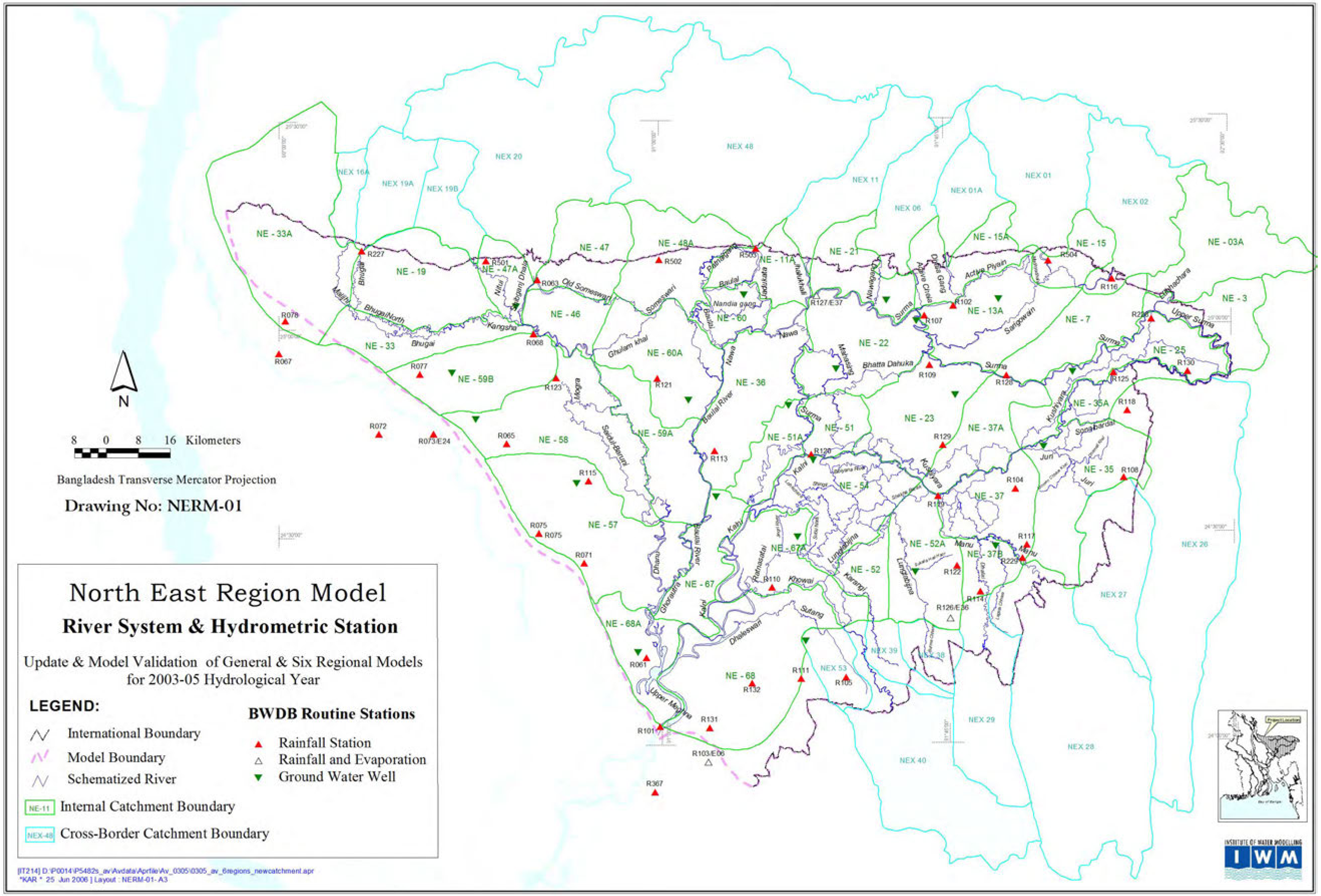
附録 **5-1**

NERM 流域分割図


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
NE-11 Internal Catchment Boundary
NEX-48 Cross-Border Catchment Boundary
BWDB Routine Stations
Rainfall Station
Rainfall and Evaporation
Ground Water Well
N
8 0 8 16 Kilometers
Bangladesh Transverse Mercator Projection
Drawing No: NERM-01
NEX 16A
NEX 19A
NEX 19B
NEX 20
NEX 48
NEX 11
NEX 06
NEX 01A
NEX 01
NEX 02
NEX 26
NEX 27
NEX 28
NEX 29
NEX 38
NEX 39
NEX 40
NEX 53
NE - 33A
NE - 19
NE - 47A
NE - 47
NE - 48A
NE - 11A
NE - 21
NE - 15A
NE - 15
NE - 03A
NE - 3
NE - 33
NE - 46
NE - 60
NE - 60A
NE - 59B
NE - 58
NE - 59A
NE - 36
NE - 22
NE - 13A
NE - 7
NE - 25
NE - 23
NE - 51
NE - 51A
NE - 37A
NE - 35A
NE - 35
NE - 54
NE - 37
NE - 57
NE - 67A
NE - 52A
NE - 37B
NE - 52
NE - 67
NE - 68A
NE - 68
Bhugai
Old Someswari
Someswari
Kangsha
Nitai
Ghulam khal
Baulai
Baulai River
Nawa
Surma
Upper Surma
Kushiyara
Sarigowain
Bhatta Dahuka
Jadukata
Kalni
Juri
Manu
Khowai
Sutang
Dhaleswari
Upper Meghna
Ghorautra
Dhanu
Mogra
Lungla
Rainfall
R227
R501
R502
R503
R063
R068
R078
R067
R077
R123
R072
R073/E24
R065
R121
R113
R115
R075
R071
R061
R101
R131
R103/E06
R367
R132
R111
R105
R110
R120
R127/E37
R102
R107
R109
R128
R129
R104
R125
R130
R118
R108
R116
R504
R220
R117
R229
R122
R114
R126/E36
R119
INSTITUTE OF WATER MODELLING
IWM
Project Location
Bay of Bengal
[IT214] D:\P0014\P5482s_av\Avdata\Aprfile\Av_0305\0305_av_6regions_newcatchment.apr
*KAR * 25 Jun 2006] Layout : NERM-01- A3

附録 5-2

計算水位による確率評価の妥当性の検討

JICA ハオール調査
計算水位による確率評価の妥当性の検討

1. 実測水位の使用可能性の検討

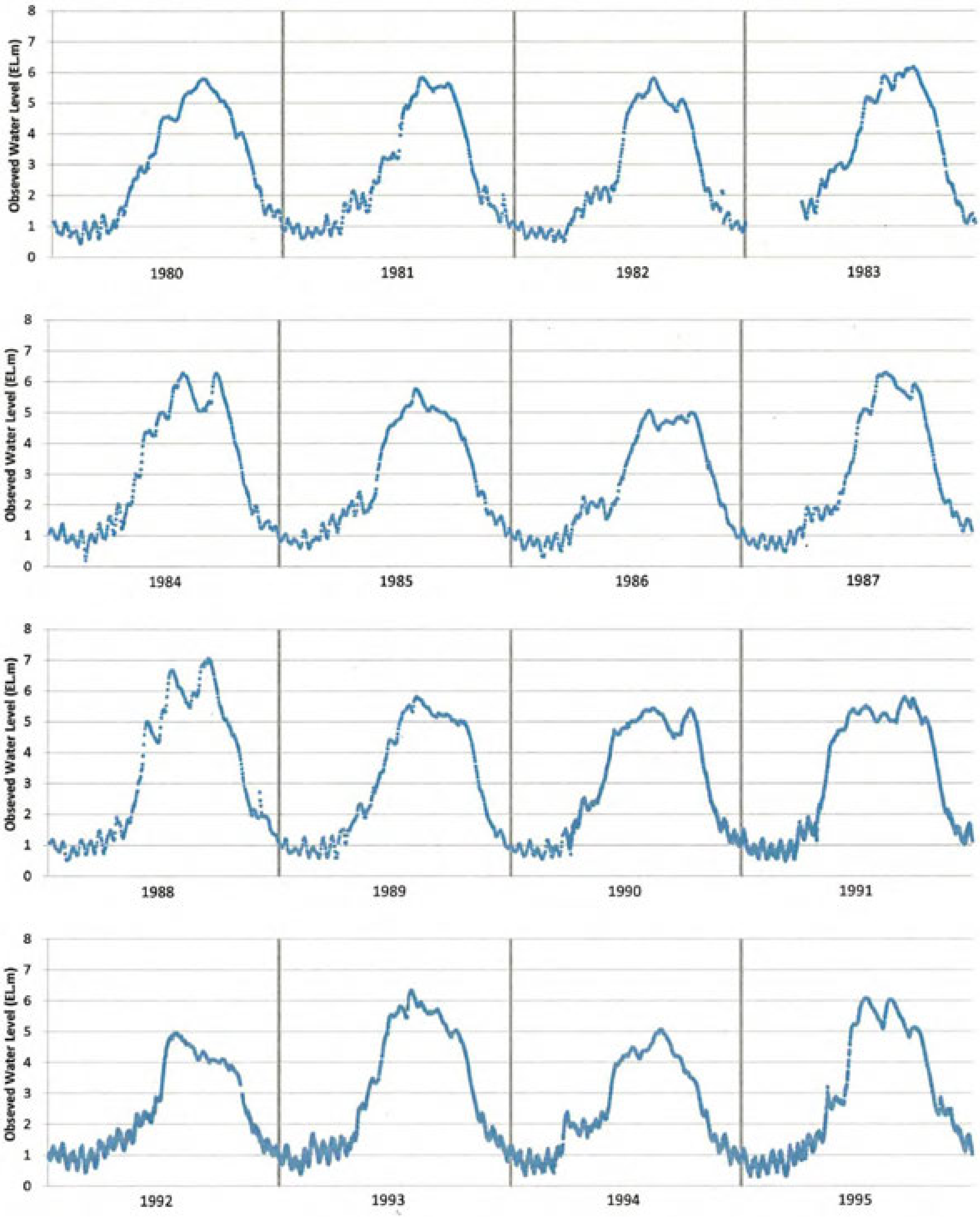
実測水位の使用可能性について、IWMから提供された4観測所（バイラブ･バザール(Bhairab Bazar)、イトナ(Itna)、シュナムゴンジ(Sunamganj)、シレット(Sylhet)）の実測水位データをもとに検証する。なお、実測水位は洪水による河道形状の変化や地盤沈下などの影響により補正が必要である。表1に水位観測所リスト、データの期間ならびに実測水位の補正値を示す。

表 **1** 水位観測所における実測水位の補正

水位観測所名	期間	補正値(m)	備考
バイラブ・バザール (Bhairab Bazar)	1980－2010	-0.62	2013年9月にIWMから提供された補正済みデータを使用
イトナ (Itna)	2003－2010	-1.45	2002年以前の補正値はIWMから信頼できる説明が得られていないため、2003年以降のデータのみ使用
シュナムゴンジ (Sunamganj)	1980－2010	-0.67	IWMから提示された補正値を通年で適用
シレット (Sylhet)	1980－2010	-0.61	IWMから提示された補正値を通年で適用

