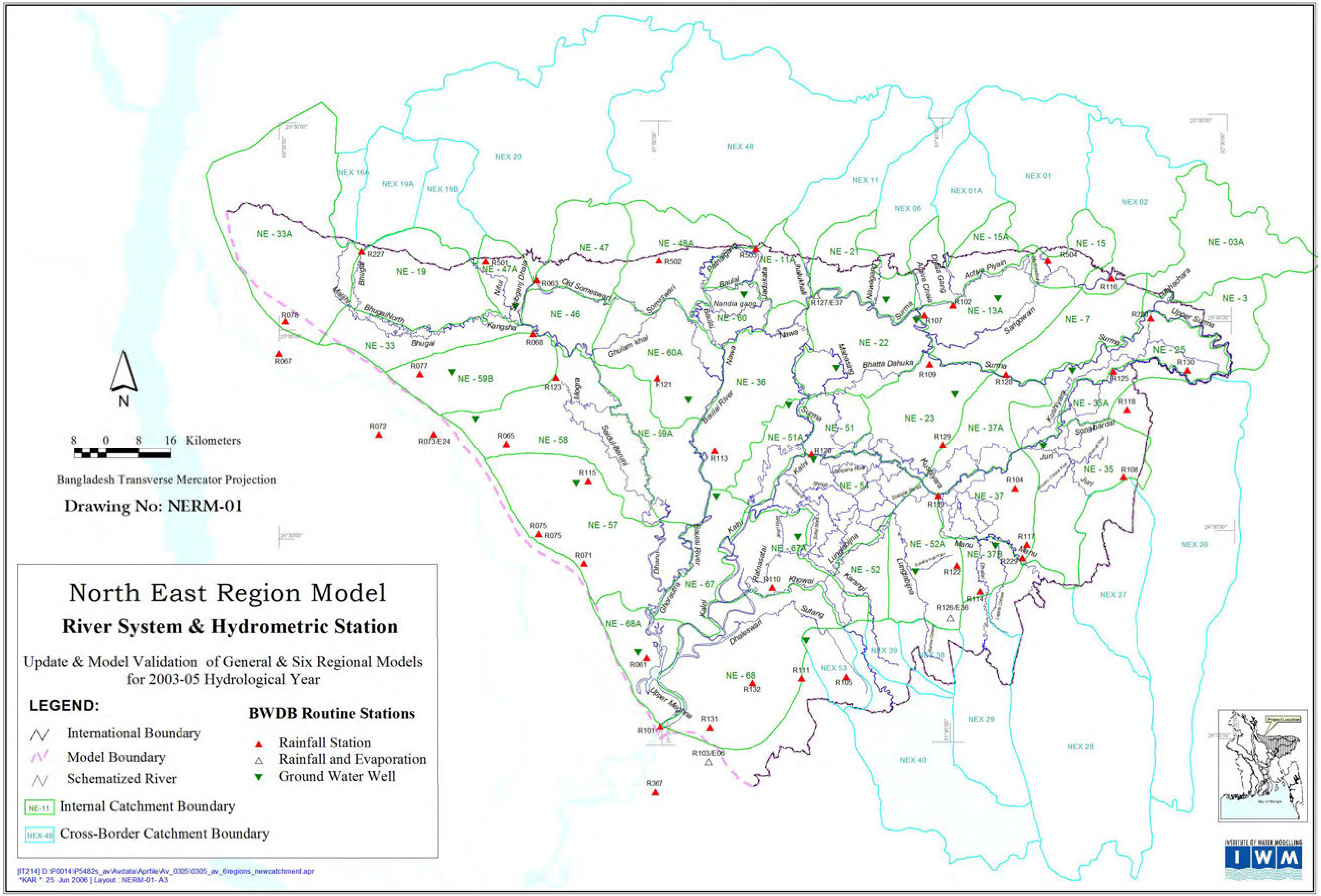
Annex 5-1

Division of Inland and Transboundafry Catchments of NERM


North East Region Model
River System & Hydrometric Station
Update & Model Validation of General & Six Regional Models
for 2003-05 Hydrological Year
LEGEND:
International Boundary
Model Boundary
Schematized River
Internal Catchment Boundary
Cross-Border Catchment Boundary
BWDB Routine Stations
Rainfall Station
Rainfall and Evaporation
Ground Water Well
8 0 8 16 Kilometers
Bangladesh Transverse Mercator Projection
Drawing No: NERM-01
N

Annex 5-2

Study on Applicability of Frequency Analysis Using Simulated Water Levels

Study on Applicability of Frequency Analysis Using Simulated Water Levels

1. Availability of Observed Water Levels

Availability of observed water levels is examined by using water level data observed at 4 stations (Bhairab Bazar, Itna, Sunamganj and Sylhet), which are located along the Surma-Baulai Rivers. These data were provided for the Study by IWM.

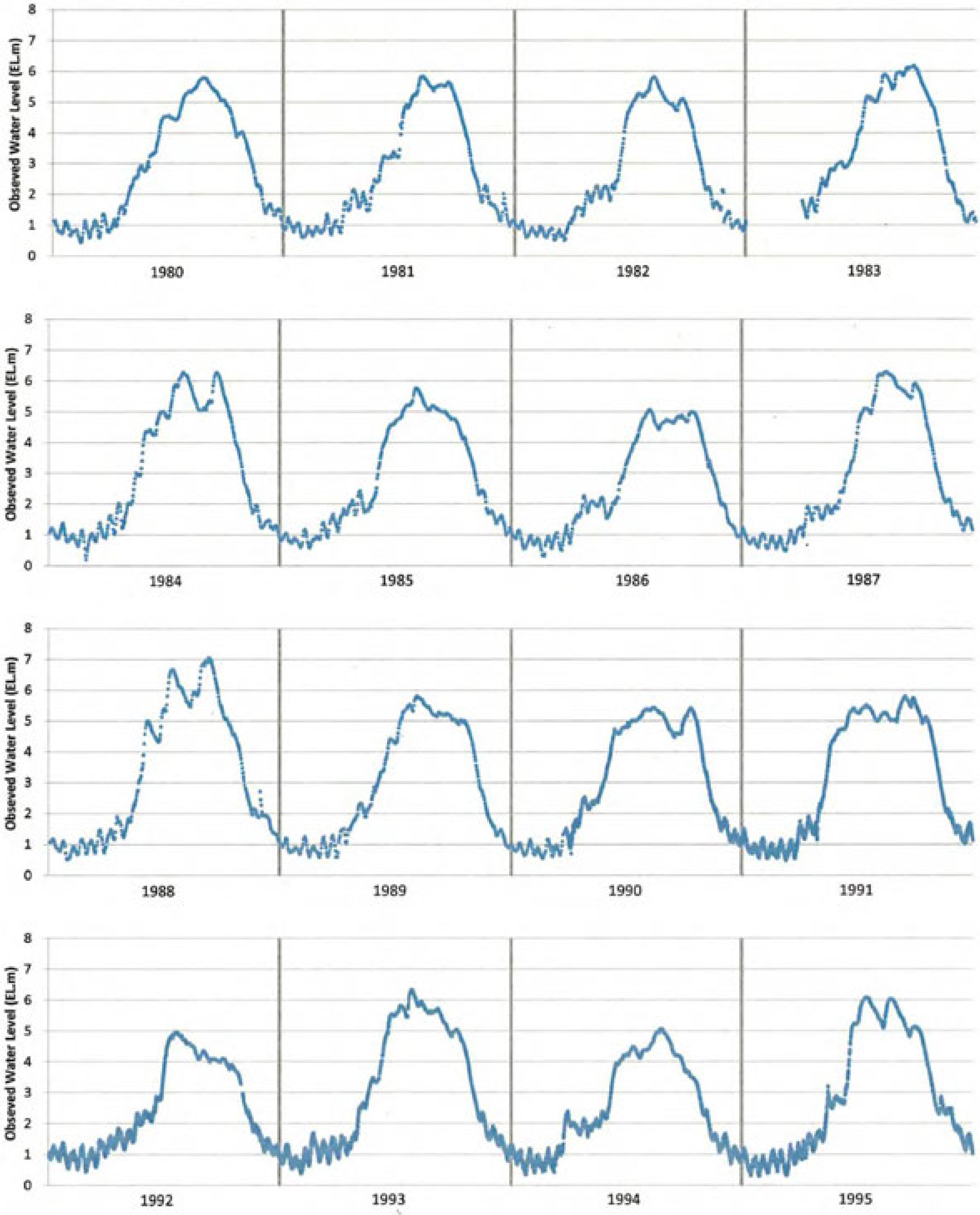
The observed data were used for the Study after correction due to river channel movement and land settlement in the haor area. Table 1 compiles the observed water level data after correction.

Table 1 Observed Water Level Data for the Study (after correction)

Station Name	Data Period	Correction value* (m)	Remarks
Bhairab Bazar	1980－2010	-0.62	Corrected data were provided for the Study in September 2013 by IWM.
Itna	2003－2010	-1.45	The data in and after 2003 were used for the Study, because no reliable correction value before 2003 had been obtained from IWM.
Sunamganj	1980－2010	-0.67	The correction value obtained from IWM was used for the 31 years (1980 to 2010).
Sylhet	1980－2010	-0.61	

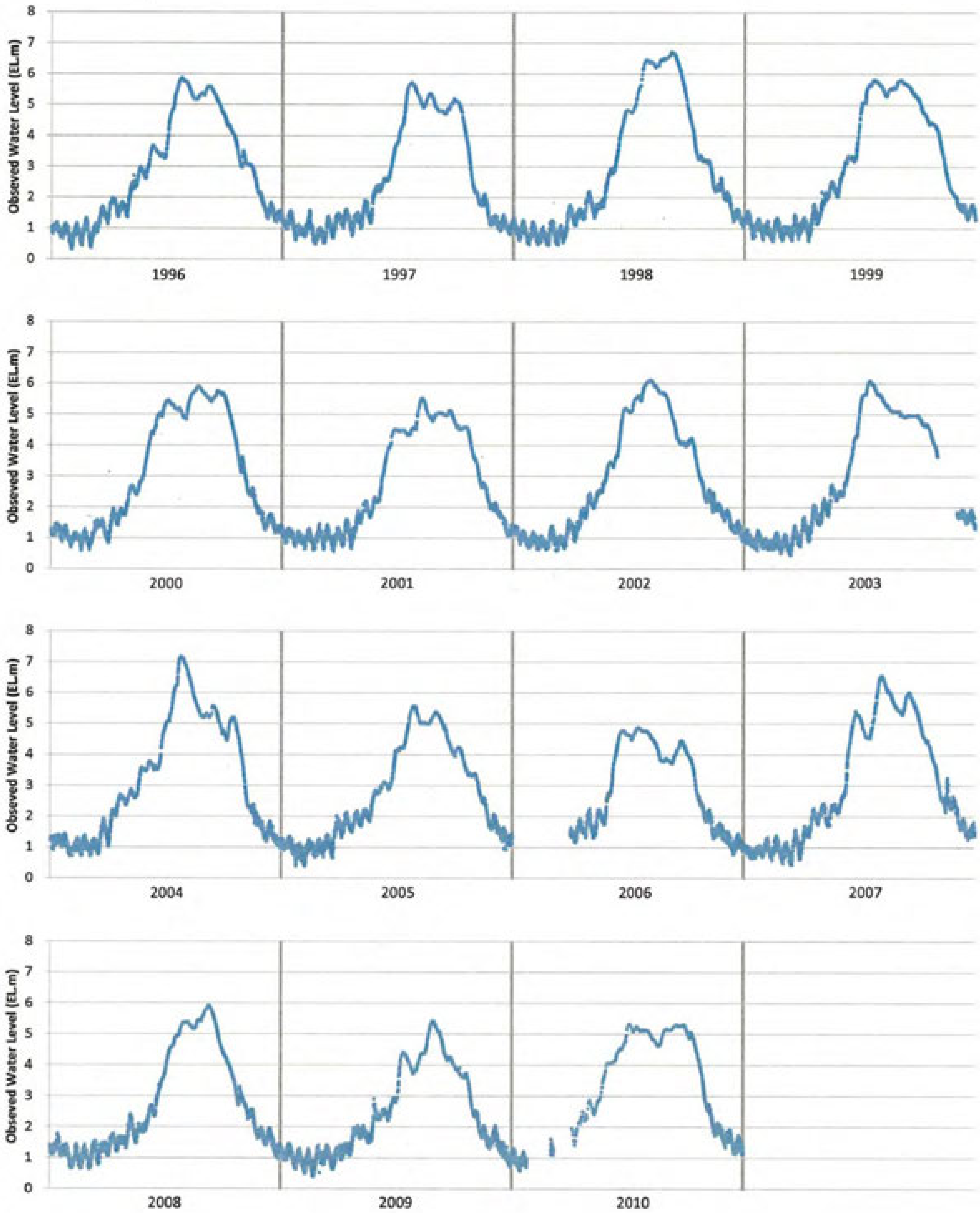
Note: * These values were added to the observed water levels for correction.

Figures 1 to 4 present the observed water levels after correction.



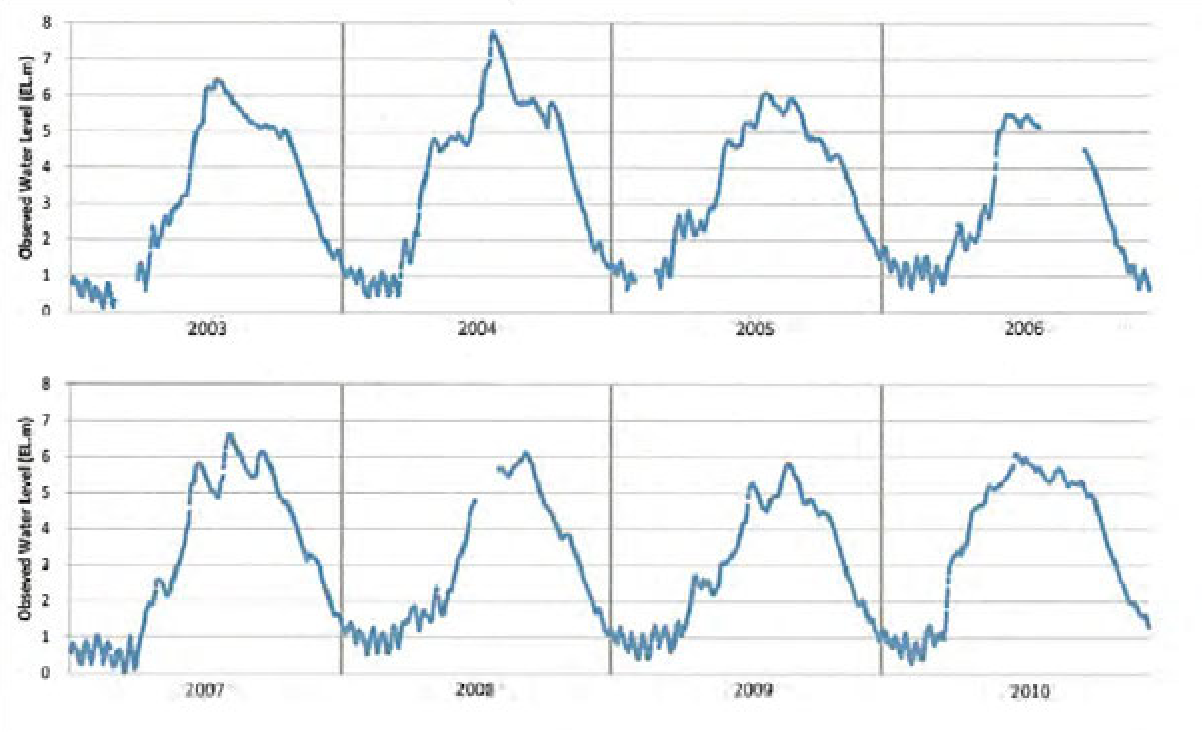
Source: JICA Study Team

Figure 1 Observed Water Levels at Bhairab Bazar Station（1/2: 1980－1995）



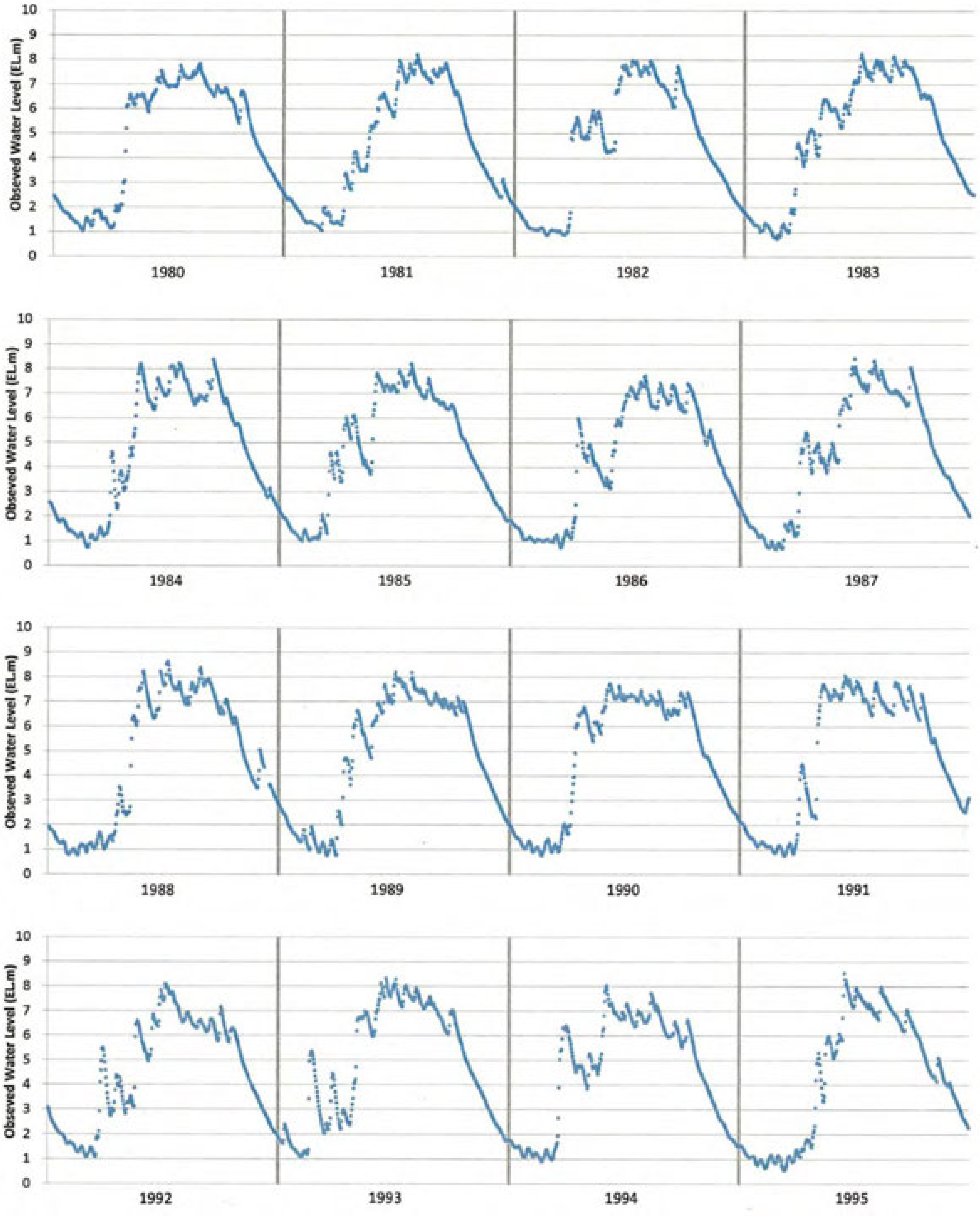
Source: JICA Study Team

Figure 1 Observed Water Levels at Bhairab Bazar Station（2/2: 1996－2010）



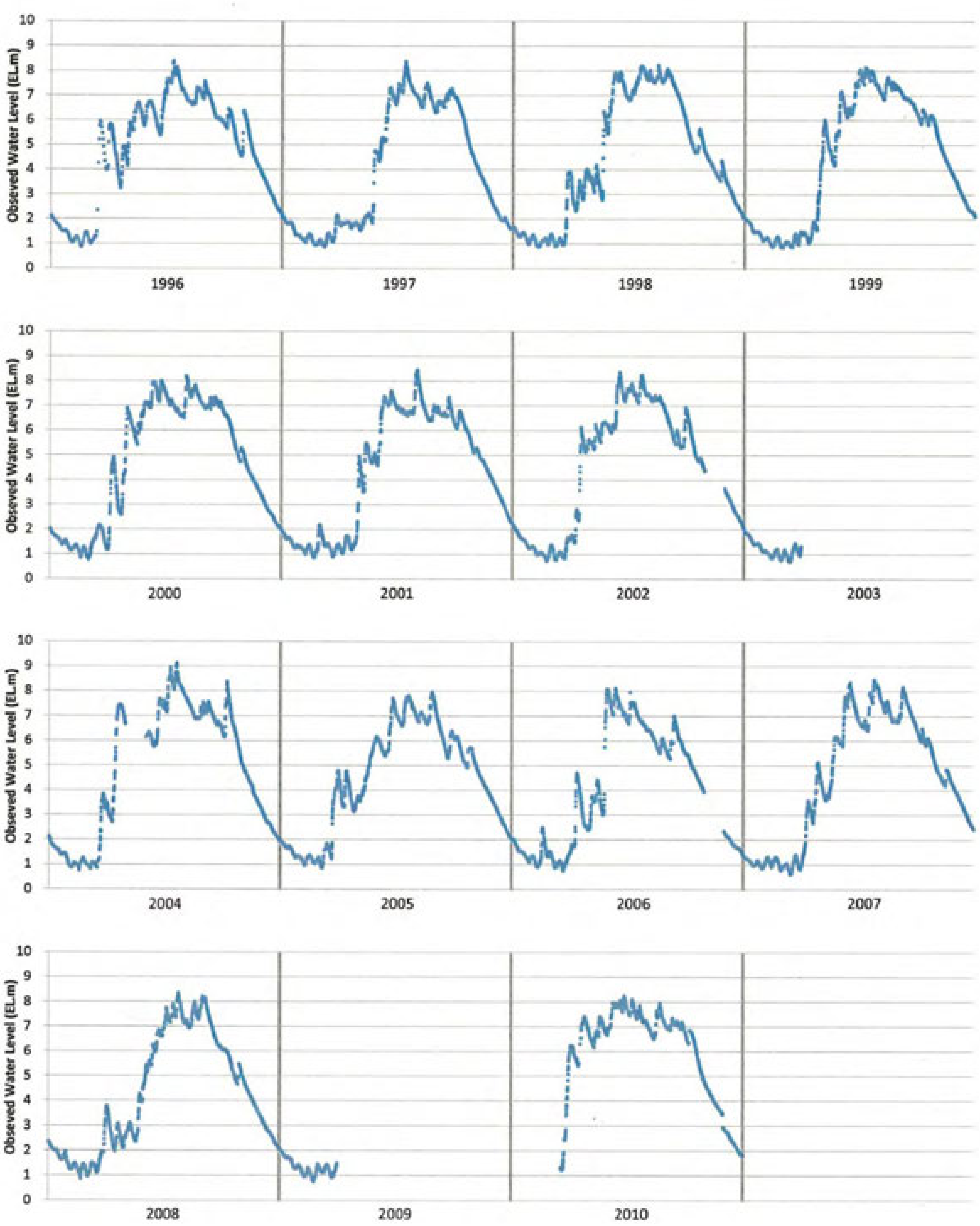
Source: JICA Study Team

Figure 2 Observed Water Levels at Itna Station（2003-2010）



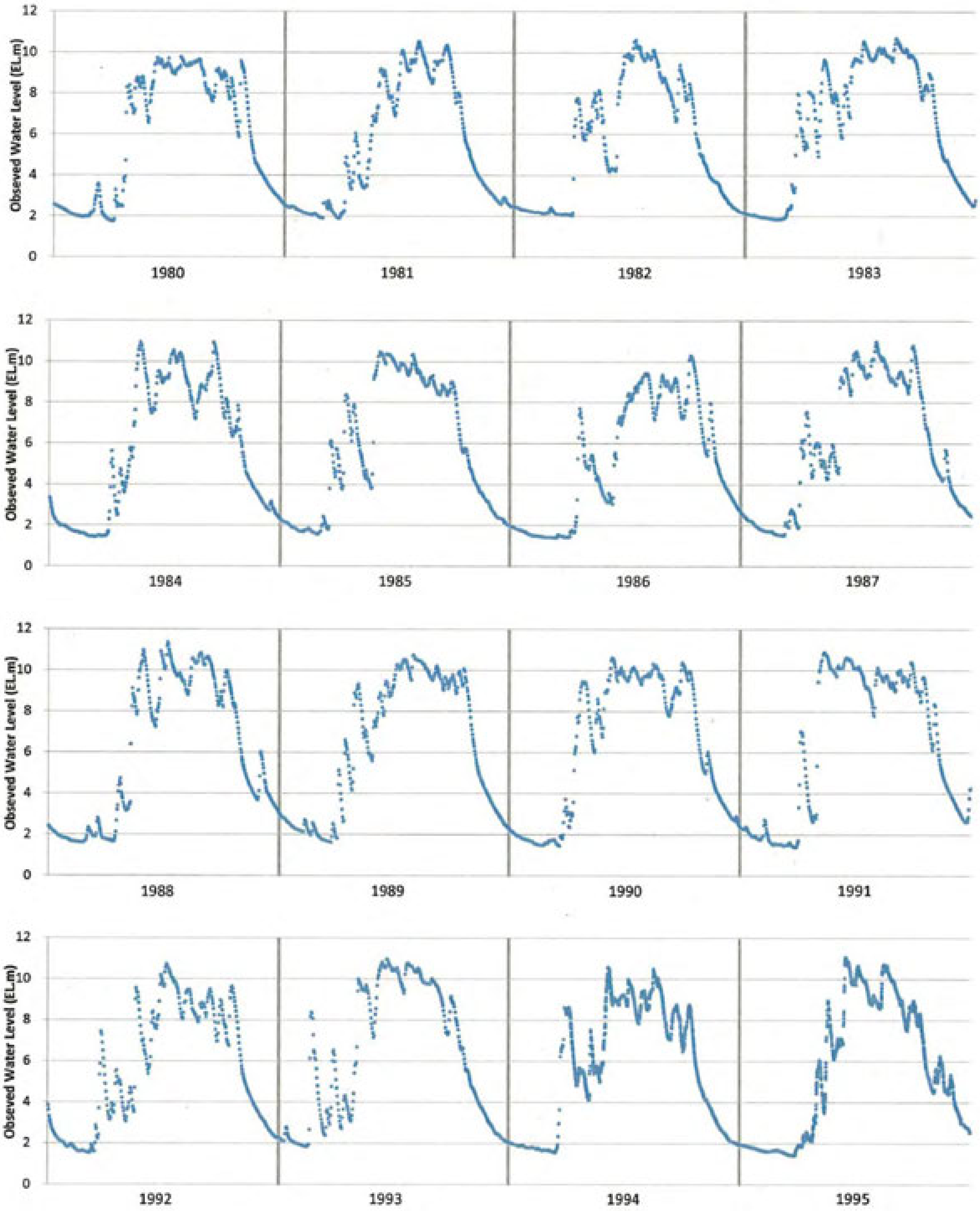
Source: JICA Study Team

Figure 3　Observed Water Levels at Sunamganj Station（1/2: 1980－1995）



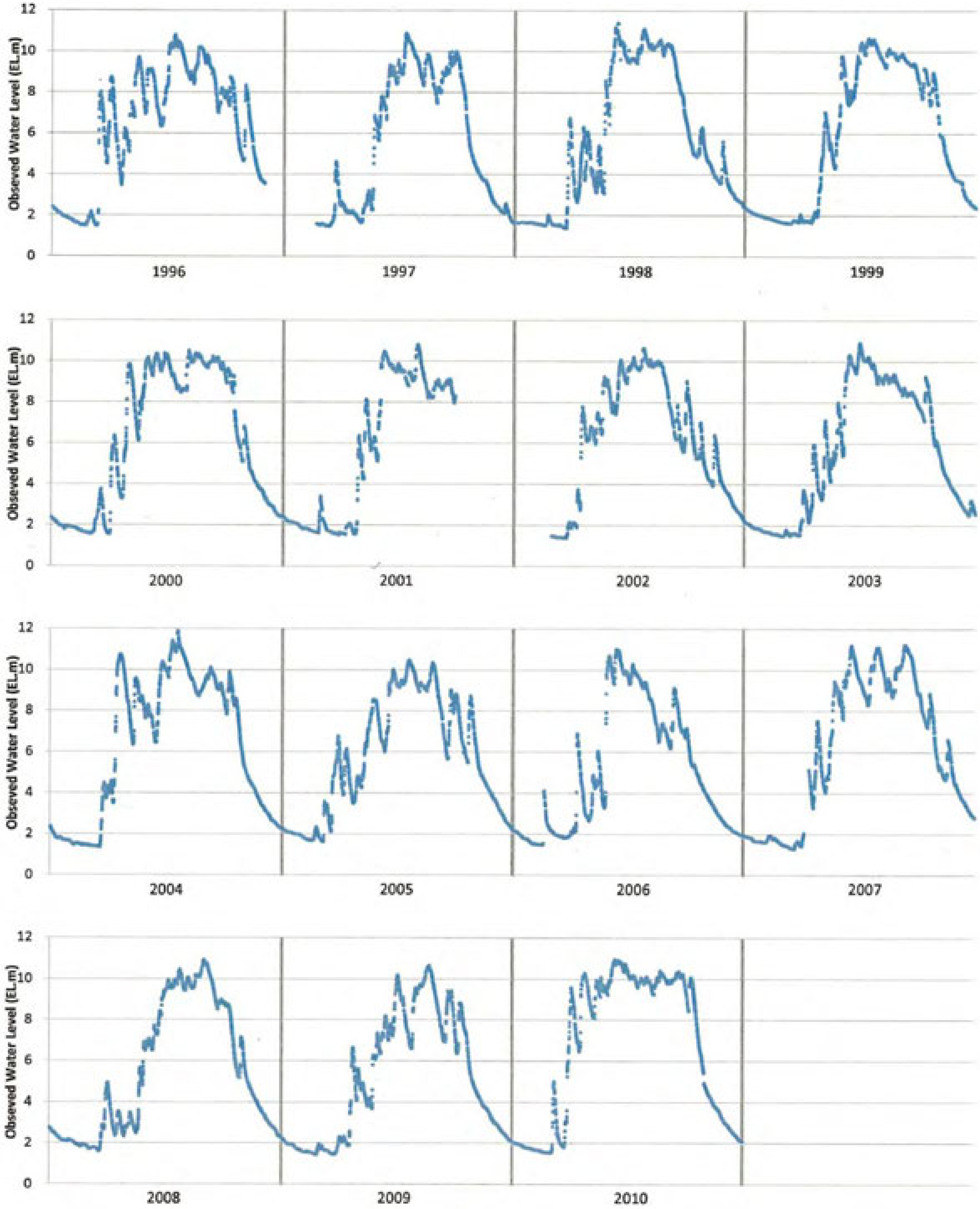
Source: JICA Study Team

Figure 3 Observed Water Levels at Sunamganj Station（2/2: 1996－2010）



Source: JICA Study Team

Figure 4 Observed Water Levels at Sylhet Station（1/2: 1980-1995）



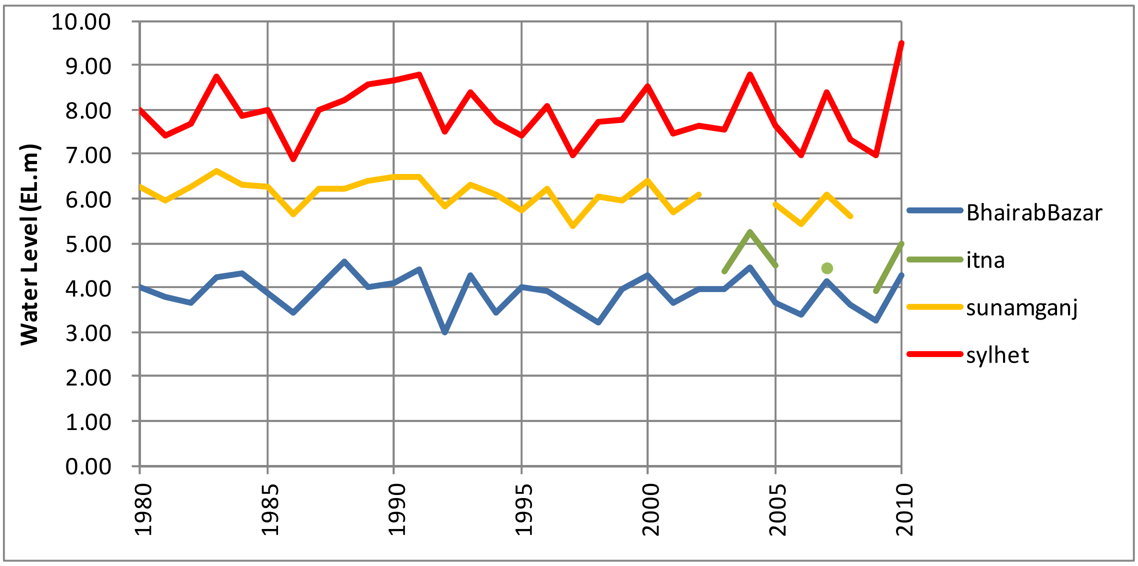
Source: JICA Study Team

Figure 4 Observed Water Levels at Sylhet Station（2/2: 1996－2010）

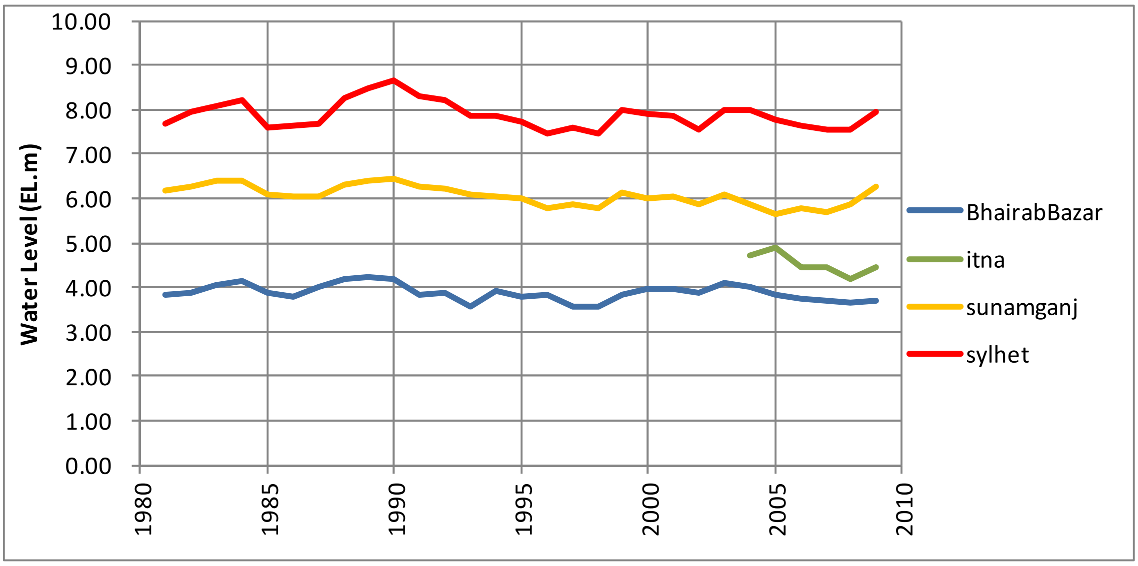
The annual average water levels during pre-monsoon and monsoon seasons, which were calculated using the corrected water levels in Table 1, and 3 year moving averages of the annual average water levels at the 4 stations are presented in Figure 5.

