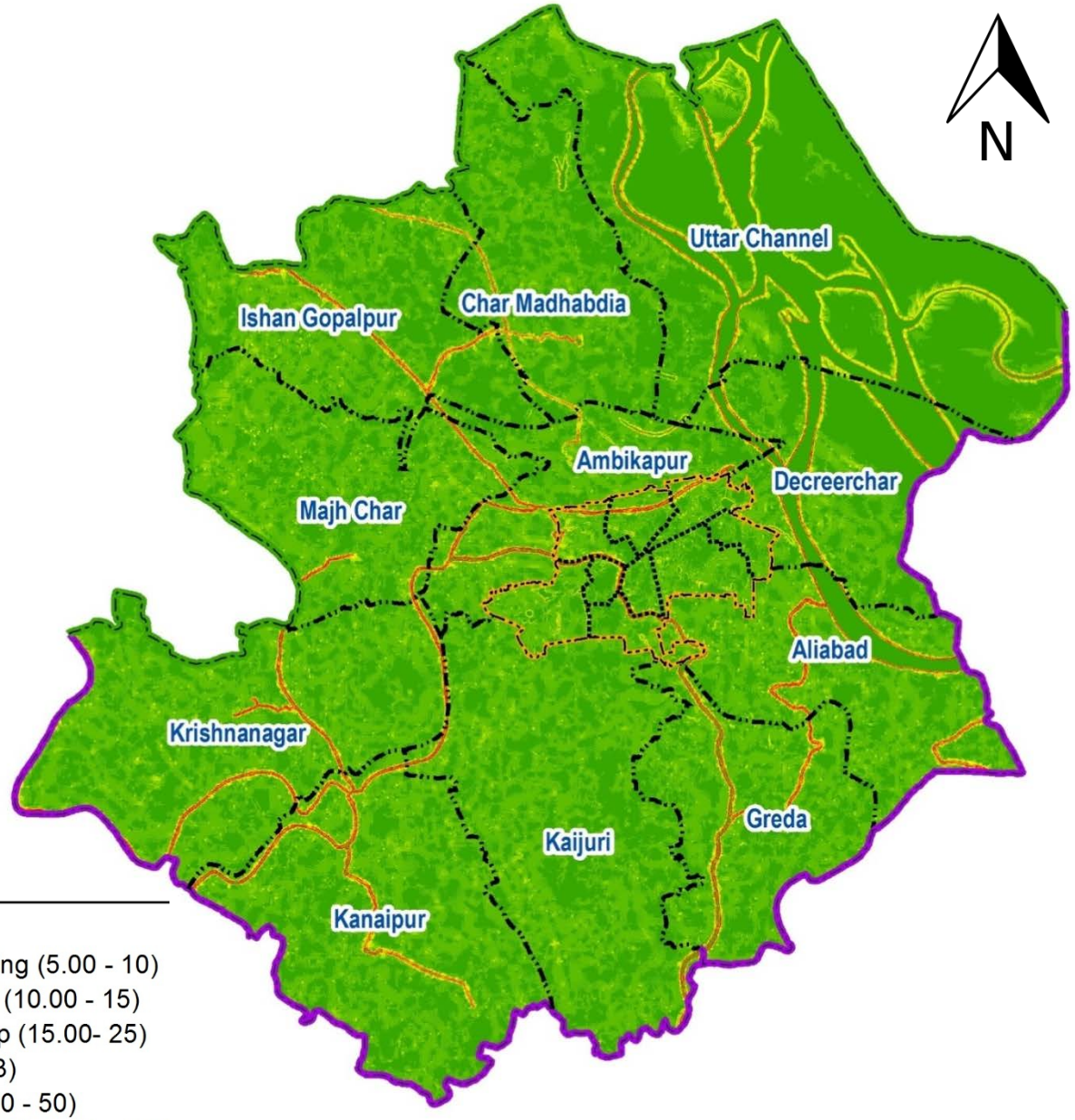


Legend

Admin Boundary	Contour (m)			
Zila Boundary	-9.50 - -8.25	-3.99 - -2.75	-2.74 - -1.50	2.26 - 3.75
Upazila Boundary	-8.24 - -7.00	-1.49 - -0.25	3.76 - 4.75	4.76 - 5.75
Pourashava Boundary	-6.99 - -5.50	-0.24 - 0.75	5.76 - 7.00	8.01 - 9.25
Union Boundary	-5.49 - -4.00	0.76 - 2.25	7.01 - 8.00	9.26 - 10.75
Ward Boundary				10.76 - 12.25
				12.26 - 13.50
				13.51 - 14.75
				14.76 - 16.50

Slope Map

Thematic Maps



Legend

Admin Boundary

- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary

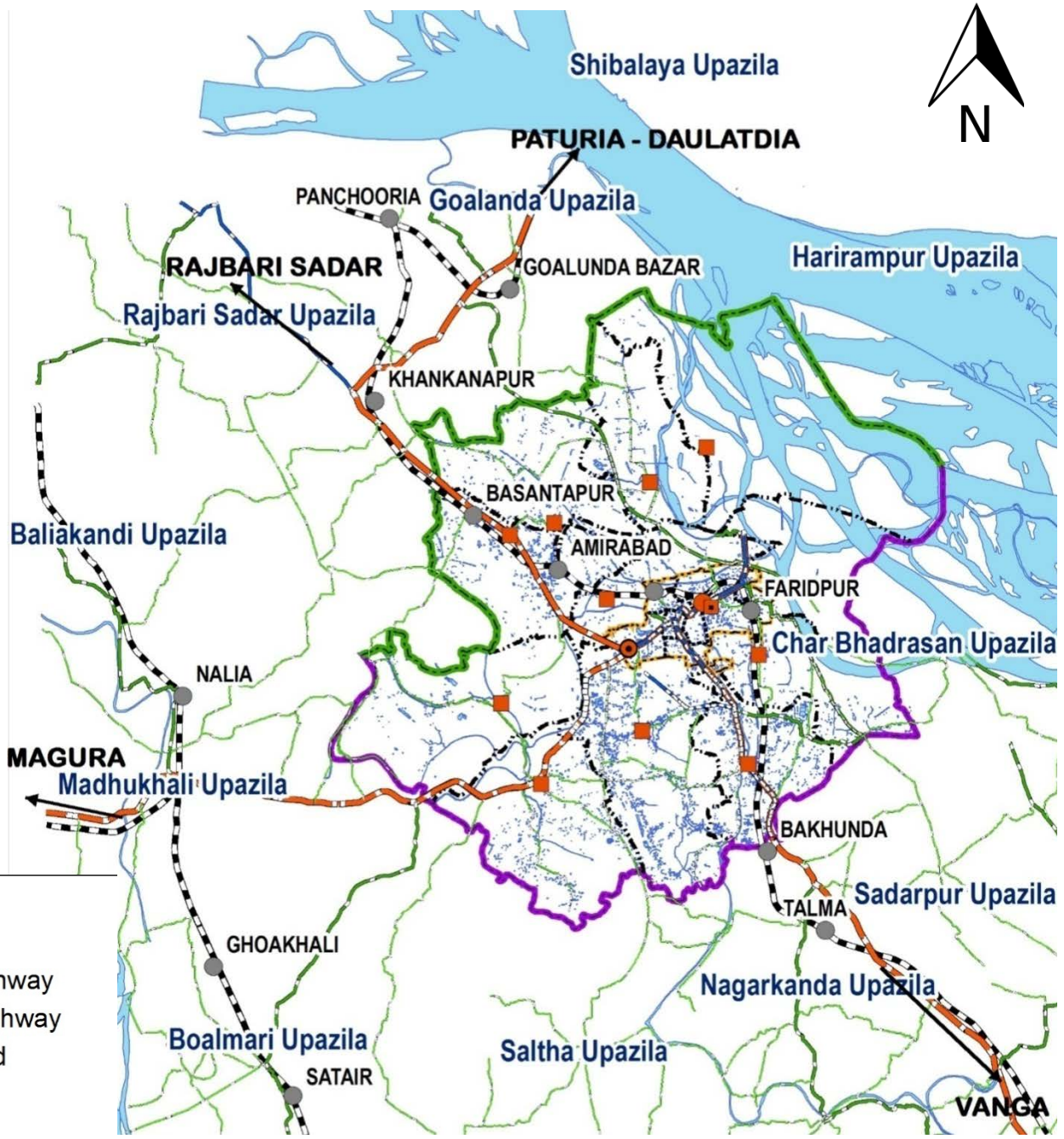
Slope

Value

- Nearly Level (0 - 1)
- Very Gently Sloping (1 - 3)
- Gently Sloping (3.00 - 5)
- Moderately Sloping (5.00 - 10)
- Strongly Sloping (10.00 - 15)
- Moderately Steep (15.00- 25)
- Steep (25.00 - 33)
- Very Steep (33.00 - 50)
- Very very Steep (More than 50)

Connectivity Map

Thematic Maps

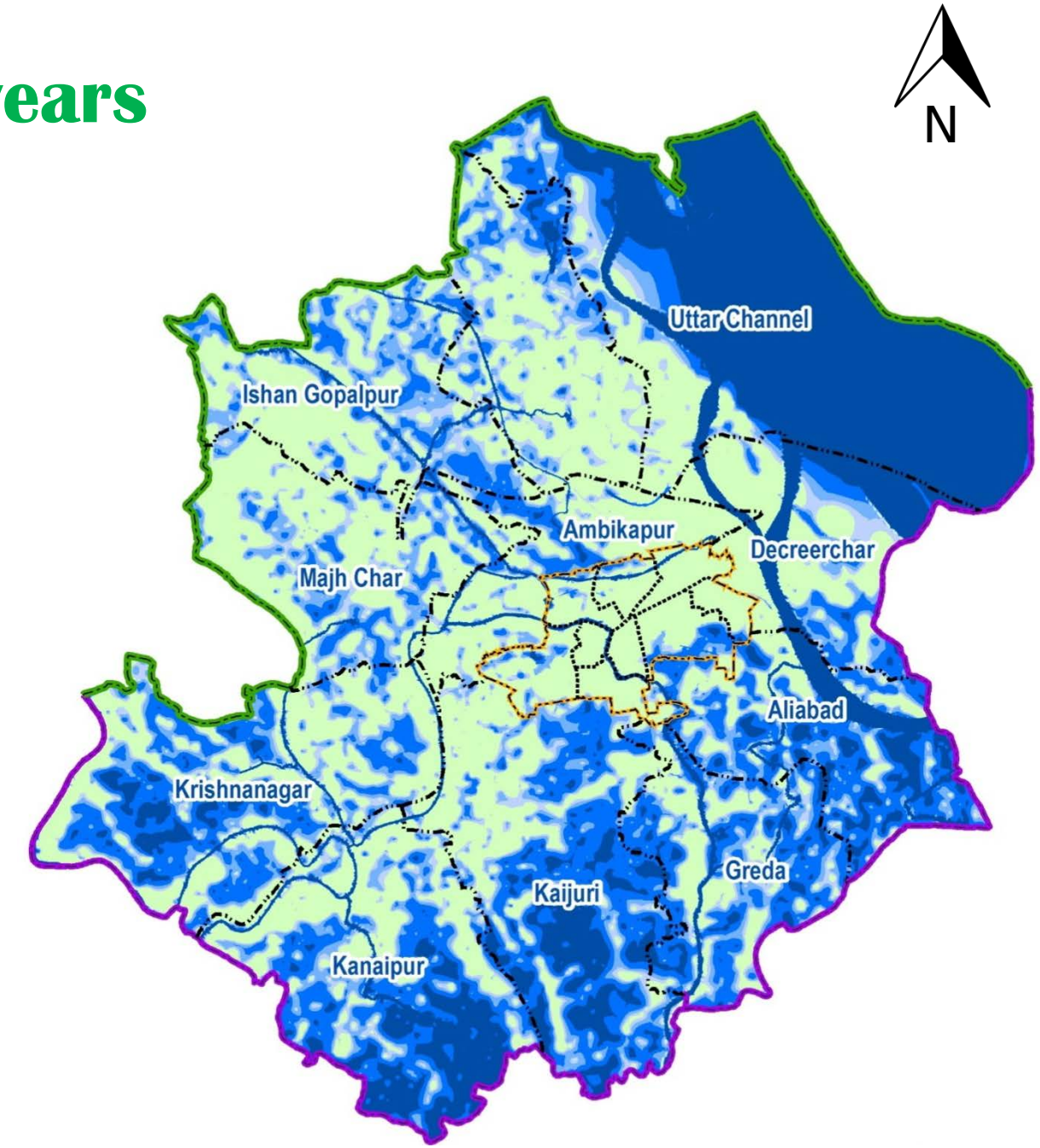


Legend

Administrative Boundary	Administrative HQ	Road Hierarchy
Zila Boundary	Zila Parishad	National Highway
Upazila Boundary	Upazila Parishad	Regional Highway
Pourashava Boundary	Pourashava	Upazila Road
Union Boundary	Union Parishad	Rail Line
Ward Boundary	Rail Stations	River

Flood Inundation Map at 5 years Return Period

Flooded Land Category	Water Depth	Percentage	Remarks
1st Degree Flooded area	0-0.3m	34.31	
2nd Degree Flooded area	0.31-0.9m	9.07	
3rd Degree Flooded area	0.91-1.8m	13.46	
4th Degree Flooded area	1.81-3.6m	19.37	Sub Flood Flow Zone
5th Degree Flooded area	>3.6m	23.79	Main Flood Flow Zone
Total		100.00	

