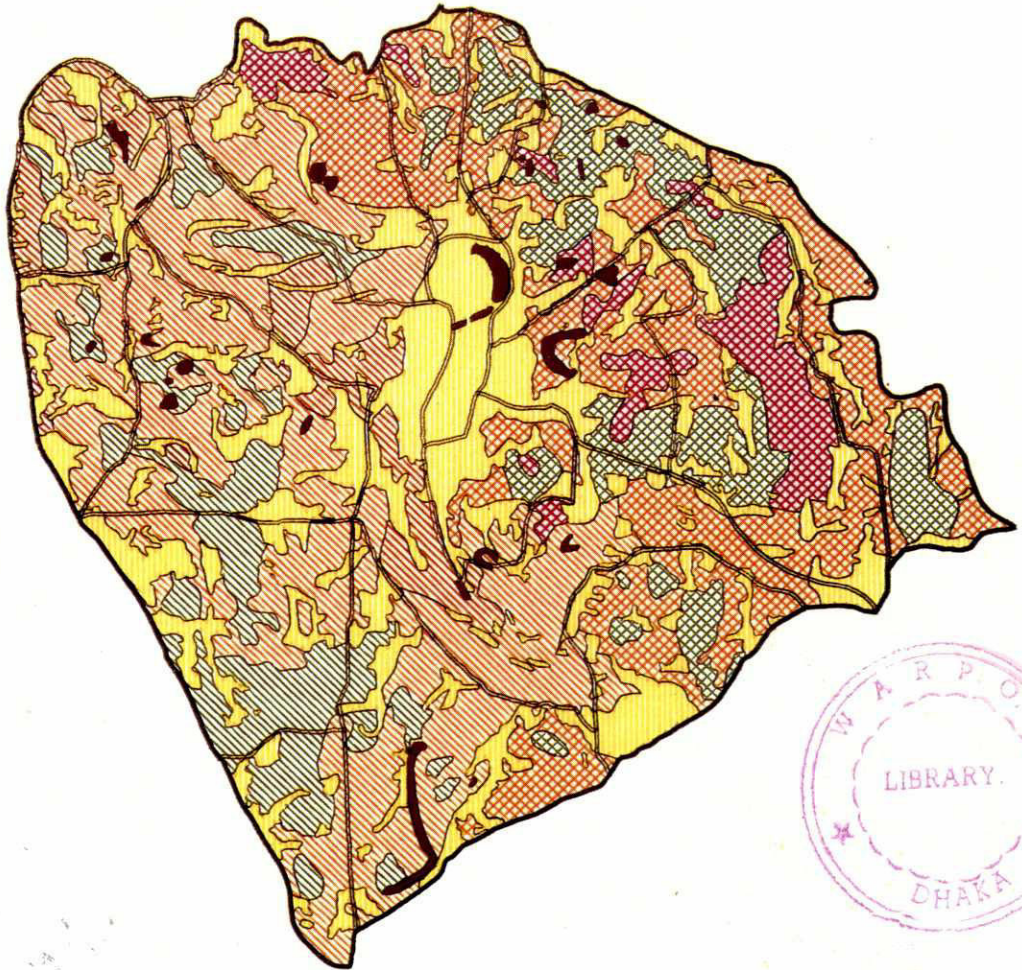


# GIS ATLAS FOR TANGAIL AREA STUDY

16

DRAFT



FAP 19 - GEOGRAPHIC INFORMATION SYSTEM



IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST

Sponsored by the U.S. Agency for International Development

November 1992

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**DRAFT**

FAP-19

Tangail

27



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4. <b>Water Bodies</b>	Perennial and seasonal water bodies
5. <b>Population Density</b>	Distribution of population densities
6. <b>Tubewells</b>	Tubewells and low-lift pumps (LLP)
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5. <b>Population Density</b>	Population density and total estimated population for each of the study units.
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7. <b>Land Types</b>	Inundation classes and area by study units.
8a. <b>Rabi Crops</b>	Major cropped area in Rabi season by study units.
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8c. <b>Kharif-II Crops</b>	Major cropped area in Kharif-II season by study units.
9. <b>Soils</b>	Soil class descriptions and areas by study units.
10. <b>Terrestrial Habitat</b>	Ecological zone (habitats) and area.
11. <b>Land Type (Rainfall Only)</b>	Inundation classes and area by study units for water levels for 1 in 5 year rainfall only.

## INTRODUCTION

This GIS Atlas is a collection of maps and statistics for the Tangail Compartmentalization Pilot Project (CPP) area, compiled in support of the FAP 16 EIA study and in collaboration with FAP 20 Compartmentalization Pilot Project.

The series of thematic maps and corresponding tabular statistics contained in the atlas have been produced as a guide to the information held within the Tangail CPP GIS and to illustrate the analyses performed. The atlas serves several purposes; it:

- presents information available to the users, specifically the FAP 16 EIA team and FAP 20, as of November 1992;
- serves as an index to spatial data within the GIS;
- assists in planning GIS analyses;
- provides a format for producing GIS atlases for other projects;
- assists in disseminating results.

The maps in this atlas were produced using pcARC/INFO GIS software. The accompanying tabulations were calculated using ERDAS GIS software with files transferred from pcARC/INFO. The area of roads and similar features has not been considered in any analysis because these features cannot accurately be mapped at the 1:50,000 base scale used. Thus, the figures for cultivable land within the compartment include a proportion of land that is actually covered by roads, embankments, etc.

The GIS Atlas is organized so that each map is on a separate page and the facing page contains the corresponding statistics for the map.

### 1. Source of Data, Processing and Quality of Information

All spatial data for this atlas was traced onto a stable film base at a scale of 1:50,000. Tracing was usually done by FAP 16 or FAP 20 specialists from their field interpretation, utilizing aerial photos or satellite imagery. The mauza information was collated and traced by FAP 19 from the Small Area Atlas (SAA) of the Bangladesh Bureau of Statistics (BBS). Digitizing was accurate to approximately 30-40 meters for most coverages. Atlas users should consider this precision when interpreting the maps and statistics. It should be noted that maps used in creating this atlas are from a variety of sources and are of varying quality and accuracy.

Mauza boundaries were digitized from the BBS SAA at a nominal scale of 1:150,000. Digitizing precision was approximately 100 m, with a typical error of no more than 5 percent in the mauza area. However, the BBS is not a map-production agency, and drawing errors on source maps were found to far exceed any digitizing error. The final mapping produced is a synthesis of the best approximation of the mauza boundaries given the available data.

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Mapping of cultivated lands within the CPP was undertaken by a FAP 16 land-use survey team. The survey included the collection of detailed information on acreage of cropped lands, crop types, and fallow lands. For the purpose of generalization of the cropping information, seasonal mapping, with minimum categorization of cropping characteristics, was prepared. These cropping categories are broad groupings by percentage of area under crops and dominance of a particular crop or absence of a dominant crop. In most cases, the units include several crops but often at least 50 percent of the total cropped area of a land unit is covered by a single crop, and this is considered dominant.

## 2. Flood Depth Mapping

A mathematical model was used by the CPP/FAP 20 to calculate flood water levels under various scenarios, to assist in estimation of project effects. The model was based on MIKE 11 software calibrated for the Tangail area. Output from the model includes water elevations at river cross sections. For each cross section, a flood cell has been assigned to represent the area that would be inundated up to the output water level. From this water level information, a water surface can be calculated for a given scenario over the extent of the compartment. Bangladesh Water Development Board (BWDB) four-inch-to-one-mile mapping was used to obtain elevation data for creating a digital elevation model (DEM) of the land surface. The water surface and the land surface were intersected to produce a digital map of flood depth and extent for the scenarios of interest to FAP 20 and FAP 16. Model runs were available for 1989, 1990, and 1991 for May to November. Water levels were also provided for a one in five year return period. The choice of water level makes a significant difference to calculation of project impact. At the time of publication, the sub-compartment water levels best representing the "with project" situation had not been finalized. Thus, all land type (flood depth) maps and impact mapping in this atlas are illustrative of potential effects rather than final estimates. It should also be understood that the land type maps are only representative of the particular situation and that they are based on estimates that have a significant margin of error.

The error in flood depth mapping can be attributed to the following sources:

- The MIKE 11 computed water levels may be incorrect owing to inadequate calibration of both the regional model, which supplies the boundary conditions, and the calibration of the model for the compartment. This error is believed to be about  $\pm 20$  cm.
- The mapping used to create the DEM is based on surveys in the early 1960's and is thus out of date.
- The procedure used to generate the DEM from the mapping may also be error-prone.
- The assumption of level pools within flood cells is incorrect.

It is important to recognise the sensitivity of flood depth mapping to the errors described above. The table below illustrates the possible effect of error on the area estimates of different flood depths for sub-compartment 2.

Table: Effect of 30 cm error on flood-depth map results of sub-compartment 2.

Land Type	Area inundated in ha			
	Water Level 1 in 5 year flood	Water Level 1 in 5 year + assumed 30 cm error	Water Level 1 in 5 year - assumed 30 cm error	Range assuming +(-) 30cm error
F0	70	48	115	67
F1	175	67	281	213
F2	731	478	816	338
F3	304	687	68	620

### 3. Quality Control Procedure

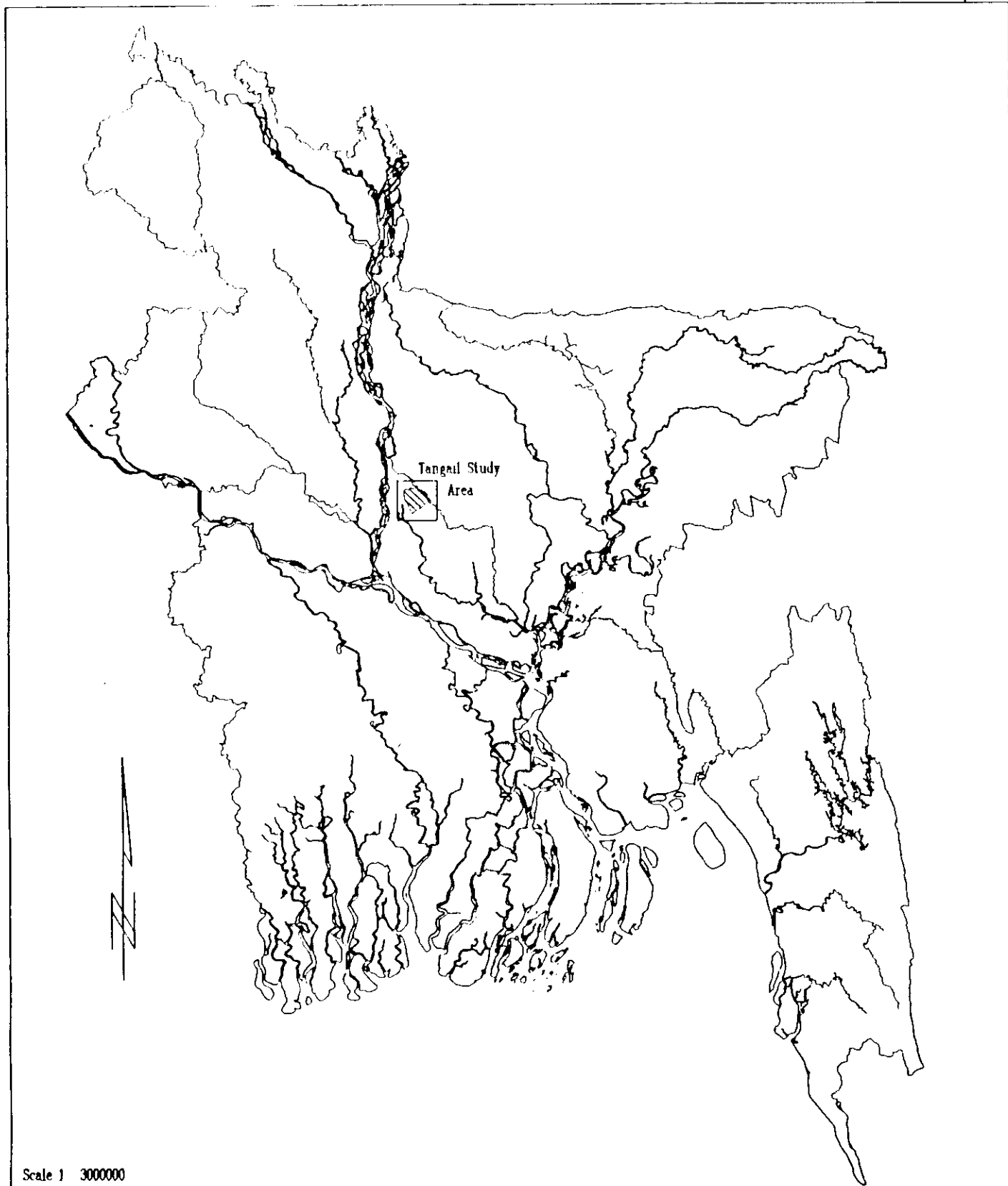
After each film overlay was digitized, a plot was prepared at 1:50,000 for comparison. After internal checks, the plots were passed to FAP 16 or FAP 20 for final corrections. In practice, the digital coverages had to be checked and changed several times. The adopted procedure for quality control of the Tangail EIA GIS database was as follows:

- Step 1 Internal checks by FAP 19
- Step 2 Check of draft plot by users
- Step 3 Corrections by FAP 19
- Step 4 Final check by users
- Step 5 Correction by FAP 19

In some cases, corrections identified during Step 4 were not previously identified. This inevitably resulted in delays and should be avoided in future. However, any errors detected in this **Draft Atlas** will be corrected during the production of the final version. Comments on information quality, cartographic presentation, and other matters are most welcome.