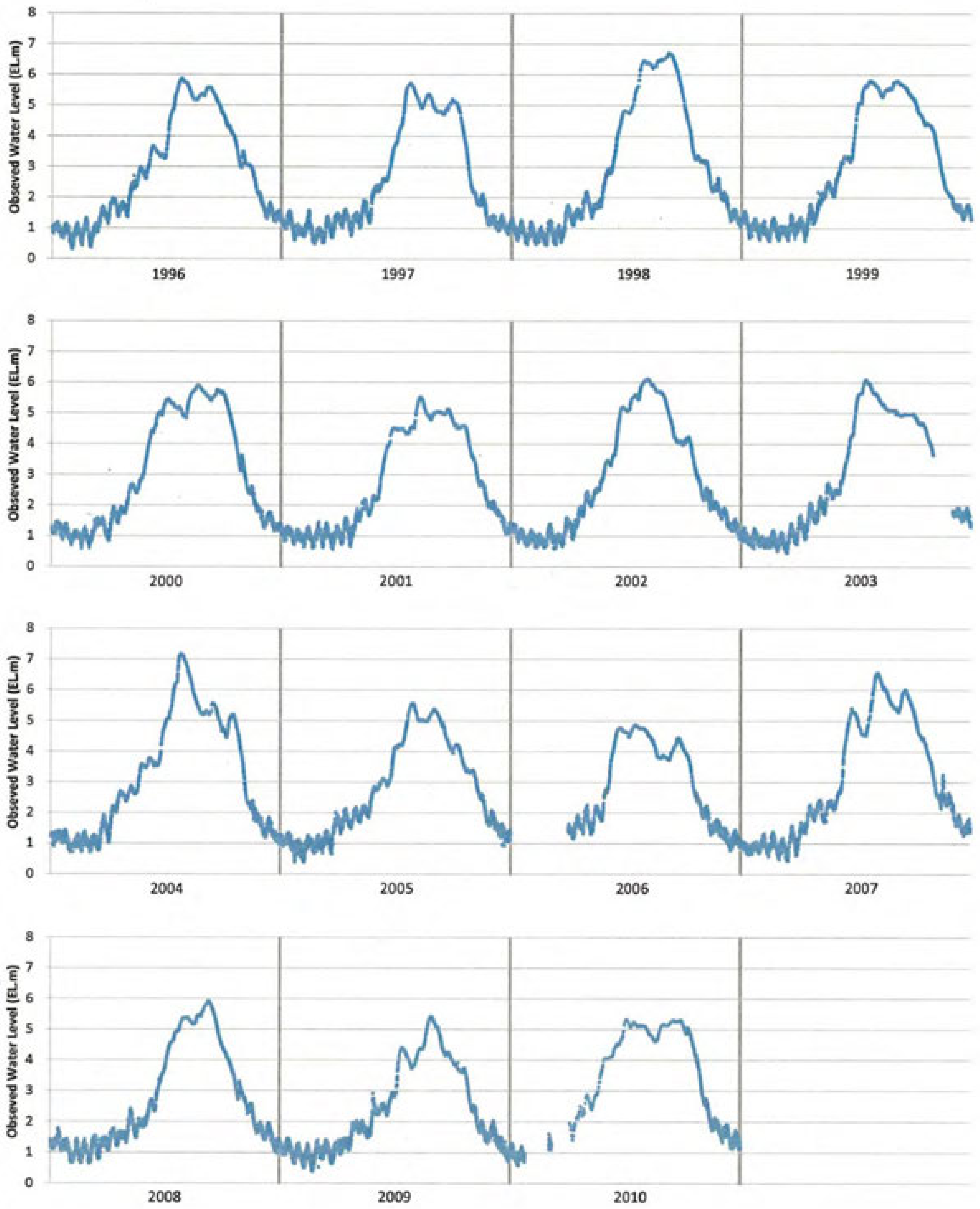
出典: IWM情報を基にJICA調査団作成

上記4観測所の補正済み水位データを次頁以降に示す。



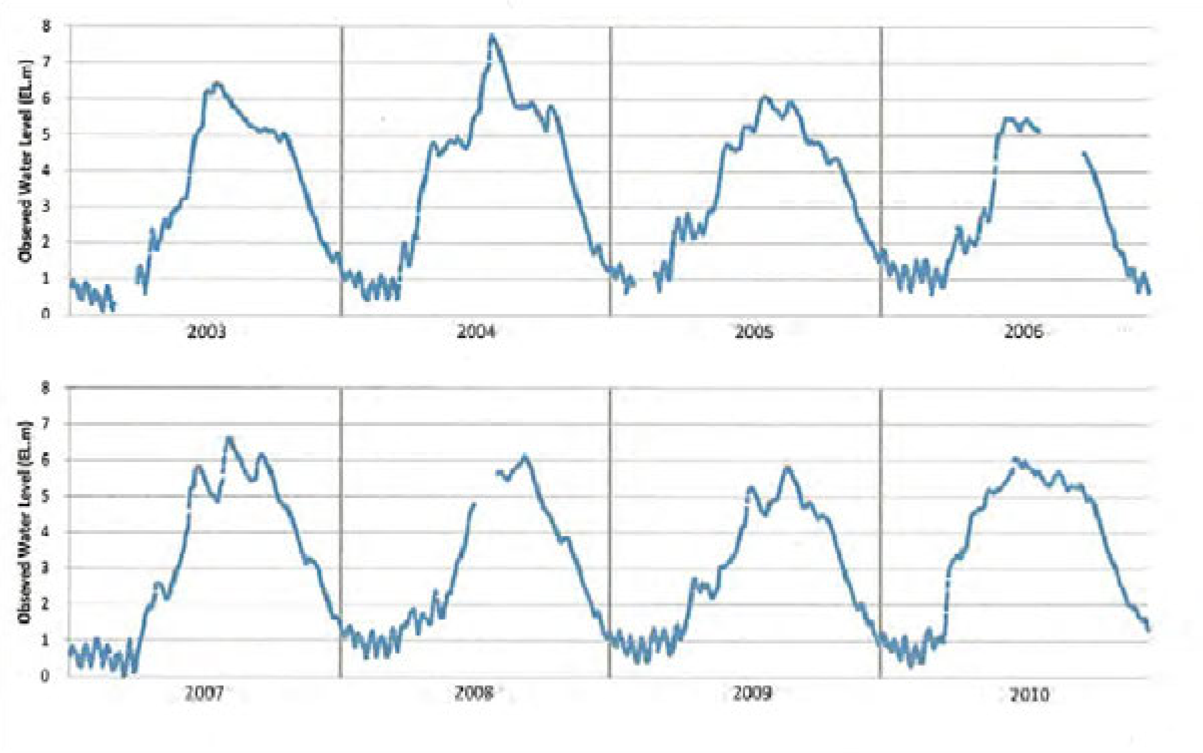
出典：JICA 調査団

図 1　バイラブ・バザール観測所の実測水位（1980－1995）



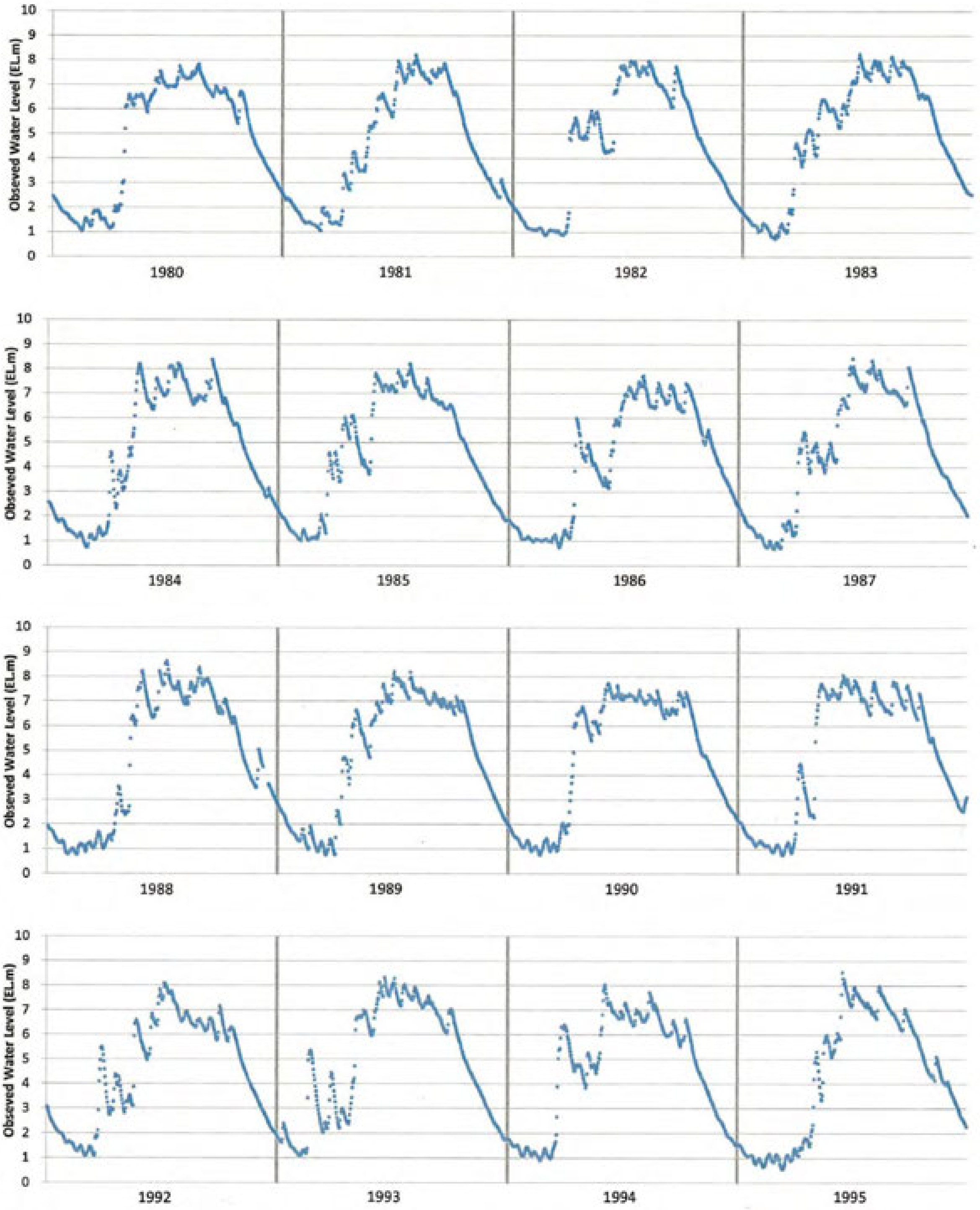
出典：JICA 調査団

図 1　バイラブ・バザール(**Bhairab Bazar**)観測所の実測水位（**1996**－**2010**）



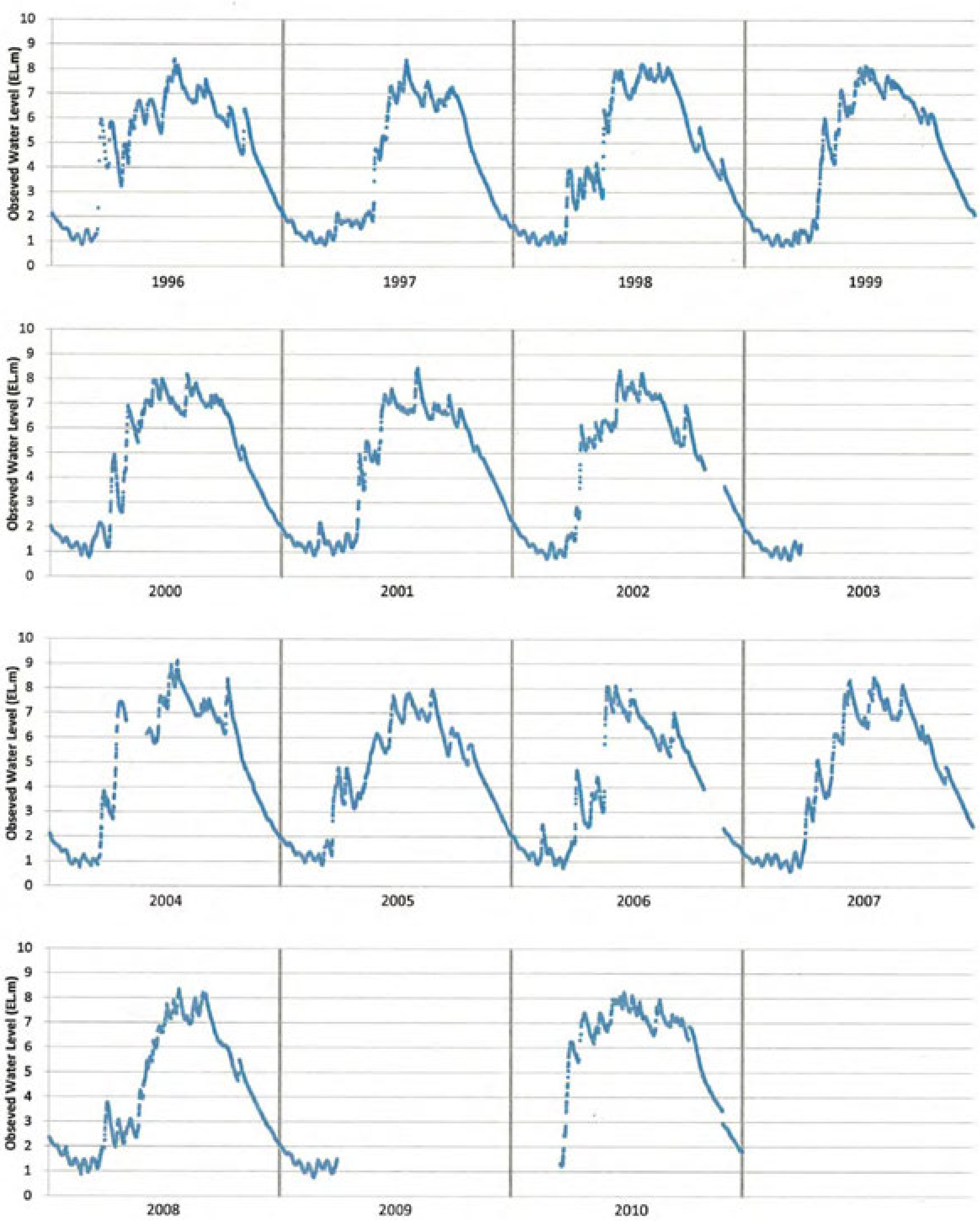
出典：JICA 調査団

図 **2**　イトナ**(Itna)**観測所の実測水位（**2003-2010**）



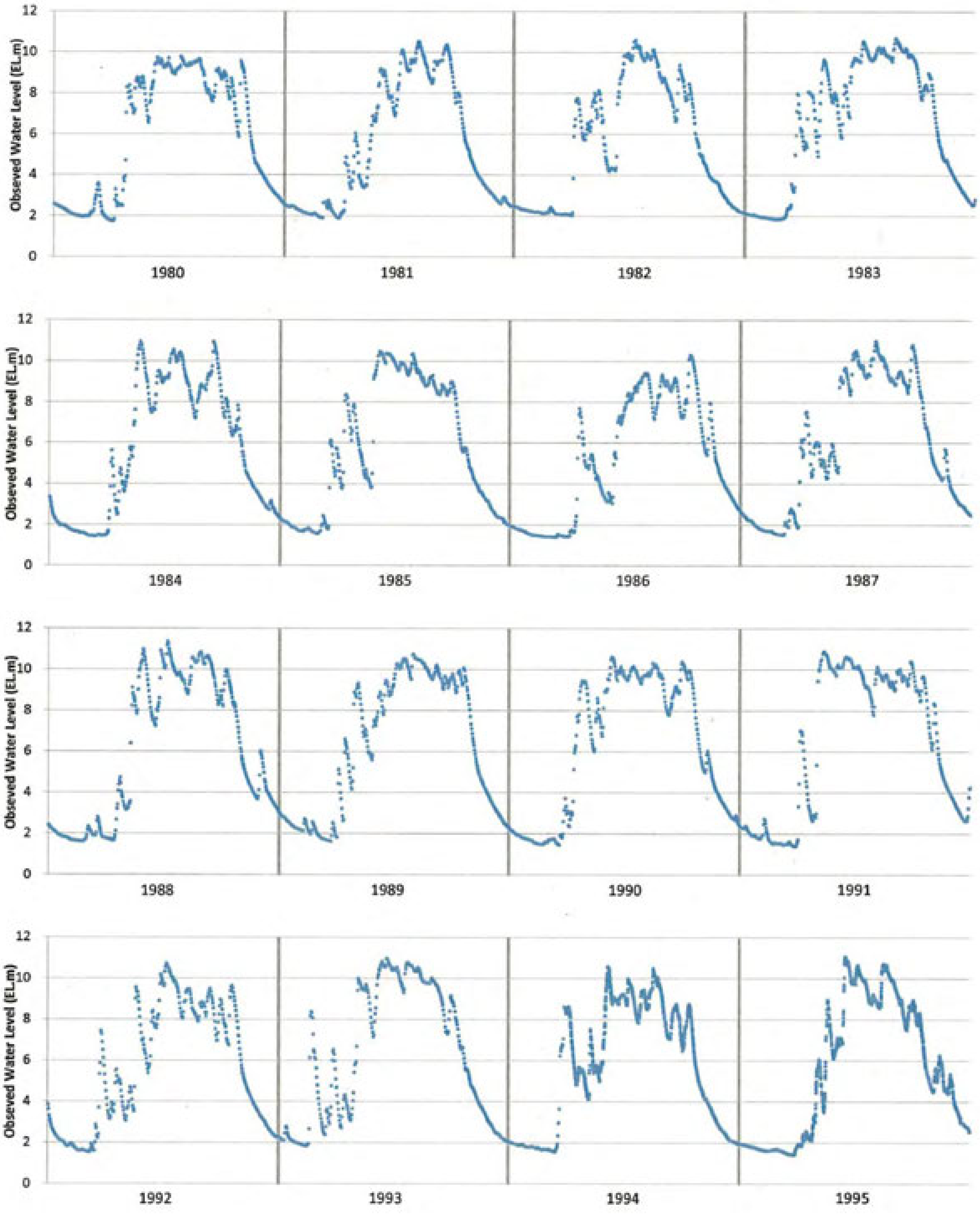
出典：JICA 調査団

図 3　シュナムゴンジ(**Sunamganj**)観測所の実測水位（**1980－1995**）



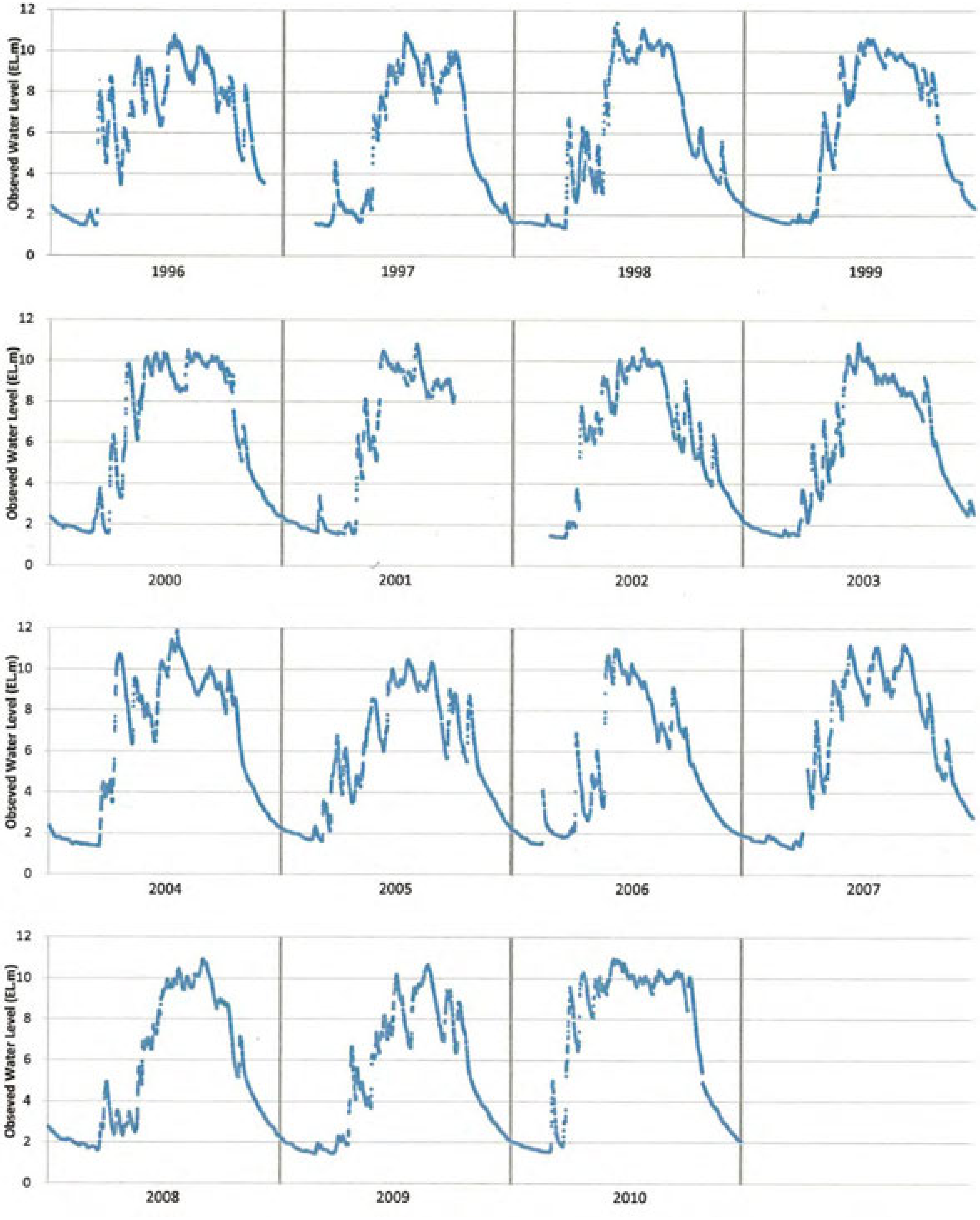
出典：JICA 調査団

図 3 シュナムゴンジ(Sunamganj)観測所の実測水位（1996－2010）



出典：JICA 調査団

図 **4**　シレット**(Sylhet)**観測所の実測水位（**1980-1995**）

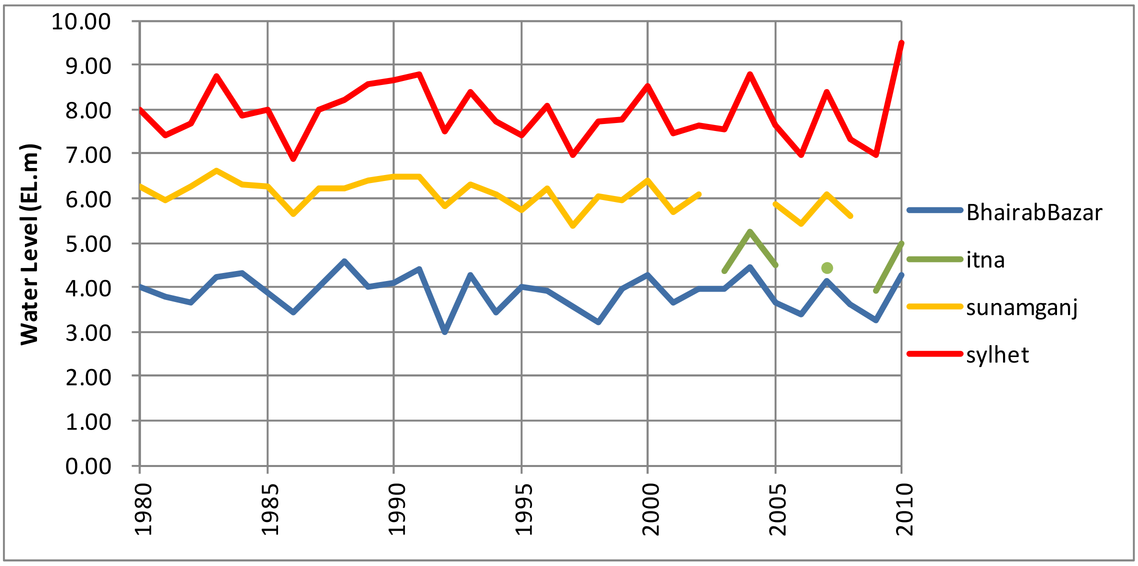


出典：JICA 調査団

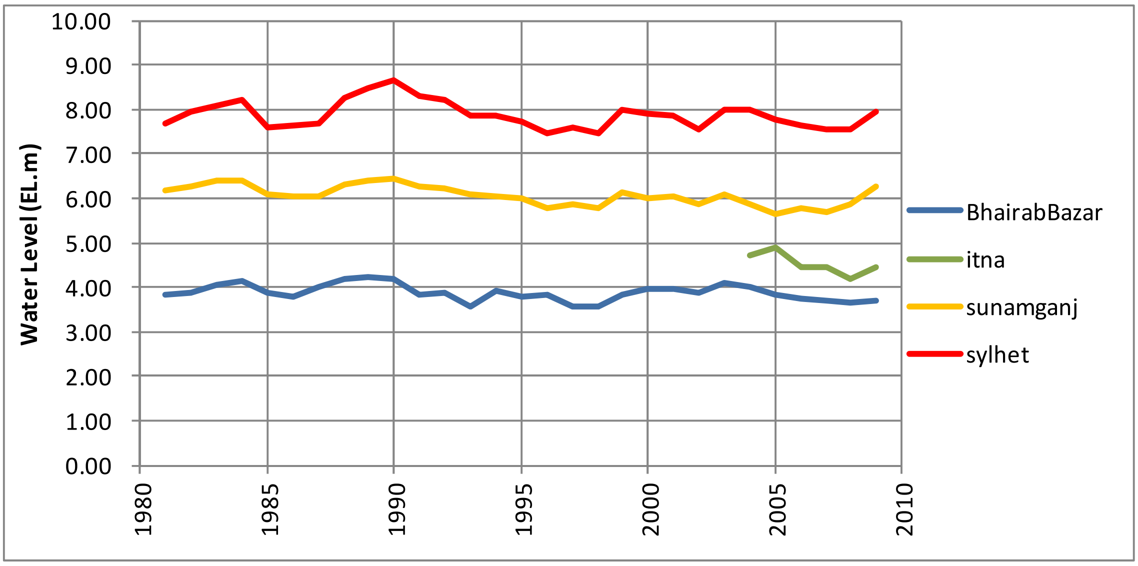
図 **4**　シレット**(Sylhet)**観測所の実測水位（**1996**－**2010**）

プレモンスーン期からモンスーン期（4/1-10/31）の各年の平均水位とそれらの 3 年移動平均値を図 **5** に示す。バイラブ・バザール(Bhairab Bazar)、シュナムゴンジ(Sunamganj)とシレット(Sylhet)観測所の水位データはトレンド（長期的傾向変化）やジャンプ（急激な変化）といった非定常性は見受けられないことから本検討において使用する。イトナ(Itna)は、データ期間が短くかつ欠測を多く含む年があるため非定常性の判断が難しく、使用しない。

(a)各年の平均水位



(b) 3 年移動平均値



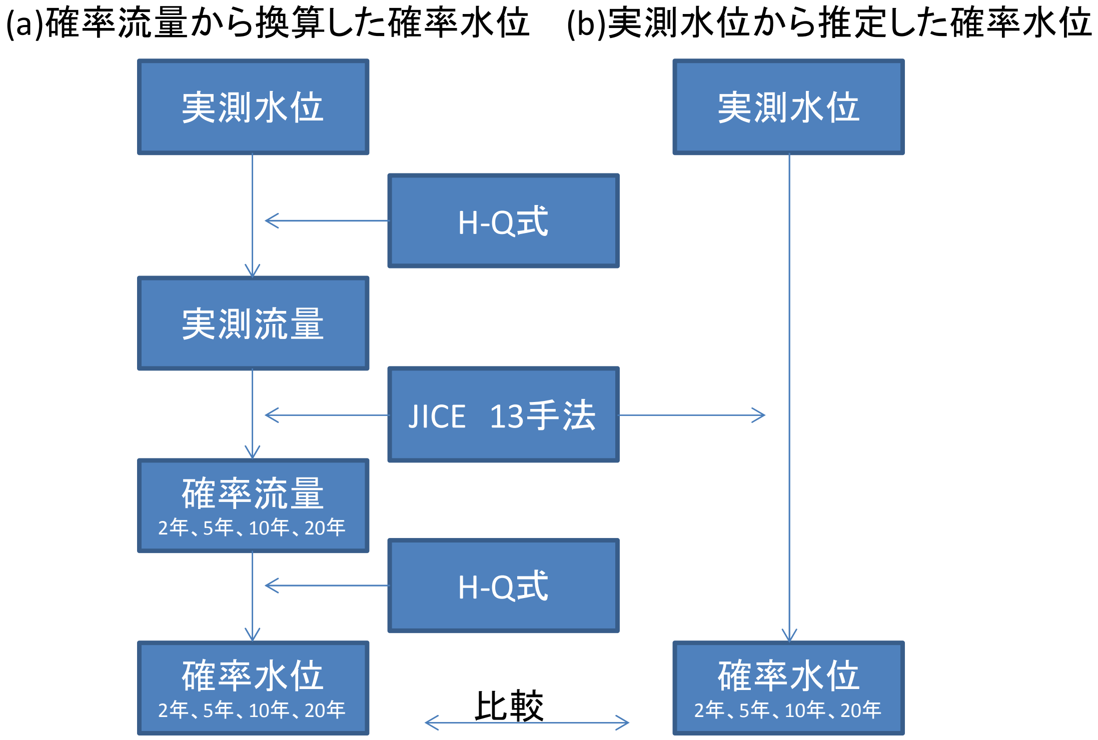
出典：JICA 調査団

図 **5**　プレモンスーン期からモンスーン期平均水位の経年変化

2. 確率水位を用いた洪水確率評価の適用可能性の検討

