



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

Preparation of Development Plan for Fourteen Upazilas Project

Presented by
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Presentation Outline

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 2. Objectives of the Project
 3. Location of Project Area & their Characteristics
 4. Conceptualization & Methodology
 5. Rapport Building & People's Participation
 6. Major Surveys, their Modalities and Outputs
 7. Thematic Maps and Suitability Maps
 8. 5-tier Plan of 14 Upazilas
 9. Summary of Key Features with Statistics of 14 Upazilas
 10. Linkage of 14 Upazila Plan Proposals with SDGs
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- Common
- Example Upazila
- Quick Go Through

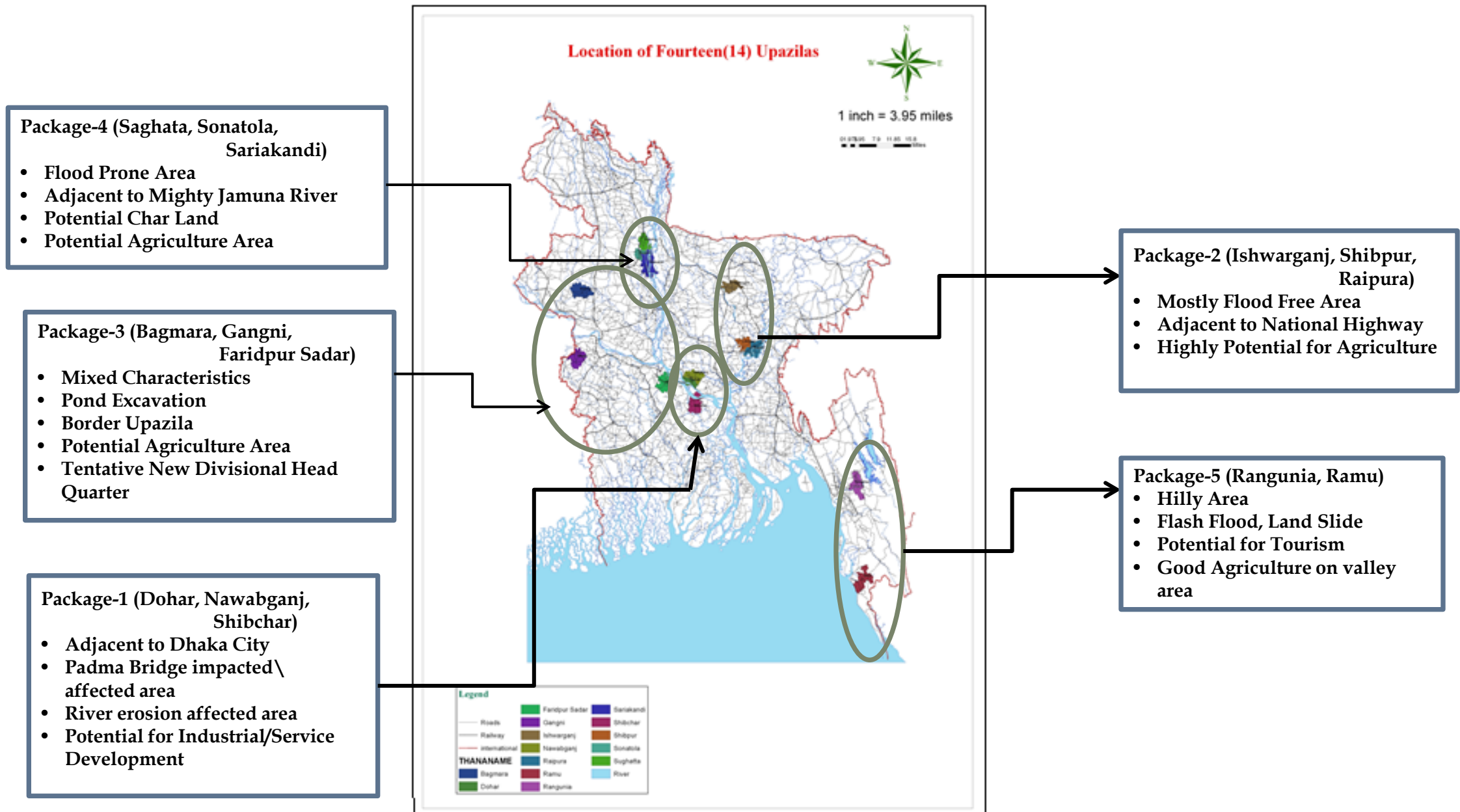
Project Brief

- Name: Preparation of Development Plan for Fourteen Upazilas
- Organization: Urban Development Directorate (UDD)
- Ministry: Ministry 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



Number of Planning Packages under this Project:

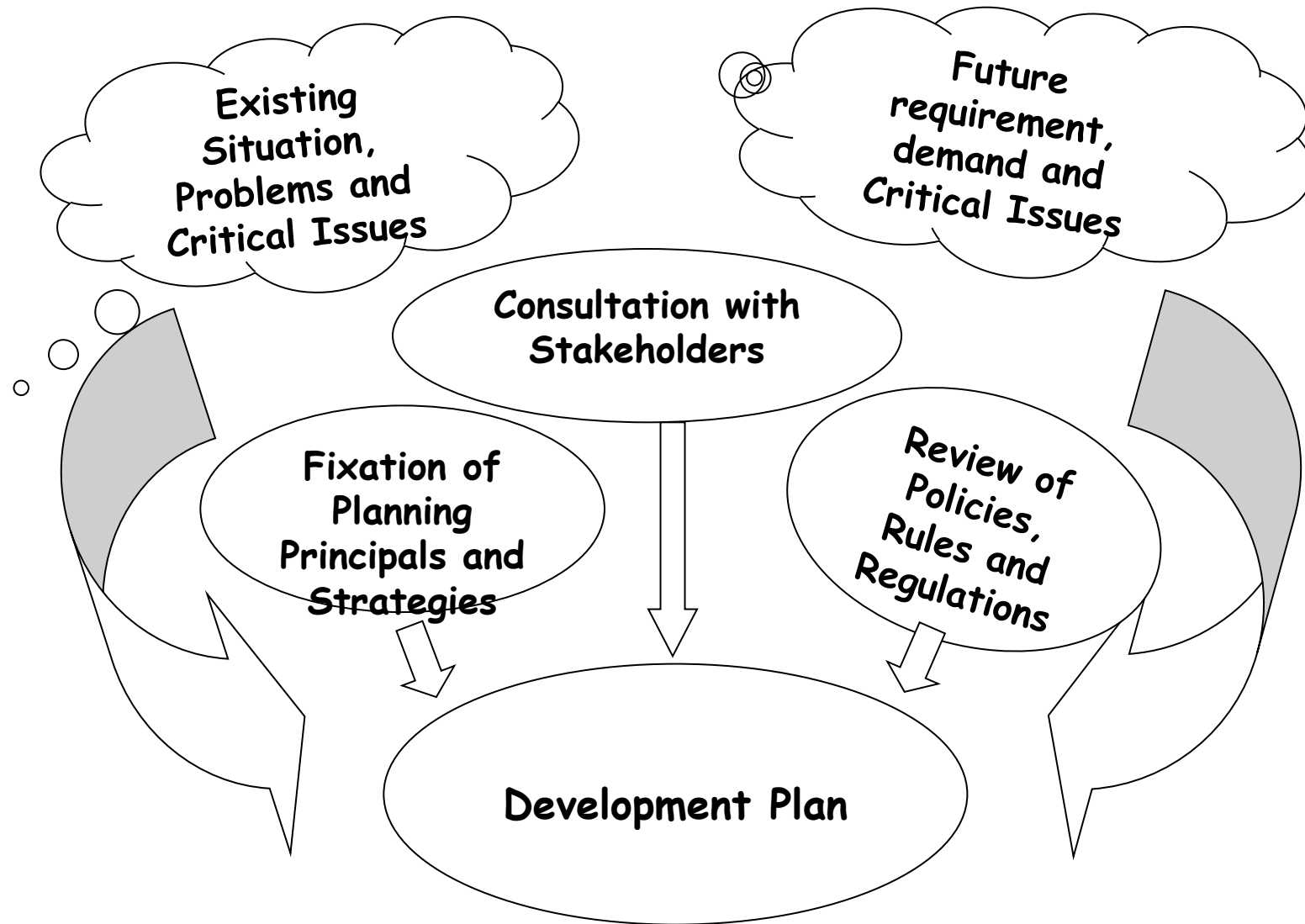
Sl. No.	Packages	Name of upazilas	Consulting Firms assigned
1.	Package-1	Nawabganj, Dohar, Shibchar	Desh-Upodesh in Association with AAima Int. BD & Texus Ltd.
2.	Package-2	Ishwarganj, Raipura, Shibpur	JV of Sheltech (Pvt.) Ltd & Arc Bangladesh Ltd.
3.	Package-3	Bagmara, Faridpur sadar, Gangni	Engineers, 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:

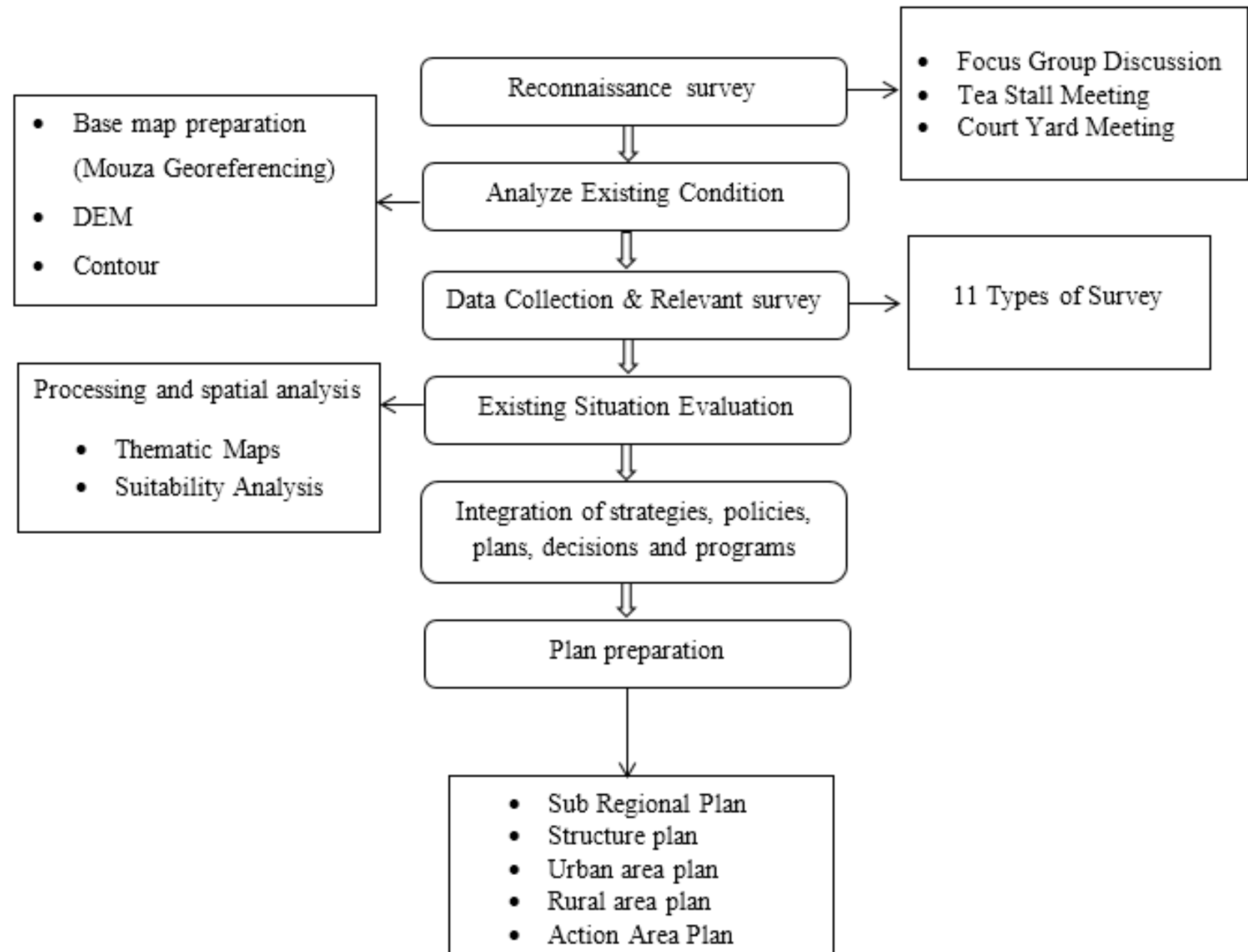
Sl. No.	Name of District	Name of upazila	Planning Area (sq.km)	Urban area	Rural area	Urban Population	Rural Population	Total Existing Beneficiary
1	Dhaka	Nawabganj	244.8	1.76	243.04	77590	410438	488028
		Dohar	161.49	20.31	141.18	61793	129630	191423
2	Chittagong	Rangunia	361.54	37.08	324.46	53035	245335	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.)

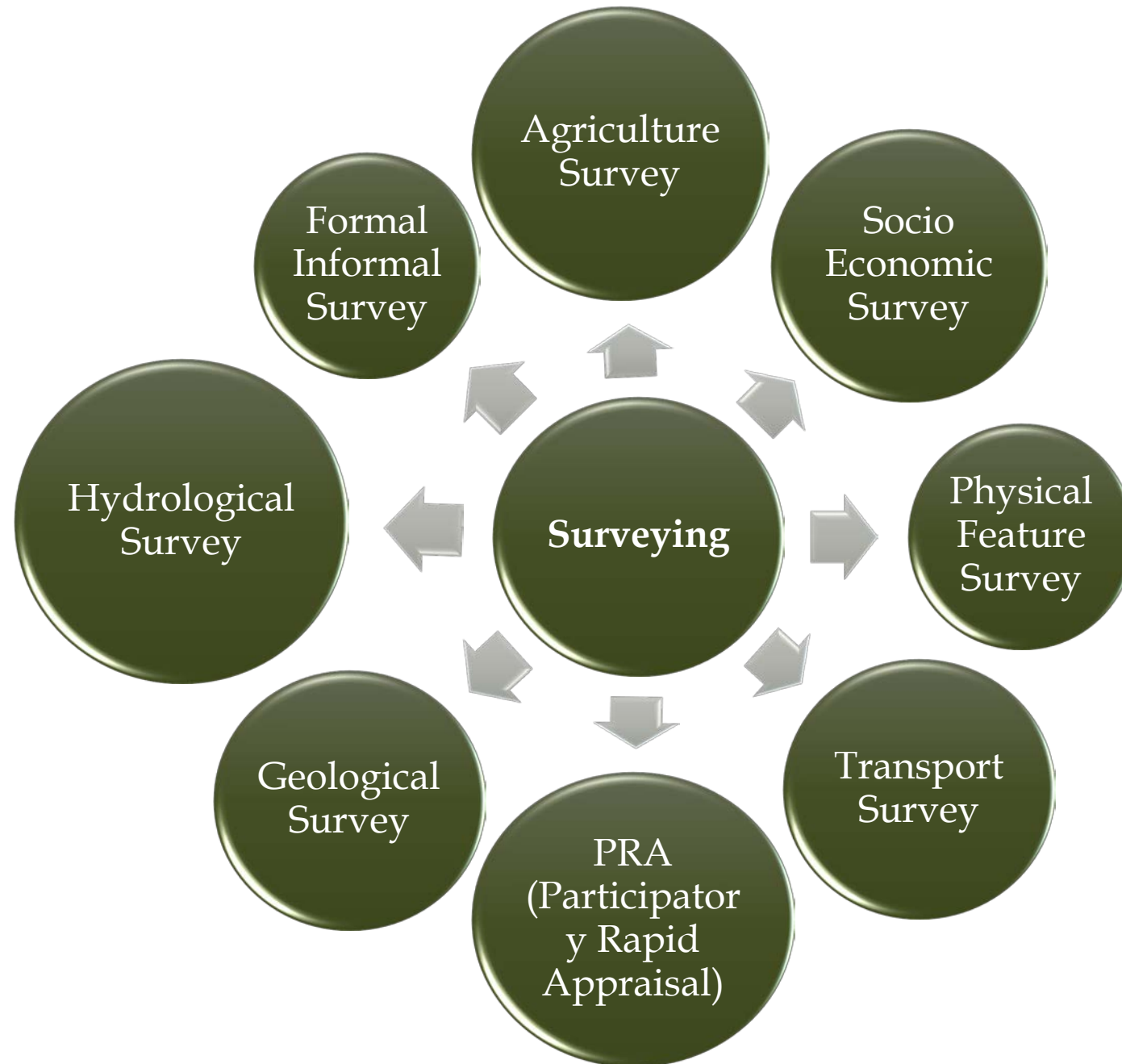
Conceptualization of Development Plan Preparation



Methodology



Surveys Conducted....





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

Preparation of Development Plan for Fourteen Upazilas
Package 03-(Bagmara Upazila)

CONSULTANT



Engineering Consultants and Associates Limited (ECAL)

What we have done for Bagmara Upazila, for Example.....

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

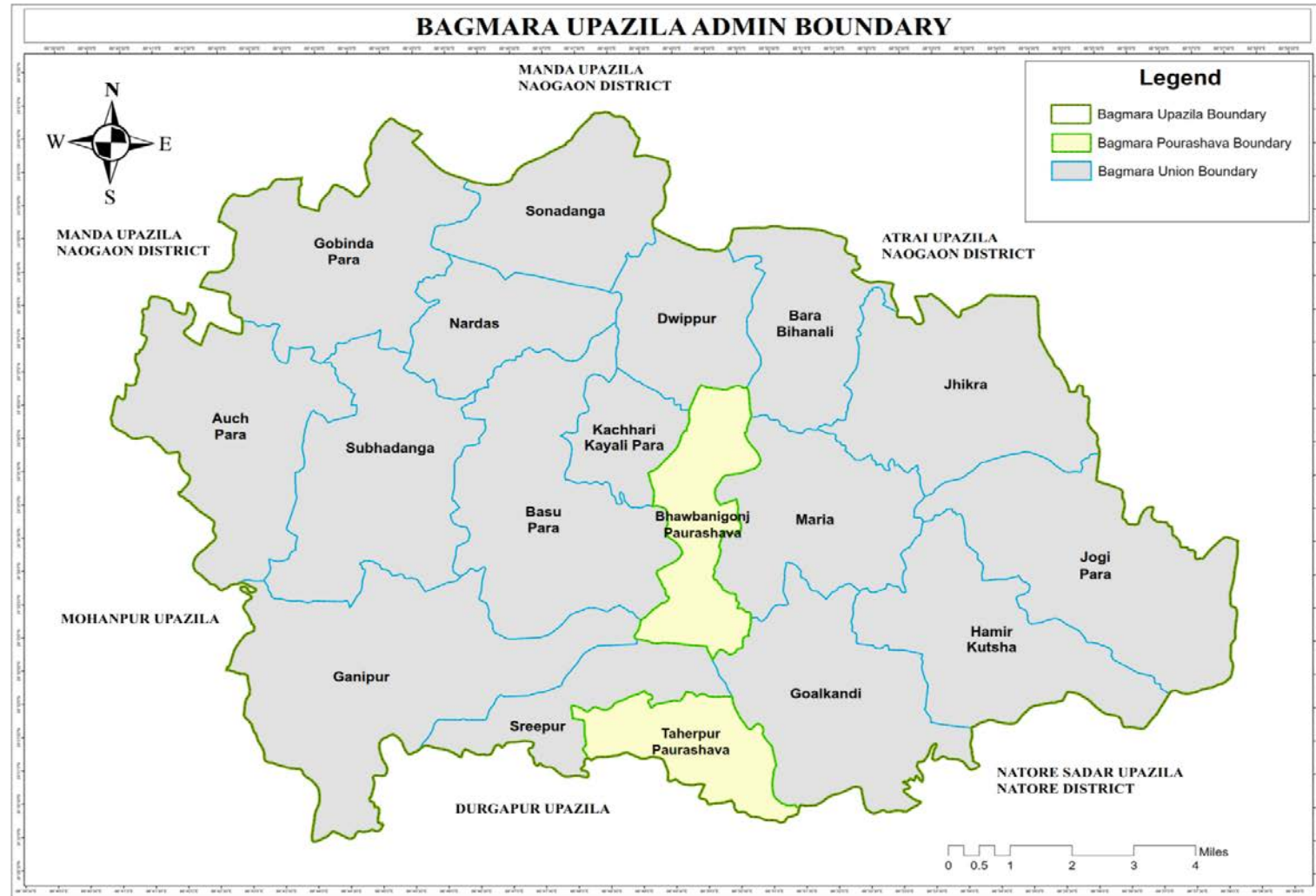
Project Area Map

Area = 363.3 sq km,

Thana was formed in 1869 and it was turned into an Upazila in 1984.

Water Bodies:

Baranai; Fakinni river, Beel Joshoi, Takta Beel, Mosher Beel, Nakkati Beel, Katila Beel



Bagmara Upazila

- Planning Package: 03-(Bagmara Upazila, District- Rajshahi, Faridpur Sadar Upazila, District- Faridpur and Gangni Upazila, District- Meherpur)
- Planning Area: Bagmara Upazila : 363.3 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 Bagmara Upazila

Upazila (363.3 sq.km)								
Municipality	Union	Mouza	Village	Population		Density (per Sq. km)	Literacy Rate (%)	
				Urban	Rural		Urban	Rural
2	16	358	332	34,632	285,336	881	43.30	38.31

Bwabaniganj Municipality (Pouro Webportal)						
Area (sq. km.)	Ward	Mahalla	Population	Density (per sq. km)	Literacy rate (%)	
10.00	9	23	19,550	1,178	64.6	

Taherpur Municipality (Pouro Webportal)					
Area (sq. km.)	Ward	Mahalla	Population	Density (per sq. km)	Literacy rate (%)
10.825	9	18	30,141	778	76

(Source: BBS, 2011)

Population Projection

Exponential Compound Growth Method has been used for population projection

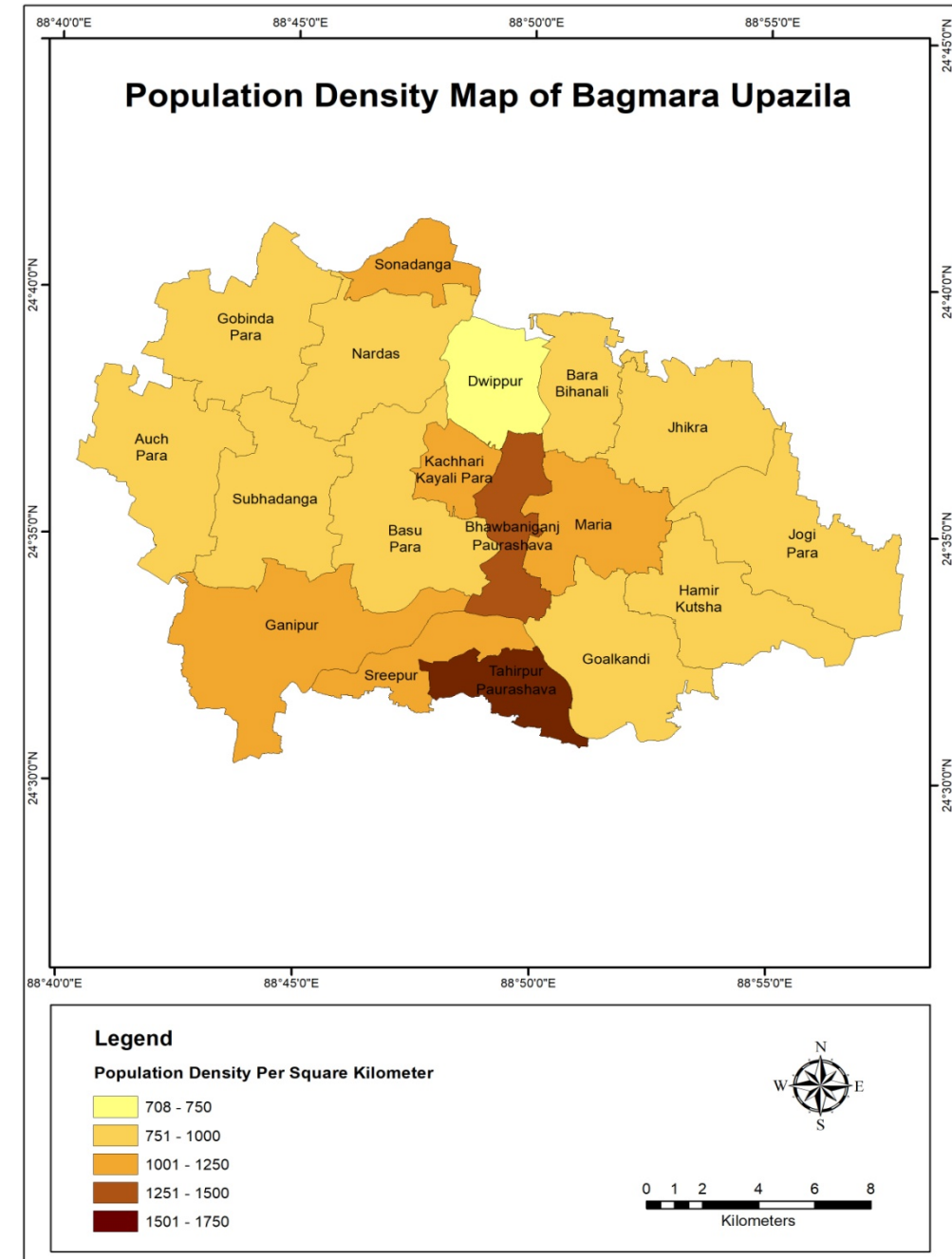
Area	Base Year Population (BBS,2011)	Projected Population (Consider Medium Growth Rate, 1.28%)			
		2018	2023	2028	2035
Paurashava	35899	39242	41818	44564	48714
Rural Area	318765	348447	371326	395707	432553
Total	354664	387689	413144	440271	481267

Urban Area Population Projection

Pourashava	Base Year Population (BBS,2011)	Projected Population (Consider Medium Growth Rate, 1.28%)			
		2018	2023	2028	2035
Bwabaniganj	17955	19627	20916	22289	24364
Taherpur	17944	19615	20903	22275	24349

Rural Area Population Projection

Unions	Base Year Population (BBS,2011)	Projected Population (Consider Medium Growth Rate, 1.28%) 2035
Auch Para	26685	36211
Bara Bihanali	12571	17058
Basu Para	26943	36561
Dwippur	9852	13369
Goalkandi	24275	32940
Gobinda Para	22707	30813
Ganipur	36469	49487
Hamir Kutsha	19817	26891
Jhikra	22026	29889
Jogipara	24830	33693
Kachari Kayali Para	7509	10189
Maria	19487	26443
Nardas	19528	26499
Sonadanga	8684	11784
Sreepur	11789	15997
Shubhadanga	25593	34729



**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-34

- (Union: 16 and Pourashava Wards : 18)

Participatory Rural Appraisal (PRA)



PRA Taherpur Pourashava, Bagmara



PRA Bhabaniganj Pourashava, Bagmara



(Source: Field Survey ,2016)

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Auchpara Union	<ul style="list-style-type: none"> ➤ Communication ➤ Pure drinking water ➤ Drainage problem ➤ Education ➤ Unemployment 	<ul style="list-style-type: none"> ➤ Agricultural land ➤ Fruit garden ➤ Cattle farming ➤ Fish farming ➤ Active manpower
Basu Para Union	<ul style="list-style-type: none"> ➤ Communication ➤ Pure drinking water ➤ Agricultural problem ➤ Educational infrastructure ➤ Health service 	<ul style="list-style-type: none"> ➤ Agricultural land ➤ Educated people ➤ Cattle farming ➤ Fish farming ➤ Farmer
Bara Bihanali Union	<ul style="list-style-type: none"> ➤ Communication ➤ HealthFacilities ➤ Water Logging ➤ Electricity ➤ Child Marriage 	<ul style="list-style-type: none"> ➤ Agriculture ➤ Fisheries ➤ Livestock & Fisheries ➤ Hat-Bazar ➤ Man power
Dwippur Union	<ul style="list-style-type: none"> ➤ Communication ➤ Health Facilities ➤ Water Logging ➤ Electricity ➤ Child Marriage 	<ul style="list-style-type: none"> ➤ Agriculture ➤ Fisheries ➤ Livestock & Fisheries ➤ Hat-Bazar ➤ Man power
Goalkandi Union	<ul style="list-style-type: none"> ➤ Polder ➤ Communication ➤ Pure Drinking water ➤ Agricultural Instruments ➤ Health Complex lacking 	<ul style="list-style-type: none"> ➤ Bill ➤ Agricultural Land availability ➤ Fisheries ➤ Active Manpower ➤ Livestock

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Gabindapara Union	<ul style="list-style-type: none"> ➤ Communication ➤ Electricity ➤ Pure Drinking Water ➤ Modern Education ➤ Agriculture 	<ul style="list-style-type: none"> ➤ Agricultural Land ➤ Active Manpower ➤ Livestock & Fisheries ➤ Educational Institutions ➤ Hat-Bazar
Gonipur Union	<ul style="list-style-type: none"> ➤ Communication ➤ Pure Drinking Water ➤ Electricity ➤ Education ➤ Health 	<ul style="list-style-type: none"> ➤ Bettle leaf ➤ Agriculture ➤ Fisheries ➤ Livestock ➤ Hat-Bazar
Hamirkutsha Union	<ul style="list-style-type: none"> ➤ Communication ➤ Health Facilities ➤ Water Logging ➤ Electricity ➤ Child Marriage 	<ul style="list-style-type: none"> ➤ Agriculture ➤ Fisheries ➤ Livestock ➤ Hat-Bazar ➤ Man Power
Jhikra Union	<ul style="list-style-type: none"> ➤ Communication ➤ Electricity ➤ Water Logging ➤ Health Facilities ➤ Industry Lacking 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Fisheries ➤ Livestock ➤ Hat-Bazar ➤ Fruits & Forest
Jogipara Union	<ul style="list-style-type: none"> ➤ Communication ➤ Pure Drinking Water ➤ Drainage Problem ➤ Education ➤ Unemployment 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Fruit Garden ➤ Cattle Farming ➤ Fish Farming ➤ Active Manpower

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Kachari Kayalipara Union	<ul style="list-style-type: none"> ➤ Communication ➤ Electricity ➤ Educational Institute ➤ Health Facilities ➤ River Digging 	<ul style="list-style-type: none"> ➤ Agriculture ➤ Fisheries ➤ Livestock ➤ Adeqate River ➤ Man Power
Maria Union	<ul style="list-style-type: none"> ➤ Communication ➤ Agricultural Facilities ➤ Health Facilities ➤ Residential ➤ Agriculture 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Fruit Garden ➤ Cattle Farming ➤ Fish Farming ➤ Active Manpower
Nordas Union	<ul style="list-style-type: none"> ➤ Communication ➤ Pure Drinking Water ➤ Drainage Problem ➤ Education ➤ Unemployment 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Fruit Garden ➤ Cattle Farming ➤ Fish Farming ➤ Active Manpower
Sonadanga Union	<ul style="list-style-type: none"> ➤ Communication ➤ Water Logging ➤ Education ➤ Agricultural Facilities ➤ Electricity & Fuel 	<ul style="list-style-type: none"> ➤ Agriculture ➤ Fruit Garden ➤ Manpower ➤ Livestock & Fisheries ➤ Hat-Bazar
Sreepur Union	<ul style="list-style-type: none"> ➤ Communication ➤ Agricultural Facilities ➤ Health Facilities ➤ Residential ➤ Agriculture 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Fruit Garden ➤ Cattle Farming ➤ Fish Farmnig ➤ Acticve Manpower

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Subhadanga Union	<ul style="list-style-type: none"> ➤ Communication ➤ Agricultural Facilities ➤ Health Facilities ➤ Residential ➤ Agriculture 	<ul style="list-style-type: none"> ➤ Agriculture Land ➤ Educated Person ➤ Cattle Farming ➤ Fish Farming ➤ Active Manpower
Bwabanigonj Pourashava Ward No. 01	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 02	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 03	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 04	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Bwabanigonj Pourashava Ward No. 05	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 06	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 07	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 08	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Bwabanigonj Pourashava Ward No. 09	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Taherpur Pourashava Ward No. 01	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 02	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 03	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 04	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 05	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand Main Road in City

PRA Findings of Bagmara Unions and Pourashavas

Union/Ward	Problems	Potentials
Taherpur Pourashava Ward No. 06	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 07	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 08	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City
Taherpur Pourashava Ward No. 09	<ul style="list-style-type: none"> ➤ Shortage of Pure Drinking Water ➤ Road Broken ➤ Water Logging ➤ Unemployment to Women ➤ Problem of Drug addiction & Entertainment 	<ul style="list-style-type: none"> ➤ River ➤ Children Park ➤ Natural Cannel ➤ Bus Stand ➤ Main Road in City

Development Priorities through PRA

- **Short Term (1-5 Years):** Improvement of Health Service , Development of Educational System, Employment Opportunity, Improvement of Agriculture, River Dredging, Sanitation.
- **Mid Term (5-10 Years):** Development of Educational System, Improvement of Agriculture, Employment, River Dredging, Development of Educational System
- **Long Term (10-20 Years):** Improvement of Communication System, Establishment of Adequate Education & Health, Recreational Facilities, Increased Amount of Industrial Investment etc.