## MAPS AND TABLES

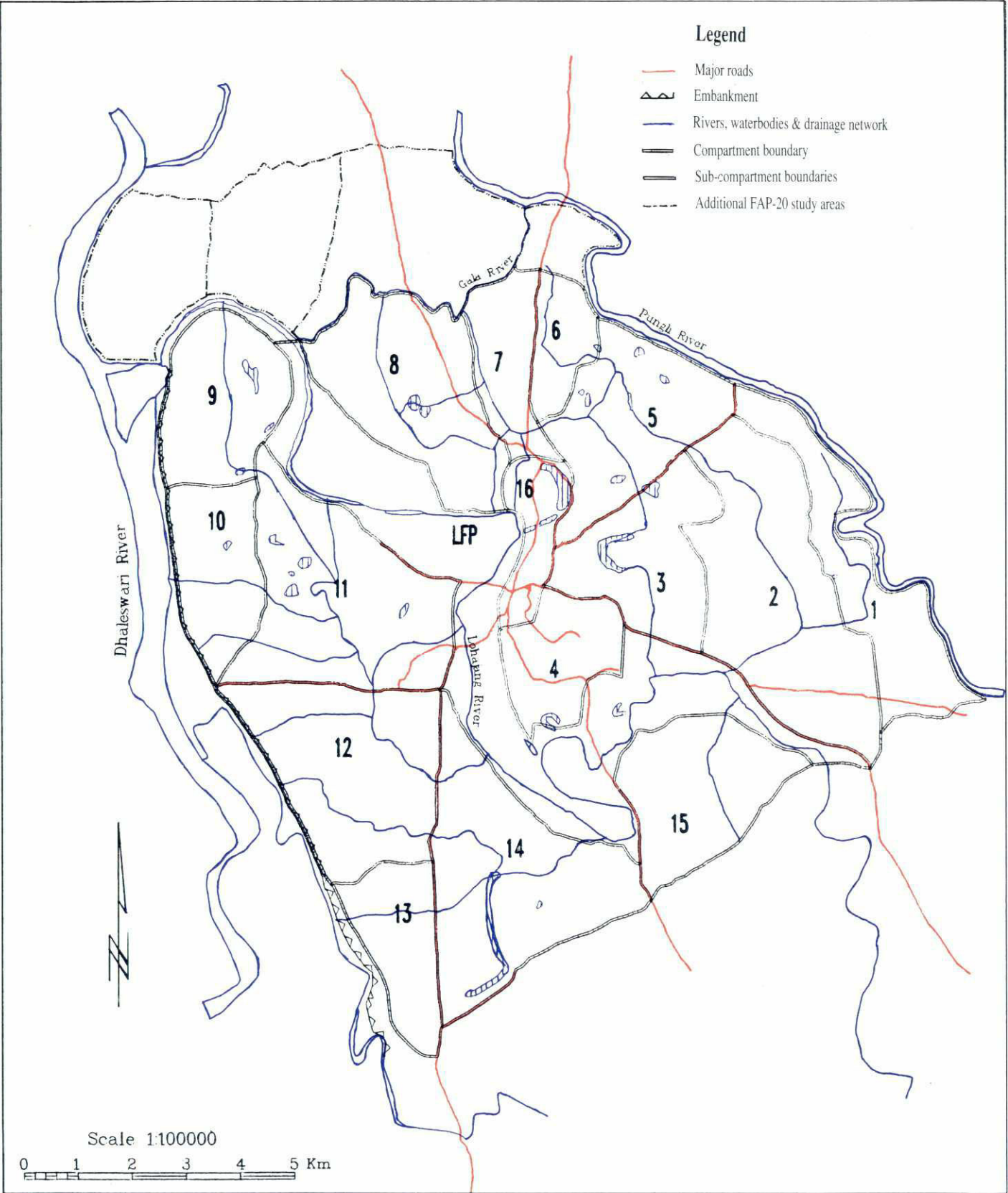




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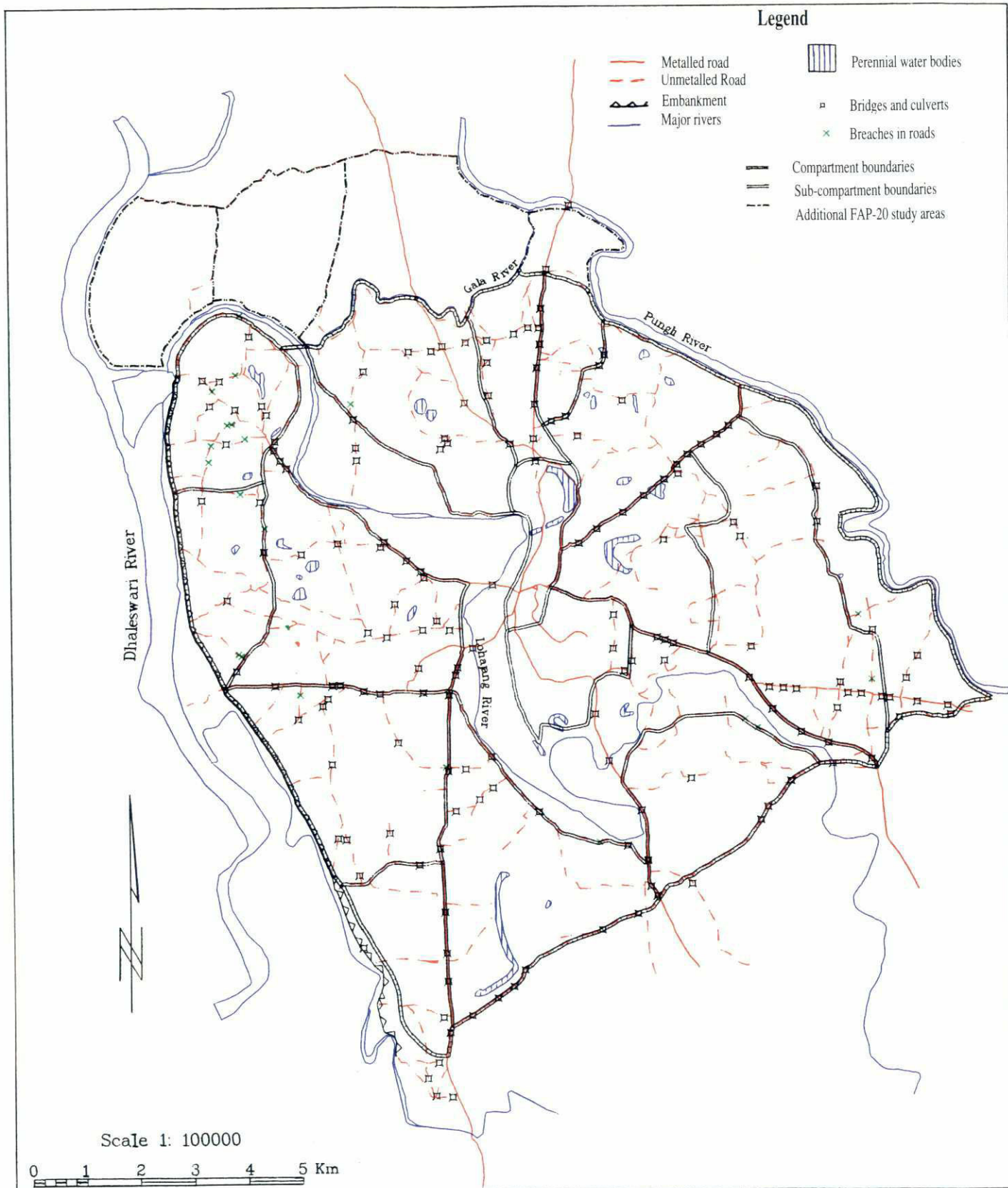
**JISPA**

Location of Tangail Study Area



**Table 2. Study units.**

<b>Unit</b>	<b>Area (Ha)</b>	<b>Percentage of Total</b>
Sub-compartment 1	688	5.3
Sub-compartment 2	1,280	9.8
Sub-compartment 3	630	4.8
Sub-compartment 4	418	3.2
Sub-compartment 5	753	5.8
Sub-compartment 6	241	1.9
Sub-compartment 7	359	2.8
Sub-compartment 8	904	7.0
Sub-compartment 9	606	4.7
Sub-compartment 10	487	3.7
Sub-compartment 11	1,125	8.7
Sub-compartment 12	1,021	7.9
Sub-compartment 13	425	3.3
Sub-compartment 14	1,143	8.8
Sub-compartment 15	690	5.3
Sub-compartment 16	260	2.0
Louhajong Flood Plain (LFP)	1,969	15.1
<b>Total CPP Area</b>	<b>12,999</b>	<b>100</b>