The observed water levels at Bhairab Bazar, Sunamganj and Sylhet after correction were used in the succeeding study, because unsteadiness of water levels such as change of long-term trend and jump (sudden change) is not found in Figure 5. The water level data at Itna were not used because of its short period data with data missing.

(a) Annual Average Water Level



(b) 3-year Moving Average of Annual Average Water Levels



Source: JICA Study Team

Figure 5 Chronological Change of Observed Water Levels during Pre-monsoon and Monsoon Seasons

2. Applicability of Flood Frequency Analysis Using Water Levels

Applicability of flood frequency analysis using not discharges but water levels was verified at the Sylhet station. The work flow of verification is as explained below (see Figure 6).

(1) Calculation of (a) probable water levels converted from probable discharges,
- Conversion of observed water levels (WLs) to observed discharges through H-Q curves prepared by the Study Team,
- Frequency analysis of the observed discharges, and
- Conversion of probable discharges to probable WLs through the H-Q curves.

(2) Calculation of (b) probable water levels estimated from observed water levels,
- Frequency analysis of observed WLs

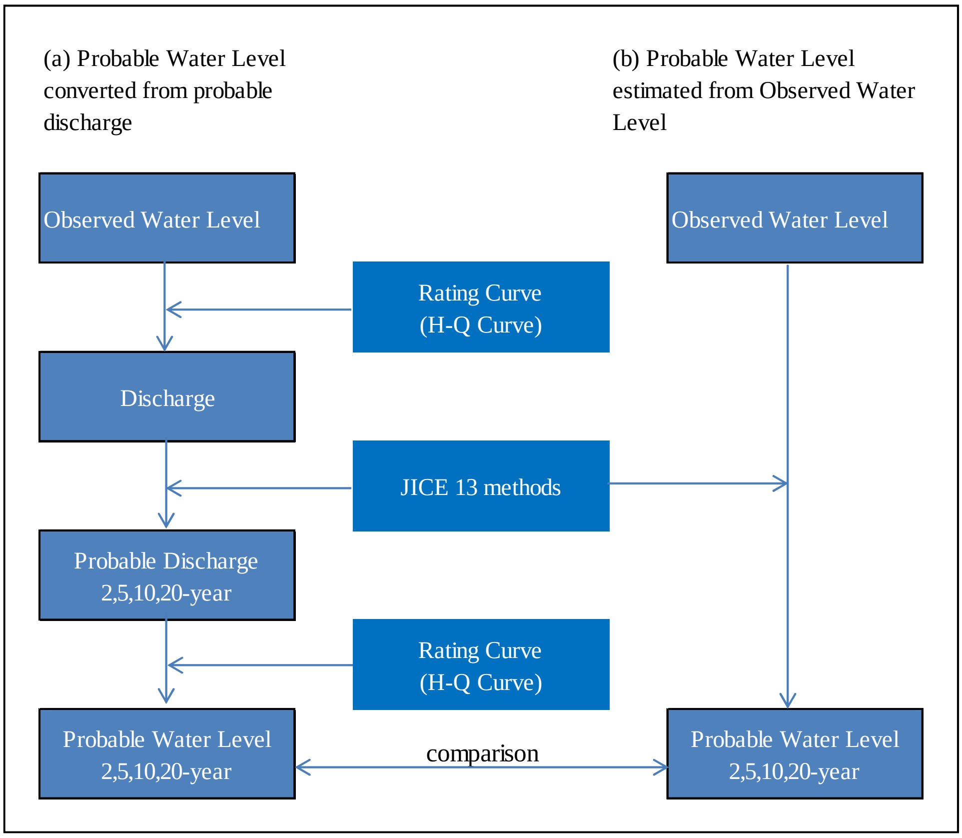
(3) Verification of applicability of frequency analysis using WLs through comparison between probable WLs (return periods: 2, 5, 10 and 20years) of the (a) and (b)

Selection criteria of probable distribution model in frequency analysis

The frequency analysis in the (1) and (2) was carried out for each of the pre-monsoon season (4/1-5/15) and monsoon season (5/16-10/31) by using annual maximum values during each season and the hydrological statistic utility program developed by Japan Institute of Country-ology and Engineering (JICE).

Out of 13 probable distribution models for annual events, the model which has an index of “Standard Least Square Criterion (SLSC)” of less than 0.04 and a comparatively smaller “Jackknife Estimation Error” was selected as an optimum one, referring to “Technical Criteria for River Works: Practical Guide (Investigation; Japanese Ministry of Land, Infrastructure, Transport and Tourism, June 2012)”

If each model has a SLSC index of more than 0.04, the model which has a comparatively smaller value as the index of “Akaike's Information Criterion (AIC)” was selected, after confirming its adaptability on a probability paper in 10 and 20 year return period cases.



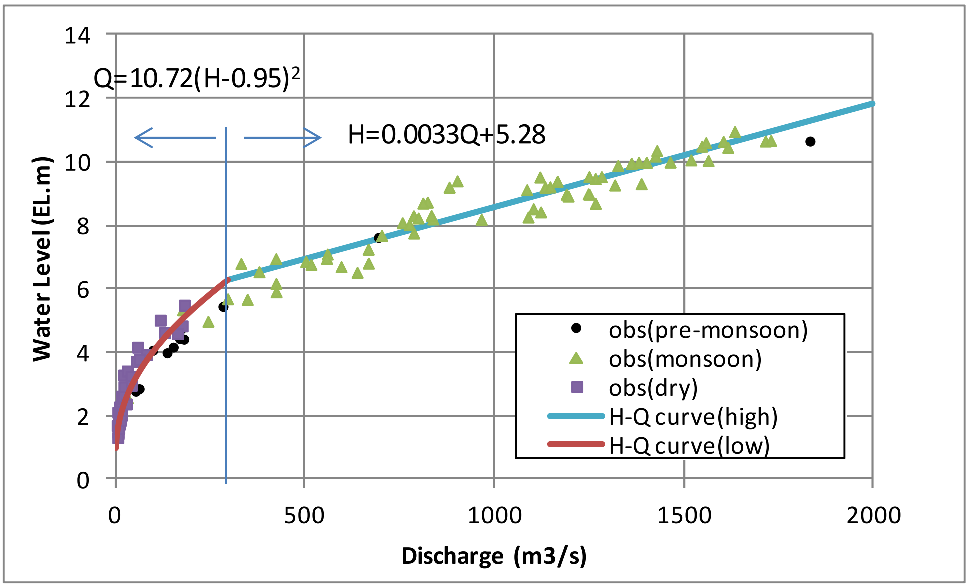
Source: JICA Study Team

Figure 2 Comparison between Frequency Analyses Using Water Levels and Discharges

Preparation of H-Q Curve

A H-Q curve was worked out based on discharge measurement data (2003－2009) at Sylhet. Taking into account the dates of discharge measurements, the measured discharges were divided into two flow conditions, namely low and flood flows, with a threshold of 300m^3/s, and H-Q formulas: $Q=a(H+b)^2$ and $H=aQ+b$ were applied to low and flood flows, respectively, as shown in Figure 7. The coefficients of “a” and “b” were calculated by the “Least Squares Method”.

In this study, the correlation coefficient is employed as an index to assess adaptability of the H-Q curve. The correlation coefficients of the H-Q curve in Figure 7 have rather high values of 0.94 and 0.95 for low and flood flows, respectively.

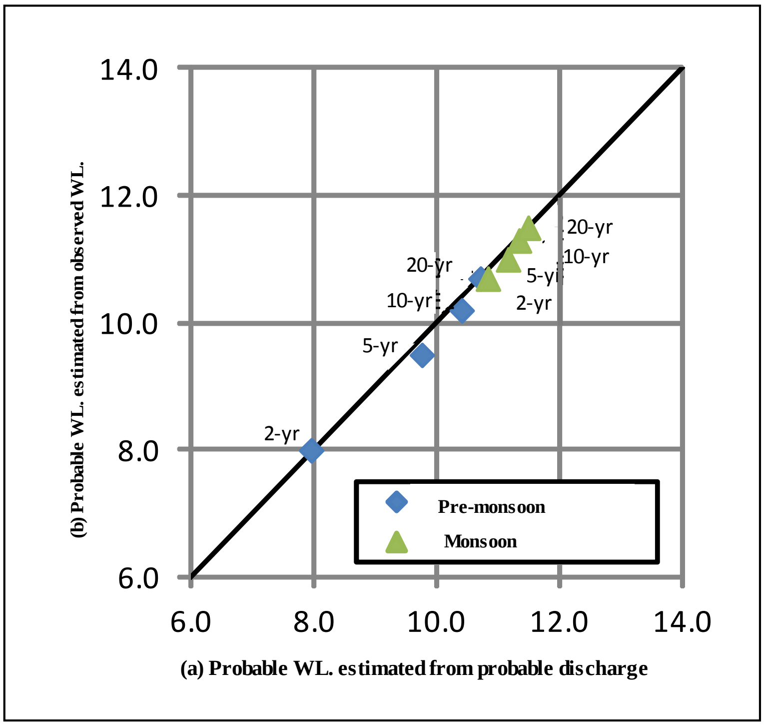


Source: JICA Study Team

Figure 7 H-Q Curve at Sylhet Station

Figure 8 presents comparison between probable WLs of the (a) and (b) above, wherein 2, 5, 10 and 20 year water levels during pre-monsoon and monsoon seasons are plotted. As the probable WLs of (a) and (b) show similar tendency in Figure 8, the applicability of frequency analysis using water levels was confirmed. Table 2 and Figures 9 to 12 present the results of the above mentioned frequency analyses.

It is noted that each probability distribution model has an SLSC index of more than 0.04 in selection optimum ones for probable discharges and probable water levels during the monsoon season. Therefore, probability distribution models were selected based on AIC indices and their adaptability on probability papers (see Figures 10 and 12 for the results on frequency analyses of observed discharge and observed water levels, respectively).



Source: JICA Study Team

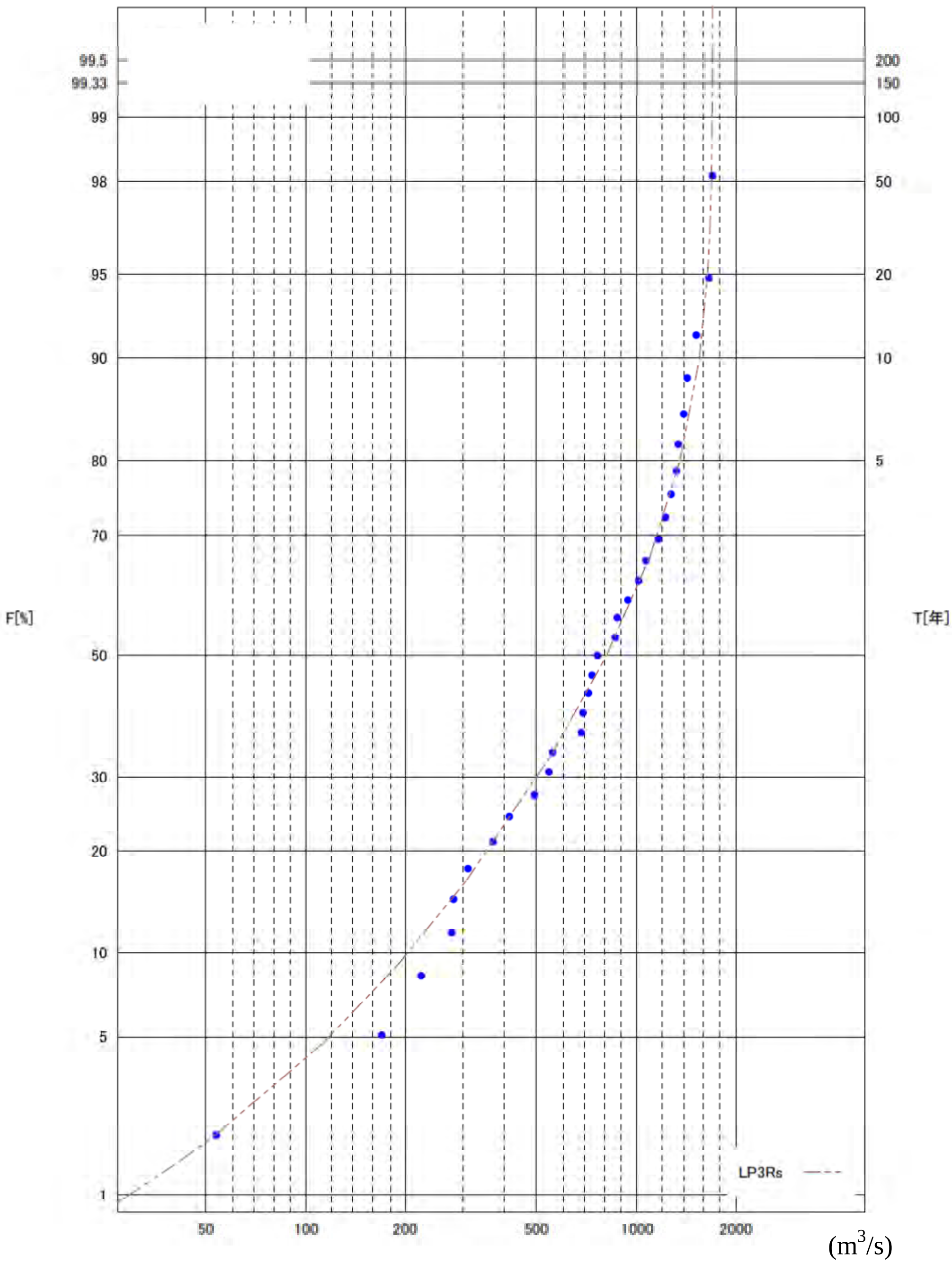
Figure 8 Comparison between Probable Water Levels Analyzed Using Observed Discharges and Observed Water Levels

Table 2 Probable Water Levels at Sylhet Estimated from Probable Discharges and Observed Water Levels

Sylhet Station		Pre-monsoon Season			Monsoon Season		
Estimation Method		(a) Probable Discharge		(b) Observed WL.	(a) Probable Discharge		(b) Observed WL.
		Discharge	Water Level	Water Level	Discharge	Water Level	Water Level
Probability Distribution Function		LP3Rs	-	GEV	LN2PM	-	Gumbel
Parameter Estimation Method			-	L-moment method	Moment method	-	L-moment method
Estimated value by Jackknife method	1/2	812	8.0	8.0	1,681	10.8	10.7
	1/5	1,356	9.8	9.5	1,780	11.2	11.0
	1/10	1,552	10.4	10.2	1,834	11.3	11.3
	1/20	1,644	10.7	10.7	1,879	11.5	11.5
Estimated Error by Jackkhife method	1/2	127	-	0.4	20	-	0.1
	1/5	87	-	0.3	28	-	0.1
	1/10	96	-	0.3	37	-	0.1
	1/20	129	-	0.4	46	-	0.2
SLSC		0.030	-	0.024	0.058	-	0.056
Correlation (X-COR)		0.984	-	0.994	0.964	-	0.963
pAIC		0.0	-	127.4	363.3	-	47.2
Number of sample		31	-	31	31	-	31

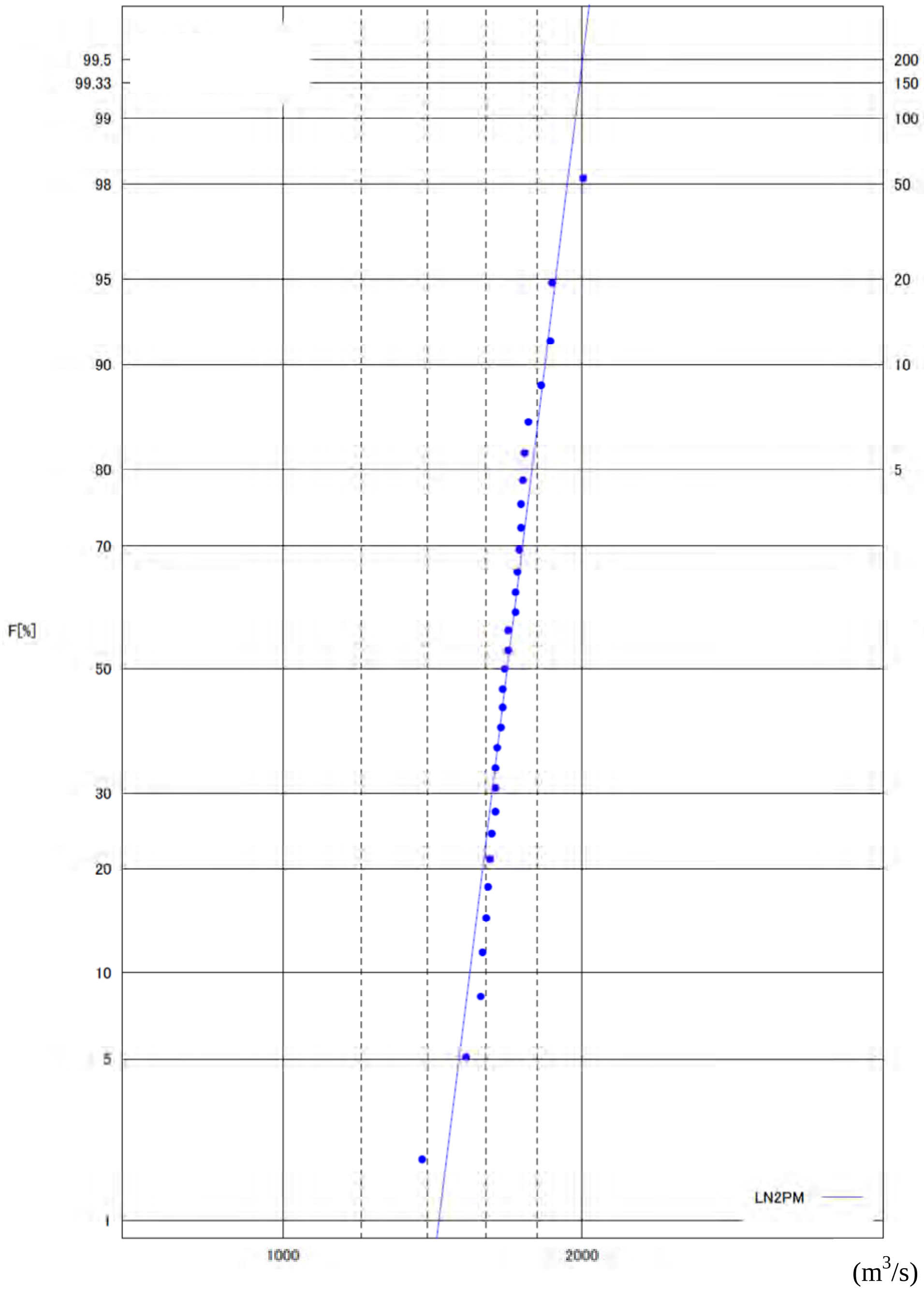
Note: LP3Re: Log Poison Type III Distribution (Real space method),
GEV: Generalized Extreme Value Distribution, LN2PM: Log Normal Distribution (2 parameter)
Gumbel: Gumbel Distribution

Source: JICA Study Team



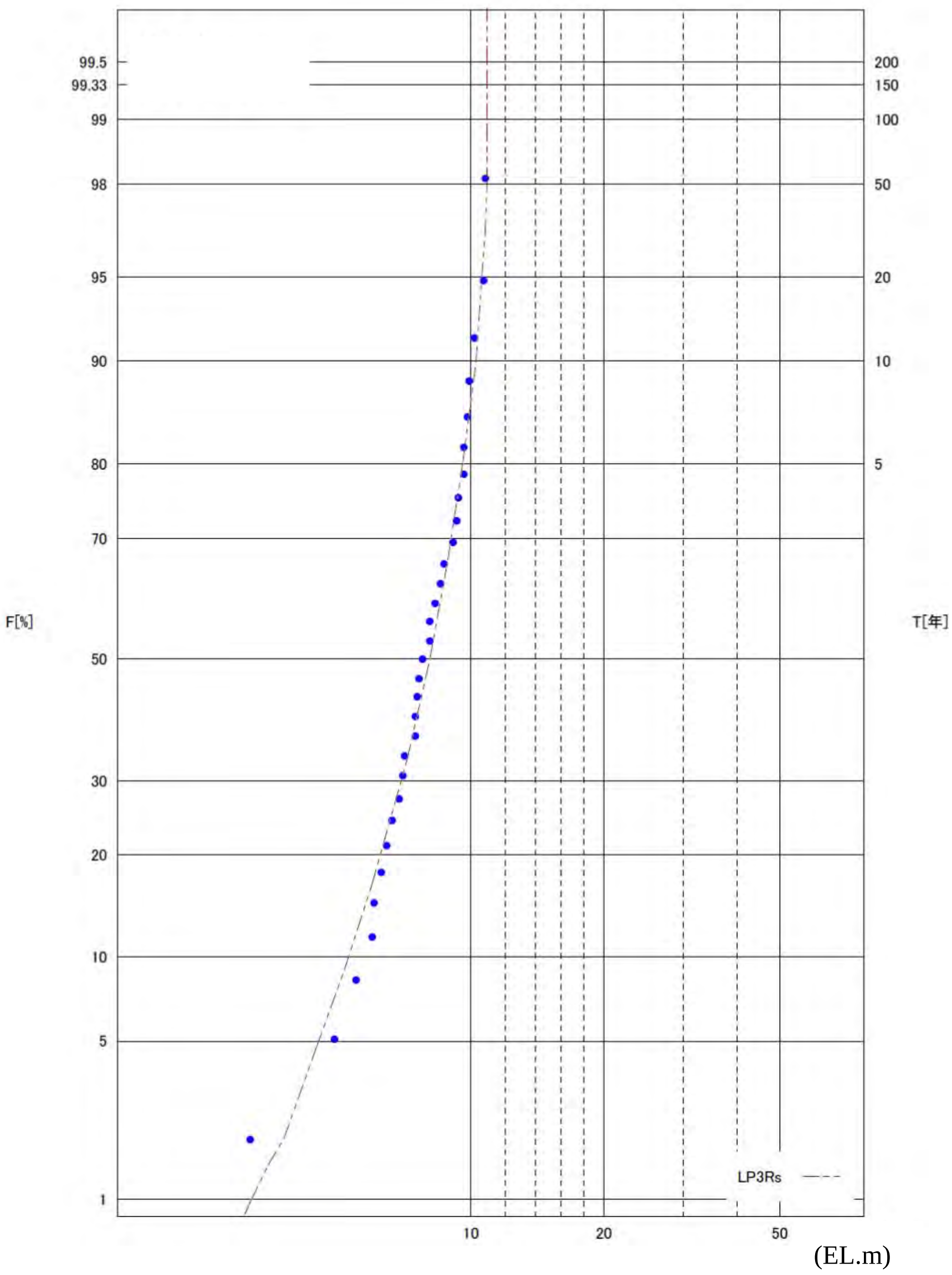
Source: JICA Study Team

Figure 9 Frequency Analysis of Discharge Data in Pre-monsoon Season at Sylhet Station



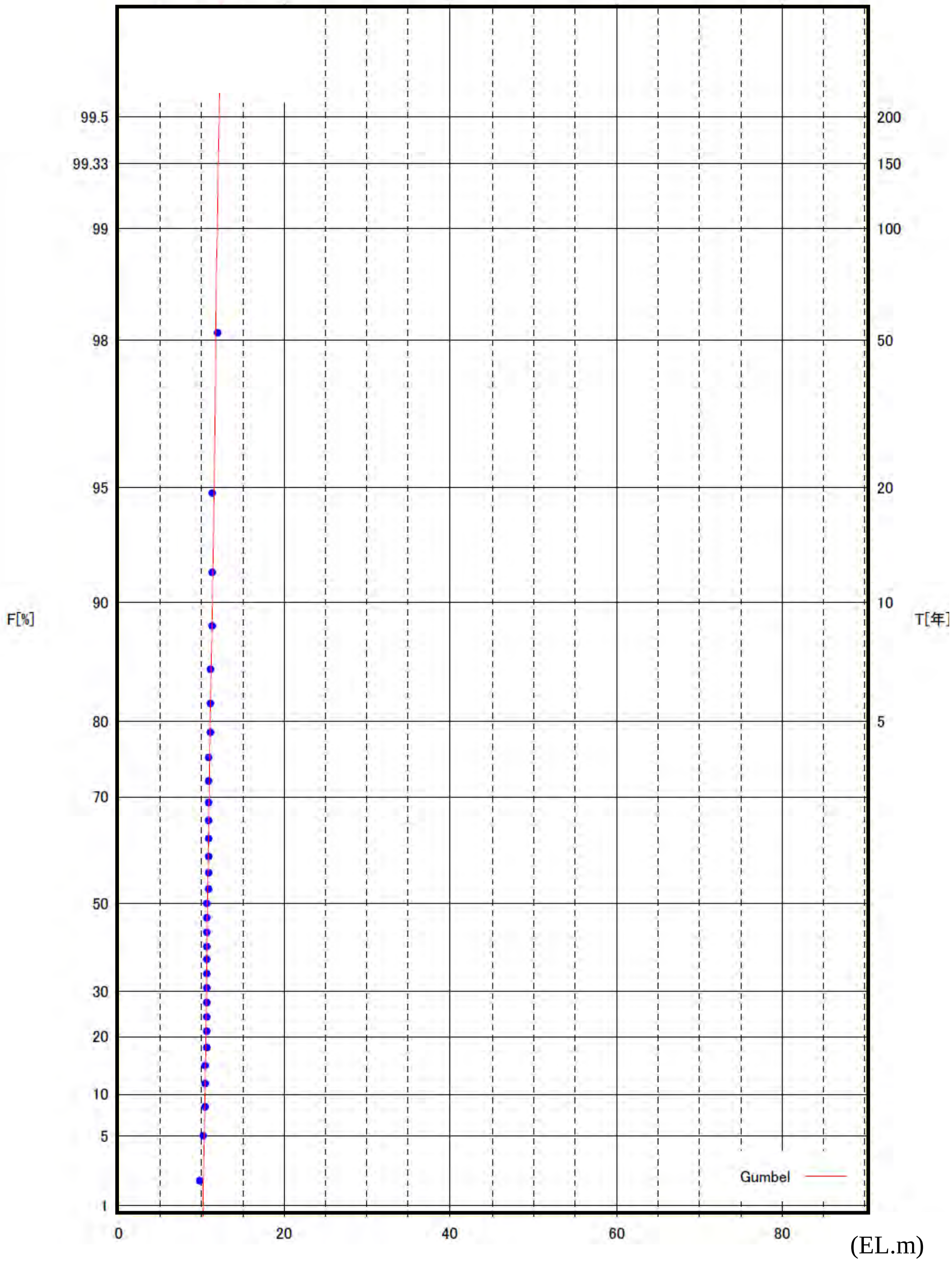
Source: JICA Study Team

Figure 10 Frequency Analysis of Discharge Data in Monsoon Season at Sylhet Station



Source: JICA Study Team

Figure 11 Frequency Analysis of Observed Water Level in Pre-monsoon Season at Sylhet Station



Source: JICA Study Team

Figure 12 Frequency Analysis of Observed Water Level in Monsoon Season at Sylhet Station

3. Applicability of Frequency Analysis Using Simulated Water Levels

The applicability of frequency analysis using simulated water levels has been verified at Bhairab Bazar, Sunamganj and Sylhe stations by comparing with the results of frequency analysis using observed water levels. The Itna station is excluded in this verification because the number of available observed water level data at this station is small.