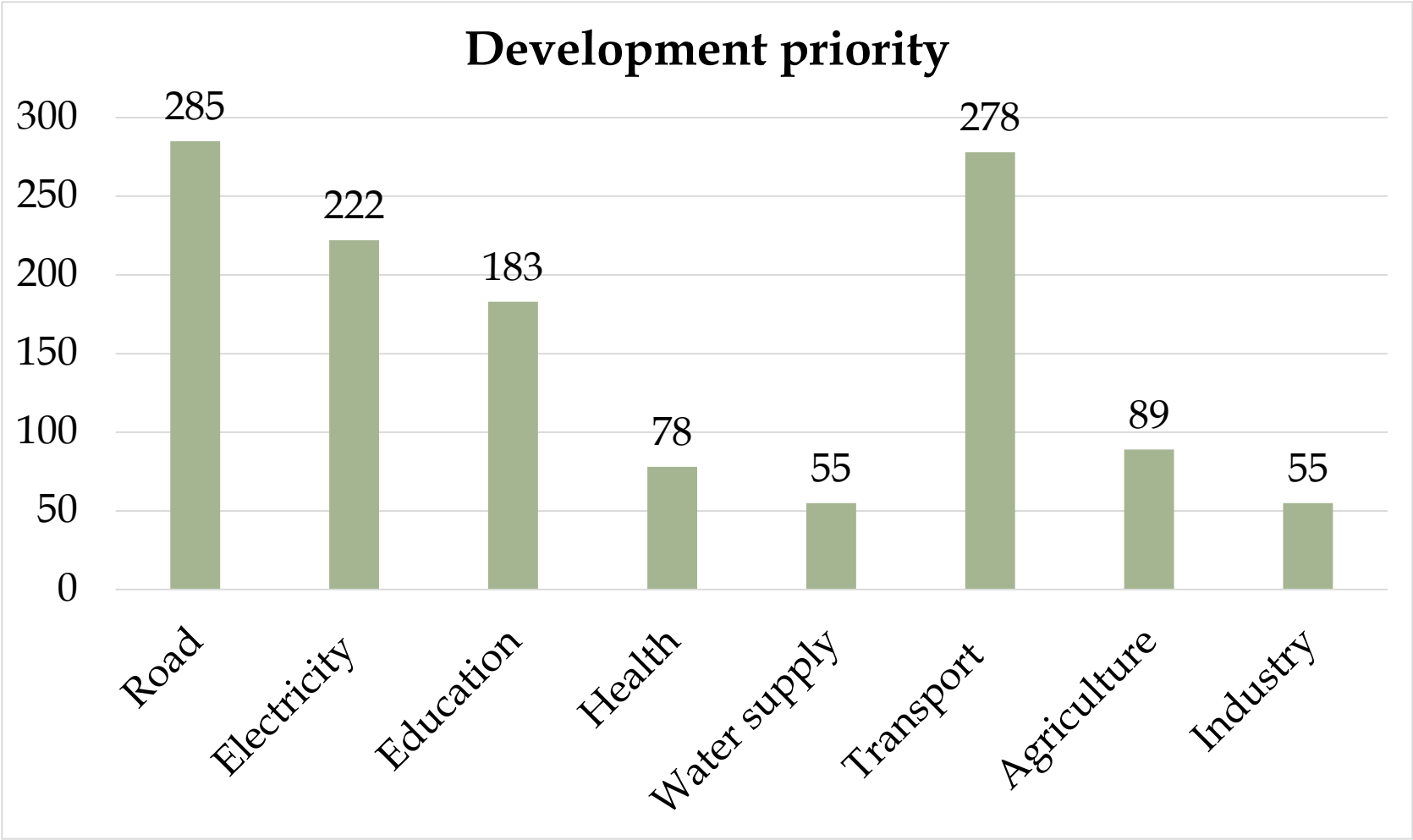
Socio Economic Survey

■ 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
Bagmara	115	778	893

People's Aspiration about the Development of the Upazila



Socio Economic Survey



Formal and Informal Economic Survey

Name of Upazila	Name of Work	Quantity
Bagmara	Field work	235

Production amount and their yearly price

Formal

Industries	Avg. Price in BDT
Brick Field	4,69,82,000
Ice factory	5,34,000
Workshop	16,60,000
Building materials	42,90,000
Cottage	22,500
Rice mill	1,37,00,000
Workshop	8,16,000
Yarn and Fabrics industry	9,99,333
Handicrafts	67,000
Yarn and Fabrics industry	9,99,333

Informal

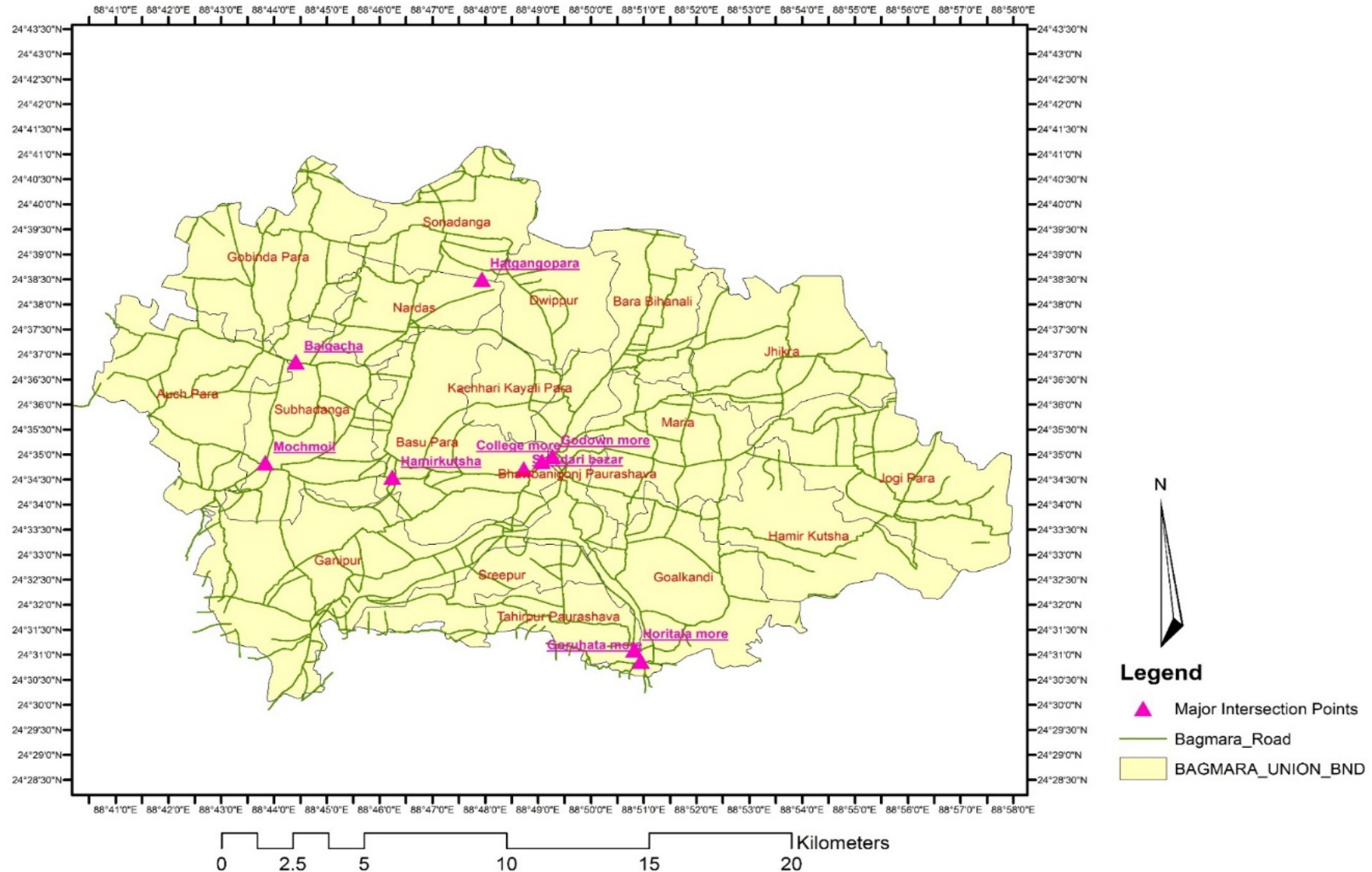
Industries	Yearly price of products in BDT
Poultry	29,51,000
Dairy farm	8,77,000
Nursery	46,00,000
Furniture making	48,80,000

Traffic and Transportation Survey

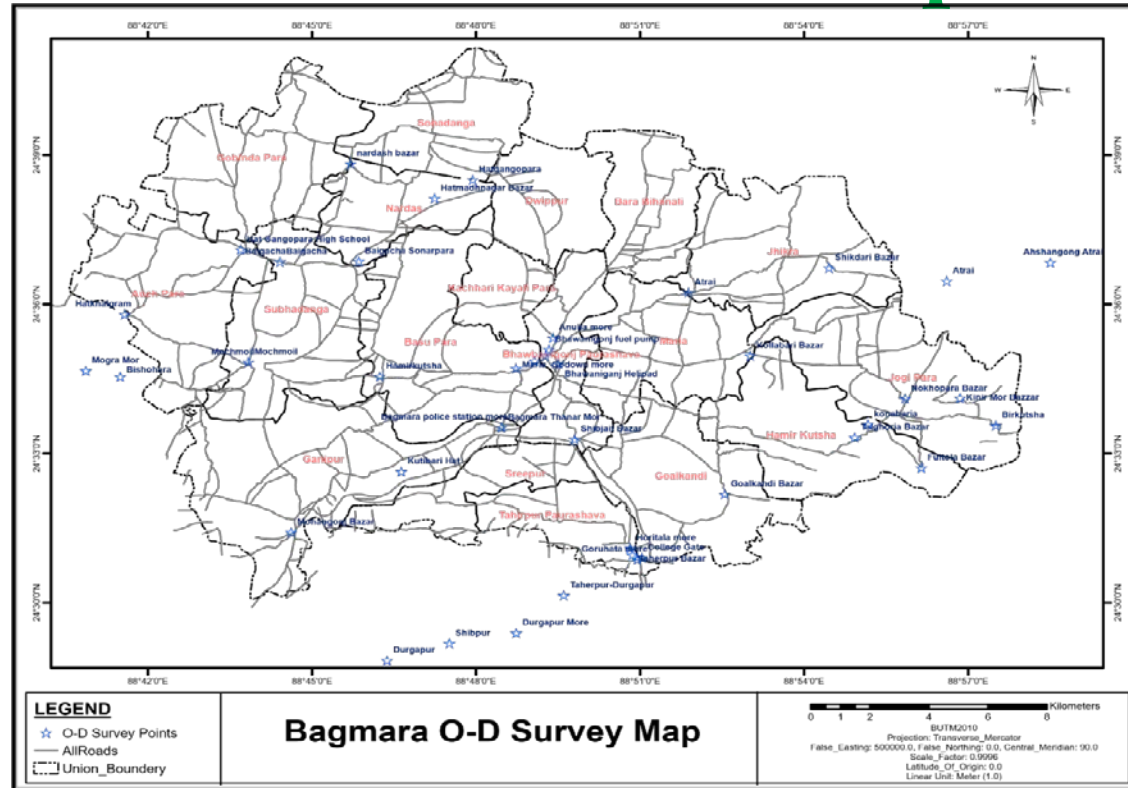
- Traffic Volume Count Survey
- Origin & Destination (O-D) Survey
- Passenger Interview Survey and
- Regional Transportation Survey

Method	Type of Survey	Sample Size
Questionnaire	O-D Survey	24
	Traffic Volume	33
	Inter Regional Trip Survey	12
	Passenger Inter view	56

Traffic and Transportation Survey

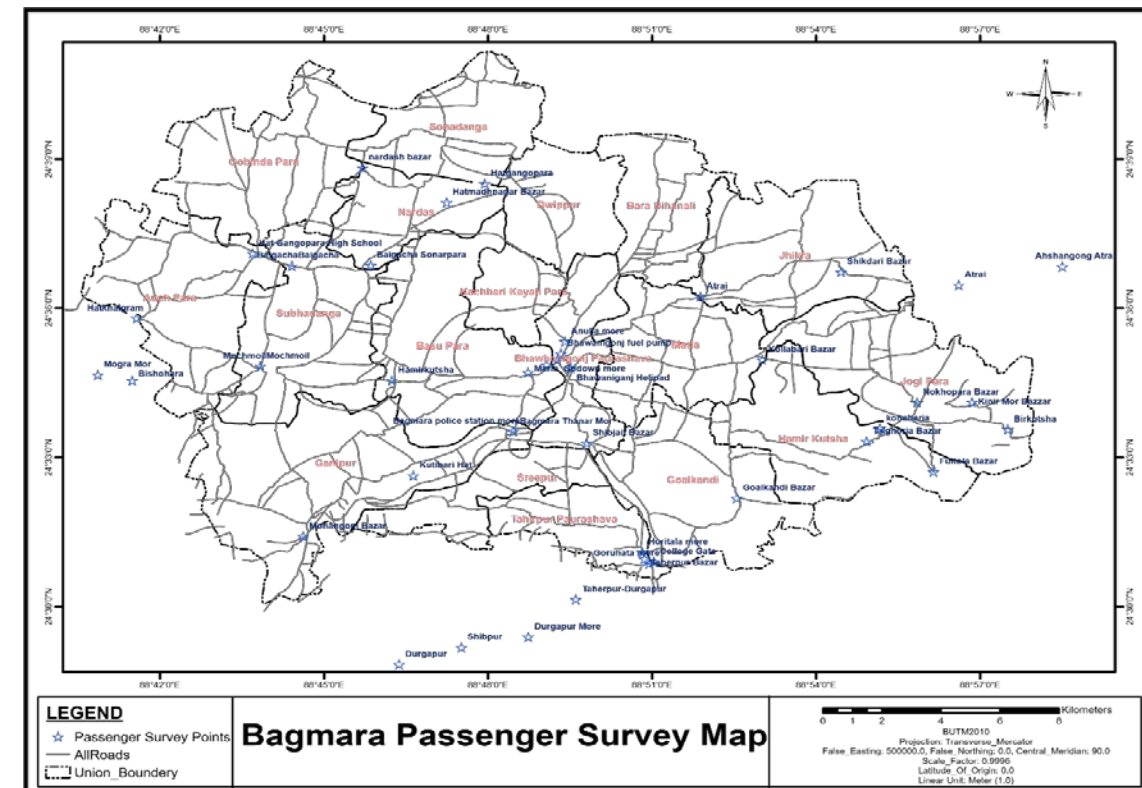


Traffic and Transportation Survey



Locations of Origin Destination Survey at Bagmara Upazila

Location of Passenger Interview Survey at Bagmara Upazila



Traffic and Transportation Survey

Destination Origin	Atrai	Bwabanigonj	Dewlia	Gangepara	Jhikra	Kaligonj	Keshorhat	Machmoil	Puthia	Rajshahi	Total
Atrai	0	2	0	0	0	0	0	0	0	0	2
Bwabanigonj	0	0	0	0	0	0	0	0	0	0	0
Dewlia	0	0	0	0	0	0	0	0	0	0	0
Gangepara	0	2	0	0	0	0	0	0	0	0	2
Jhikra	0	2	0	0	0	0	0	0	0	0	2
Kaligonj	0	2	0	0	0	0	0	0	0	0	2
Keshorhat	0	1	0	0	0	0	0	1	0	0	2
Machmoil	0	1	1	0	0	0	0	0	0	0	2
Puthia	0	0	0	0	1	0	0	0	0	0	1
Rajshahi	0	1	0	0	0	0	0	0	0	0	1
Total	0	11	1	0	1	0	0	1	0	0	14

Origin Destination Matrix

(Source: Field Survey ,2016)

Agricultural Survey



Plate 1: Farmer Betel Leaf Field



Plate 2: Farmer Chili Field



Plate 3: Maize Crop Field



Plate 4:Harvested T. Aman Rice Field

Some Pictures of Agriculture Survey

Bagmara Upazila Present Land Use

Upazila Land use	Total Area (ha)
Total Area	36558
High land	6550
Medium high land	12180
Medium low land	5330
Low land	5050
Single cropped area	3290
Double cropped area	9180
Triple cropped area	15850
More than three cropped area	690
Net Cropped area	29110
Total cropped area	71960
Cropping Intensity (%)	247
Forest	270
Permanent fallow land	1267
Current/Seasonal Fallow Land: - Rabi fallow	00
- Kharif-1 fallow	3010
- Kharif-2 fallow	3020
Urban Built-up area	142.36
Permanent fruit garden	875
Betel Vine	640
Irrigated land area	28010
Water land (River, Ponds and others)	1375
Brick Field	99.50
Rural Settlement and HV	9352.55

PRESENT CROPPING PATTERN OF BAGMARA UPAZILA

Crop Grown	Crop area(ha)	Yield/ha (mt)	Production (mt)	Contribution (%)
T. Aus (HYV)	11700	2.82	32994	19.20
T. Aman(LV)	10	1.9	19	0.01
T. Aman(HYV)	810	2.67	2162.7	1.26
Boro (HYV)	13210	8.2	108322	63.05
Boro (Hybrid)	5550	5.1	28305	16.48
Sub Total Rice	31280		171802.7	100.00
Summer Vegetables	1705	13	22165	4.55
Winter vegetables	2705	12	32460	6.66
Wheat	1590	3.6	5724	1.17
Maize	4220	6	25320	5.20
Jute	670	3.5	2345	0.48
Sweet Potato	15	25	375	0.08
Potato	13320	22.35	297702	61.11
Spices (Onion & Garlic etc)	5088	15.52	78965.76	16.21
Oil seeds (Mustard, Til, Groundnut)	6755	1.3	8781.5	1.80
Betel Leaf	640	18.3	11712	2.40
Pulses	170	1.31	222.7	0.05
Sugarcane	25	14.9	372.5	0.08
Fruits (Orchard)	40	25.68	1027.2	0.21
Sub-Total	36943		487172.66	100.00
Total	68223		658975.36	

Agricultural Questionnaire Survey

Major Problems of Crop Production (16 Unions & 02 Paurashavas)

- ⇒ Water logging causes damages crops.
- ⇒ Drought and cold wave create negative impact on diversification of crops.
- ⇒ Most of the canals/khals of the Unions & Paurashavas were found mostly closed or silted.
- ⇒ Changes in rainfall pattern and climate change.
- ⇒ Lack of knowledge both men and women farmers on crop production technology and farmers financial problems for adaption of modern technology.
- ⇒ Scarcity of surface water for irrigation, higher cost Shallow Tube Wells(STWs) and Deep Tube Wells(DTWs).
- ⇒ Less supply of quality HYV/Hybrid and stress tolerant variety crop seeds and cultivation equipment's (power tiller, thresher, foot pump etc).
- ⇒ Inadequate drainage facilities and kutchha irrigation drainage system.
- ⇒ Inadequate electricity supply hampers irrigation for Boro and other irrigated crops.

Major Problems Of Crop Production (16 Unions & 02 Paurashavas) ...Cont.

- ⇒ Agriculture marketing system and infrastructure are not developed.
- ⇒ Shortage of cold storage, seed store and wholesale vegetables market infrastructure.
- ⇒ Using less amount of bio-fertilizers and green manure or compost.
- ⇒ Cultivable agriculture lands are reducing every year due to unplanned construction of houses ,roads, and settlements, markets, industries, unplanned fish and poultry production.
- ⇒ Over-drainage, abrupt reduction of wet land, restricts open water fisheries and its breeding place.
- ⇒ Acquisition of agricultural land for non- agriculture purposes.
- ⇒ Top soil cutting and filling sand, unplanned expansion of urban and commercial areas.
- ⇒ Lack of potato , vegetable, betel leaf processing, grading and packaging facility.
- ⇒ There is no agro processing center and industries under Unions and Upazila level.
- ⇒ City migration.

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

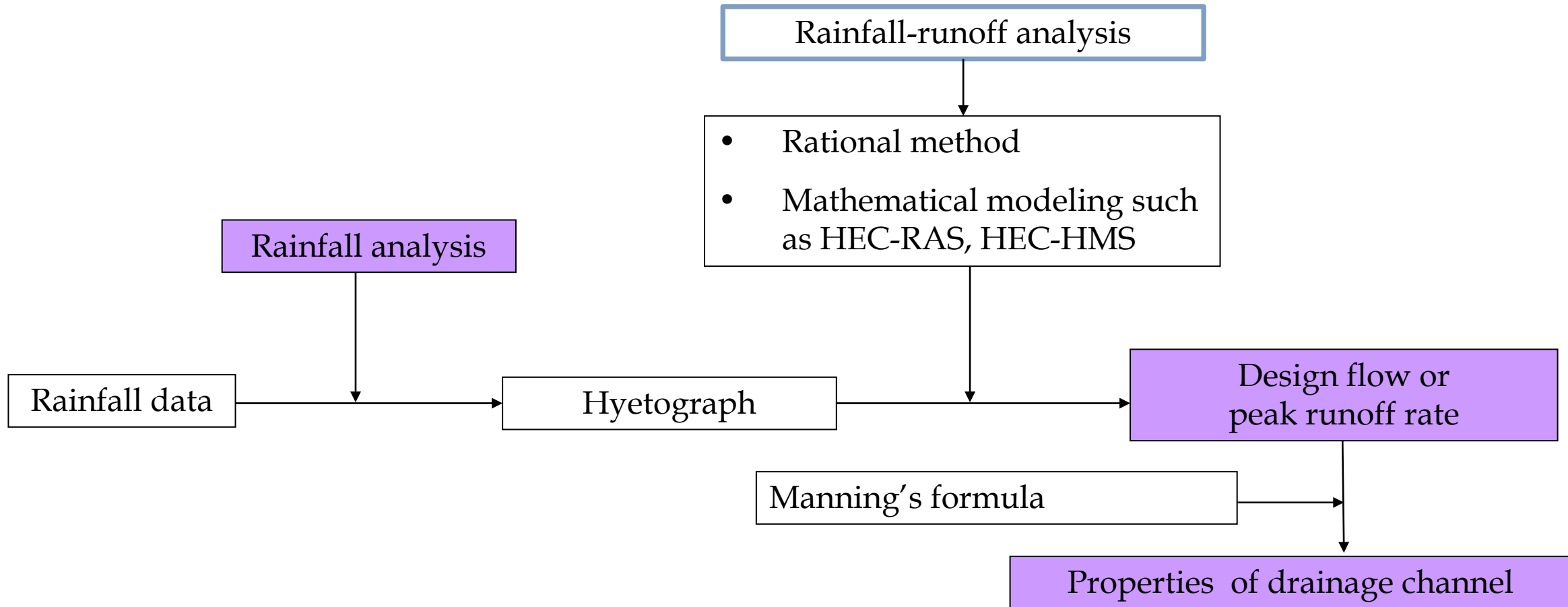
Drainage Improvement Projects

- Assess major-minor drainage system using HD Modelling
- Develop structural, non structural interventions

Data Analysis & Recommendations

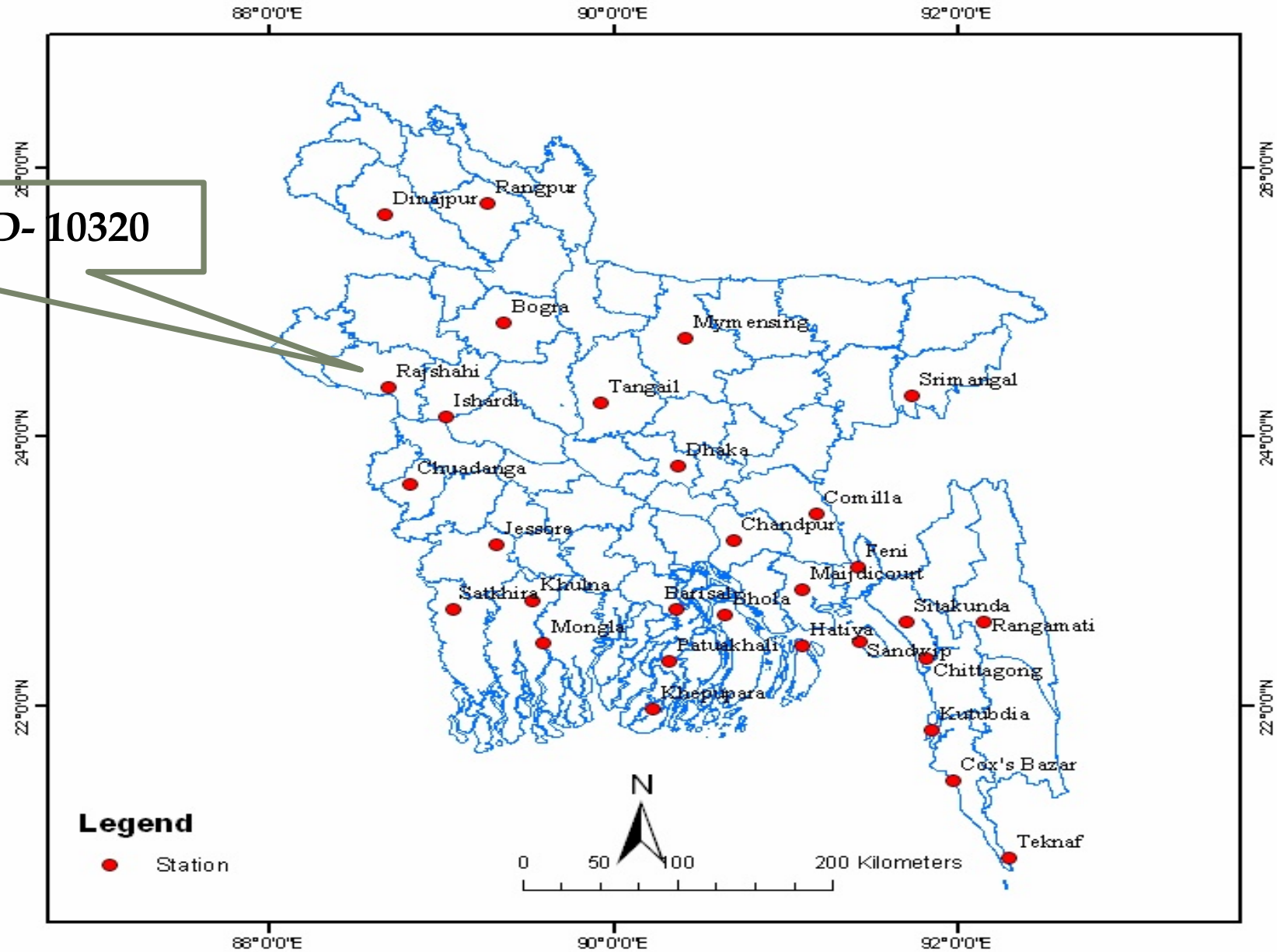
- Hydrology and hydrodynamic Modelling, Analyze existing and future plans

Flow Diagram



Rain gauge station of BMD

Rajshahi Rainguage BMD- 10320



Hydrological Survey



River Cross section survey

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

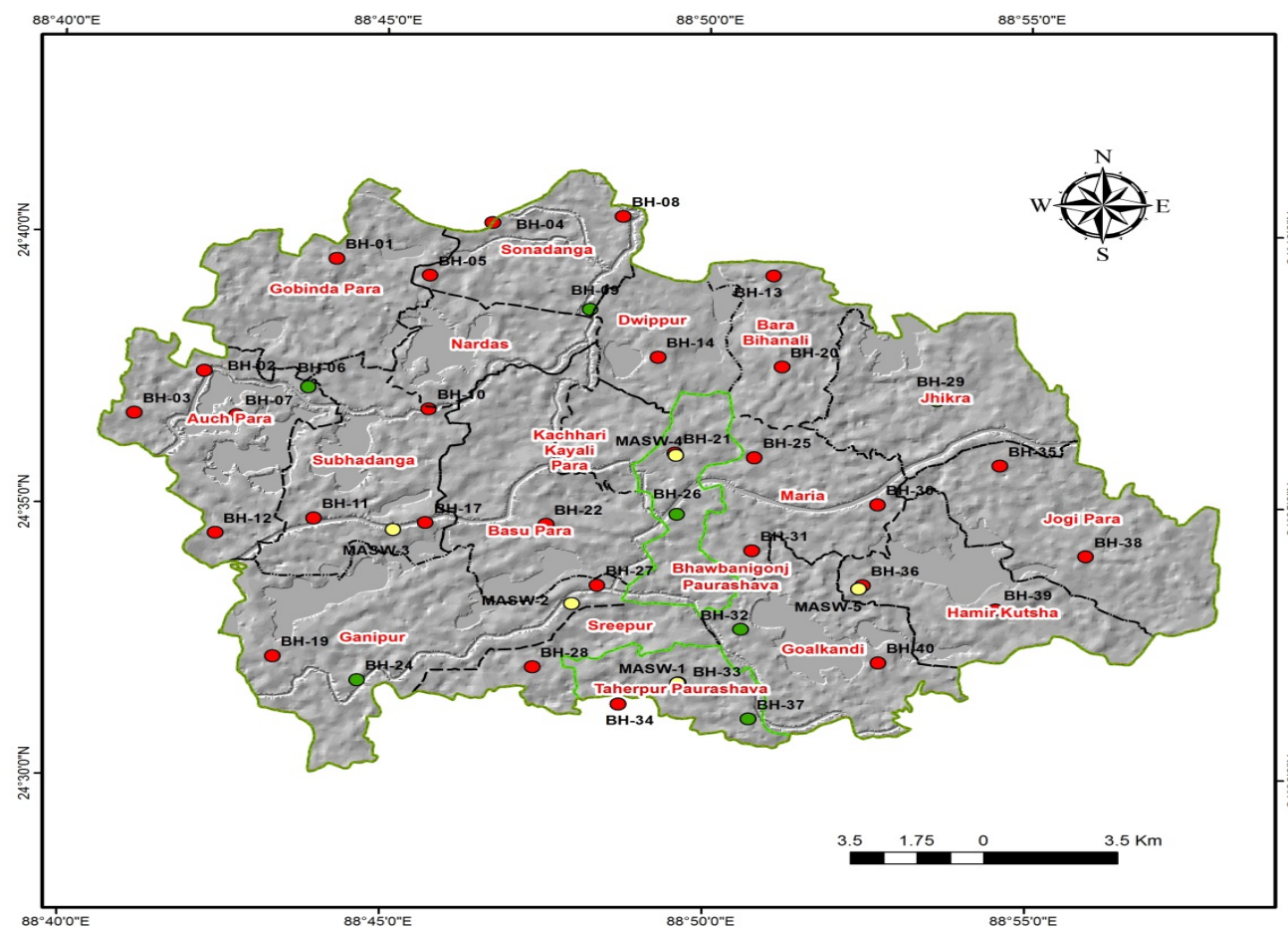
Conducted Test Number

Upazila Name	SPT Boring	Down Hole Seismic (PS Logging) Test	MASW Survey
Bagmara	36	7	5

Geological Work Statuses Till Now

Upazila Name	Laboratory Test	Data Processing and Analysis	Interpretation	All Thematic Maps and Land use Map Production
Bagmara	Completed	Completed	Completed	Completed

Geological and Geo Physical Survey



Geotechnical and Geophysical Test locations of Bagmara Upazila

Legend

Work Locations

Geotechnical and Geophysical Test

- Downhole Seismic Test (PS Logging)
- Multi-channel Analysis of Surface Wave (MASW)
- Standard Penetration Test (SPT) Drilling
- BAGMARA_UNION_BND
- Upazila Boundary

This map has been produced by plotting the co-ordinates of all the Geotechnical and Geophysical works which was acquired during field investigation. The drilling depth of those boroholes are up to 30m from the existing ground level (EGL).