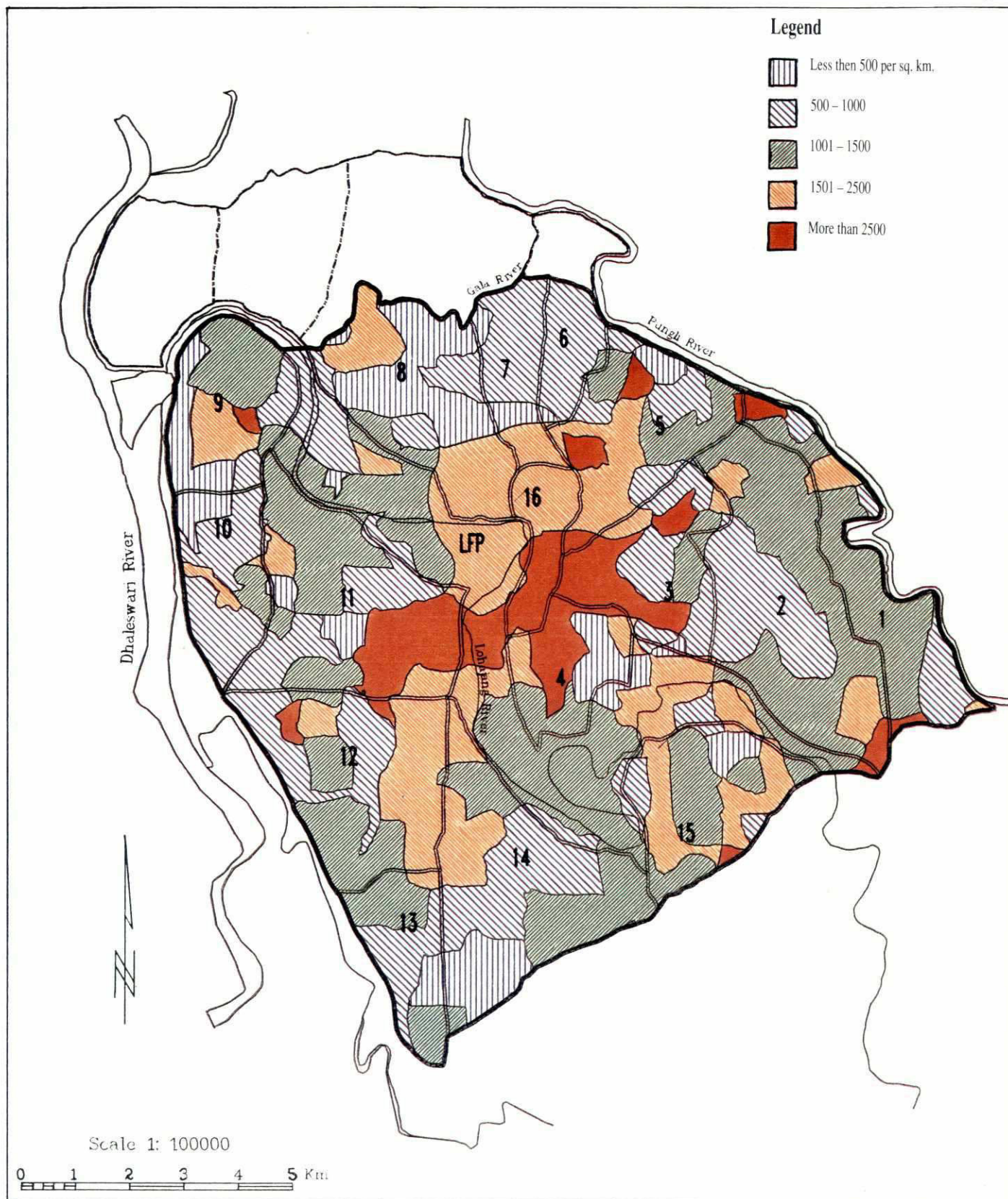






**Table 4. Seasonal and perennial waterbodies by study unit.**

Unit	Water area (ha) (Seasonal)	Water Area (ha) (Perennial)
Sub-compartment 1	1	1
Sub-compartment 2	28	0
Sub-compartment 3	34	22
Sub-compartment 4	5	4
Sub-compartment 5	32	12
Sub-compartment 6	1	1
Sub-compartment 7	8	0
Sub-compartment 8	22	9
Sub-compartment 9	52	10
Sub-compartment 10	27	2
Sub-compartment 11	76	14
Sub-compartment 12	18	0
Sub-compartment 13	17	0
Sub-compartment 14	67	28
Sub-compartment 15	3	0
Sub-compartment 16	23	23
Louhajong Flood Plain	18	7
<b>Total CPP Area</b>	<b>432</b>	<b>133</b>



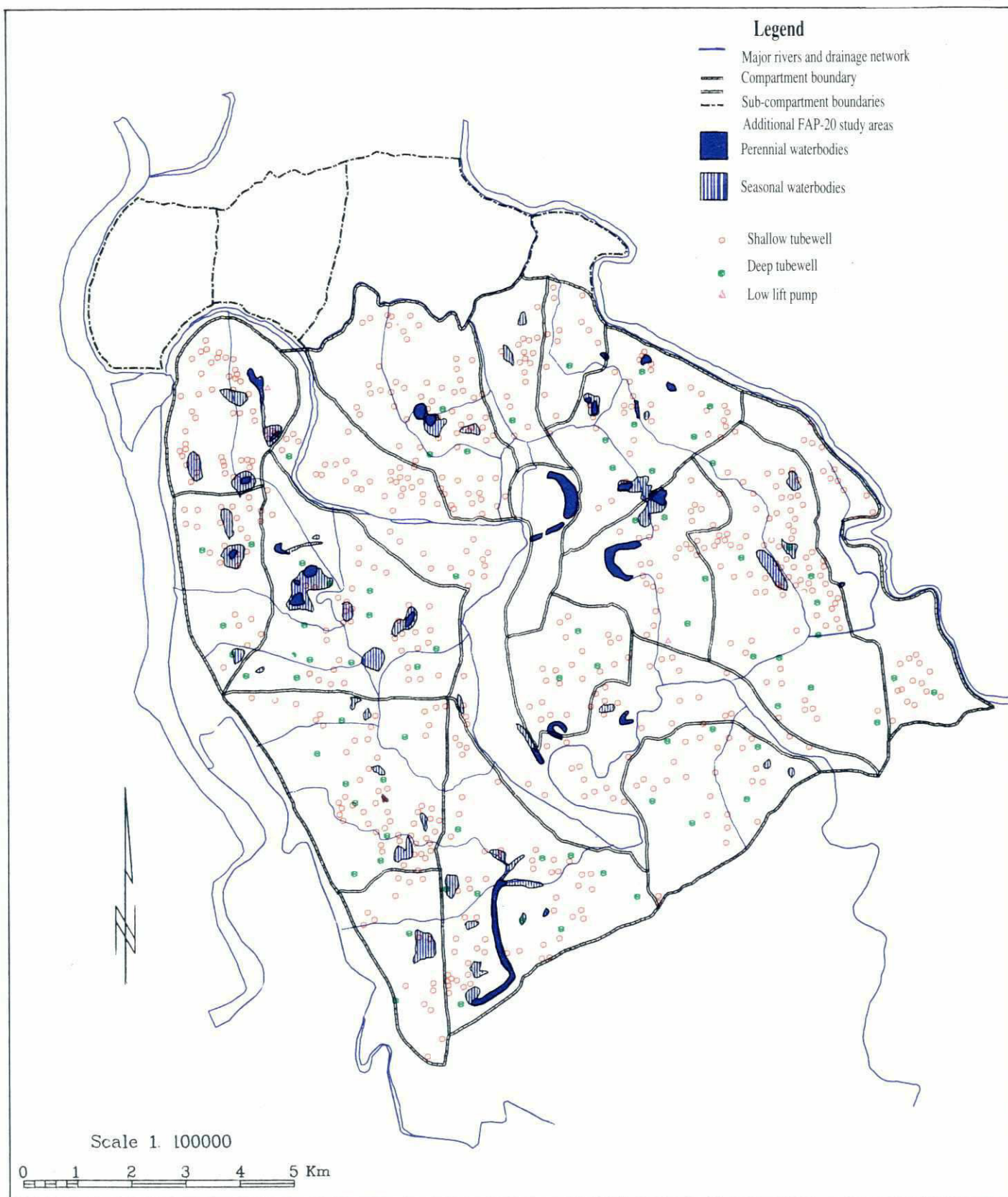
**Table 5. Population estimates by study area unit based on BBS 1981 statistics<sup>1/</sup>.**

Unit	Area(Km2)	Population per Km2	Estimated Population
Sub-compartment 1	6.88	1228	8,451
Sub-compartment 2	12.80	1171	14,984
Sub-compartment 3	6.30	2891	18,215
Sub-compartment 4	4.18	4351	18,186
Sub-compartment 5	7.53	1730	13,028
Sub-compartment 6	2.41	740	1,784
Sub-compartment 7	3.59	809	2,903
Sub-compartment 8	9.04	1011	9,138
Sub-compartment 9	6.06	1121	6,792
Sub-compartment 10	4.87	735	3,580
Sub-compartment 11	11.25	1517	17,406
Sub-compartment 12	10.21	1416	14,459
Sub-compartment 13	4.25	976	4,150
Sub-compartment 14	11.43	976	11,150
Sub-compartment 15	6.90	1288	8,884
Sub-compartment 16	2.60	3938	10,238
Louhajong Flood Plain (LFP)	19.69	1375	27,082
<b>Total CPP Area</b>	<b>129.99</b>	<b>1465</b>	<b>190,430</b>

<sup>1/</sup> The following considerations and measures have been taken in estimating population for the Tangail CPP Area :

- population densities have been calculated using the population figures from Small Area Atlas (SAA) of BBS (1981 Population Census) and the FAP-19 GIS area of mouzas;
- population data missing from SAA mouzas 2383402, 9511099, 9511328, 9517261 and 9547069 has been estimated by taking the average of population densities for mouzas surrounding the respective mouzas;
- in the case of Tangail Pourashava, population density has been calculated ward wise;
- population of Tangail CPP area for 1981 has been estimated by approp?? the population for the respective portions of the mouzas falling within a sub-compartment;
- population density of each sub-compartment is the weighted average of population densities of mouzas falling within that sub-compartment;
- the administrative area of Tangail Pourashava is spread over sub-compartments no. 3, 4, 5, 7, 8, 16 and Louhajong flood plain.





**Table 6. Number and density of tubewells by study unit<sup>1/</sup>.**

Unit	No. STW	Density STW/Km2	No. DTW	Density DTW/Km2	No. LLP	Density LLP/Km2
Sub-compartment 1	24	3.5	2	0.3	1	0.2
Sub-compartment 2	81	6.3	11	0.9	0	0.0
Sub-compartment 3	26	4.1	4	0.6	1	0.2
Sub-compartment 4	22	5.3	3	0.7	0	0.0
Sub-compartment 5	31	4.1	7	0.9	0	0.0
Sub-compartment 6	12	5.0	1	0.4	0	0.0
Sub-compartment 7	17	4.7	1	0.3	0	0.0
Sub-compartment 8	64	7.1	3	0.3	0	0.0
Sub-compartment 9	48	7.9	0	0.0	1	0.2
Sub-compartment 10	26	5.3	4	0.8	0	0.0
Sub-compartment 11	38	3.4	10	0.9	0	0.0
Sub-compartment 12	55	5.4	9	0.9	0	0.0
Sub-compartment 13	15	3.5	2	0.5	0	0.0
Sub-compartment 14	54	4.7	10	0.9	0	0.0
Sub-compartment 15	24	3.5	7	1.0	0	0.0
Sub-compartment 16	0	0.0	0	0.0	0	0.0
Louhajong Flood Plain (LFP)	79	4.0	2	0.1	0	0.0
<b>Total CPP Area</b>	<b>616</b>	<b>4.7</b>	<b>76</b>	<b>0.6</b>	<b>3</b>	<b>0.02</b>

<sup>1/</sup> STW = Shallow Tubewell  
DTW = Deep Tubewell  
LLP = Low Lift Pump



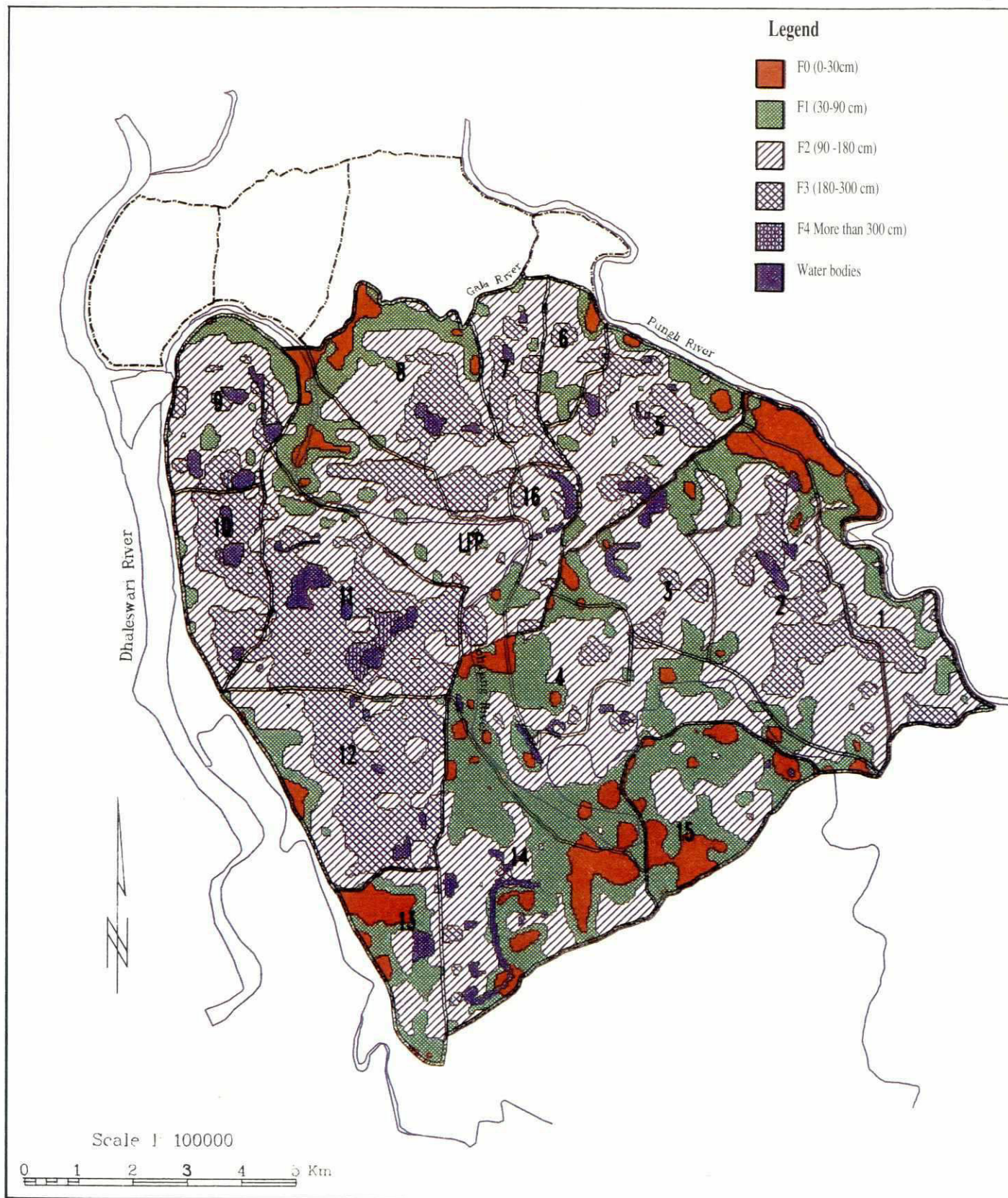


Table 7. Land types based on 1 in 5 year flood by study unit (ha).