In Figure 13, the annual maximum observed and simulated water levels are compared for pre-monsoon and monsoon seasons. As seen in Figure 13, the observed and simulated water levels at Bhairab Bazar are mostly the same, while there is a tendency that the observed water levels are higher than the simulated ones at Sunamganj and Sylhet. Thus, three stations have different tendency from one another. However, it is assessed that there is no data plotted extremely far from the bold lines at these stations.

In Figure 14, compared are 2, 5, 10 and 20 year water levels calculated for pre-monsoon and monsoon seasons using observed and simulated water levels.

There is no significant difference between them at Bhairab Bazar. On the other hand, at Sunamganj and Sylhe, though a similar tendency is seen in Figure 14, the probable water levels of observed ones are bigger: in the case of the 2 year water level at Sylhet during pre-monsoon season, the difference is 60 cm.

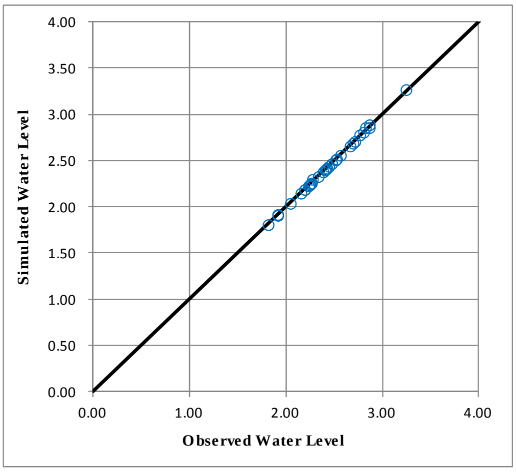
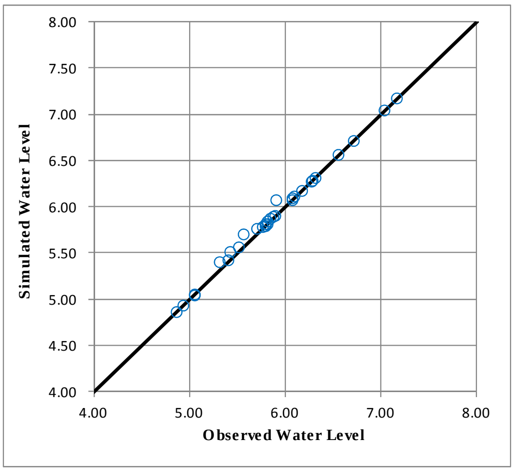
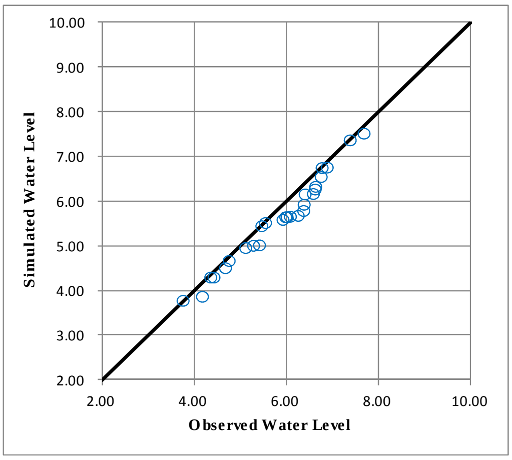
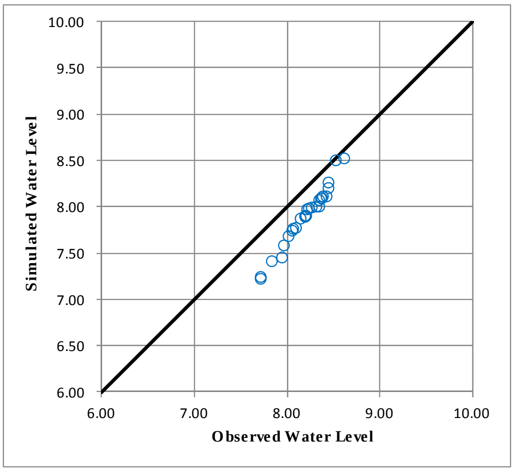
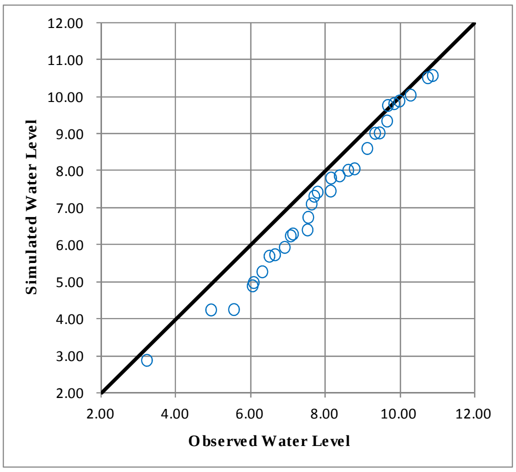
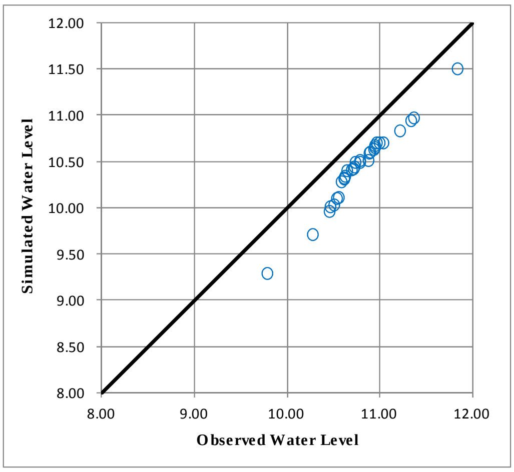
Furthermore, the pre-monsoon difference of the 10 year water levels is 30 cm at maximum at Sunmganj, and the monsoon difference of the 20 year waters is 40 cm at maximum at Sylhet. A 10 year pre-monsoon water level and a 20 year monsoon water level are used for design of submergible and full embankments, respectively. Tables 3 to 5 and Figures 15 to 26 present the results of frequency analyses at the 3 stations.

Each probability distribution model has an SLSC index of more than 0.04 in both observed and simulated water level cases at Sylhet during the monsoon season. Therefore, probability distribution models were selected based on AIC indices and also their adaptability on probability papers (see Figures 25 and 26 for frequency analyses of observed and simulated water levels, respectively)

The analysis results mentioned above are summarized as stated below:

(1) The probable WLs of observed ones are bigger than those of simulated WLs at Sunamganj and Sylhet.

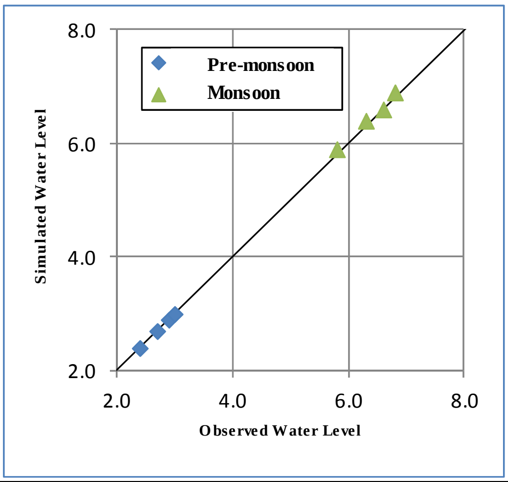
(2) The maximum difference of 10 year pre-monsoon water levels for design of submergible embankment is 30 cm and the maximum difference of 20 year monsoon water levels for design of full embankment is 40 cm.

Pre-monsoon Season	Monsoon Season
Bhairab Bazar	
	
Sunamganj	
	
Sylhet	
	

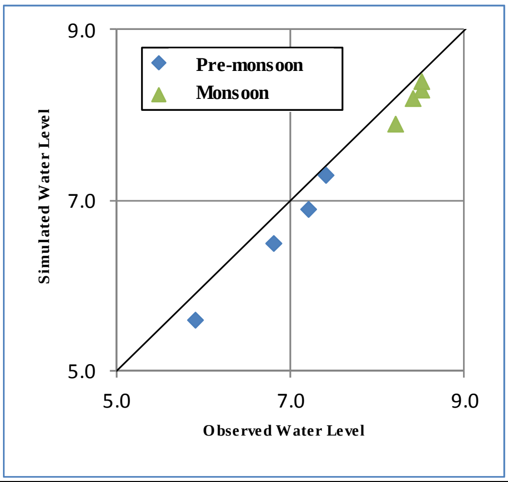
Source: JICA Study Team

Figure 13 Comparison of Maximum Water Levels between Observed and Simulated WLs in Pre-monsoon Season(4/1-5/15) and Monsoon Season(5/16-10/31)

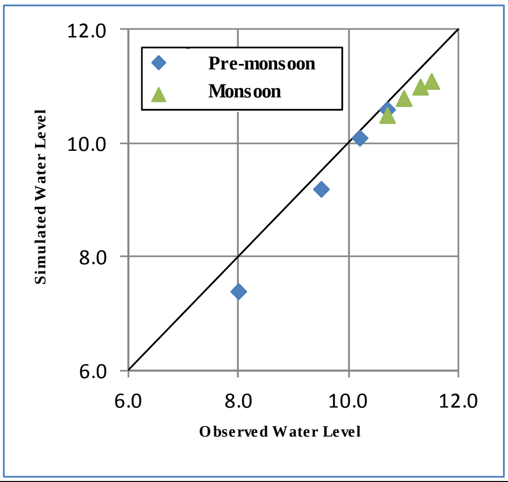
Bhairab Bazar



Sunamganj



Sylhet



Note: Probable water levels are estimated to 2, 5, 10 and 20-year return periods.

Source: JICA Study Team

Figure 14 Comparison of Probable Water Levels between Observed and Simulated Water Levels (Pre-monsoon and Monsoon Seasons)

Furthermore, it could be pointed out that the following are included in the causes of the (1) and (2) above :

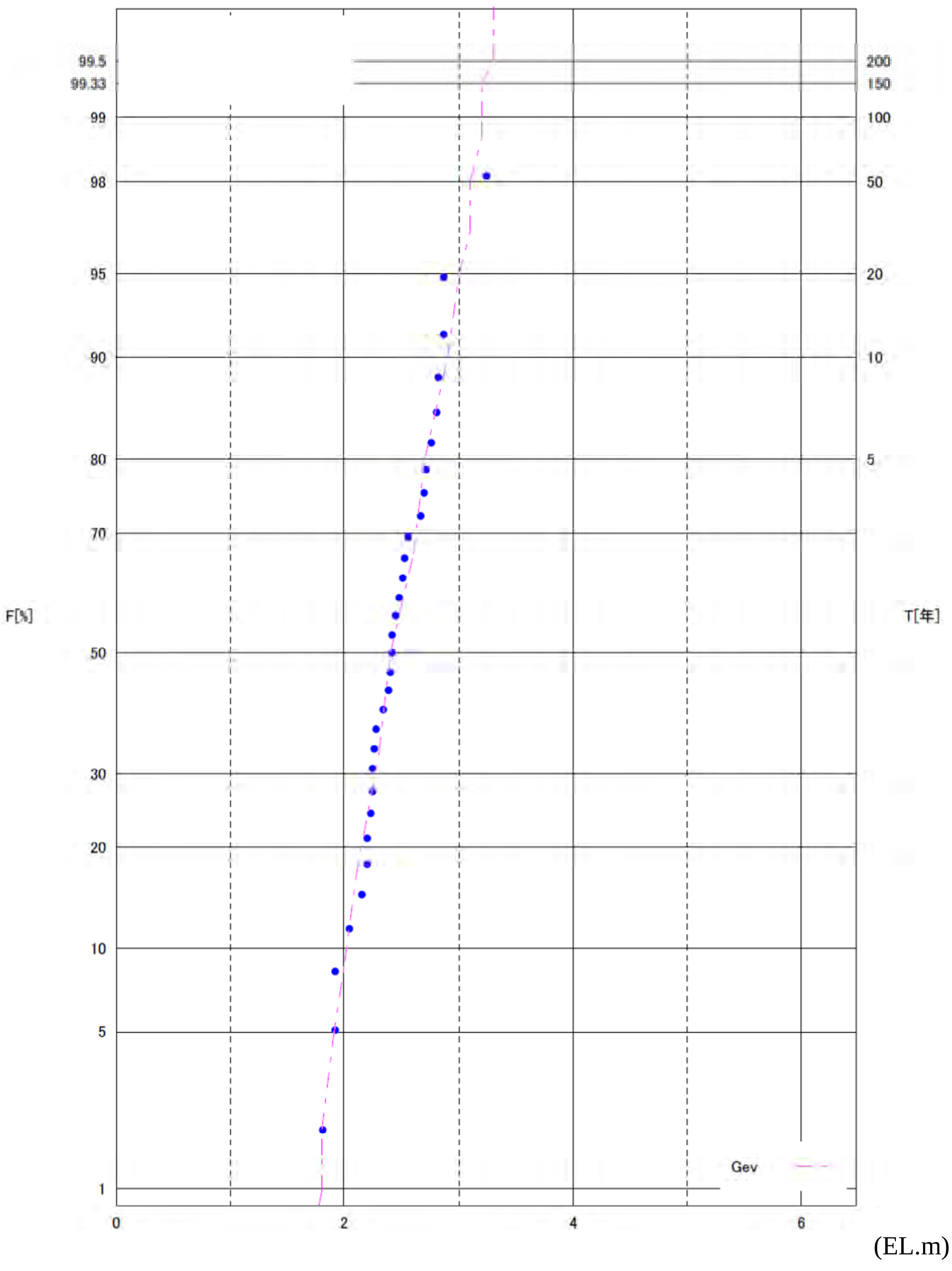
- Since the observed WLs for 31 years (1980-2010) are corrected with one constant correction value for each station, the WLs after correction fail to properly reflect the actual chronological changes due to river bed/channel movement, settlement, etc. in the haor area. And
- Since the simulation of water levels is carried out by using the meteoro-hydrologic data from 1980 to 2010 and current river cross sections, the reproducibility of water levels under past river conditions is not necessarily high.

Table 3 Probable Water Levels Estimated by Observed and Simulated Water Levels at Bhairab Bazar

Bhairab Bazar Station		Pre-monsoon Season			Monsoon Season		
		Observed WL.	Simulated WL.	Obs. - Sim.	Observed WL.	Simulated WL.	Obs. - Sim.
Probability Distribution Function		GEV	GEV		GEV	LN3PM	
Parameter Estimation Method		L-moment method	L-moment method		L-moment method	Ishihara-Takase	
Estimated value by Jackknife method	1/2	2.4	2.4	0.0	5.8	5.9	-0.1
	1/5	2.7	2.7	0.0	6.3	6.4	-0.1
	1/10	2.9	2.9	0.0	6.6	6.6	0.0
	1/20	3.0	3.0	0.0	6.8	6.9	-0.1
Estimated Error by Jackkhife method	1/2	0.1	0.1		0.1	0.1	
	1/5	0.1	0.1		0.1	0.1	
	1/10	0.1	0.1		0.2	0.2	
	1/20	0.1	0.1		0.2	0.2	
SLSC		0.036	0.033		0.036	0.039	
Correlation (X-COR)		0.991	0.992		0.987	0.984	
pAIC		22.2	23.2		55.7	55.4	
Number of sample		31	31		31	31	

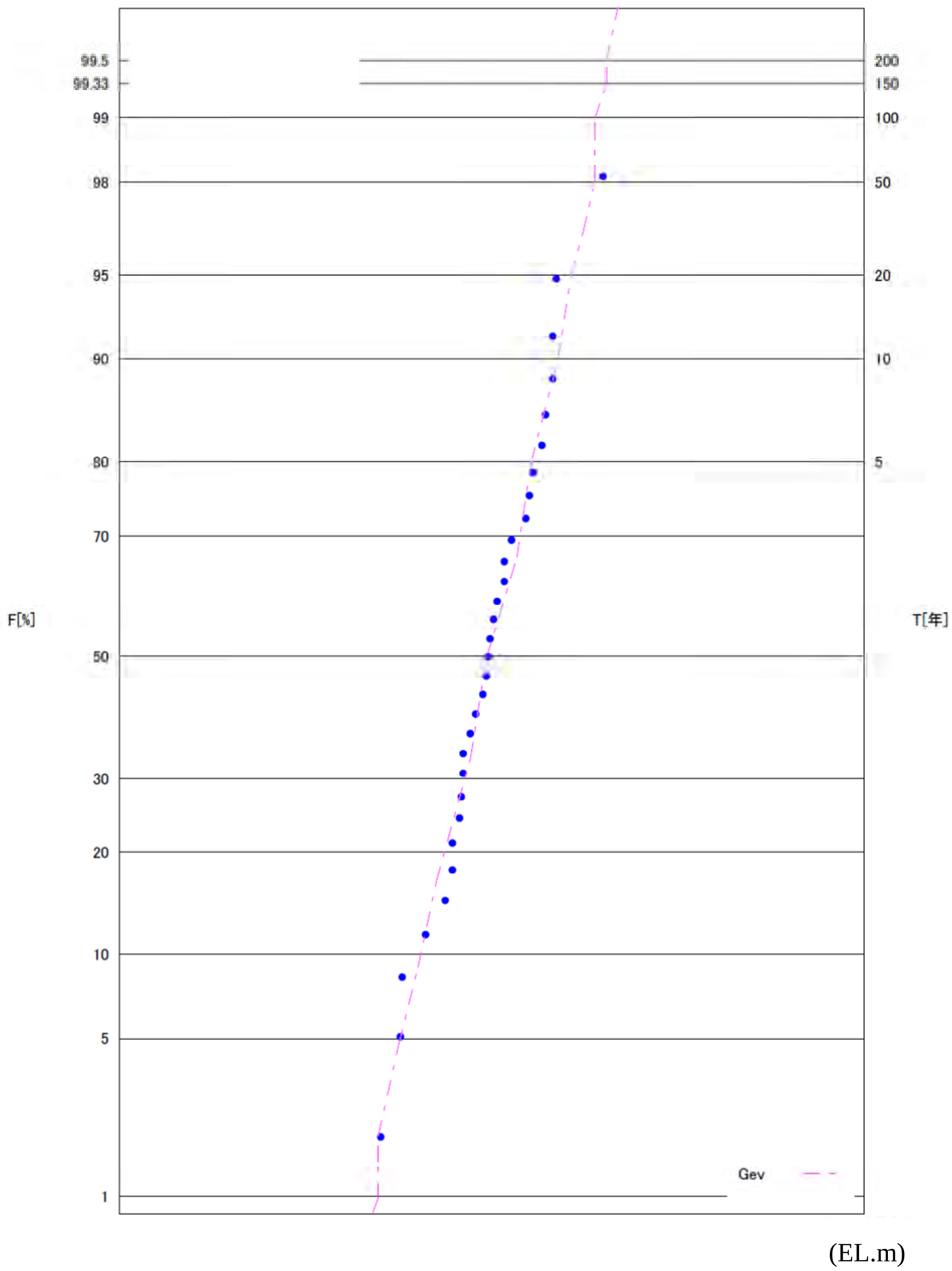
Note: GEV: Generalized Extreme Value Distribution, LN3PM: 3parameter Log normal Distribution

Source: JICA Study Team



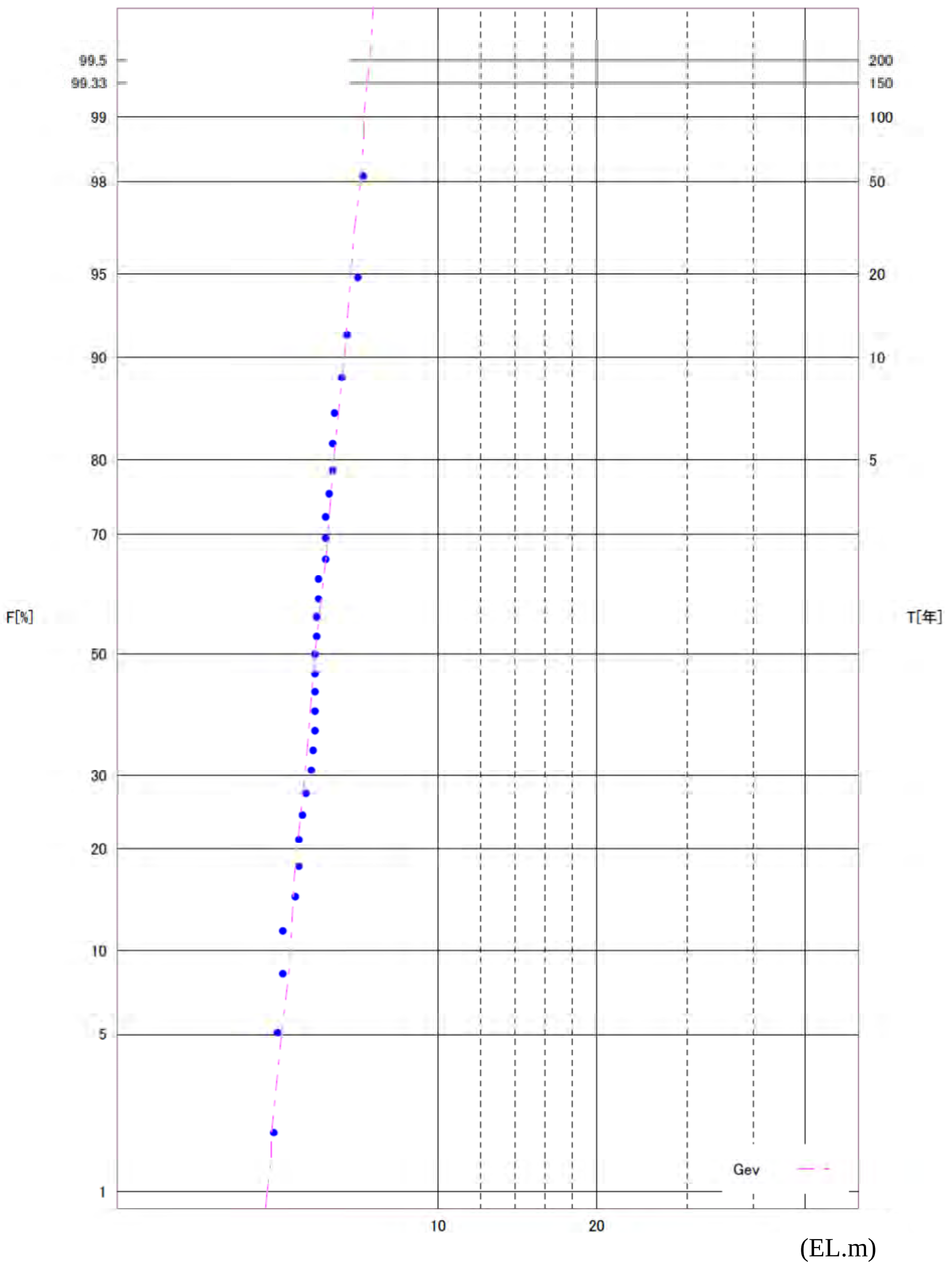
Source: JICA Study Team

Figure 15 Frequency Analysis of Observed Water Level in Pre-monsoon Season at Bhairab Bazar Station



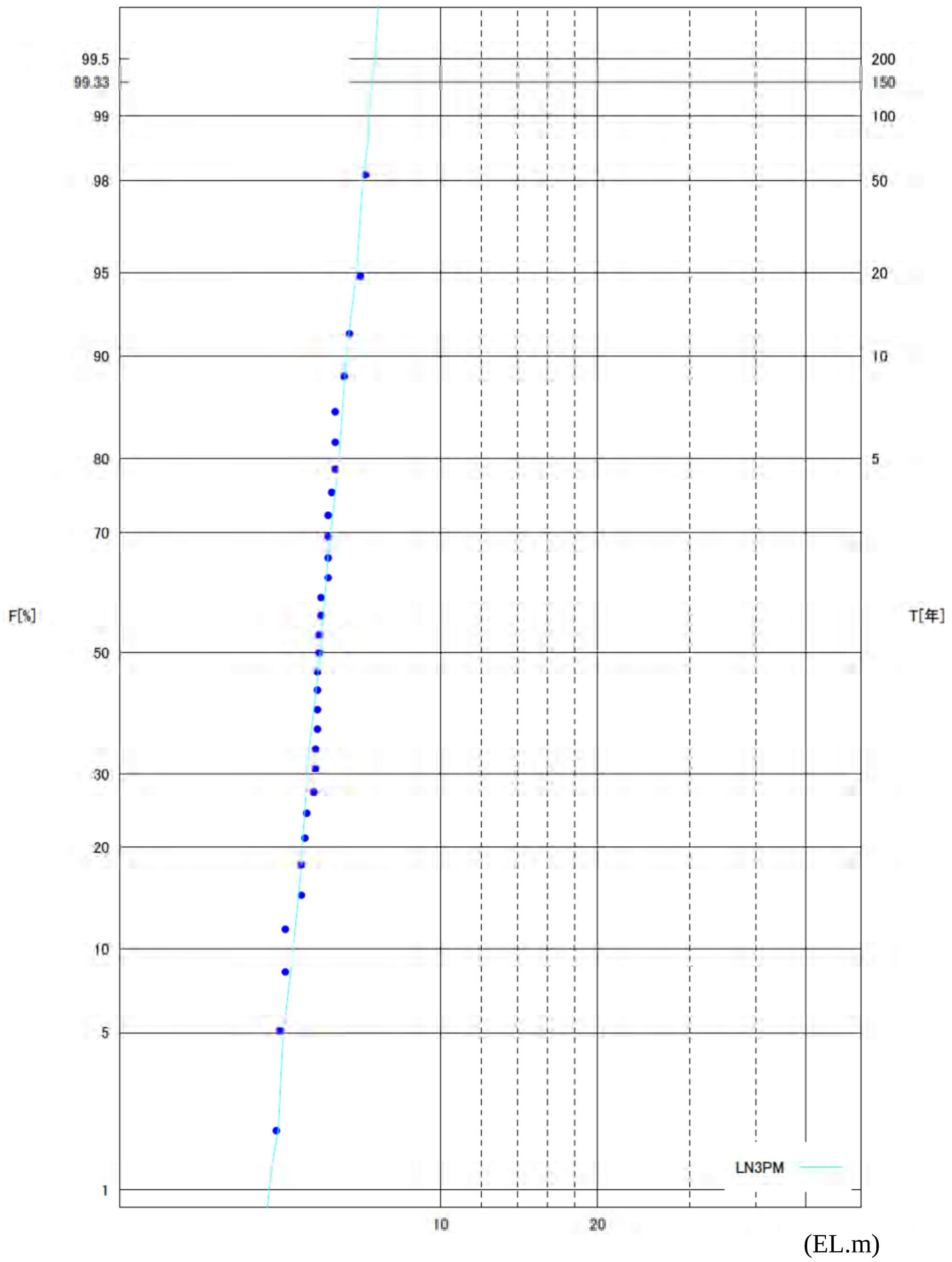
Source: JICA Study Team

Figure 16 Frequency Analysis of Simulated Water Level in Pre-monsoon Season at Bhairab Bazar Station



Source: JICA Study Team

Figure 17 Frequency Analysis of Observed Water Level in Monsoon Season at Bhairab Bazar Station



Source: JICA Study Team

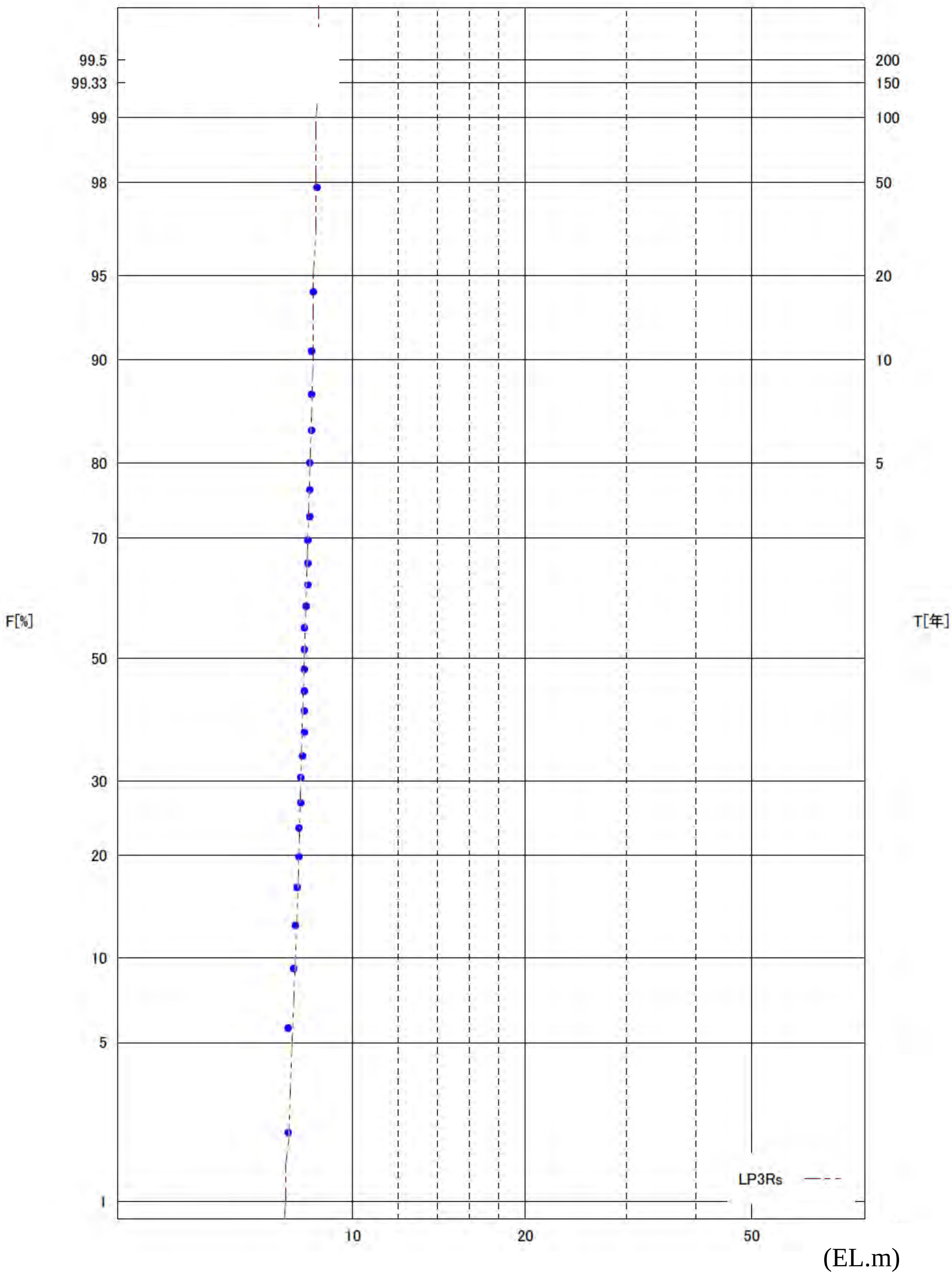
Figure 18 Frequency Analysis of Simulated Water Level in Monsoon Season at Bhairab Bazar Station

Table 4 Probable Water Levels Estimated by Observed and Simulated Water Levels at Sunamganj

Sunamganj Station		Pre-monsoon Season			Monsoon Season		
		Observed WL.	Simulated WL.	Obs. - Sim.	Observed WL.	Simulated WL.	Obs. - Sim.
Probability Distribution Function		LP3Rs	LP3Rs		LP3Rs	LP3Rs	
Parameter Estimation Method							
Estimated value by Jackknife method	1/2	5.9	5.6	0.3	8.2	7.9	0.3
	1/5	6.8	6.5	0.3	8.4	8.2	0.2
	1/10	7.2	6.9	0.3	8.5	8.3	0.2
	1/20	7.4	7.3	0.1	8.5	8.4	0.1
Estimated Error by Jackkhife method	1/2	0.2	0.2		0.0	0.1	
	1/5	0.2	0.2		0.0	0.1	
	1/10	0.2	0.2		0.0	0.1	
	1/20	0.3	0.3		0.1	0.1	
SLSC		0.030	0.029		0.027	0.039	
Correlation (X-COR)		0.991	0.992		0.993	0.983	
pAIC		81.3	80.3		0.1	20.1	
Number of sample		27	27		28	28	