Coordinate System: BUTM2010
 Projection: Transverse Mercator
 Datum: WGS 1984
 false easting: 500,000.0000
 false northing: 0.0000
 central meridian: 90.0000
 scale factor: 0.9996
 latitude of origin: 0.0000
 Units: Meter

(Source: Field Survey ,2016)

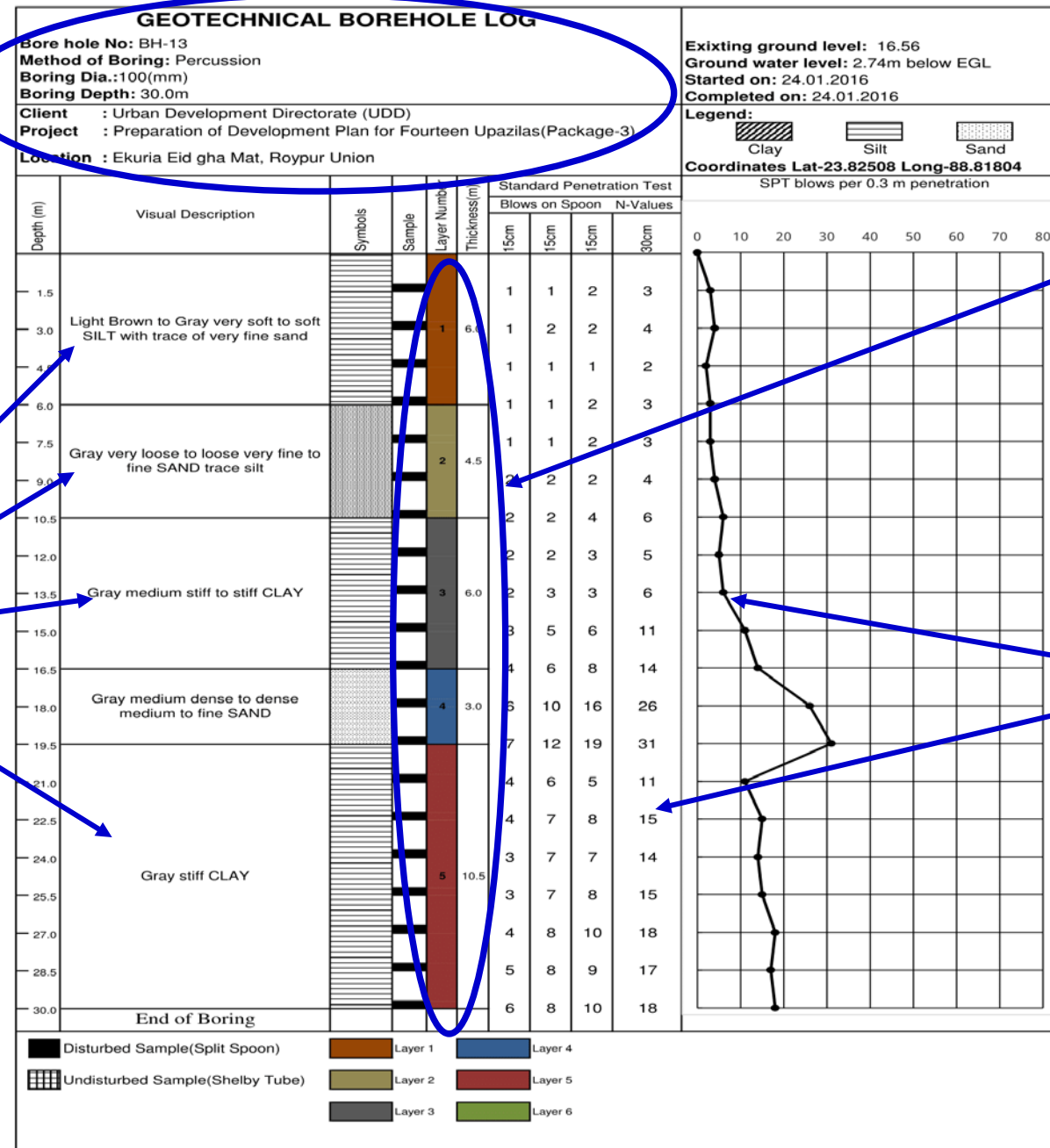
Standard penetration Test boring Data Processing and Log Format representation

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.

Oscilloscope

PS LOGGING TEST

Pump

Horizontal plank
with normal load

Hammer

packer

Horizontal
Velocity
Transducers
(Geophone
Receivers)

Cased
Borehole

Δt

z_1

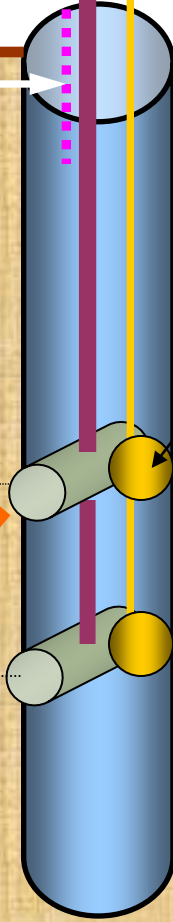
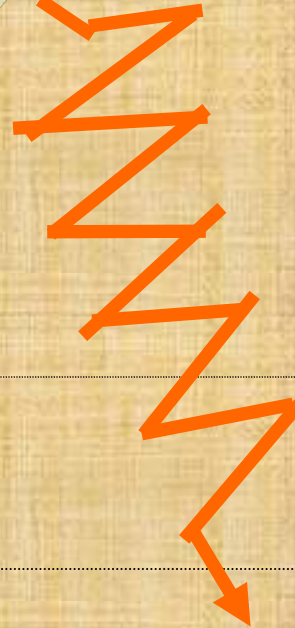
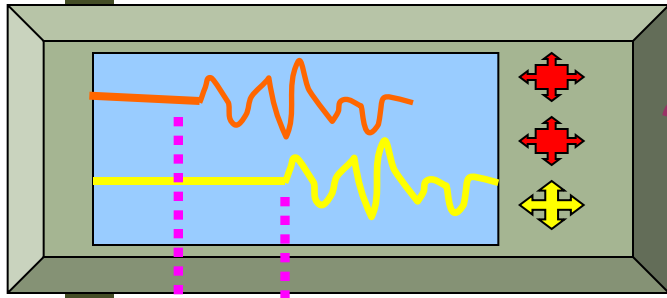
z_2

Test
Depth
Interval

Shear Wave Velocity:
 $V_s = \Delta R / \Delta t$

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

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



x

DOWN HOLE SEISMIC (PS LOGGING) TEST DATA PROCESSING AND REPRESENTATION

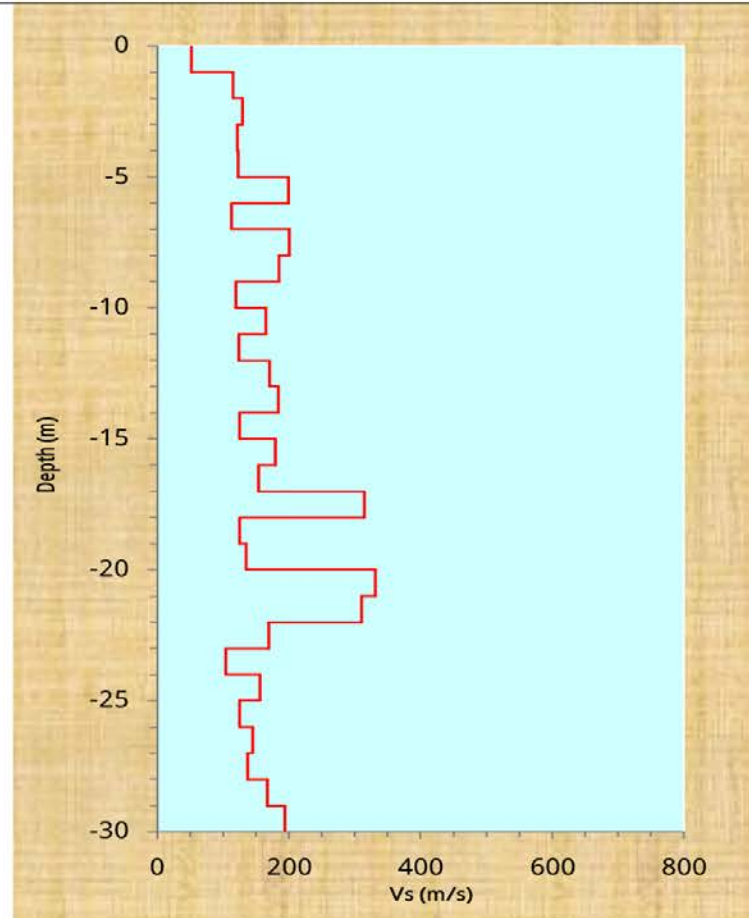
Tested Date : 7 January 2016
 Location : Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar
 Test Id : PS-5 (BH-22)
 Coordinate : Latitude 23.5869 Longitude 89.81373
 Operator : The Olson Instruments Downhole Seismic system

Source : 7kg Sledge Hammer
 Downhole Receiver : Tri-axial Geophone
 Recording Equipment : Freedom Data PC
 Borehole Information : Grouted Cased
 Casing Diameter : 75mm PVC Casing

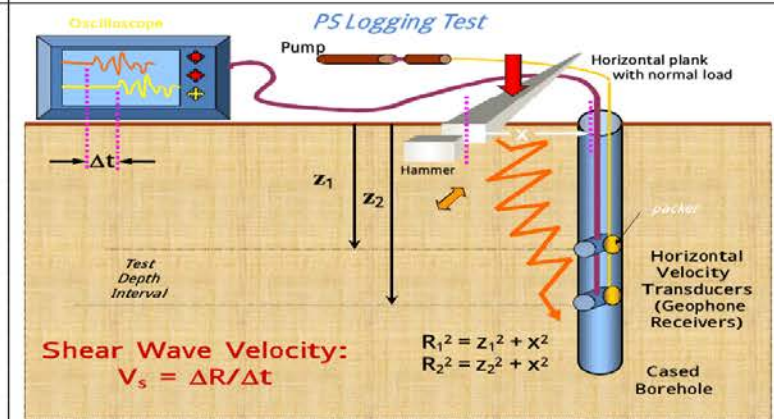
Depth (m) Form EGL	S-wave Velocity
-1	51
-2	115
-3	129
-4	121
-5	122
-6	199
-7	112
-8	200
-9	185
-10	119
-11	165
-12	124
-13	171
-14	184
-15	125
-16	179
-17	154
-18	314
-19	124
-20	135
-21	331
-22	310
-23	170
-24	104
-25	156
-26	124
-27	145
-28	137
-29	167
-30	193

Average Vs 30m = 142m/sec

Graphical Representation of S-wave Velocity



Data Acquisition Procedure



Downhole Seismic Test Data Acquisition

TEST DETAILS AND PROCEDURE OF MULTI-CHANNEL ANALYSIS OF SURFACE WAVE (MASW)

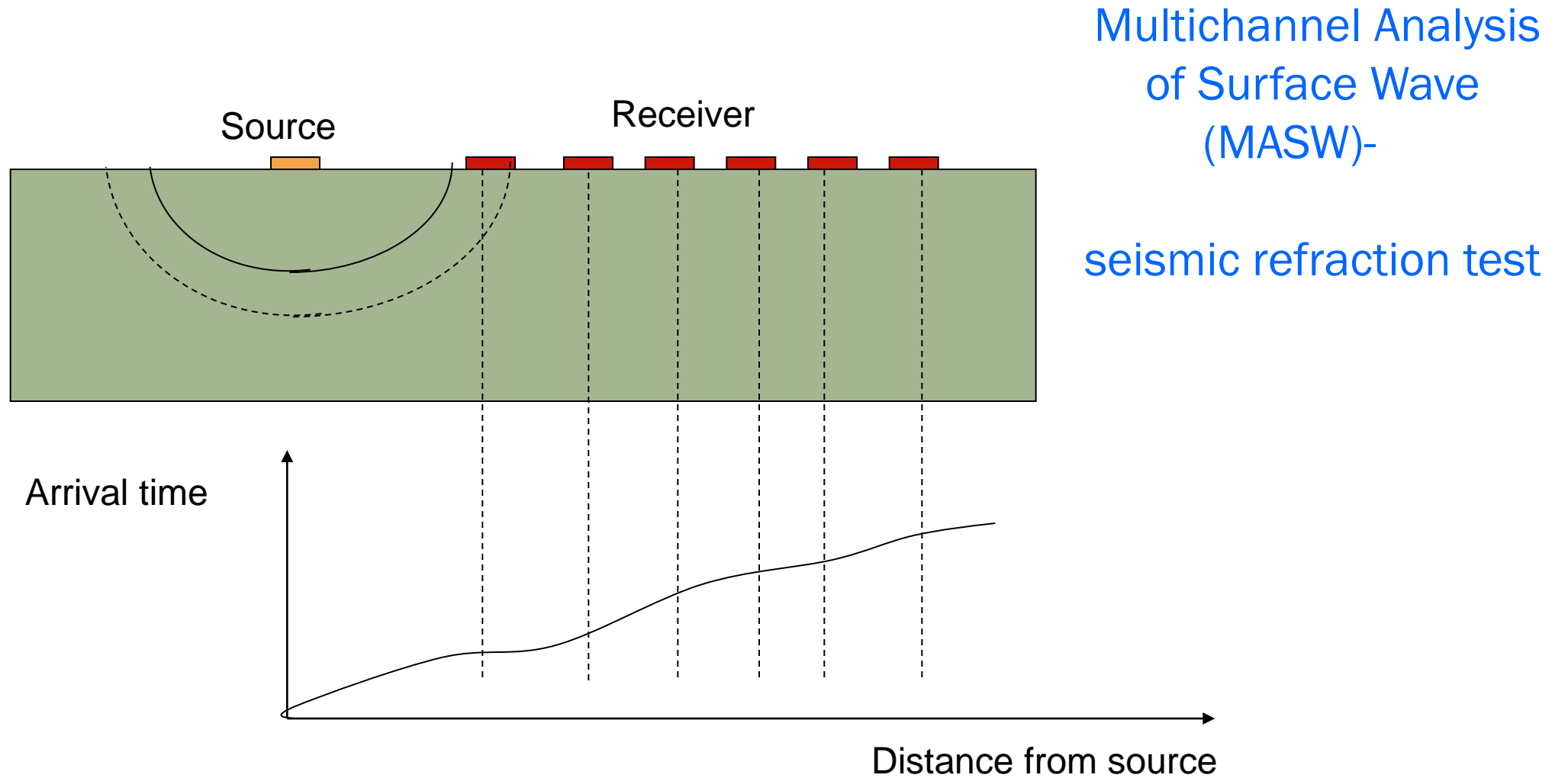
MASW is a seismic surface method, widely used for subsurface characterization and is increasingly being applied for seismic microzonation and site response studies (Anbazhagan and Sitharam, 2008).

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

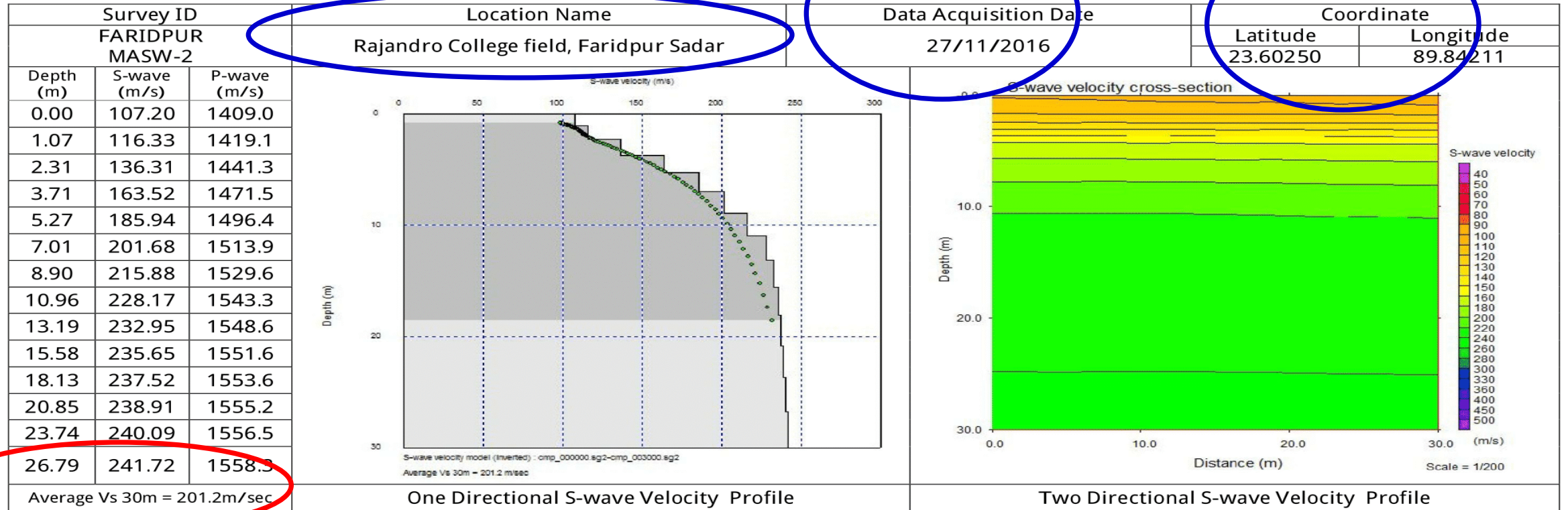


- surface wave test

FIELD DATA ACQUISITION PARAMETERS

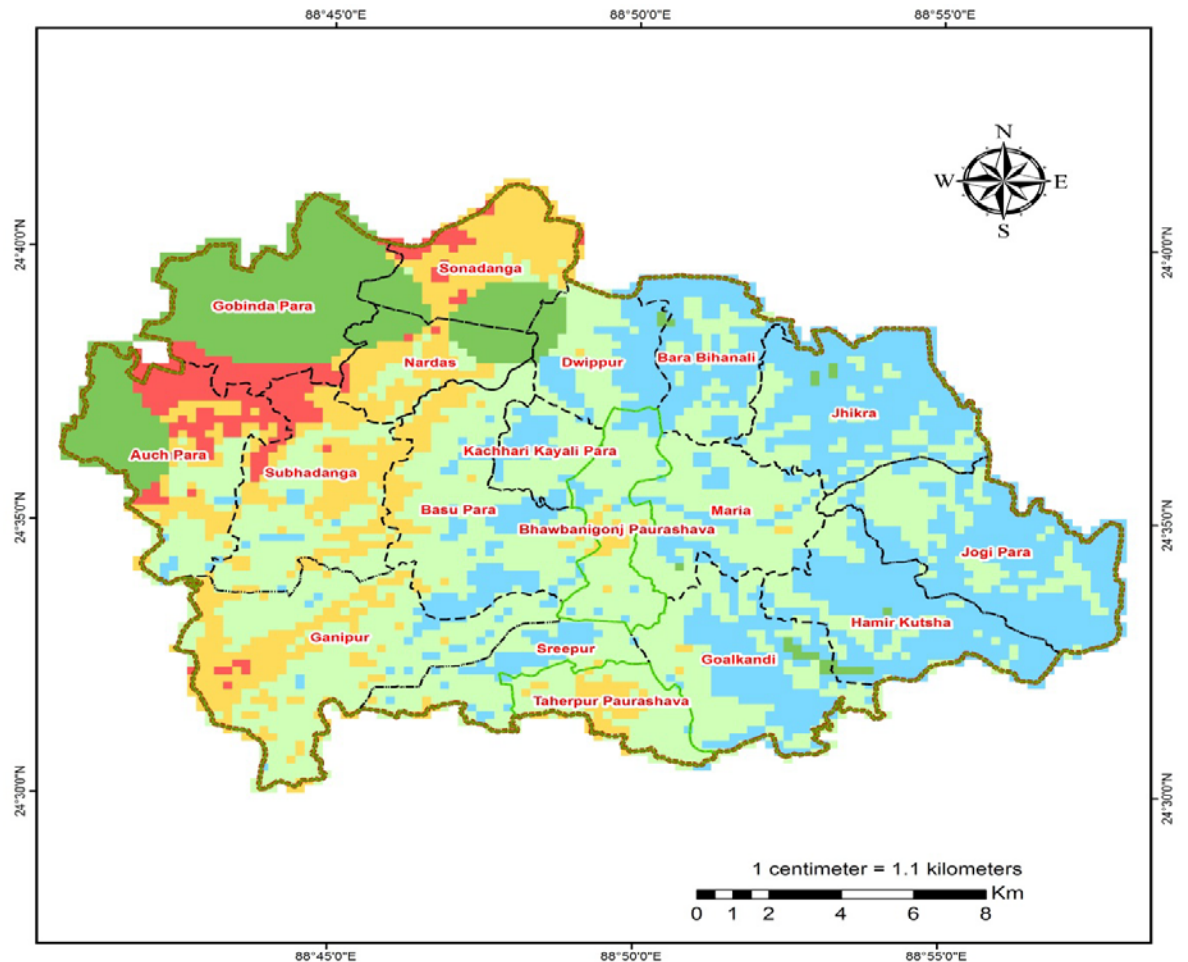
Seismic refraction (MASW) Test	
Number of channels	12
Geophone spacing	3m
Array length	33m
Sampling rate	1ms
Record length	2 sec
Natural frequency of Geophone	10 Hz
Source	8 kg hammer
Shot number	13 points, 11 between geophones and 2 outside of measuring line

MASW SURVEY DATA PROCESSING AND REPRESENTATION



MASW Survey Data Acquisition at Rajandro College field

FOUNDATION LAYER RECOMMENDATION MAP OF BAGMARA UPAZILA



Foundation Layer Recommendation Map

Legend

- BAGMARA_UNION_BND
- Upazila Boundary

Engineering Soil Layers

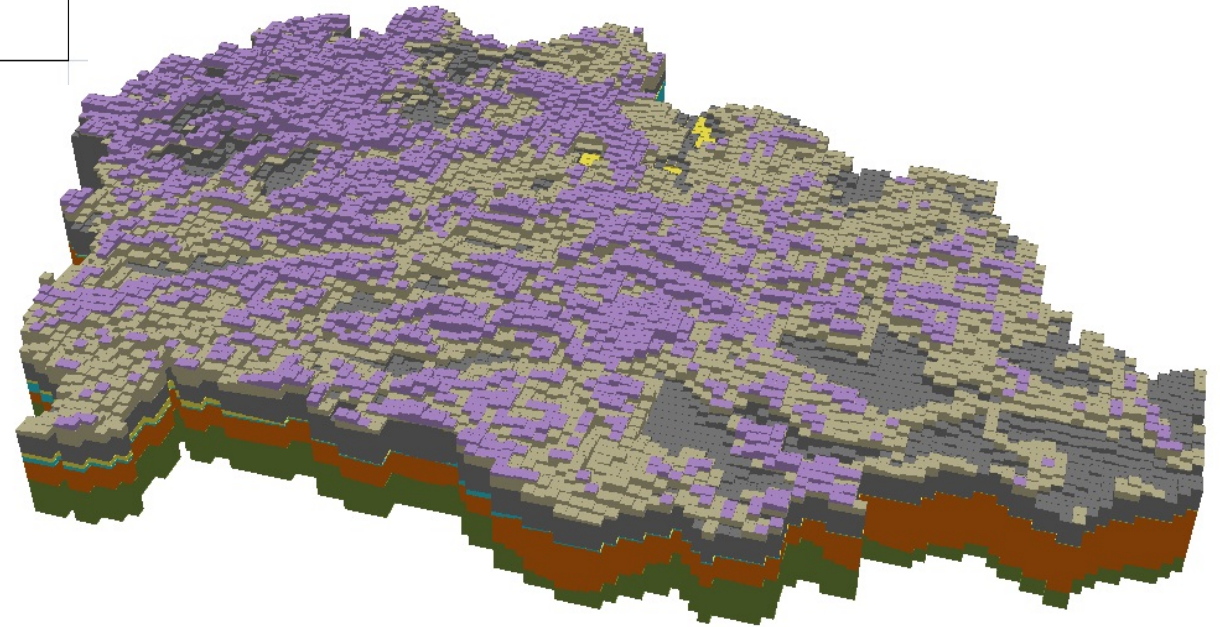
Foundation Depth (m) from EGL

- 2.00 - 4.00
- 4.01 - 10.00
- 10.01 - 15.00
- 15.01 - 20.00
- 20.01 - 33.53

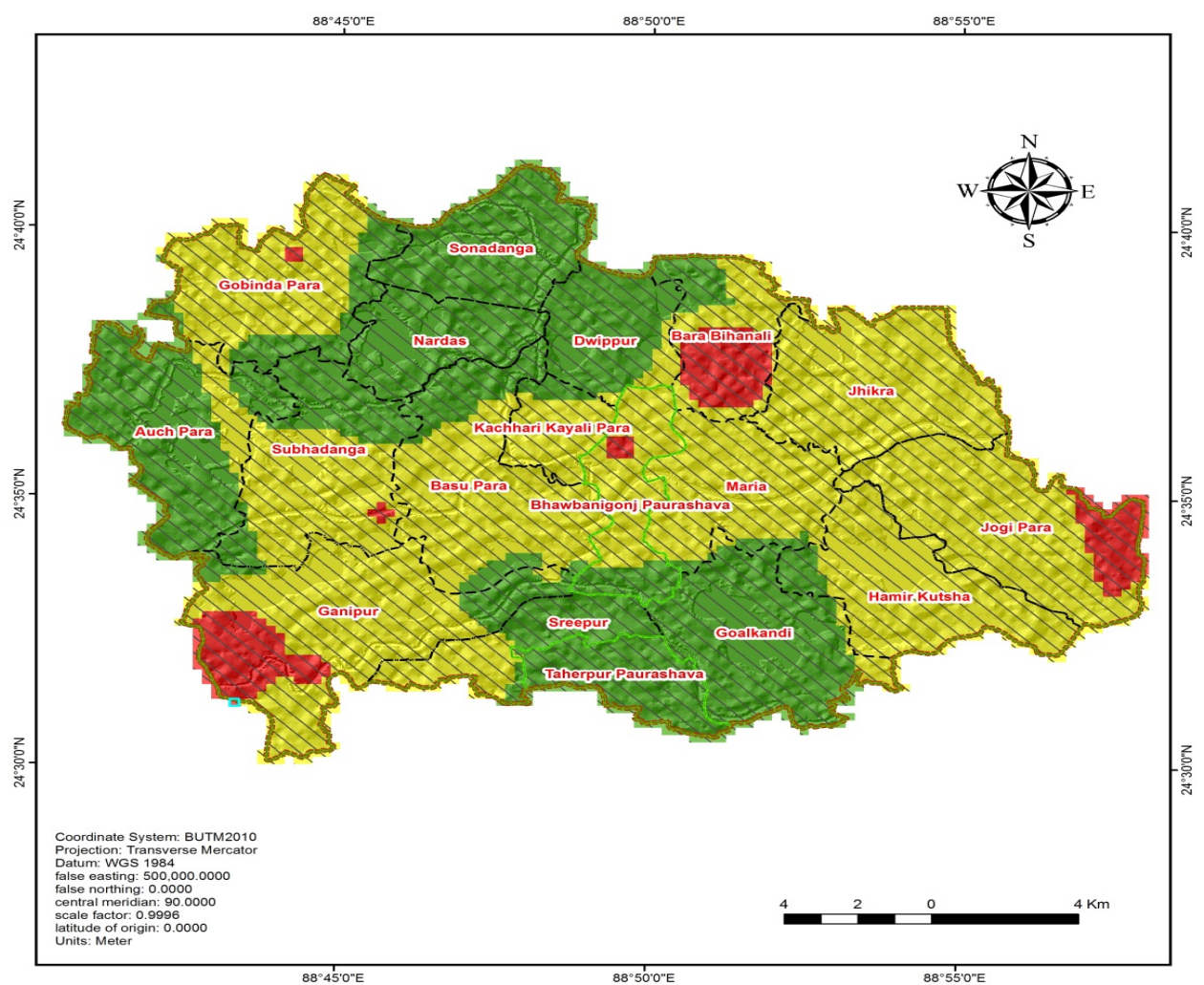
Coordinate System: BUTM2010
Projection: Transverse Mercator
Datum: WGS 1984
false easting: 500,000.0000
false northing: 0.0000
central meridian: 90.0000
scale factor: 0.9996
latitude of origin: 0.0000
Units: Meter

GIS BASE SUBSURFACE LITHOLOGICAL 3D MODEL OF BAGMARA UPAZILA

Lithological description	SPT N Value Range
Layer 1: Brownish Grey very Soft to Stiff SILT with very fine sand	2 to 11
Layer 2: Light Brown to Grey very Loose to medium Dense very fine to fine SAND with silt	2 to 20
Layer 3: Light Grey to Dark Grey very Soft to very Stiff SILT with clay	2 to 22
Layer 4: Redish Brown to Brown medium Stiff to Stiff SILT with clay	4 to 15
Layer 5: Brown to Light Grey medium Dense to Dense fine to very fine SAND with silt	9 to 35
Layer 6: Light Brown medium Dense to very Dense medium to fine SAND with silt	10 to 68
Layer 7: Light Grey Dense to very Dense medium to coarse/fine SAND little silt	33 to 84



Geological Works (Probabilities Seismic Hazard Assessment)



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



Upazila Boundary

Provable Earthquake Intensity

Intensity and Shaking

VIII, Severe

Probabilities Seismic Hazard Assessment (PSHA)

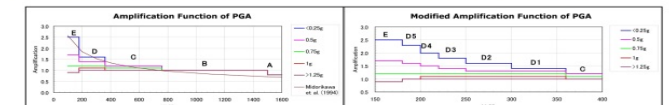
Earthquake Sensitivity with Peak Ground Acceleration (PGA)

1st Degree Sensitive

2nd Degree Sensitive

3rd Degree Sensitive

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

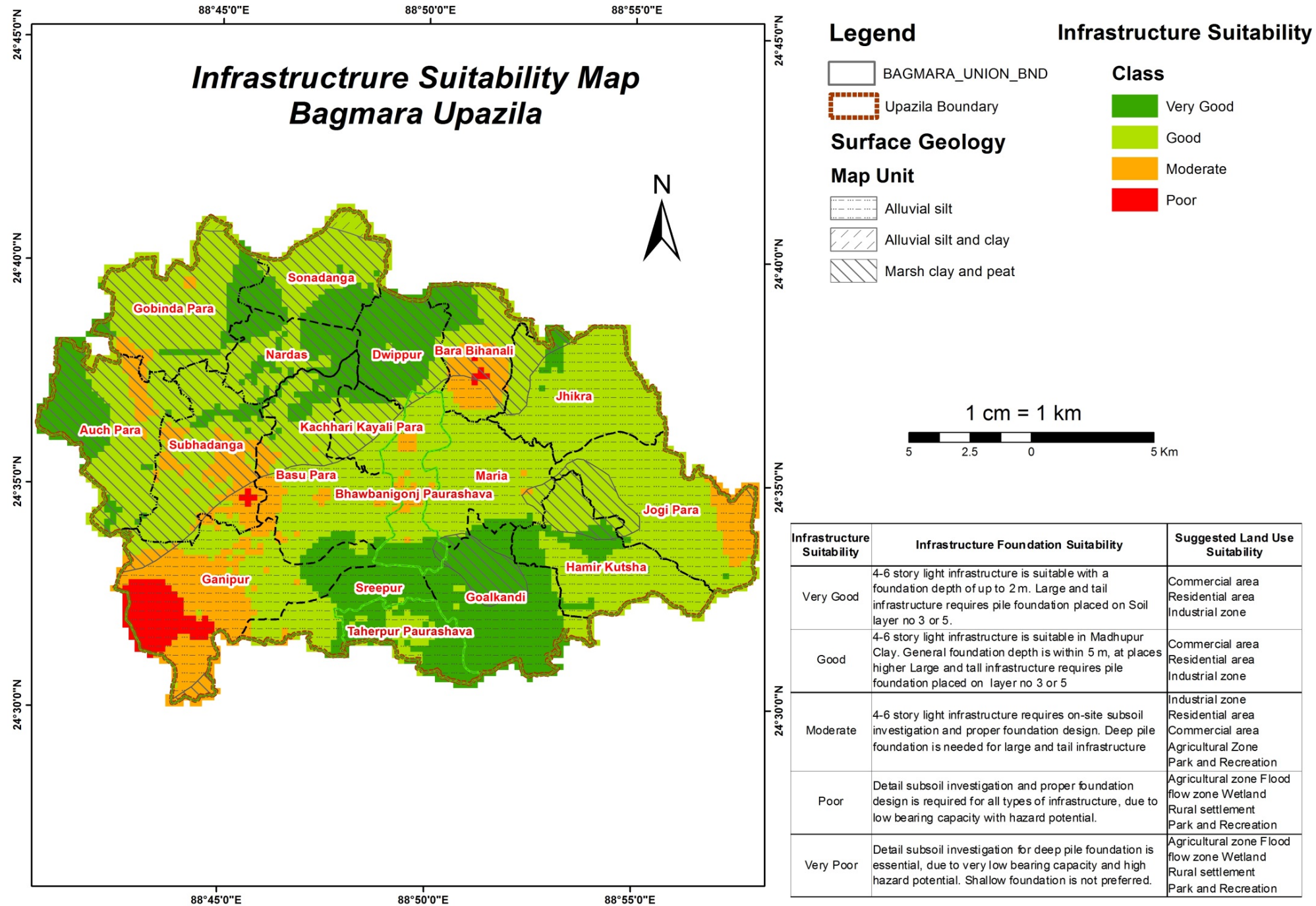


The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions

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 Map of Bagmara Upazila



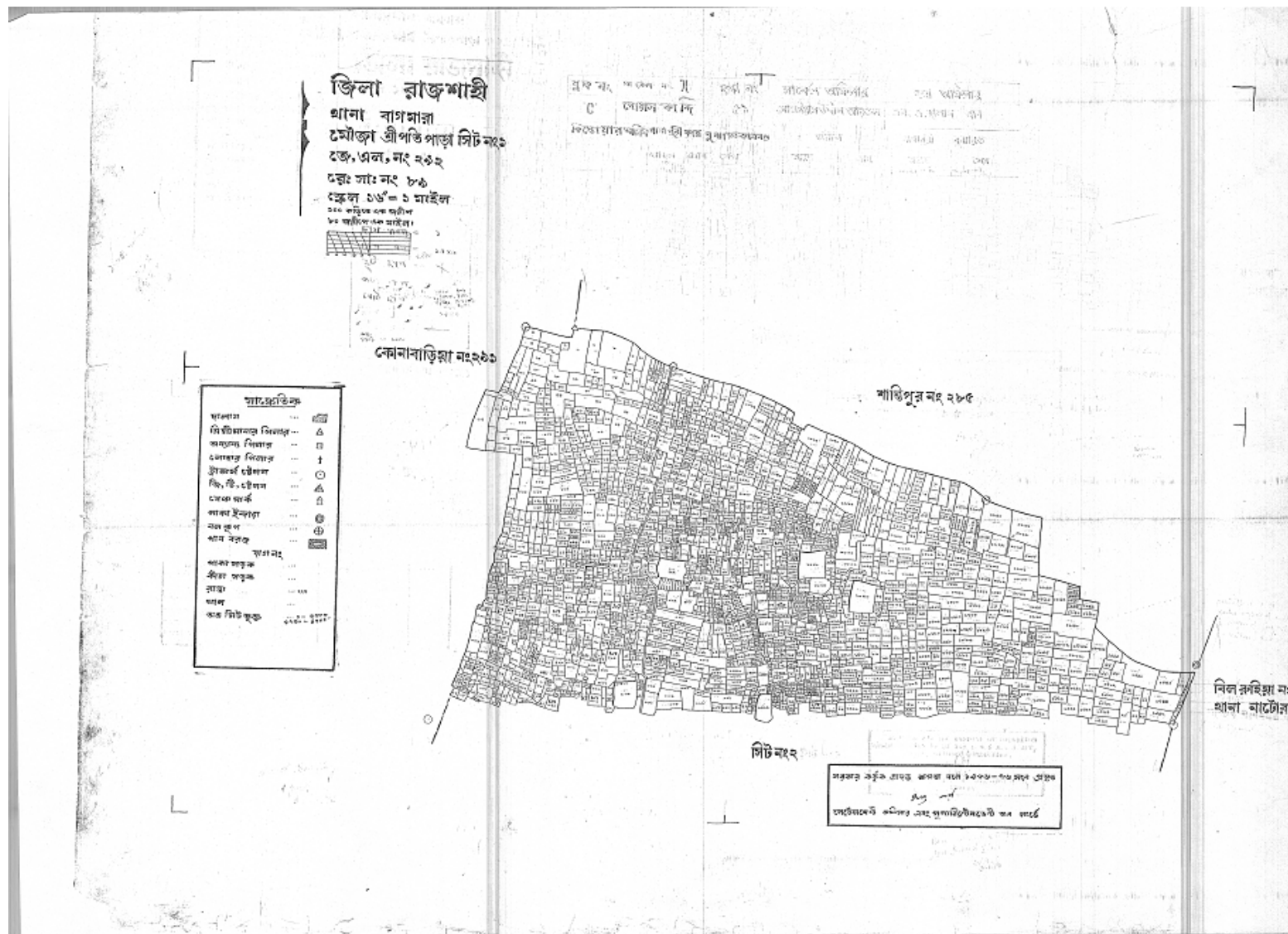
Downhole Seismic Test (PS Logging) Activities at Bagmara