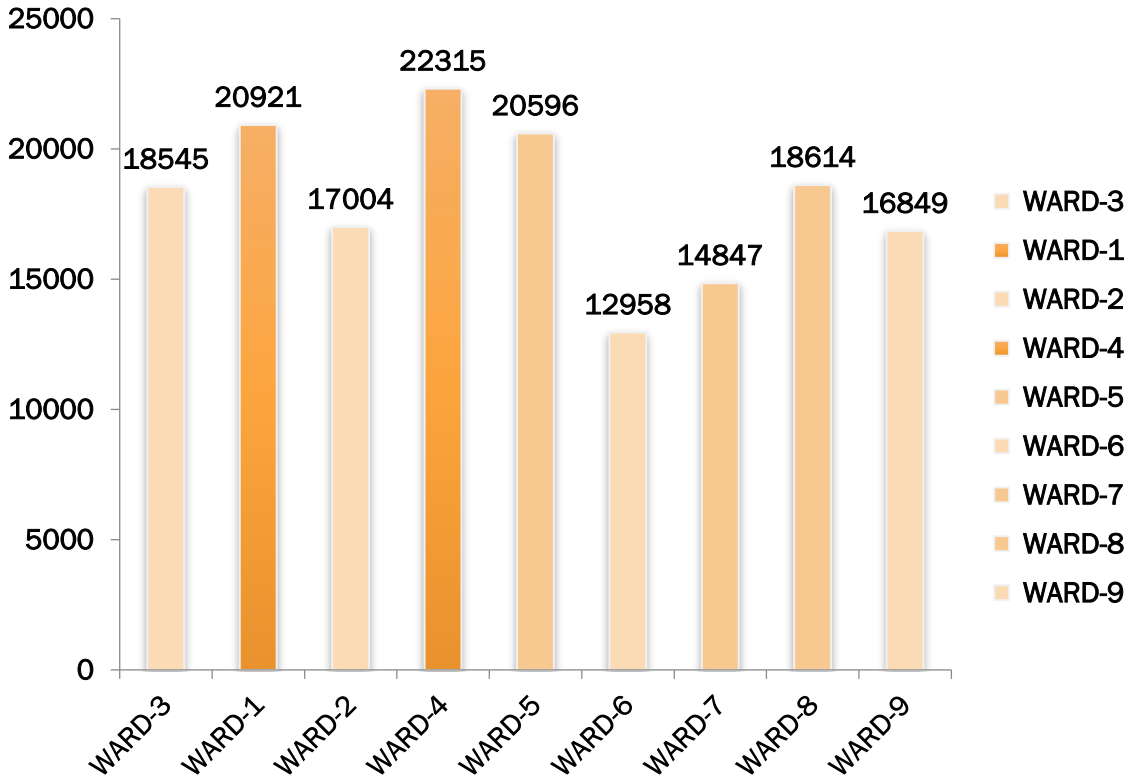


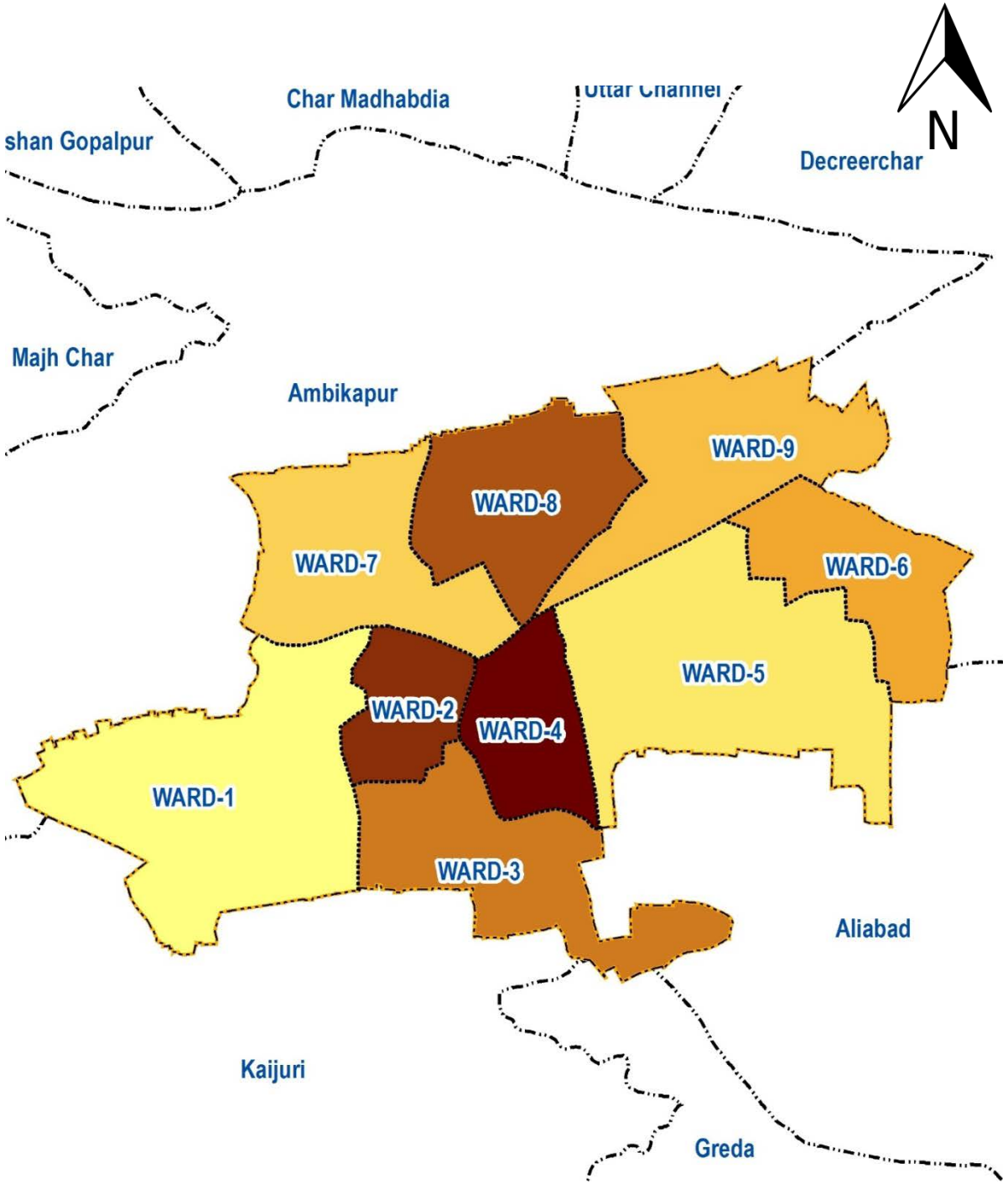
Thematic Maps

Population Projection

	Ward No.	Population in 2011	Population in 2035
Population Projection of Faridpur Paurashava according to wads. Existing Population 469400 (BBS, 2011)	Ward No. 1	15644	20921
	Ward No. 2	12715	17004
	Ward No. 3	13867	18545
	Ward No. 4	16686	22315
	Ward No. 5	15401	20596
	Ward No. 6	9689	12958
	Ward No. 7	11102	14847
	Ward No. 8	13919	18614
	Ward No. 9	12599	16849
	Urban	**121622**	**162649**
Population Projection according to 11 Unions of Faridpur Sadar Upazila **Projected Population 624721** **Estimated Growth Rate:** **1.33 (Urban)** **1.3 (Rural)**	Union	Population in 2011	Population in 2035
	Aliabad	33944	45099
	Ambikapur	27477	36507
	Char Madhabdia	28476	37834
	Decreerchar	21195	28161
	Greda	29242	38852
	Ishan Gopalpur	28861	38346
	Kaijuri	42153	56006
	Kanaipur	48559	64518
	Krishnanagar	37667	50046
	Majh Char	29118	38687
	North Channel	21086	28016
	Union	**347778**	**462072**

Population Density (2033)
Map of Paurashava



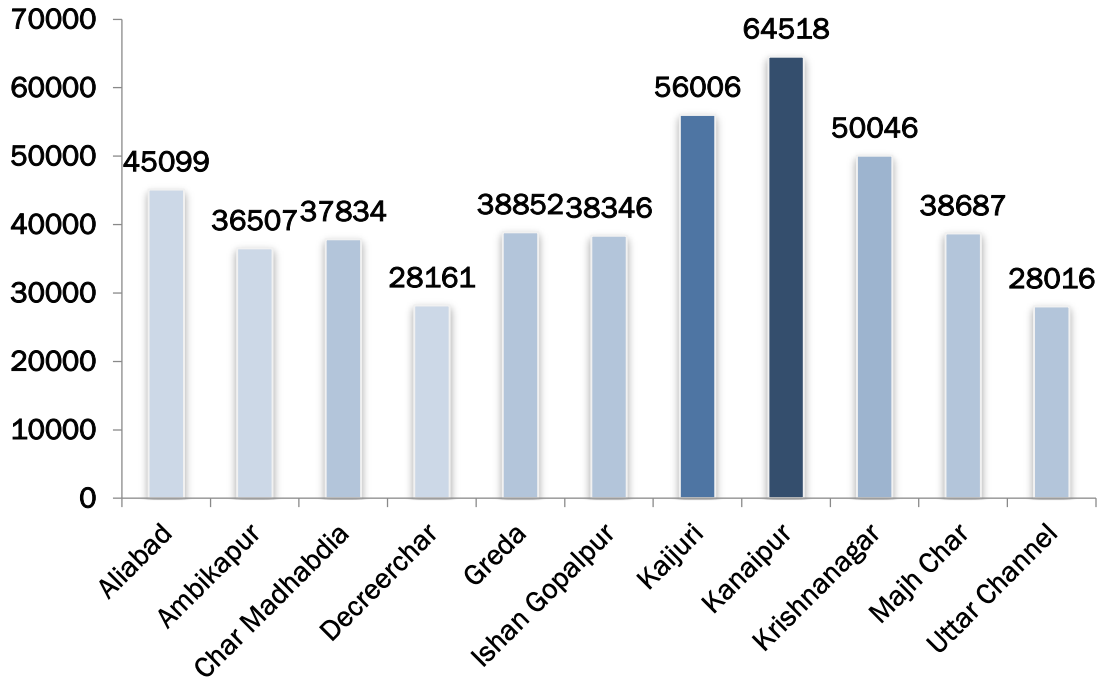


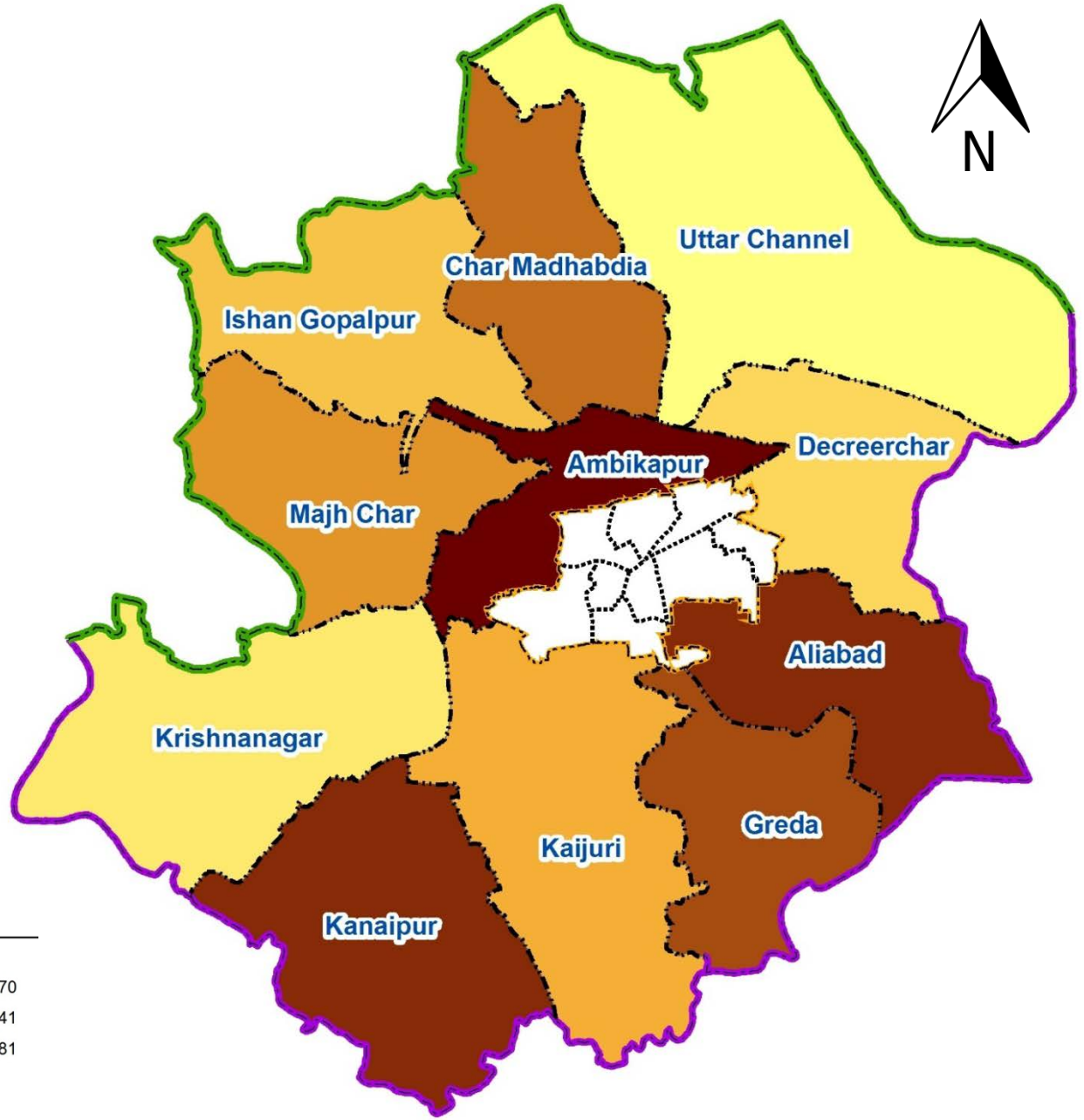
Legend

Administrative Boundary
- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary

Population in 2033 / Acre
- 25.06
- 25.07 - 25.70
- 25.71 - 31.62
- 31.63 - 34.66
- 34.67 - 37.55
- 37.56 - 39.05
- 39.06 - 43.77
- 43.78 - 83.64
- 83.65 - 86.29