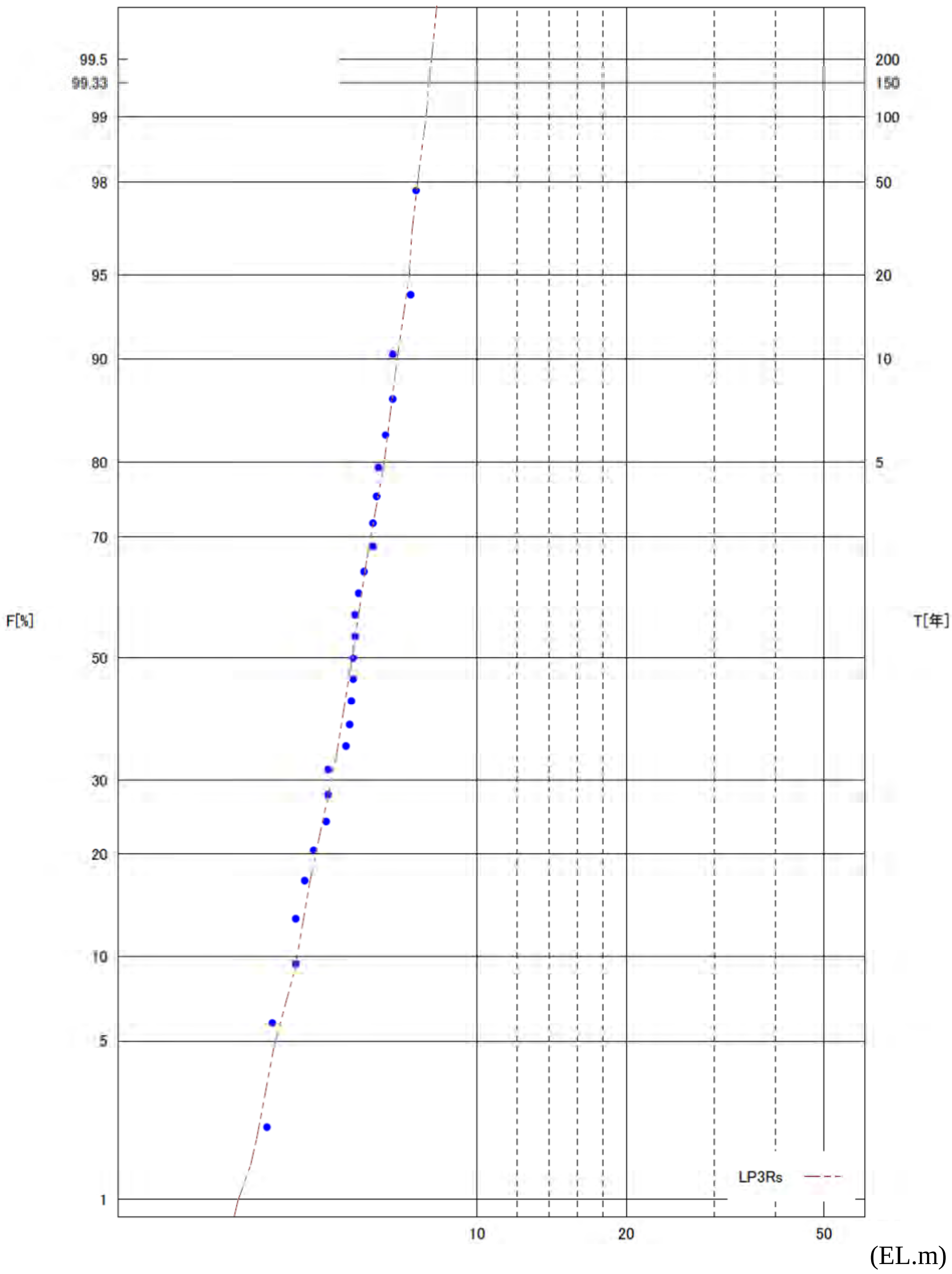
Note: LP3Rs: Log Poison Type III Distribution (Real space method)

Source: JICA Study Team



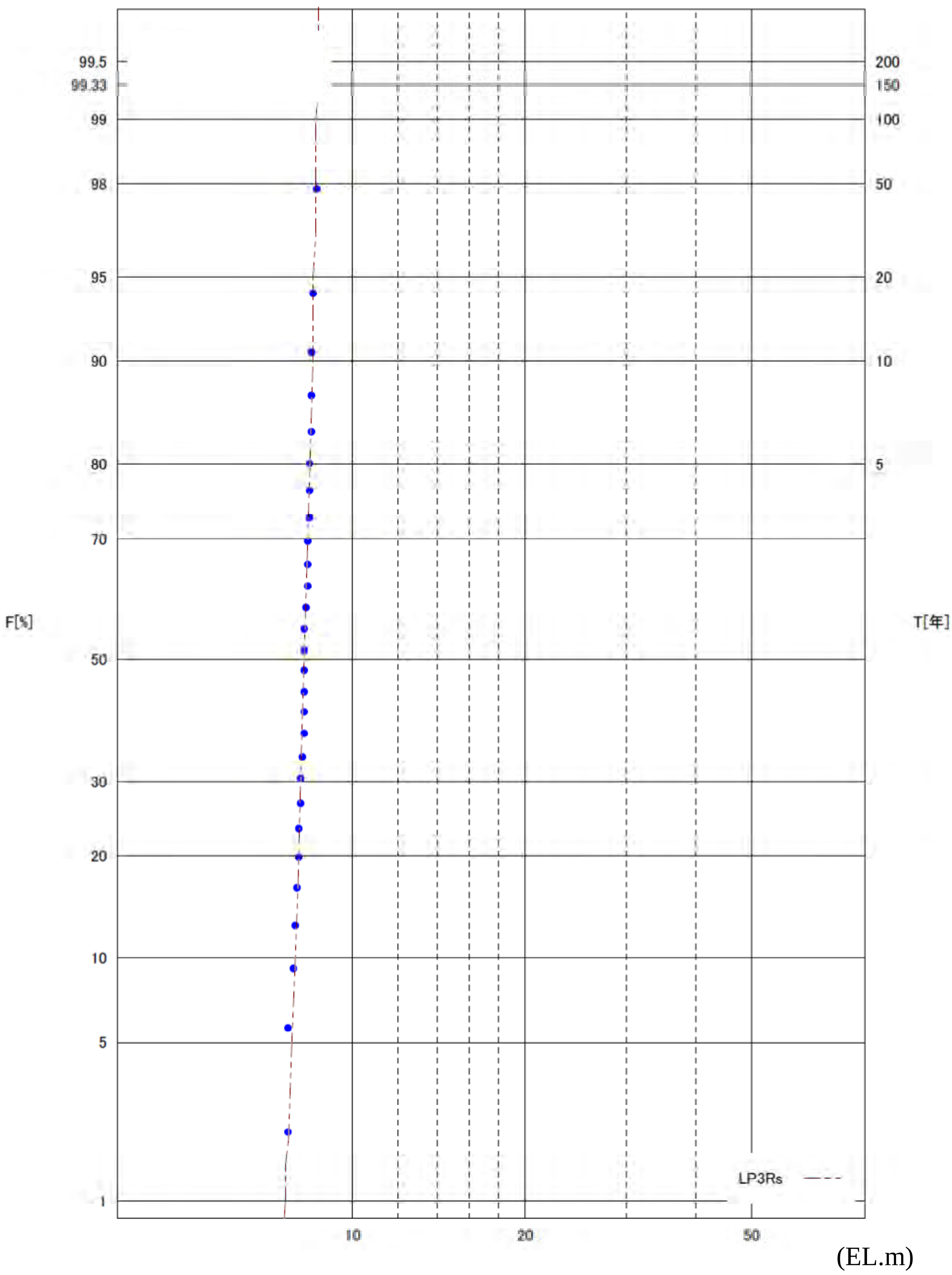
Source: JICA Study Team

Figure 19 Frequency Analysis of Observed Water Level in Pre-monsoon Season at Sunamganj Station



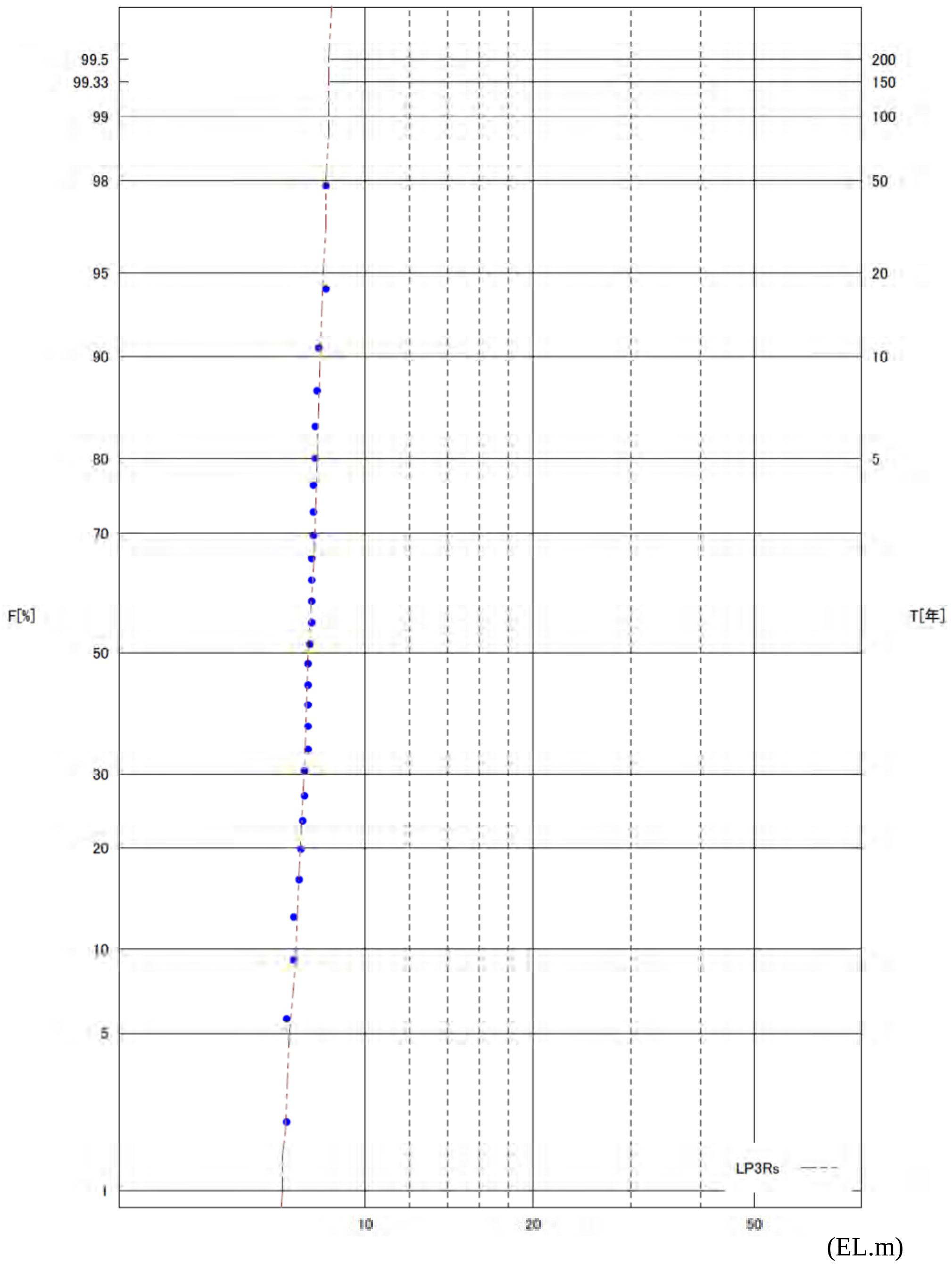
Source: JICA Study Team

Figure 20 Frequency Analysis of Simulated Water Level in Pre-monsoon Season at Sunamganj Station



Source: JICA Study Team

Figure 21 Frequency Analysis of Observed Water Level in Monsoon Season at Sunamganj Station



Source: JICA Study Team

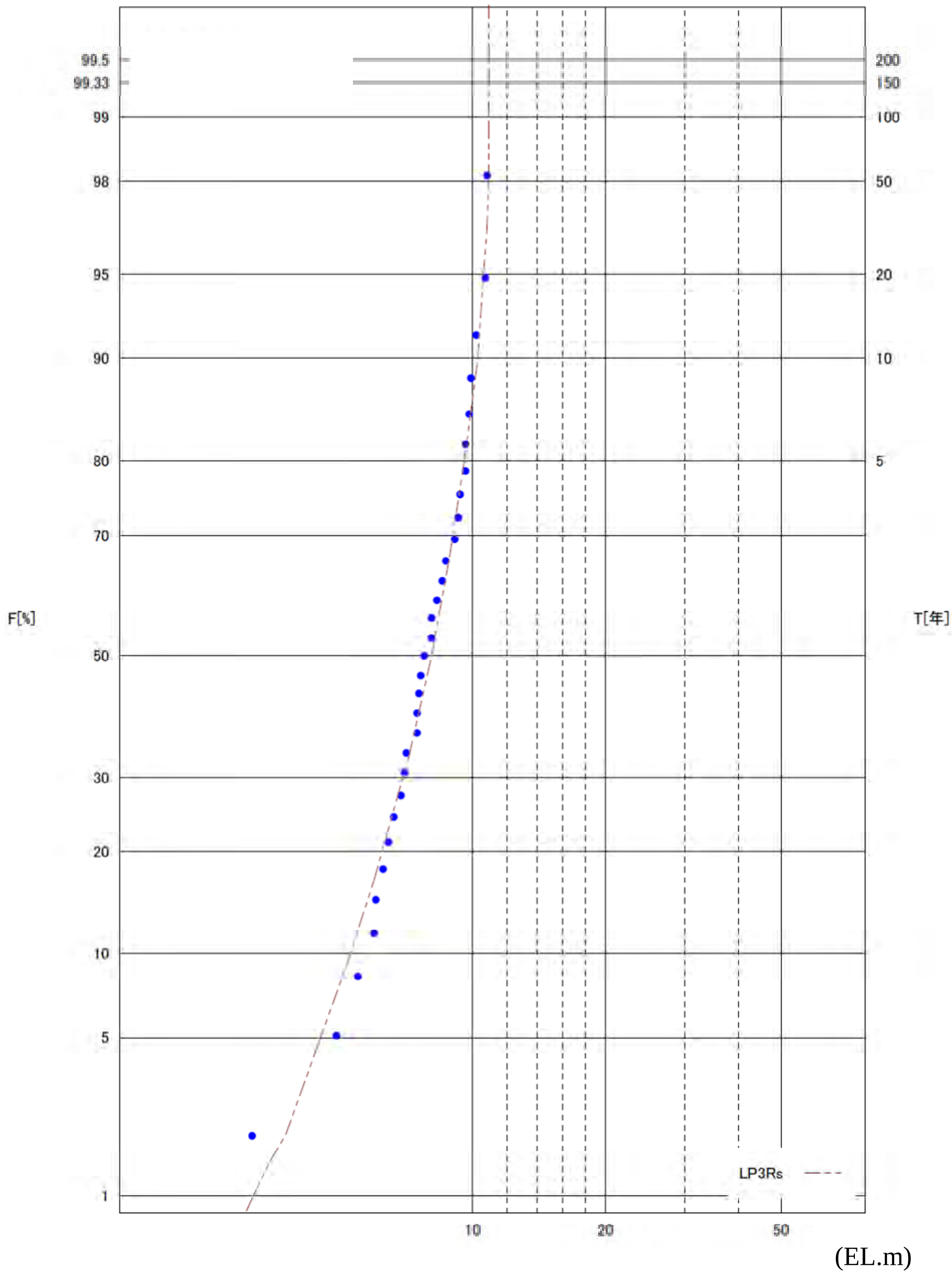
Figure 22 Frequency Analysis of Simulated Water Level in Monsoon Season at Sunamganj Station

Table 5 Probable Water Levels Estimated by Observed and Simulated Water Levels at Sylhet

Sylhet Station		Pre-monsoon Season			Monsoon Season		
		Observed WL.	Simulated WL.	Obs. - Sim.	Observed WL.	Simulated WL.	Obs. - Sim.
Probability Distribution Function		GEV	LP3Rs		Gumbel	LP3Rs	
Parameter Estimation Method		L-moment method			L-moment method	Moment method	
Estimated value by Jackknife method	1/2	8.0	7.4	0.6	10.7	10.5	0.2
	1/5	9.5	9.2	0.3	11.0	10.8	0.2
	1/10	10.2	10.1	0.1	11.3	11.0	0.3
	1/20	10.7	10.6	0.1	11.5	11.1	0.4
Estimated Error by Jackkhife method	1/2	0.4	0.5		0.1	0.1	
	1/5	0.3	0.4		0.1	0.1	
	1/10	0.3	0.3		0.1	0.2	
	1/20	0.4	0.4		0.2	0.2	
SLSC		0.024	0.024		0.056	0.049	
Correlation (X-COR)		0.994	0.994		0.963	0.972	
pAIC		127.4	134.0		47.2	40.6	
Number of sample		31	31		31	31	

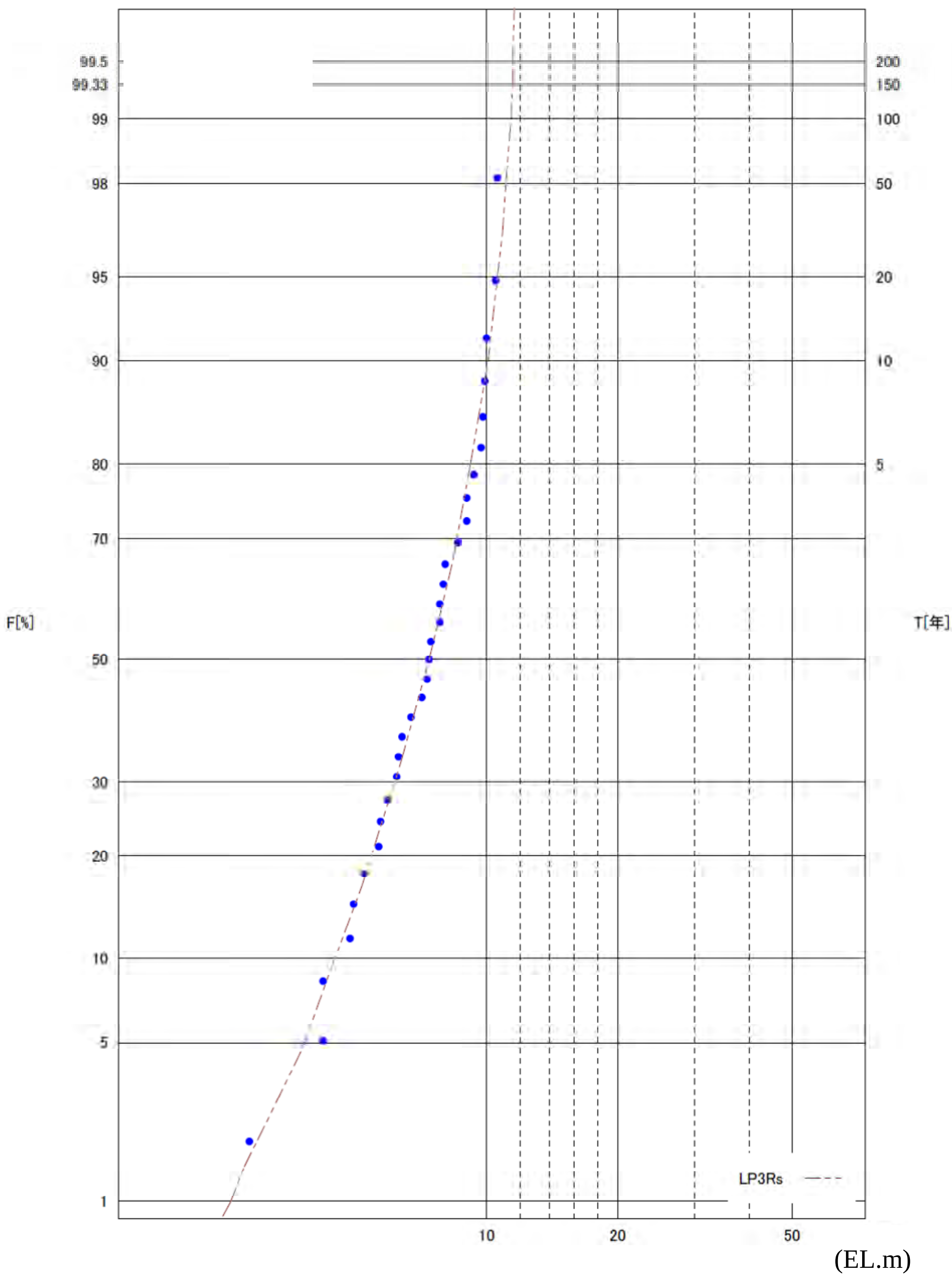
Note: GEV: Generalized Extreme Value Distribution,
LP3Rs: Log Poison Type III Distribution (Real space method)
Gumbel: Gumbel Distribution

Source: JICA Study Team



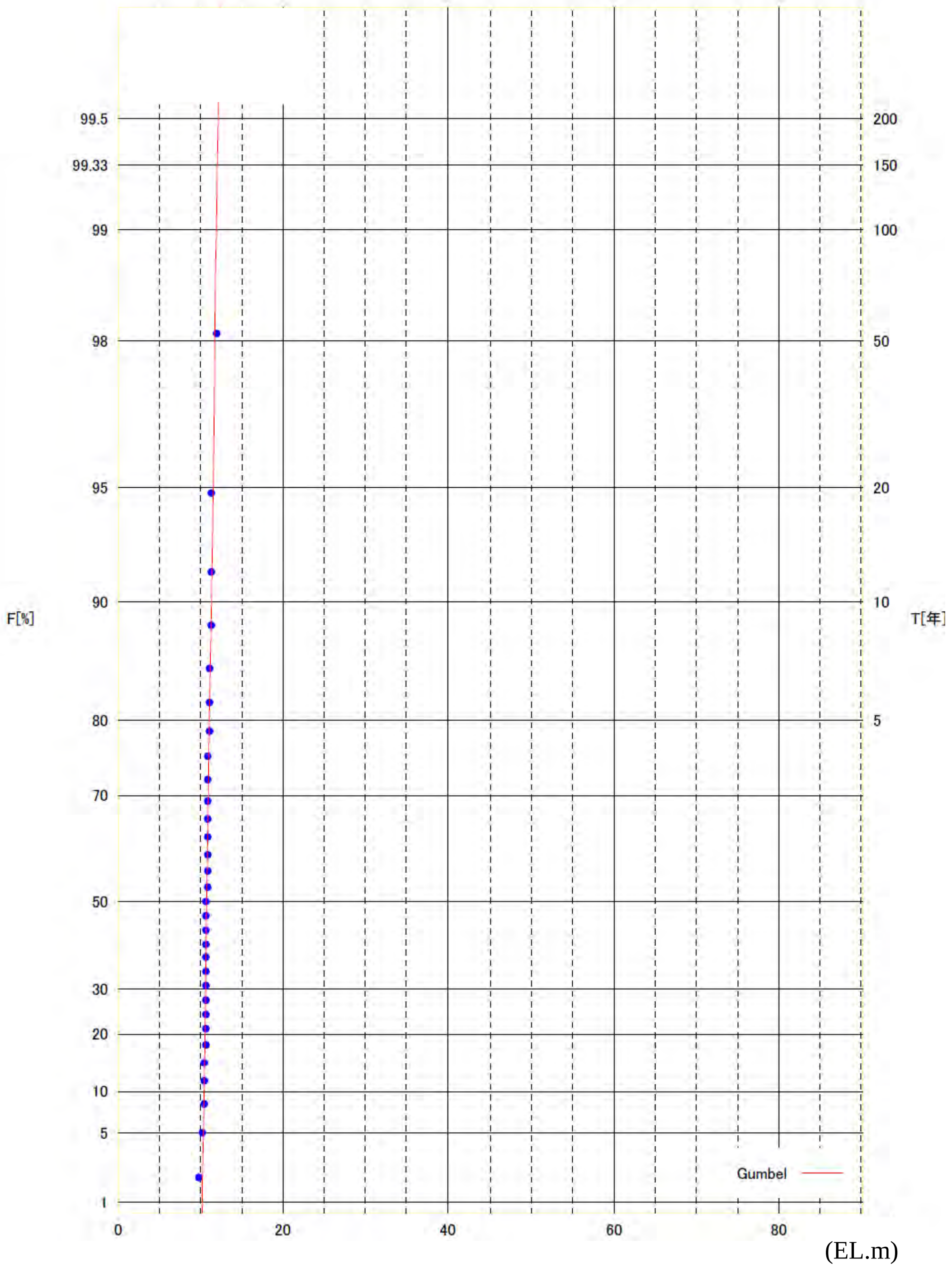
Source: JICA Study Team

Figure 23 Frequency Analysis of Observed Water Level in Pre-monsoon Season at Sylhet Station



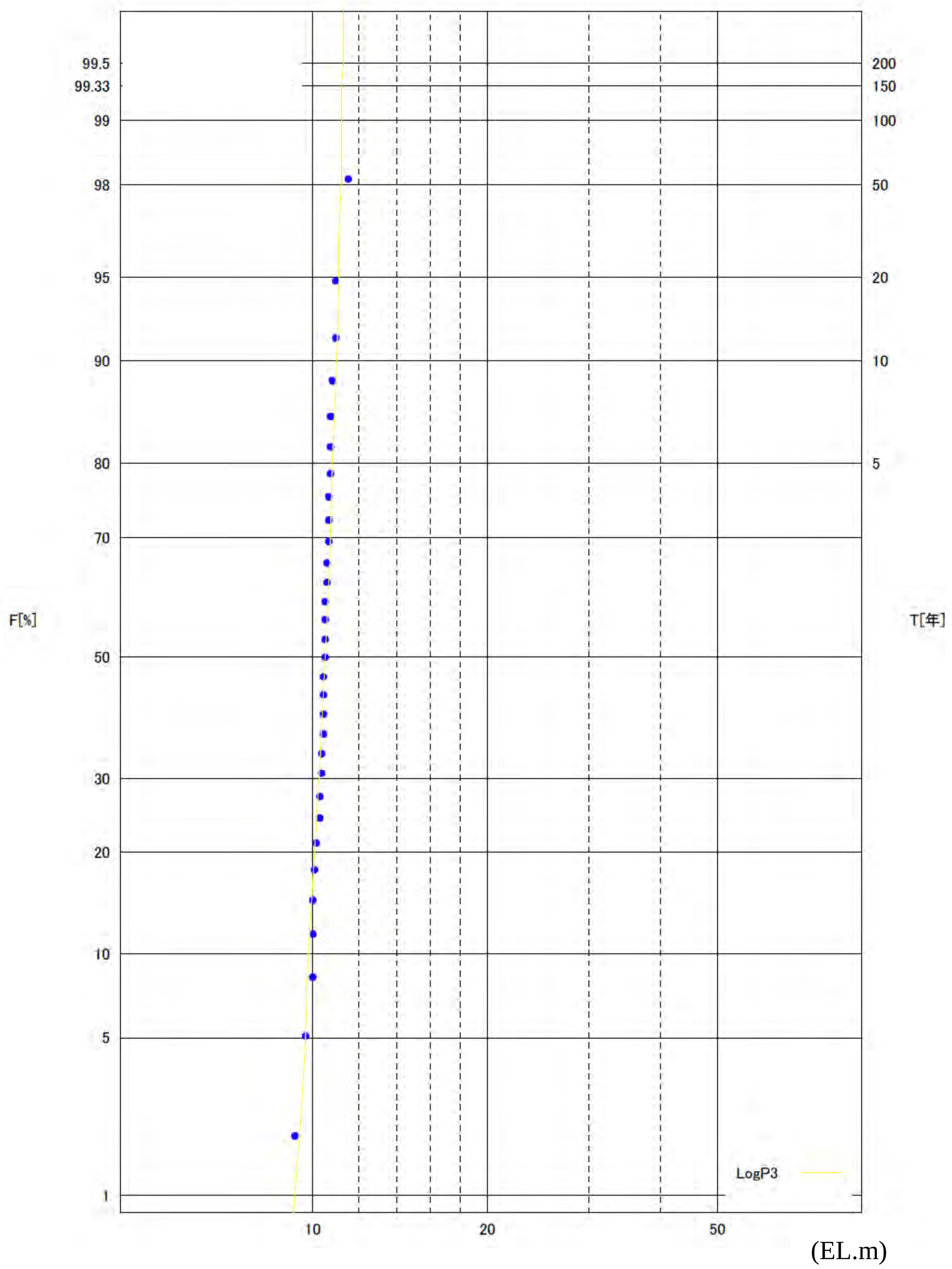
Source: JICA Study Team

Figure 24 Frequency Analysis of Simulated Water Level in Pre-monsoon Season at Sylhet Station



Source: JICA Study Team

Figure 25 Frequency Analysis of Observed Water Level in Monsoon Season at Sylhet Station



Source: JICA Study Team

Figure 26 Frequency Analysis of Simulated Water Level in Monsoon Season at Sylhet Station

Annex 7.1

Impact of New Haor Project

Study on the Impact to Upstream Area after Construction of New Haor Projects

1 Background

Many new haor projects are planned at downstream area along the Surma-Baulai River. If these projects affect to the upstream existing haor projects, heightening of existing submergible embankment in the existing haor projects are carried out or some new haor projects shall be rejected. And many rehabilitation projects decided by BWDB are on-going. Therefore, some new projects will be rejected. The hydraulic calculation by HEC-RAS is carried out to estimate the impact to upstream existing haor projects.

2 Simulation

The hydraulic simulation is carried out non-uniform flow calculation by using HEC-RAS. The assumptions of simulation are as follows;

- Water levels at Bhairab Bazar, Itna, Sunamganj are applied at 10-year pre-monsoon maximum water level for calibration of simulation model because the submergible embankment is considered to new and existing haor projects,
- Peak discharge is decided from 10-year pre-monsoon maximum water level. The peak discharge is estimated from the simulated discharge by NERM.
- Roughness coefficient is assumed at 0.03 in river and 0.09 at the flood plain area.

According to the simulated discharge by NERM model, there are several discharges at same water level due to impact from Padma River and other noise of the NERM. Therefore, maximum and mean discharges of the NERM result are used in the simulation.

2.1 Simulation Method

The simulation is carried out from following steps;

1st step: Calibration of present condition

Present condition is considered. The water levels at 3 points, Bhairab Bazar, Itna and Sunamganj, are fixed to the 10-year pre-monsoon maximum water level as shown below;

Water Level

Location	Water Level (EL.m)
Bhairab Bazar	2.86
Itna	4.52
Sunamganj	6.95

Source: JICA Study Team

The peak discharges at 3 points are applied to maximum and mean discharge cases.

Discharge Case

Location	Case 1(Max.) (m^3/s)	Case 2 (Mean) (m^3/s)
Bhairab Bazar	4,360	3,000
Itna	500	380
Sunamganj	3,700	2,400

Source: JICA Study Team

The water levels at 3 points are adjusted to same water level of 10-year pre-monsoon maximum water level.