Findings

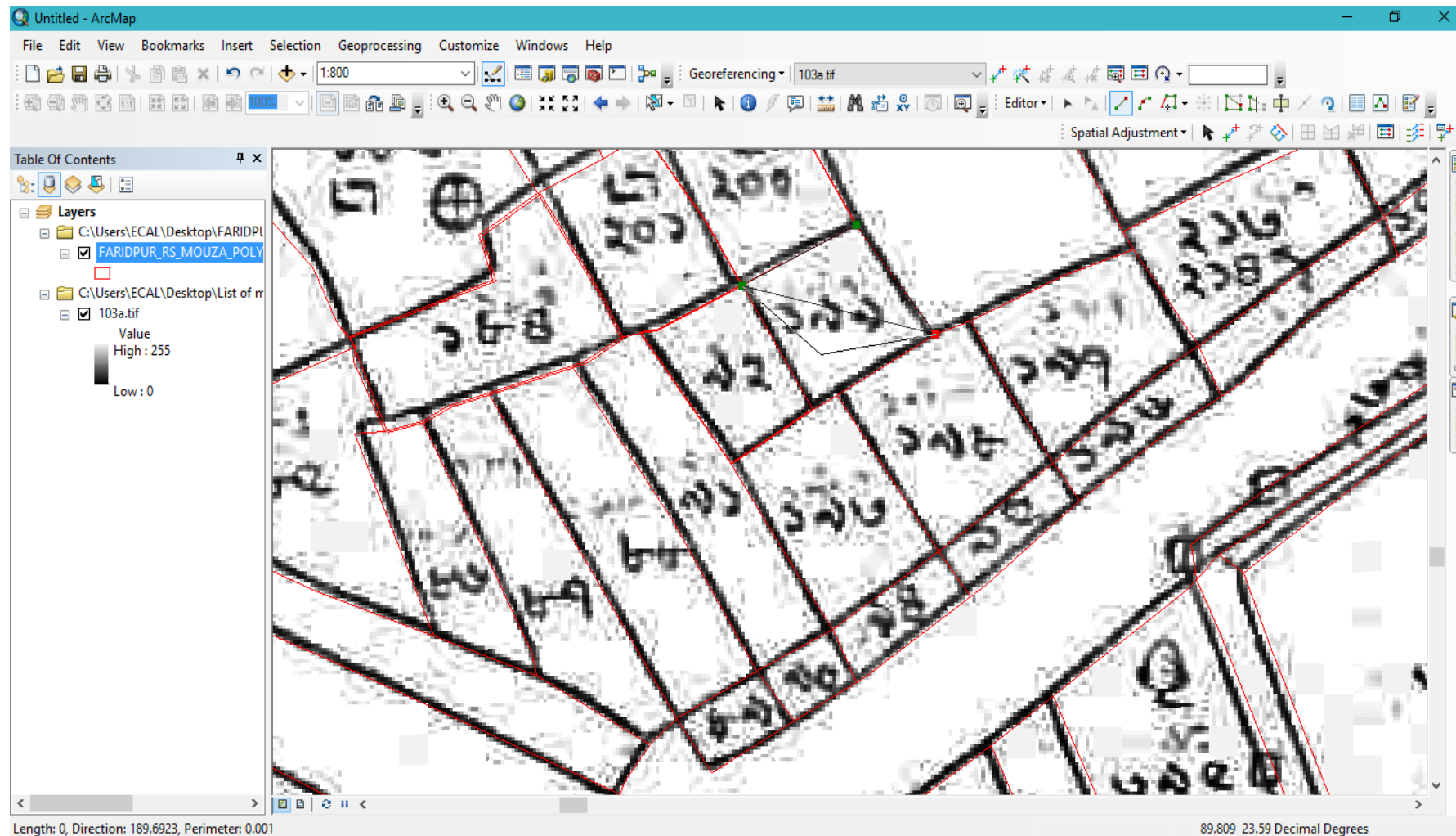
- This geological investigations has been given us a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up 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



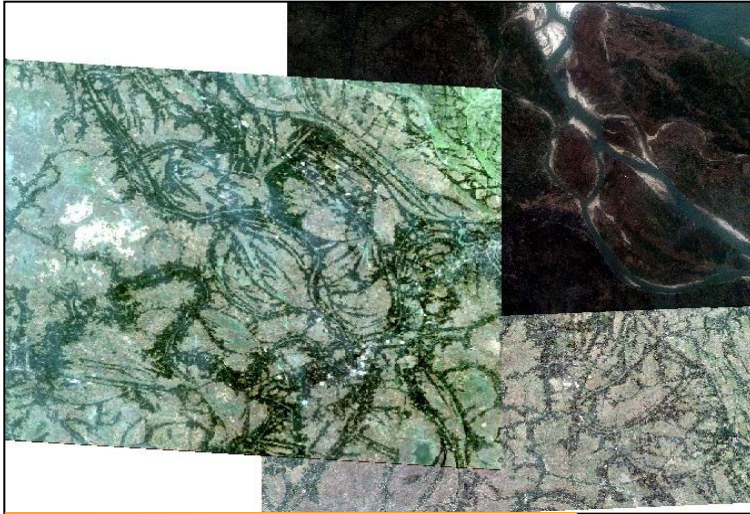
Mouza Map Collection, Scanning and Digitization

DIGITIZATION OF MOUZA MAPS

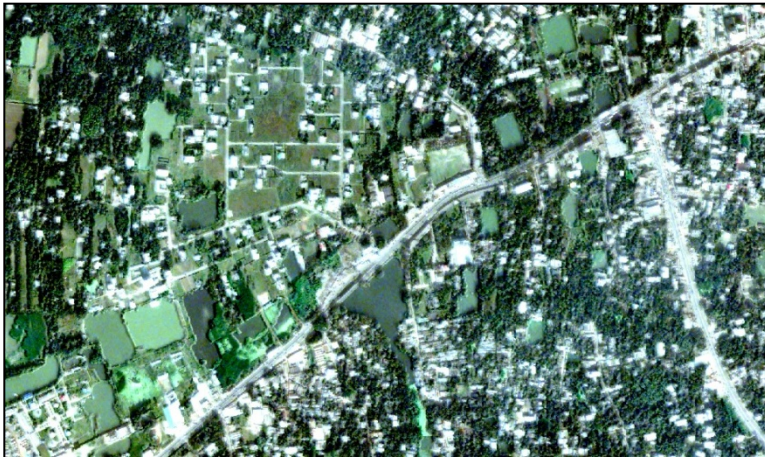


Processing of Satellite Image

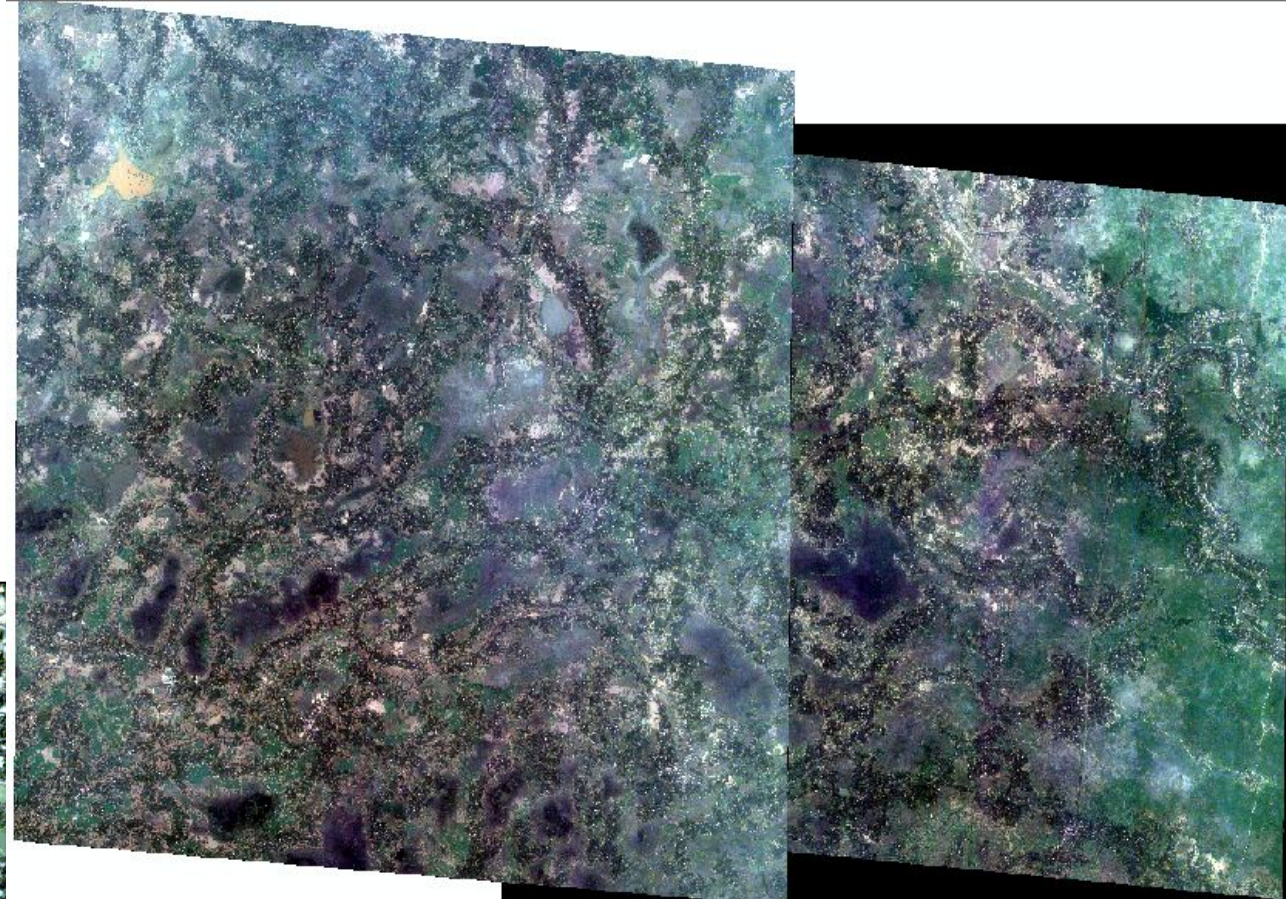
Tiles



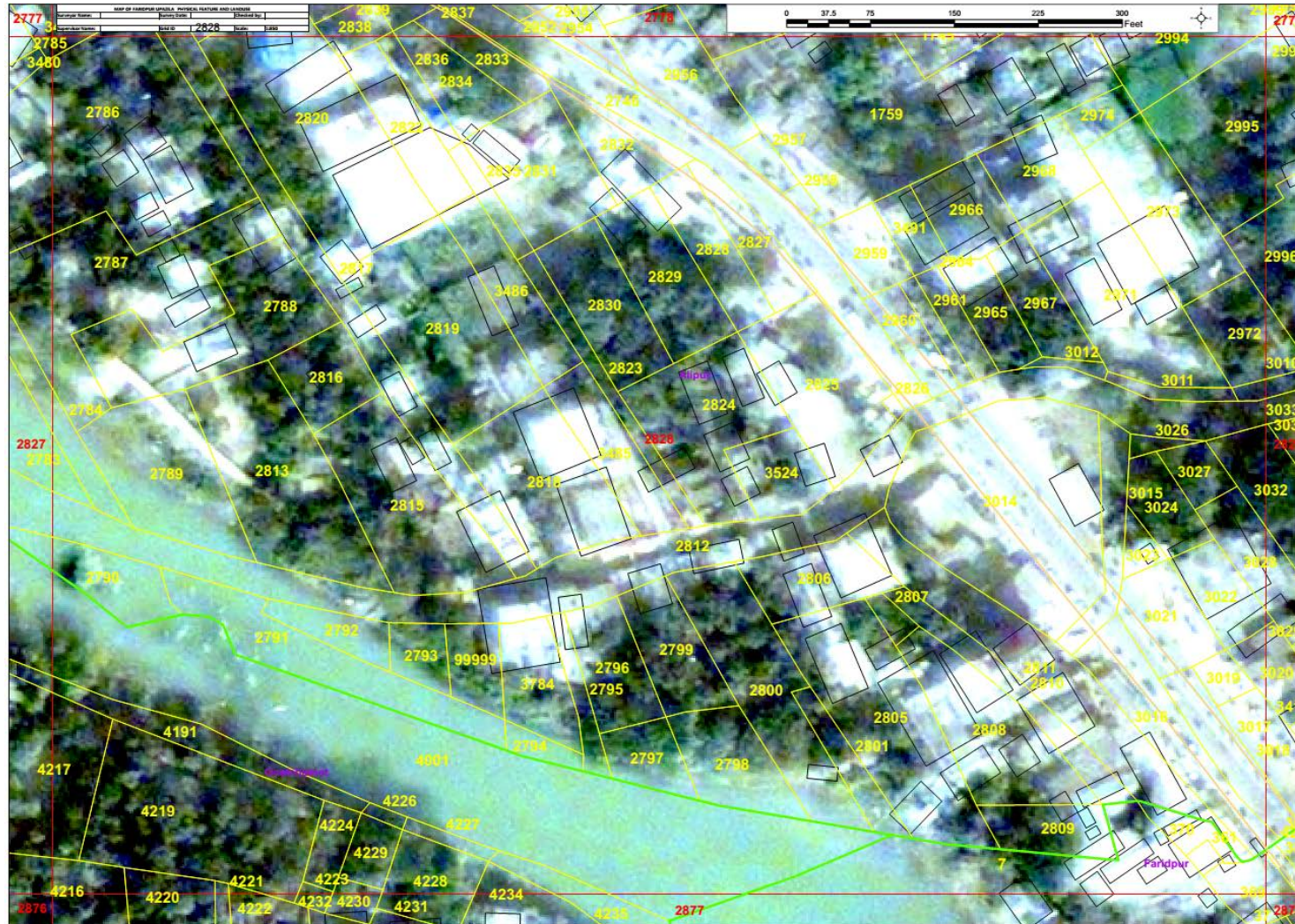
Pan-sharpen Image



Merged satellite image



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

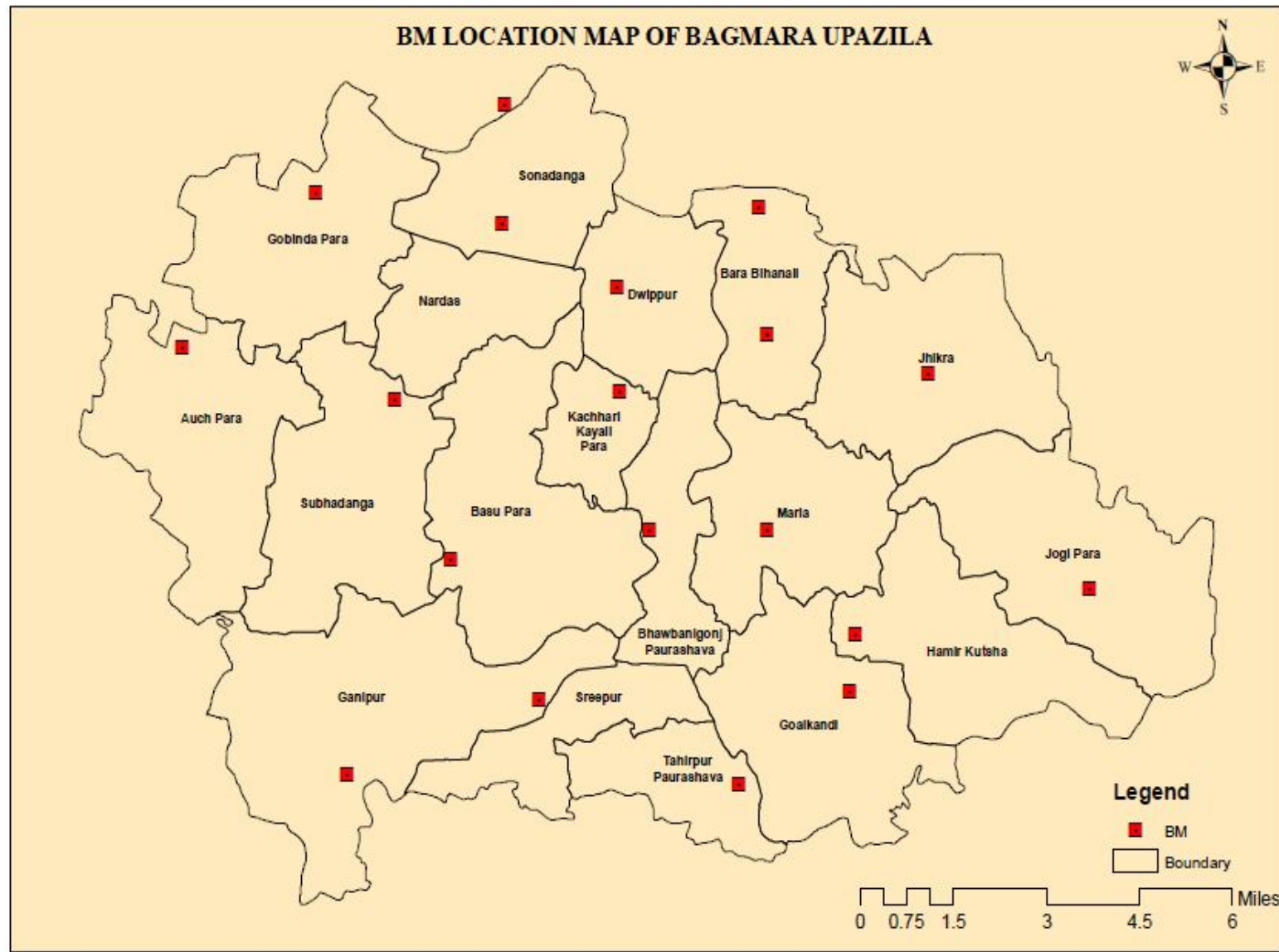


(Source: Field
Survey ,2016)

Bench Mark (BM) Pillar Installation

Locations of Installed BM Pillars

Name of Upazila	Construction of BM Pillar	Establishment of BM Pillar	GC P
Bagma ra	18	18	22



(Source: Field
Survey ,2016)

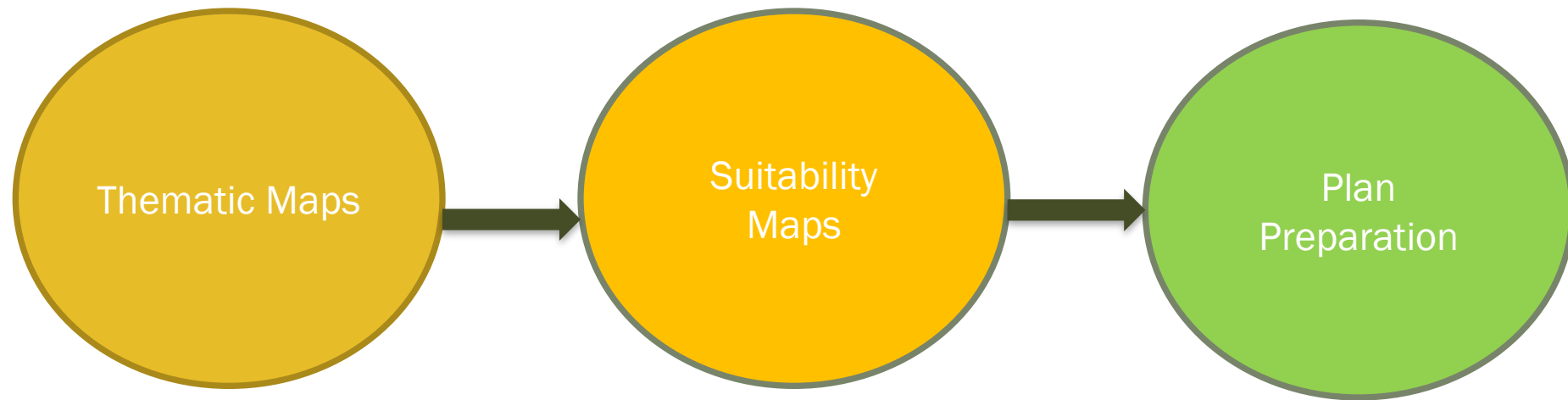
Physical Feature Survey



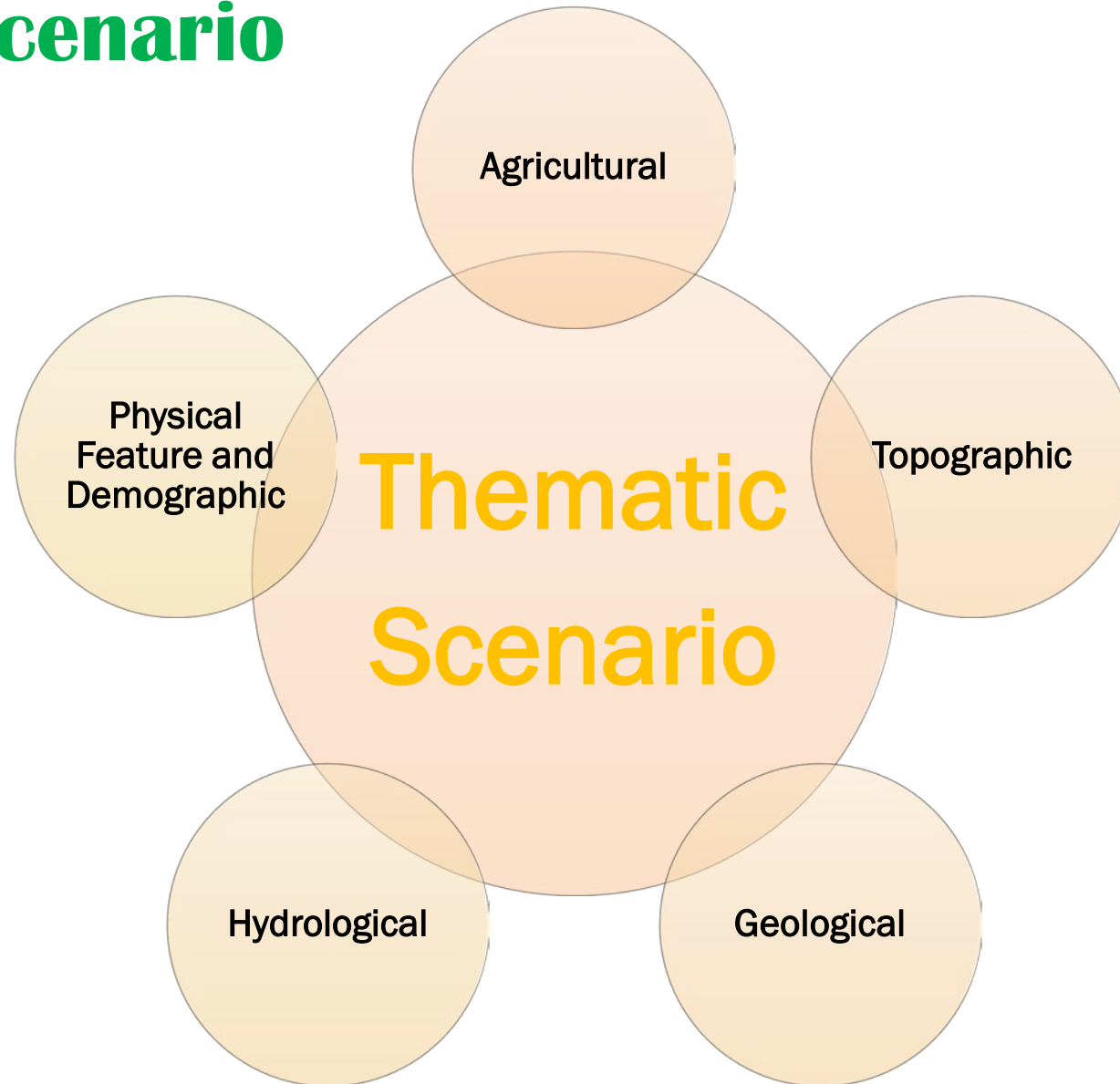
Field Survey Instruction

Planning Stage

Plan Preparation Process

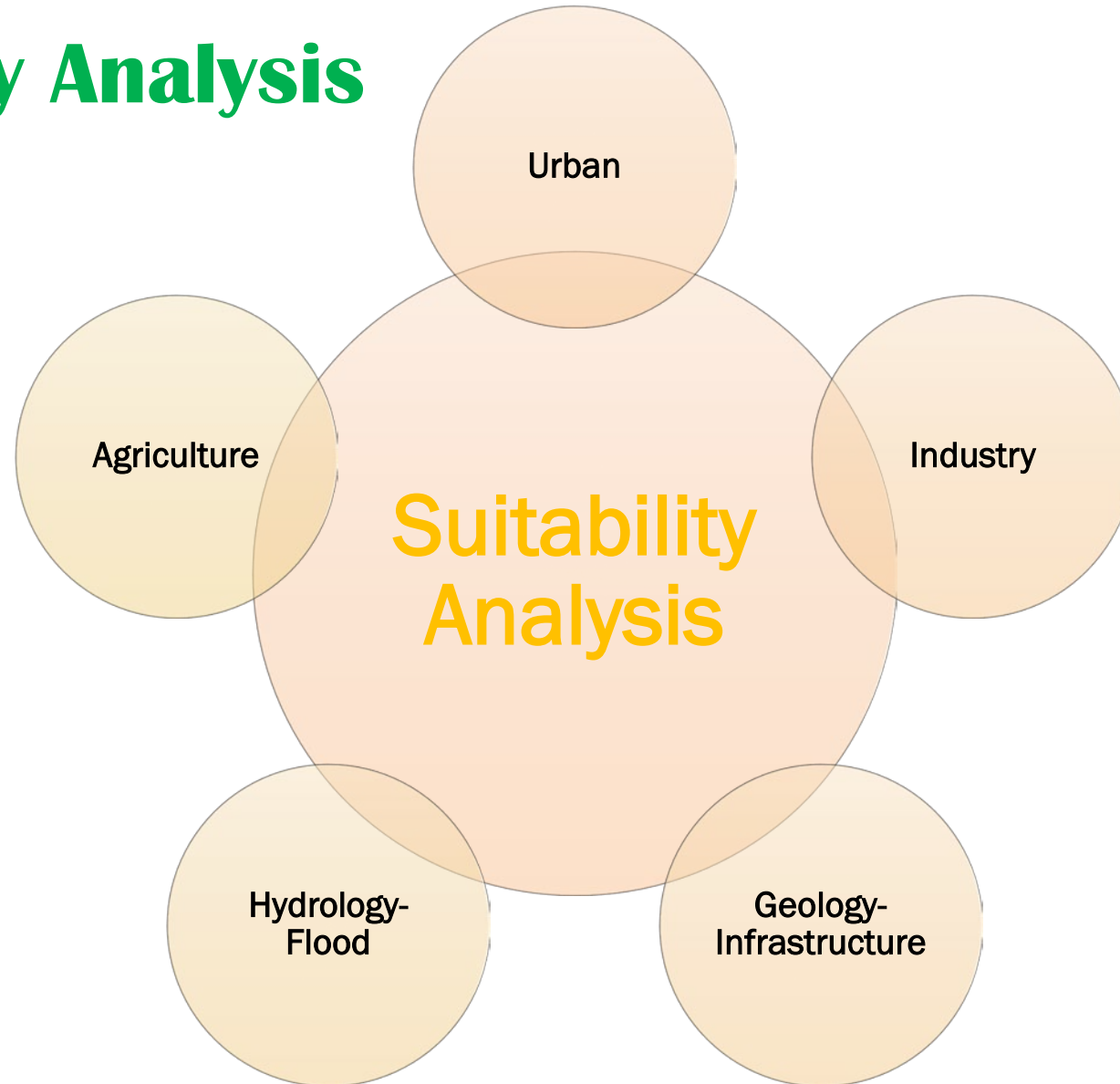


Thematic Scenario



19 Thematic maps

Suitability Analysis

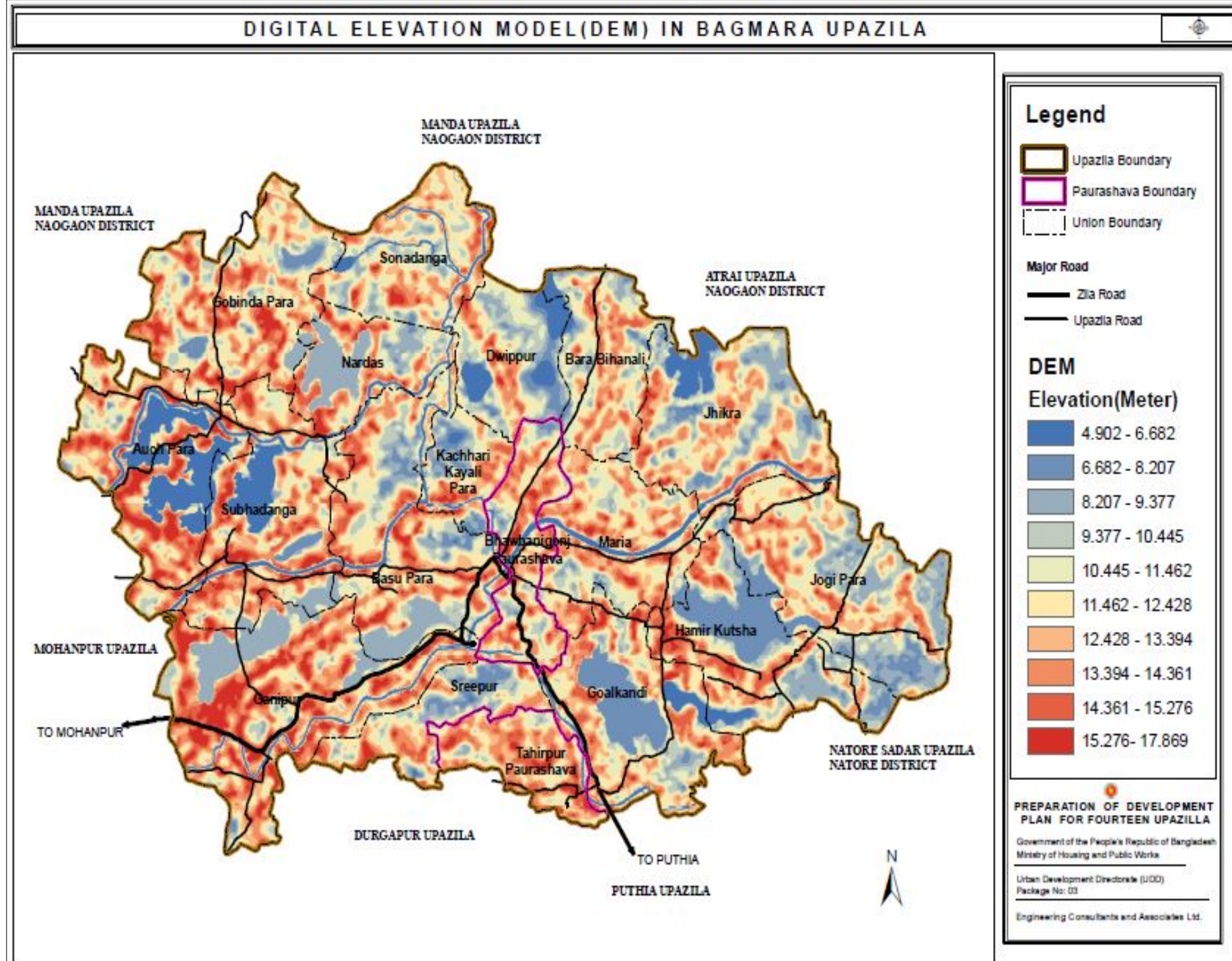


7 Suitability maps

Thematic Maps

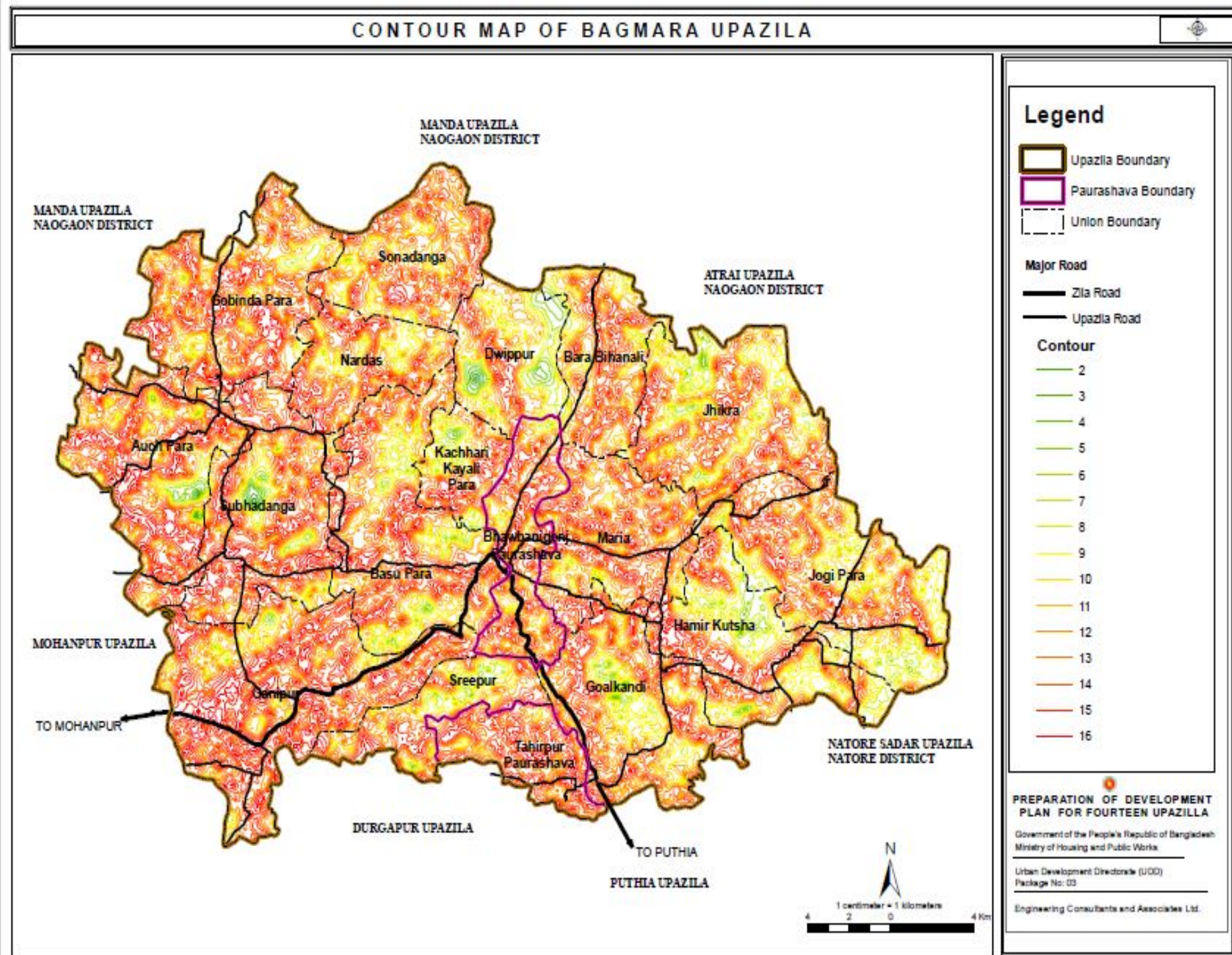
Digital Elevation Model (DEM)