流量ではなく水位で確率評価することの適用性をシレット(Sylhet)において検証する。検討フローを図 6 に示す。(a)では実測水位を調査団作成の H-Q 式にて実測流量に換算し、この実測流量を使用して確率評価を行い、算定した確率流量を再度上記の H-Q 式により確率水位に換算する。一方、(b)では実測水位を確率評価し、確率水位を算定する。そして(a)と(b)の確率水位の比較により、水位で確率評価することの適用性を確認する。確率評価年は 2 年、5 年、10 年、20 年の 4 ケースとする。年最大値資料はプレモンスーン期（4/1-5/15）とモンスーン期（5/16-10/31）の 2 期間でそれぞれ抽出し、確率評価を行った。

確率評価には国土技術研究センター（JICE）の水文統計ユーティリティを用いた。毎年値分布の 13 手法全てを用い、河川砂防技術基準（調査編）を参考に、評価指標 SLSC が 0.04 以下でかつ Jackknife 推定誤差が相対的に小さいものを最適な確率分布モデルとして選択した。なお、全ての手法で SLSC が 0.04 を超えた場合は、赤池の情報量基準(pAIC)の値が相対的に小さく、また、10 年、20 年確率の範囲の適合度を確率紙上で確認して選択した。


(a)確率流量から換算した確率水位
(b)実測水位から推定した確率水位
実測水位
H-Q式
実測流量
JICE 13手法
確率流量
2年、5年、10年、20年
H-Q式
確率水位
2年、5年、10年、20年
比較
実測水位
確率水位
2年、5年、10年、20年

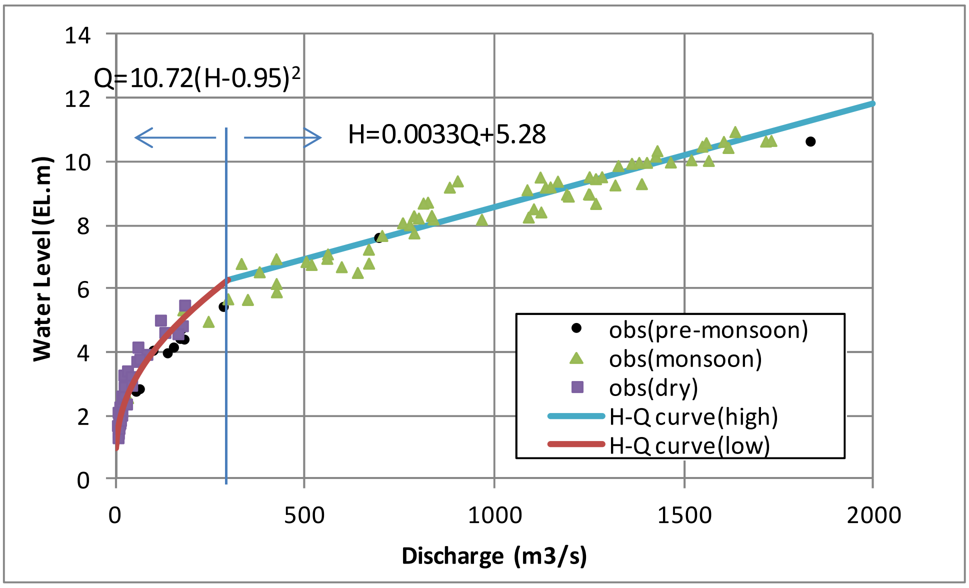
出典：JICA 調査団

図 6 検討フロー

H-Q 式の作成

シレット(Sylhet)観測所の流量観測データ（2003－2009）から H-Q 式を作成した。流量観測データの観測時期を考慮し、300m^3/s を閾値として低水領域と洪水領域にわけ、低水領域の H-Q 式は $Q=a(H+B)^2$、洪水領域では $H=aQ+b$ とした。それぞれの係数 a, b は最小自乗法により算定した。作

成した H-Q 式を図 7 に示す。H-Q 式の適合度の指標として相関係数を算定すると、低水領域では 0.94、洪水領域では 0.95 と比較的高い値を示した。

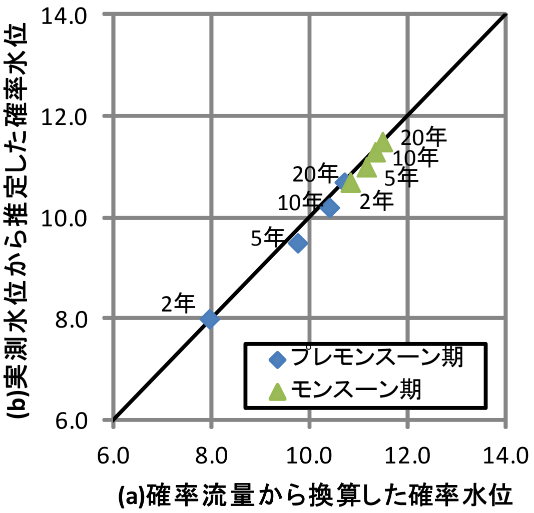


出典：JICA 調査団

図 7　シレット(Sylhet)観測所の H-Q 式

上記 H-Q 式を用いて推定した確率水位(a)と実測水位から推定した確率水位(b)の比較を図 8 に示す。プレモンスーン期とモンスーン期でそれぞれ 2 年、5 年、10 年、20 年確率値をプロットしている。両者はともに同等の傾向を示しており、水位で確率評価をすることの適用性を確認した。

参考として、確率評価結果一覧を表 2 に、各ケースの確率評価結果を図 9 から図 12 に示す。なお、モンスーン期における確率流量ならびに確率水位の最適な確率分布モデルの選択では、SLSC が 0.04 以下となる確率分布モデルはなかったが pAIC 値ならびに確率紙上での適合具合を確認し、確率分布モデルを選定した（実測流量の確率評価結果：図 10、実測水位の確率評価結果：図 12）。