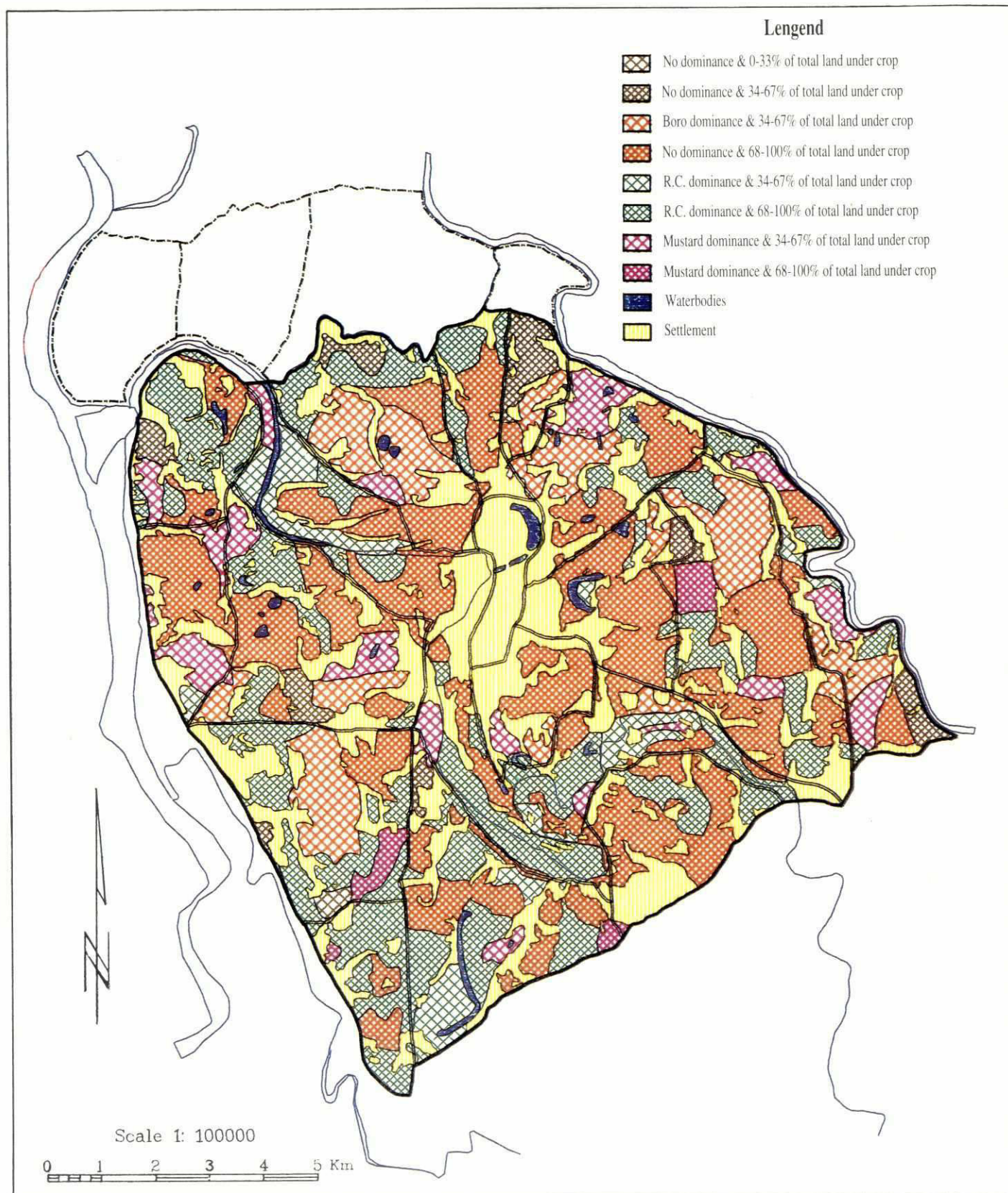
Unit	L A N D T Y P E S					Net Cultivable Area	Settle- ment	Water bodies	Louha- jong River & Others	Total Area
	F0	F1	F2	F3	F4					
Sub-compartment 1	114	127	236	76	0	553	134	1	0	688
Sub-compartment 2	56	118	548	280	0	1002	278	0	0	1280
Sub-compartment 3	5	69	296	40	0	410	198	22	0	630
Sub-compartment 4	0	40	144	26	0	210	204	4	0	418
Sub-compartment 5	12	52	270	172	0	506	235	12	0	753
Sub-compartment 6	6	29	113	25	0	173	67	1	0	241
Sub-compartment 7	0	11	156	102	0	269	89	0	1	359
Sub compartment 8	40	111	306	235	0	692	203	9	0	904
Sub-compartment 9	0	64	272	104	8	448	148	10	0	606
Sub compartment 10	0	6	94	247	6	353	132	2	0	487
Sub-compartment 11	0	30	209	536	46	821	290	14	0	1125
Sub-compartment 12	12	20	233	489	0	754	267	0	0	1021
Sub compartment 13	58	132	139	1	0	330	95	0	0	425
Sub-compartment 14	103	325	404	20	0	852	263	28	0	1143
Sub-compartment 15	55	230	163	1	0	449	240	0	1	690
Sub-compartment 16	0	0	1	2	0	3	234	23	0	260
Louhajong Flood Plain	115	456	665	135	0	1371	425	7	166	1969
<b>Total CPP Area</b>	<b>576</b>	<b>1820</b>	<b>4249</b>	<b>2491</b>	<b>60</b>	<b>9196</b>	<b>3502</b>	<b>133</b>	<b>168</b>	<b>12999</b>

#### Land Type (1 in 5 Yr Flood depth)

The land type map shown opposite represents the depth of inundation as Master Plan Organization (MPO) land type categories, for the without project scenario using water levels based on the 3 day mean maximum on a 1 in 5 year return period.

All land type and inundation maps shown in this document are created by GIS analysis using MIKE 11 model results. Given the margin of error involved in the procedures (see section 2) the maps and tables produced should be treated as approximations rather than absolute delineations of flood depth. The analysis is particularly useful for comparison of changes in inundation with and without project. A reliable estimate of relative change can be obtained. Subcompartment design for water management will require detailed survey work before an accurate model can be constructed.





**Table 8a. Crop type in rabi season by study unit for net cultivable area (ha).**

Unit	C R O P T Y P E								Net Cultivable Area
	No dom. <sup>1/</sup>	Boro dom. <sup>2/</sup>	Rabi dom. <sup>3/</sup>	Must. dom. <sup>4/</sup>	No dom. <sup>5/</sup>	Boro dom. <sup>6/</sup>	Rabi dom. <sup>7/</sup>	Must. dom. <sup>8/</sup>	
Sub-compartment 1	0	86	35	154	58	118	102	0	553
Sub-compartment 2	0	234	2	35	12	416	237	66	1002
Sub-compartment 3	0	26	10	0	27	312	33	0	410
Sub-compartment 4	0	27	0	27	0	146	10	0	210
Sub-compartment 5	0	125	0	110	0	199	72	0	506
Sub-compartment 6	0	45	0	1	107	20	0	0	173
Sub-compartment 7	0	3	0	0	5	142	119	0	269
Sub-compartment 8	0	263	0	33	45	191	160	0	692
Sub-compartment 9	0	0	0	48	42	104	254	0	448
Sub-compartment 10	0	0	20	127	0	205	1	0	353
Sub-compartment 11	0	119	5	113	52	345	187	0	821
Sub-compartment 12	25	227	0	0	18	96	329	59	754
Sub-compartment 13	0	0	0	0	0	72	249	9	330
Sub-compartment 14	0	0	133	32	25	296	347	19	852
Sub-compartment 15	0	0	0	1	0	322	122	4	450
Sub-compartment 16	0	0	0	0	0	3	0	0	3
Louhajang Flood Plain	0	32	265	90	0	515	469	0	1371
Total CPP Area	25	1189	470	771	391	3502	2691	157	9196

<sup>1/</sup>No dom. : No dominant crop, 0-33% of total area under crops

<sup>2/</sup>Boro dom. : Boro dominance, 34-67% of total area under crops

<sup>3/</sup>Rabi dom. : Rabi Crops dominance, 34-67% of total area under crops

<sup>4/</sup>Must. dom. : Mustard dominance, 34-67% of total area under crops

<sup>5/</sup>No dom. : No dominant crop, 34-67% of total area under crops

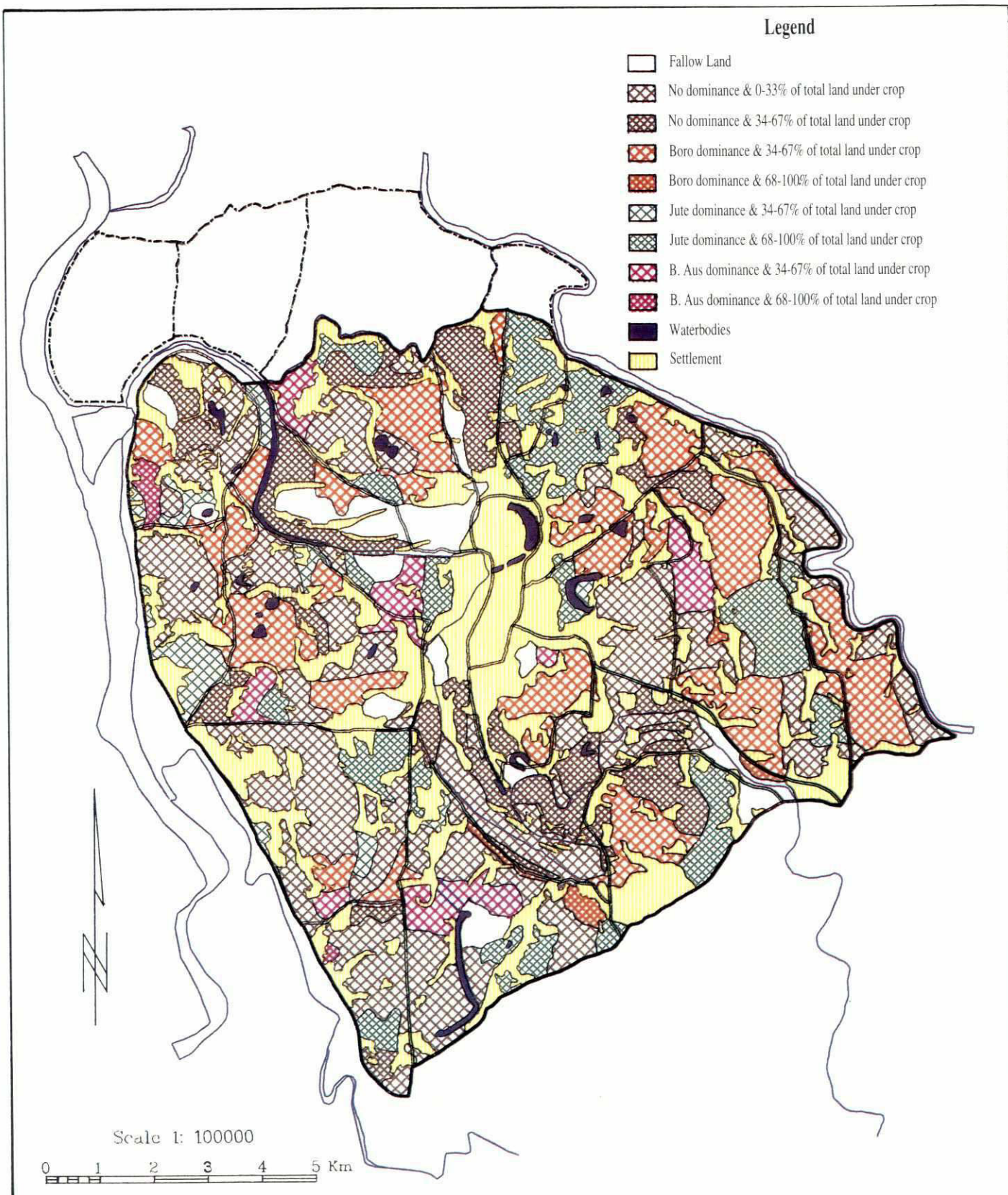
<sup>6/</sup>Boro dom. : Boro dominance, 68-100% of total area under crops

<sup>7/</sup>Rabi dom. : Rabi Crops dominance, 68-100% of total area under crops

<sup>8/</sup>Must. dom. : Mustard dominance, 68-100% of total area under crops

Note: A crop is considered dominant if it covers more than 50% of total area under crops.