Thematic Maps



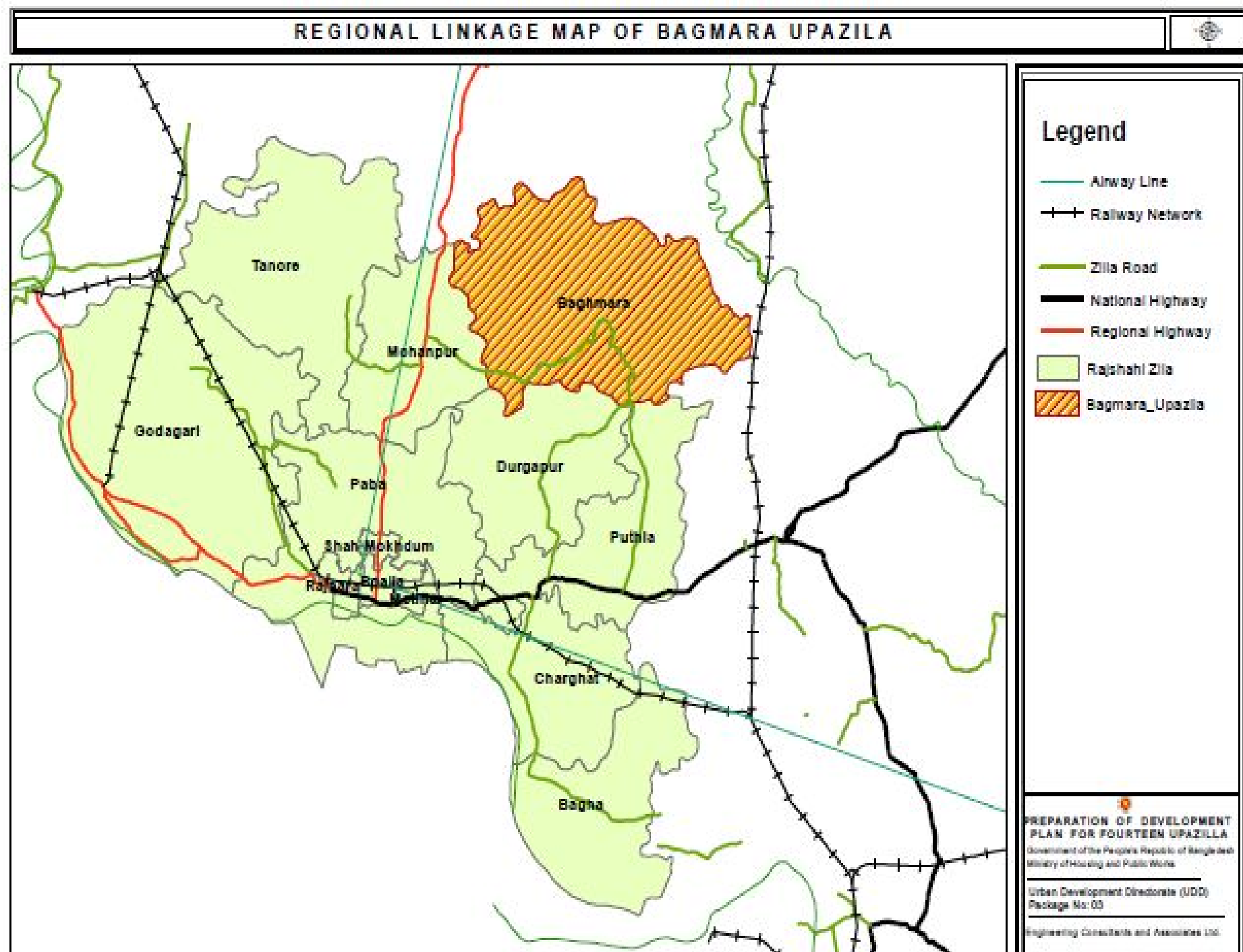
Contour Map

Thematic Maps



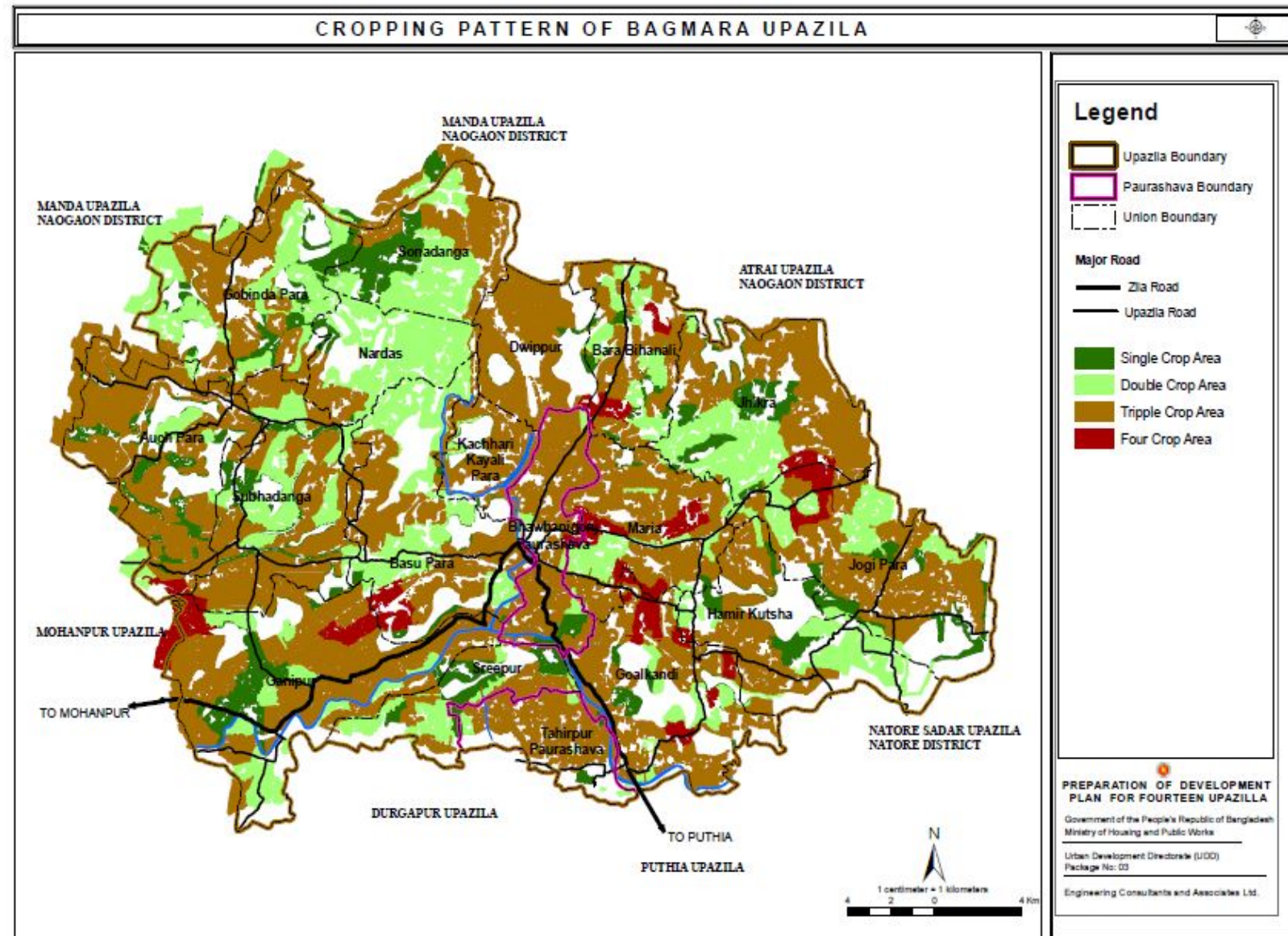
Connectivity Map

Thematic Maps



Agricultural Cropping Intensity Map

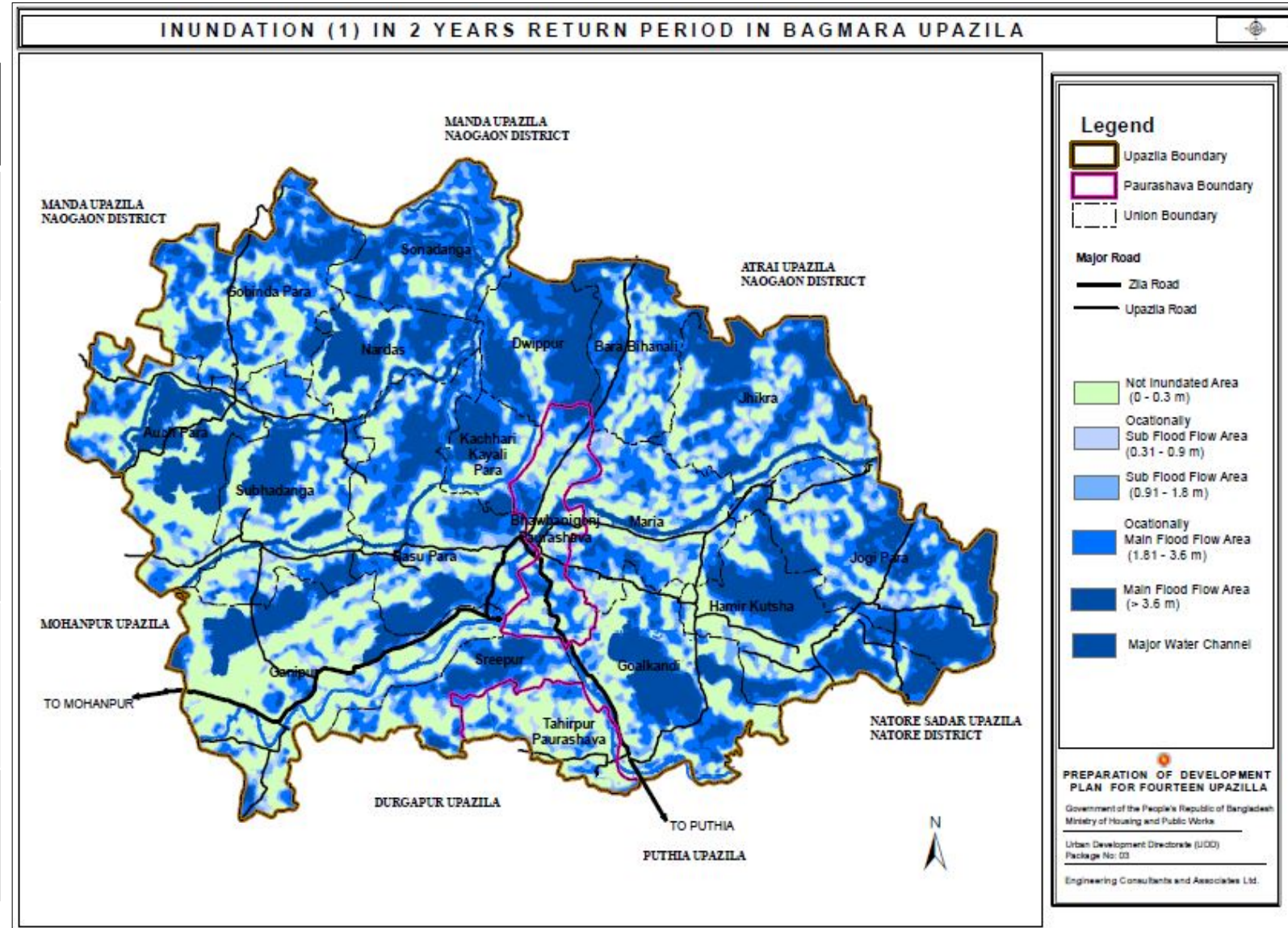
Cropping Pattern	Area in Acre	Area in Sq.km	Percentage
Single Cropping	7790.02 3111	31.5251 05	12.85%
Double Cropping	15651.7 8868	63.3405 42	25.81%
Triple Cropping	34876.8 4722	141.141 593	57.51%
Four Cropping	2324.32 1155	9.40619 4	3.83%
Total	60642.9 8017	245.413 434	100%



Thematic Maps

Flood Inundation Map at 2 years Return Period

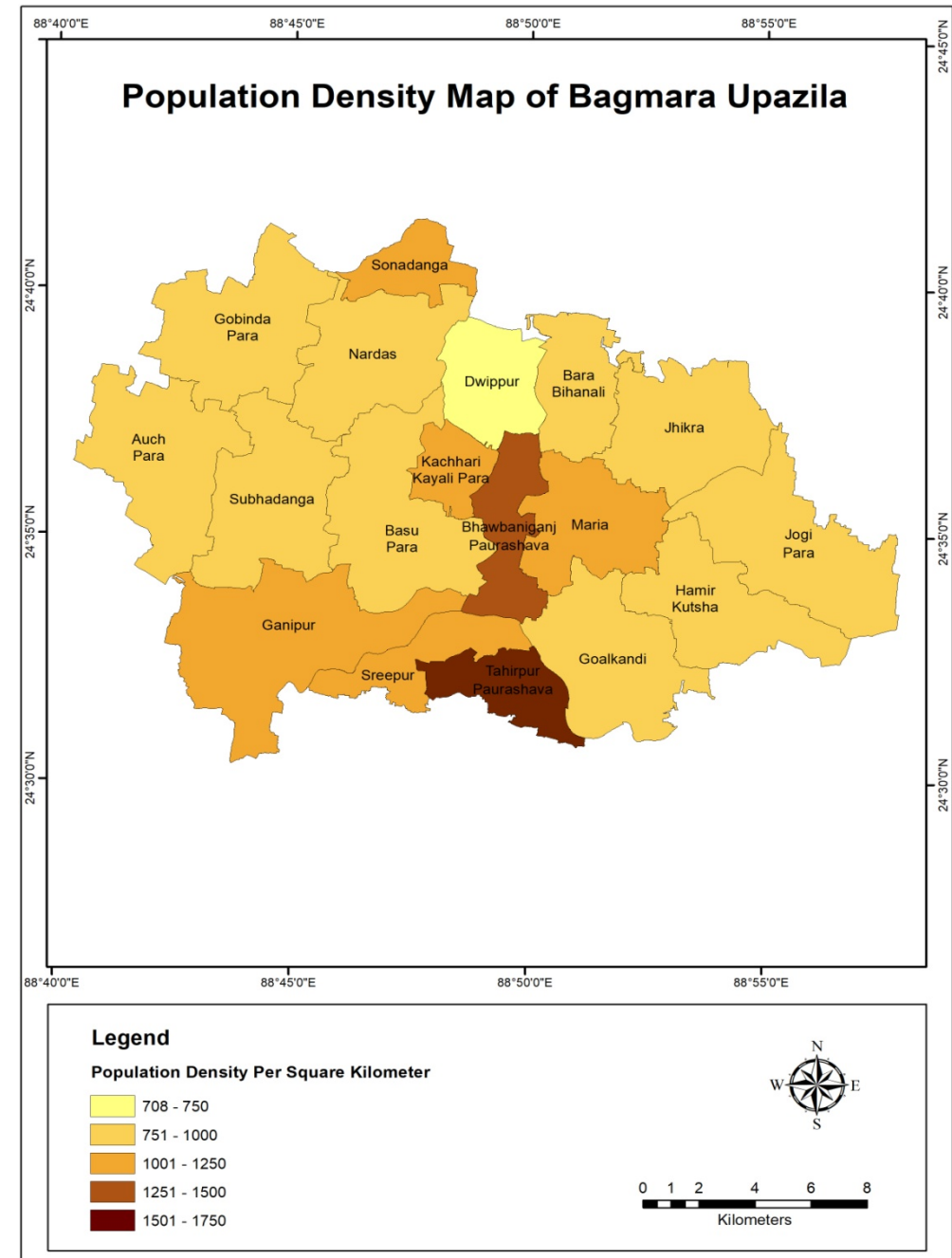
Flooded Land Category	Water Depth	Percentage area	Remarks
1st Degree Flooded area	0-0.3m	28%	Not Inundated Area
2nd Degree Flooded area	0.31-0.9m	9%	Ocationally Sub Flood Flow Area
3rd Degree Flooded area	0.91-1.8m	13%	Sub Flood Flow Area
4th Degree Flooded area	1.81-3.6m	22%	Ocationally Main Flood Flow Area
5th Degree Flooded area	>3.6m	27%	Main Flood Flow Area



Thematic Maps

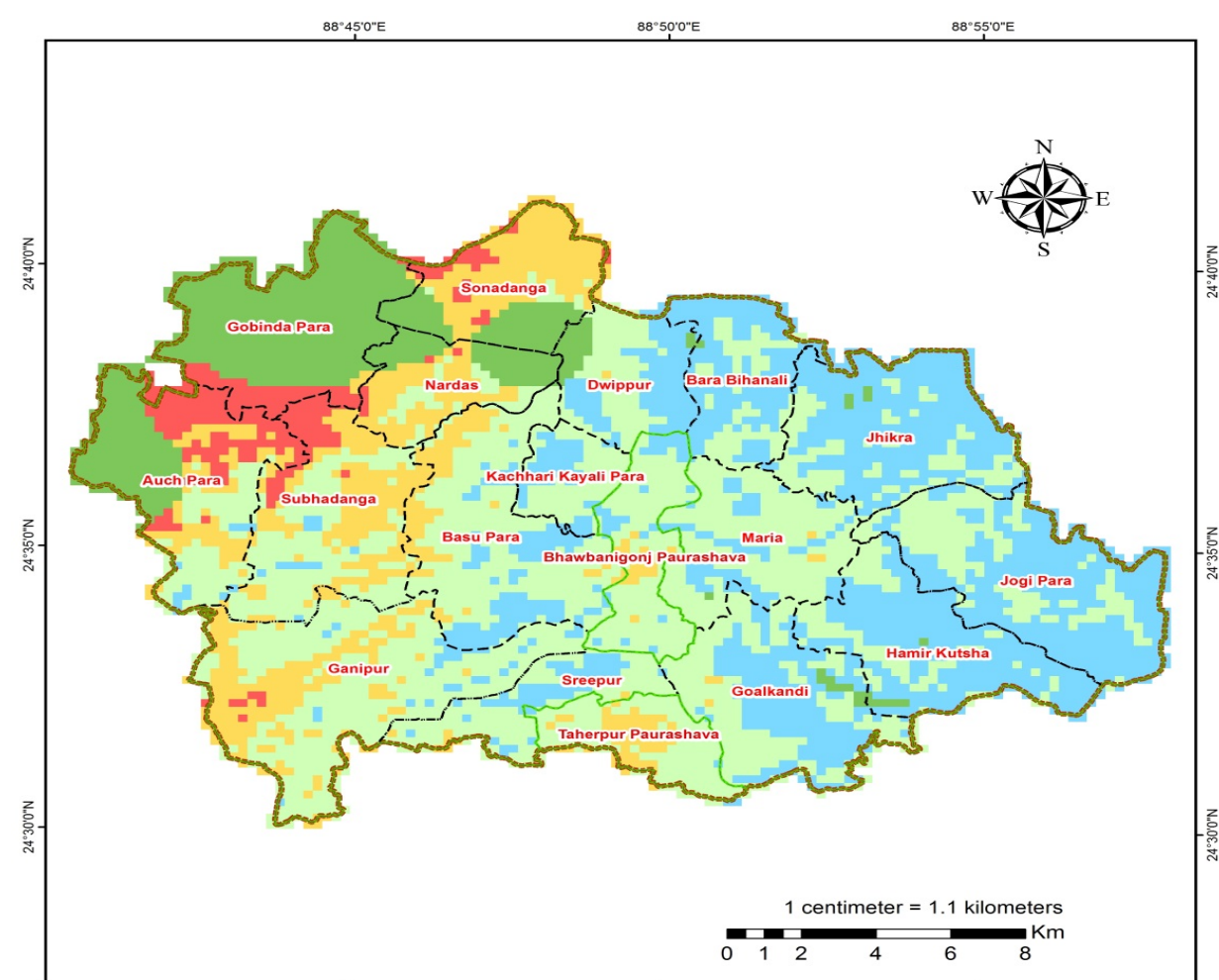
Population Density (2035) Map of Bagmara Upazila

Unions	Base Year Population (BBS,2011)	Projected Population (Consider Medium Growth Rate, 1.28%) 2035
Auch Para	26685	36211
Bara Bihanali	12571	17058
Basu Para	26943	36561
Dwippur	9852	13369
Goalkandi	24275	32940
Gobinda Para	22707	30813
Ganipur	36469	49487
Hamir Kutsha	19817	26891
Jhikra	22026	29889
Jogipara	24830	33693
Kachari Kayali Para	7509	10189
Maria	19487	26443
Nardas	19528	26499
Sonadanga	8684	11784
Sreepur	11789	15997
Shubhadanga	25593	34729



Thematic Maps

Foundation Layer Map of Bagmara Upazila



Foundation Layer Recommendation Map

Legend

BAGMARA_UNION_BND

Upazila Boundary

Engineering Soil Layers

Foundation Depth (m) from EGL

2.00 - 4.00

4.01 - 10.00

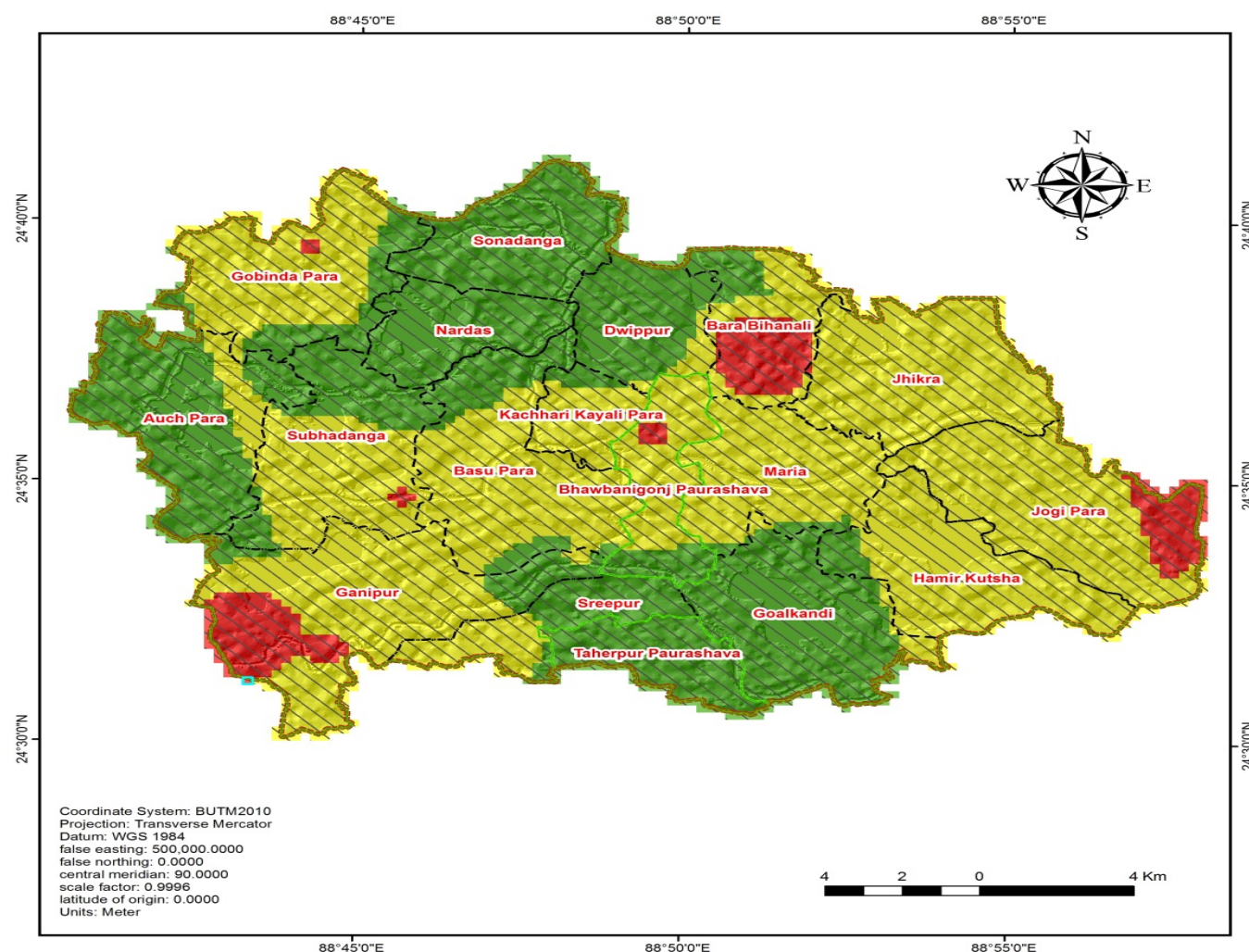
10.01 - 15.00

15.01 - 20.00

20.01 - 33.53

Coordinate System: BUTM2010
Projection: Transverse Mercator
Datum: WGS 1984
false easting: 500,000.0000
false northing: 0.0000
central meridian: 90.0000
scale factor: 0.9996
latitude of origin: 0.0000
Units: Meter

Peak Ground Acceleration Map of Bagmara Upazila



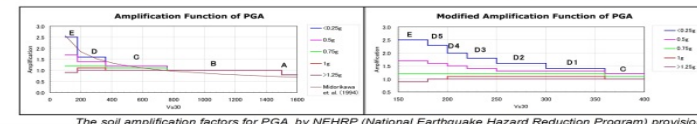
Peak Ground Acceleration (PGA) (g) at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years

Upazila Boundary
Provable Earthquake Intensity
 Intensity and Shaking
 VIII, Severe

Probabilities Seismic Hazard Assessment (PSHA)
 Earthquake Sensitivity with Peak Ground Acceleration (PGA)

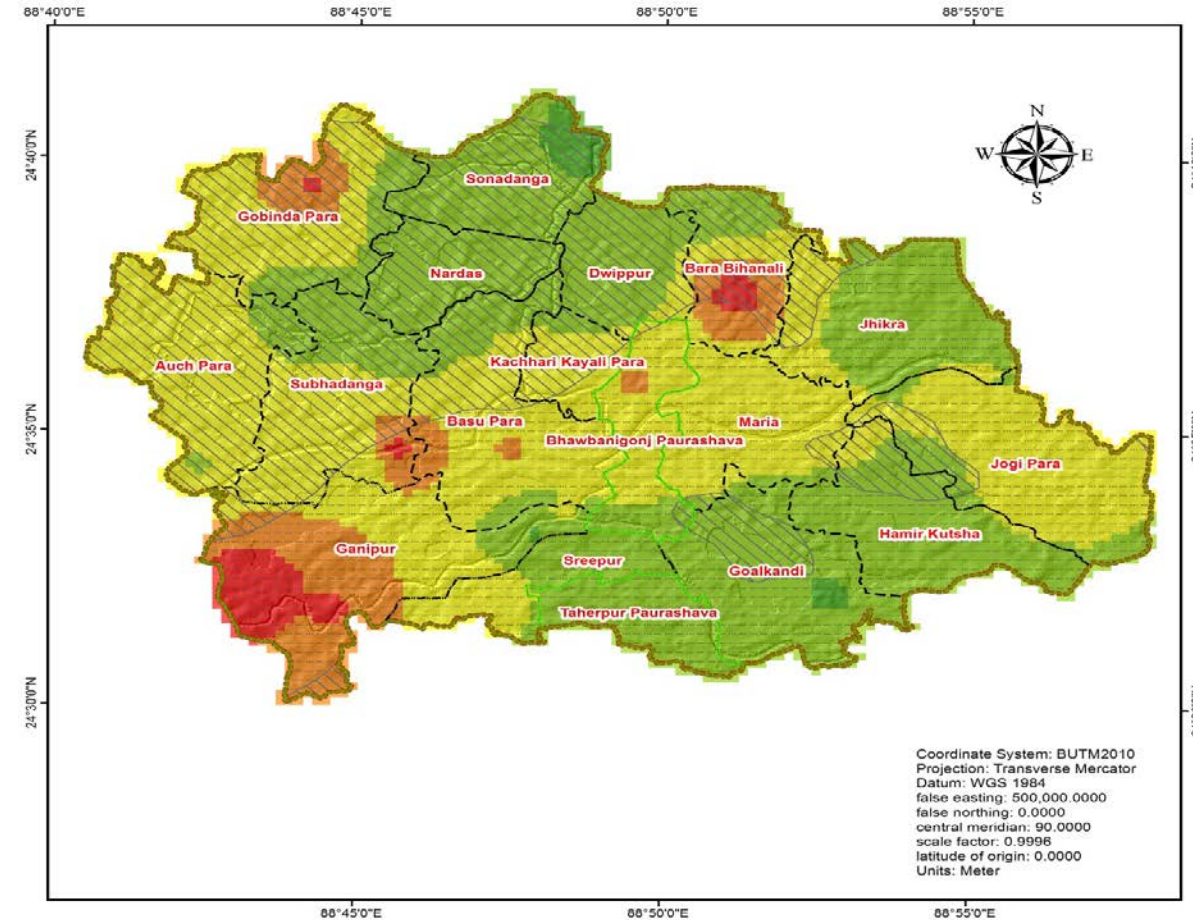
- 1st Degree Sensitive
- 2nd Degree Sensitive
- 3rd Degree Sensitive