Population Density (2033)
Map of Unions



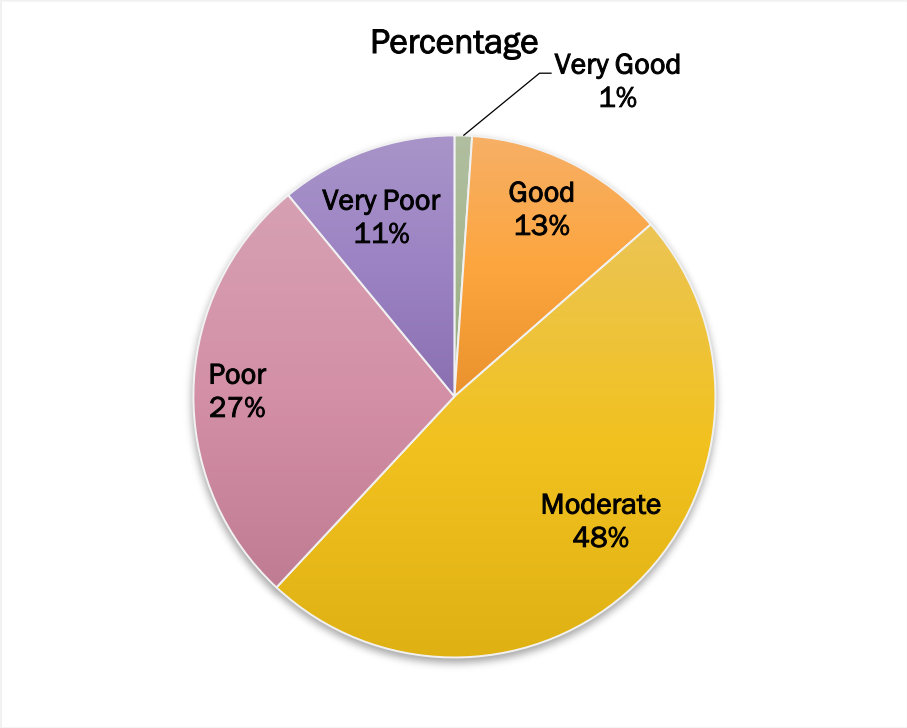


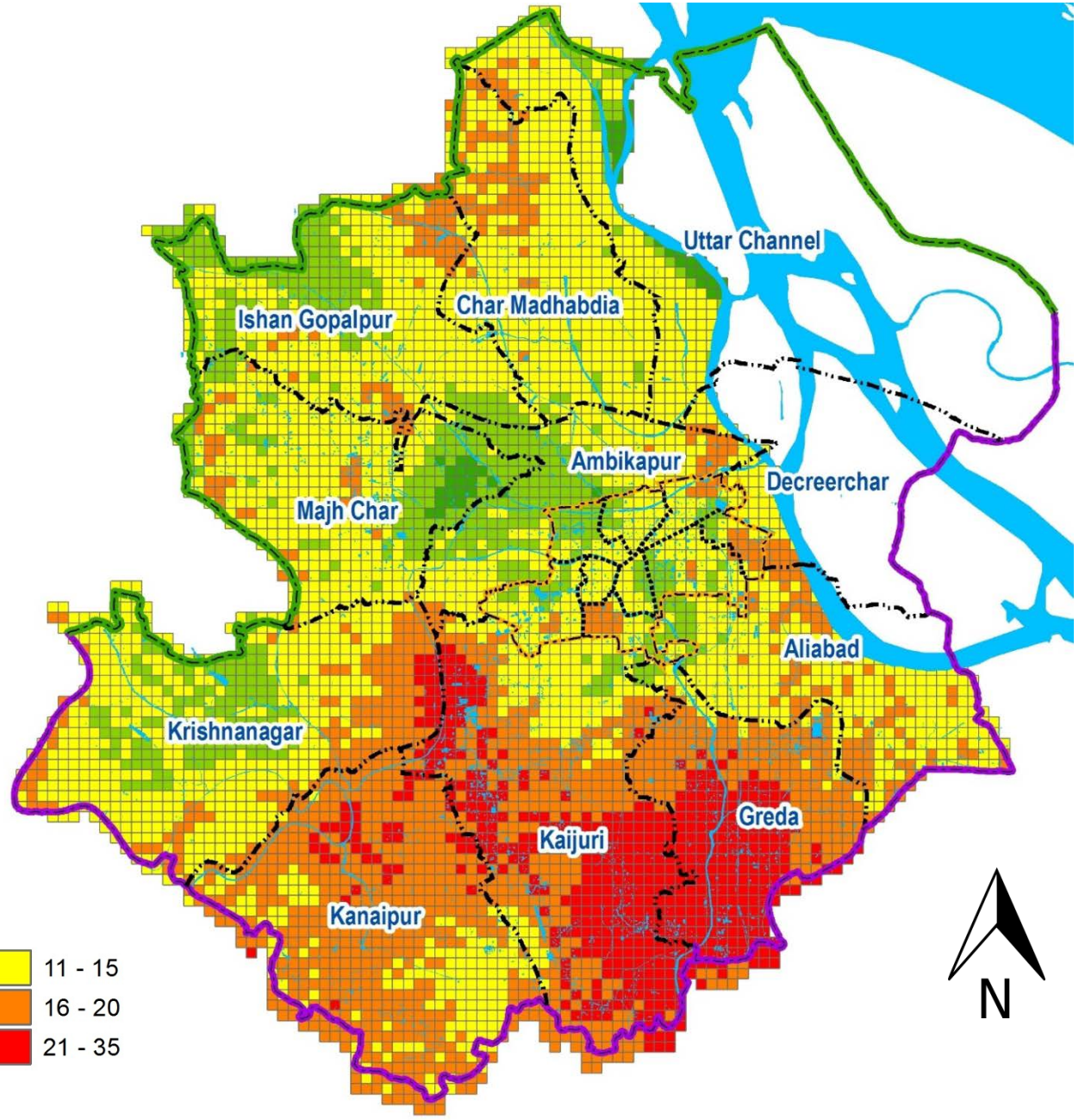
Legend

Administrative Boundary
- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary

Population in 2033 / Acre
- 1.684
- 1.685 - 4.861
- 4.862 - 4.986
- 4.987 - 5.307
- 5.308 - 5.339
- 5.340 - 5.503
- 5.504 - 5.826
- 5.827 - 6.570
- 6.571 - 7.141
- 7.142 - 8.781

Foundation Layer Map





Legend

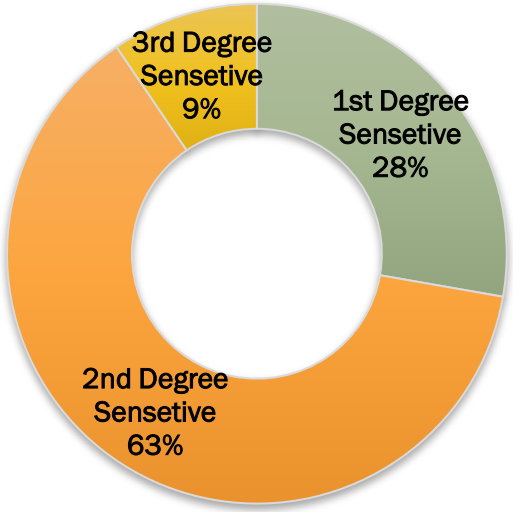
Admin Boundary

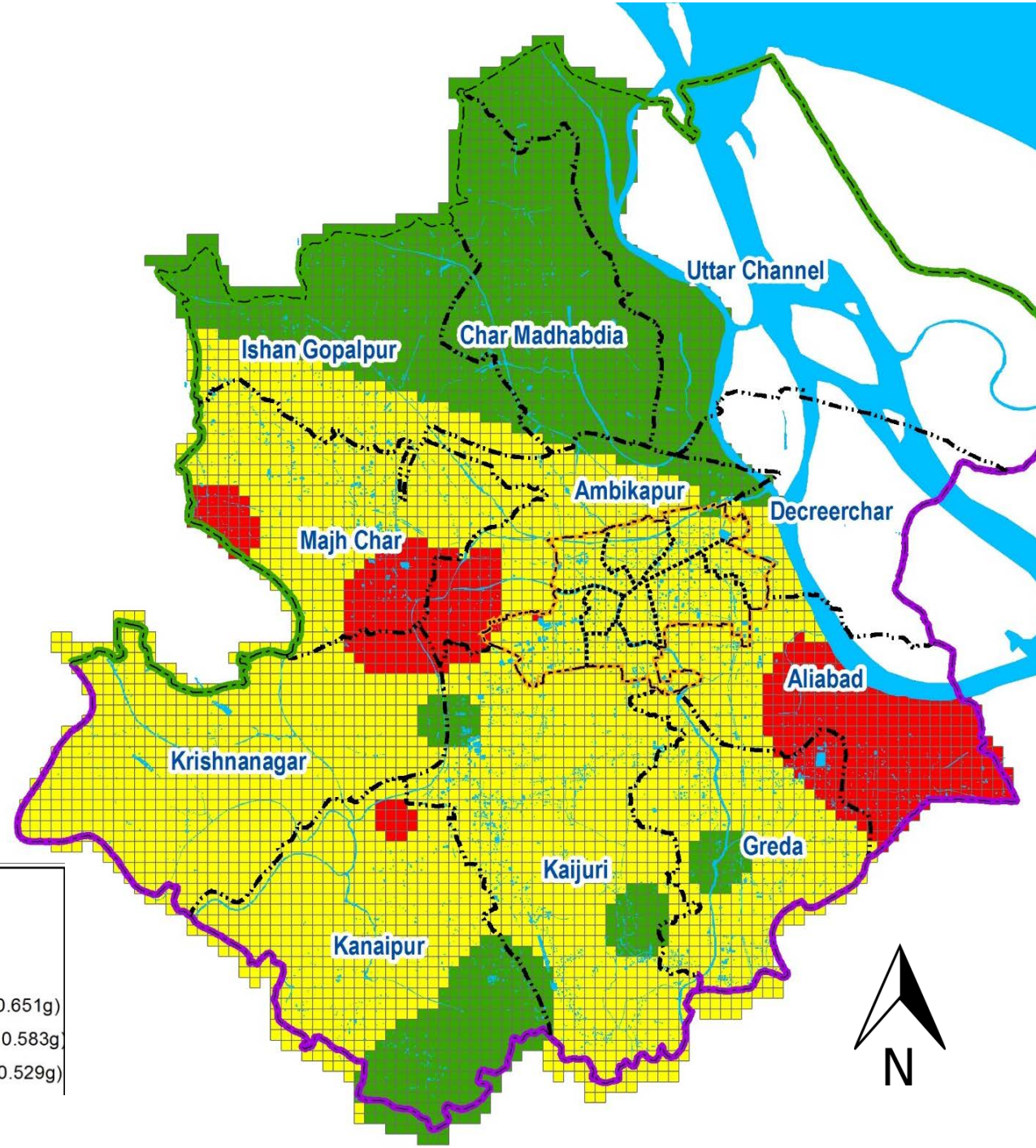
- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary
- Waterbody

Foundation Depth

- 1.5 - 5
- 5.1 - 10
- 11 - 15
- 16 - 20
- 21 - 35

Peak Ground Acceleration Map





Legend

Admin Boundary

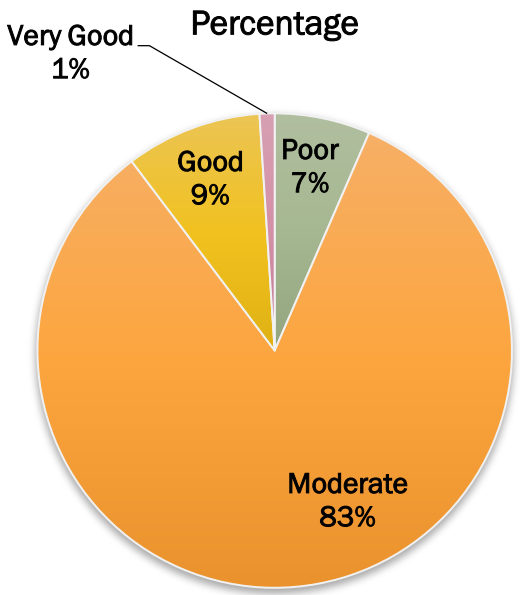
- Upazila Boundary
- Zila Boundary
- Pourashava Boundary
- Union Boundary
- Ward Boundary
- Waterbody

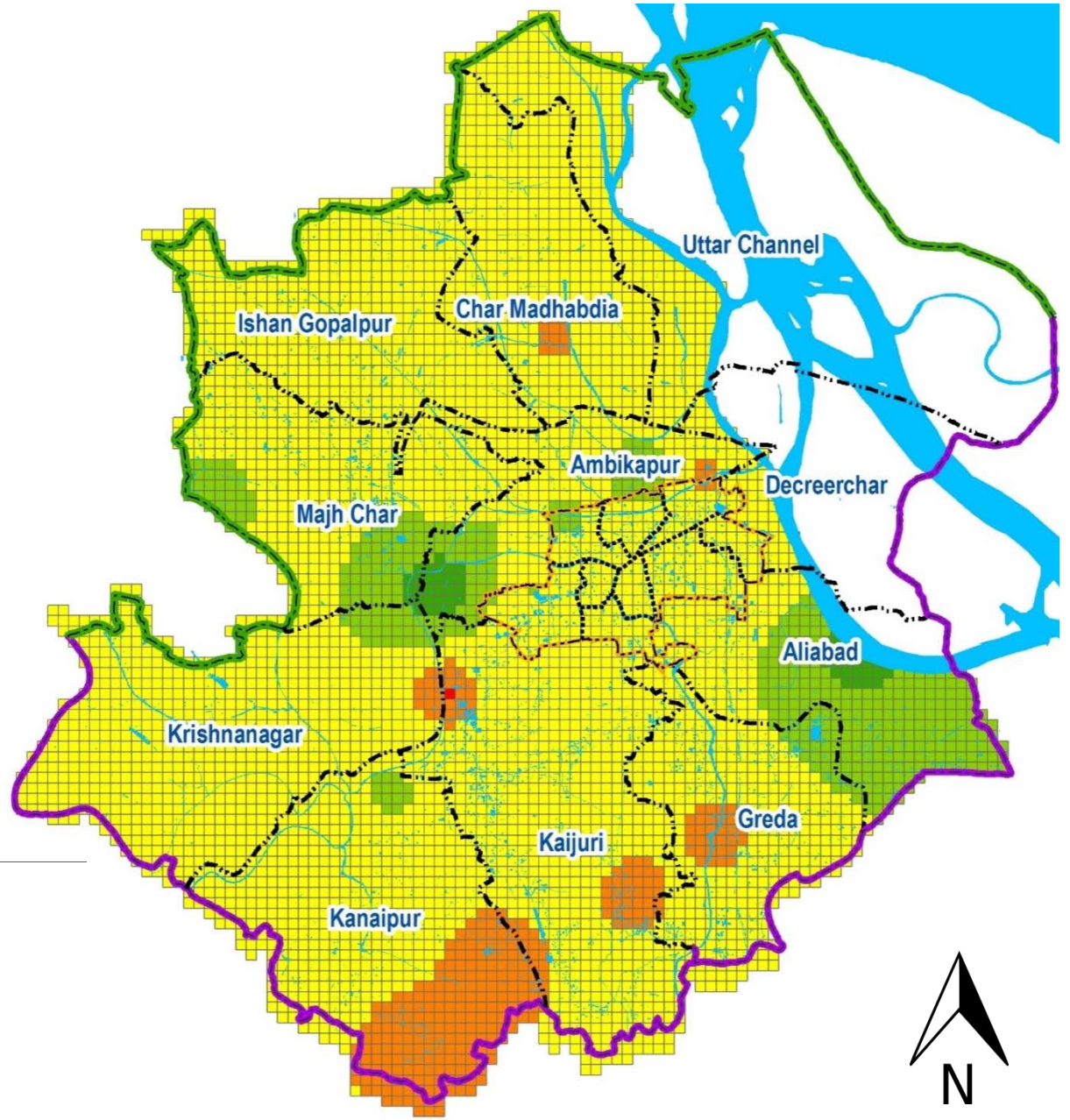
PGA

Earthquake Sensitivity

- 1st Degree Sensetive (PGA 0.584g to 0.651g)
- 2nd Degree Sensetive (PGA 0.528g to 0.583g)
- 3rd Degree Sensetive (PGA 0.443g to 0.529g)

Shear Wave Velocity Map





Legend

Admin Boundary	Waterbody	Shear Wave
Zila Boundary	Waterbody	Very Poor (Less than 150)
Upazila Boundary		Poor (150 - 180)
Pourashava Boundary		Moderate (180-200)
Union Boundary		Good (200- 220)
Ward Boundary		Very Good (More than 220)