**Table 8b. Crop type in kharif-i season by study unit for net cultivable area (ha).**

Unit	C R O P T Y P E								Fallow Land	Net Cultivable Area
	No dom. <sup>1/</sup>	Boro dom. <sup>2/</sup>	Jute dom. <sup>3/</sup>	B Aus dom. <sup>4/</sup>	No dom. <sup>5/</sup>	Boro dom. <sup>6/</sup>	Jute dom. <sup>7/</sup>	B Aus dom. <sup>8/</sup>		
Sub-compartment 1	238	289	0	0	0	0	22	0	4	553
Sub-compartment 2	206	415	0	77	52	12	240	0	0	1002
Sub-compartment 3	245	94	10	27	0	0	34	0	0	410
Sub-compartment 4	6	141	0	11	28	0	0	0	24	210
Sub-compartment 5	26	195	0	0	46	0	239	0	0	506
Sub-compartment 6	0	0	0	0	21	0	152	0	0	173
Sub-compartment 7	3	23	0	0	194	0	8	0	41	269
Sub-compartment 8	183	192	0	59	73	0	79	0	106	692
Sub-compartment 9	171	47	49	0	91	0	0	40	50	448
Sub-compartment 10	183	57	110	0	0	0	0	2	1	353
Sub-compartment 11	281	309	26	73	74	0	30	0	28	821
Sub-compartment 12	516	75	42	26	0	0	95	0	0	754
Sub-compartment 13	222	6	0	0	50	0	45	7	0	330
Sub-compartment 14	460	6	12	141	8	51	118	0	56	852
Sub-compartment 15	0	144	0	0	142	0	125	0	38	449
Sub-compartment 16	0	0	0	0	0	0	0	0	3	3
Louhajang Flood Plain	389	93	29	72	450	18	71	0	249	1371
<b>Total CPP Area</b>	<b>3129</b>	<b>2086</b>	<b>278</b>	<b>487</b>	<b>1229</b>	<b>81</b>	<b>1258</b>	<b>50</b>	<b>506</b>	<b>9196</b>

<sup>1/</sup>No dom. : No dominant crop, 0-33% of total area under crops

<sup>2/</sup>Boro dom. : Boro dominance, 34-67% of total area under crops

<sup>3/</sup>Jute dom. : Jute dominance, 34-67% of total area under crops

<sup>4/</sup>B Aus dom. : B Aus dominance, 34-67% of total area under crops

<sup>5/</sup>No dom. : No dominant crop, 34-67% of total area under crops

<sup>6/</sup>Boro dom. : Boro dominance, 68-100% of total area under crops

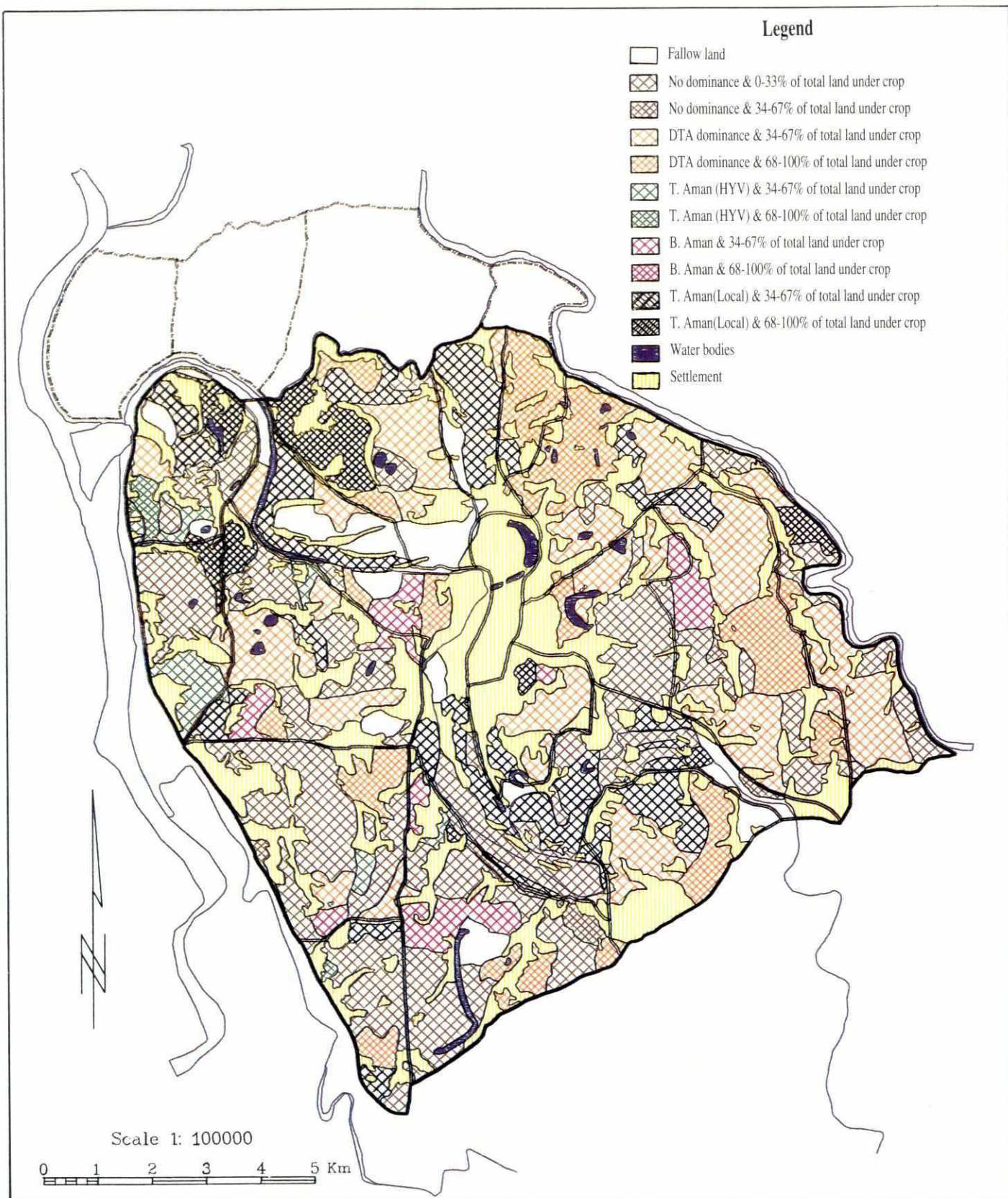
<sup>7/</sup>Jute dom. : Jute dominance, 68-100% of total area under crops

<sup>8/</sup>B Aus dom. : B Aus dominance, 68-100% of total area under crops

Note: A crop is considered dominant if it covers more than 50% of total area under crops.

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Map 8.c



**Table 8c. Crop type in kharif-ii season by study unit for net cultivable area (ha).**

Unit	C R O P T Y P E										Net Culti- vable Area
	No dom. 1/	DTA dom. 2/	TA(H) dom. 3/	BAman dom. 4/	TA(L) dom. 5/	No dom. 6/	DTA dom. 7/	TA(H) dom. 8/	TA(L) dom. 9/	Fallow Land	
Sub-compartment 1	191	289	0	0	0	0	22	0	47	4	553
Sub-compartment 2	206	415	0	77	52	12	240	0	0	0	1002
Sub-compartment 3	245	104	0	27	0	0	34	0	0	0	410
Sub-compartment 4	6	141	0	11	28	0	0	0	18	6	210
Sub-compartment 5	26	195	0	0	46	0	239	0	0	0	506
Sub-compartment 6	0	0	0	0	20	0	153	0	0	0	173
Sub-compartment 7	3	23	0	0	194	0	8	0	0	41	269
Sub-compartment 8	60	191	0	0	73	0	79	0	183	106	692
Sub-compartment 9	112	42	45	0	92	0	0	40	63	54	448
Sub-compartment 10	183	20	102	0	0	0	0	2	36	10	353
Sub-compartment 11	281	266	26	74	74	0	30	0	43	27	821
Sub-compartment 12	516	75	25	27	0	17	94	0	0	0	754
Sub-compartment 13	222	6	0	0	50	0	45	7	0	0	330
Sub-compartment 14	454	6	13	166	8	51	93	0	6	55	852
Sub-compartment 15	0	144	0	0	142	0	126	0	0	37	449
Sub-compartment 16	0	0	0	0	0	0	0	0	0	3	3
Louhajang Flood Plain	377	93	3	68	450	18	71	0	16	275	1371
<b>Total CPP Area</b>	<b>2882</b>	<b>2010</b>	<b>214</b>	<b>450</b>	<b>1229</b>	<b>96</b>	<b>1234</b>	<b>49</b>	<b>412</b>	<b>618</b>	<b>9196</b>

<sup>1/</sup>No dom. : No dominant crops, 0-33% of total area under crops

<sup>2/</sup>DTA dom. : DTA dominance, 34-67% of total area under crops

<sup>3/</sup>TA(H) dom. : T Aman (HYV) dominance, 34-67% of total area under crops

<sup>4/</sup>BAman dom. : B Aman dominance, 34-67% of total area under crops

<sup>5/</sup>TA(L) dom. : T Aman (L) dominance, 34-67% of total area under crops

<sup>6/</sup>No dom. : No dominant crop, 68-100% of total area under crops

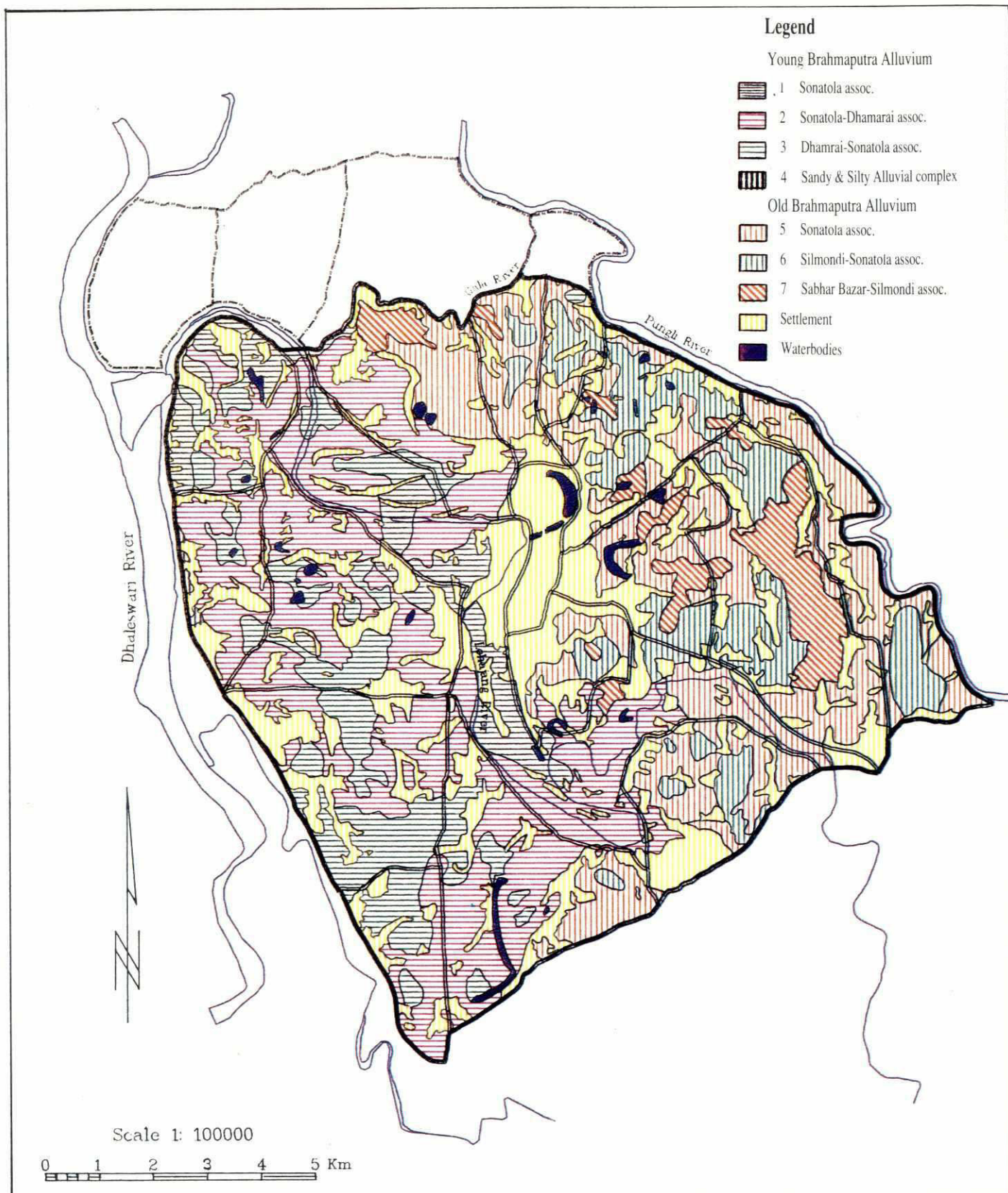
<sup>7/</sup>DTA dom. : DTA dominance, 68-100% of total area under crops

<sup>8/</sup>TA(H) dom. : T Aman (HYV) dominance, 68-100% of total area under crops

<sup>9/</sup>TA(L) dom. : T Aman (L) dominance, 68-100% of total area under crops

Note: A crop is considered dominant if it covers more than 50% of total area under crops.