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

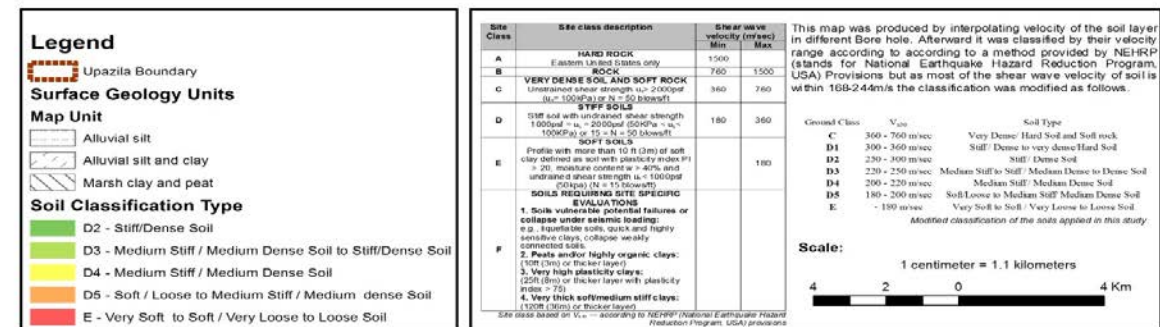


Thematic Maps

Shear Wave Velocity Map of Bagmara Upazila

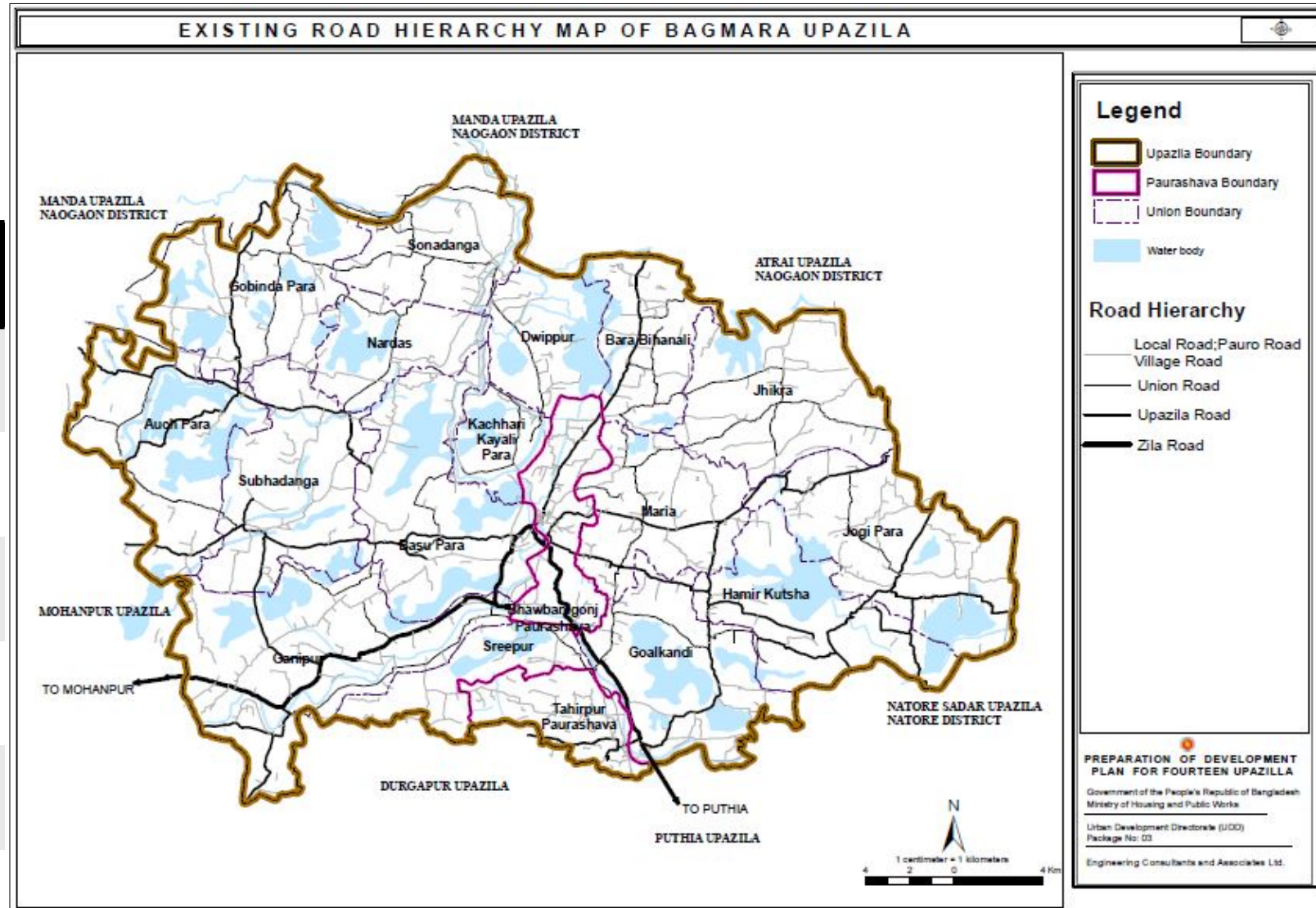


Engineering Geological Map based on Avarage Shear wave Velocity (upto30m)



Road Hierarchy Map of Bagmara Upazila

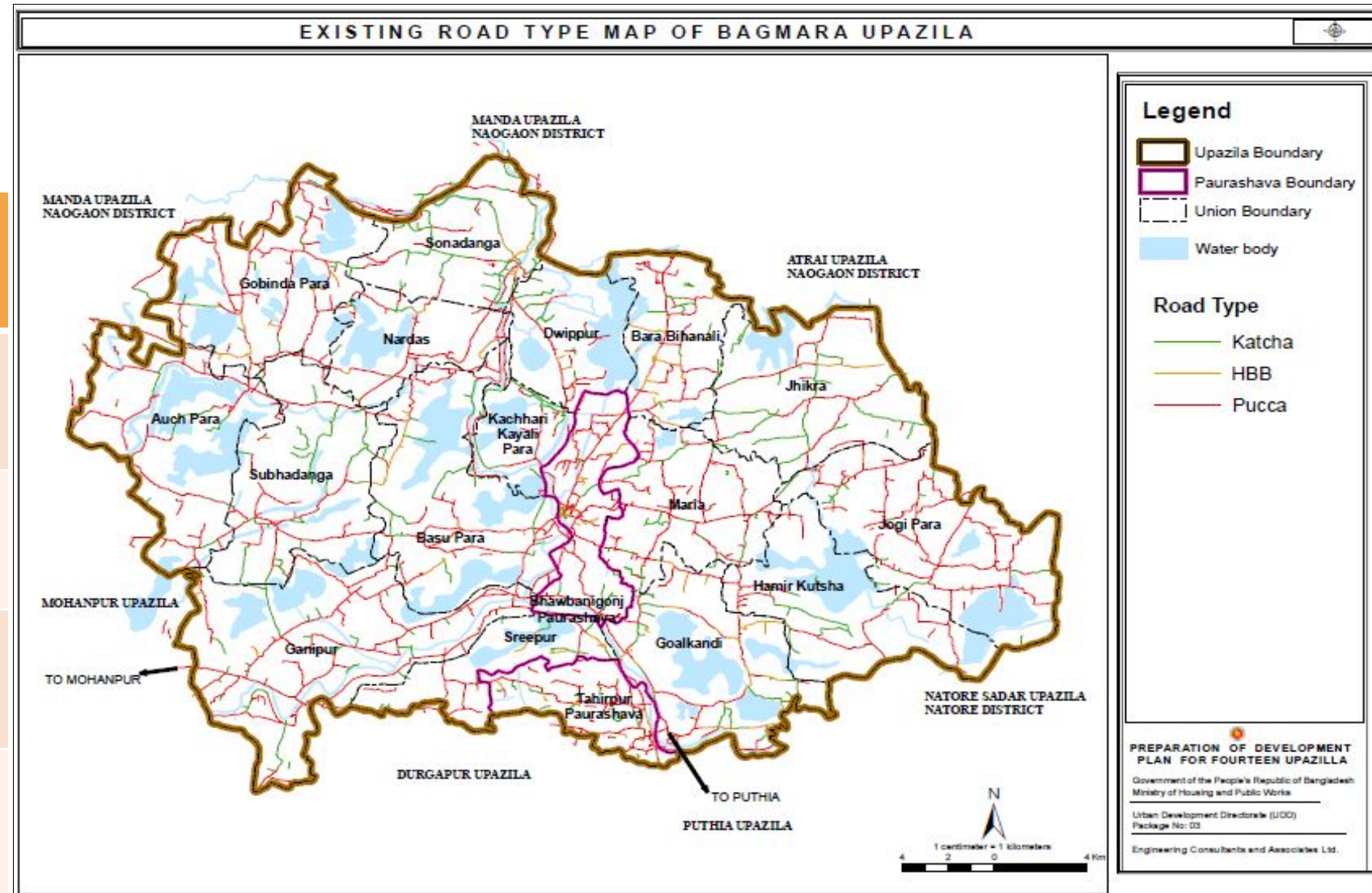
Road Hierarchy	Length in Km.	Percentage
Local Road	14.07	2.03%
Pouro Road	41.75	6.02%
Union Road	152.14	21.93%
Upazila Road	123.95	17.87%
Village Road	338.57	48.80%
Zilla Road	23.35	3.36%
Total	693.83	100.00%



Thematic Maps

Existing Road Type Map of Bagmara Upazila

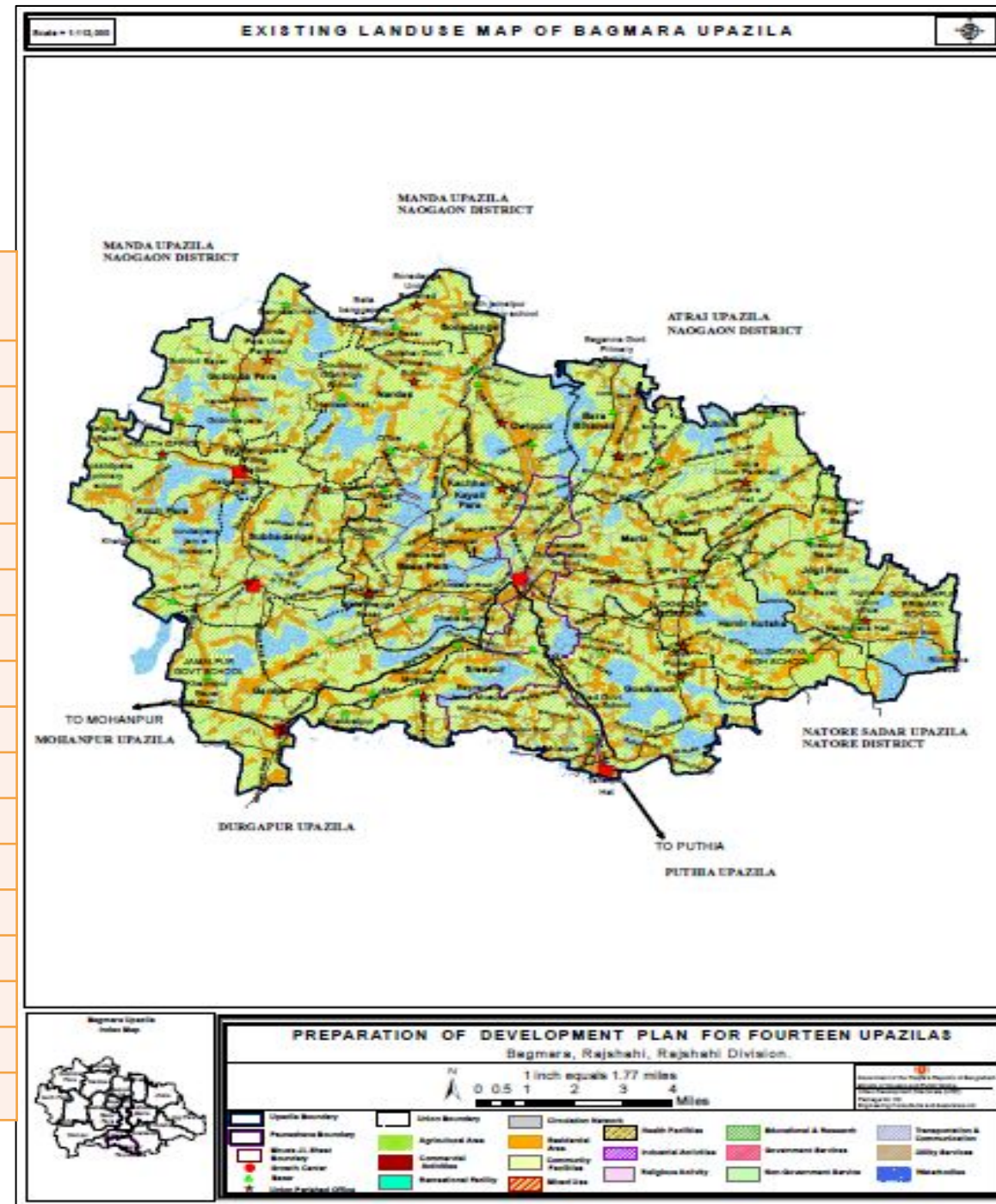
Road Type	Length in Km.	Percent age
Katcha	166.96	24.15%
HBB	45.32	6.55%
Pucca	479.06	69.30%
Total	691.34	100%



Existing Land Use Map of Bagmara Upazila

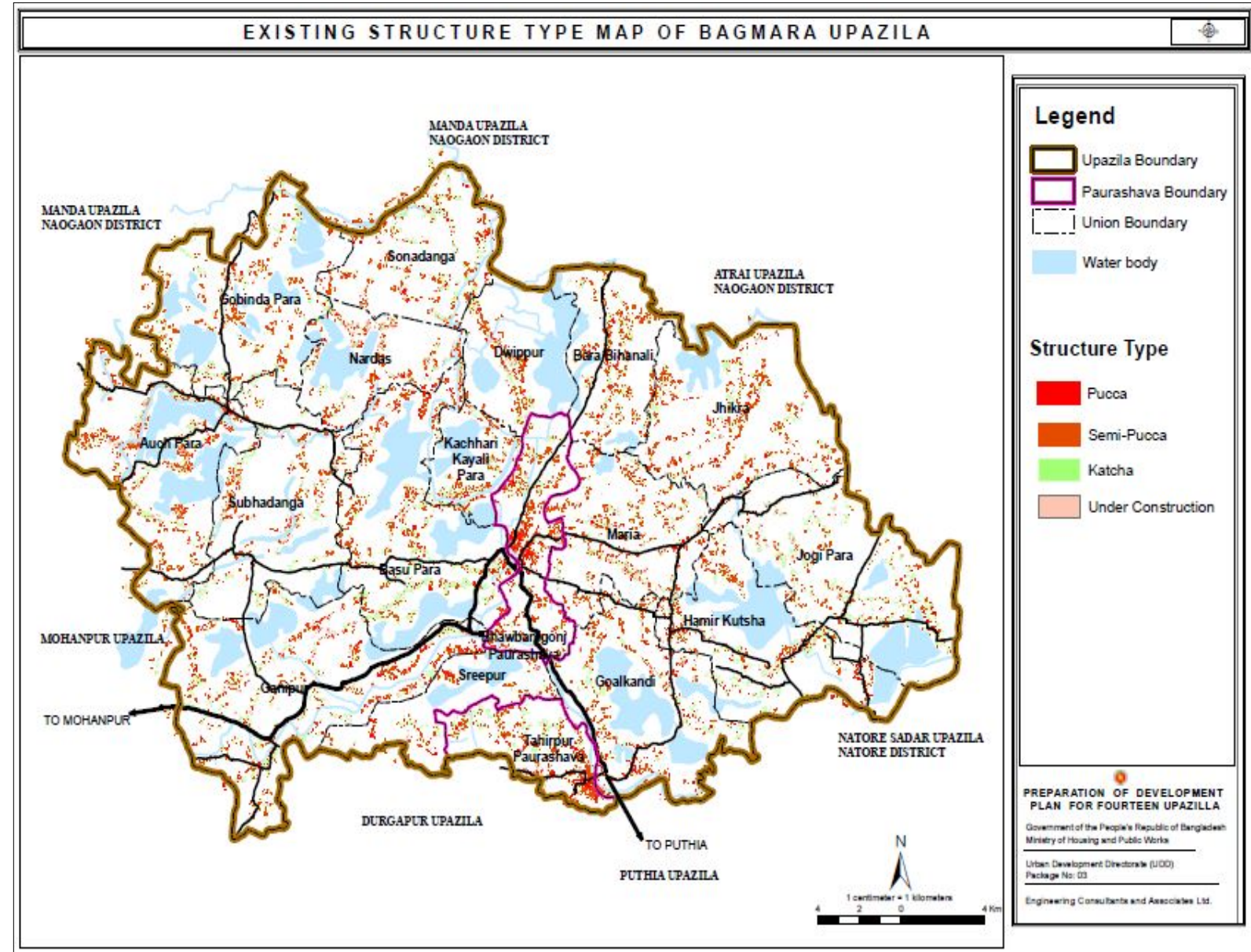
Landuse	Area in Acres	Area in Sq.km
Administrative	26.46	0.107072
Agricultural	58611.48	237.192252
Commercial	164.12	0.664175
Community Facilities	0.39	0.001594
Education & Research	61.28	0.247976
Health Facilities	2.63	0.01066
Industrial	6.96	0.028185
Miscellaneous	0.50	0.002008
Mixed Use	14.86	0.060136
NGO	0.51	0.002046
Recreational Facilities	0.14	0.00056
Religious	8.55	0.034616
Residential	16316.24	66.029498
Utility Facilities	0.91	0.003689
Waterbodies	15502.78	62.737509
Circulation Network	495.50	2.00523
Total	91213.32	369.13

Thematic Maps



Structure Type Map of Bagmara Upazila

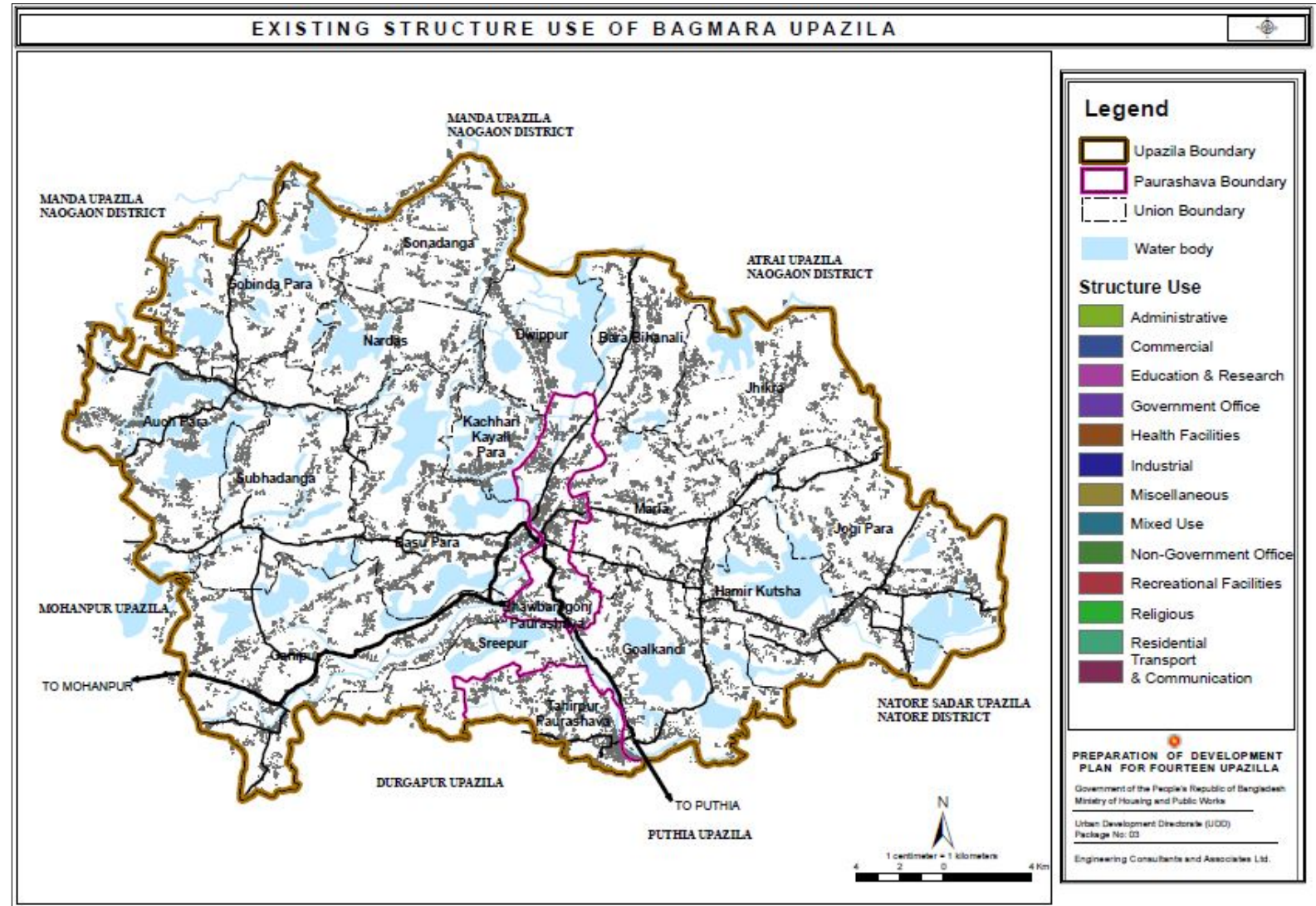
Structure Type	No. of Structures	Percent age
Katcha	17055	27.33%
Semi Pucca	39703	63.62%
Pucca	5604	8.98%
Under Construction	48	0.08%
Total	62410	100%



Thematic Maps

Structure Use Map of Bagmara Upazila

Structure Use	No. of Structures
Administrative	123
Agricultural	70
Commercial	1982
Community Facilities	2
Education and Research	220
Health Facilities	22
Industrial	34
Miscellaneous	37
Mixed Use	60
Non-Government Services	21
Recreational Facilities	2
Religious	97
Residential	59723
Transportation Facilities	9
Utility Facilities	8

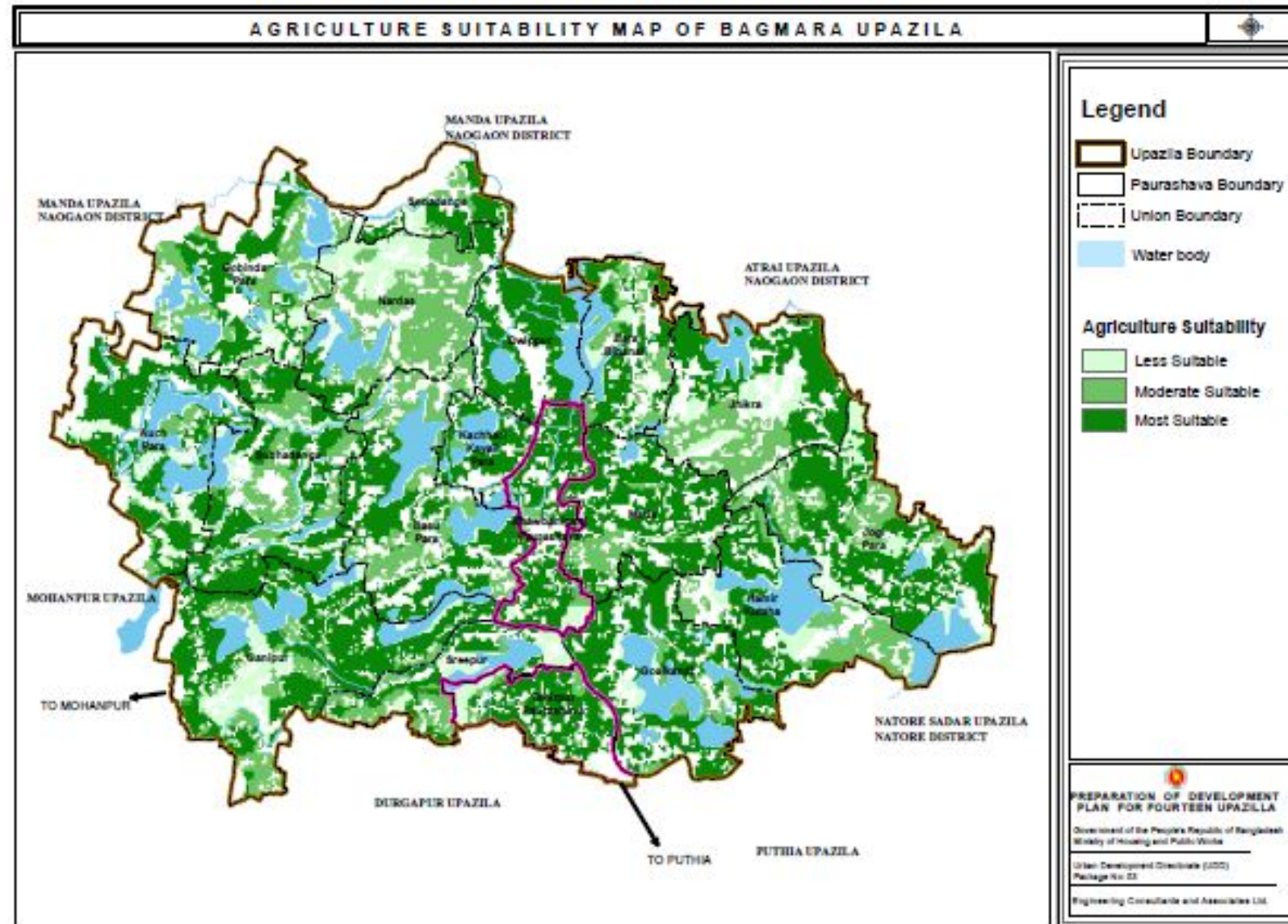


Thematic Maps

Suitability Maps

Agricultural Suitability Maps

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

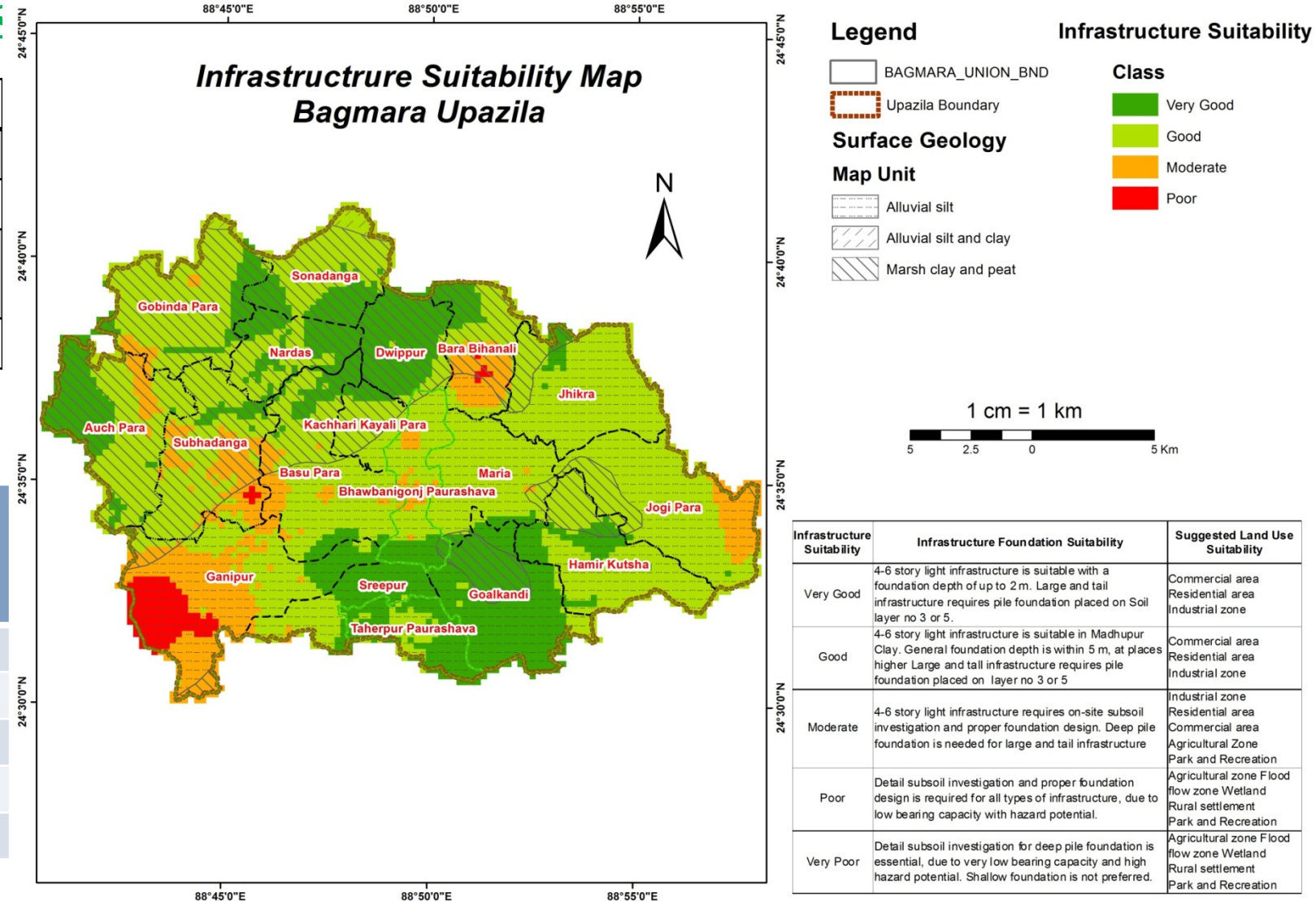


Suitability Maps

Infrastructural Suitability Maps

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

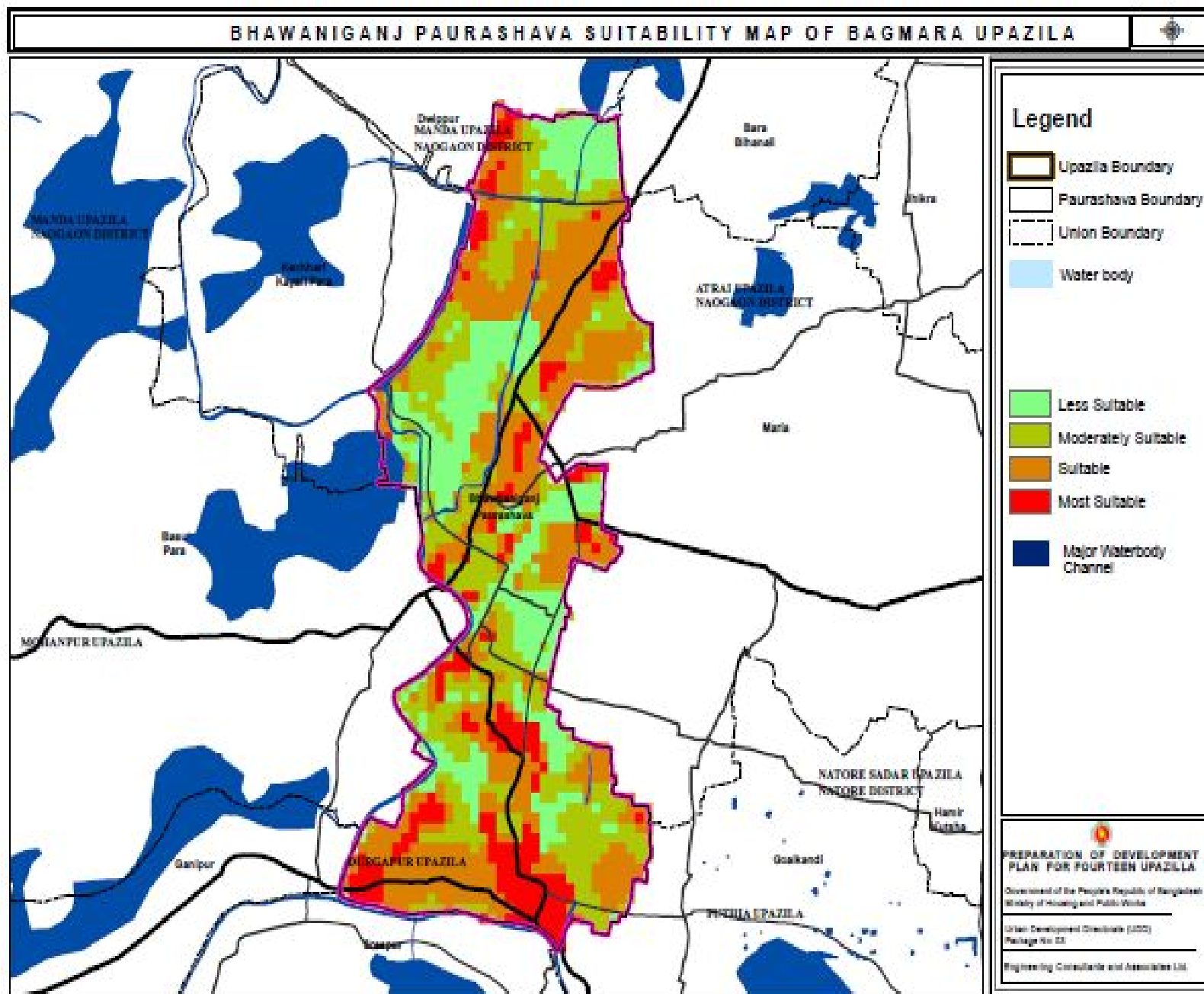
Infrastructure Category	Area(Sq. Km)	% of Area
Good	228.88	58.98%
Moderate	46.00	11.85%
Poor	8.06	2.08%
Very Good	105.13	27.09%
Total	388.06	100%