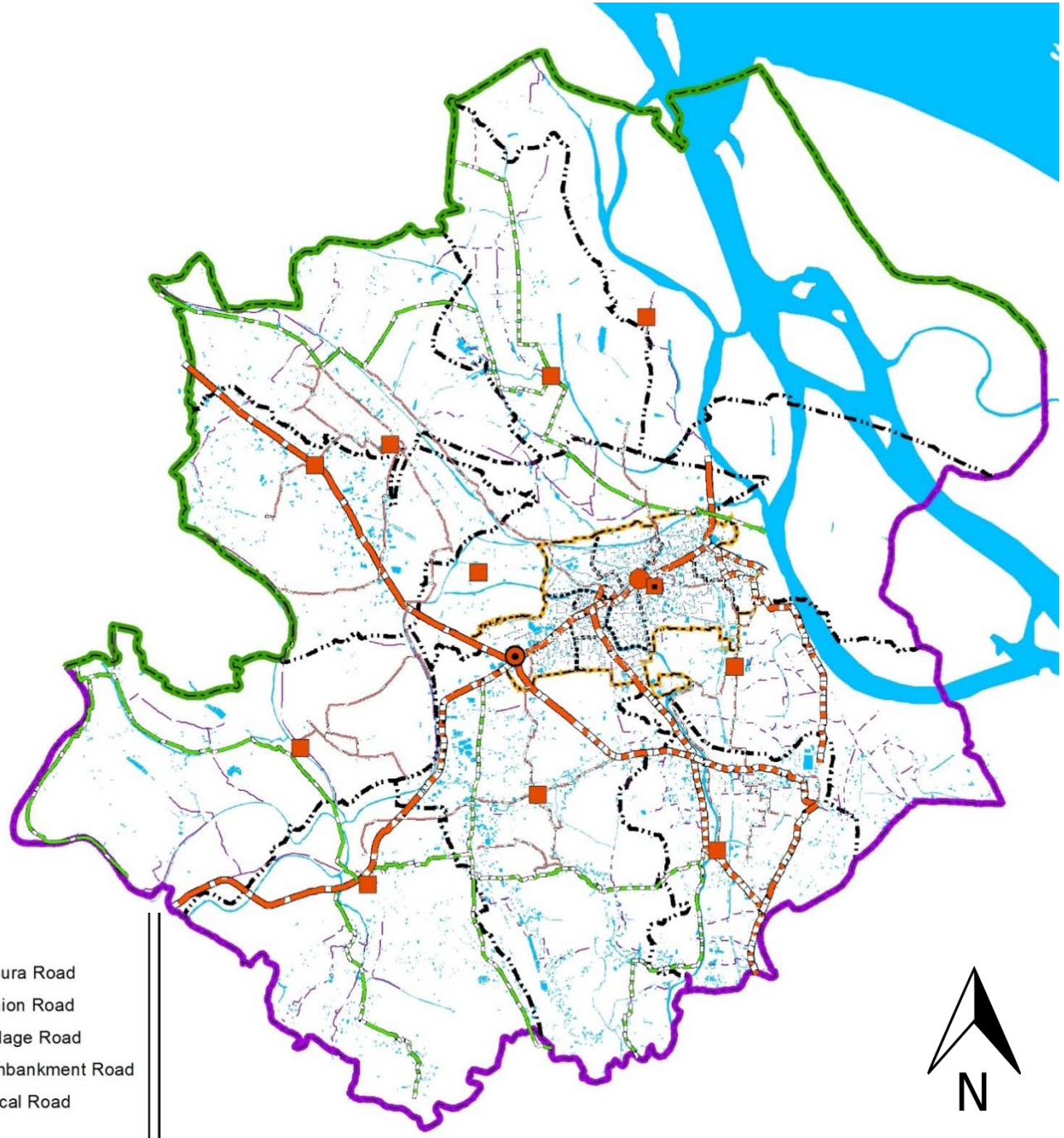
Road Statistics

Type	Length in Km.	Percentage
Pucca	678.3	59%
HBB	195.34	17%
Katcha	274.95	24%
Total	1148.59	100%

Road Hierarchy	Length in Km.	Percentage
Village Road	792.03	68.95%
Local Road	126.20	10.98%
Upazila Road	81.76	7.12%
Poura Road	53.38	4.65%
Union Road	45.43	3.95%
National Highway	23	2%
Regional Highway	22.82	1.98%
Embankment Road	3.94	0.37%
Total	1148.59	100%

Road Hierarchy Map

Thematic Maps



Existing Land Use Map of Paurashava

Thematic Maps

Existing Land Use Map of Pourashava

Landuse	Area (sq	Area (Acre)	Percentage
Administrative	0.23	56.05	1.30
Agriculture	4.28	1057.99	24.59
Circulation Network	0.65	159.55	3.71
Commercial	0.38	93.24	2.17
Community Facilities	0.00	0.48	0.01
Education & Research	0.19	47.03	1.09
Health Facilities	0.06	15.78	0.37
Industrial	0.14	34.94	0.81
Miscellaneous	0.06	14.29	0.33
Mixed Use	0.66	163.02	3.79
Orchard & Gloves	0.00	0.61	0.01
Recreational Facilities	0.01	3.02	0.07
Religious	0.04	9.01	0.21
Residential	8.94	2208.44	51.33
Transport & Communication	0.03	8.07	0.19
Utility Facilities	0.01	1.67	0.04
Waterbody	1.74	429.18	9.98
Total	17.41	4302.36	100.00

Structure Type

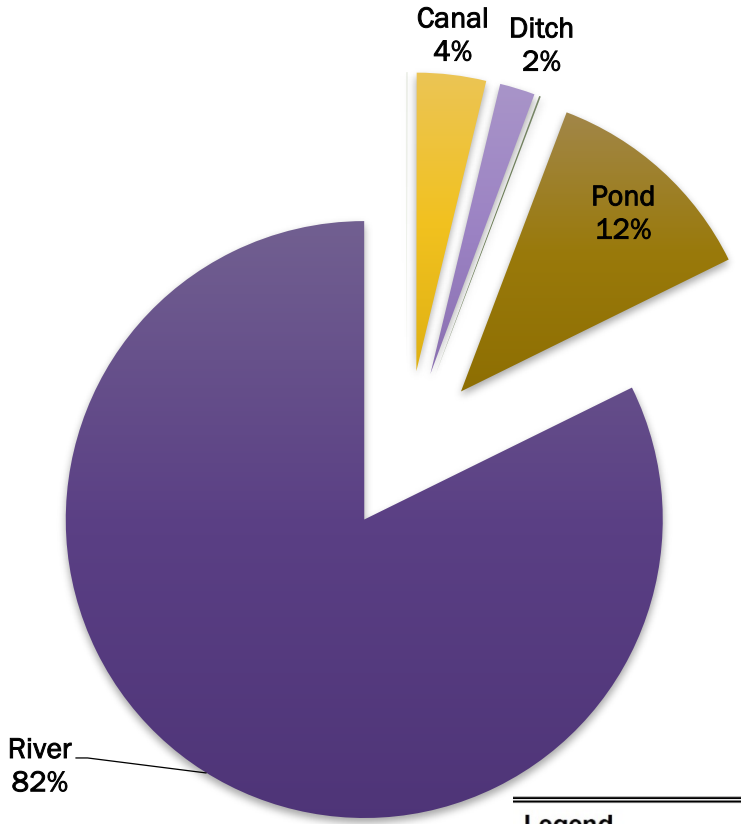
Structure Type in Urban (Faridpur Pourashava)

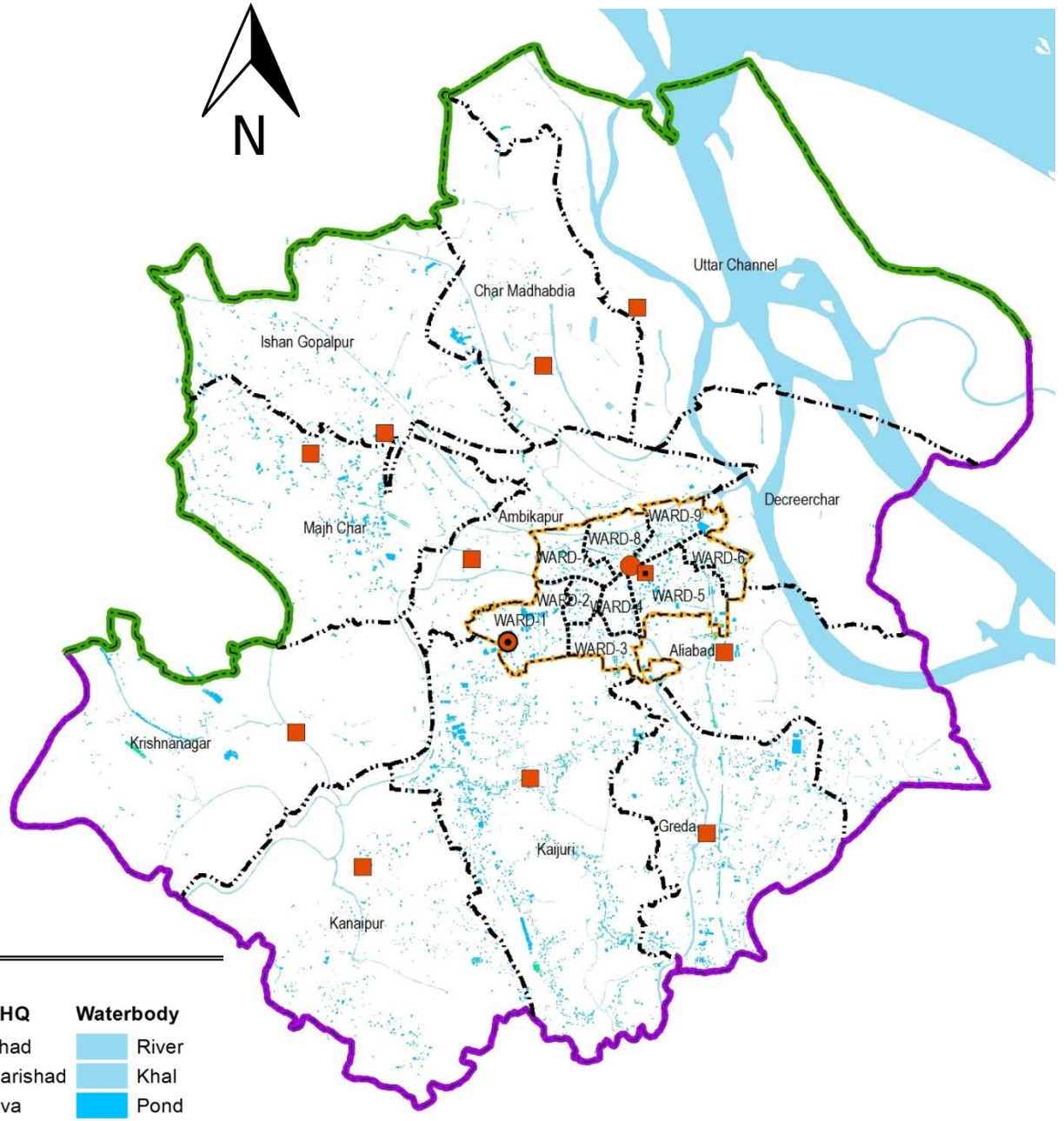
Structure Type	No. of Structures	Percentage
Katcha	20213	54.40%
Pucca	7953	21.40%
Semi Pucca	8830	23.76%
Under Construction	159	0.44%
Total	37155	100%

Structure Type in Rural (Unions)

Structure Type	No. of Structures	Percentage
Katcha	67057	85.07%
Pucca	2501	3.17%
Semi Pucca	9234	11.71%
Under Construction	30	0.05%
Total	78822	100%

Water Source Map of Faridpur Sadar Upazila

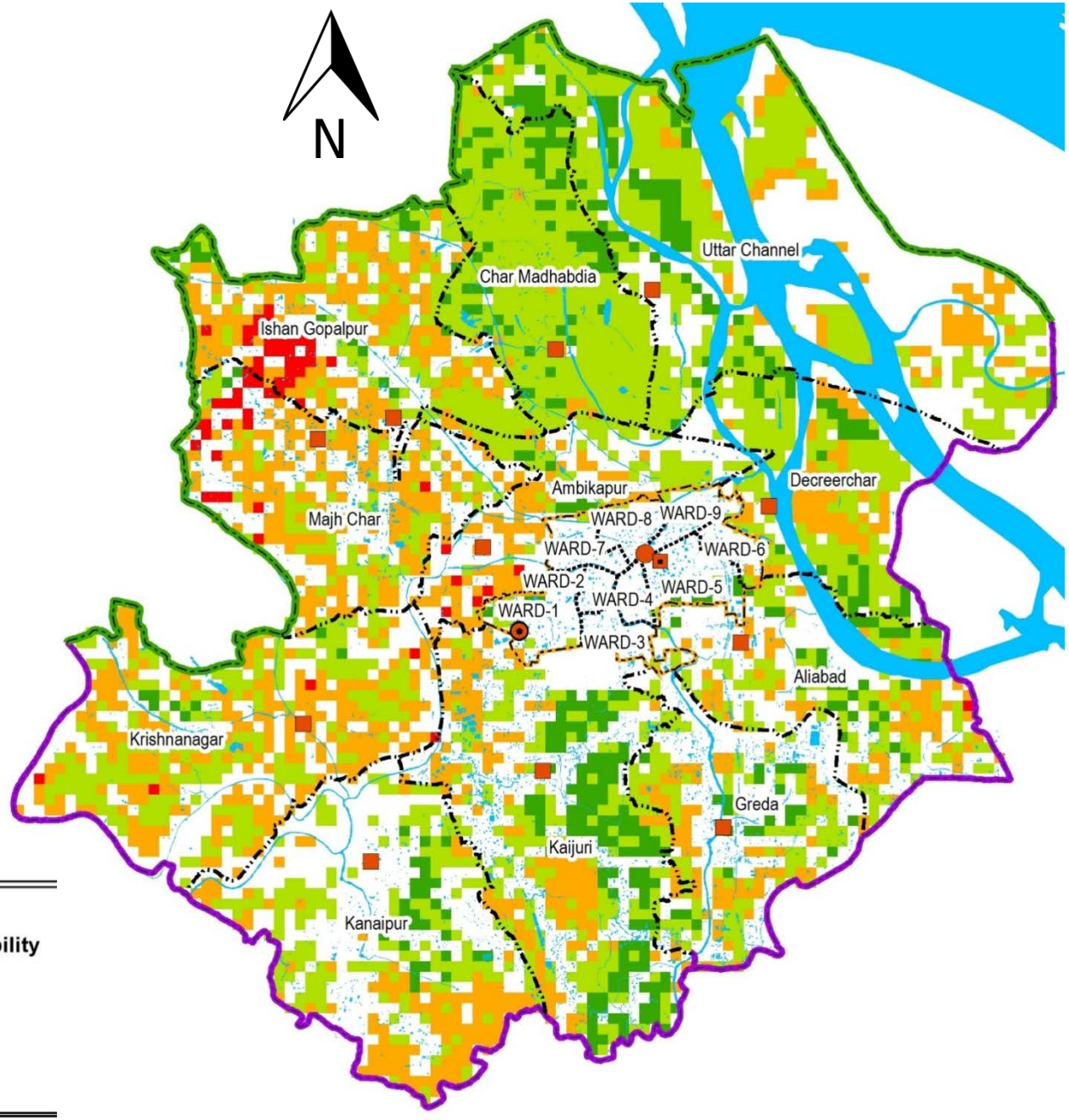




Suitability Maps

Agricultural Suitability Maps

Agricultural Suitability	
Criteria	Weightage
Cropping Intensity	50
Water Depth	30
DEM	20