2nd Step: Calculation of impact after completion of all proposed new projects

All proposed new projects are completed in this step. In this step, the submergible embankment is constructed along the new projects. Therefore, the upstream water level will be raised. The rising height and affected area are estimated. If the impact of the upstream existing haor area is small, the calculation is finished. Affected area is evaluated from difference between the present condition and the completion condition. The affected area is judged from 5cm difference of water level.

3rd Step: Calculation of impact after completion of selected proposed new projects

The bottle neck sections along the new projects area are checked, and its new projects are rejected. If the impact of the upstream existing haor area is small, the calculation is finished. Then, rejected new projects are fond out. Affected area is evaluated from difference between the present condition and the selected one. The affected area is judged from 5cm difference of water level.

2.2 Simulation Results

The simulation results are shown in following table and figure.

Location	Rising (cm)			
	Case 1		Case 2	
	All	Proposed	All	Proposed
Bhairab Bazar	0	0	0	0
Itna	14	6	16	7
Sunamganj	6	2	5	2

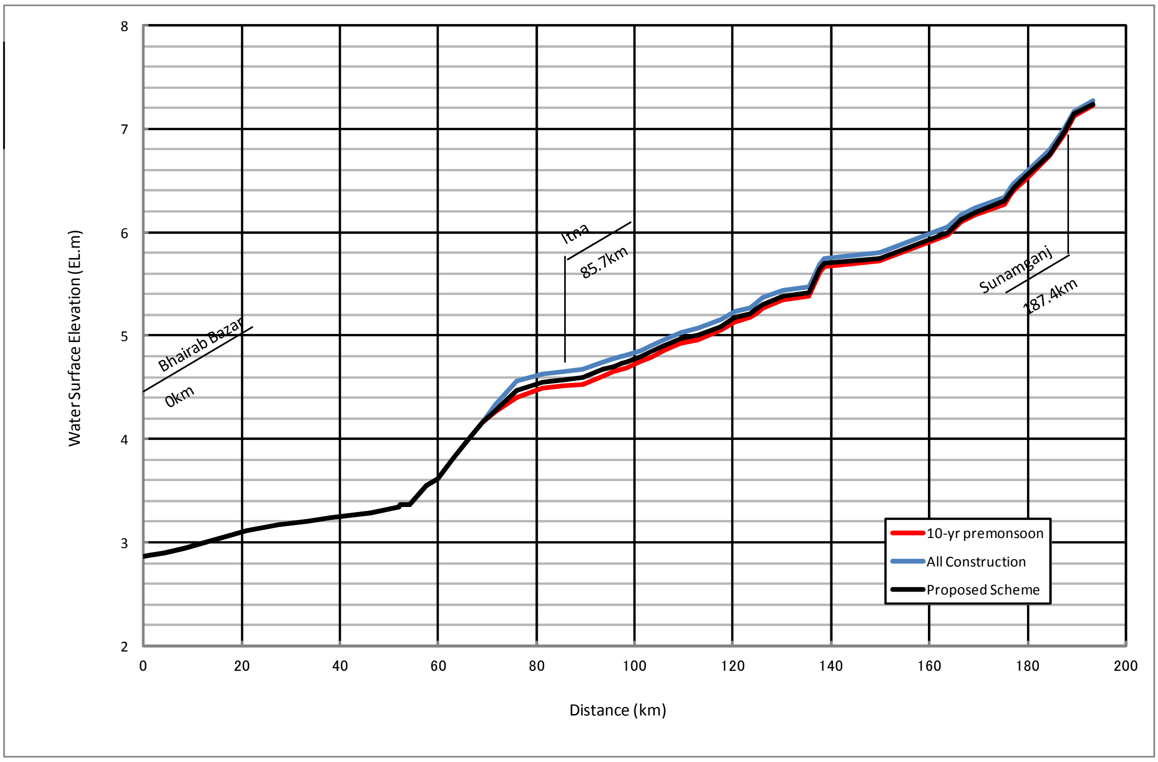
Note: Proposed scheme is not included Charigram Haor project.
Source: JICA Study Team

Location	Affected Area from Itna (km)			
	Case 1		Case 2	
	All	Proposed	All	Proposed
Itna	104	13	84	16

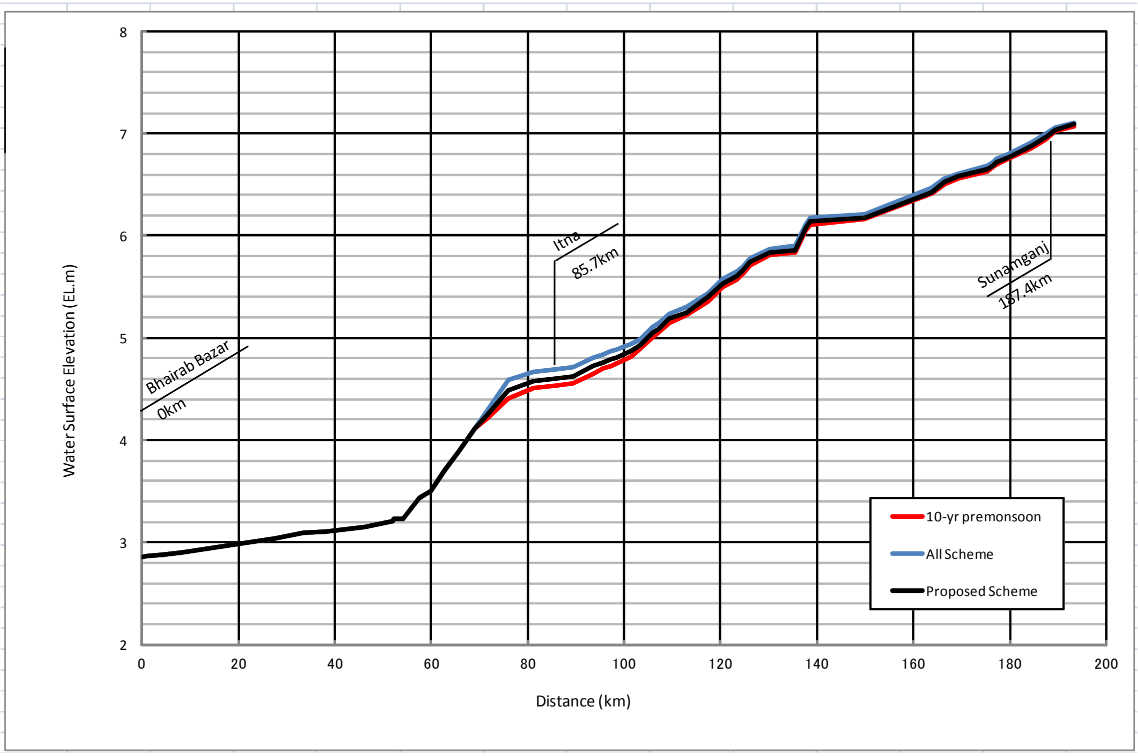
Note: Proposed scheme is not included Charigram Haor project.
Source: JICA Study Team

2.3 Recommendation

Charigram haor project shall be rejected from the hydraulic viewpoint.



Case 1



Case 2

Source: JICA Study Team

Figure 1 Water Level of with/without Scheme

Annex-7.2

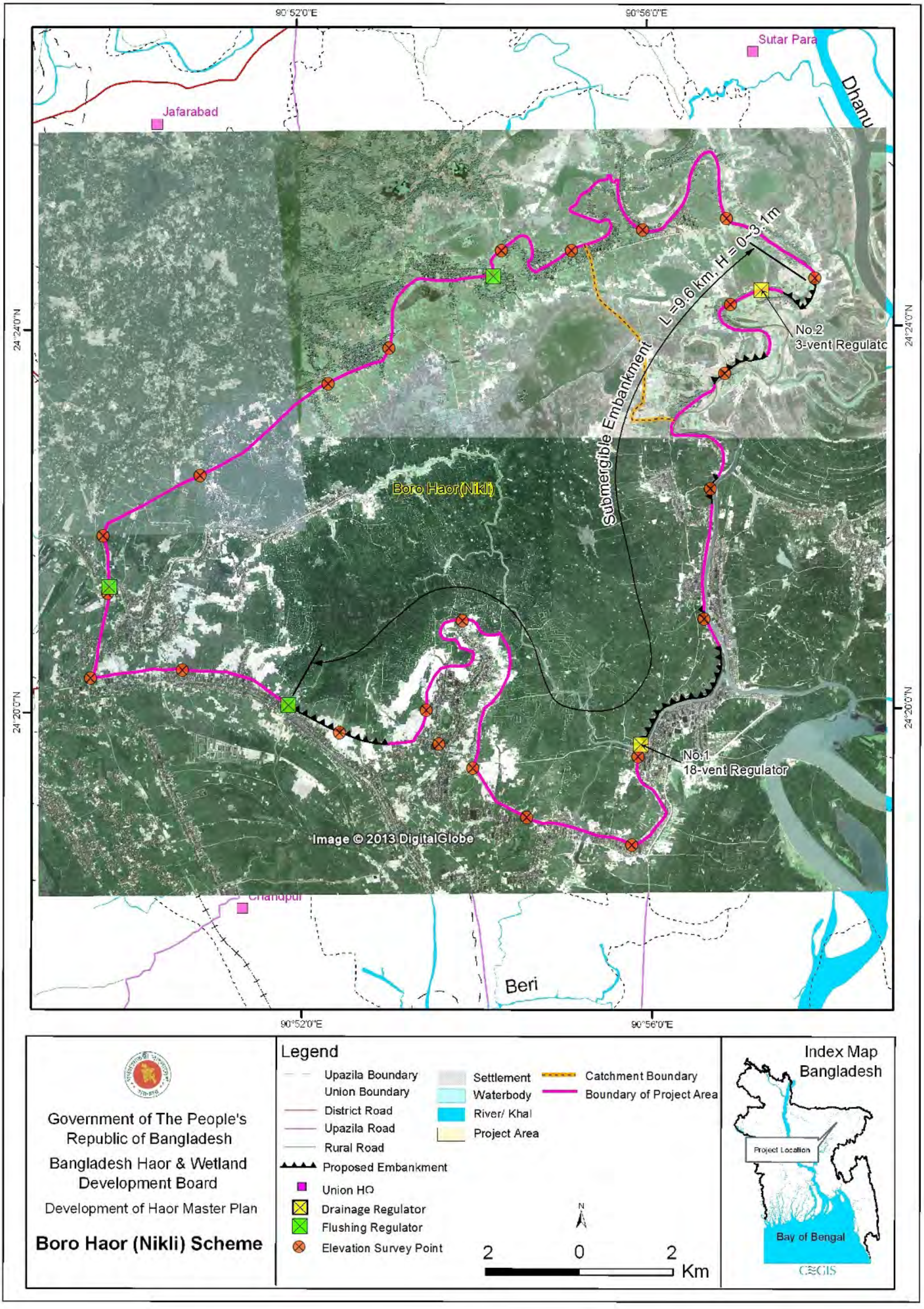
Project Map

New Project List

	Name of Haor Project	Crest Level (height) of embankment	Volume of Embankment	Re-excavation of Canal	Regulator
n-1	Boro Haor (Nikli)	5.4m (0 – 3.2 m)	9.6 km	10 km	9-vent: 2nos 3-vent: 1nos
n-2	Naogaon Haor	5.3m (0 – 1.7 m)	34.1 km	20 km	9-vent: 2nos 8-vent: 1nos 4-vent: 1nos
n-3	Jaliar Haor	7.6m (0 – 1.6 m)	6.8 km	8 km	2-vent: 1nos 2-vent: 1nos
n-4	Dharmapasha Rui Beel	6.4m (0 – 2.7m)	57.1 km	5 km	9-vent: 3nos 8-vent: 2nos 6-vent: 1nos 3-vent: 1nos
n-5	Chandpur Haor	5.2m (0 – 0.6 m)	2.1 km	5 km	4-vent: 1nos 1-vent: 1nos
n-6	Sunair Haor	5.9m (0 – 0.4 m)	16.2 km	25 km	4-vent: 1nos 1-vent: 1nos
n-7	Badla Project	5.2m (0 – 1.8m)	10.8 km	2 km	2-vent: 2nos
n-8	Nunnir Haor	4.7m (0 – 2.5 m)	25.5 km	20 km	5-vent: 1nos 2-vent: 2nos
n-9	Dakhshiner Haor	5.1m (0 – 2.3 m)	18.3 km	10 km	6-vent: 1nos 3-vent: 1nos
n-10	Chatal Haor	5.7m (0 – 2.3 m)	5.7 km	11 km	1-vent: 2nos
n-11	Ganesh Haor	6.4m (0 – 2.2 m)	22.5 km	3 km	3-vent: 1nos 2-vent: 1nos
n-12	Dhakua Haor	6.3m (0 – 3.2 m)	36.5 km	30 km	5-vent: 1nos 3-vent: 1nos 1-vent: 1nos
n-13	Mokhar Haor	5.5 – 6.2m (0 – 5.8 m)	68.8 km	110 km	5-vent: 1nos 4-vent: 2nos 3-vent: 2nos
n-14	Noapara Haor	4.9m (0 – 3.5 m)	28.3 km	7 km	3-vent: 1nos 2-vent:1nos 1-vent: 1nos
n-15	Dulalpur Haor	4.3m (0 – 2.9 m)	8.3 km	3 km	2-vent: 1nos
n-16	Bara Haor	6.3m (0 – 4.6 m)	27.0 km	40 km	5-vent: 1nos 1-vent: 1nos
n-17	Bansharir Haor	6.1m (0 – 2.8 m)	18.0 km		1-vent: 2nos
n-18	Korati Haor	5.2m (0 – 4.3 m)	40.4 km	4 km	4-vent: 1nos 1-vent: 1nos
n-19	Sarishapur Haor	4.6m (0 – 1.8 m)	7.1 km	5 km	1-vent: 1nos
n-20	Shelnir Haor	5.5m (0 – 1.6 m)	30.1 km	2 km	1-vent: 3nos
n-21	Kuniarbandh Haor	4.3m (0 – 3.0 m)	8.3 km		1-vent: 1nos
n-22	Ayner Gupi Haor	4.3m (0 – 3.0m)	13.7 km		3-vent: 1nos
	Charigram Project	4.9m (0 – 2.2m)	25.7 km	3 km	4-vent: 1nos 1-vent: 1nos
	Bara Haor (Austagram)	4.8m (0 – 2.2 m)	60.3 km	40 km	11-vent:2nos 4-vent: 1nos 3-vent: 1nos
	Golaimara Haor	4.2m (0 m)	-	-	-
	Joyariya Haor	4.2m (0 m)	-	-	-
	Total				

Rehabilitation Project List

No.	Name of Haor Project	Re-sectioning of Embankment	Replace of Gate and Regulator	Re-excavation of Canal
r-1	1. Dampara Water Management Scheme	Full 200 m Sub 400 m	Gate 15 nos	12km
r-2	2. Kangsa River Scheme	Full 40 m	Gate 16 nos	
r-3	3. Singer Beel Scheme	Full 100 m Sub 125 m	Gate 1 nos	2 km
r-4	4. Baraikhali Khal Sub-Project	Full 10 m	Gate 6 nos	24.5 km
r-5	5. Aladia-Bahadia Scheme		Gate 2 nos	8 km
r-6	6. Modkhola Bairagirchar Scheme	Full 500 m		
r-7	7. Ganakkahali Scheme		Gate 3 nos	
r-8	8. Kairdhala Ratna	Sub 60 m	Gate 9 nos	
r-9	9. Bashira River Re-excavation Schme	Sub 6,000 m	2vent Reg. 2 nos	20 km
r-10	10. Aralia Khal Scheme		Gate 4 nos	2.4 km
r-11	11. Chandal Beel Scheme	Full 100 m	2vent Reg. 1 nos	1.5 km
r-12	12. Satdona Beel Scheme		2vent Reg. 2 nos	
r-13	15. Gangajuri FCD	Full 600 m	Gate 20 nos	4.5 km
r-14	20. Kaliajuri Polder #02	Sub 810 m	Gate 19 nos	
r-15	21. Kaliajuri Polder #04	Sub 630 m	Gate 3 nos	



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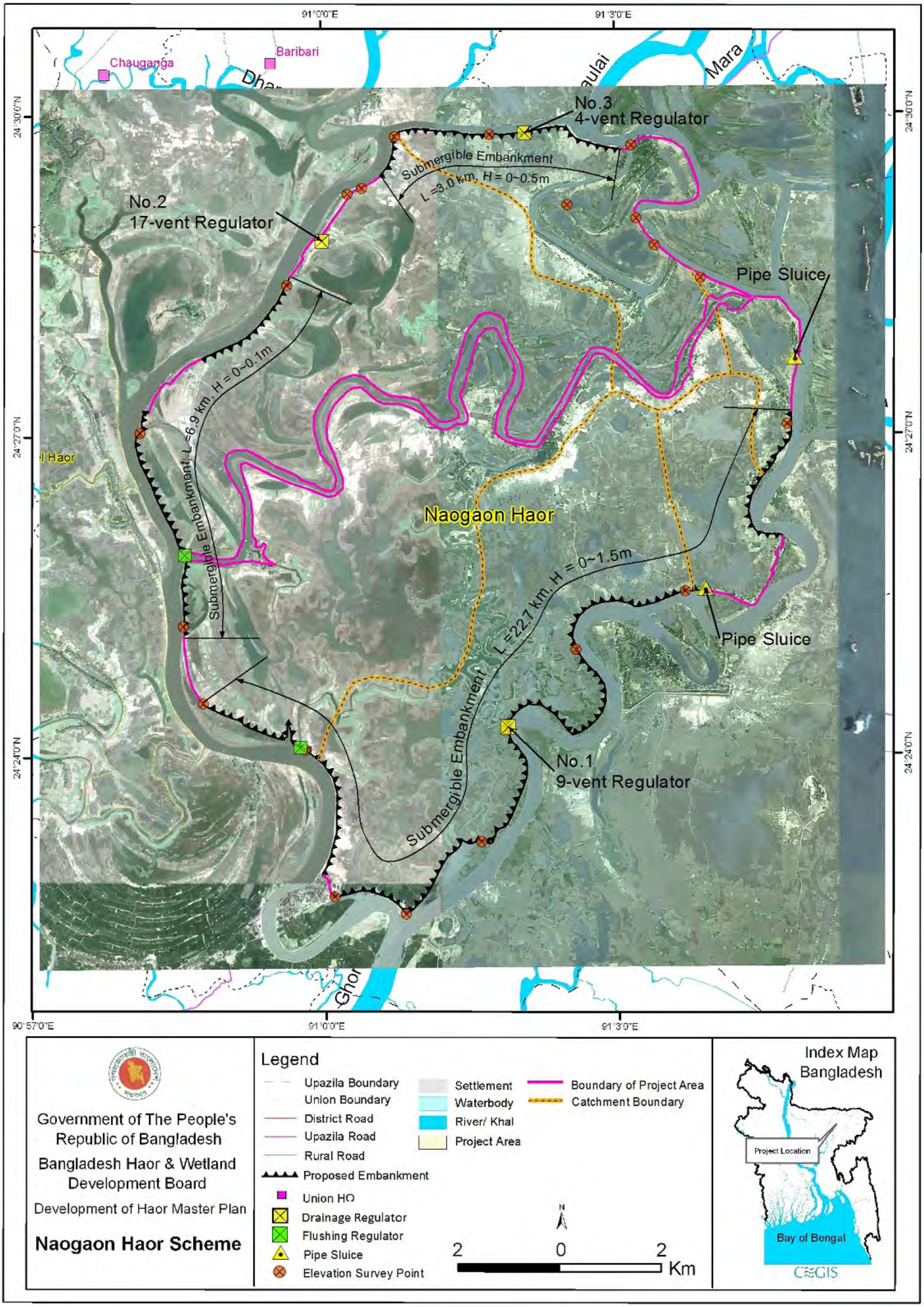
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Boro Haor (Nikli) Scheme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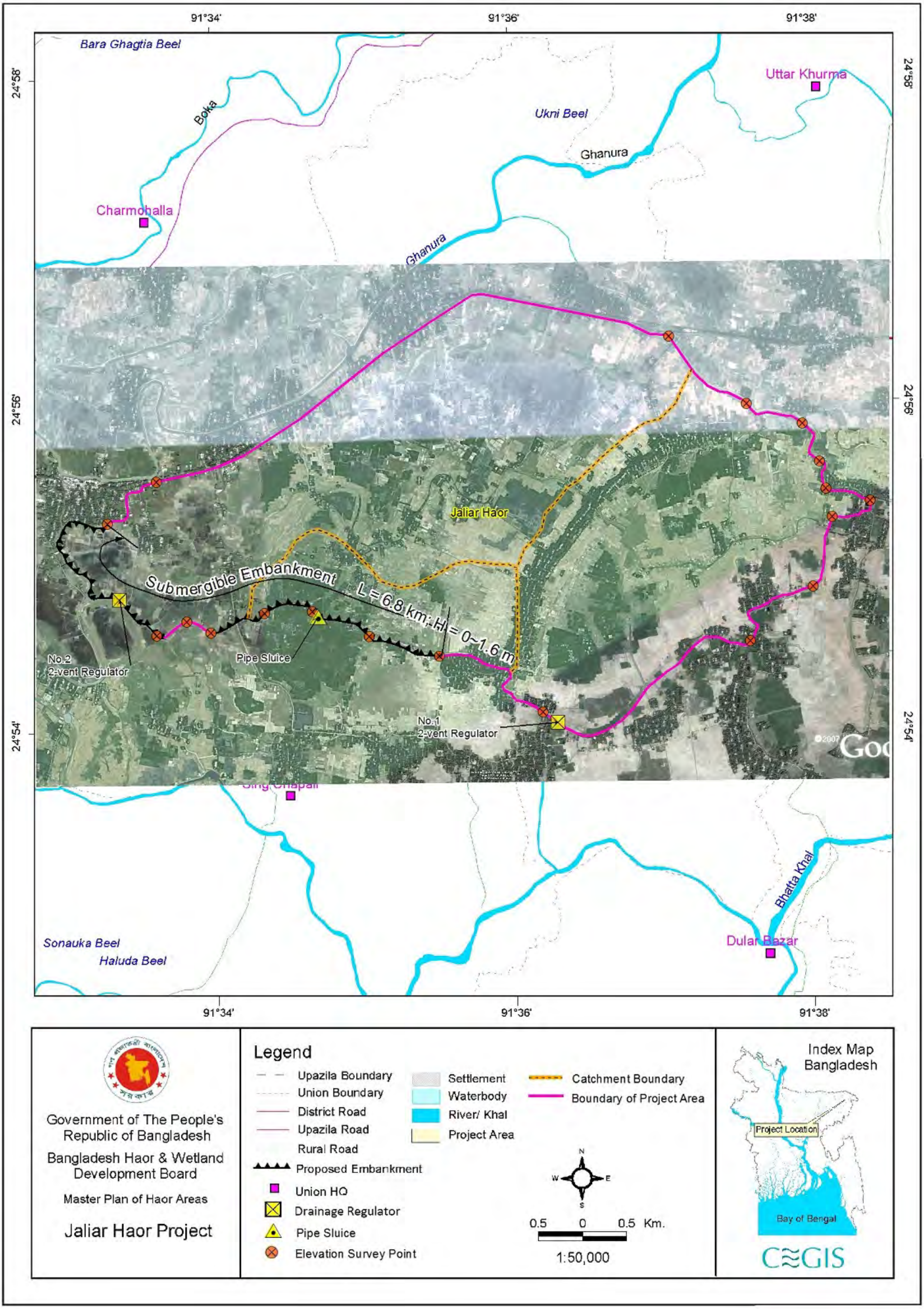
91°3'0"E
90°57'0"E
24°30'0"N
24°27'0"N
24°24'0"N
Chauganga
Baribari
Mara
No.3
4-vent Regulator
Submergible Embankment
L =3.0 km, H = 0~0.5m
No.2
17-vent Regulator
Pipe Sluice
L =6.9 km, H = 0~0.1m
Submergible Embankment
Naogaon Haor
L =22.7 km, H = 0~1.5m
Submergible Embankment
Pipe Sluice
No.1
9-vent Regulator
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Naogaon Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Flushing Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
2 0 2 Km
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



91°34'
91°36'
91°38'
24°58'
24°56'
24°54'
Bara Ghagtia Beel
Boka
Uttar Khurma
Ukni Beel
Ghanura
Charmohalla
Ghanura
Jaliar Haor
Submergible Embankment
L = 6.8 km; H = 0~1.6 m
No.2
2-vent Regulator
Pipe Sluice
No.1
2-vent Regulator
Sing Chapali
Bhatta Khal
Sonauka Beel
Haluda Beel
Dular Bazar
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Master Plan of Haor Areas
Jaliar Haor Project
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
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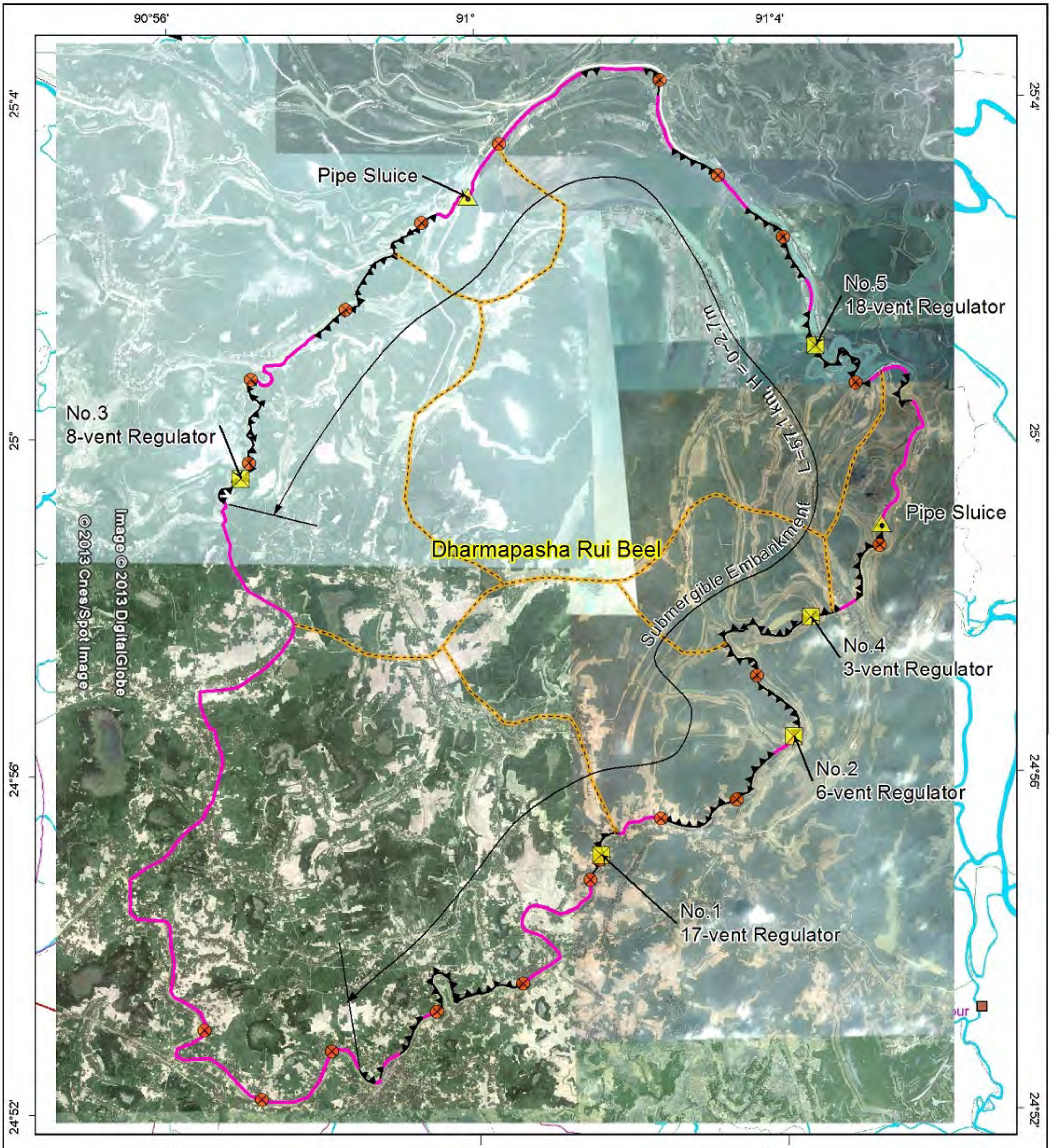
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Dharmapasha Rui Beel Project

Legend

- Upazila Boundary
- Union Boundary
- District Road
- Upazila Road
- Rural Road
- Proposed Embankment
- Elevation Survey Point
- Drainage Regulator
- Pipe Sluice
- Settlement
- Waterbody
- River/ Khal
- Project Area
- Boundary of Project Area
- Catchment Boundary