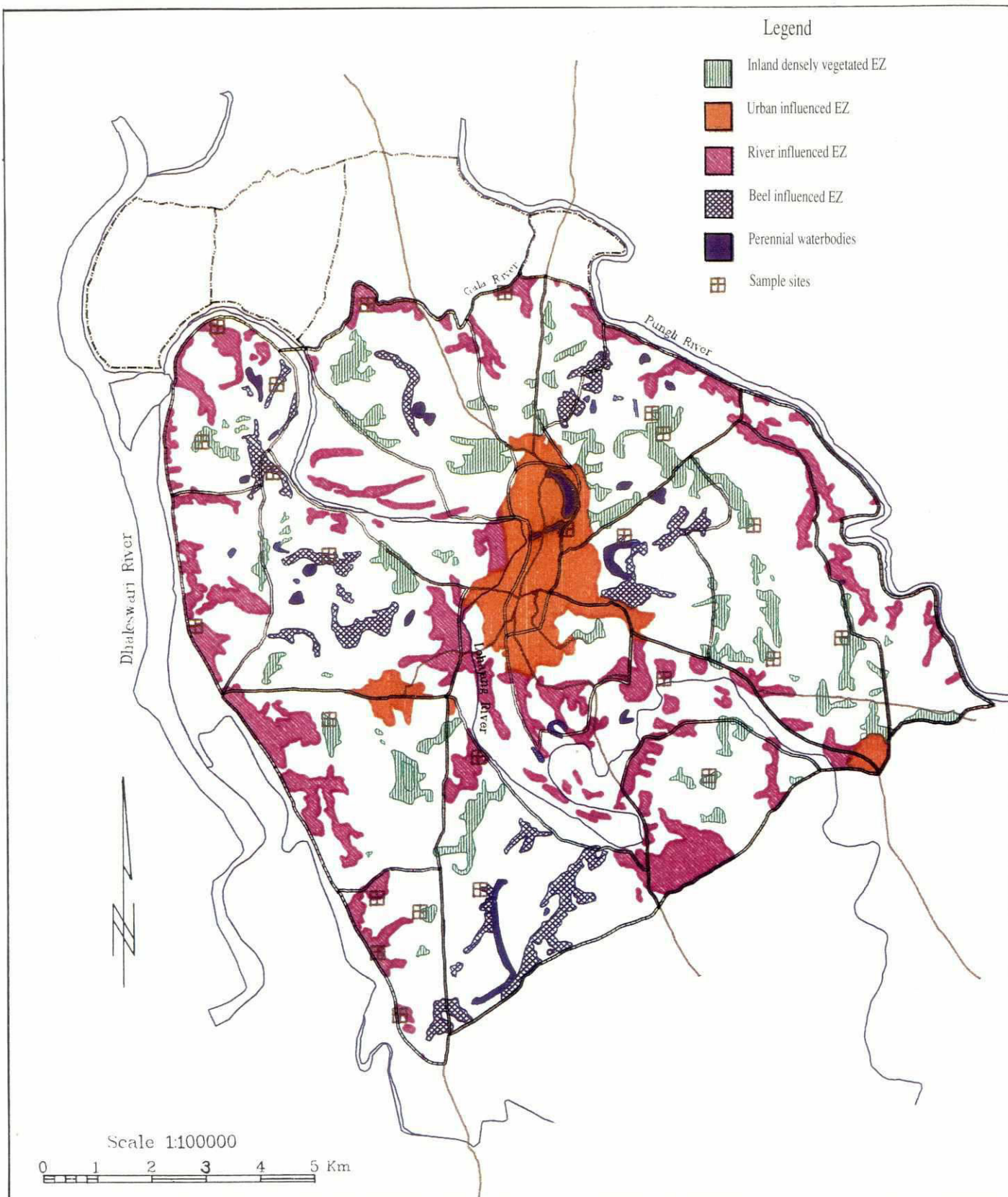




**Table 9. Soil classes, settlement, perennial water bodies and Louhajang river by study unit (ha).**

Unit	S O I L C L A S S E S <sup>1/</sup>							Net Cultiva- ble Area	Settle- ment	Water bodies	Louha- jong River	Total Area
	1	2	3	4	5	6	7					
Sub-compartment 1	0	0	0	0	421	132	0	553	134	1	0	688
Sub-compartment 2	0	0	0	0	350	305	347	1002	278	0	0	1280
Sub-compartment 3	0	0	0	0	224	88	98	410	198	22	0	630
Sub-compartment 4	6	47	0	0	102	46	9	210	204	4	0	418
Sub-compartment 5	0	0	0	0	180	274	52	506	235	12	0	753
Sub-compartment 6	0	0	8	0	88	77	0	173	67	1	0	241
Sub-compartment 7	0	5	0	0	200	48	16	269	89	0	1	359
Sub-compartment 8	11	324	30	0	247	0	80	692	203	9	0	904
Sub-compartment 9	171	182	95	0	0	0	0	448	148	10	0	606
Sub-compartment 10	2	271	64	16	0	0	0	353	132	2	0	487
Sub-compartment 11	55	565	201	0	0	0	0	821	290	14	0	1125
Sub-compartment 12	0	342	412	0	0	0	0	754	267	0	0	1021
Sub-compartment 13	0	174	156	0	0	0	0	330	95	0	0	425
Sub-compartment 14	0	536	128	0	173	15	0	852	263	28	0	1143
Sub-compartment 15	0	36	0	0	288	125	0	449	240	0	1	690
Sub-compartment 16	0	3	0	0	0	0	0	3	234	23	0	260
Louhajang FP	330	720	94	0	169	36	22	1371	425	7	166	1969
<b>Total CPP Area</b>	<b>575</b>	<b>3205</b>	<b>1188</b>	<b>16</b>	<b>2442</b>	<b>1146</b>	<b>624</b>	<b>9196</b>	<b>3502</b>	<b>133</b>	<b>168</b>	<b>12999</b>
<sup>1/</sup> Soil Class 1	:	Sonatala association under young Brahmanputra alluvium										
Soil Class 2	:	Sonatala-dhamrai association under young Brahmanputra alluvium										
Soil Class 3	:	Dhamrai-sonatala association under young Brahmanputra alluvium										
Soil Class 4	:	Sandy and silty alluvium complex association under young Brahmanputra alluvium										
Soil Class 5	:	Sonatala association under old Brahmanputra alluvium										
Soil Class 6	:	Silmondi-sonatala association under old Brahmanputra alluvium										
Soil Class 7	:	Sahar hazar-silmondi association under old Brahmanputra alluvium										