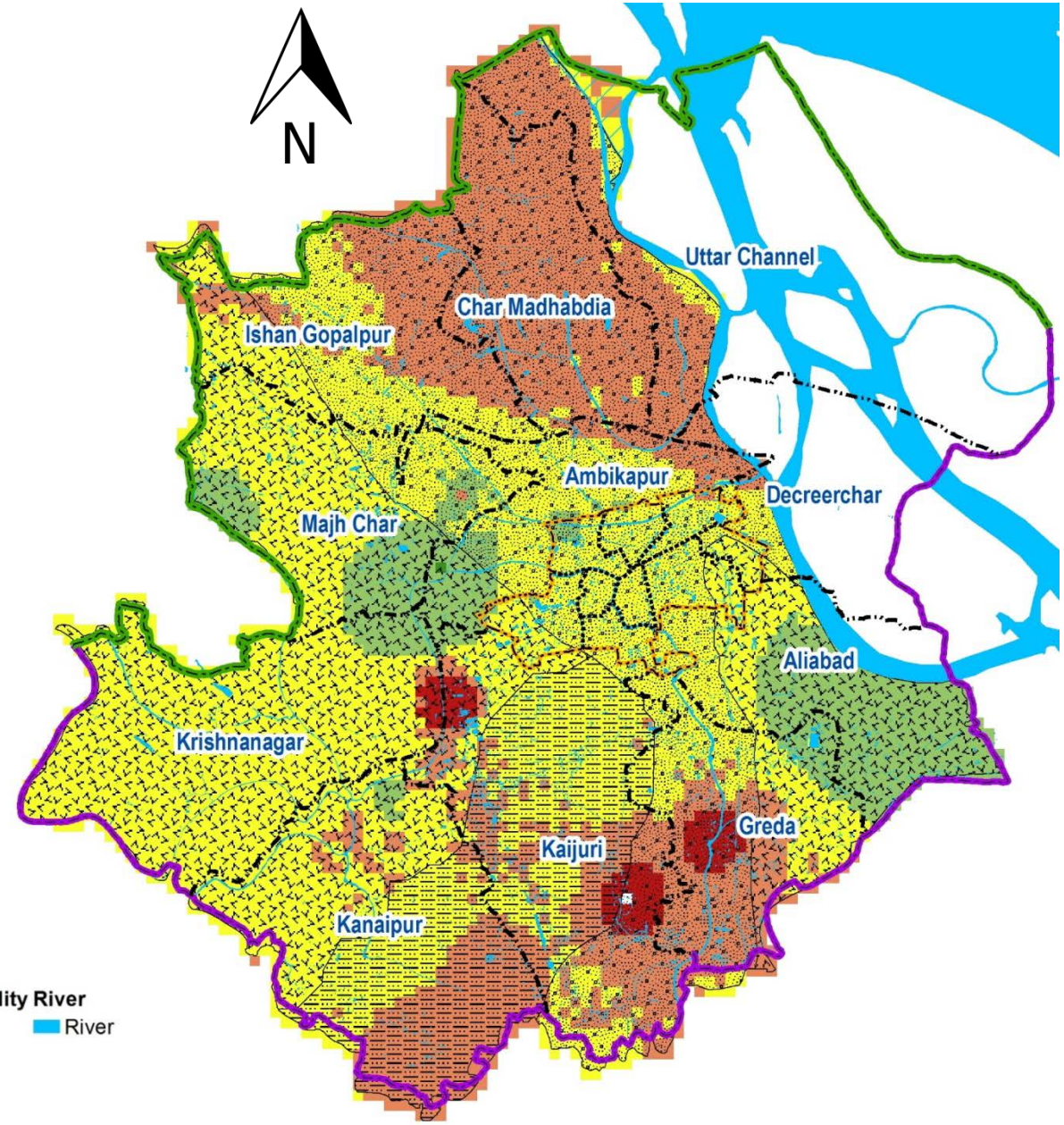
Legend

Administrative Boundary	Administrative HQ		Agricultural Suitability
Union Boundary	Zila Parishad	Pourashava	Poor
Zila Boundary	Upazila Parishad	Union Parishad	Moderate
Upazila Boundary		Waterbody	Good
Pourashava Boundary			Very Good
Ward Boundary			

Infrastructural Suitability Maps

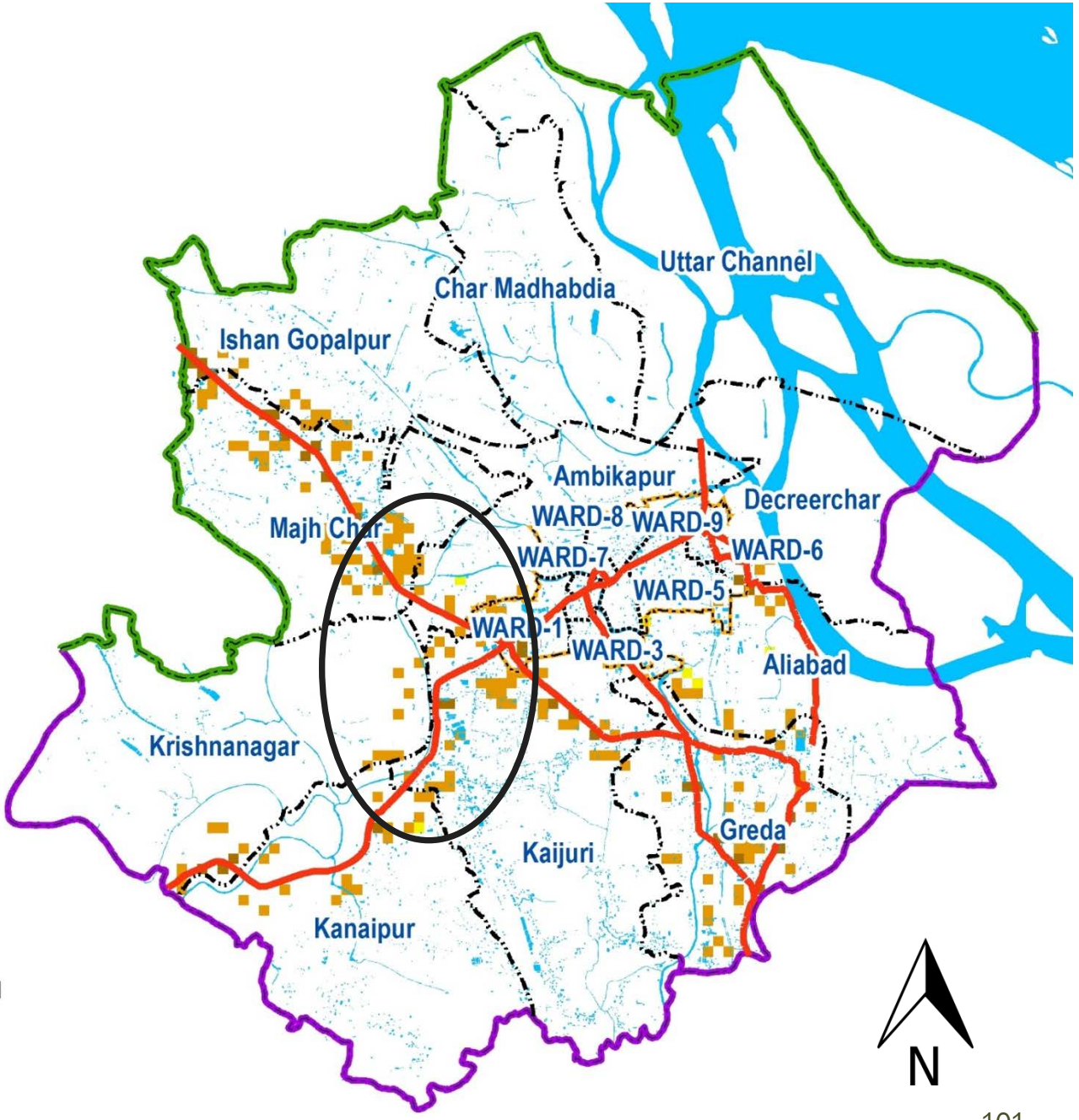
Infrastructure Suitability	
Criteria	Weightage
PGA	30
Foundation Depth	40
Shear Wave	30

Category	Percent (%)	Area in Sq. Km
Very Poor	1.739803	5.625
Poor	31.45177	101.6875
Moderate	56.77557	183.5625
Good	10.01353	32.375
Very Good	0.019331	0.0625



Urban Suitability Maps

Urban Suitability	
Criteria	Weightage
DEM	35
Major Roads	25
Infrastructure Suitability	20
1/Hydrological Suitability	10
1/Agricultural Suitability	10



Legend

Administrative Boundary
- Union Boundary
- Zila Boundary
- Upazila Boundary
- Pourashava Boundary
- Ward Boundary

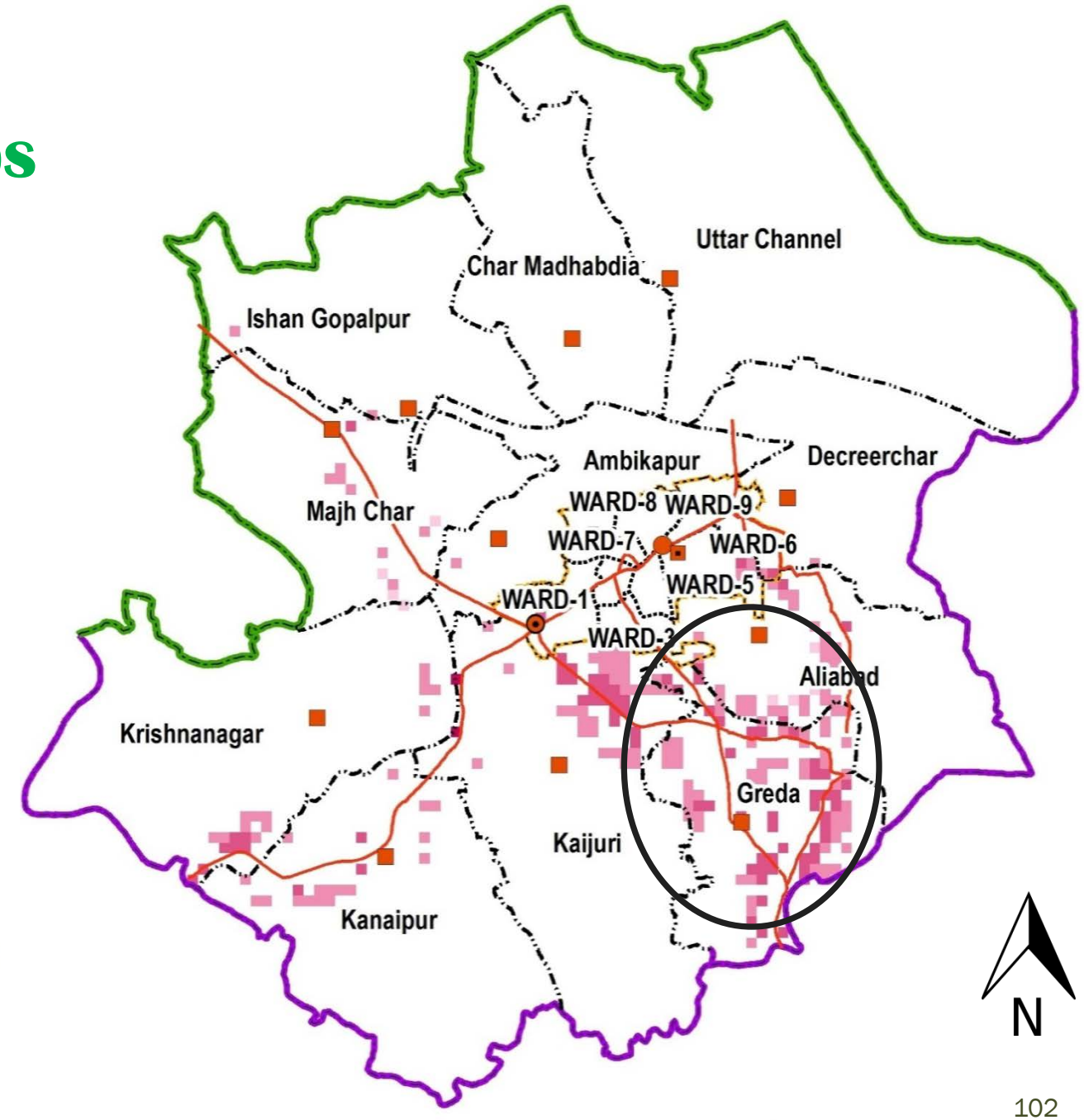
Roads
- Roads

Waterbody
- Waterbody

Urban Suitability
- Good
- Moderate
- Very Good

Industrial Suitability Maps

Industrial Suitability	
Criteria	Weightage
DEM	30
Major Roads	30
Infrastructure Suitability	30
1/Hydrological Suitability	10



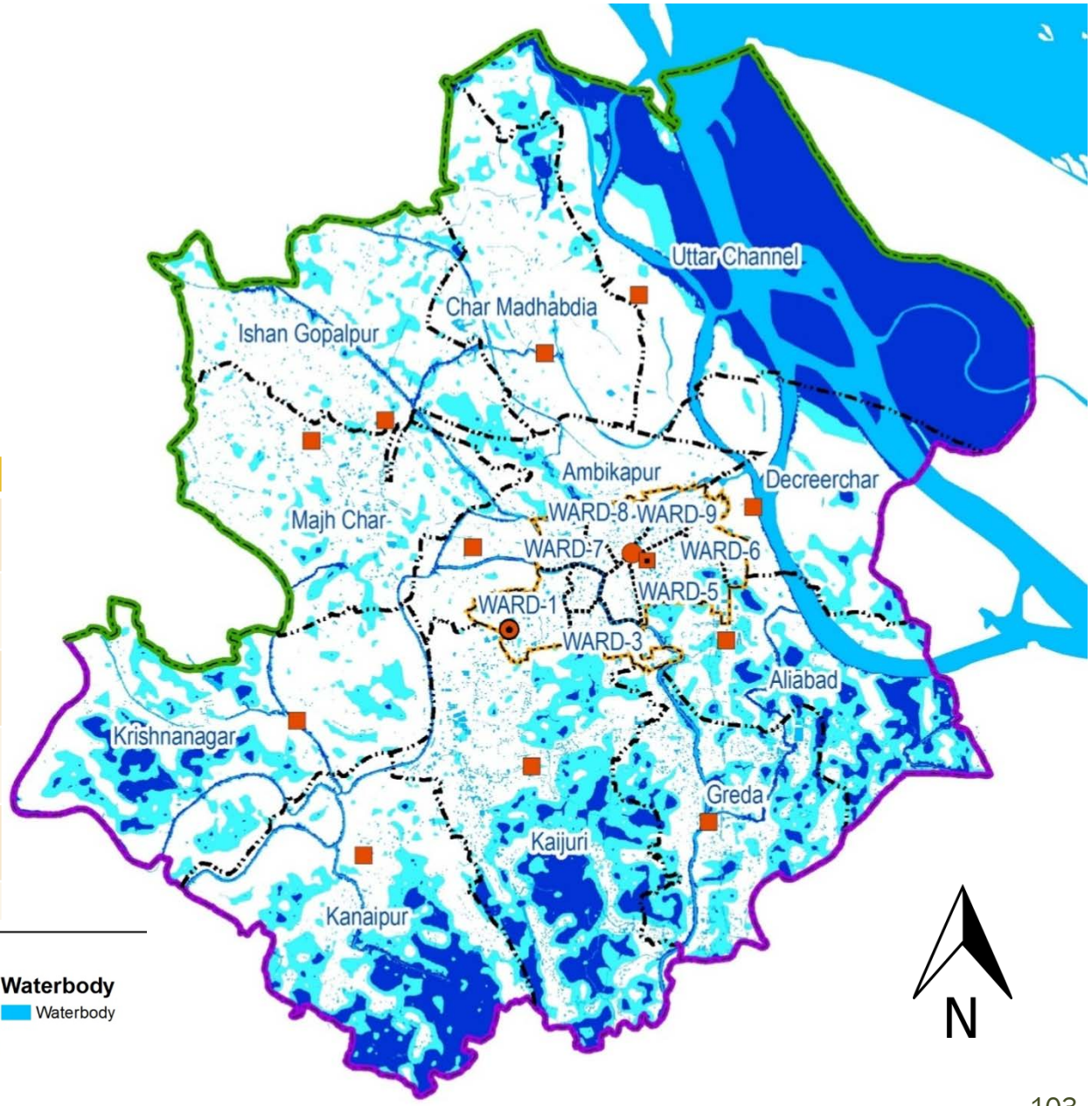
Legend

Administrative Boundary	Administrative HQ	Primary Roads
Union Boundary	Zila Parishad	Primary Roads
Zila Boundary	Upazila Parishad	Poor
Upazila Boundary	Pourashava	Moderate
Pourashava Boundary	Union Parishad	Good
Ward Boundary		Very Good