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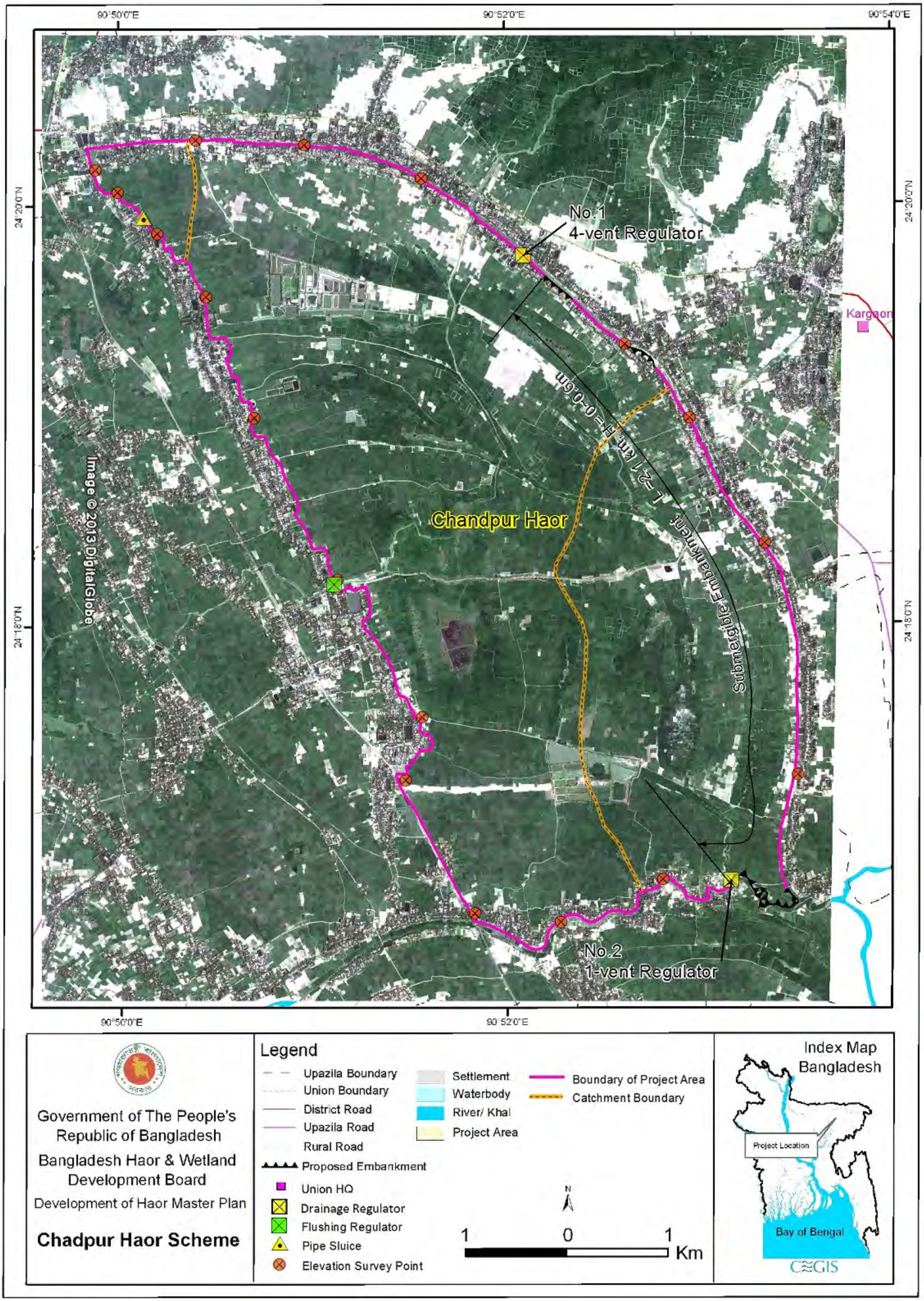
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90°54'0"E
24°20'0"N
24°18'0"N
No.1
4-vent Regulator
Kargaon
L = 2.1 km, H = 0-0.6m
Submergible Embankment
Chandpur Haor
Image © 2013 DigitalGlobe
No.2
1-vent Regulator
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Chadpur Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Flushing Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
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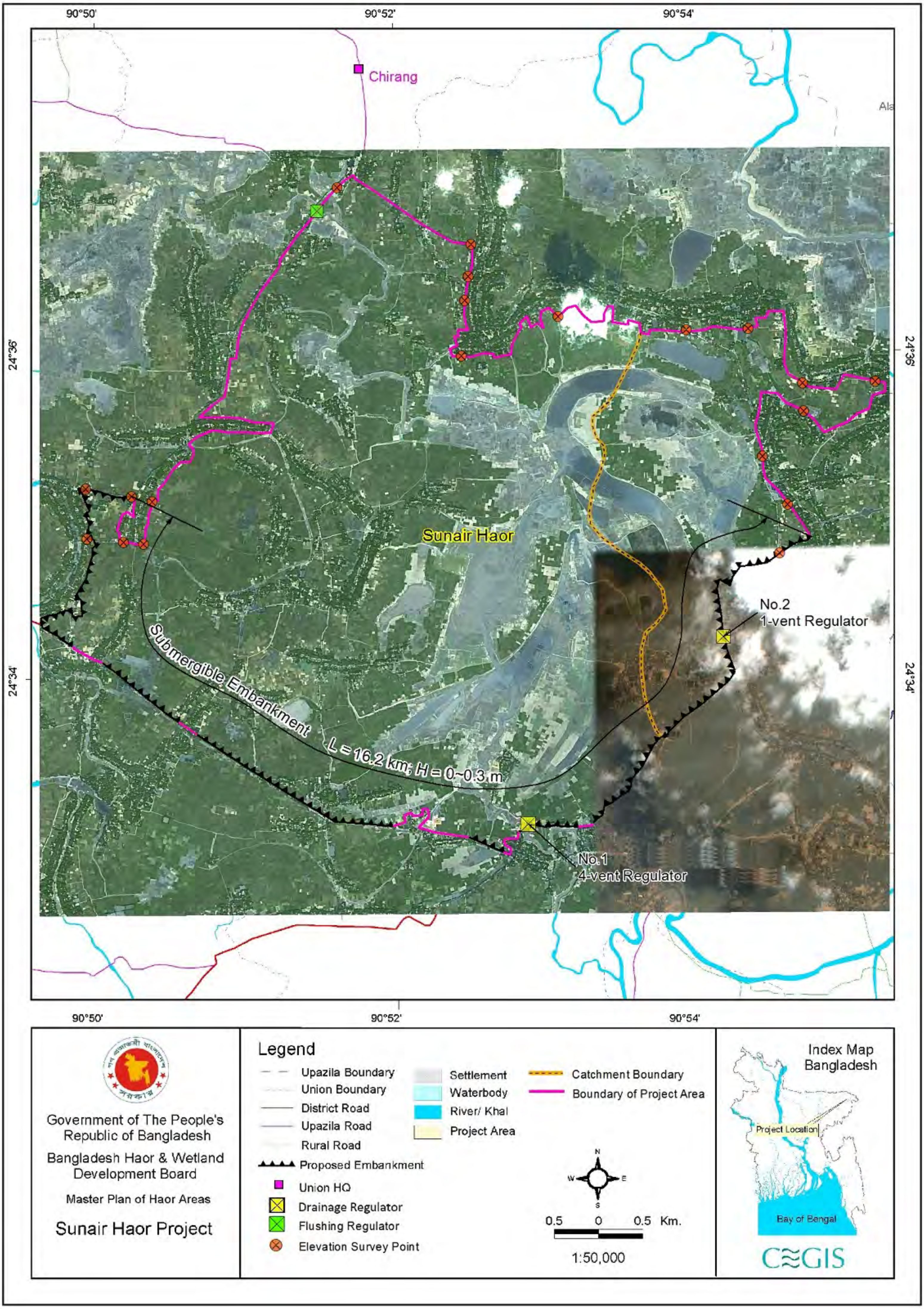
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS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90°52'
90°54'
24°36'
24°34'
Chirang
Sunair Haor
Submergible Embankment
L = 16.2 km; H = 0~0.3 m
No.2
1-vent Regulator
No.1
4-vent Regulator
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Flushing Regulator
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
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Government of The People's Republic of Bangladesh
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Sunair Haor Project
Index Map Bangladesh
Project Location
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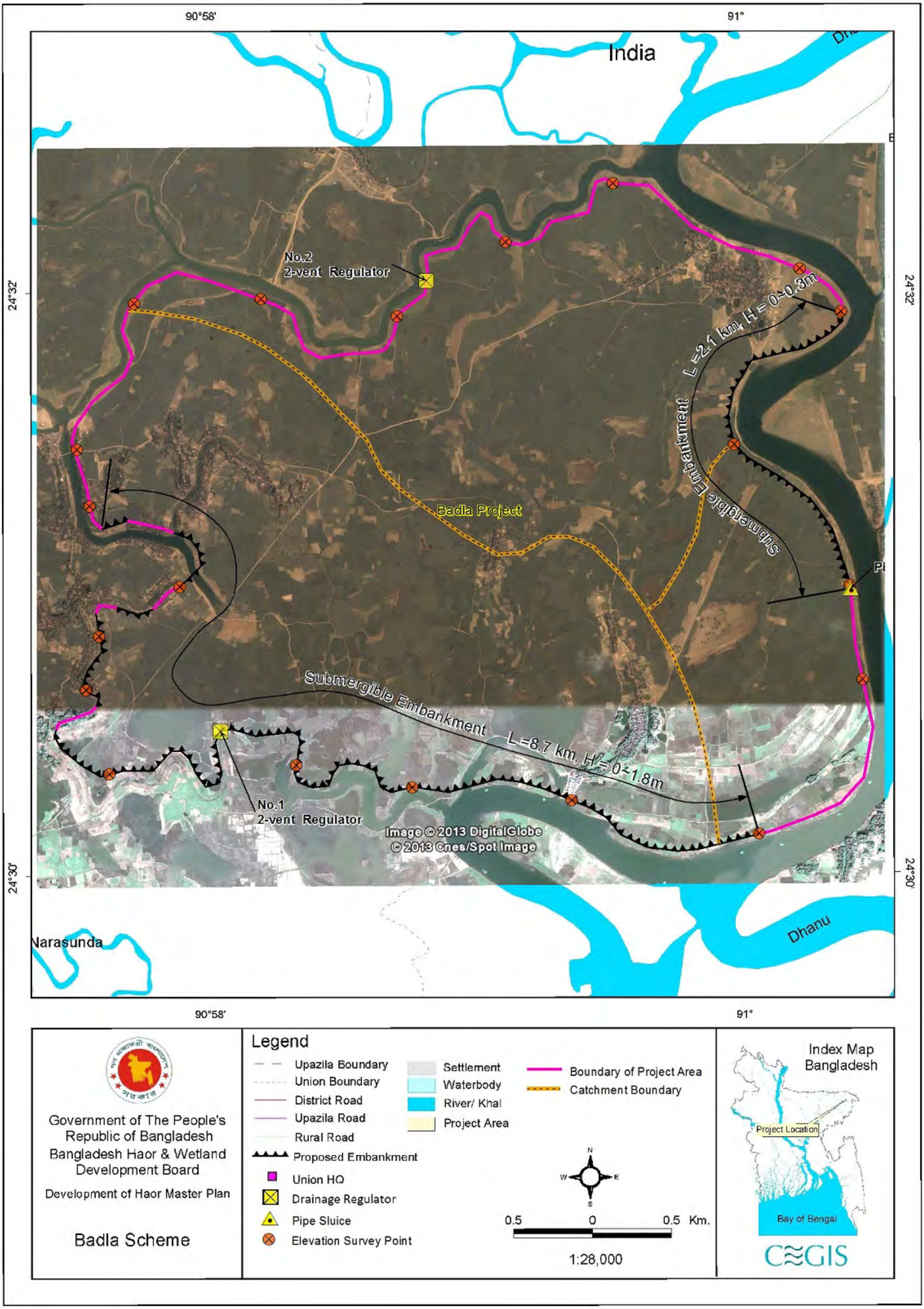
CEGIS



90°58'
91°
India
24°32'
24°30'
No.2
2-vent Regulator
L =2.1 km, H = 0~0.3m
Submergible Embankment
Badla Project
Submergible Embankment
L =8.7 km, H = 0~1.8m
No.1
2-vent Regulator
Image © 2013 DigitalGlobe
© 2013 Cnes/Spot Image
Narasunda
Dhanu
Government of The People's Republic of Bangladesh
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Badla Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
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Km.
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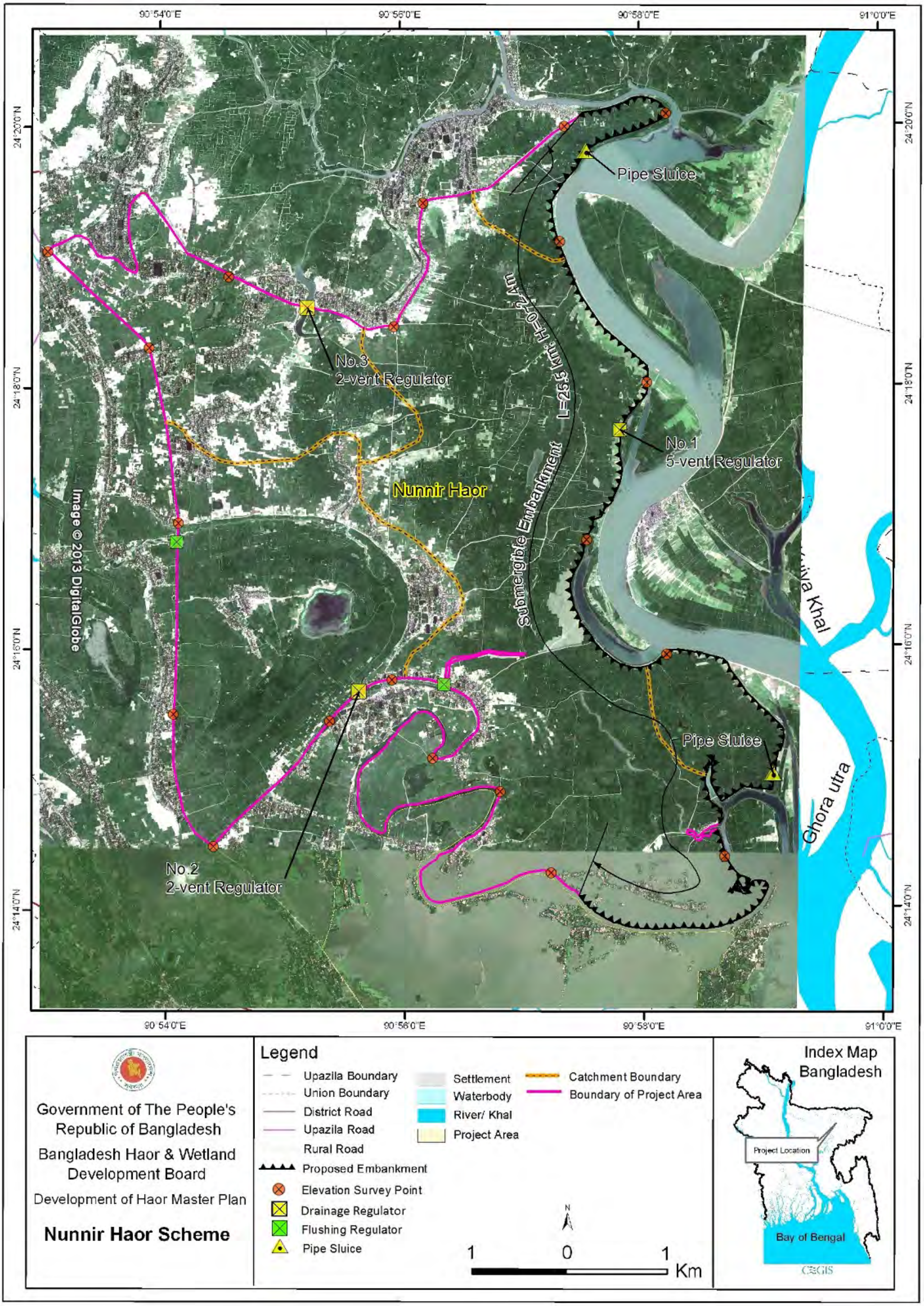
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



90°54'0"E
90°56'0"E
90°58'0"E
91°0'0"E
24°20'0"N
24°18'0"N
24°16'0"N
24°14'0"N
Pipe Sluice
No.3
2-vent Regulator
L=25.5 km; H=0-2.4m
Submergible Embankment
No.1
5-vent Regulator
Nunnir Haor
Image © 2013 DigitalGlobe
Pipe Sluice
No.2
2-vent Regulator
Ghora utra
Government of The People's Republic of Bangladesh
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Nunnir Haor Scheme
Legend
Upazila Boundary
Union Boundary
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Rural Road
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Drainage Regulator
Flushing Regulator
Pipe Sluice
Settlement
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Project Area
Catchment Boundary
Boundary of Project Area
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Km
Index Map
Bangladesh
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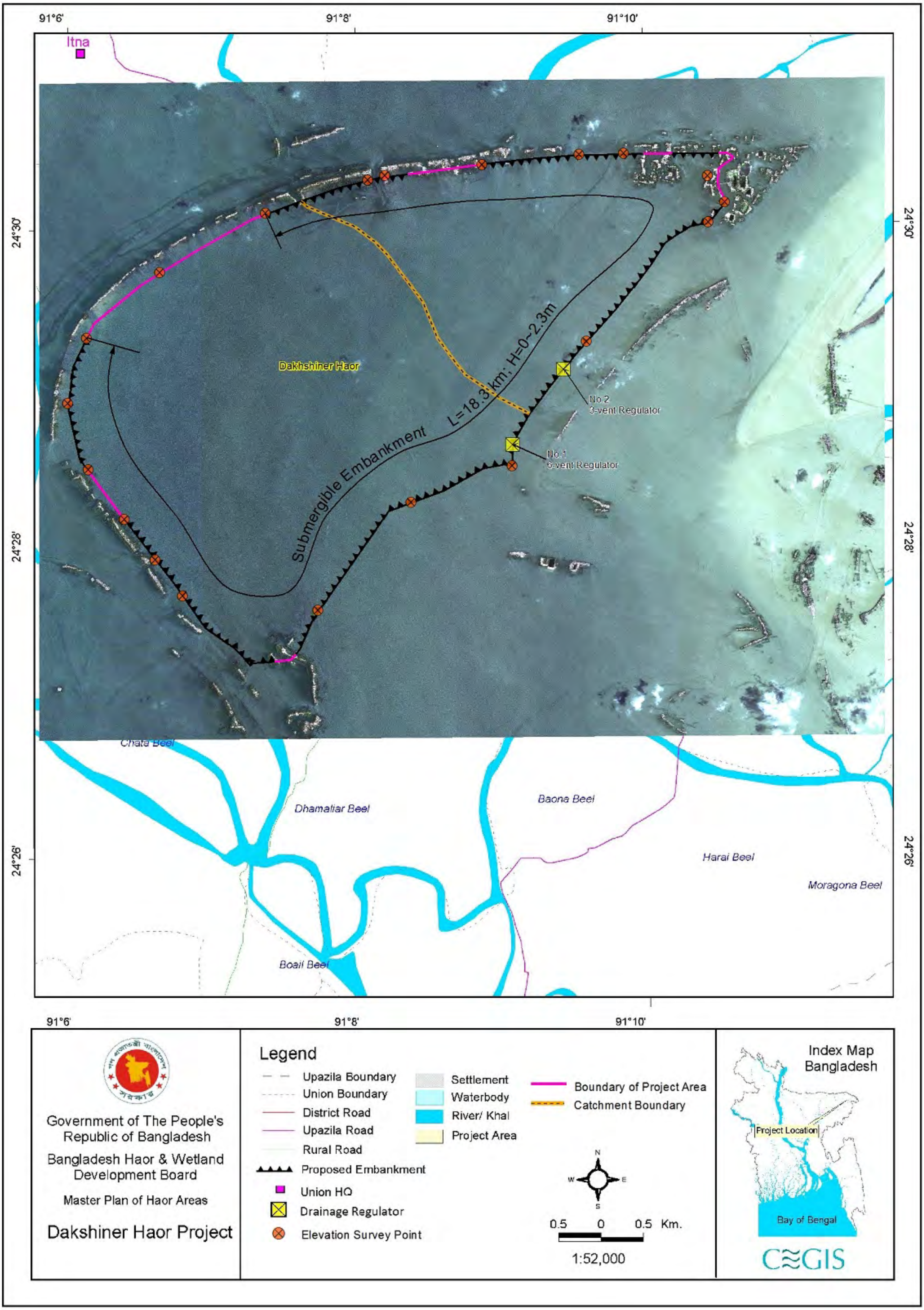
91°6'
91°8'
91°10'
24°30'
24°28'
24°26'
Itna
Dakhshiner Haor
L=18.3 km; H=0~2.3m
Submergible Embankment
No.2
3-vent Regulator
No.1
6-vent Regulator
Chata Beel
Dhamaliar Beel
Baona Beel
Harai Beel
Moragona Beel
Boail Beel
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Boundary of Project Area
Catchment Boundary
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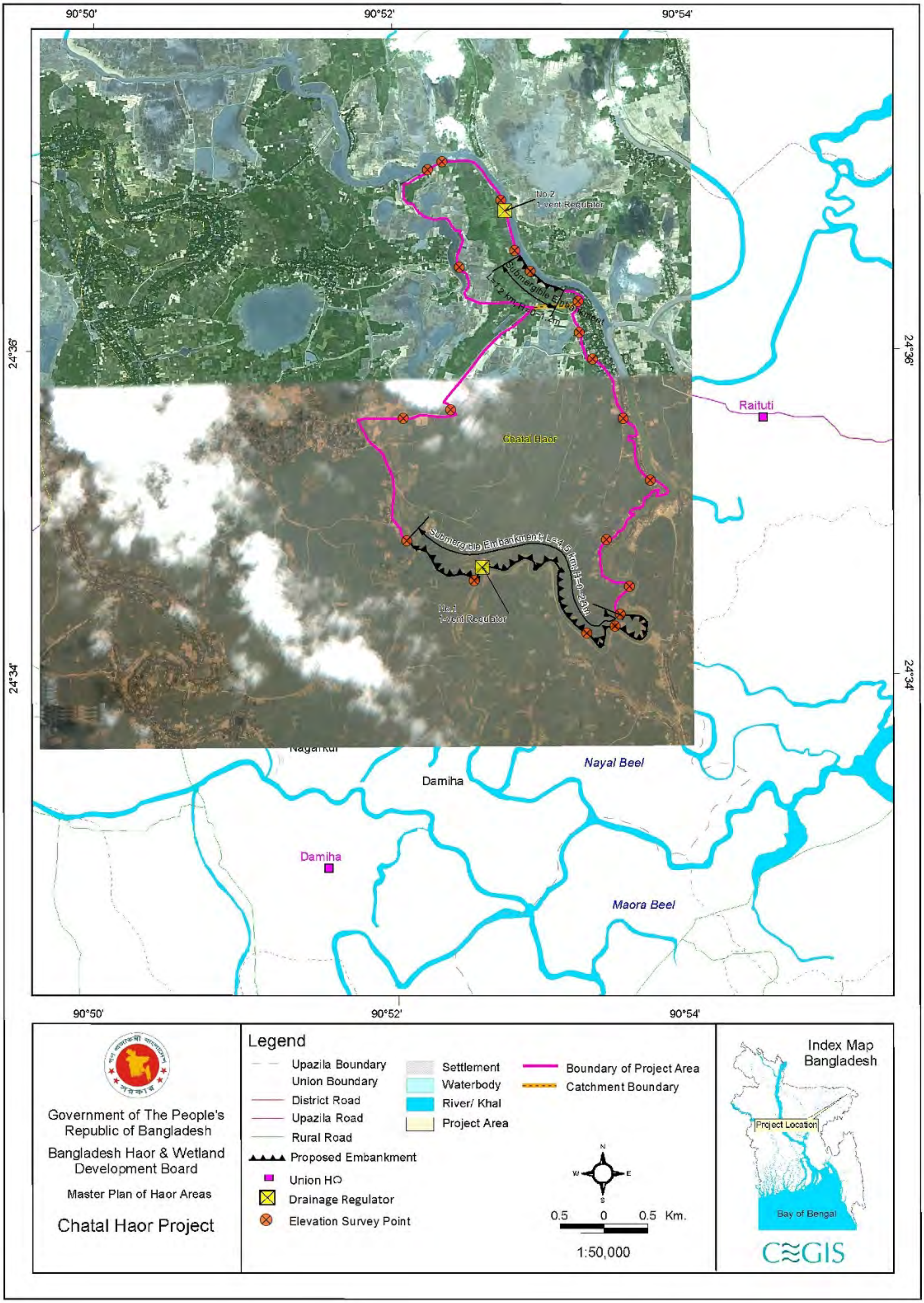
Project Location
Bay of Bengal
CEGIS



90°50'
90°52'
90°54'
24°36'
24°34'
No.2
1-vent Regulator
Submergible Embankment
L=1.2 km; H=0-1.2m
Chatal Haor
Raituti
Submergible Embankment; L=4.5 km; H=0-2.2m
No.1
1-vent Regulator
Nagarkul
Damiha
Nayal Beel
Damiha
Maora Beel
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Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
N
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0.5
Km.
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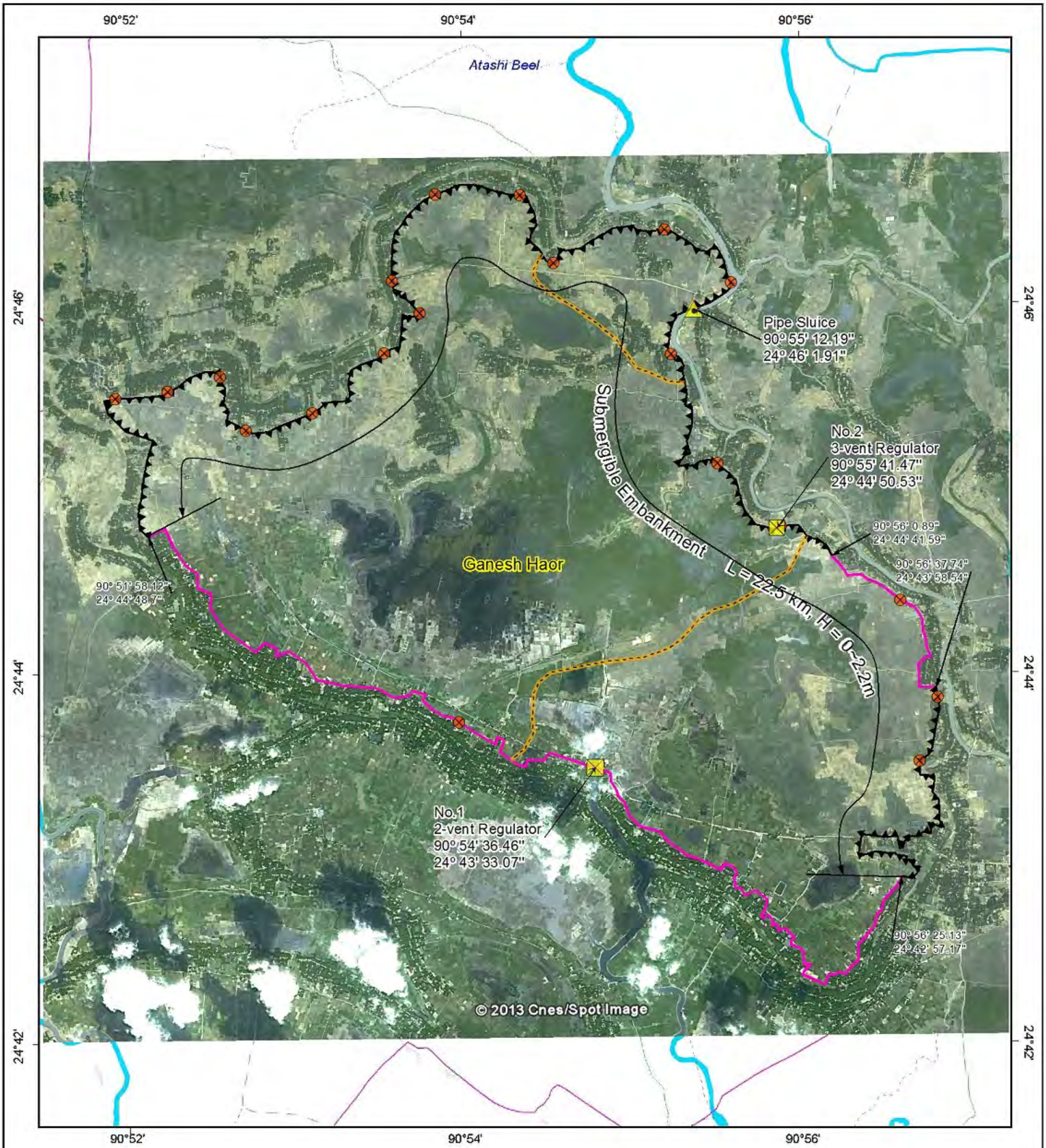
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Ganesh Haor Project

Legend

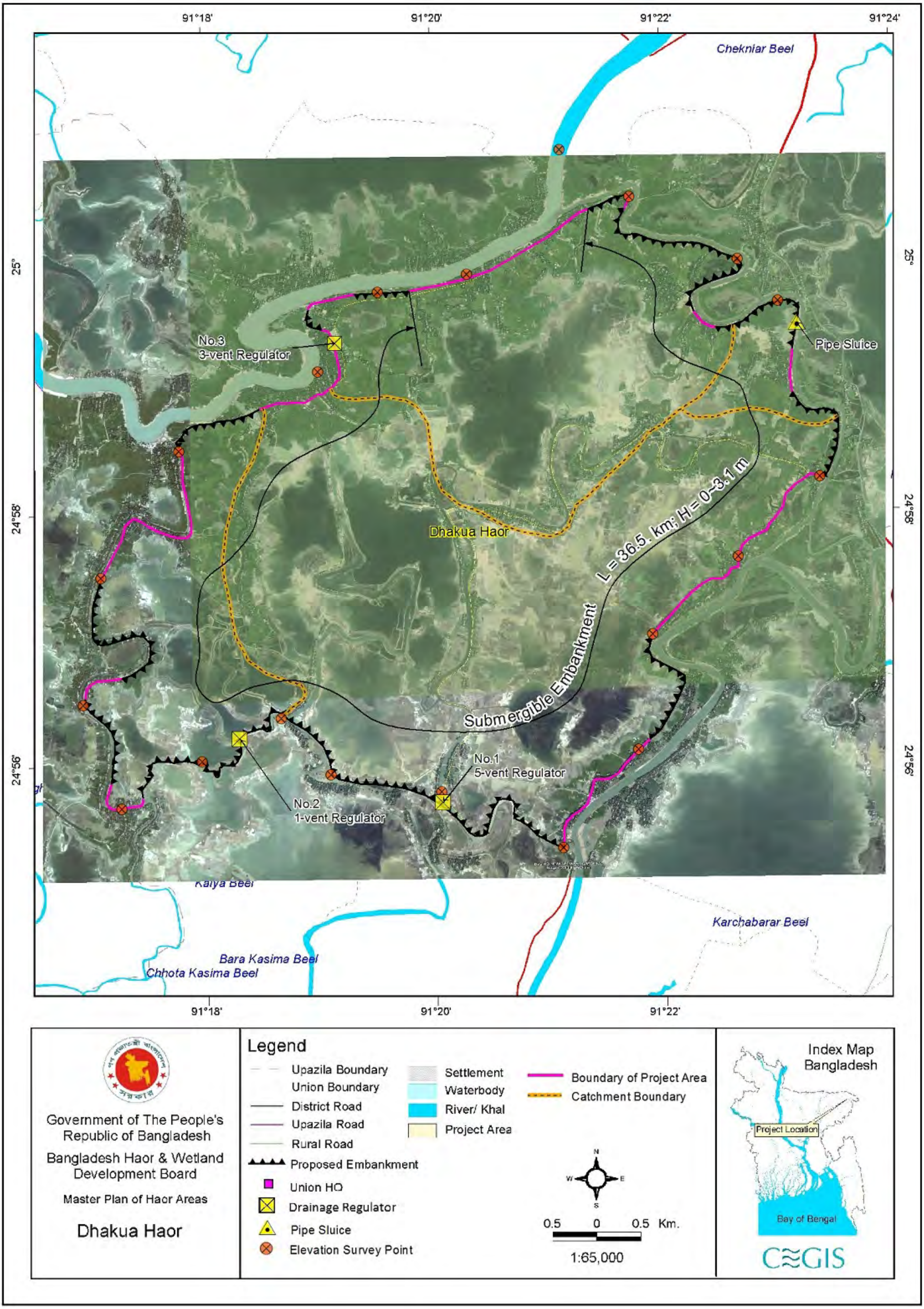
- Upazila Boundary
- Union Boundary
- District Road
- Upazila Road
- Rural Road
- Proposed Embankment
- Elevation Survey Point
- Drainage Regulator
- Pipe Sluice
- Catchment Boundary
- Boundary of Project Area
- Settlement
- Waterbody
- River/ Khal
- Project Area

N W E S

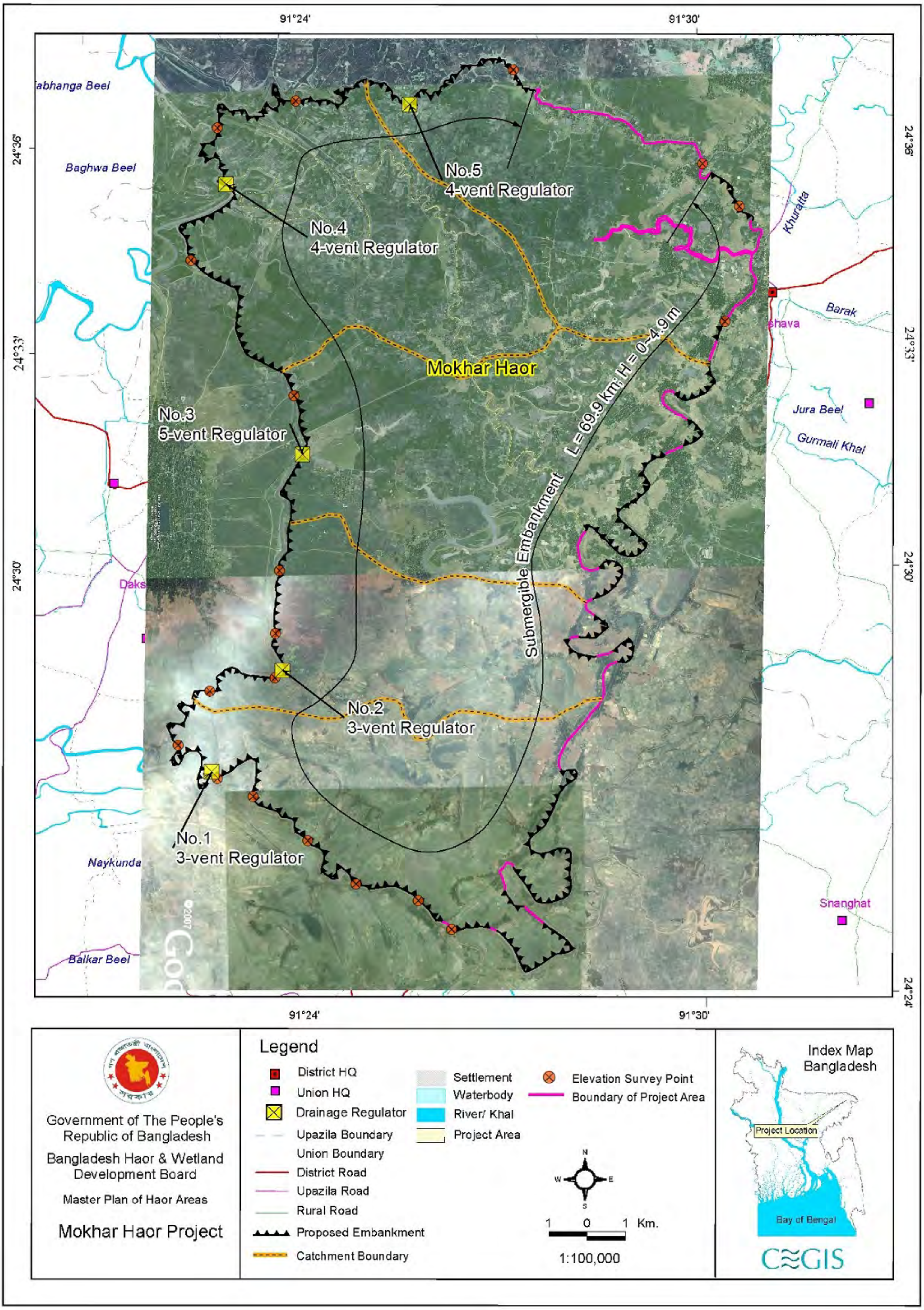
0.5 0 0.5 Km.