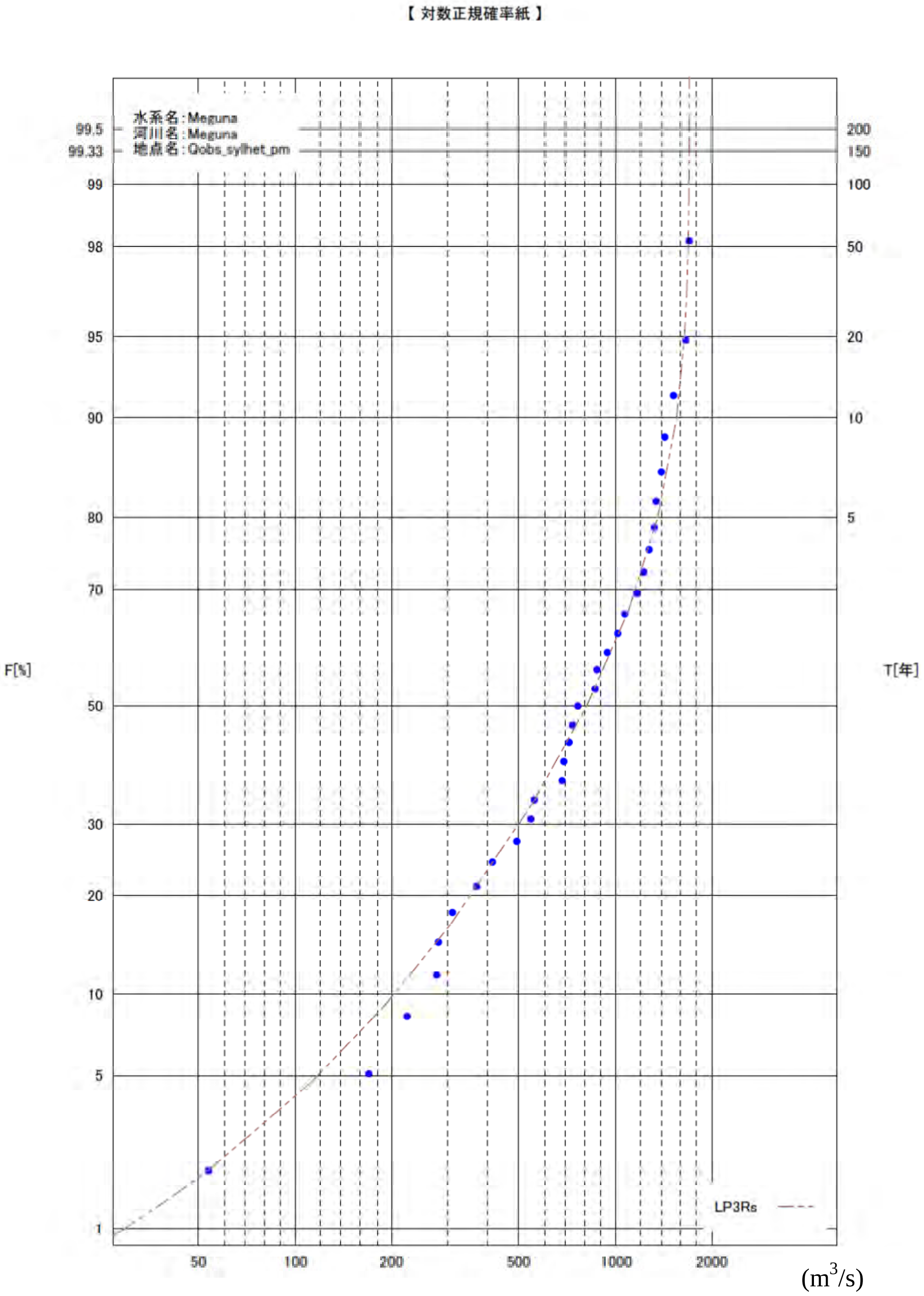
出典：JICA 調査団

図 8　確率流量から換算した確率水位と実測水位から推定した確率水位の比較

表 2　シレット(**Sylhet**)観測所の確率評価結果

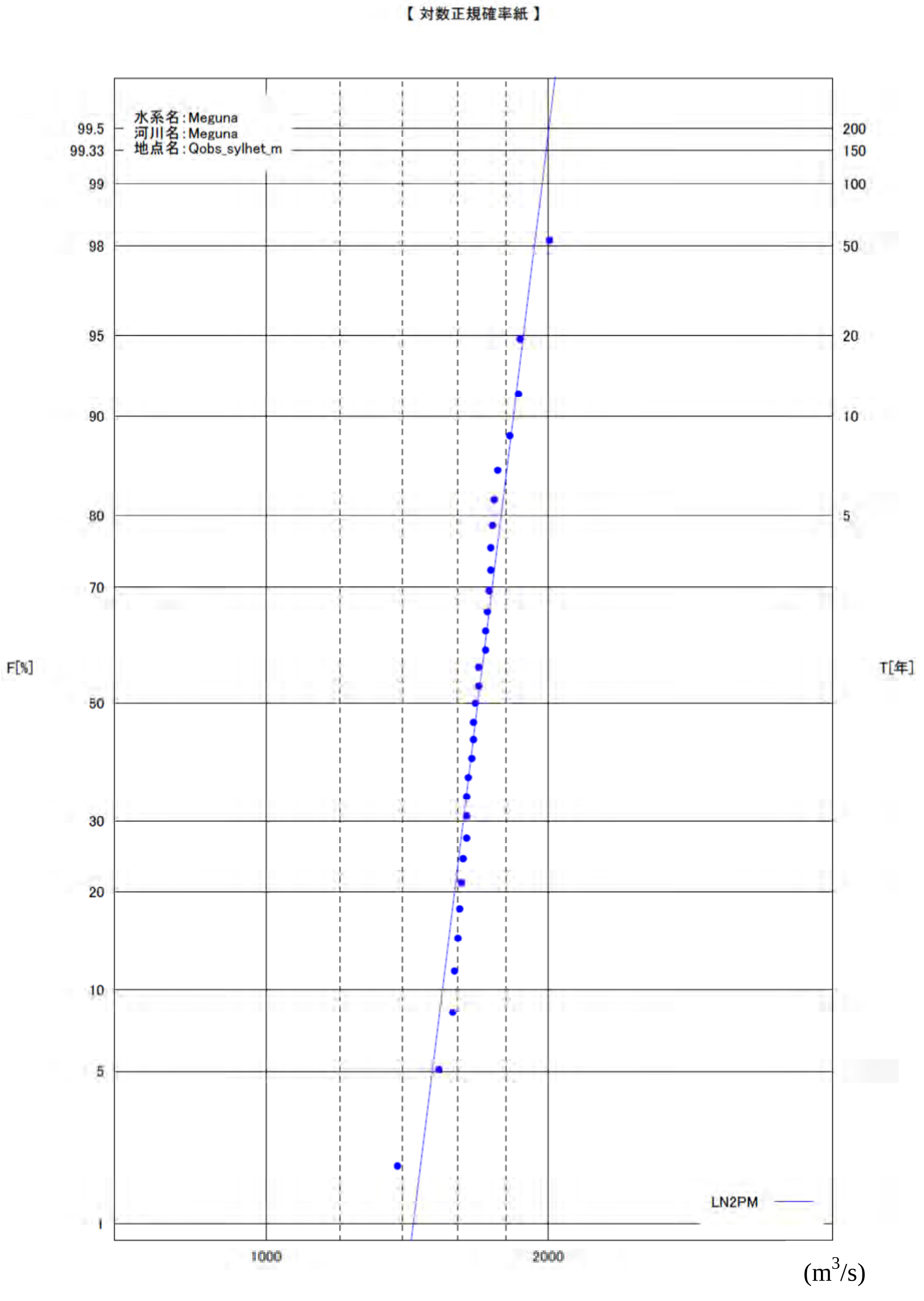
sylhet		プレモンスーン期			モンスーン期		
		(a)確率流量から換算		(b)実測水位から推定	(a)確率流量から換算		(b)実測水位から推定
		確率流量	確率水位	確率水位	確率流量	確率水位	確率水位
確率分布関数		LP3Rs	－	一般化 極値分布	2母数 対数正規分布	－	グンベル分布
母数推定法			－	L積率法	積率法	－	L積率法
Jackknife 推定値	1/2	812	8.0	8.0	1681	10.8	10.7
	1/5	1356	9.8	9.5	1780	11.2	11.0
	1/10	1552	10.4	10.2	1834	11.3	11.3
	1/20	1644	10.7	10.7	1879	11.5	11.5
Jackknife 推定誤差	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
相関係数(X-COR)		0.984	－	0.994	0.964	－	0.963
pAIC		0.0	－	127.4	383.3	－	47.2
資料数		31	－	31	31	－	31

出典：JICA 調査団



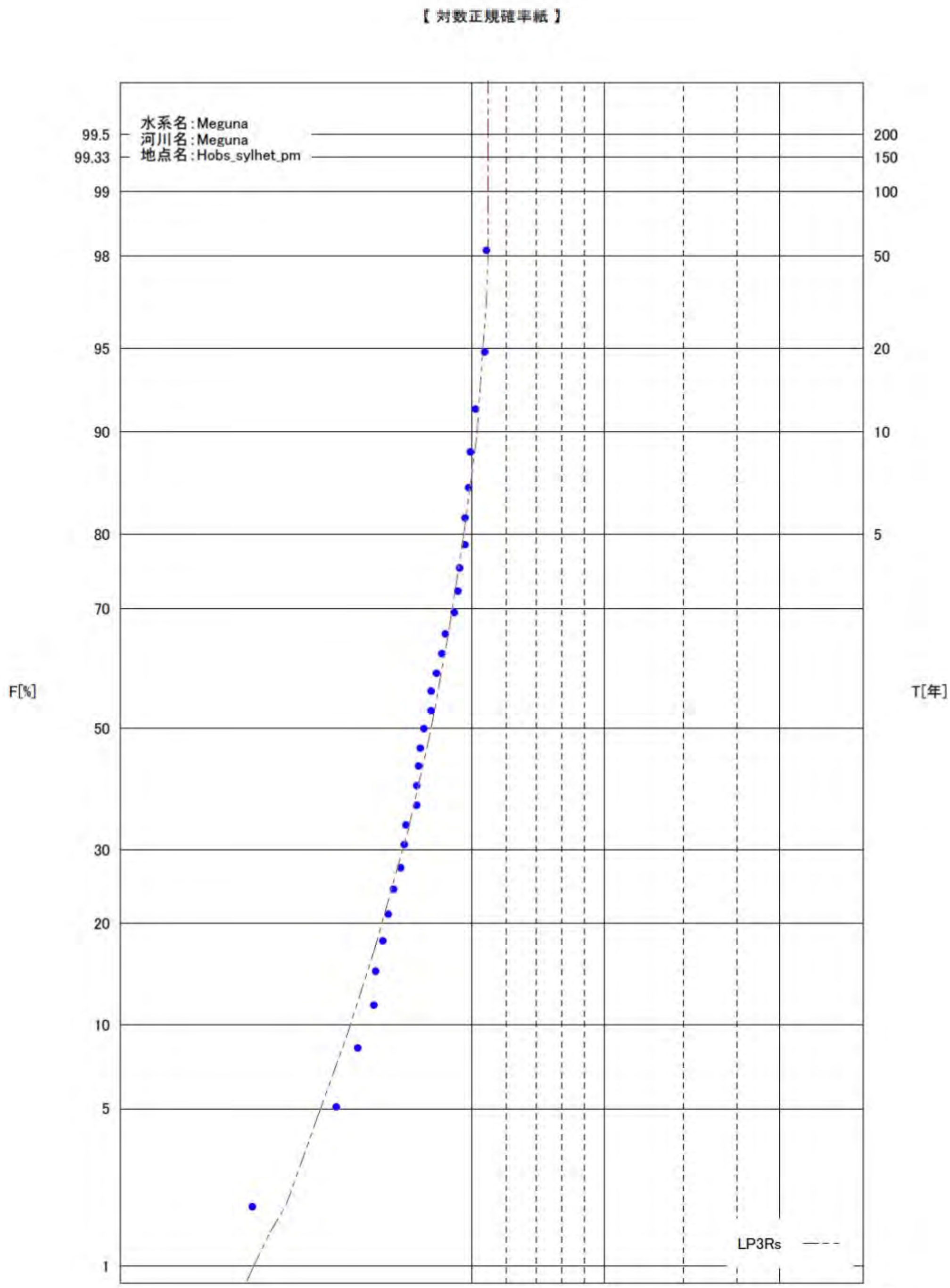
出典：JICA 調査団

図 9 シレット(Sylhet)　プレモンスーン期　実測流量確率評価結果



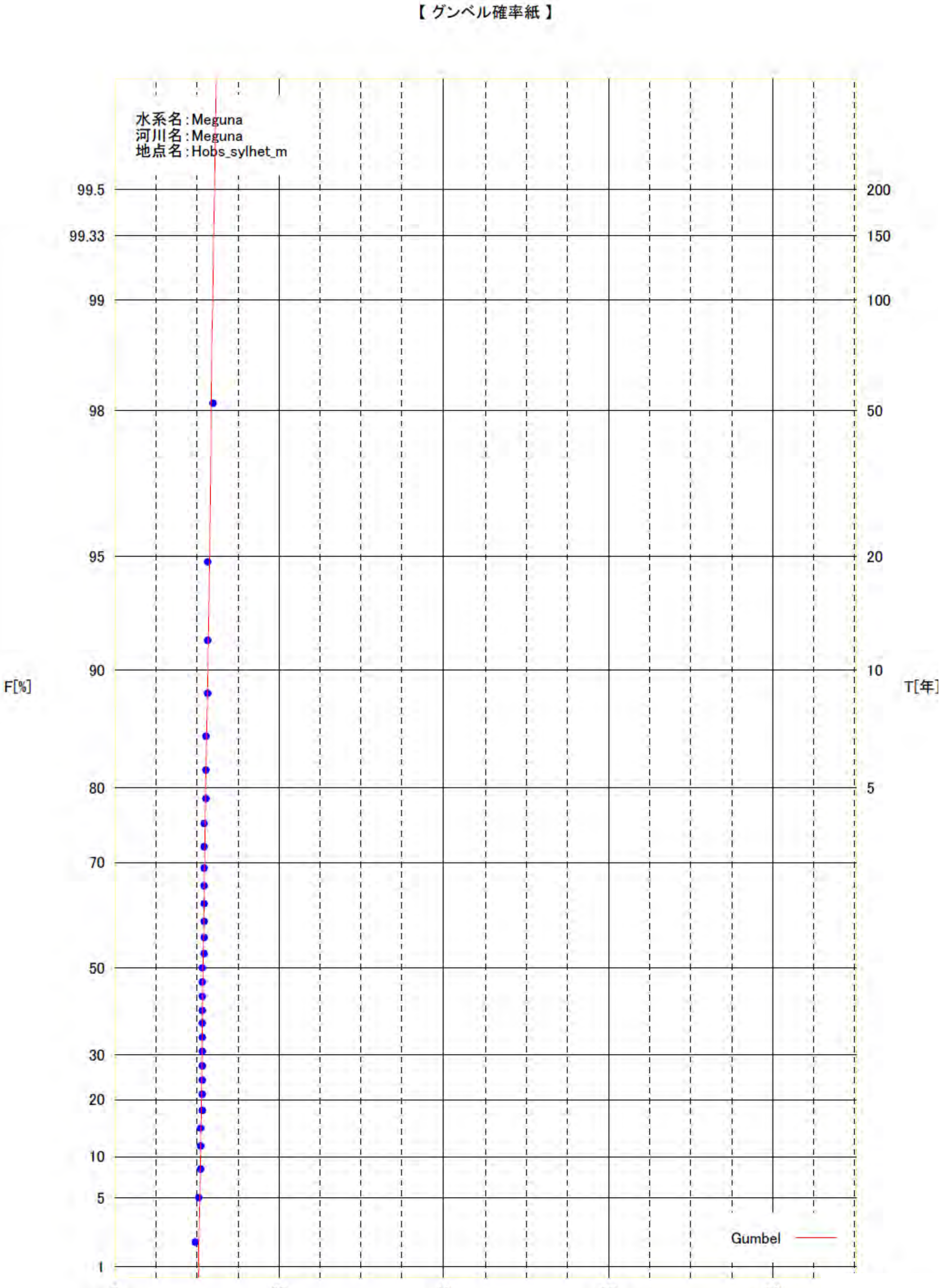
出典：JICA 調査団

図 **10**　シレット**(Sylhet)**　モンスーン期　実測流量確率評価結果



出典：JICA 調査団

図 **11** シレット**(Sylhet)** プレモンスーン期 実測水位確率評価結果



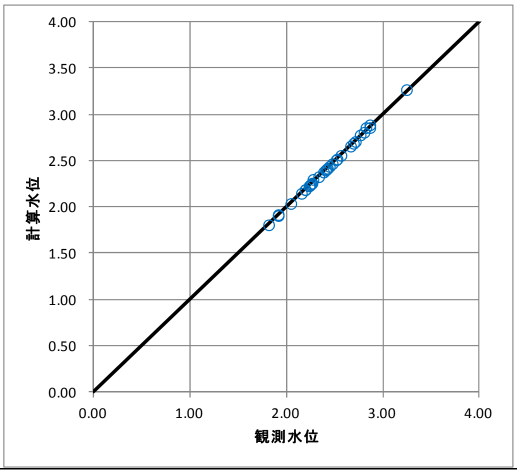
出典：JICA 調査団

図 12　シレット(Sylhet)　モンスーン期　実測水位確率評価結果

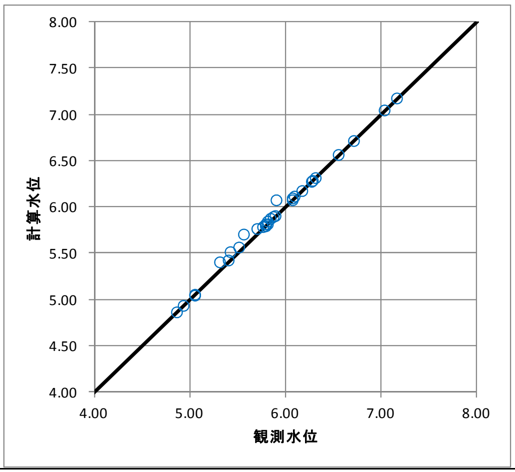
3. 計算水位による確率評価の妥当性の検討

計算水位による確率評価の妥当性について、実測水位による確率評価結果との比較により検証する。対象とする観測所はバイラブ・バザール(Bhairab Bazar)、シュナムゴンジ(Sunamganj)、シレット(Sylhet)とする。なお、イトナ(Itna)は8年間（2003-2010）と確率評価に用いる資料数が少ないため対象外とした。
プレモンスーン期とモンスーン期における実測水位と計算水位の最大値資料の比較を図 13に示す。バイラブ・バザールで(Bhairab Bazar)は実測水位ならびに計算水位の最大値資料はほぼ同値となっている。その一方、シュナムゴンジ(Sunamganj)とシレット(Sylhet)では実測水位の最大値資料のほうが計算水位より高い傾向となっている。このように観測所ごとに傾向が異なるが、3観測所ともに大きく外れた資料はないことが確認できる。