Flood Flow Zone Maps

Flood Affected Area	
Criteria	Water Depth (m)
Sub Flood Flow Zone	1.8-3.6
Main Flood Flow Zone	>3.6

Flooded Land Category	Water Depth	Percentage	Remarks
1st Degree Flooded area	0-0.3m	34.31	
2nd Degree Flooded area	0.31-0.9m	9.07	
3rd Degree Flooded area	0.91-1.8m	13.46	
4th Degree Flooded area	1.81-3.6m	19.37	Sub Flood Flow Zone
5th Degree Flooded area	>3.6m	23.79	Main Flood Flow Zone
Total	115628500	100.00	

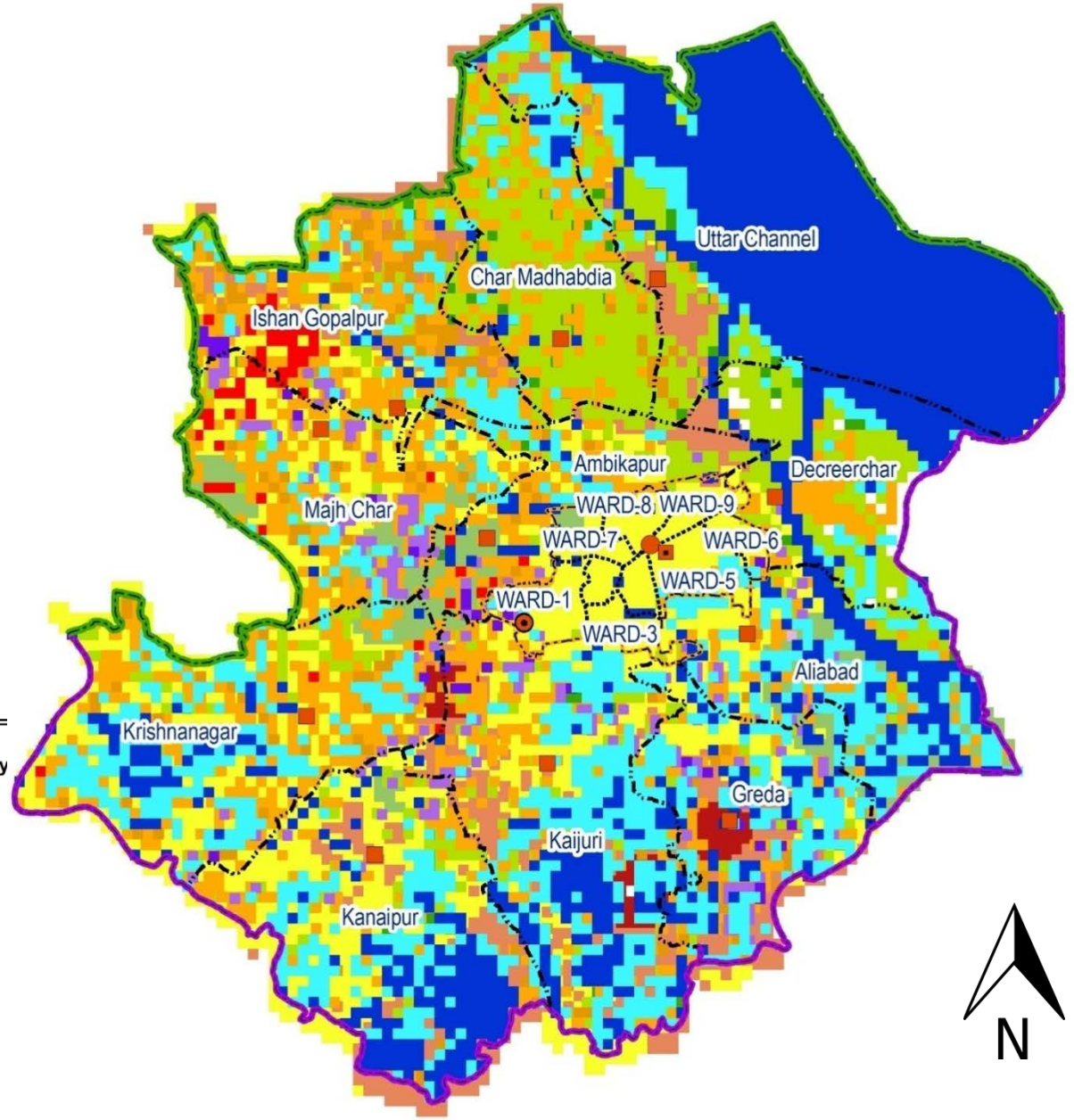


Legend

Faridpur Admin Boundary	Administrative HQ	Flood Flow Zone	Waterbody
Zila Boundary	Zila Parishad	Sub Flood Flow Zone	Waterbody
Upazila Boundary	Upazila Parishad	Main Flood Flow Zone	
Pourashava Boundary	Pourashava		
Union Boundary	Union Parishad		
Ward Boundary			

Conflict Maps

A Platform to delineate the Tentative Zoning



Legend

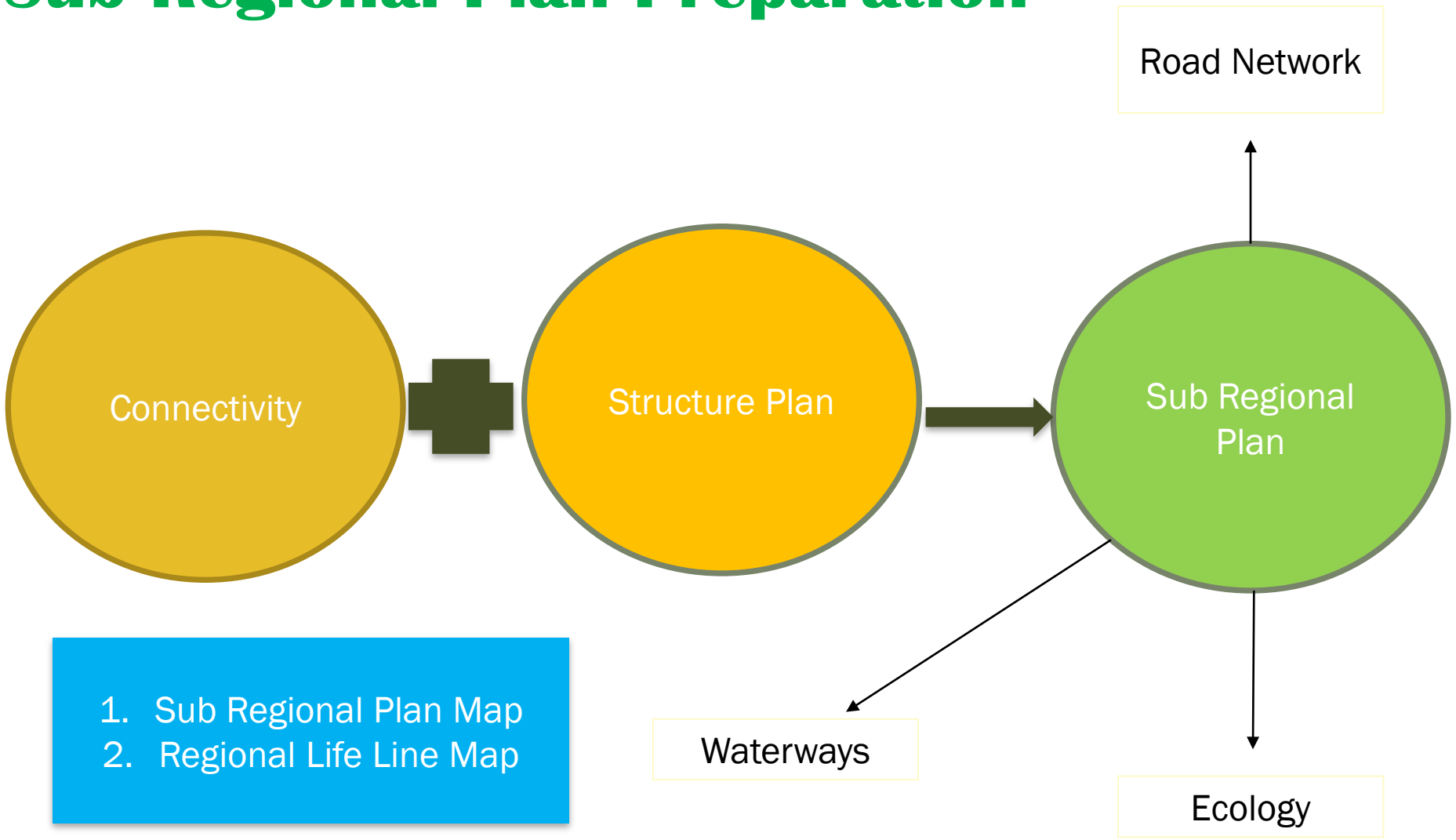
Administrative Boundary	Flood Flow Zone	Urban Suitability	Infrastructure Suitability
Union Boundary	Sub Flood Flow Zone	Good	Very Poor
Zila Boundary	Main Flood Flow Zone	Very Good	Poor
Upazila Boundary	**Agricultural Suitability**	**Industry Suitability**	Moderate
Pourashava Boundary	Poor	Poor	Good
Ward Boundary	Moderate	Moderate	Very Good
	Good	Good	
	Very Good		

Suitability Maps

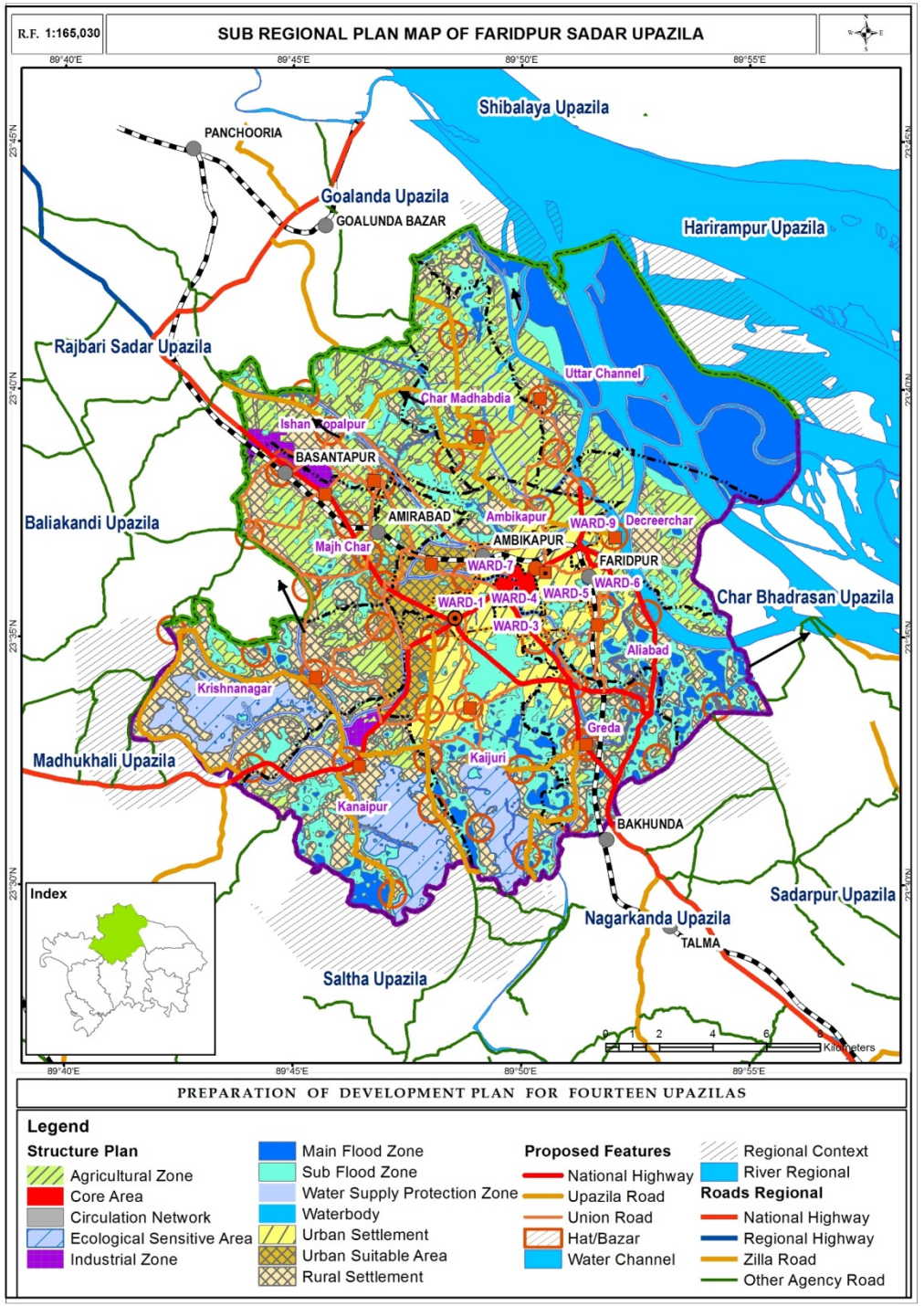
Plan Preparation

Sub Regional Plan

Sub Regional Plan Preparation



1. Sub Regional Plan Map
2. Regional Life Line Map



Sub Regional Plan Map

Sub Regional Plan

Components of Sub-Regional Plan

1. Connectivity
    a) Physical (Road, Waterways, Railway etc)
    b) Economic, environment and nature (ecosystem)
    c) Social and urban services
2. Biodiversity and Nature Conservation
3. Community Resilience through Disaster Management