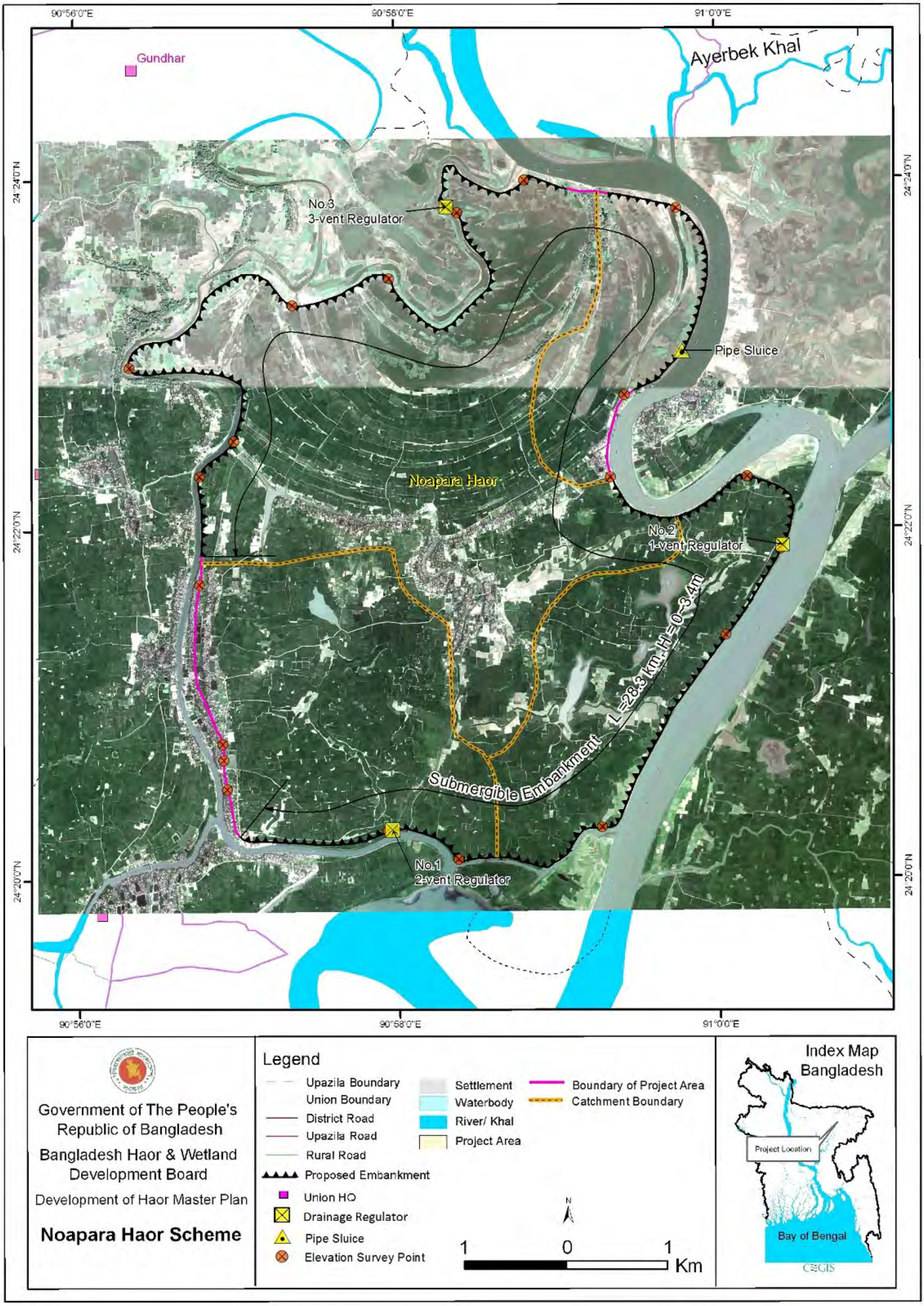
1:50,000

CEGIS

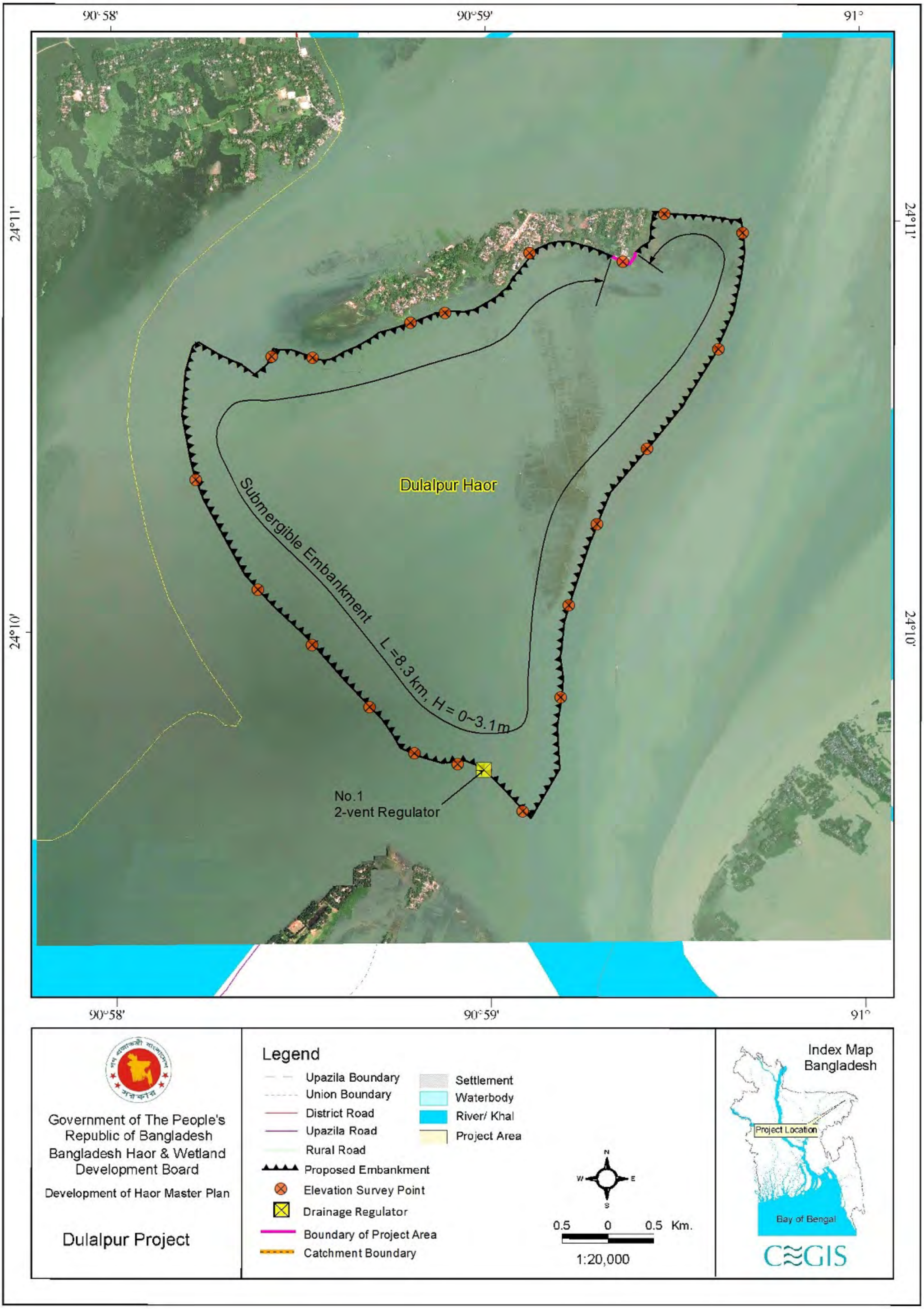


91°18'
91°20'
91°22'
91°24'
25°
24°58'
24°56'
Chekniar Beel
No.3
3-vent Regulator
Pipe Sluice
Dhakua Haor
L = 36.5. km; H = 0~3.1 m
Submergible Embankment
No.1
5-vent Regulator
No.2
1-vent Regulator
Kalya Beel
Karchabarar Beel
Bara Kasima Beel
Chhota Kasima Beel
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Master Plan of Haor Areas
Dhakua Haor
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
N
W
E
S
0.5 0 0.5 Km.
1:65,000
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS

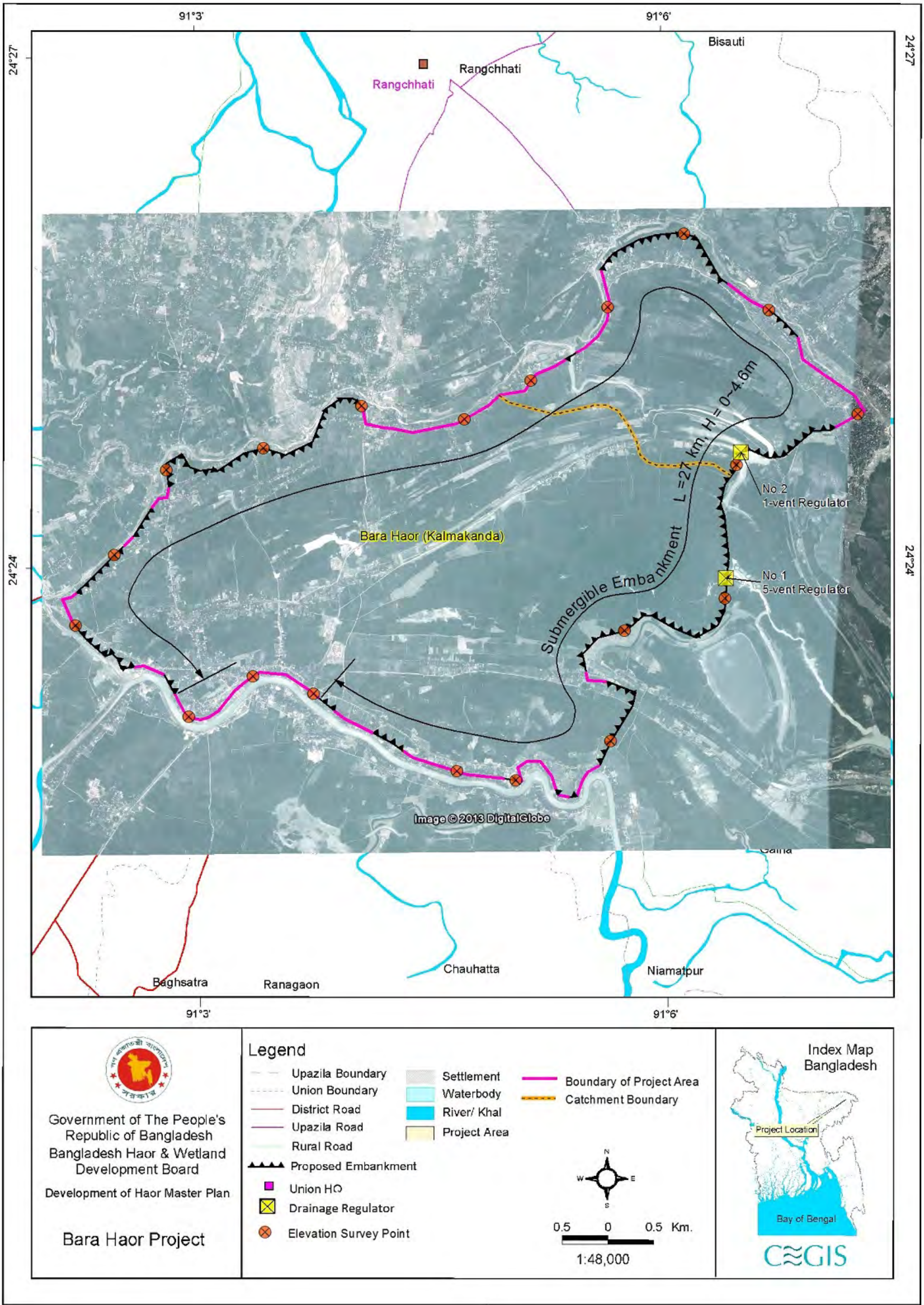

91°24'
91°30'
24°36'
24°33'
24°30'
24°24'
abhanga Beel
Baghwa Beel
Naykunda
Balkar Beel
Daks
Khuratta
Barak
shava
Jura Beel
Gurmali Khal
Snanghat
No.5
4-vent Regulator
No.4
4-vent Regulator
Mokhar Haor
No.3
5-vent Regulator
Submergible Embankment
L = 69.9 km; H = 0-4.9 m
No.2
3-vent Regulator
No.1
3-vent Regulator
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Master Plan of Haor Areas
Mokhar Haor Project
Legend
District HQ
Union HQ
Drainage Regulator
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Catchment Boundary
Settlement
Waterbody
River/ Khal
Project Area
Elevation Survey Point
Boundary of Project Area
N
S
E
W
1 0 1 Km.
1:100,000
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS



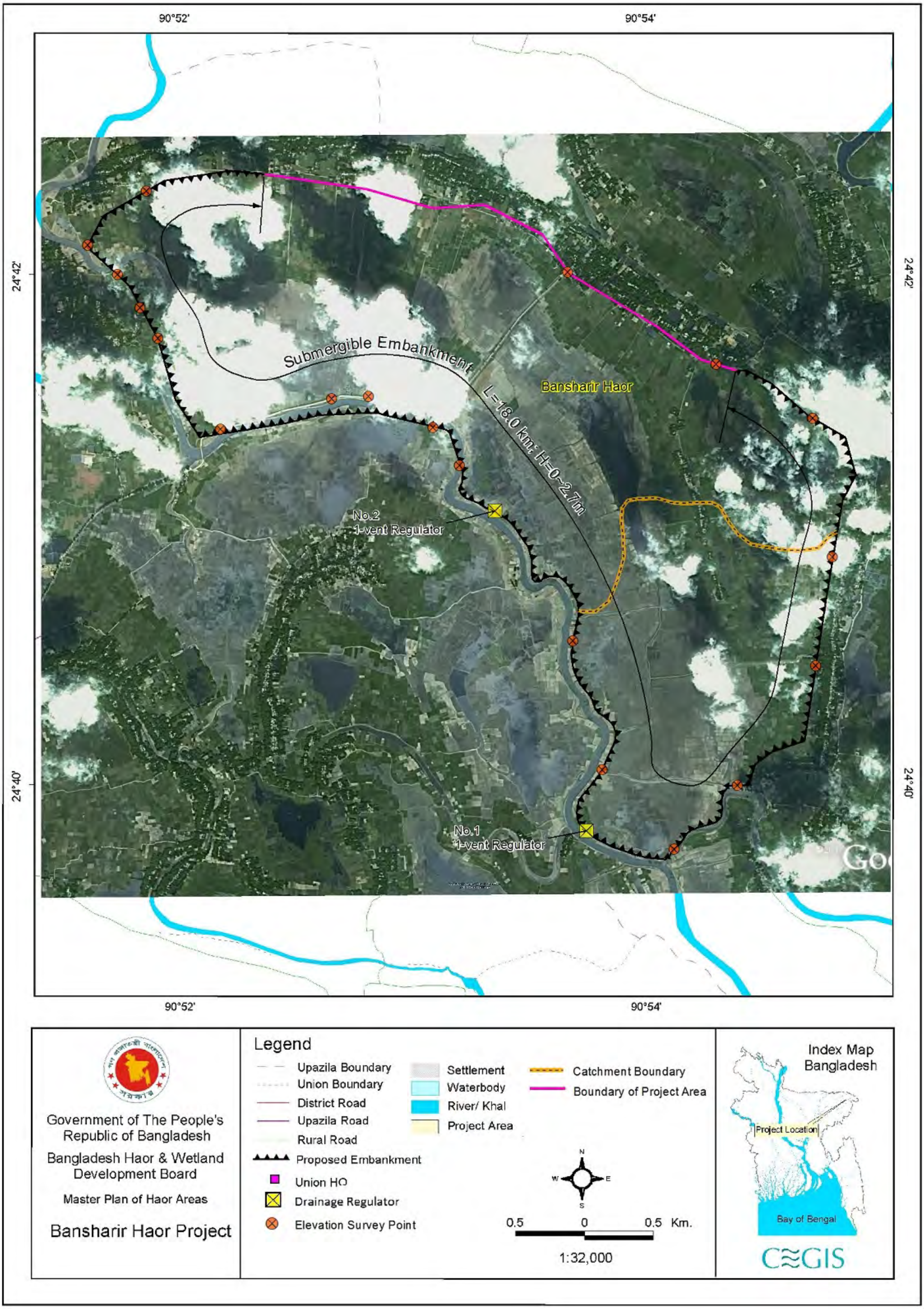
90°56'0"E
90°58'0"E
91°0'0"E
24°24'0"N
24°22'0"N
24°20'0"N
Gundhar
Ayerbek Khal
No.3
3-vent Regulator
Pipe Sluice
Noapara Haor
No.2
1-vent Regulator
L=28.3 km, H=0~3.4m
Submergible Embankment
No.1
2-vent Regulator
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Noapara Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
N
1
0
1
Km
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS

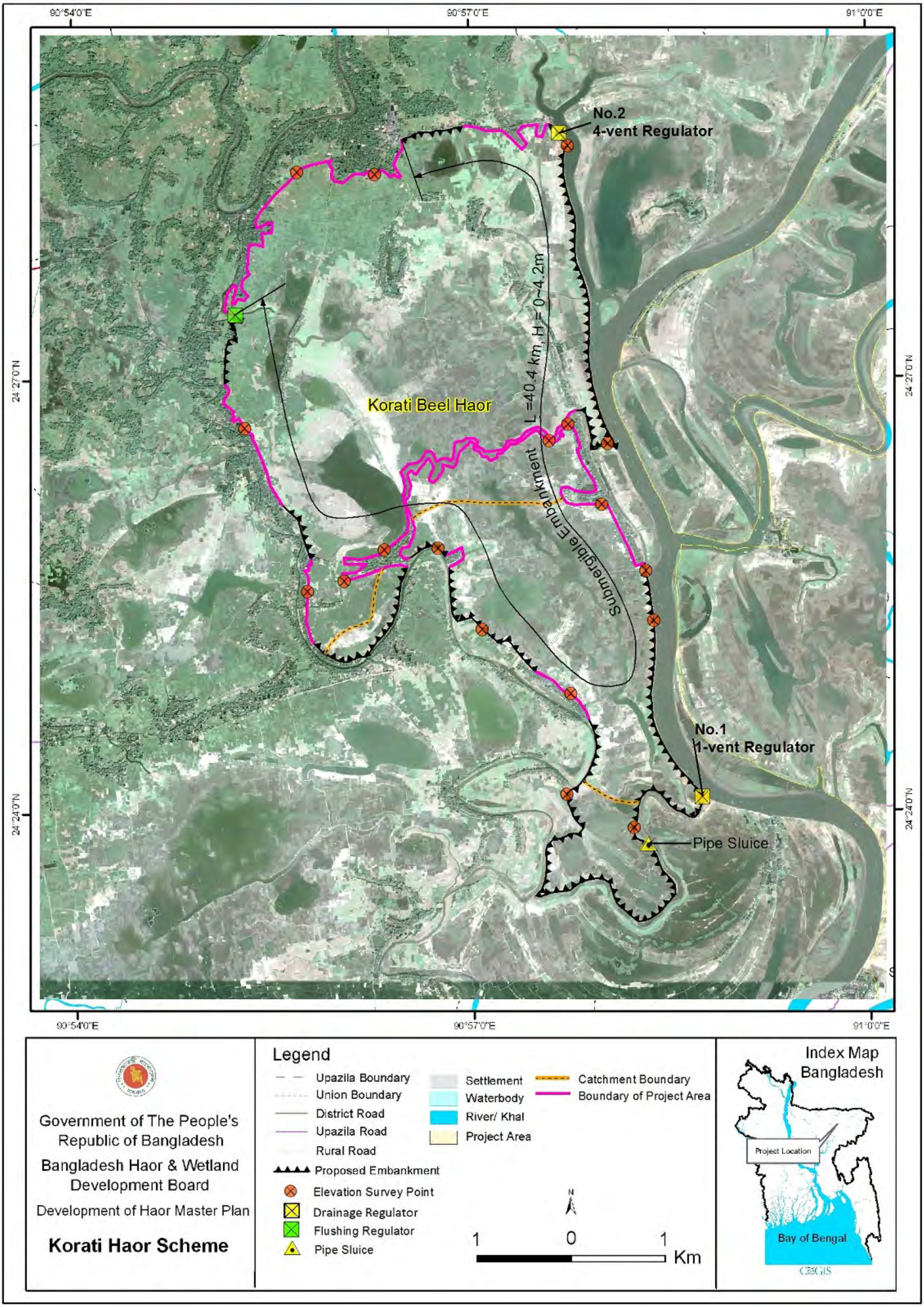


90°58'
90°59'
91°
24°11'
24°10'
Dulalpur Haor
Submergible Embankment
L =8.3 km, H = 0~3.1m
No.1
2-vent Regulator
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Dulalpur Project
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Boundary of Project Area
Catchment Boundary
Settlement
Waterbody
River/ Khal
Project Area
N
S
E
W
0.5 0 0.5 Km.
1:20,000
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS

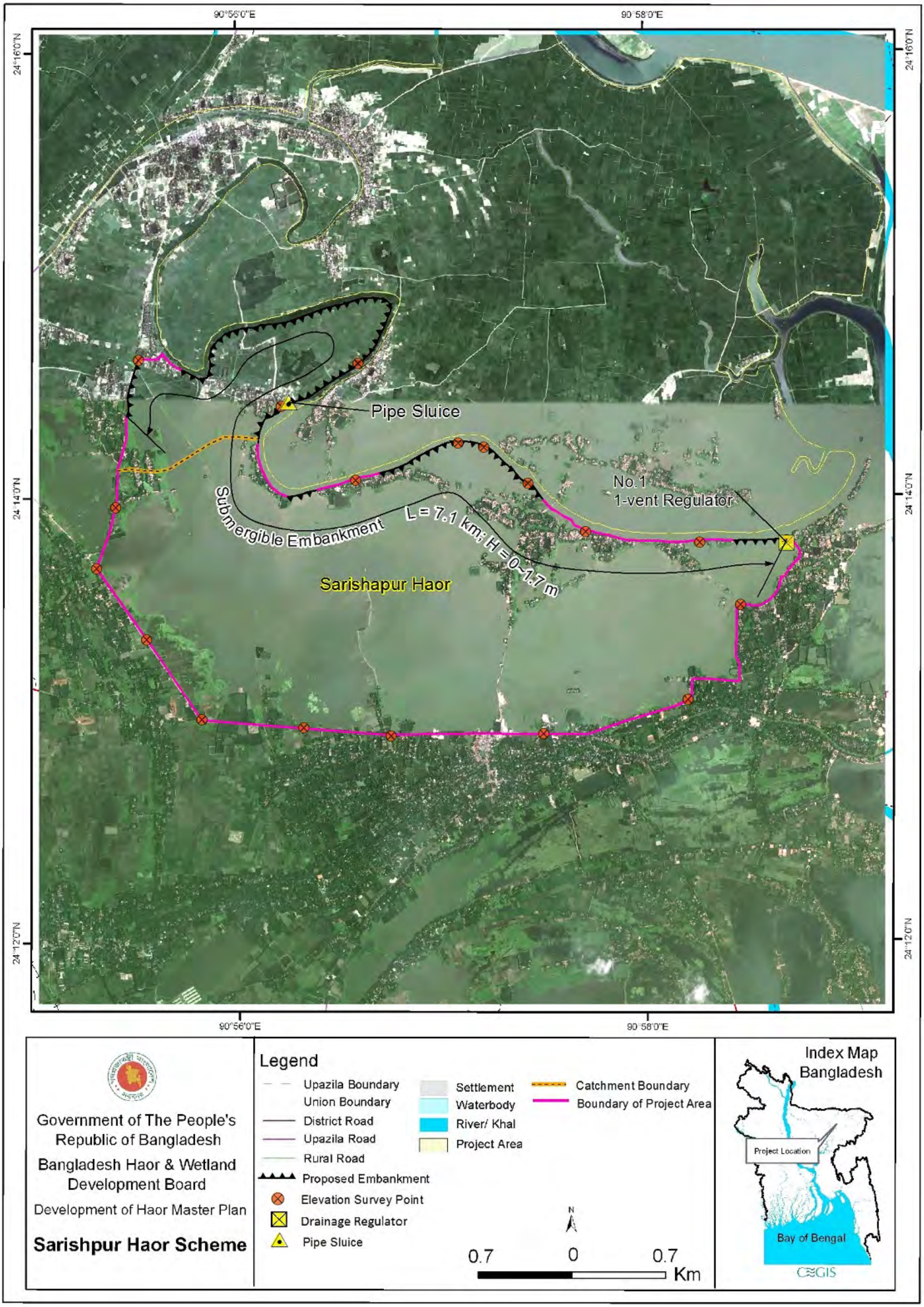


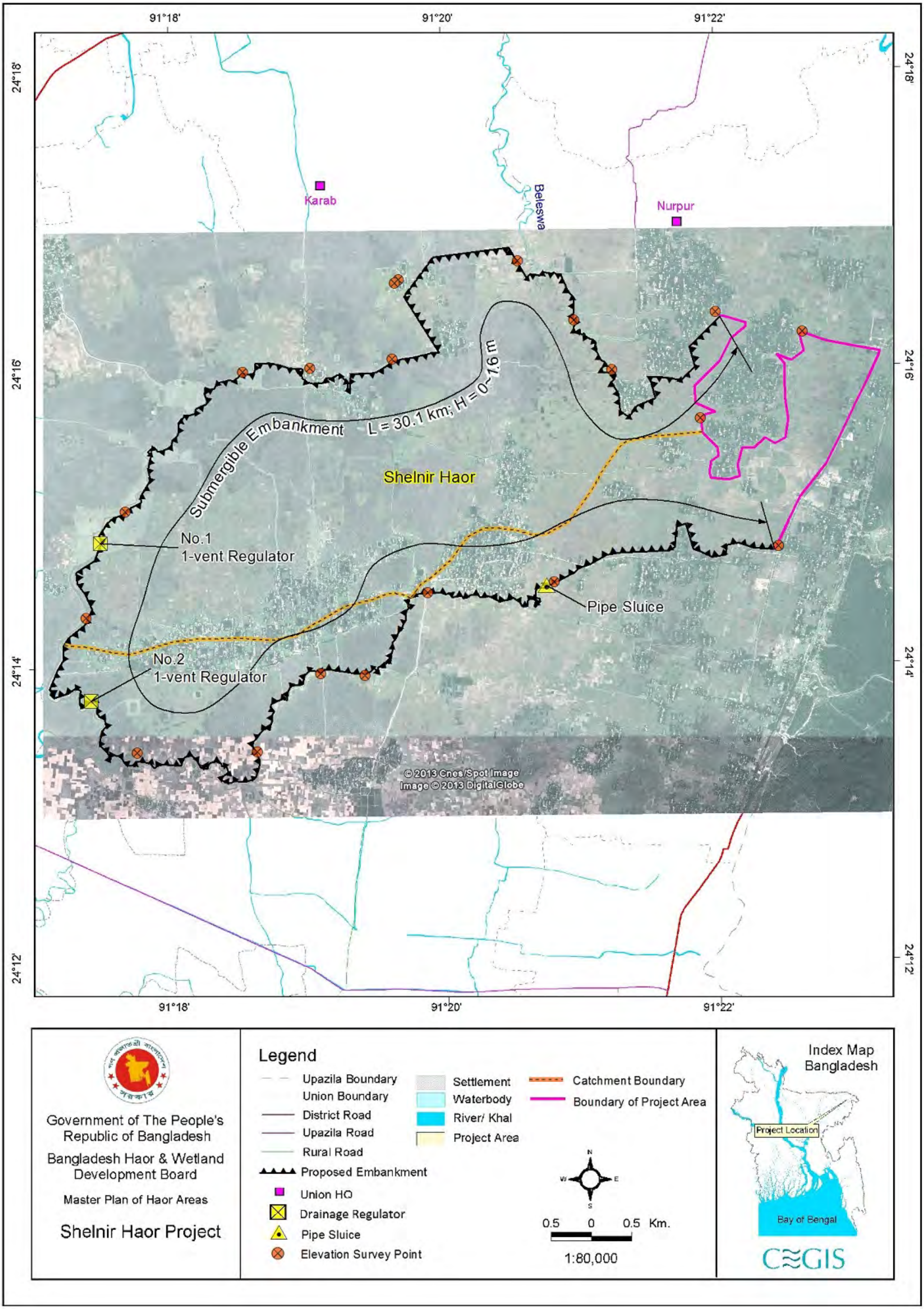
91°3'
91°6'
24°27'
24°24'
Bisauti
Rangchhati
Rangchhati
Bara Haor (Kalmakanda)
L =27 km, H = 0~4.6m
Submergible Embankment
No.2
1-vent Regulator
No.1
5-vent Regulator
Image © 2013 DigitalGlobe
Chauhatta
Niamatpur
Baghsatra
Ranagaon
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Bara Haor Project
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
N
W
E
S
0.5
0
0.5
Km.
1:48,000
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS