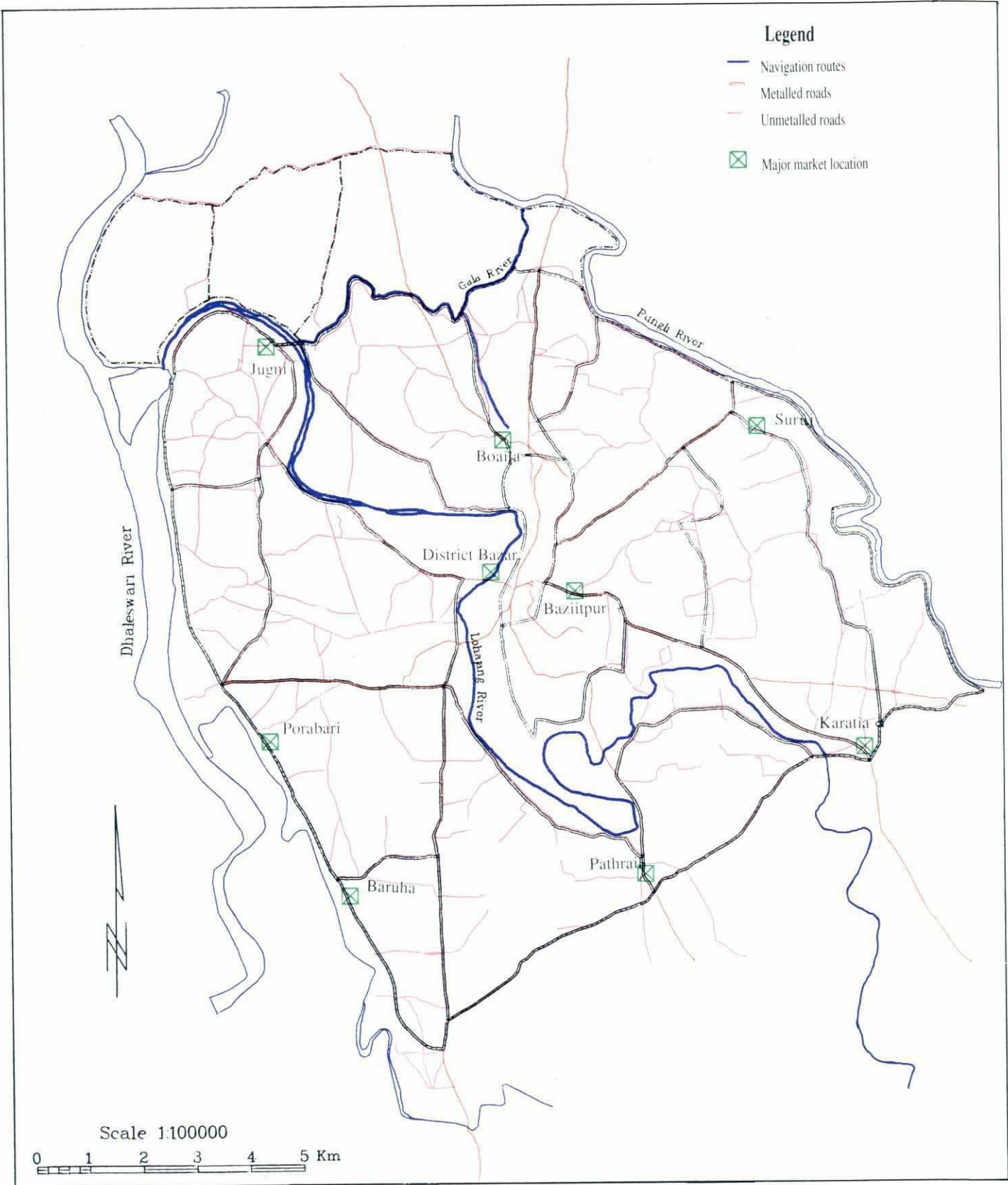




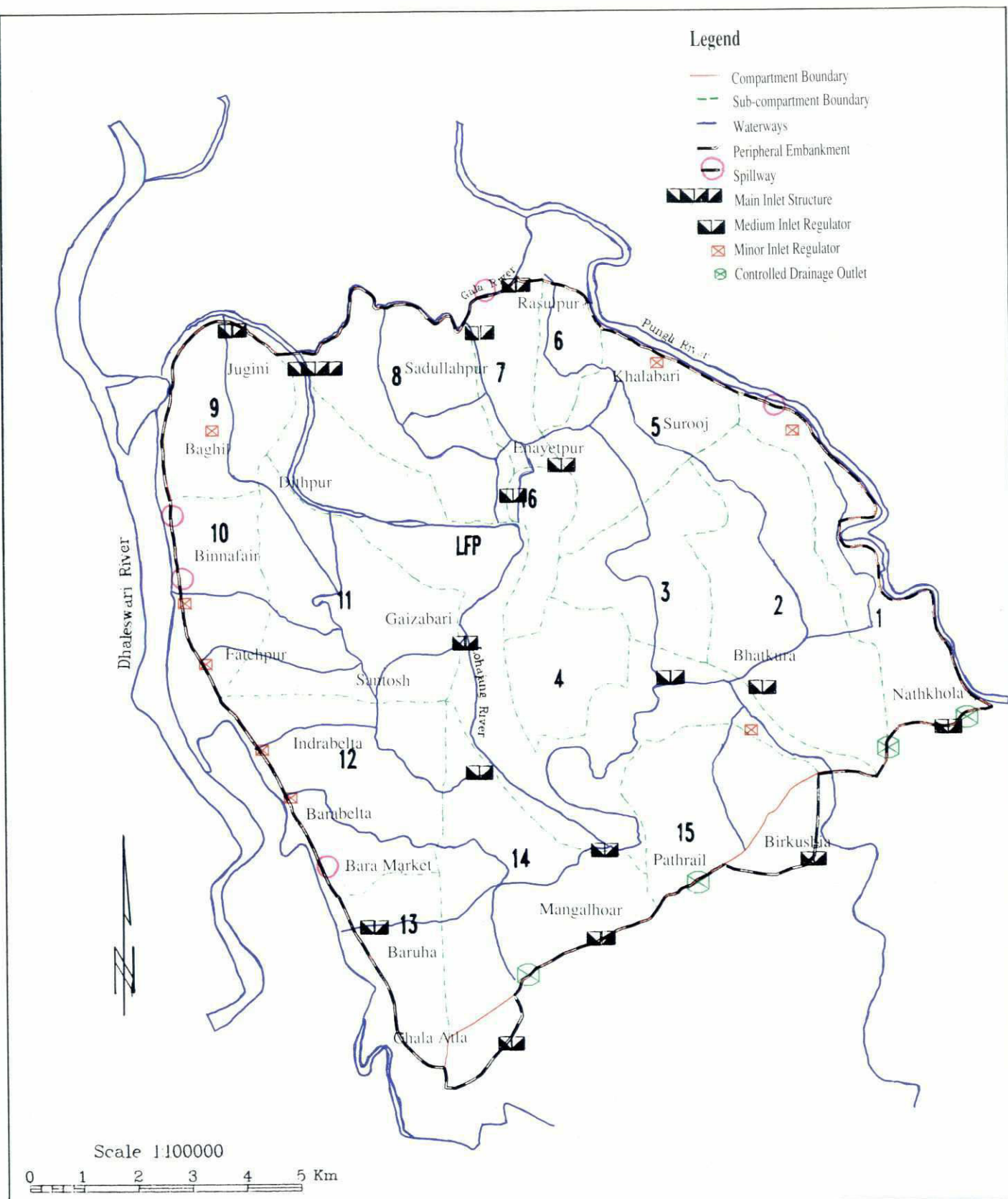
**Table 10. Terrestrial ecological zones (EZ) of Tangail CPP area**

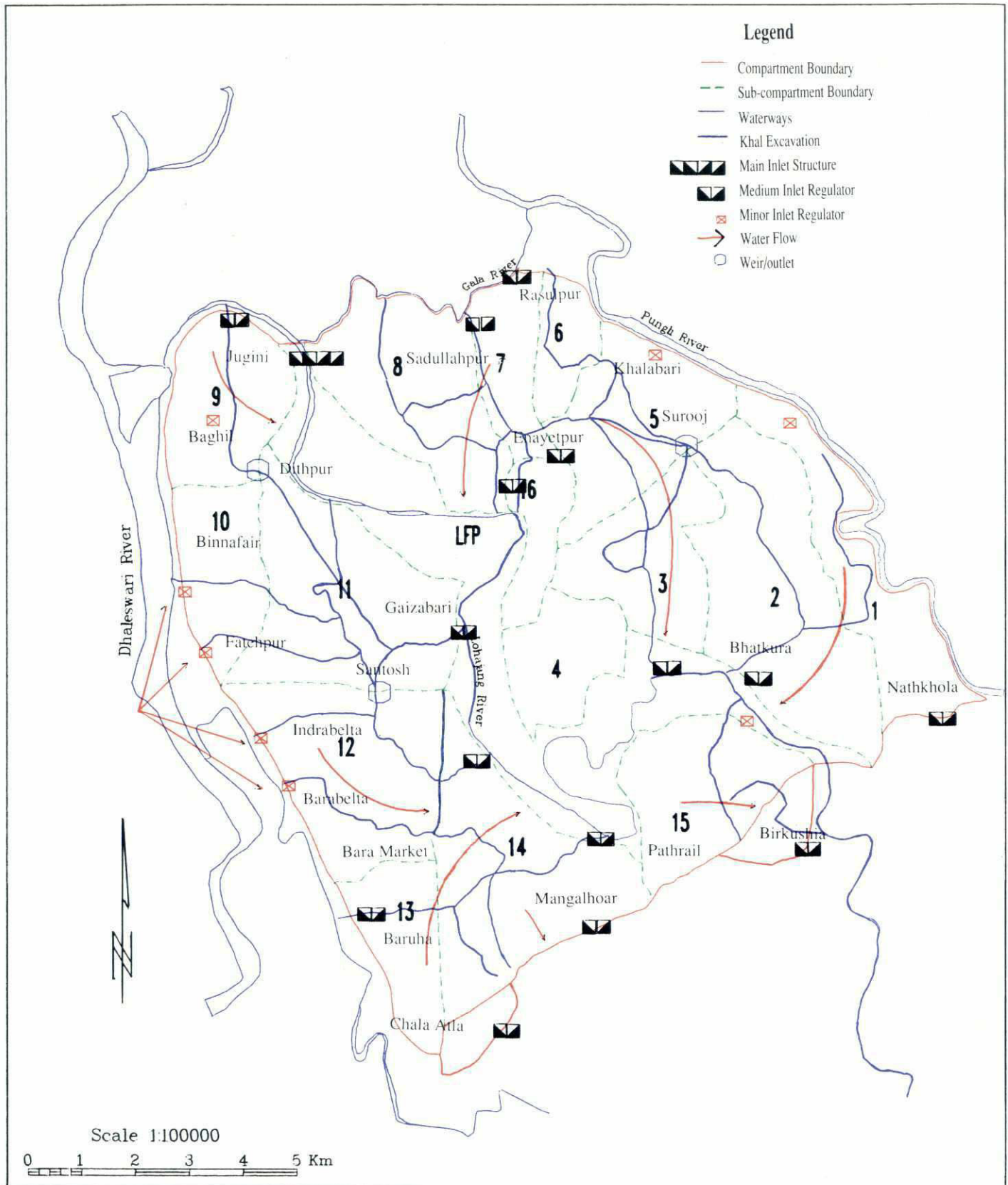
Description	Area/ Length	Percentage over CPP Area
River influenced vegetation	1503 ha	11.6
Beel influenced vegetation	453 ha	3.5
Climax area vegetation	808 ha	6.2
Urban area vegetation	745 ha	5.7
Road side vegetation		
- Metalled road	59 Km	-
- Unmetalled road	193 Km	-
- Embankment	10 Km	-
Agricultural land	9196 ha	70.75

<sup>1/</sup> Road side vegetation not digitized on map due to scale











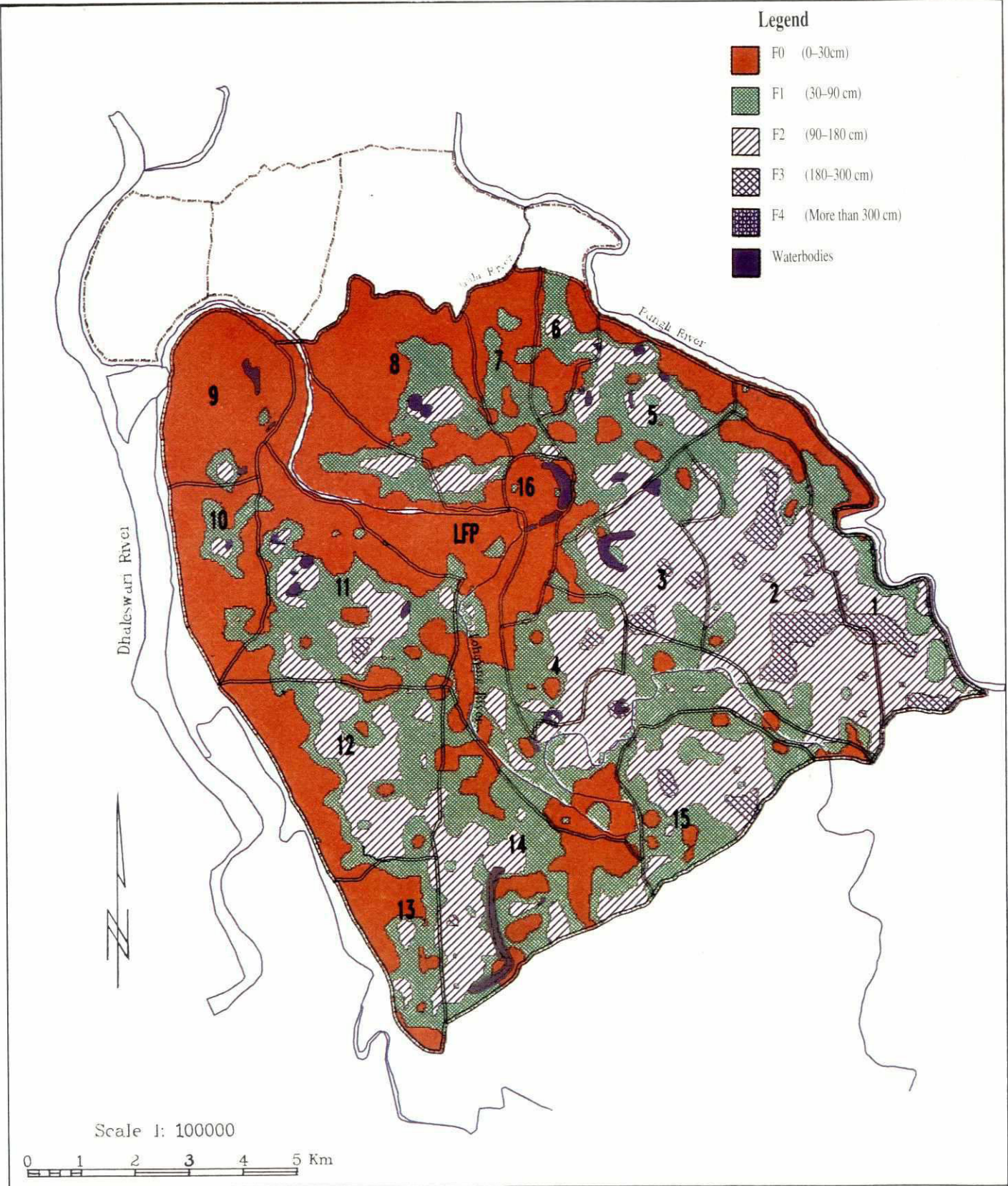


Table 14. Land types based on 1 in 5 year flood due to rainfall only by study unit (ha).