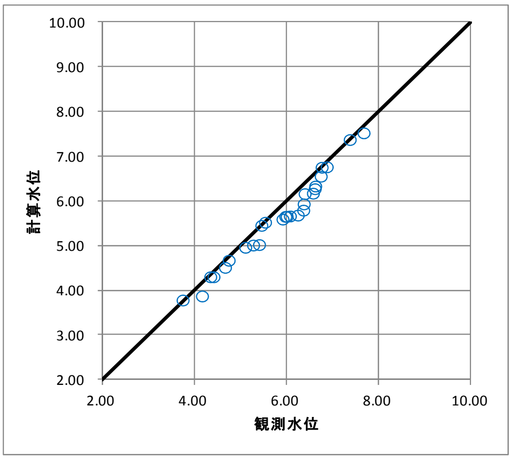
バイラブ・バザール (Bhairab Bazar)
プレモンスーン期



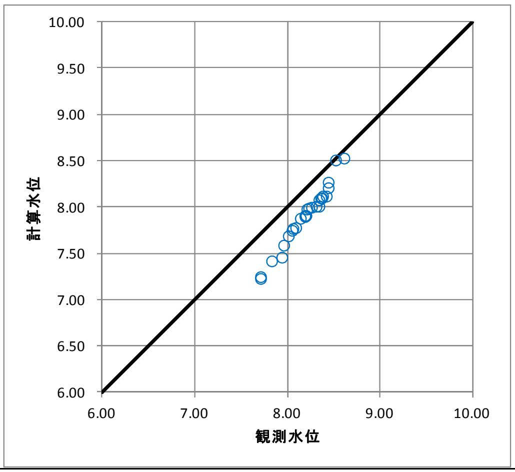
バイラブ・バザール(Bhairab Bazar)
モンスーン期



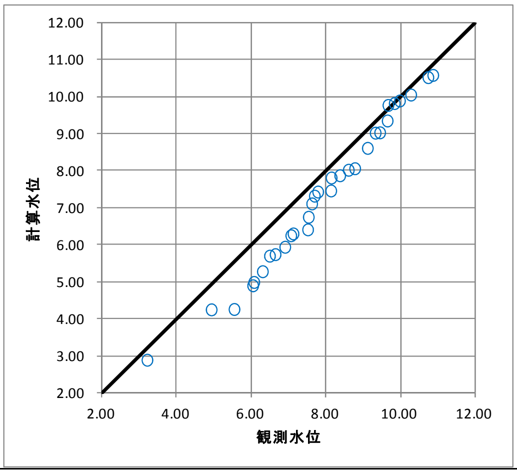
シュナムゴンジ(Sunamganj)
プレモンスーン期



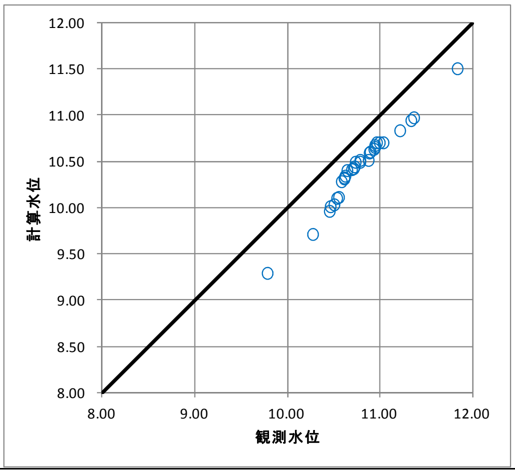
シュナムゴンジ(Sunamganj)
モンスーン期



シレット(Sylhet)
プレモンスーン期



シレット(Sylhet)
モンスーン期



出典：JICA 調査団

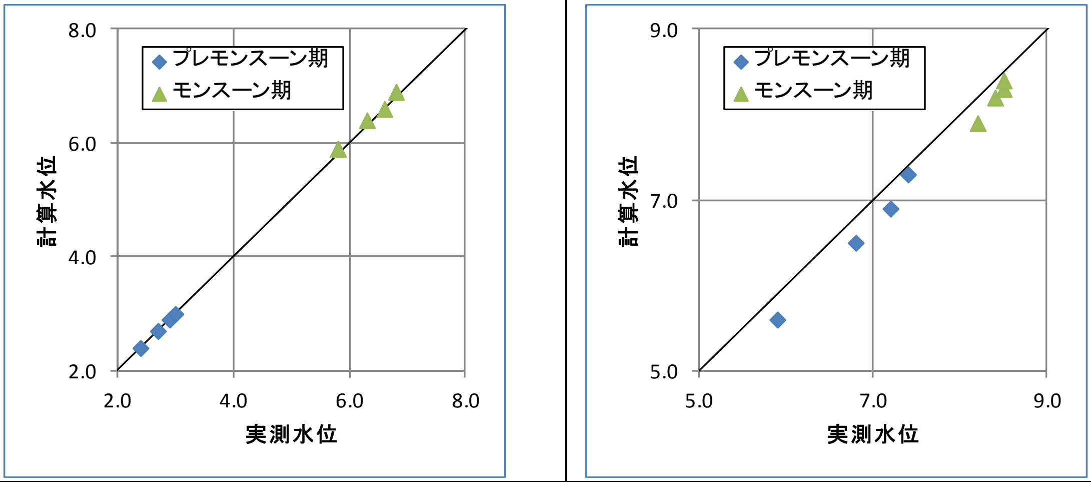
図 **13** プレモンスーン期（**4/1-5/15**）とモンスーン期（**5/16-10/31**）における実測水位と計算水位の最大値の比較

3 観測所における実測水位ならびに計算水位から推定した確率水位の比較を**図 14** 示す。プレモンスーン期とモンスーン期でそれぞれ 2 年、5 年、10 年、20 年確率値をプロットしている。バイラブ・バザール(Bhairab Bazar)では両者に大きな違いはない。一方、シュナムゴンジ(Sunamganj)とシレット(Sylhet)では、両者は同等の傾向を示しているものの実測水位から推定した確率値のほうが大きく、シレット(Sylhet)のプレモンスーン期 2 年確率値の場合は 60cm の差がある。計画確率年に注目すると、プレモンスーン期での計画確率年である 10 年確率値では最大 30cm の差（シュナムゴンジ(Sunamganj)　プレモンスーン期）、モンスーン期での計画確率年である 20 年確率では、最大 40cm の差（シレット(Sylhet)　モンスーン期）となった。参考として、3 観測所の確率評価結果一覧を表 3 から表 5 に、各ケースの確率評価結果を図 15 から図 26 に示す。

なお、シレット(Sylhet)のモンスーン期では実測水位ならびに計算水位ともに SLSC が 0.04 以下となる確率分布関数がなかったが、pAIC 値ならびに確率紙上での適合具合を確認し、確率分布モデルを選定した（実測水位の確率評価結果：図 25、計算水位の確率評価結果：図 26）。

以上の結果をまとめると、シュナムゴンジ(Sunamganj)とシレット(Sylhet)では実測水位から推定した確率値のほうが大きく、プレモンスーン期での計画確率年である 10 年確率値では最大 30cm の差、モンスーン期での計画確率年である 20 年確率では最大 40cm の差となった。その要因としては以下の点も指摘できるものと推察される。

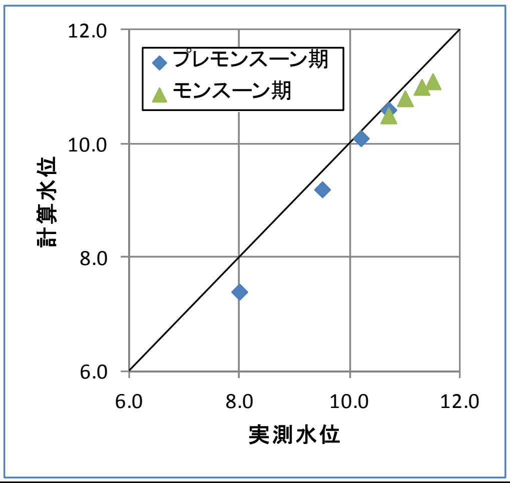
- 実測水位は同じ補正値を通年(1980-2010)で適用しているため、河床/河道の変化や地盤沈下などによる経年的な変化を適切かつ十分には反映していない。
- 計算水位は 1980-2010 年の気象・水文データを用いて現時点での河道断面により計算されていることから、それ以前の河道条件での再現計算の再現性は必ずしも高くない。



バイラブ・バザール(Bhairab Bazar)

シュナムゴンジ(Sunamganj)

シレット(Sylhet)



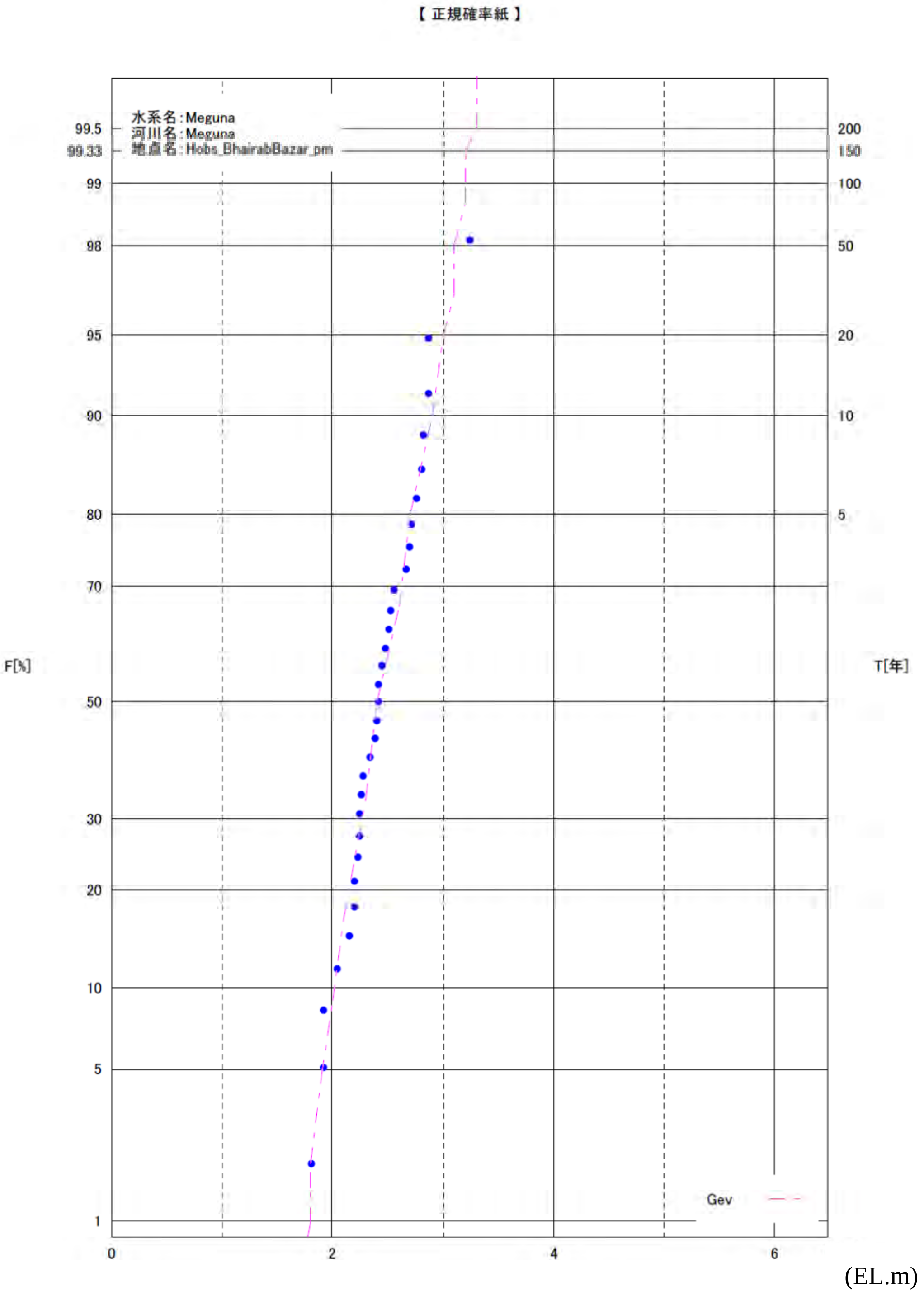
出典：JICA 調査団

図 **14**　実測水位ならびに計算水位から推定した確率水位の比較（プレモンスーン期ならびにモンスーン期における **2** 年、**5** 年、**10** 年、**20** 年確率値）

表 3　バイラブ・バザール(**Bhairab Bazar**)観測所の確率評価結果

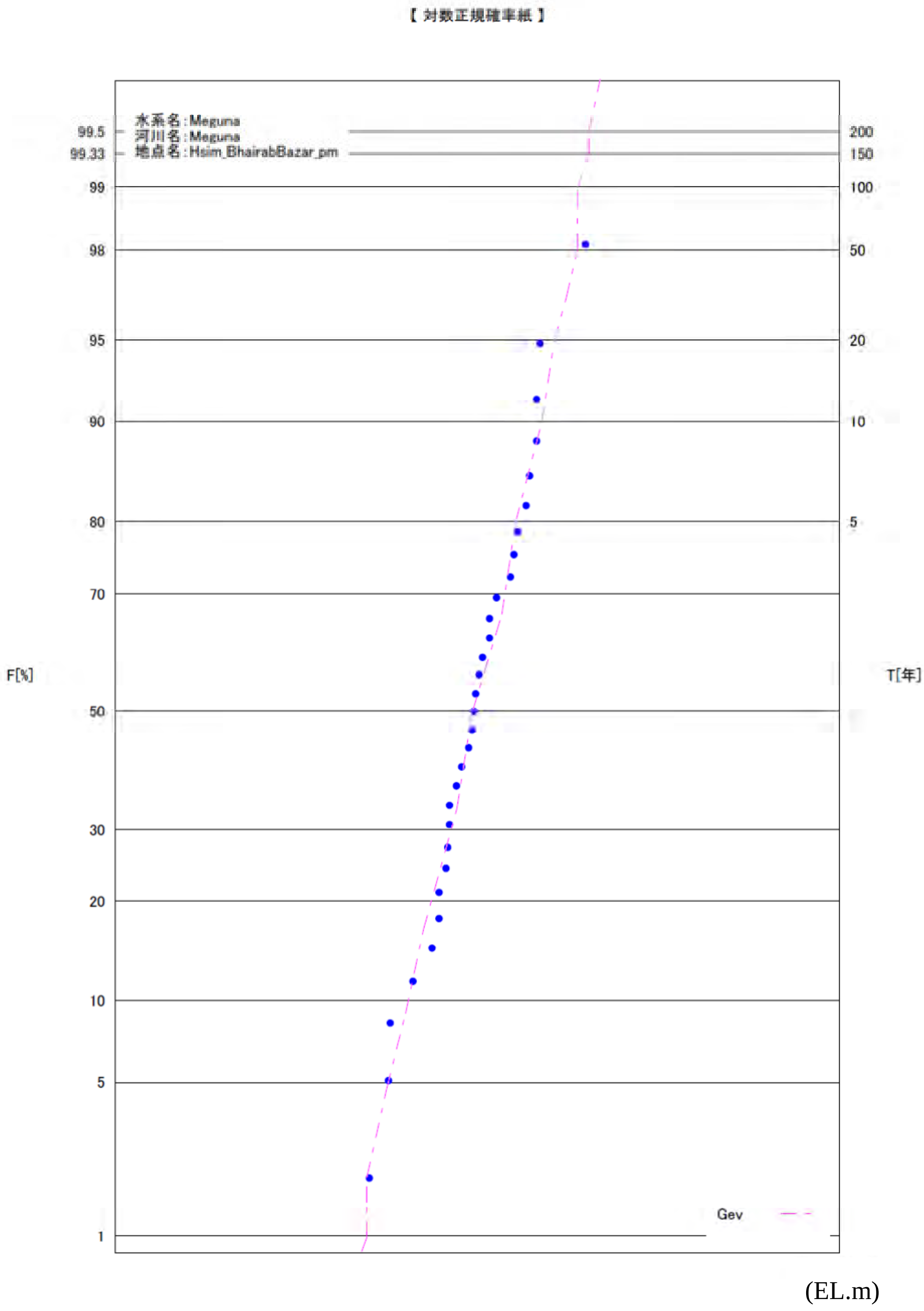
BhairabBazar		プレモンスーン期			モンスーン期		
		実測水位	計算水位	実測-計算	実測水位	計算水位	実測-計算
確率分布関数		一般化 極値分布	一般化 極値分布		一般化 極値分布	3母数 対数正規分布	
母数推定法		L積率法	L積率法		L積率法	石原・高瀬法	
Jackknife 推定値	1/2	2.4	2.4	0.0	5.8	5.9	-0.1
	1/5	2.7	2.7	0.0	6.3	6.4	-0.1
	1/10	2.9	2.9	0.0	6.6	6.6	0.0
	1/20	3.0	3.0	0.0	6.8	6.9	-0.1
Jackknife 推定誤差	1/2	0.1	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	
相関係数(X-COR)		0.991	0.992		0.987	0.984	
pAIC		22.2	23.2		55.7	55.4	
資料数		31	31		31	31	