Policies for Sub-Regional Planning

Connectivity and Transportation Network

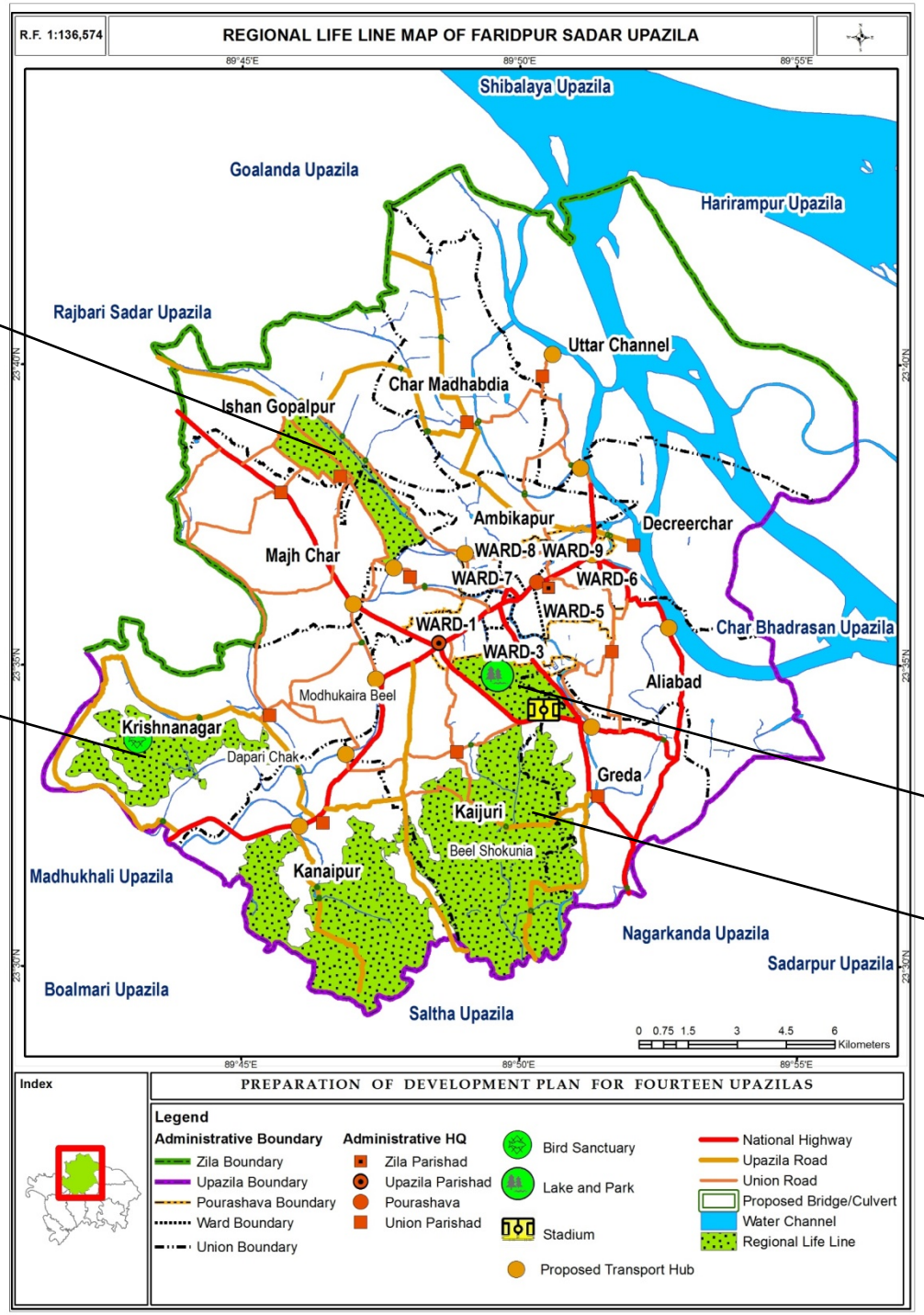
Policy 1: Prioritize inter- (Zila-Upazila/Upazila-Upazila) and intra- (Urban-Rural-GC) regional connectivity.

Policy 2: Proper design standards and details of all categories.

Policy 3: Develop an integrated (land, rail and water) transportation network.

Canal and Triple Cropped Land

Dighilar Beel, Alnar Beel, Ghedar Beel, Bangaira Beel, Baikkar Beel



Proposed Lake and Park

Beel Shokunia

Regional Life Line Map

Sub Regional Plan

Regional Life-Line

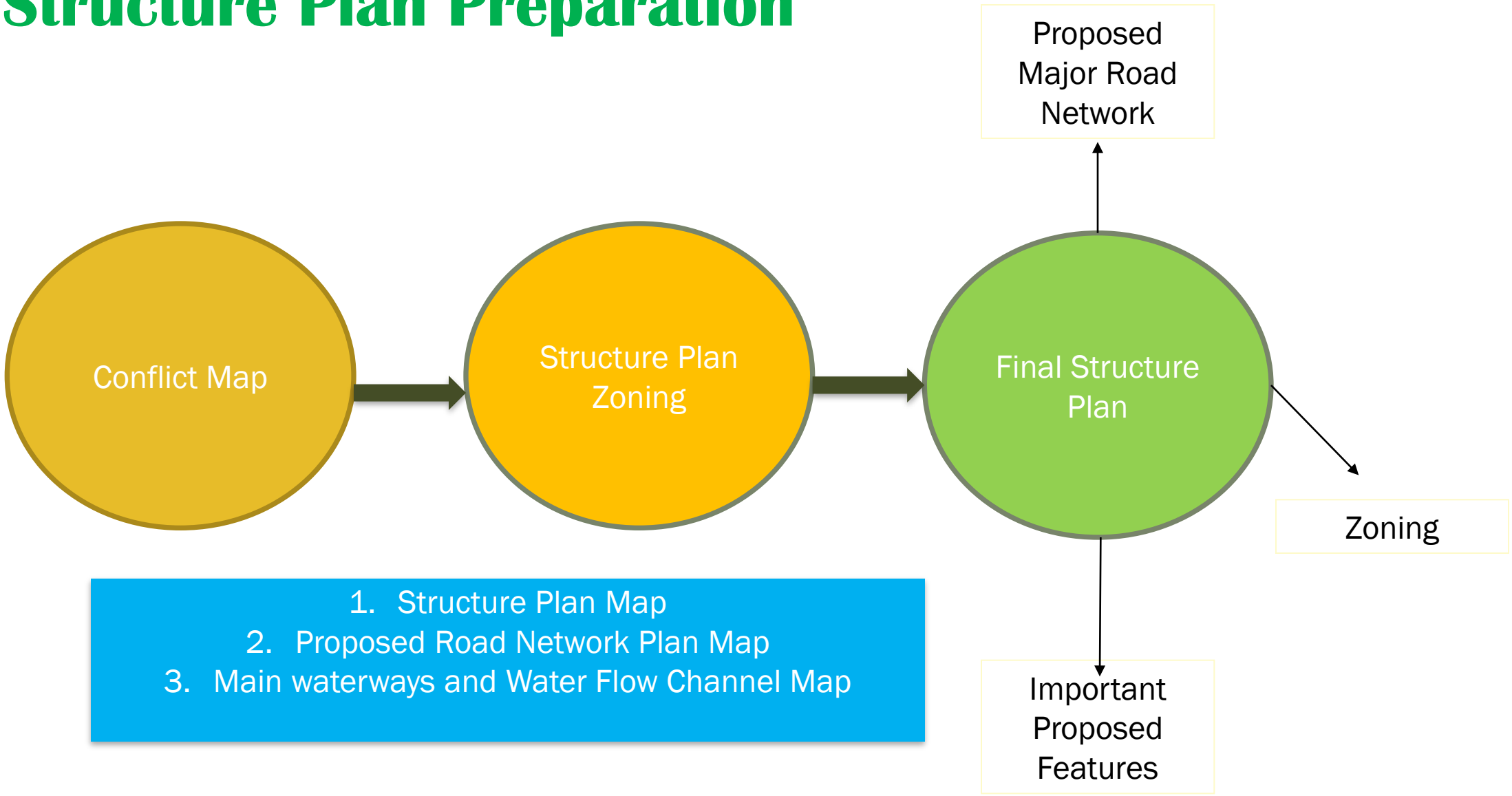
- Life-line: There are two dimensions of Upazila-life-line; physical and Natural. Physical life-line consist of upazila's communication network such as road, railway, waterways as well as water channels.
- Natural life-line consists of important areas for conservation and also the preservation of flora fauna.

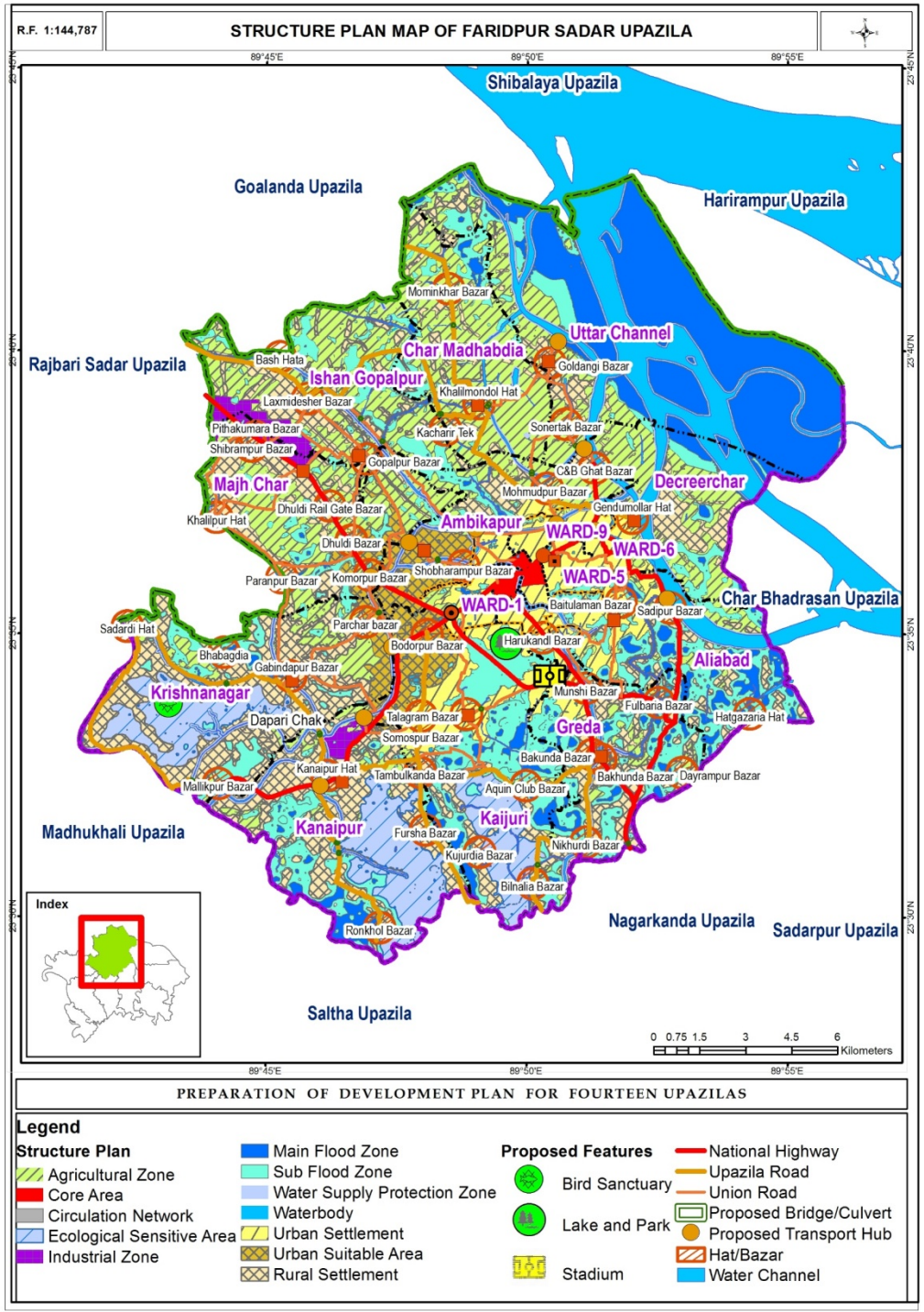
Sub Regional Plan-Regional Life-Line

Along the built corridor (Road)	Along the natural corridor (Waterways)	Disaster Resilient
• Mobility – Road – Green Footpath – Public transport bay – Walkway – Cycle track – Multi modal transfer station – Rest and sitting facilities for pedestrians and emergency	• Water – Canal – River – Water transport • Greenery – Park – Open spaces – Forest – Botanical Garden – Orchards	• Evacuation route • Evacuation shelter • Retrofitting of infrastructures
• Utility Facilities – Drainage Facility – Public Toilet – Line services in 'Utility Duct' including electricity, gas, water supply etc. • Others – Hawkers and small shops – Amphitheatre – Research Centre	• Environment Conservation – Flora fauna conservation – Wetland conservation – Flood water drainage – Ground water recharge – Micro climate stabilization	

Structure Plan

Structure Plan Preparation





Structure Plan Map

Structure Plan

1. Agricultural Zone
2. Core Area
3. Circulation Network
4. Industrial Zone
5. Main Flood Zone
6. Sub Flood Zone
7. Water Supply Protection Zone
8. Waterbody
9. Urban Settlement
10. Urban Suitable Area
11. Rural Settlement