Unit	L A N D T Y P E S					Net Cultiva- ble Area	Settle- ment	Water bodies	Louhajo- ng River & Others	Total Area
	F0	F1	F2	F3	F4					
Sub-compartment 1	130	144	227	52	0	553	134	1	0	688
Sub-compartment 2	63	141	623	176	0	1002	278	0	0	1280
Sub-compartment 3	7	87	292	24	0	410	198	22	0	630
Sub-compartment 4	1	62	137	10	0	210	204	4	0	418
Sub-compartment 5	117	216	173	0	0	506	235	12	0	753
Sub-compartment 6	72	76	25	0	0	173	67	1	0	241
Sub-compartment 7	167	101	1	0	0	269	89	0	1	359
Sub-compartment 8	417	190	85	0	0	692	203	9	0	904
Sub-compartment 9	414	24	10	0	0	448	148	10	0	606
Sub-compartment 10	237	105	11	0	0	353	132	2	0	487
Sub-compartment 11	285	327	197	12	0	821	290	14	0	1125
Sub-compartment 12	169	275	310	0	0	754	267	0	0	1021
Sub-compartment 13	133	149	48	0	0	330	95	0	0	425
Sub-compartment 14	202	333	313	4	0	852	263	28	0	1143
Sub-compartment 15	16	151	248	35	0	449	240	0	1	690
Sub-compartment 16	3	0	0	0	0	3	234	23	0	260
Louhajang Flood Plain (LFP)	608	485	269	9	0	1371	425	7	166	1969
<b>Total CPP Area</b>	<b>3041</b>	<b>2865</b>	<b>2969</b>	<b>321</b>	<b>0</b>	<b>9196</b>	<b>3502</b>	<b>133</b>	<b>168</b>	<b>12999</b>

#### Land Type (1 in 5 Yr Flood Rainfall Only)

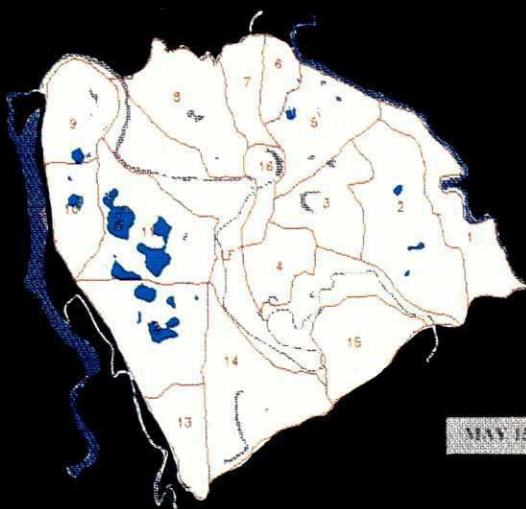
This land type map shows the depth of inundation for the "with project" situation. It assumes flooding from rainfall based on the 10 day mean maximum rainfall for a 1 in 5 year return period, and assumes no inundation from rivers and khals. This is a hypothetical concept tested for the purposes of FAP 16 and FAP 20. The map illustrates the effect of operating the CPP scheme so as to totally preclude inundation from overbank spillage. It is not the intention of FAP 20 that the compartment would actually be operated in this way.

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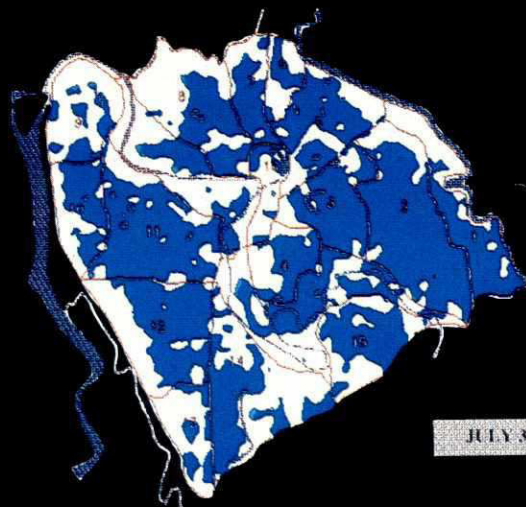
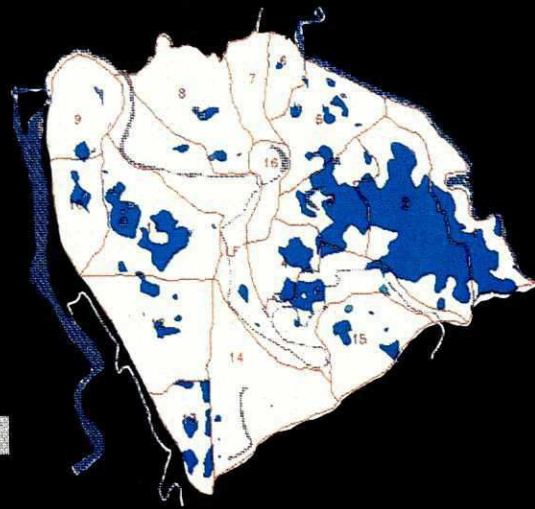
## SEASONAL INUNDATION

WITHOUT PROJECT

WITH PROJECT



MAY 15, 1991



JULY 30, 1991



ISPAN

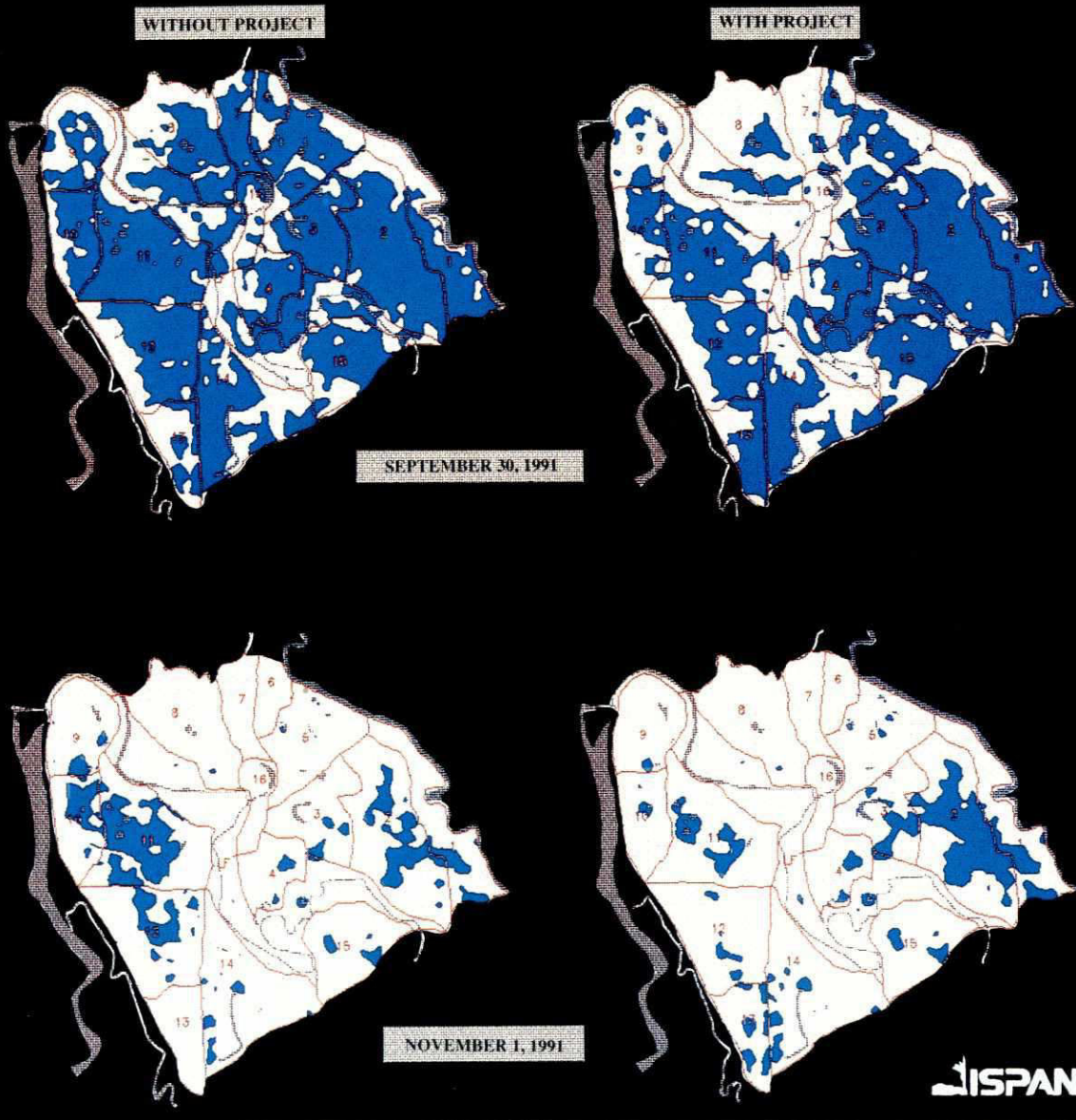
Areas inundated to a depth of 180 cm or more are shaded in blue



## Seasonal Inundation

The series of maps shown opposite and on the overleaf provide a comparison of inundation for the "without project" and "with project" scenarios modelled on data provided by FAP 20 from the 1991 MIKE 11 model run. In this case, any land that is not dry is considered inundated.

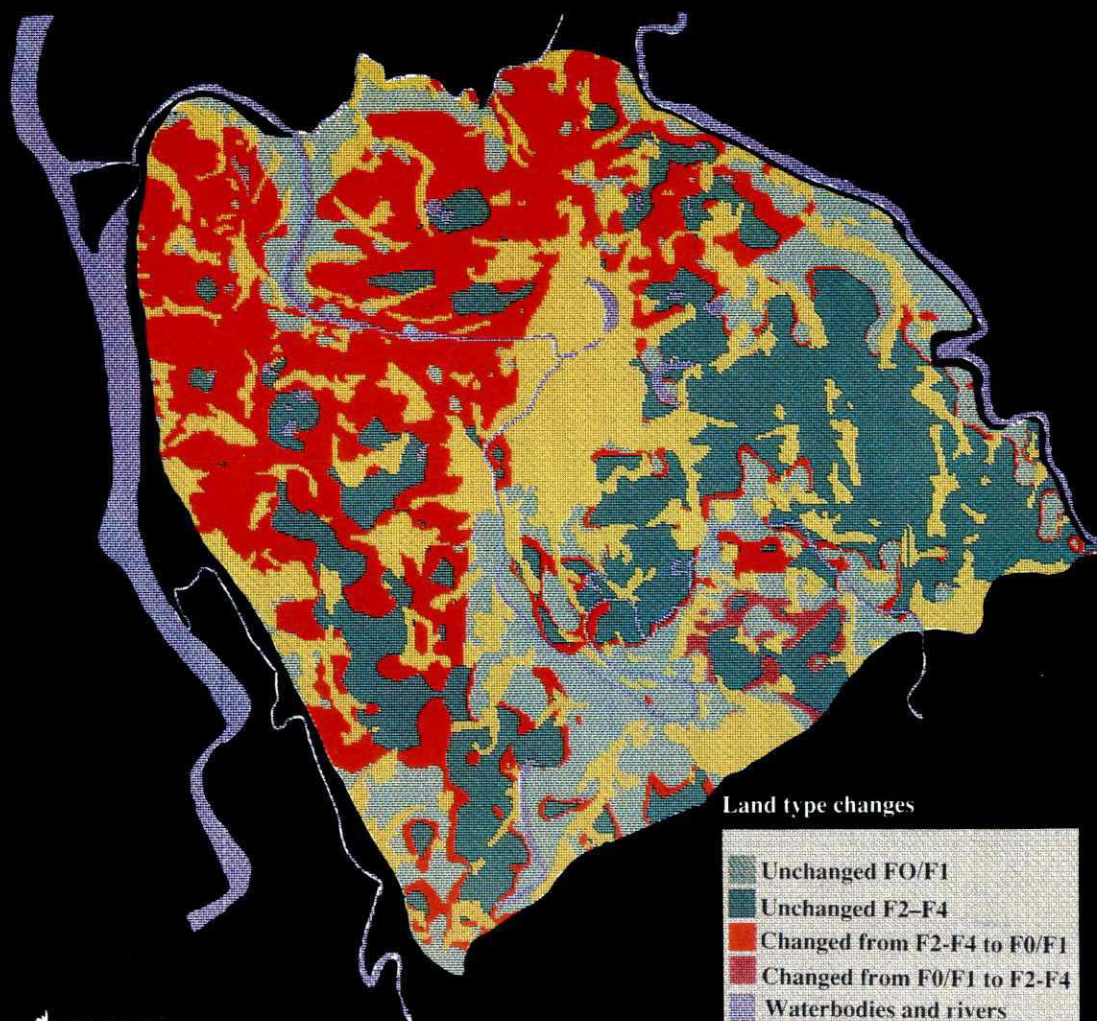
# SEASONAL INUNDATION



Areas inundated to a depth of 180 cm or more are shaded in blue



## PROJECT IMPACT



ISPAN

## **Project Impact**

This map shows the probable impact of the project on flood depth within the Tangail compartment. The scenario shown assumed full control, with flooding only from rainfall for a 1 in 5 year return period.

Flood depth modelling and impact analysis are still ongoing under the FAP 20 program of work. The map shown is an example of the use of GIS technology in impact analysis, it does not necessarily represent the actual impact. FAP 20 and FAP 16 will consider water levels based on other return periods and refine their analysis on the basis of local knowledge and available ground truth.