90°52'
90°54'
24°42'
24°40'
Submergible Embankment
L=18.0 km; H=0~2.7m
Bansharir Haor
No.2
1-vent Regulator
No.1
1-vent Regulator
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
N
S
E
W
0.5
0
0.5
Km.
1:32,000
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Master Plan of Haor Areas
Bansharir Haor Project
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS



90°54'0"E
90°57'0"E
91°0'0"E
24°27'0"N
24°24'0"N
No.2
4-vent Regulator
Korati Beel Haor
L =40.4 km, H = 0~4.2m
Submergible Embankment
No.1
1-vent Regulator
Pipe Sluice
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Korati Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Flushing Regulator
Pipe Sluice
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
N
1
0
1
Km
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS


90°56'0"E
90°58'0"E
24°16'0"N
24°14'0"N
24°12'0"N
Pipe Sluice
No.1
1-vent Regulator
Submergible Embankment
L = 7.1 km; H = 0-1.7 m
Sarishapur Haor
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Sarishpur Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Pipe Sluice
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
N
0.7 0 0.7
Km
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS


91°18'
91°20'
91°22'
24°18'
24°16'
24°14'
24°12'
Karab
Nurpur
Beleswa
Submergible Embankment L = 30.1 km; H = 0~1.6 m
Shelnir Haor
No.1
1-vent Regulator
No.2
1-vent Regulator
Pipe Sluice
© 2013 Cnes/Spot Image
Image © 2013 DigitalGlobe
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Master Plan of Haor Areas
Shelnir Haor Project
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
N
W
E
S
0.5 0 0.5 Km.
1:80,000
Index Map Bangladesh
Project Location
Bay of Bengal
CEGIS

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

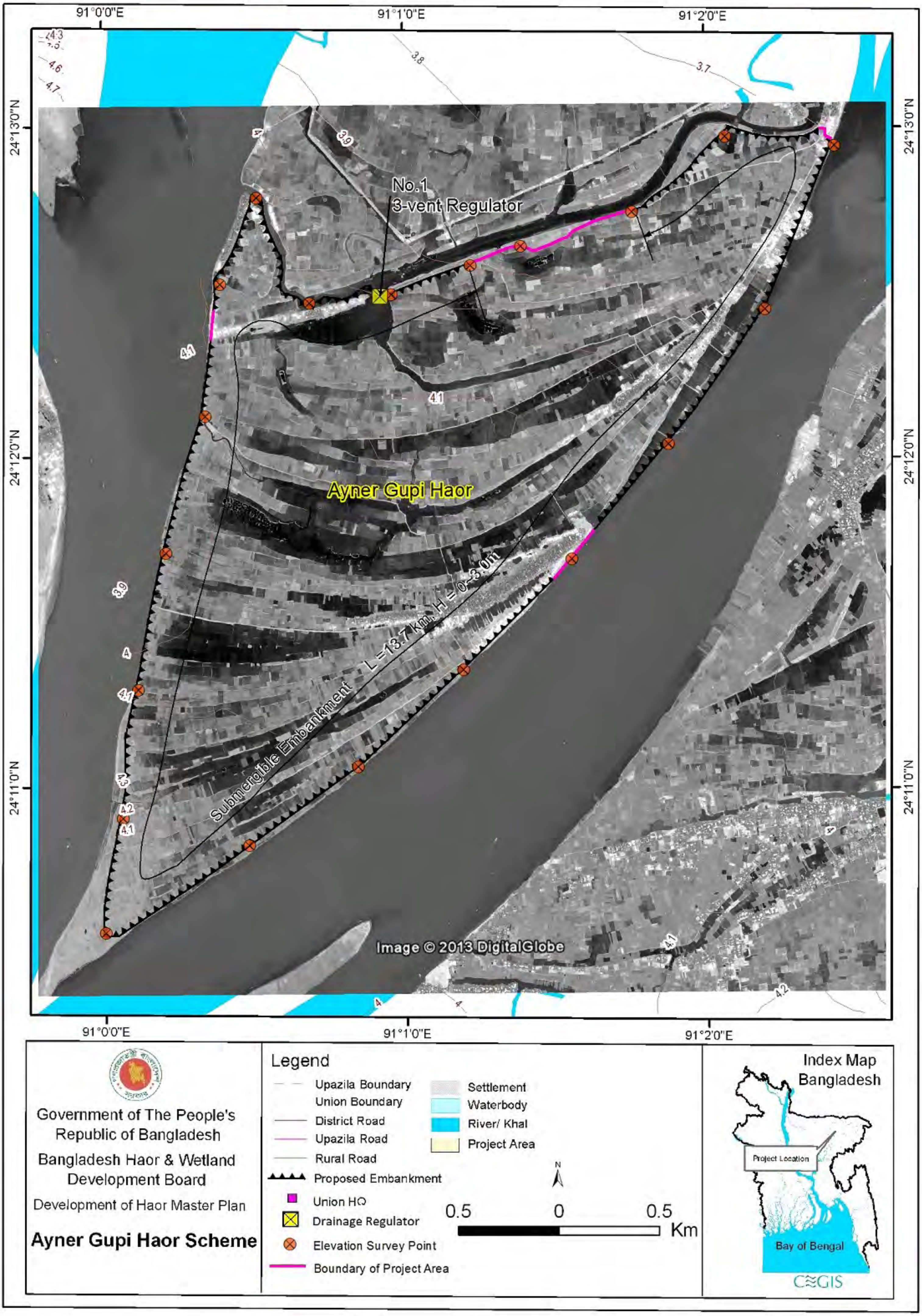
Kuniarbandh Haor Scheme

Legend

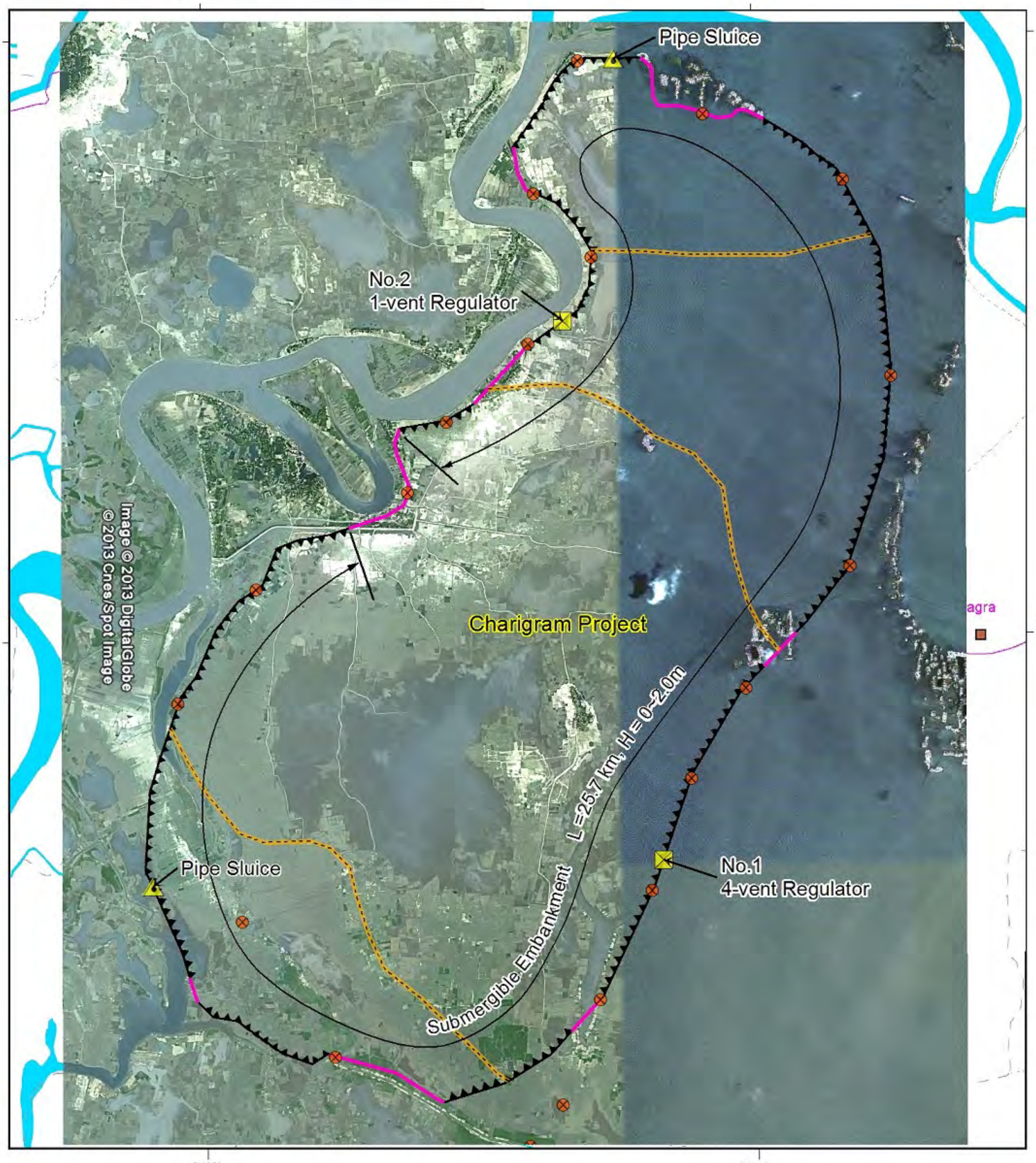
- Upazila Boundary
- Union Boundary
- District Road
- Upazila Road
- Rural Road
- Proposed Embankment
- Elevation Survey Point
- Drainage Regulator
- Boundary of Project Area
- Settlement
- Waterbody
- River/ Khal
- Project Area

N

0.7 0 0.7 Km



91°0'0"E
91°1'0"E
91°2'0"E
24°13'0"N
24°12'0"N
24°11'0"N
No.1
3-vent Regulator
Ayner Gupi Haor
Submergible Embankment L =13.7 km, H = 0-3.0m
Image © 2013 DigitalGlobe
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Ayner Gupi Haor Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Elevation Survey Point
Boundary of Project Area
Settlement
Waterbody
River/ Khal
Project Area
N
0.5 0 0.5
Km
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Charigram Project

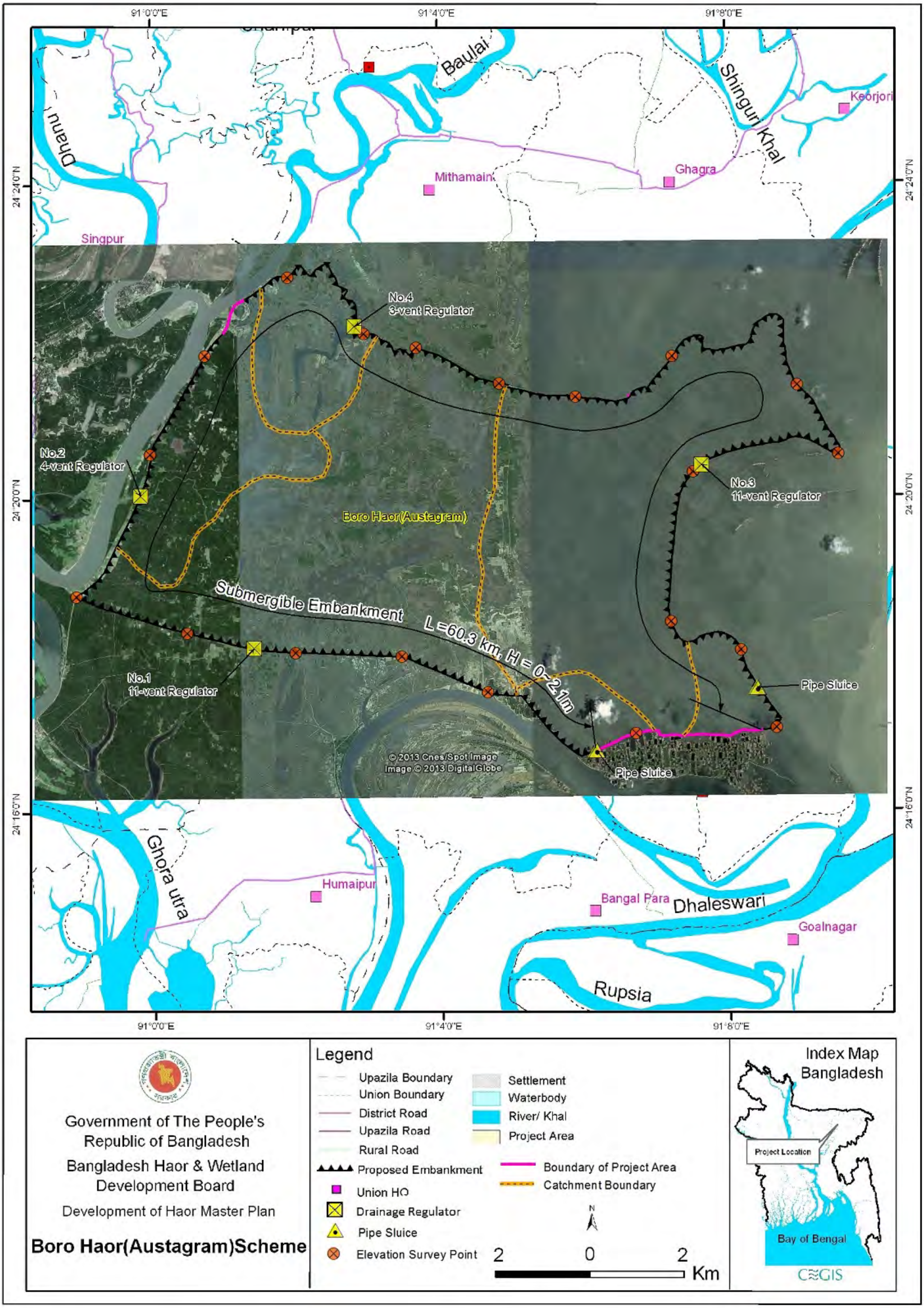
Legend

- Upazila Boundary
- Union Boundary
- District Road
- Upazila Road
- Rural Road
- Proposed Embankment
- Union HQ
- Drainage Regulator
- Pipe Sluice
- Elevation Survey Point
- Settlement
- Waterbody
- River/ Khal
- Project Area
- Boundary of Project Area
- Catchment Boundary

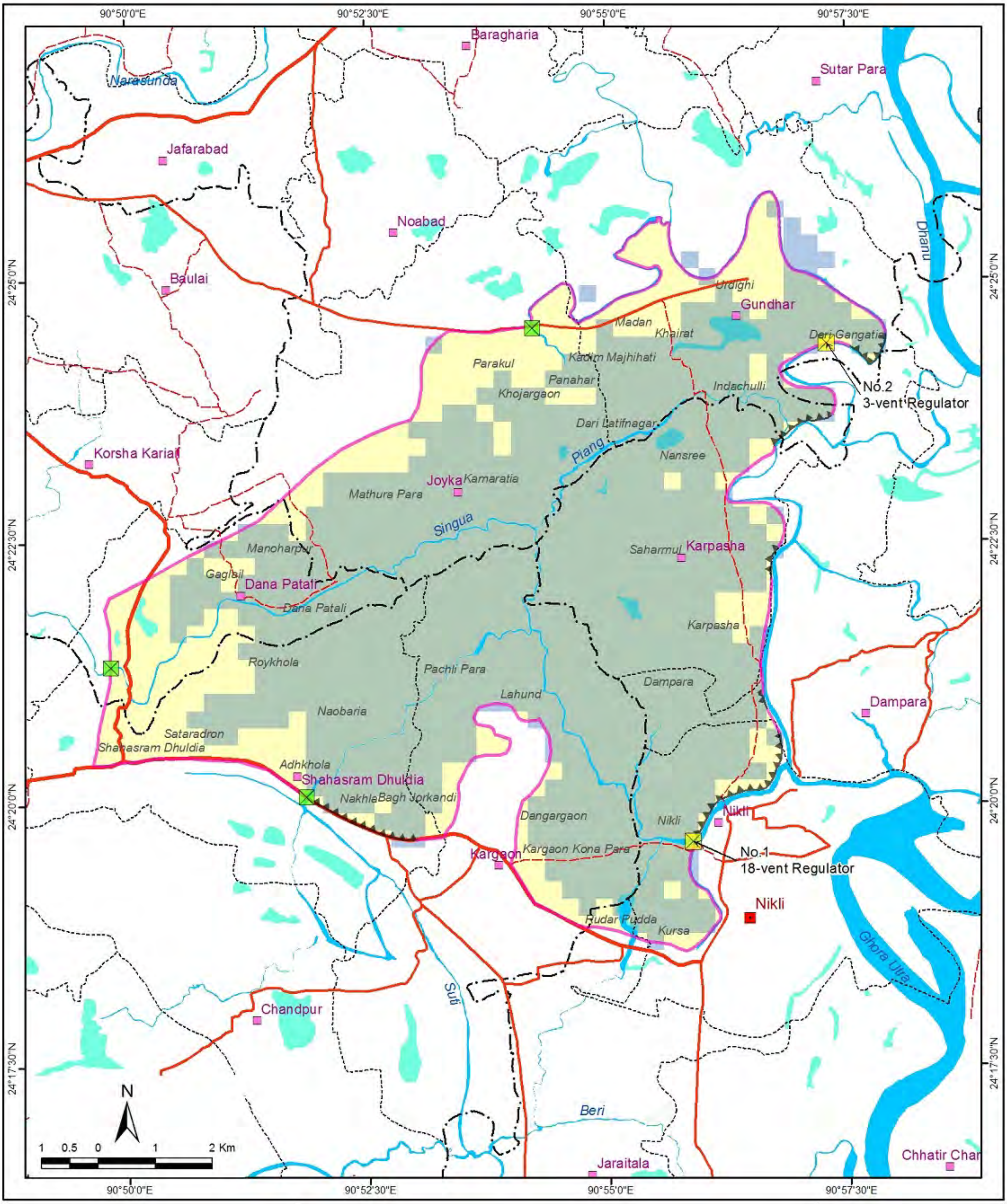
0.5 0 0.5 Km.

1:110,000

CEGIS



91°0'0"E
91°4'0"E
91°8'0"E
24°24'0"N
24°20'0"N
24°16'0"N
Baulai
Dhanu
Shingun Khal
Keorjori
Mithamain
Ghagra
Singpur
No.4
3-vent Regulator
No.2
4-vent Regulator
No.3
11-vent Regulator
Boro Haor(Austagram)
Submergible Embankment
L =60.3 km, H = 0~2.1m
No.1
11-vent Regulator
Pipe Sluice
Pipe Sluice
© 2013 Cnes/Spot Image
Image © 2013 DigitalGlobe
Ghora utra
Humaipur
Bangal Para
Dhaleswari
Goalnagar
Rupsia
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Boro Haor(Austagram)Scheme
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Union HQ
Drainage Regulator
Pipe Sluice
Elevation Survey Point
Settlement
Waterbody
River/ Khal
Project Area
Boundary of Project Area
Catchment Boundary
N
2 0 2
Km
Index Map
Bangladesh
Project Location
Bay of Bengal
CEGIS



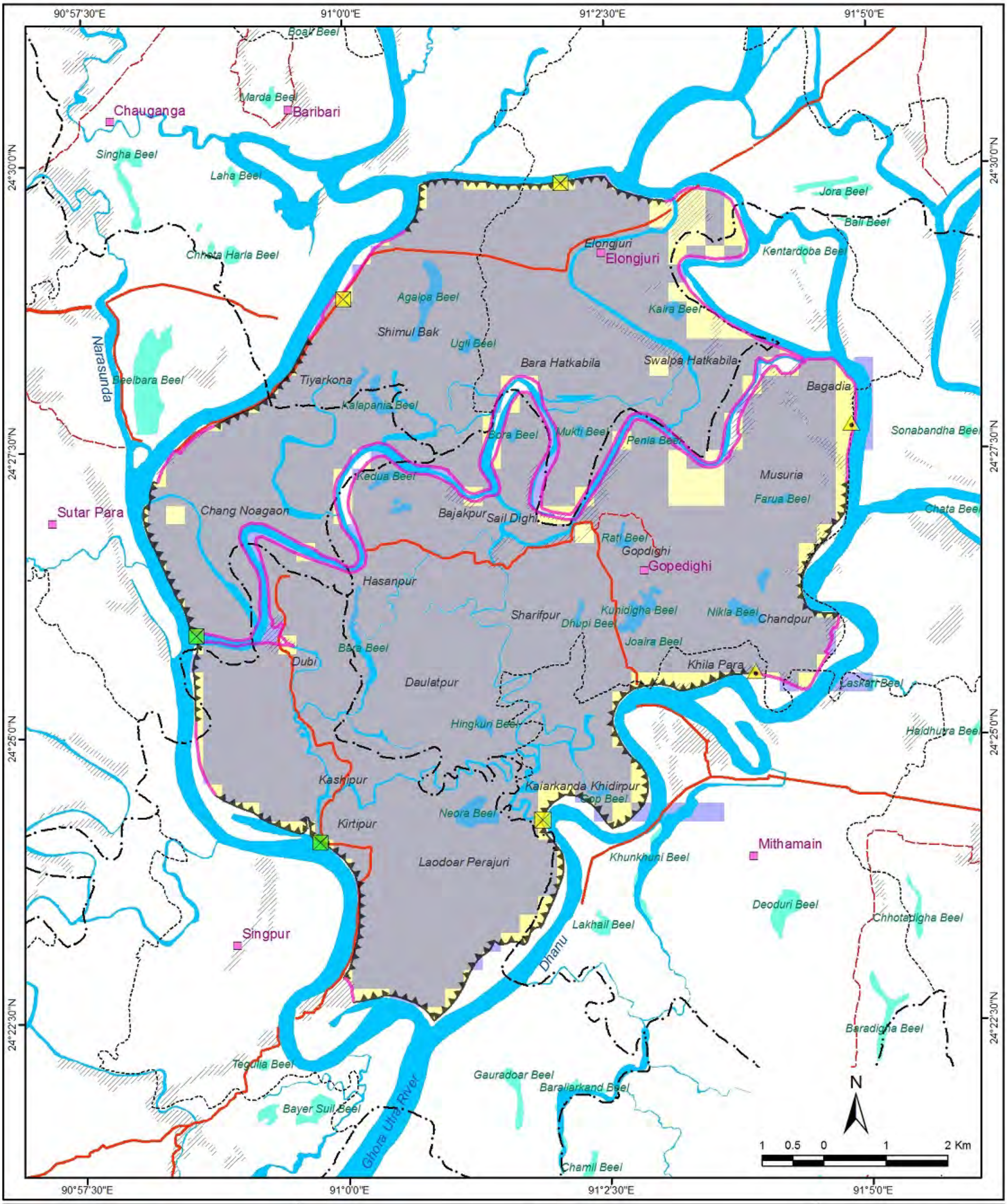
Data Collection Survey
On
Water Resources Management
in Haor Area of Bangladesh

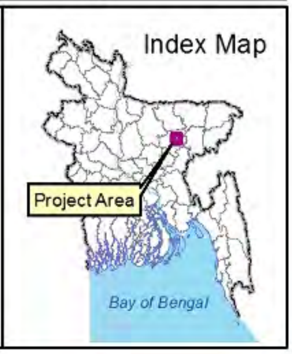
Boro Haor (Nikli) Scheme

Legend

Upazila Boundary	Upazila H/Q
Union Boundary	Union H/Q
Upazila Road	Drainage Regulator
Union Road	Flushing Regulator
Rural Road	River / Khal
Project Boundary	Water body
Proposed Embankment	Inundated area (DWL = 5.1 m+PWD)

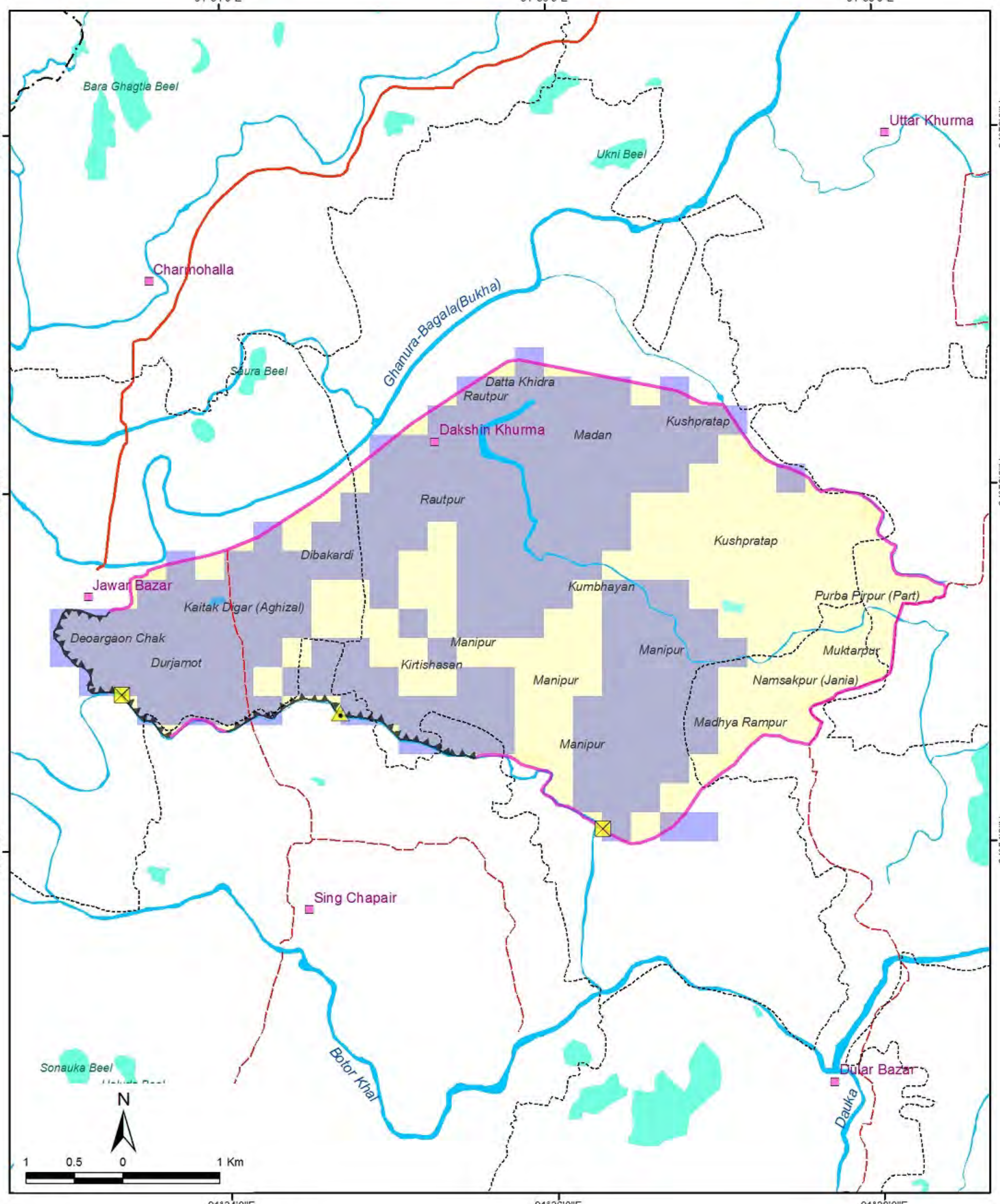
Index Map





Data Collection Survey
On
Water Resources Management
in Haor Area of Bangladesh

Naogaon Haor Scheme



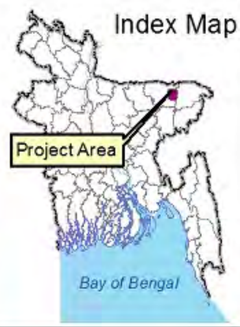
Data Collection Survey
On
Water Resources Management
in Haor Area of Bangladesh

Jaliar Haor Project

Legend

- Upazila Boundary
- Union Boundary
- Union Road
- Rural Road
- Project Boundary
- Proposed Embankment
- Union H/Q
- Drainage Regulator
- Pipe Sluice
- River / Khal
- Water body
- Inundated area (DWL = 7.3 m+PWD)

Index Map



Data Collection Survey
On
Water Resources Management
in Haor Area of Bangladesh
Dharmapasha Rui Beel Project
Legend
Division Boundary
District Boundary
Upazila Boundary
Union Boundary
Upazila Road
Union Road
Rural Road
Project Boundary
Proposed Embankment
Upazila H/Q
Union H/Q
Drainage Regulator
Pipe Sluice
River / Khal
Water body
Inundated area
(DWL = 6.1 m+PWD)
Index Map
Project Area
Bay of Bengal
90°55'0"E
90°57'30"E
91°0'0"E
91°2'30"E
91°5'0"E
25°5'0"N
25°2'30"N
25°0'0"N
24°57'30"N
24°55'0"N
24°52'30"N
2 1 0 2 Km
N
Kalmakanda
Someswari
Updakhali
Dubhapur Beel
Sunua Beel
Pakertala Beel
Kechuria Beel
Baulai
Machhimpur
Laudugnai
Kanda Para
Sampadpur
Uttar Noagaon
Chholemanpur
Madhyanagar
Madhya Noagaon
Jamalpur
Majlishpur
Chamardani
Ramdigha
Datta Para
Ikabad
Madhabpur (Tapirkona)
Uttar Daulatpur
Sabari Para
Karabad (Abidnagar)
Galaikhali
Mashakanda (Khalisha Kanda)
Narijora (Faruqnagar)
Balarampur
Pasna Haor
Tulir Beel
Kablia Beel
Bara Kharpan
Maskanda (Shahanagar)
Muzaffarpur
Purba Sahapur
Jalusha
Gumai
Kurshibari
Balakipur
Bahar Beel
Balia
Noagaon (Bangaon)
Bekhaijura
Hashua Beel
Banarashipur
Shahapur Chak
Baitpur (Lakhankhala)
Bakharpur
Shunai
Barai
Ghirail
Kalumai
Kumkria beel
Kalna Beel
Daikatra Beel
Urdha Beel
Bhatgaon
Sonamaral Haor
Bara Khurdarpur
Alipur
Lengur
Shilkura Beel
Uttar Rajapur
Chhata Beel
Mandaruar Beel
Sairtali
Nizampur
Balijuri
Haripur
Achpur Chak
Baraihati
Paikurati
Dullal Beel
Paikrati
Bahadurpur
Dhobala (Birchak)
Solahamara Beel
Saikomara Beel
Baunura Beel
Gonderber
Naoder
Joysree
Ranigaon
Bir
Pailchapra beel
Kainger Beel
Karcher Beel
Baulam
Naihati
Labiar Pachur (Vetapara)
Asma
Chhiram
Saidigha Beel
Rui Beel
Durbakanda
Bamangaon
Khala Para
Jaldhara Beel
Someswari
Matikata
Maijbari
Karagati
Ramjibanpur
Lanka Patharia
Naya Para (Langpati)
Fulur
Salap
Harua Beel
Sharisham
Selborash
Dulijhar Beel
Inga Beel
Gabhi
Saiyadpur
Roymadhab
Jagabpur
Habibpur (Madhabpur)
Joypatak
Mirzapur
Bhatakpur
Bhatgaon
Bawal Beel
Ahammadpur
Kohuar Beel
Hargor Beel
Bamunerbari
Bagar Pachur (Part-1)
Nedgaon
Geria
Singpur
Dharmapasha
Chandrapur
Naldugi Beel
Ramer Geria
Dharani Beel
Pagli
Kakura
Baniagaon
Basaura
Dharampasha
Nimalkona Beel
Kukrani Beel
Singdha
Bhogai Kangsho
Dakshin Sukhairrajapur
Telikuri
Singdha
Makra Beel
Alokdia
Sanjal beel
Barhatta
Dharam
Baratali Banihari
Paurashava
Mohanganj
Satli Beel