出典：JICA 調査団



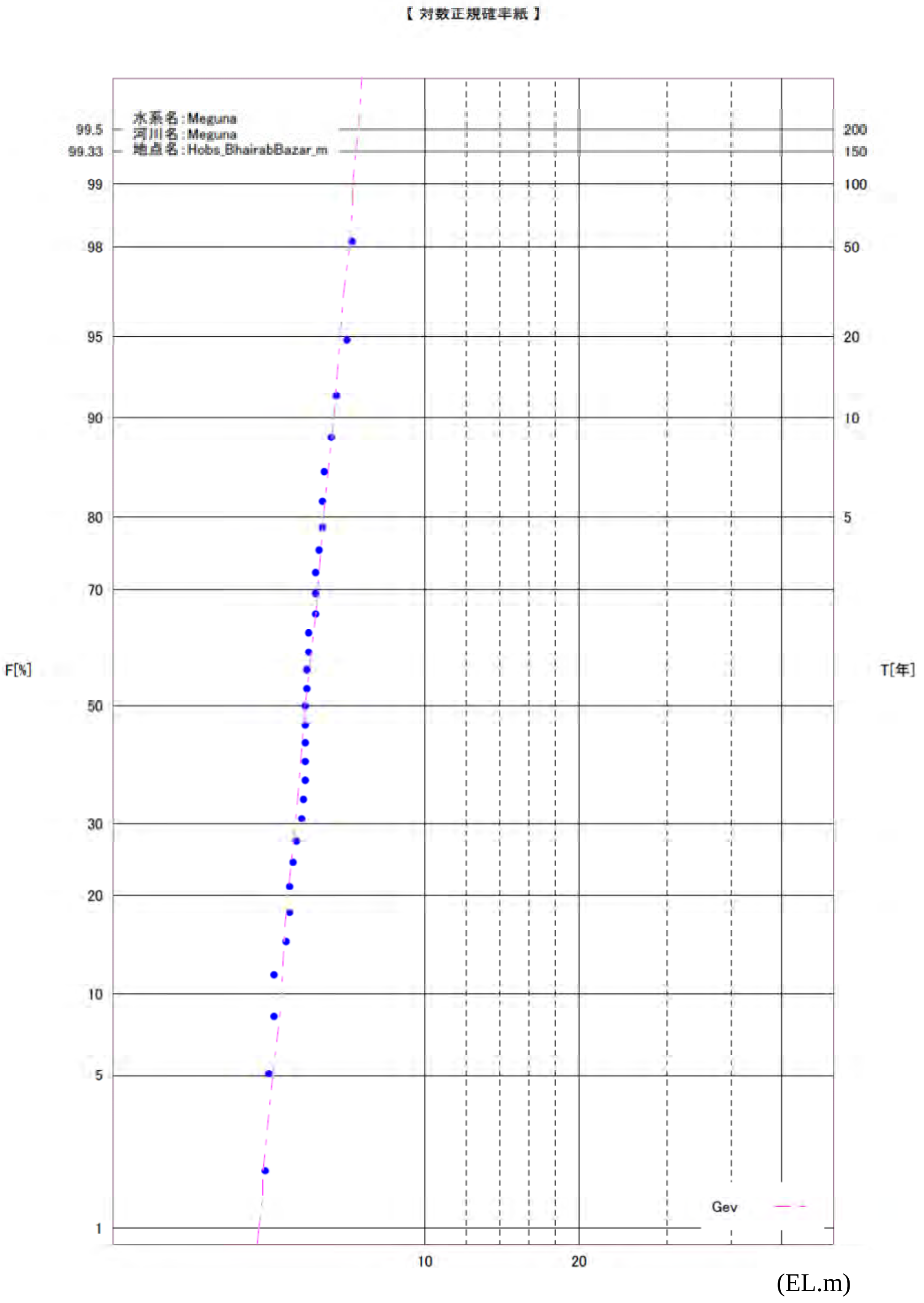
出典：JICA 調査団

図 15　バイラブ・バザール(**Bhairab Bazar**)　プレモンスーン期　実測水位確率評価結果



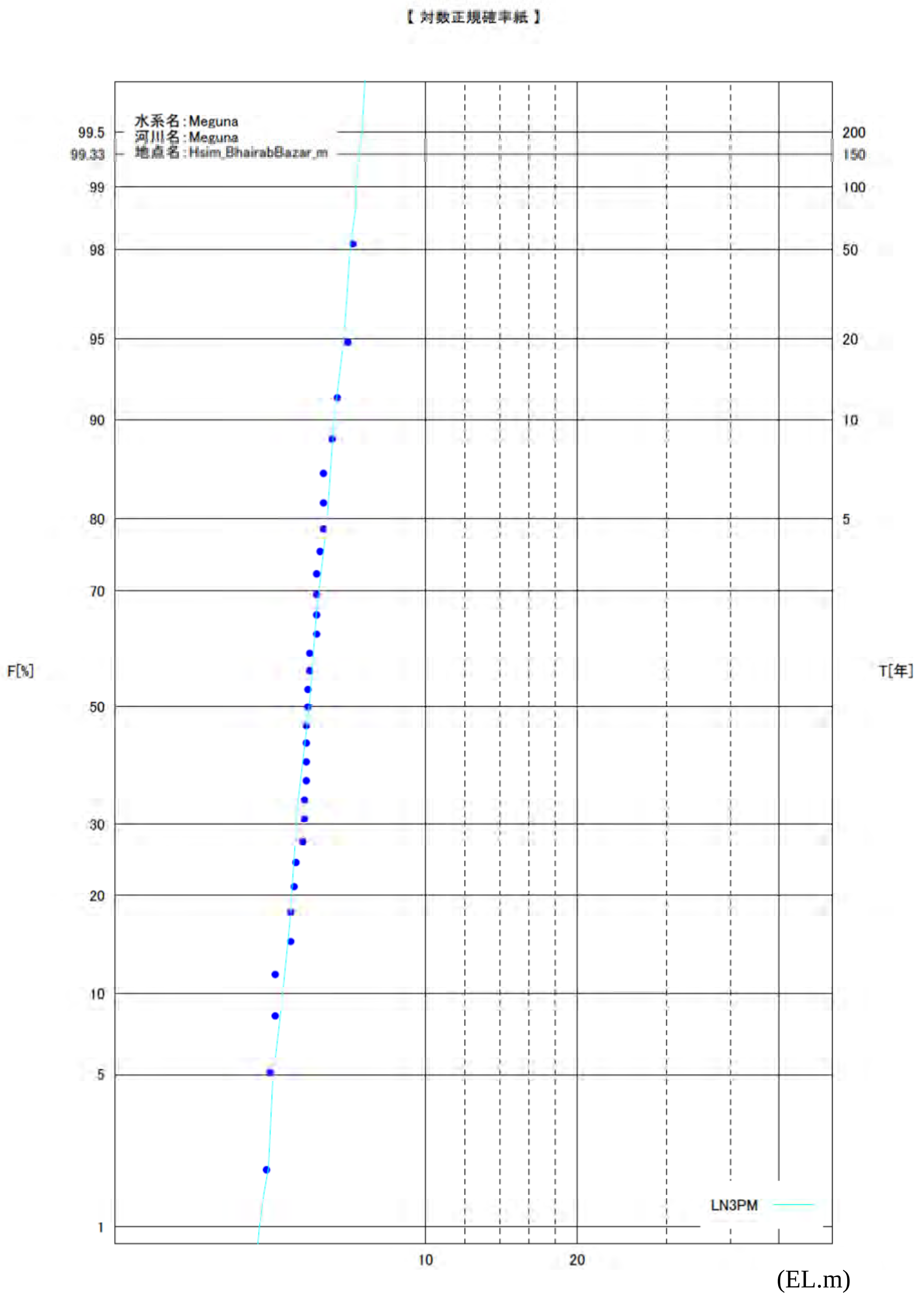
出典：JICA 調査団

図 **16**　バイラブ・バザール**(Bhairab Bazar)**　プレモンスーン期　計算水位確率評価結果



出典：JICA 調査団

図 **17**　バイラブ・バザール**(Bhairab Bazar)**　モンスーン期　実測水位確率評価結果



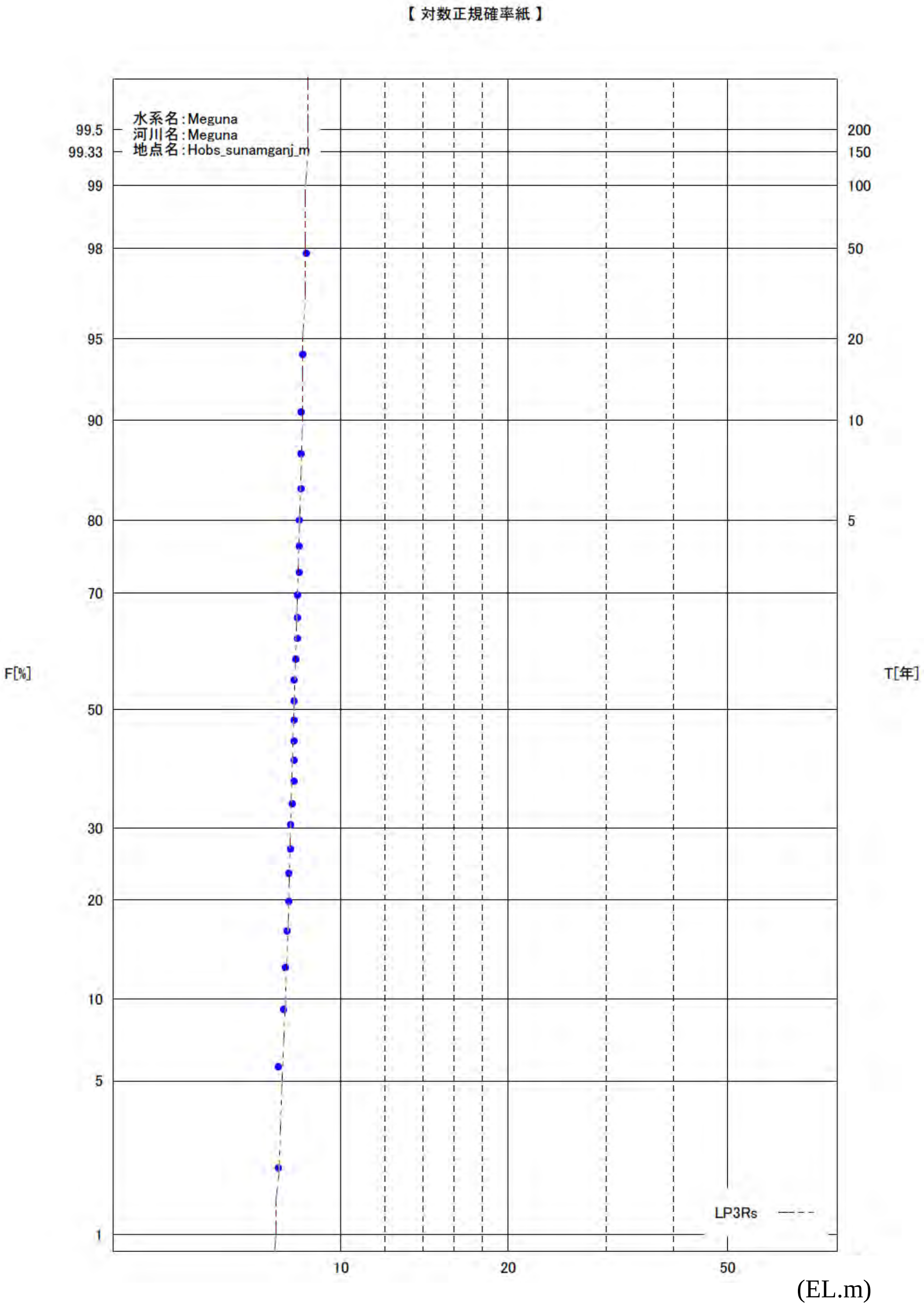
出典：JICA 調査団

図 **18**　バイラブ・バザール**(Bhairab Bazar)**　モンスーン期　計算水位確率評価結果

表 4　シュナムゴンジ(Sunamganj)観測所の確率評価結果

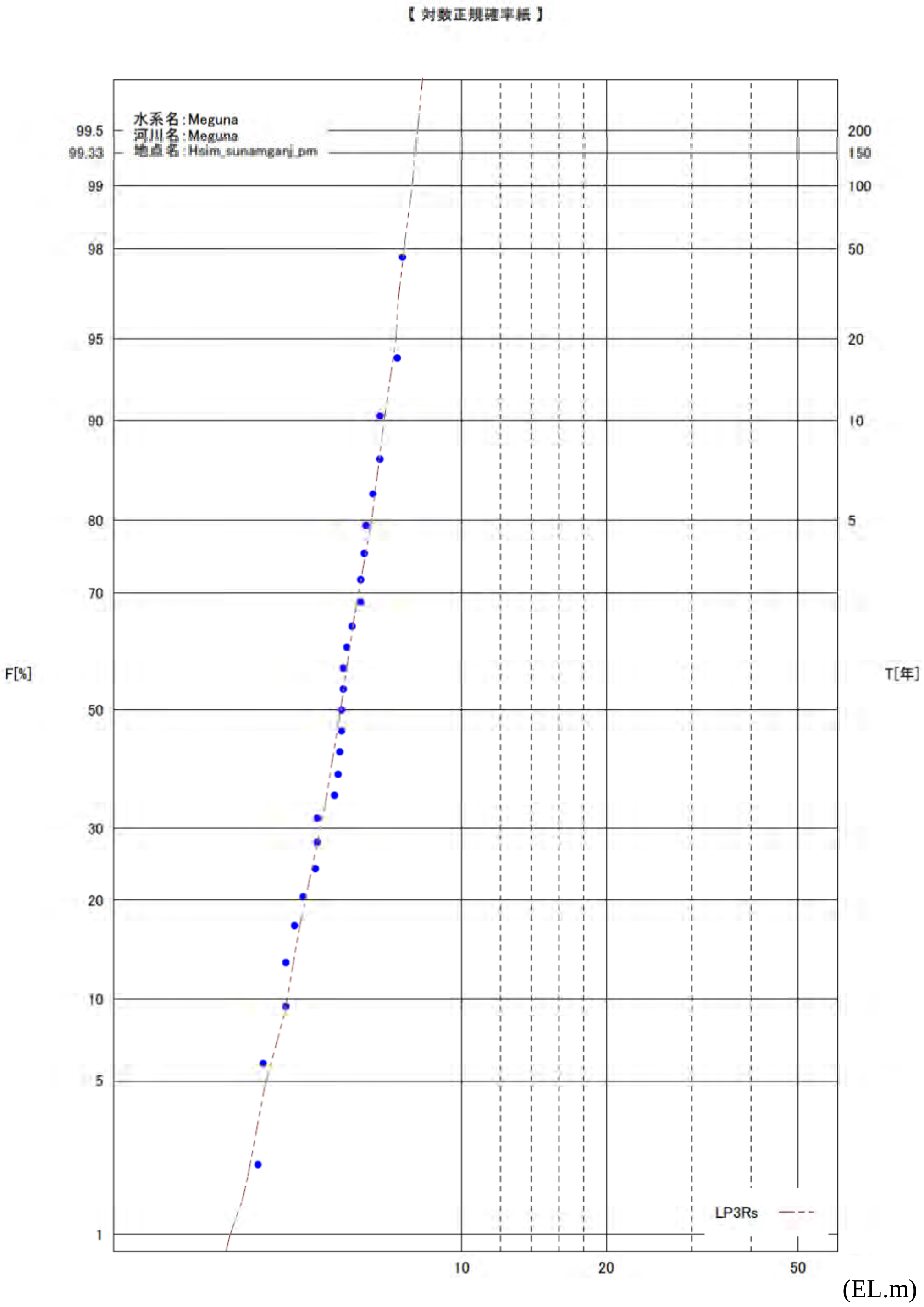
sunamganj		プレモンスーン期			モンスーン期		
		実測水位	計算水位	実測-計算	実測水位	計算水位	実測-計算
確率分布関数		LP3Rs	LP3Rs		LP3Rs	LP3Rs	
母数推定法							
Jackknife 推定値	1/2	5.9	5.6	0.3	8.2	7.9	0.3
	1/5	6.8	6.5	0.3	8.4	8.2	0.2
	1/10	7.2	6.9	0.3	8.5	8.3	0.2
	1/20	7.4	7.3	0.1	8.5	8.4	0.1
Jackknife 推定誤差	1/2	0.2	0.2		0.0	0.1	
	1/5	0.2	0.2		0.0	0.1	
	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	
相関係数(X-COR)		0.991	0.992		0.993	0.983	
pAIC		81.3	80.3		0.1	20.1	
資料数		27	27		28	28	