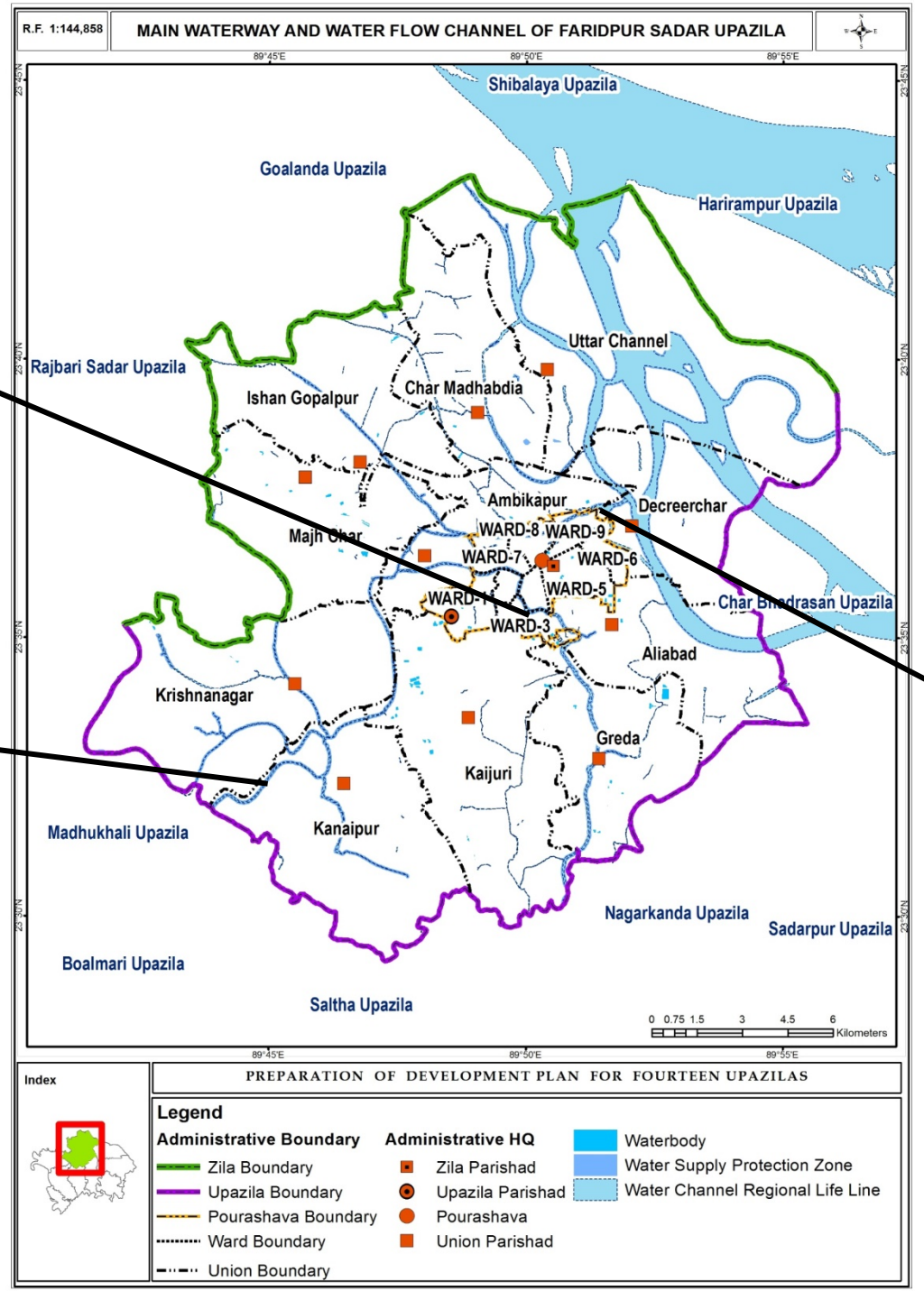
Zoning

Structure Plan Map

Zoning	Area (sq. m)	Area (sq. km)	Area (acre)	Percantage
Agricultural Zone	73891183.28	73.89	18258.91	19.47
Circulation Network	2501482.19	2.50	618.13	0.66
Core Area	1372588.41	1.37	339.17	0.36
Industrial Zone	6048851.05	6.05	1494.70	1.59
Main Flood Zone	60169894.32	60.17	14868.30	15.85
Rural Settlement	78467684.19	78.47	19389.79	20.67
Sub Flood Zone	76349953.99	76.35	18866.48	20.12
Urban Settlement	26442841.01	26.44	6534.17	6.97
Urban Suitable Area	13980947.16	13.98	3454.77	3.68
Water Supply Protection Zone	39384510.23	39.38	9732.12	10.38
Water body	956938.16	0.96	236.46	0.25
Total	379566874.00	379.57	93793.02	100.00

Important River / Canal

- Veribadh Khal
- Padma Sub River
- Old Kumar River
- Kumar River
- Bhubaneswar River
- Mandartola Khal
- Hota Khal
- Basantapur Khal

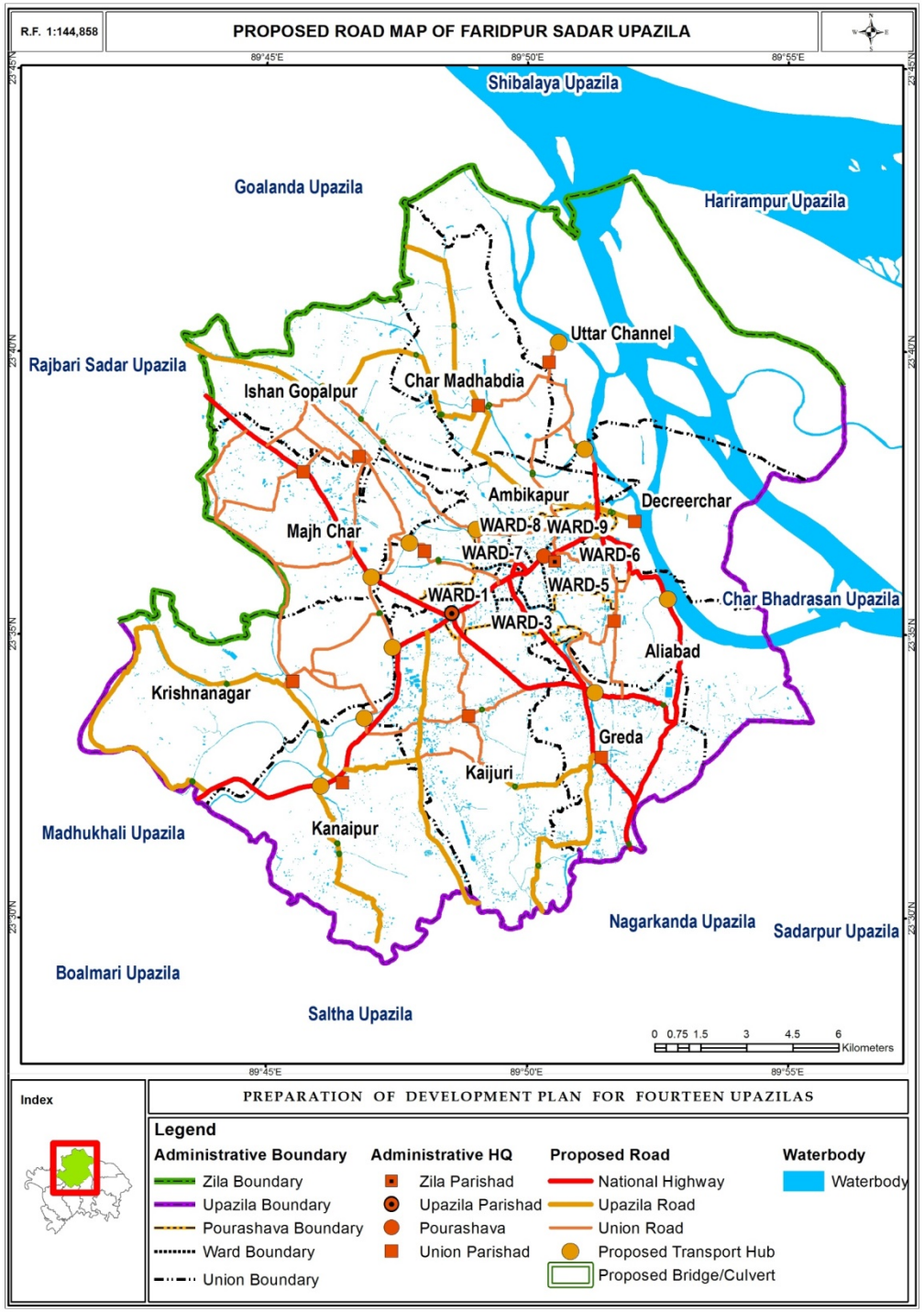


Water Channel Map

Main Waterways and Water Flow Channel Map

- Policies for Proposed water way:

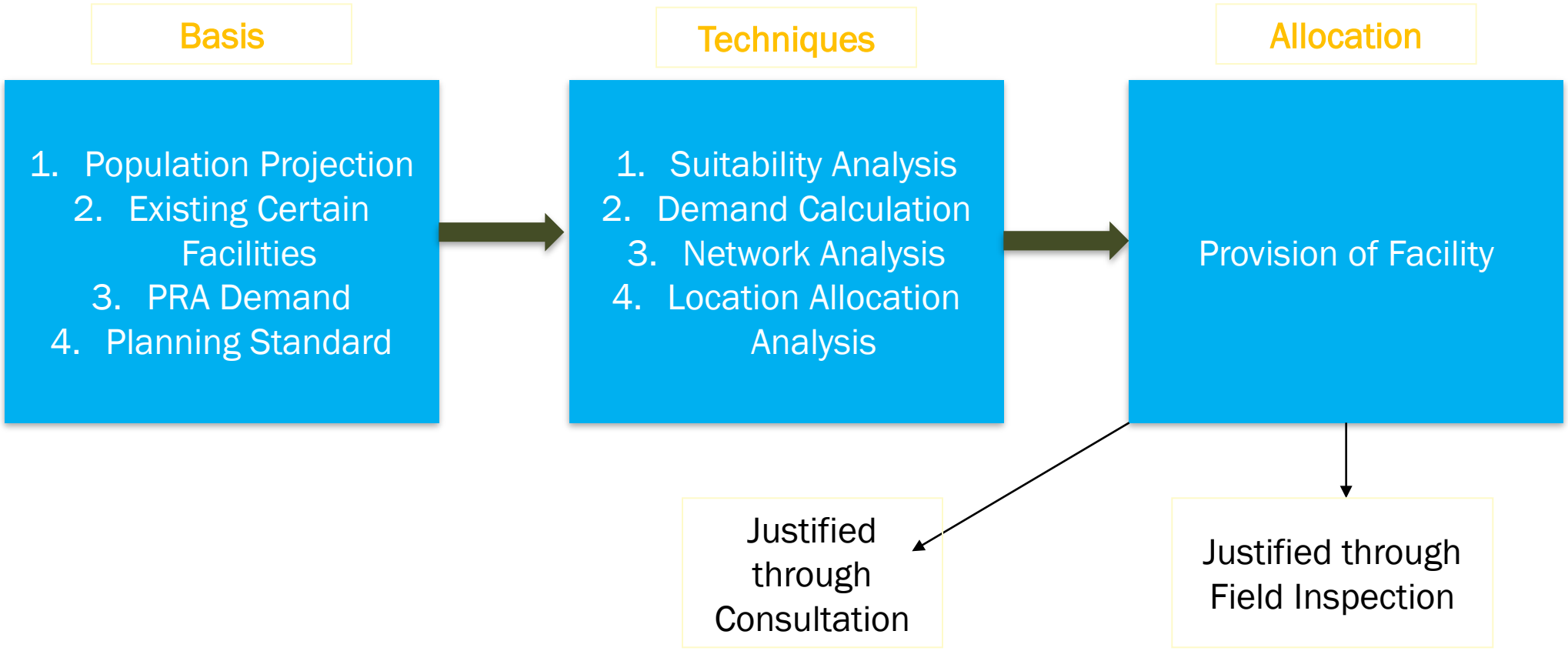
1. Illegal and unauthorized encroachment of river and canal should be removed
2. Dredging of the Kumar and Bhubonesshor river should be undertaken to establish appropriate draft for navigability
3. Construction of bridge should follow the guidance and standards of LGED/RHD and IWT so that those cannot create any obstacle in the water way navigation.



Circulation Network Map

Urban & Rural Area Plan

Urban Area Plan and Rural Area Plan Preparation



Urban Area Plan

a) Physical (road, waterways, railway etc)
b) Economic, environment and nature (ecosystem)
c) Social and urban services

(Non Infrastructural and Infrastructural)

Urban Area Plan

Resilience Dimension	Goal	
Municipal Competence and Capacity	GOAL 1:	Delivery of efficient and effective municipal services and use of resources, accountable to municipal residents
Climate and Environmental Services	GOAL 2:	Increase and restore degraded natural areas and improve water quality and water network through measures that benefit health and wellbeing of people and places
Economic Conditions	GOAL 3:	3. Restore and improve upazila life-line to attract and retain investment, create employment, diversify ecology for overall improvement of different professional and trade groups.

Urban Area Plan

	Infrastructure	Non- Infrastructure
Goal 1	Transport Network and Provision of Required facilities based on Demand Analysis	• Improved governance through management and technical capacity • Improving urban planning capacity, systems and processes. • Improving operation and maintenance capabilities • Community participation and engagement
Goal 2	Multi-functional green infrastructure and open space network	• Improve the water quality in urban water ponds • Household & community green infrastructure
Goal 3	Improving water channels for navigation and irrigation	• Diversifying the municipal economy • Creating employment • Supporting economic activities based on unique natural advantages

Rural Area Plan

Rural Area Plan

a) Physical (road, waterways, railway etc)
b) Economic, environment and nature (ecosystem)
c) Social and urban services

(Non Infrastructural and Infrastructural)

Proposed Features

Rural/Union	Urban/Built up Area	Upazila
➢ Growth Center ✓ CNG/Tempo/Auto Rickshaw /Rickshaw Stand ➢ Primary School/Kindergarten ➢ High School ➢ Health Center/Maternity Clinic ➢ Play Ground/Field ➢ Eidgah ➢ Graveyard ➢ Mosque/Pagoda/Temple ➢ Community Center ➢ Post Office ➢ Electric Substation ➢ Small Scale Industry	➢ Primary School/Kindergarten ➢ High School ➢ College ➢ Neighborhood Park ➢ Play Ground/Field ➢ Health Center/Maternity Clinic ➢ Mosque/Pagoda/Temple ➢ Eidgah ➢ Graveyard ➢ Community Center ➢ Post Office ➢ Water Reservoir ➢ Waste Secondary Transfer Station ➢ Overhead Tank ➢ Electric Substation ➢ Wholesale Market ➢ Retail Market	• Retail Trade Zone • Wholesale Trade Zone • Dairy Food Zone • Fruit processing Zone • Economic Zone • Poultry and Fish Processing Zone • Amusement park • IT Park • Low Income/Landless Affordable Housing • Planned Housing Area • Stadium • Water Treatment Plant • Textile and Sweetmeat Zone • Bus Stand • Truck Stand and Freight Zone • Solid Waste Disposal • Botanical Garden • Tourist Zone • Eco Park • Auditorium/Cinema Hall • Monument

Action Area Plan

Action Area Plan

Priority List for Infrastructure Projects for Pourashava

Problem Description	Proposed Delivery Timescale	Proposed Project	Priority Level
Insufficiently sized water supply network	Short Term	Improved water supply system	High
Drainage congestion and water pollution	Short Term	Integrated waste management system	High
Energy supply	Short Term	Access to consistent energy supply	Medium - High
Slums and informal settlements	Short Term	Slum upgrading	Medium - High
Drainage congestion and water logging	Short Term	Drainage network	Medium
Urban flooding	Short Term	Multi-functional green infrastructure and open space network	Medium
Insufficient transport facilities and traffic congestion	Medium Term	Multi-modal transport plan Investment in transport facilities	Medium

Action Area Plan

Priority List for Non-Infrastructure Projects for Pourashava

Challenge	Delivery Timescale	Proposed Projects	Priority Level
Management and technical capacity	Short Term	Strengthen technical and administrative capacity for O&M for all municipal process, equipment, facilities and infrastructure.	High
Institutional development	Short Term	Establish the Master Plan Coordination Committee	High
Urban planning capacity	Short Term	Strengthen technical and administrative capacity for urban planning, including development of spatial development framework, strengthen permitting review process and development of resettlement and housing programs	High
Community participation and engagement	Short Term	Ward-based drain cleaning program	High
Household and community green infrastructure	Short Term	Program for heavy metal absorption via phytoremediation in urban ponds Program to establish household and community level grey-water planter-beds	Medium - High
Emergency preparedness	Short Term	Develop a Pourashava Disaster Management Plan Undertake mapping and risk assessment for critical assets and infrastructure Develop a program to strengthen and disaster-proof communities	Medium
Green infrastructure	Medium Term	Develop green infrastructure and infill demonstration/pilot projects in conjunction with development of the drainage network Household and community level grey-water planter-beds	Medium

3D MODEL OF FARIDPUR POURASHAVA

Thank You .....