Urban Suitability Maps

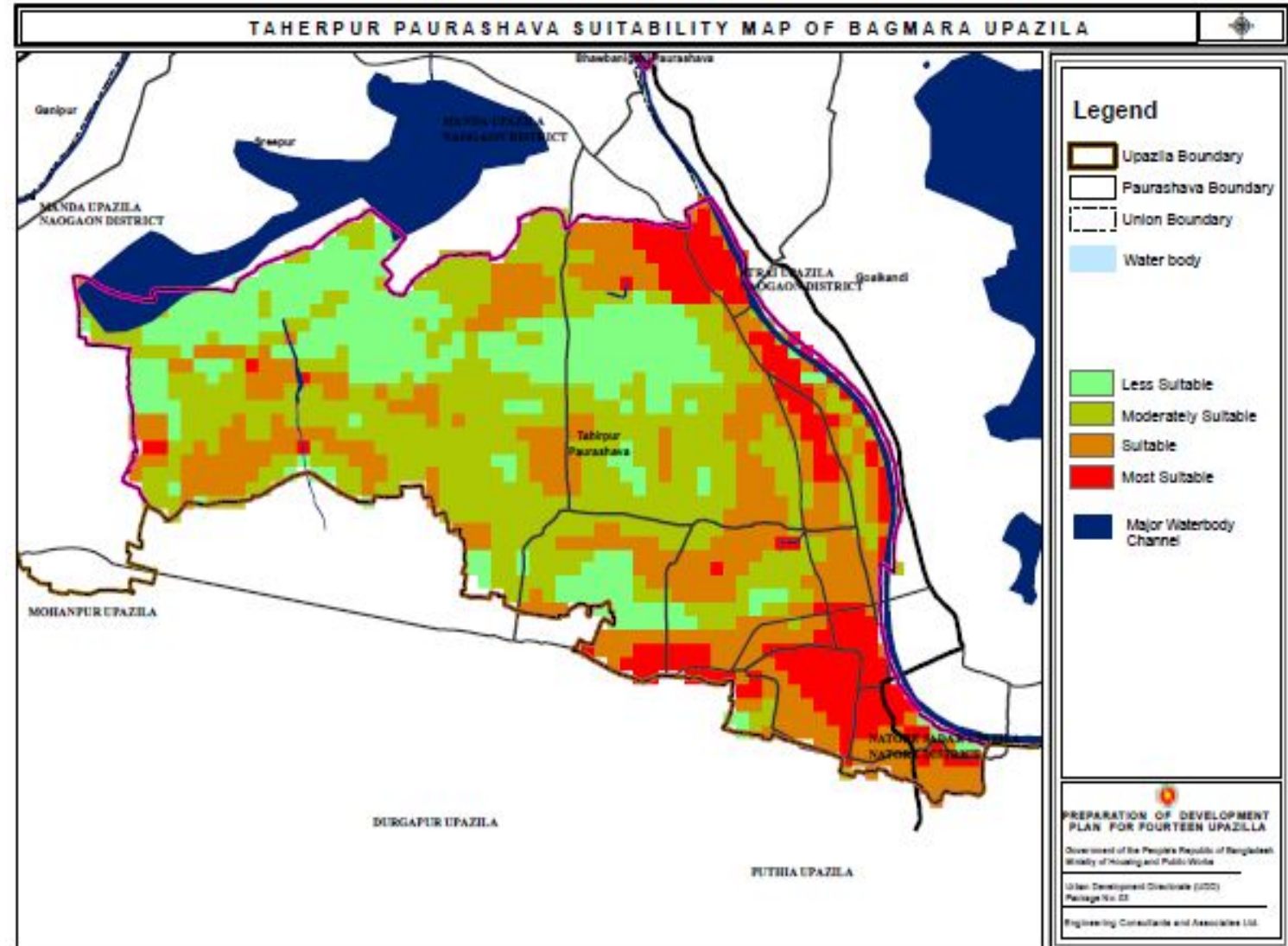
Urban Suitability	
Criteria	Weightage
DEM	20
Major Roads	25
Infrastructure	10
Suitability	
1/Hydrological	20
Suitability	
1/Agricultural	25
Suitability	

Suitability Maps



Urban Suitability Maps

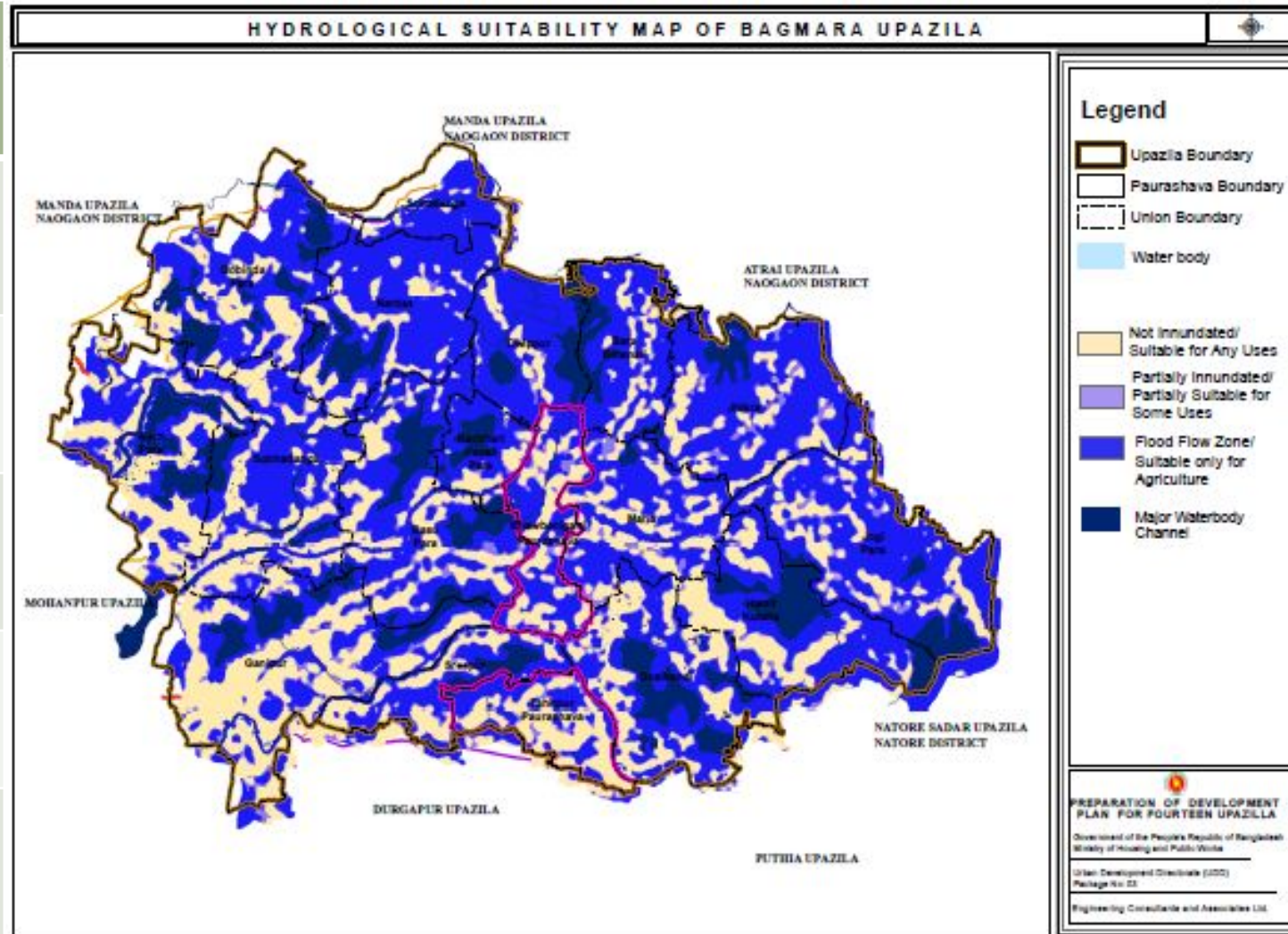
Urban Suitability	
Criteria	Weightage
DEM	20
Major Roads	25
Infrastructure Suitability	10
1/Hydrological Suitability	20
1/ Agricultural Suitability	25



Suitability Maps

Flood Flow Zone Maps

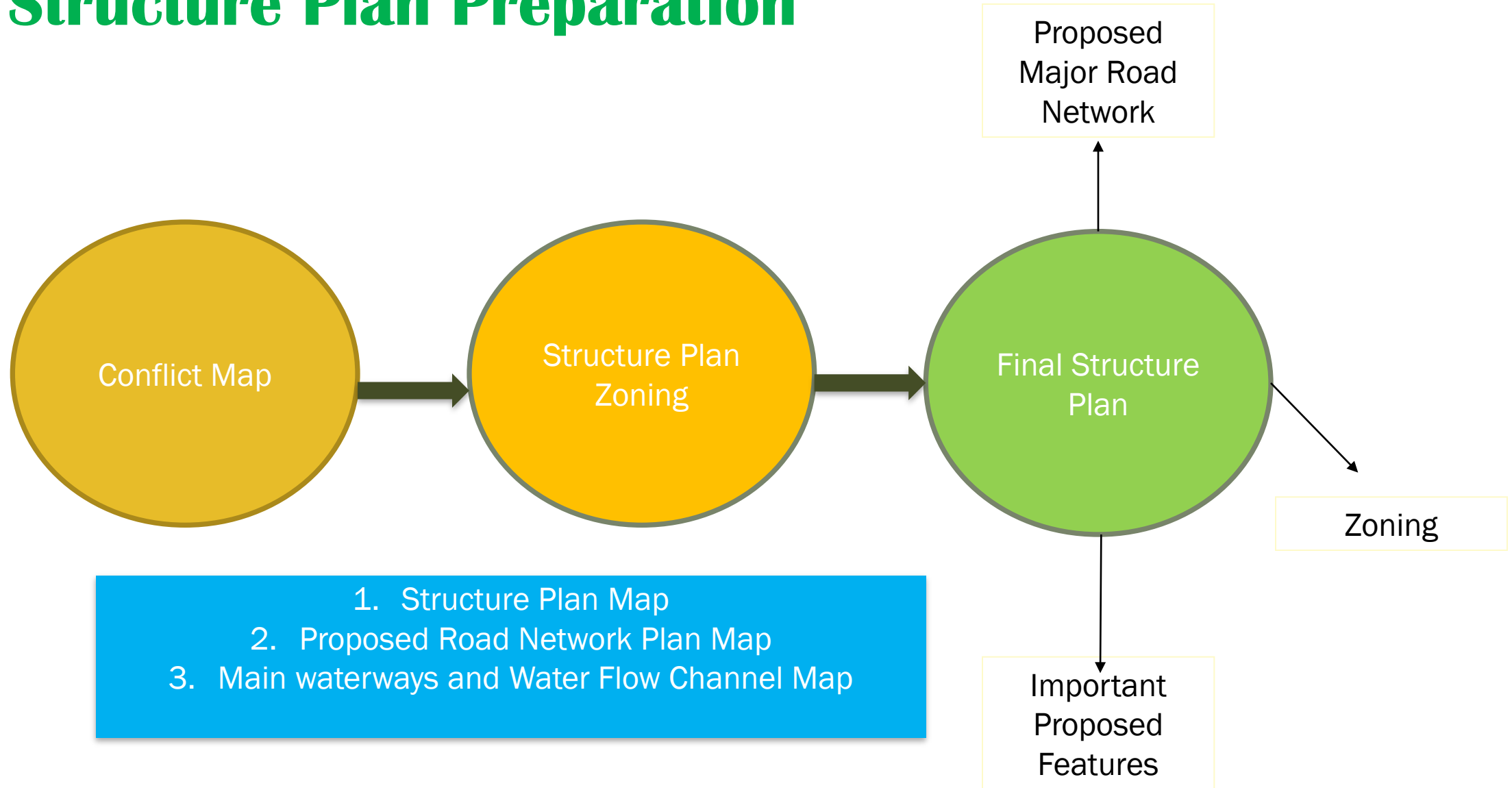
Flooded Land Category	Water Depth	Percentage area	Remarks
1st Degree Flooded area	0-0.3m	28%	Not Inundated Area
2nd Degree Flooded area	0.31-0.9m	9%	Ocationally Sub Flood Flow Area
3rd Degree Flooded area	0.91-1.8m	13%	Sub Flood Flow Area
4th Degree Flooded area	1.81-3.6m	22%	Ocationally Main Flood Flow Area
5th Degree Flooded area	>3.6m	27%	Main Flood Flow Area



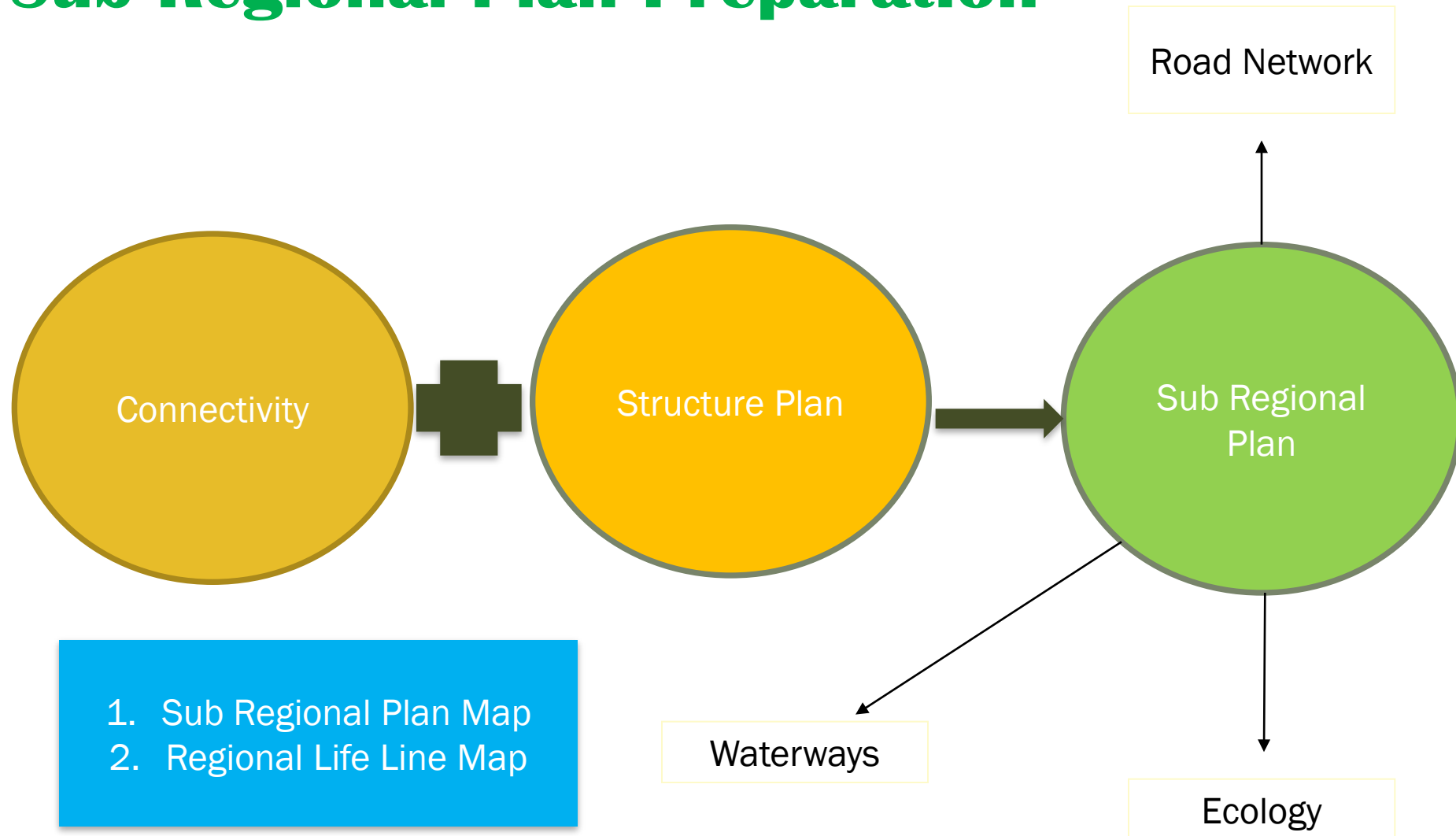
Suitability Maps

Plan Preparation

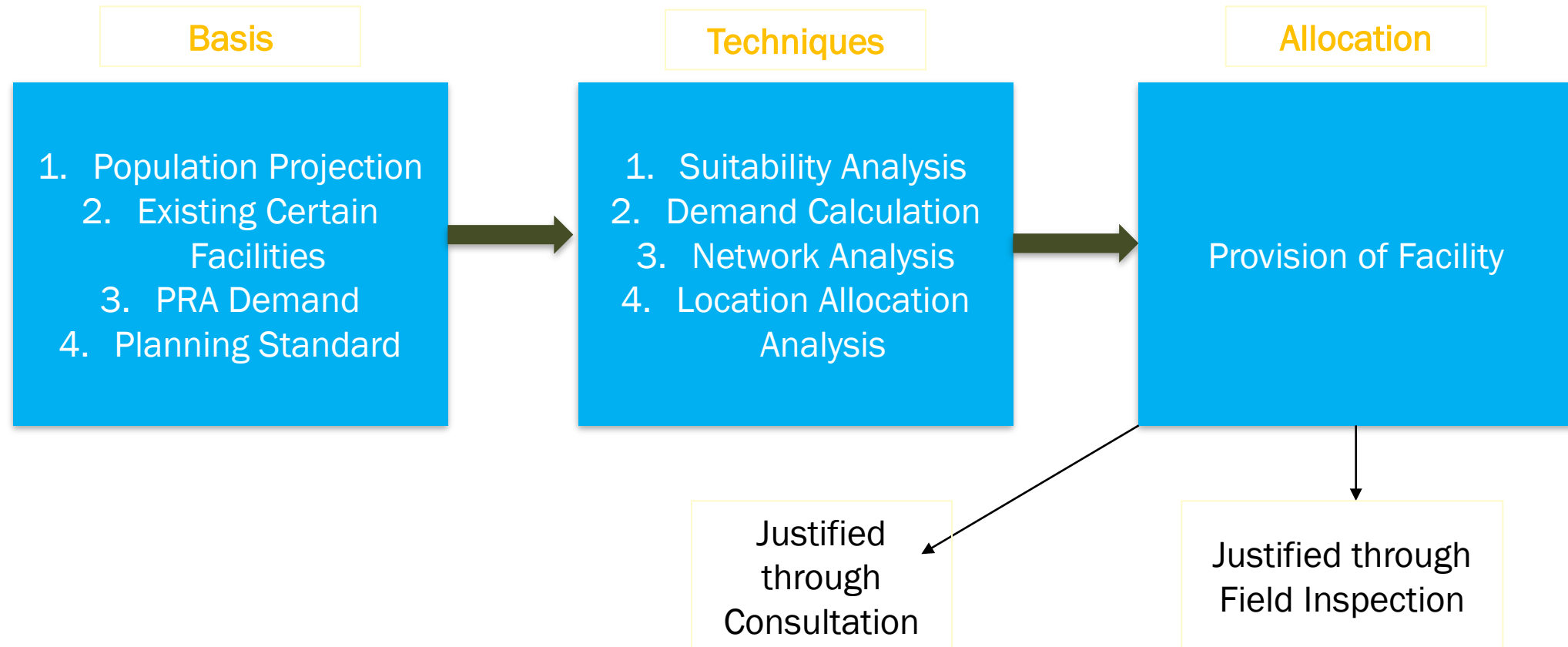
Structure Plan Preparation



Sub Regional Plan Preparation



Urban Area Plan and Rural Area Plan Preparation



Action Area Plan Preparation

- ☐ Prioritized Project from PRA
- ☐ Detailing of an Action Area Plan

Development Plan

SUB REGIONAL PLAN

Components of Sub-regional Plan

- ☐ Connectivity and Transportation Network
- ☐ Biodiversity and Nature Conservation
- ☐ Community Resilience through Disaster Management

Policies for Sub-regional Planning

☐ **Connectivity and Transportation Network**

- Accelerate high standard road links through widening of primary and secondary and construction of new tertiary roads.
- Developing an integrated local, regional and national transportation
- Improving local transport network within the Upazila linking the nearest districts.
- Establishing a Railway Platform Connecting to the Jogi Para Union for better communications.

☐ **Biodiversity and Nature Conservation**

- Conserve natural/environmental resources like hills, reserve forests and water bodies.
- Execute land use planning for the enhancement of ecosystem and species diversity.
- Conserving the play field, open space, park and natural water reservoir.

☐ **Community Resilience through Disaster Management**

- Identification of seismic hazard prone zones.
- Provision and implementation of a risk sensitive land use planning.

SDGs and Proposed Plan of Bagmara Upazila

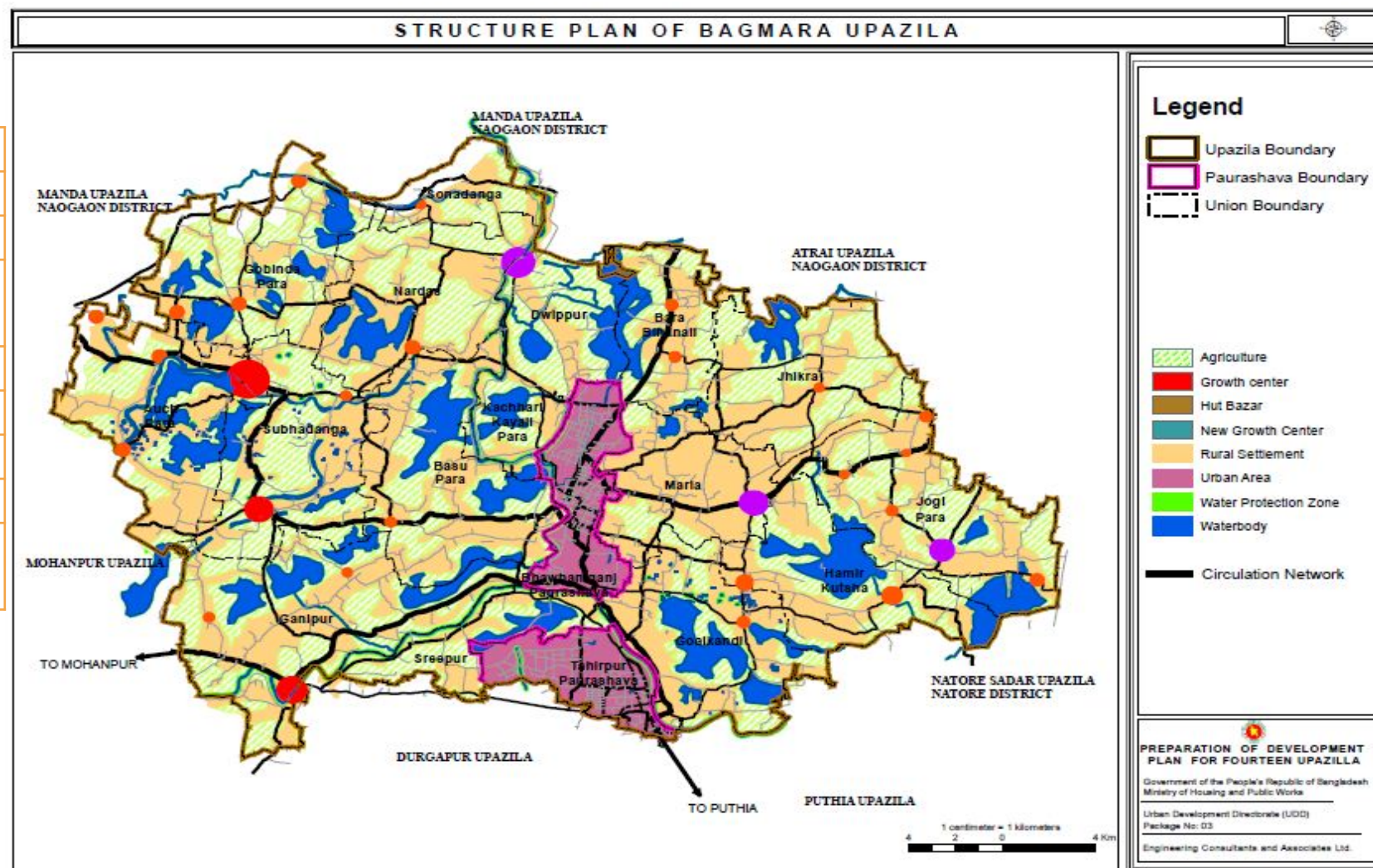
SDGs	Proposed Plan of Bagmara Upazila
SDG-1: Ensure access for all to adequate housing and basic services and upgrade slums	<ul style="list-style-type: none"> • Core Housing Area- for low income people • Planned Housing Area
SDG-2: Provide access to safe affordable accessible and sustainable transport systems for all, improving road safety, notable by expanding public transport .	<ul style="list-style-type: none"> • By pass • Over pass • Grade separations and • Different types of new service roads
SDG-3: Enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	<ul style="list-style-type: none"> • Human settlement land suitability analysis • Hydrological suitability analysis • Geological suitability analysis • Road network analysis
SDG-4: Strengthen efforts to protect and safeguard the worlds cultural and natural heritage	<p>Heritage sites such as</p> <ul style="list-style-type: none"> • Bir Kutsha Jomidar Bari • Goalkandi Rajar Bari
SDG-5: Reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses .	<ul style="list-style-type: none"> • Only some sub flood flow zone has identified after analyzing previous 20 years flood flow data. • Human settlement on sub flood flow zone are discouraged.

<p>SDG-6: Reduce the adverse per capita environmental impact of cities including by paying quality and municipal and other waste management.</p>	<ul style="list-style-type: none"> • One waste transfer station at each union and 4 waste transfer station in paurashava. • One waste Disposal Site in Upazila. • One Night Soil Treatment Plant in Upazila. • A Water Treatment Plant to evade direct mix of industrial waste with water. • Suggestion of different policy and strategy for waste management and pollution control.
<p>SDG-7: Reduce the adverse per capita environment impact of cities including by paying special attention to air quality and municipal and other waste management</p>	<ul style="list-style-type: none"> • In Urban, and peri-urban area brick field is restricted within 3 km. buffer zone from centre of the Paurashava. • Considering this consultant has proposed the brick field area in Gangni paurahsava will be converted into different facilities and for other uses.
<p>SDG-8: Provide universal access to safe inclusive and accessible green and public spaces in particular for women and children, older persons and persons with disabilities .</p>	<ul style="list-style-type: none"> • Urban parks, • Village parks, • Play grounds • Public Place Action Plan Bir Kutsha and Taherpur • 2 new park and • A stadium
<p>SDG-9: Support positive economic , social and environment links between urban, peri-urban and rural areas by strengthening national and regional development planning</p>	<ul style="list-style-type: none"> • Shopping complex, • Pauro market, • Residential zone , • Recreational park, • Government college, • Mosjid complex, • Hospital, • Bus terminal and • Central park etc.
<p>SDG-10: Support least developed countries including through financial and technical assistance in building sustainable and resilient buildings utilizing local material.</p>	<ul style="list-style-type: none"> • Risk Assessment survey • Collection of 8 type's structural data such as Overhanging, Soft Story, Pounding, Set Back, Short Column, Mobile Tower, tilting and Ground Set.