出典：JICA 調査団



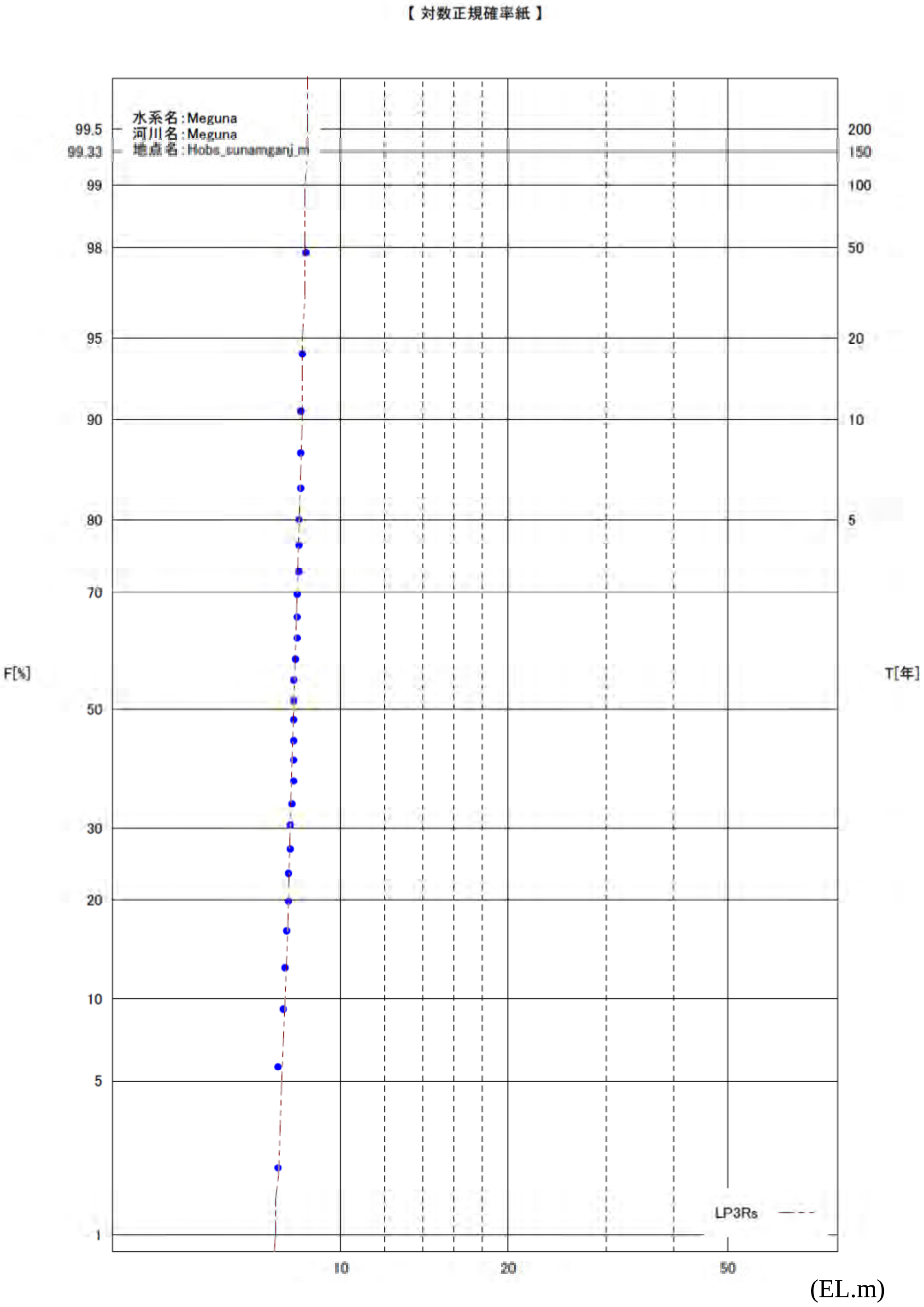
出典：JICA 調査団

図 19　シュナムゴンジ(Sunamganj)　プレモンスーン期　実測水位確率評価結果



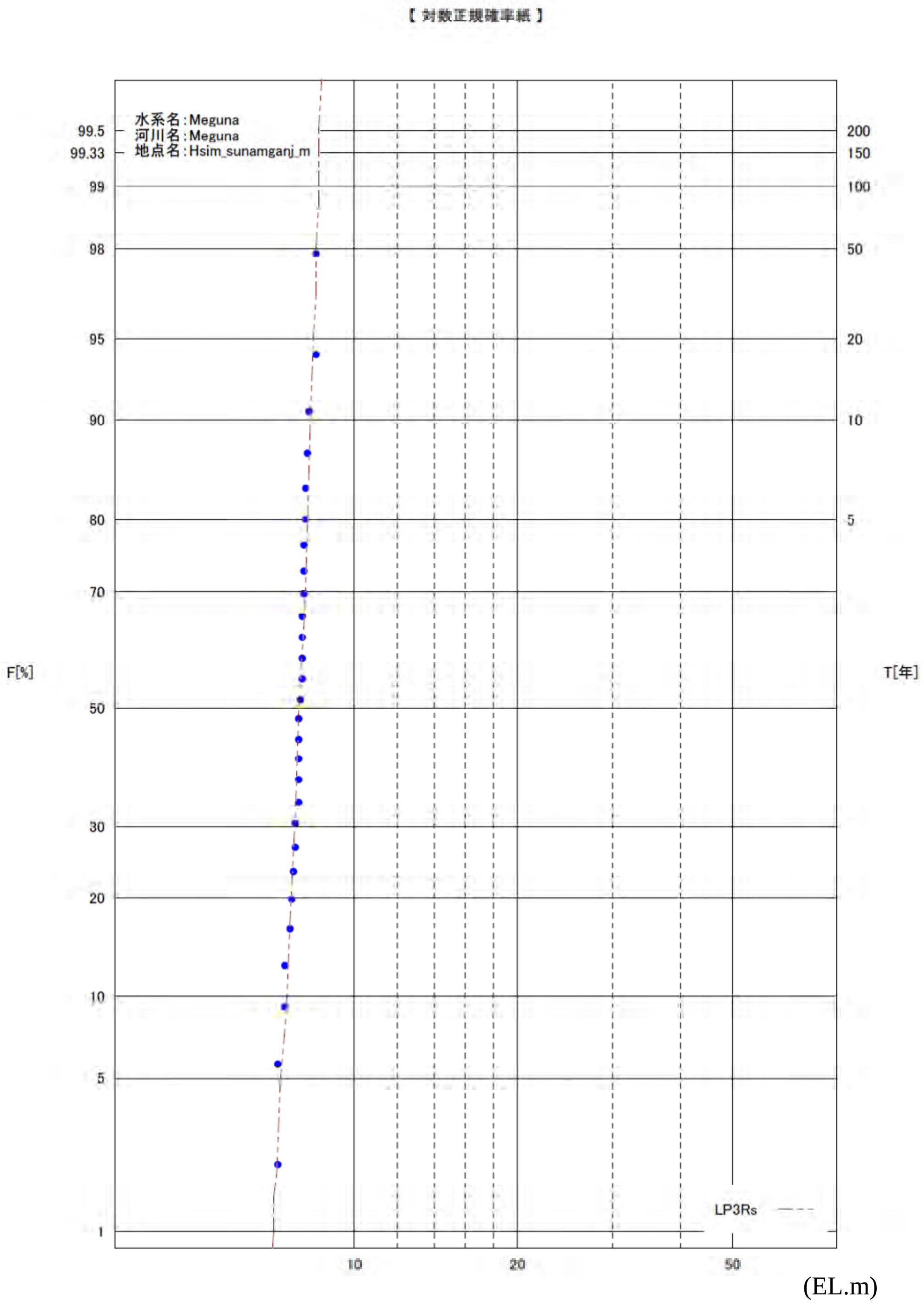
出典：JICA 調査団

図 20　シュナムゴンジ(Sunamganj)　プレモンスーン期　計算水位確率評価結果



出典：JICA 調査団

図 **21**　シュナムゴンジ**(Sunamganj)**　モンスーン期　実測水位確率評価結果



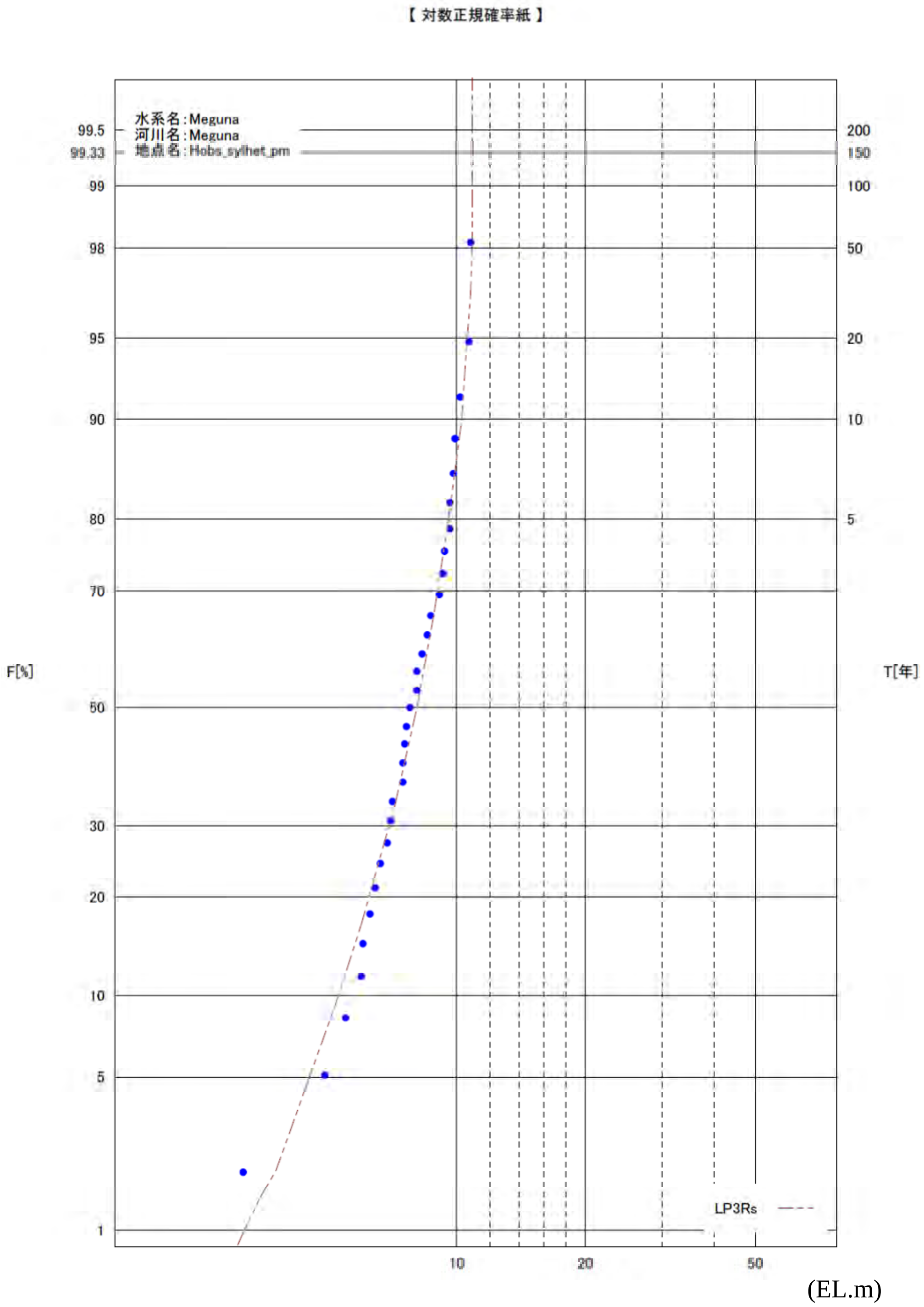
出典：JICA 調査団

図 22　シュナムゴンジ(Sunamganj)　モンスーン期　計算水位確率評価結果

表 5　シレット(Sylhet)観測所の確率評価結果

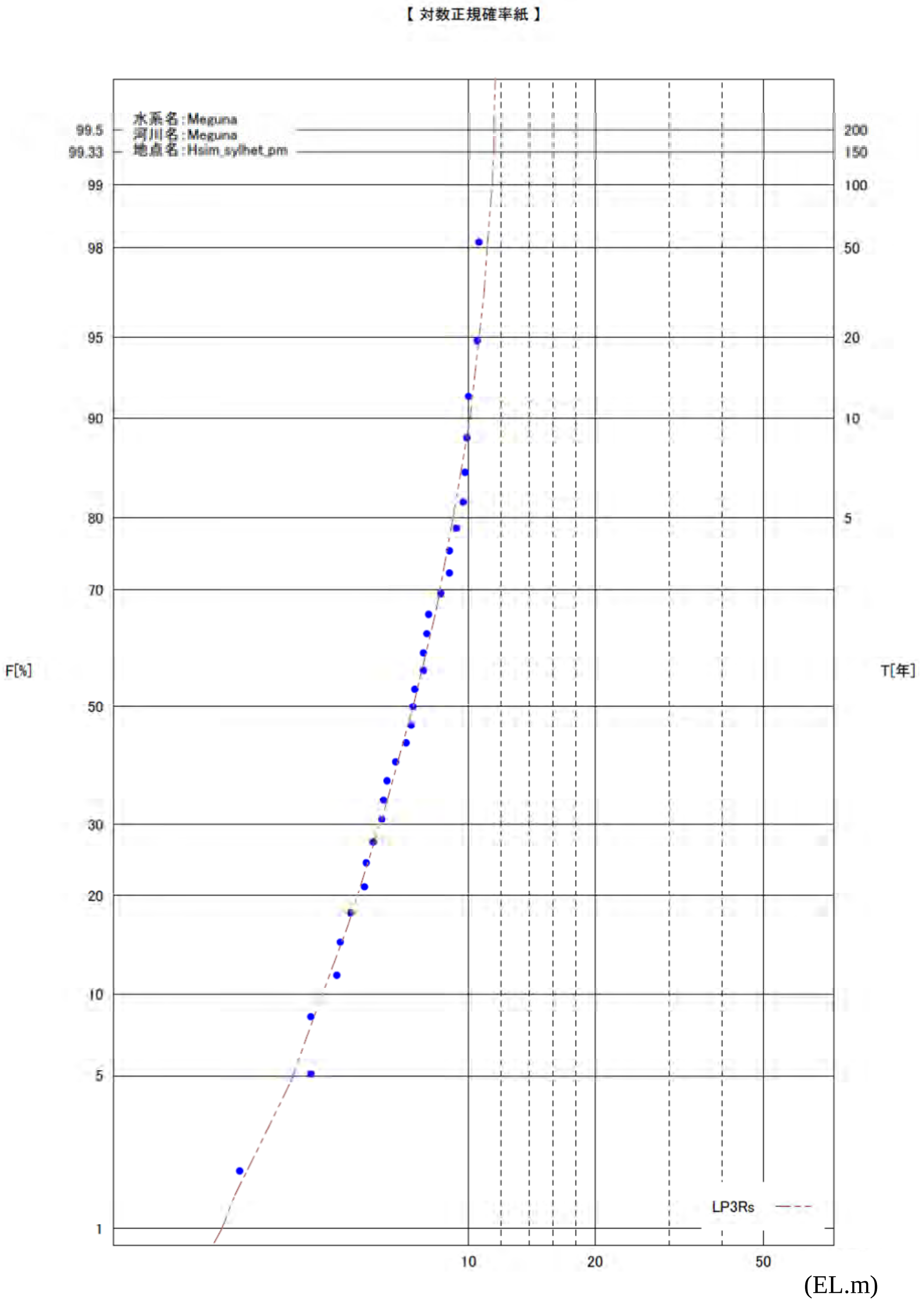
sylhet		プレモンスーン期			モンスーン期		
		実測水位	計算水位	実測-計算	実測水位	計算水位	実測-計算
確率分布関数		一般化 極値分布	LP3Rs		ｸﾞﾝﾍﾞﾙ 分布	対数ﾋﾟｱｿﾝ Ⅲ型分布	
母数推定法		L積率法			L積率法	積率法	
Jackknife 推定値	1/2	8.0	7.4	0.6	10.7	10.5	0.2
	1/5	9.5	9.2	0.3	11.0	10.8	0.2
	1/10	10.2	10.1	0.1	11.3	11.0	0.3
	1/20	10.7	10.6	0.1	11.5	11.1	0.4
Jackknife 推定誤差	1/2	0.4	0.5		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	
相関係数(X-COR)		0.994	0.994		0.963	0.972	
pAIC		127.4	134.0		47.2	40.6	
資料数		31	31		31	31	