STRUCTURE PLAN

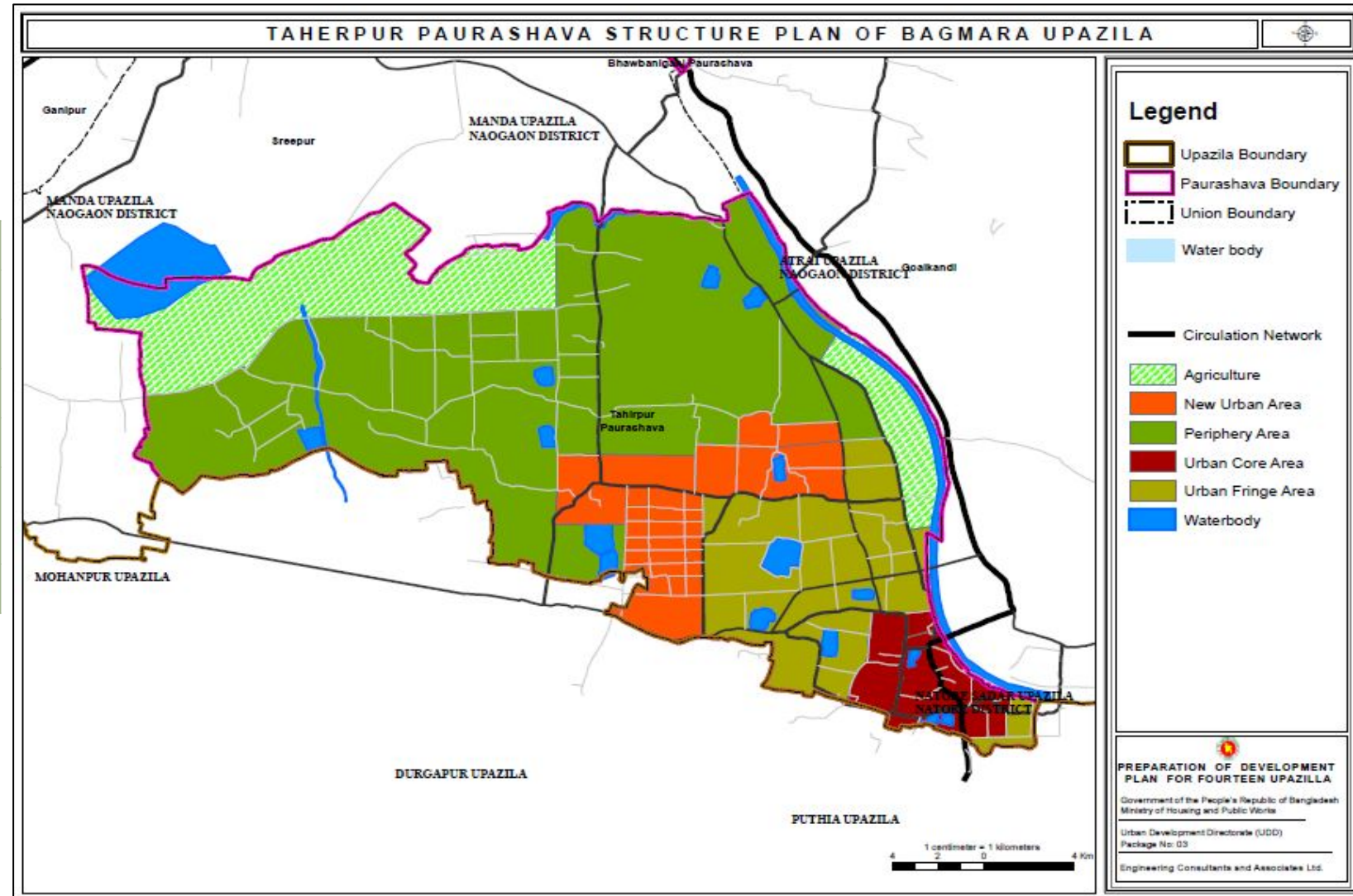
Structure Plan of Bagmara Upazila

Type	Area(Acre)
Growth center	458.407315
Hut Bazar	554.369952
New Growth Center	355.444428
Rural Settlement	38425.70047
Agriculture	31059.09998
Urban Area	5536.848893
Waterbody	11023.7377
Water Protection Zone	2272.860141



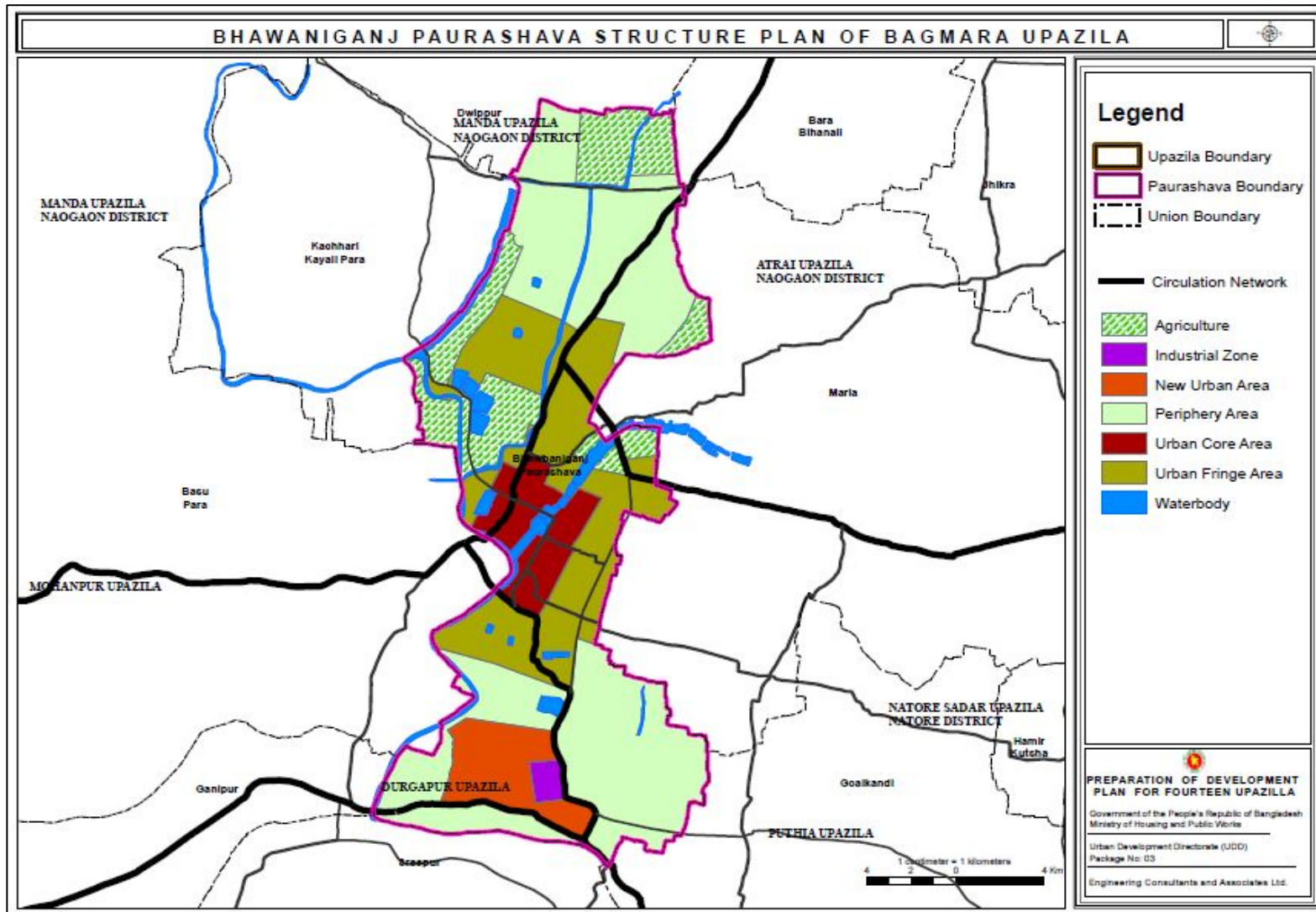
Urban Structure Plan of Bagmara Upazila: Taherpur Paurashava

Type	Area
Periphery Area	1367.26546
Urban Core Area	137.085676
New Urban Area	302.739842
Agriculture	503.300351
Urban Fringe Area	422.878452
Waterbody	199.605746



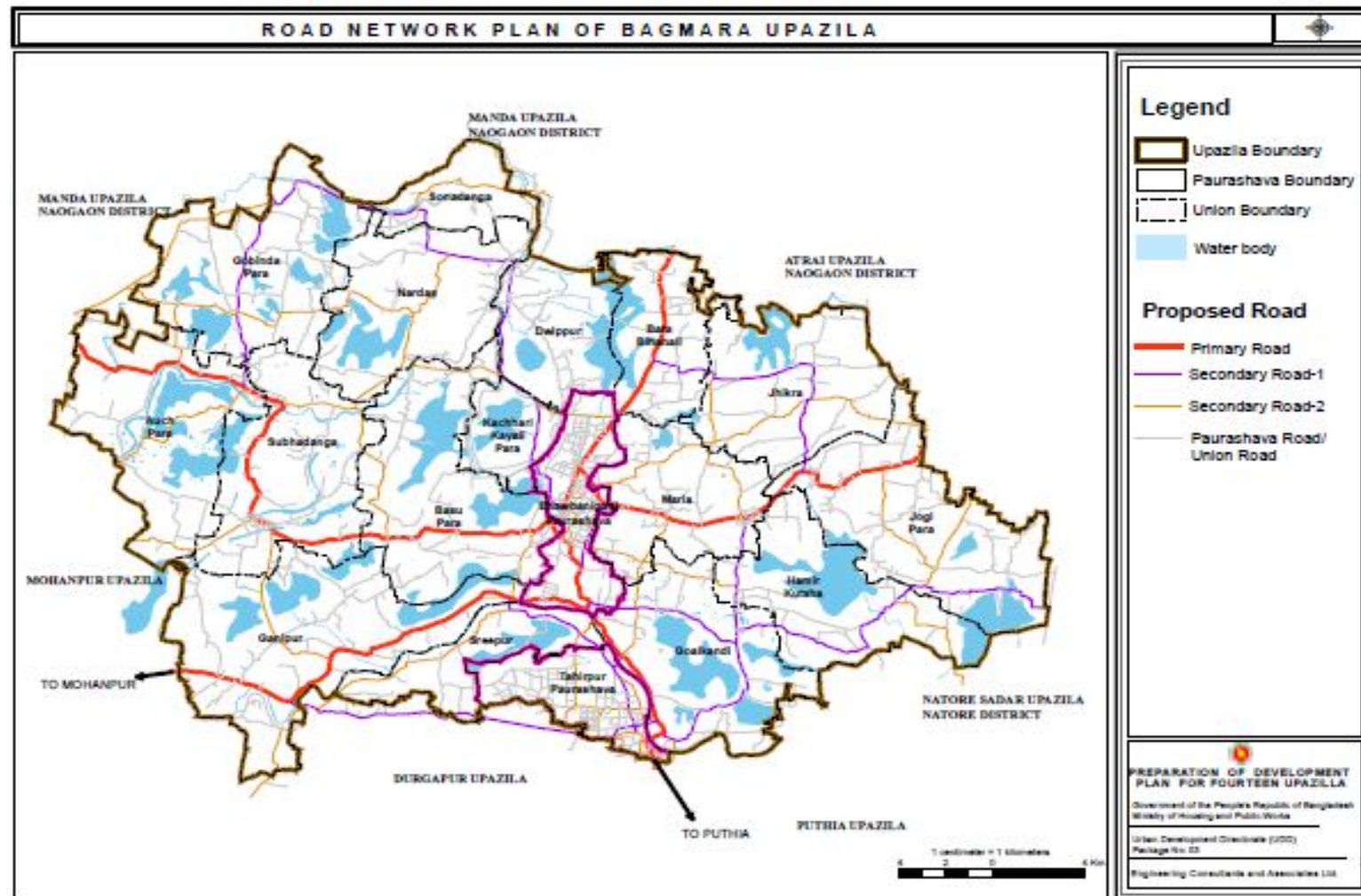
Urban Structure Plan of Bagmara Upazila: Bwabaniganj Paurashava

Type	Area
Periphery Area	1353.114
Agriculture	447.847
Urban Core Area	209.6371
Urban Fringe Area	720.7871
Industrial Zone	27.87249
New Urban Area	198.3439
Waterbody	259.6626



Proposed Road Network Plan of Bagmara Upazila

Proposed Road Type	Road Length(Km)
Primary Road	67.44
Secondary Road-1	128.8
Secondary Road-2	81.18
Pouro/Union Road	530.77
Total	808.19

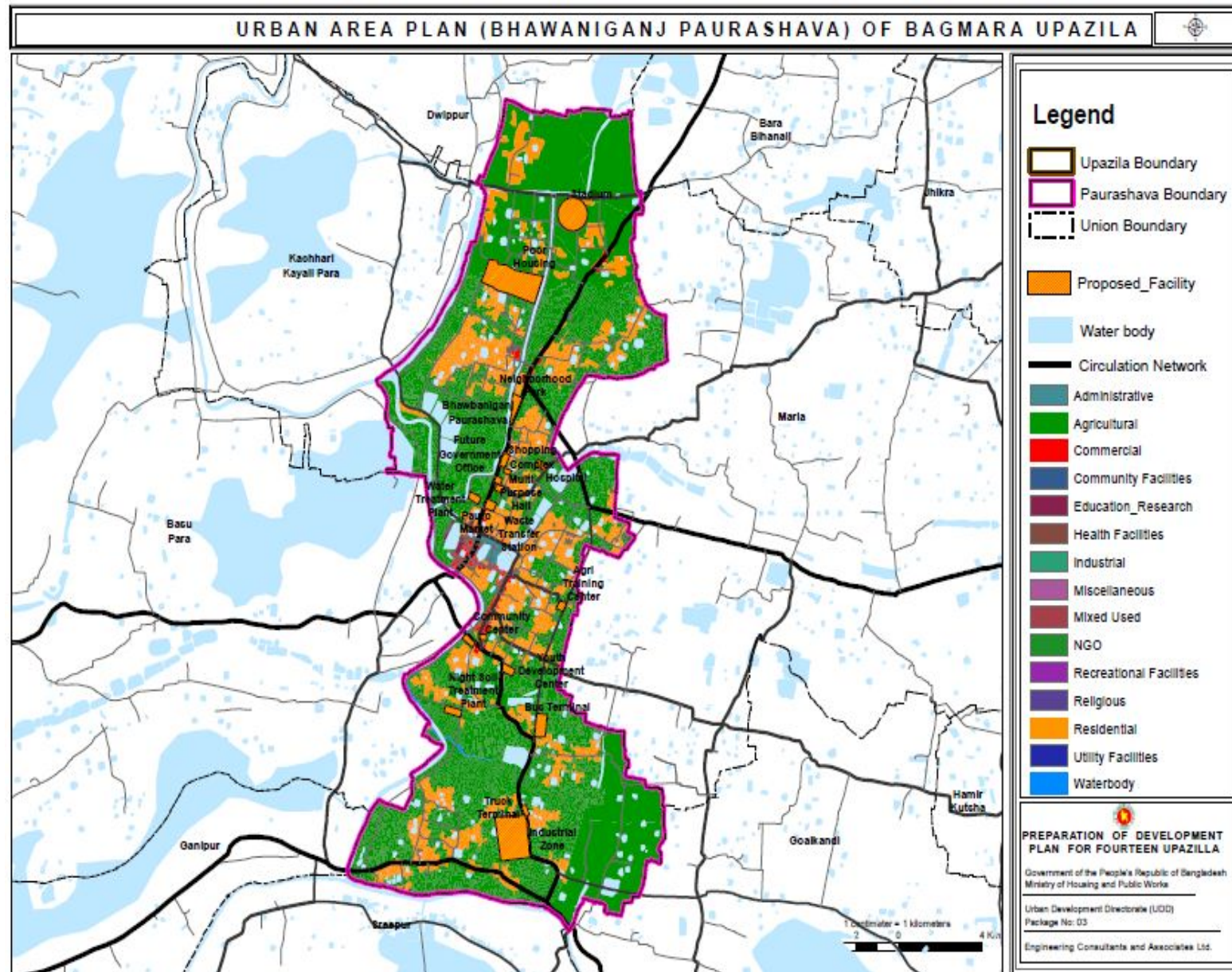


URBAN AREA PLAN

Proposed Urban Area Plan of Bwabanigonj Pourashava

The proposed facilities are:

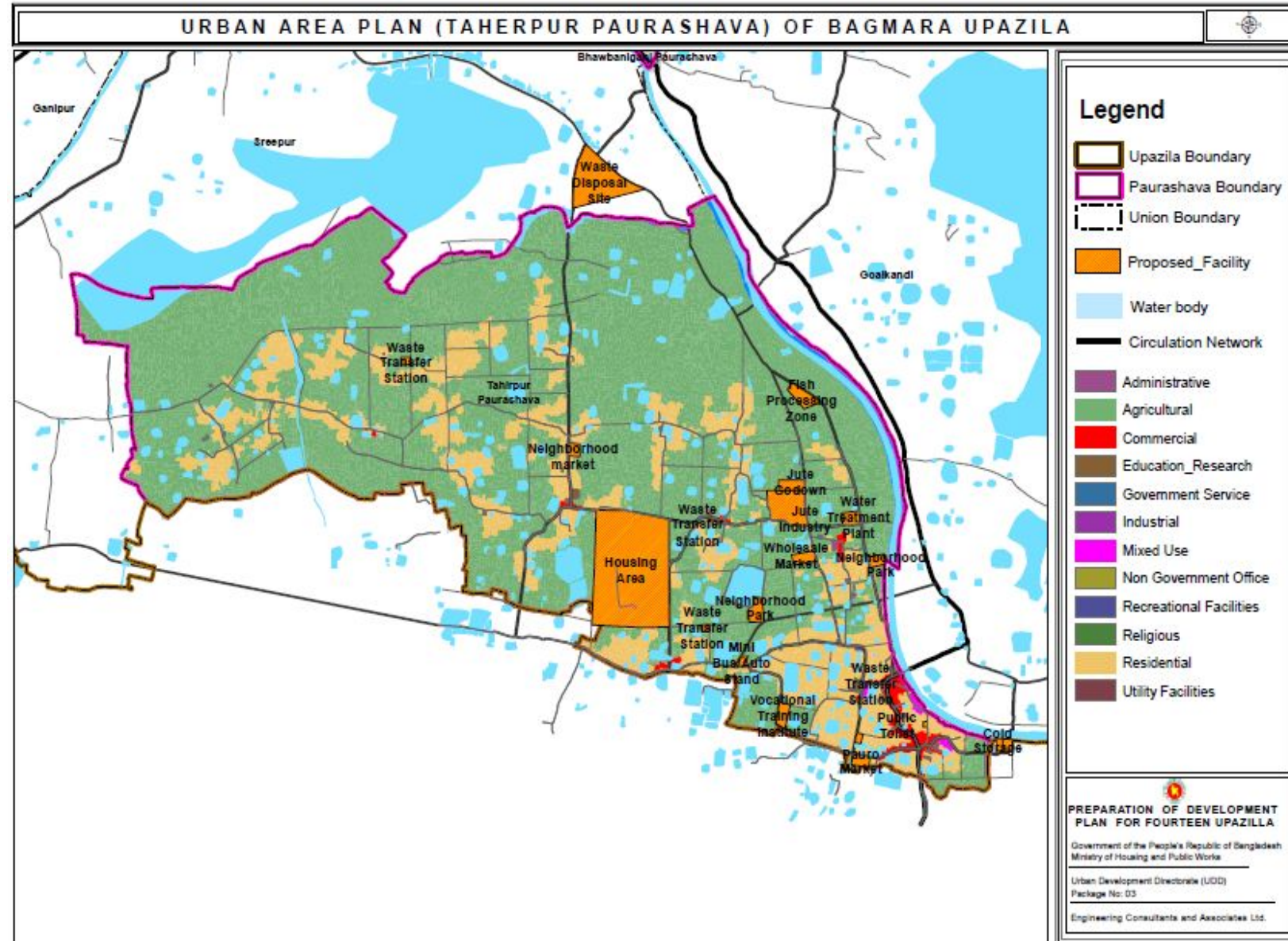
- ✓ Stadium
- ✓ Poor Housing
- ✓ Neighborhood Park
- ✓ Shopping Complex
- ✓ Hospital
- ✓ Multi-Purpose Hall
- ✓ Future Government Office
- ✓ Water Treatment Plant
- ✓ Pouro Market
- ✓ Waste Transfer Station
- ✓ Agri Training Center
- ✓ Community Center
- ✓ Youth Development Center
- ✓ Bus Terminal
- ✓ Night Soil Treatment Plant
- ✓ Industrial Zone
- ✓ Truck Terminal etc.



Proposed Urban Area Plan of Taherpur Pourashava

The proposed facilities are:

- ✓ Waste Disposal Site
- ✓ Waste Transfer Station
- ✓ Neighborhood Market
- ✓ Fish Processing Zone
- ✓ Housing Area
- ✓ Water Treatment Plant
- ✓ Jute Godown
- ✓ Jute Industry
- ✓ Wholesale Market
- ✓ Neighborhood Park
- ✓ Mini Bus Auto Stand
- ✓ Public toilet
- ✓ Vocational Training Institute
- ✓ Cold Storage
- ✓ Pouro Market

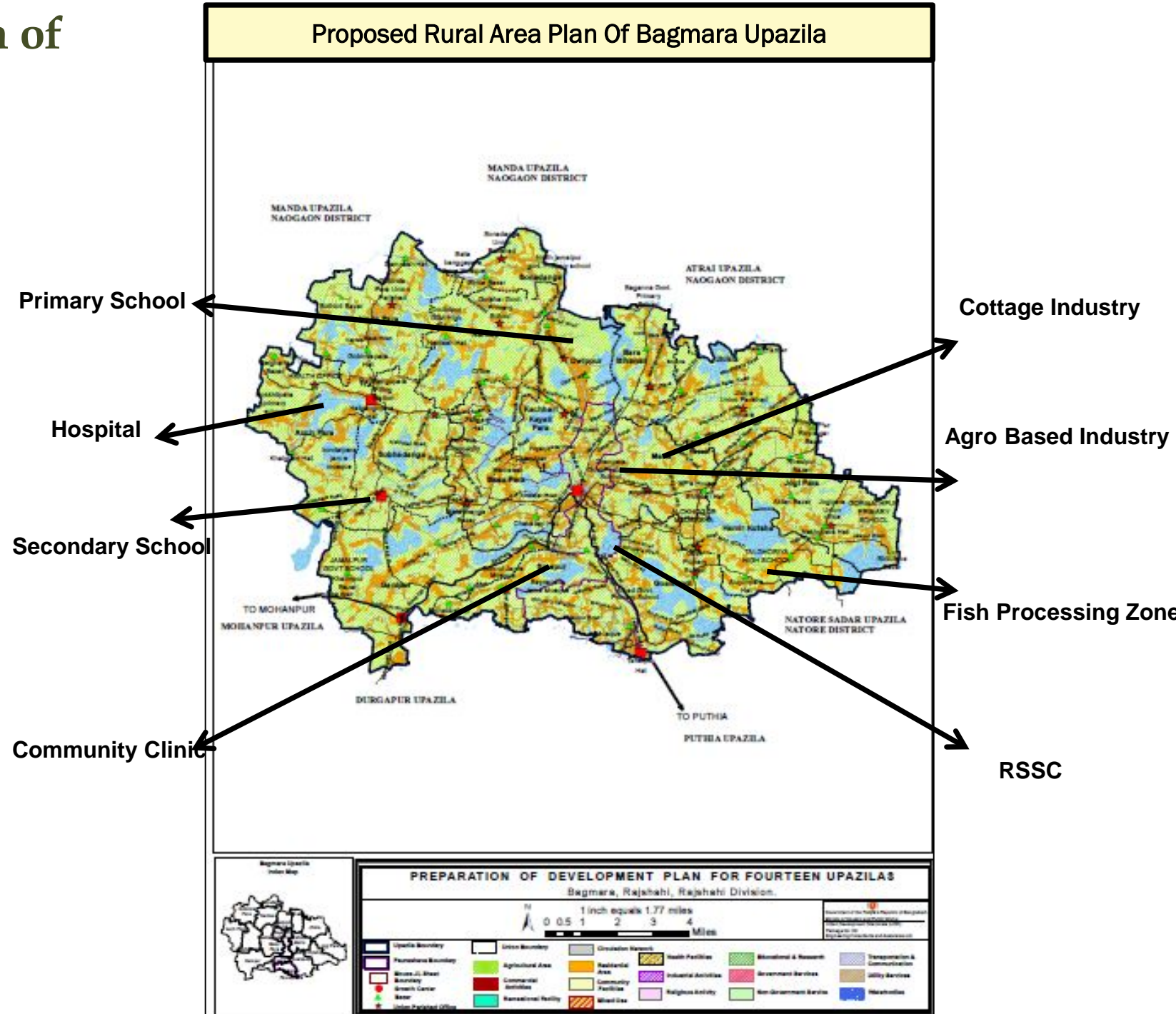


Rural Area Plan

Proposed Rural Area Plan of Bagmara Upazila

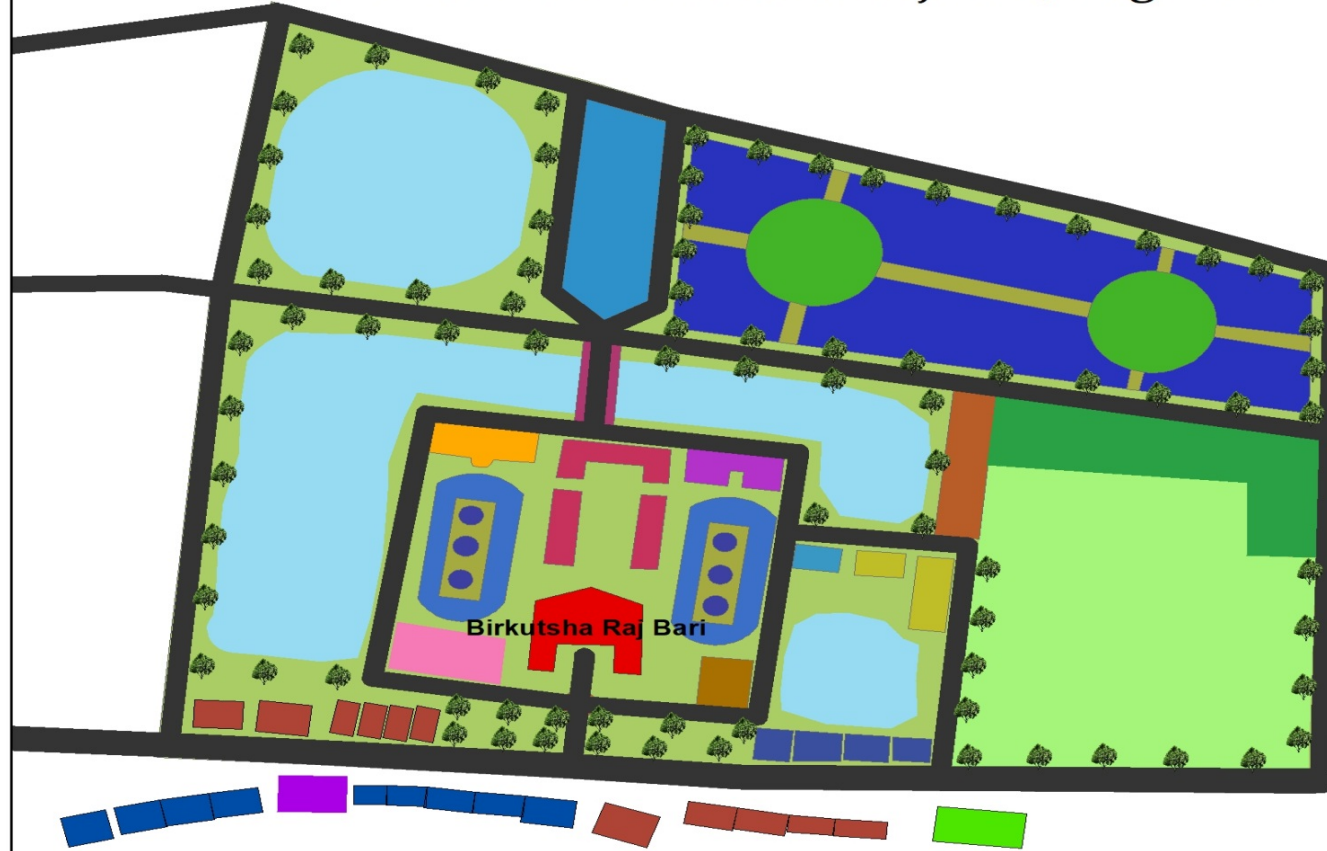
The proposed facilities are:

- ✓ RSSC (Rural Sales And Service Center)
- ✓ Agro Based Industry- Maria
- ✓ Cottage Industry- Maria
- ✓ Cold Storage- Ganipur, Dwippur
- ✓ Fish Processing Zone- Goalkandi
- ✓ Neighborhood Park - Auch Para, Subhadanga, Sreepur
- ✓ Primary School- Ganipur, Bara Bihanali
- ✓ Secondary School- Ganipur
- ✓ College- Hamir Kutsha, Dwippur, GoalKandi
- ✓ Mini Bus/ Auto Stand
- ✓ Health Center- Basu Para, Gobinda Para, Ganipur, Hamir Kutsha, Jhikra, Nardas, Sonadanga, Subhadanga, Bara Bihanali, Dwippur
- ✓ Waste Transfer Station- Every Union



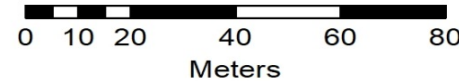
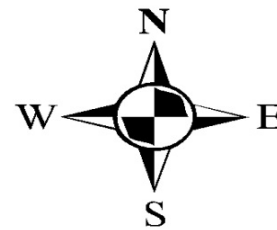
Action Area Plan

Action Plan for Bir Kutsha Raj Bari, Bagmara

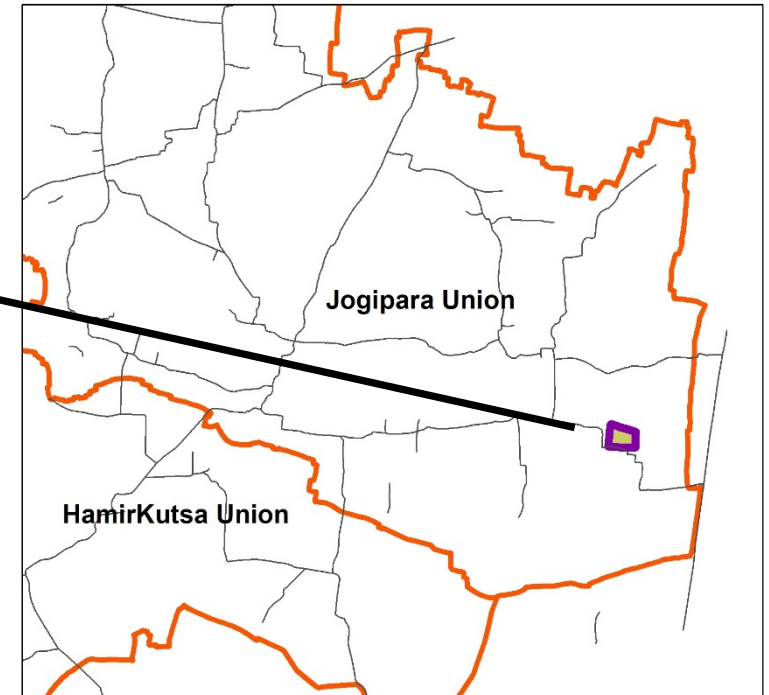


Legend

- | | |
|-----------------|--------------------|
| Trees | Parks |
| Road | Bridge |
| Bank | Car Parking |
| High school | Graveyard |
| Land Office | Museum |
| Post Office | Play Field |
| Proposed Market | Roundabout |
| Raj bari Palace | Temple |
| Primary school | Birkutsha Raj Bari |
| Waterbody | Shop |
| House | |

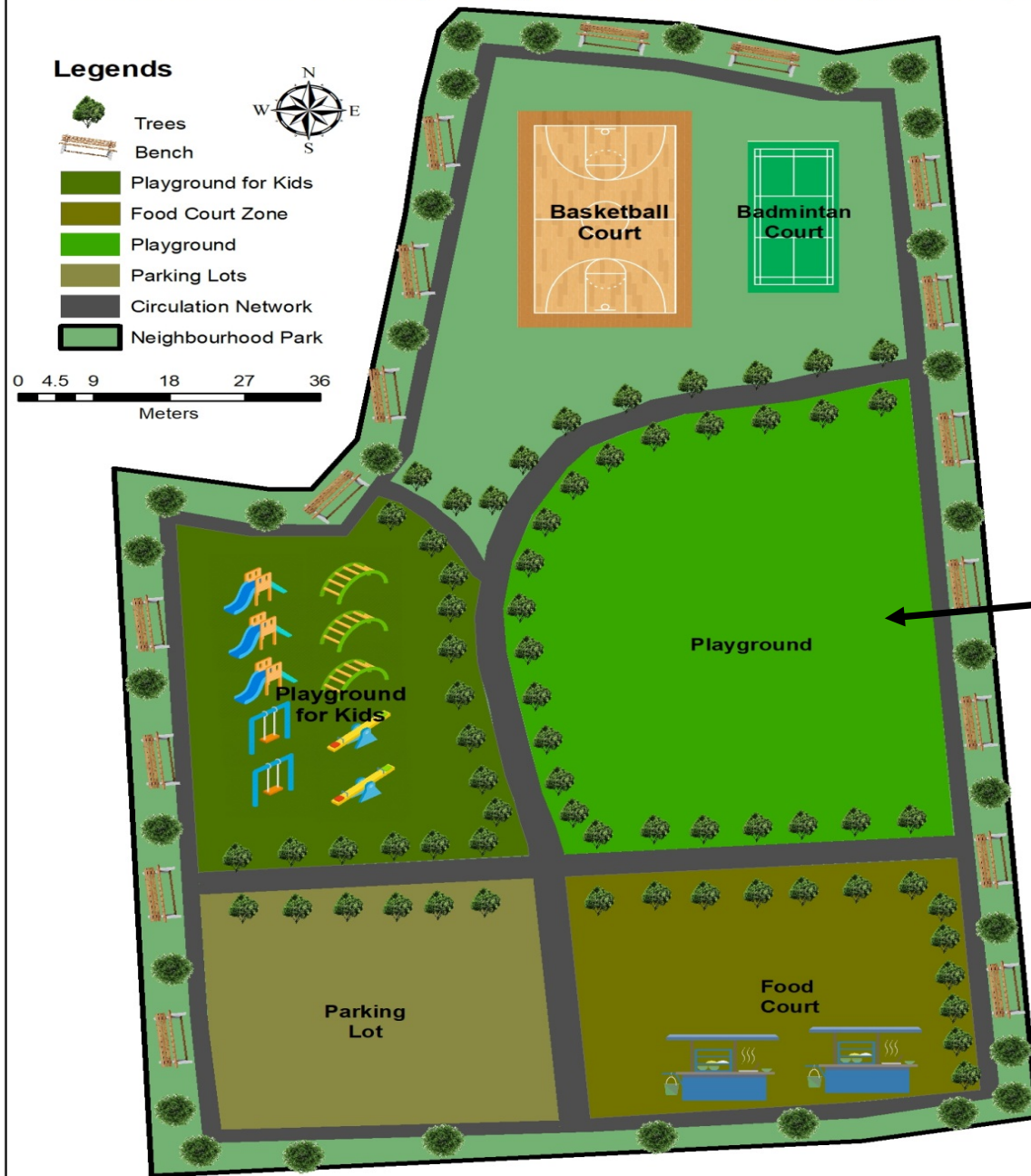


Action Area Plan for Bir Kutsha Raj Bari, Bagmara

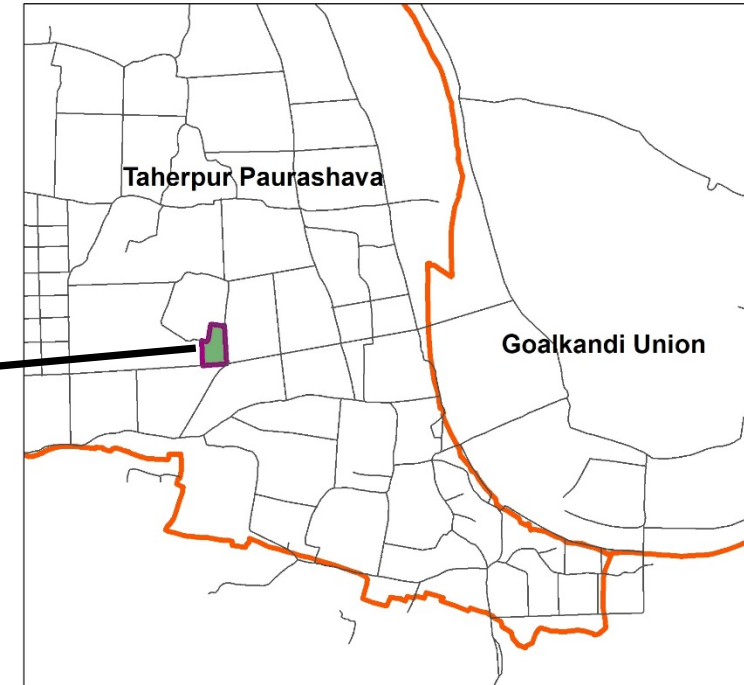


Area Of Proposed Action Area
Plan is 8.5 Acres

Action Area Plan (Neighbourhood Park, Taherpur)



Action Area Plan of Neighborhood Park, Taherpur



Area Of Proposed Action Area
Plan is 3.14 Acres

Thank You for Your Kind Attention