出典：JICA 調査団



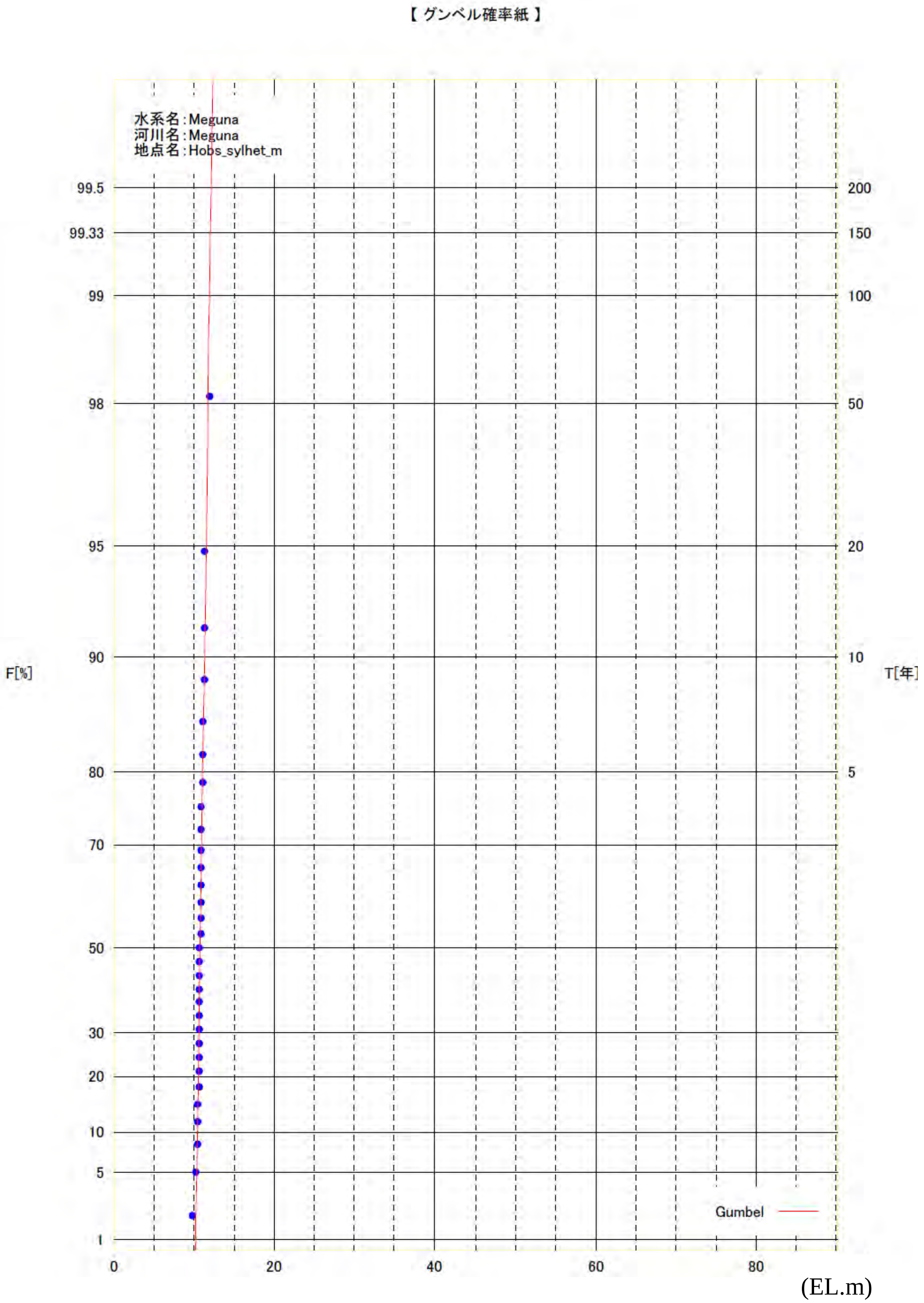
出典：JICA 調査団

図 **23**　シレット**(Sylhet)**　プレモンスーン期　実測水位確率評価結果



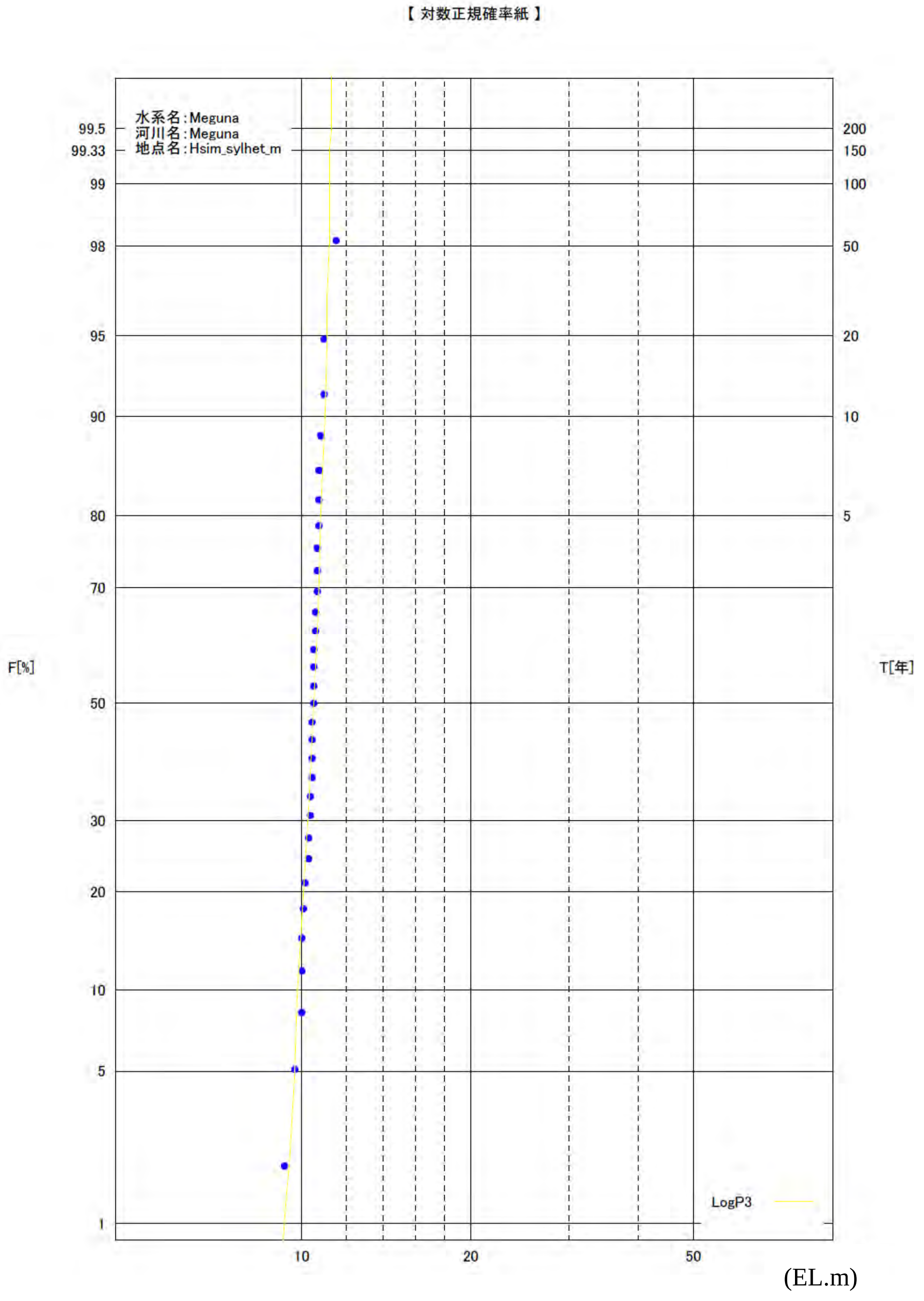
出典：JICA 調査団

図 24　シレット(Sylhet)　プレモンスーン期　計算水位確率評価結果



出典：JICA 調査団

図 25　シレット(Sylhet)　モンスーン期　実測水位確率評価結果



出典：JICA 調査団

図 **26** シレット**(Sylhet)** モンスーン期 計算水位確率評価結果

附録 **7-1**

新規プロジェクトの影響

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 model.
- ➢ 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 model. Therefore, maximum and mean discharges of the NERM model 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

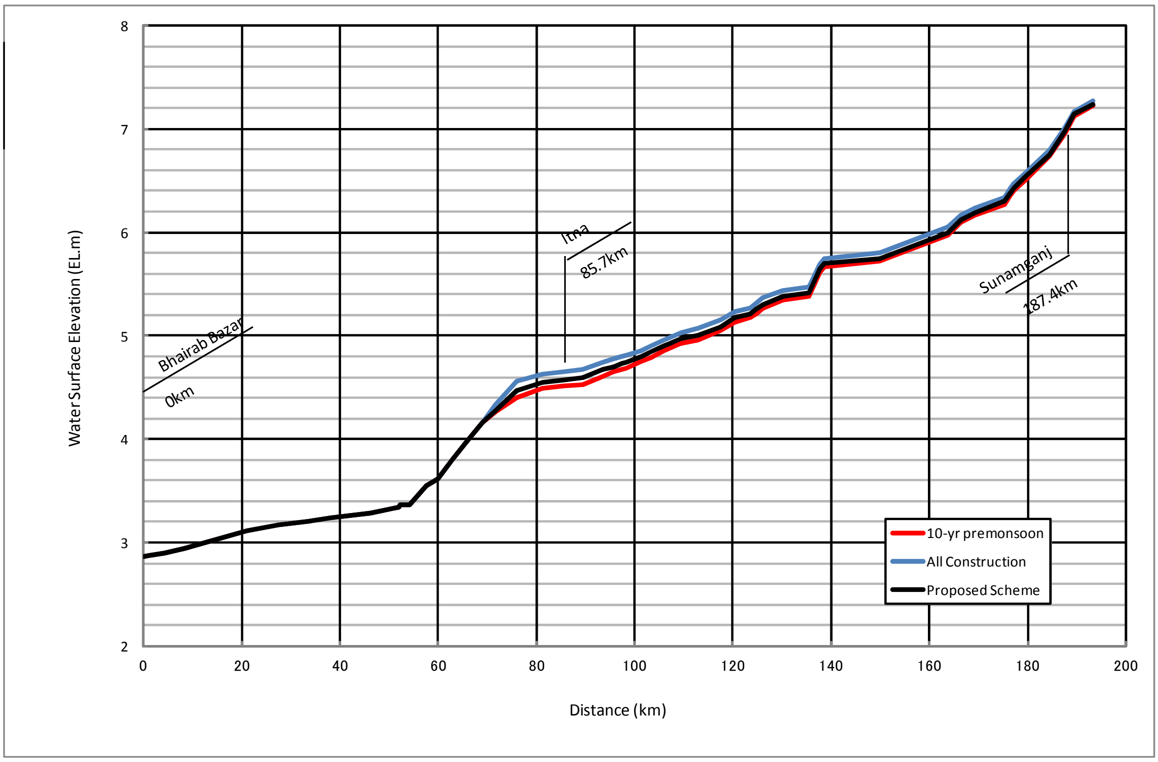
Location	Affected Area from Itna (km)			
	Case 1		Case 2	
	All	Proposed	All	Proposed
Itna	104	13	84	16

Note: Proposed scheme is not included Charigram Haor project.

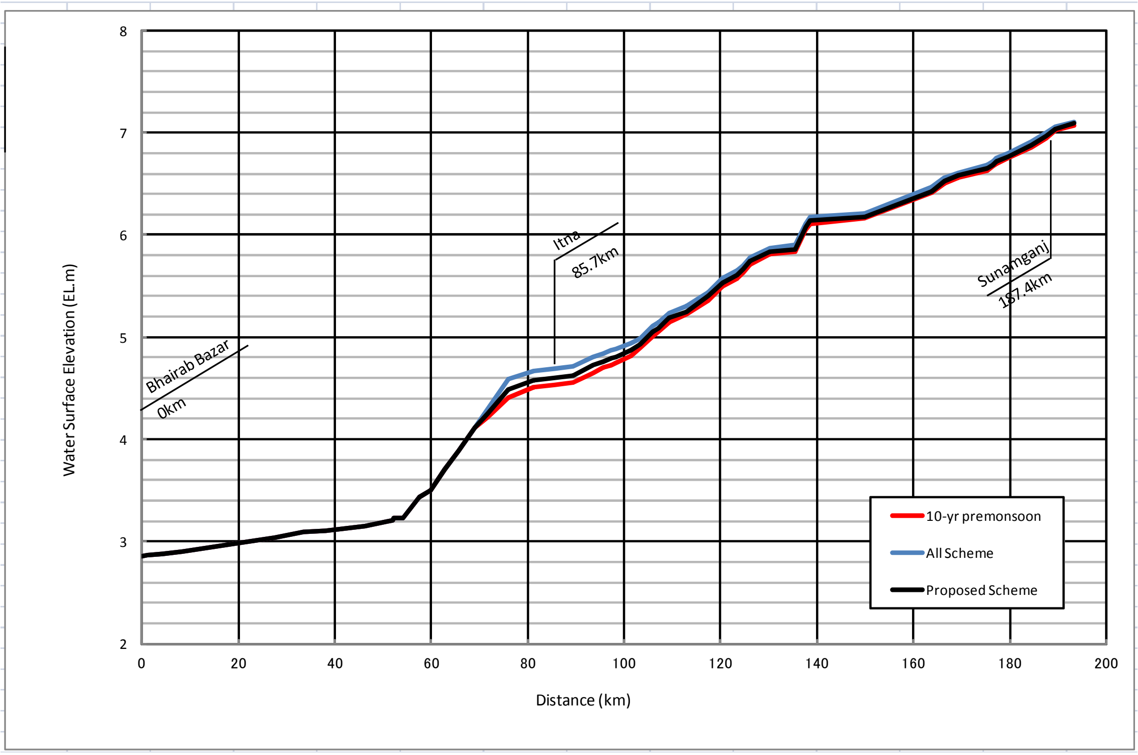
Source: JICA Study Team

2.3 Recommendation

Charigram haor project shall be rejected from the hydraulic viewpoint.



Case 1



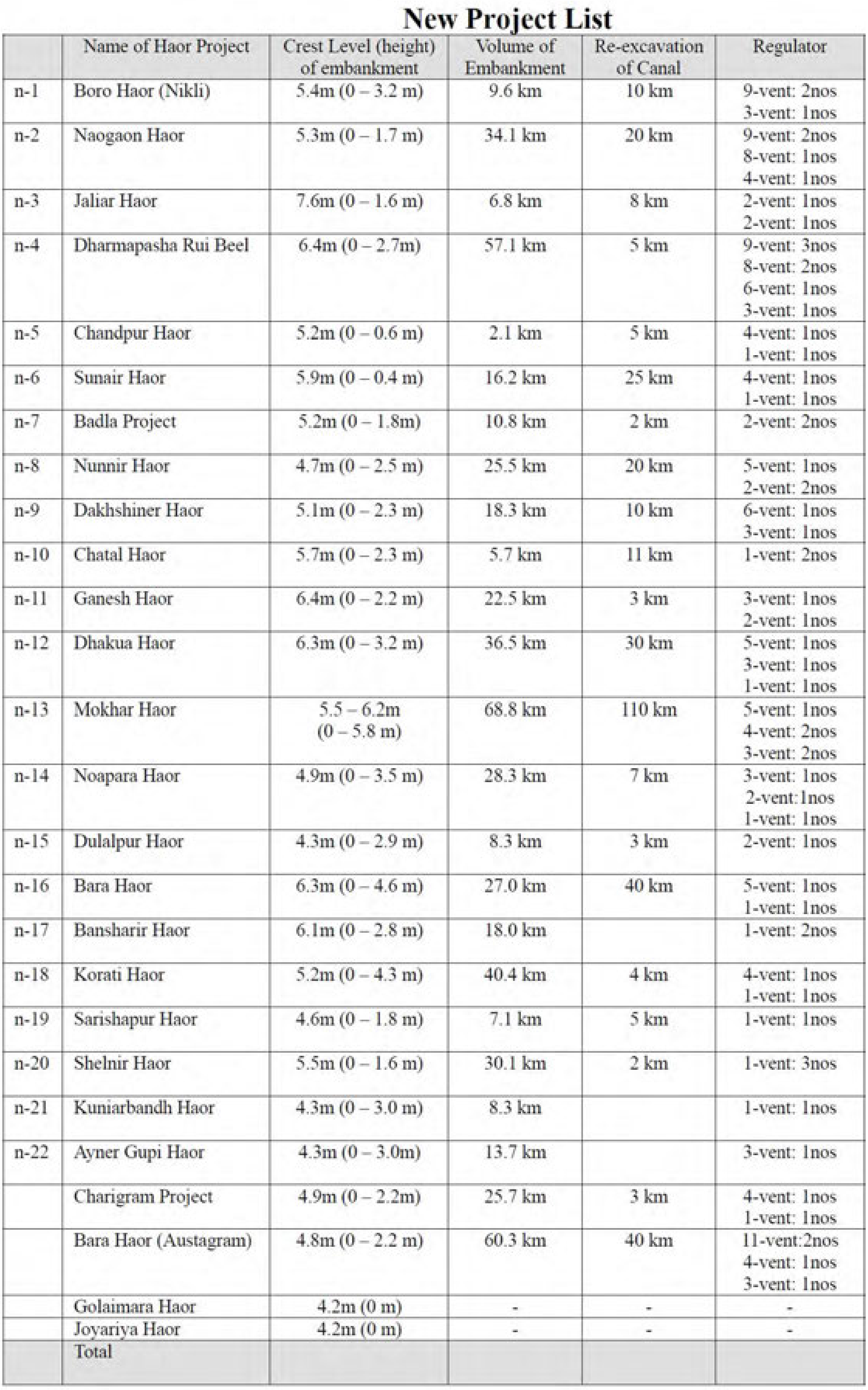
Case 2

Source: JICA Study Team

Figure 1 Water Level of with/without Scheme

附録 7-2

プロジェクトマップ

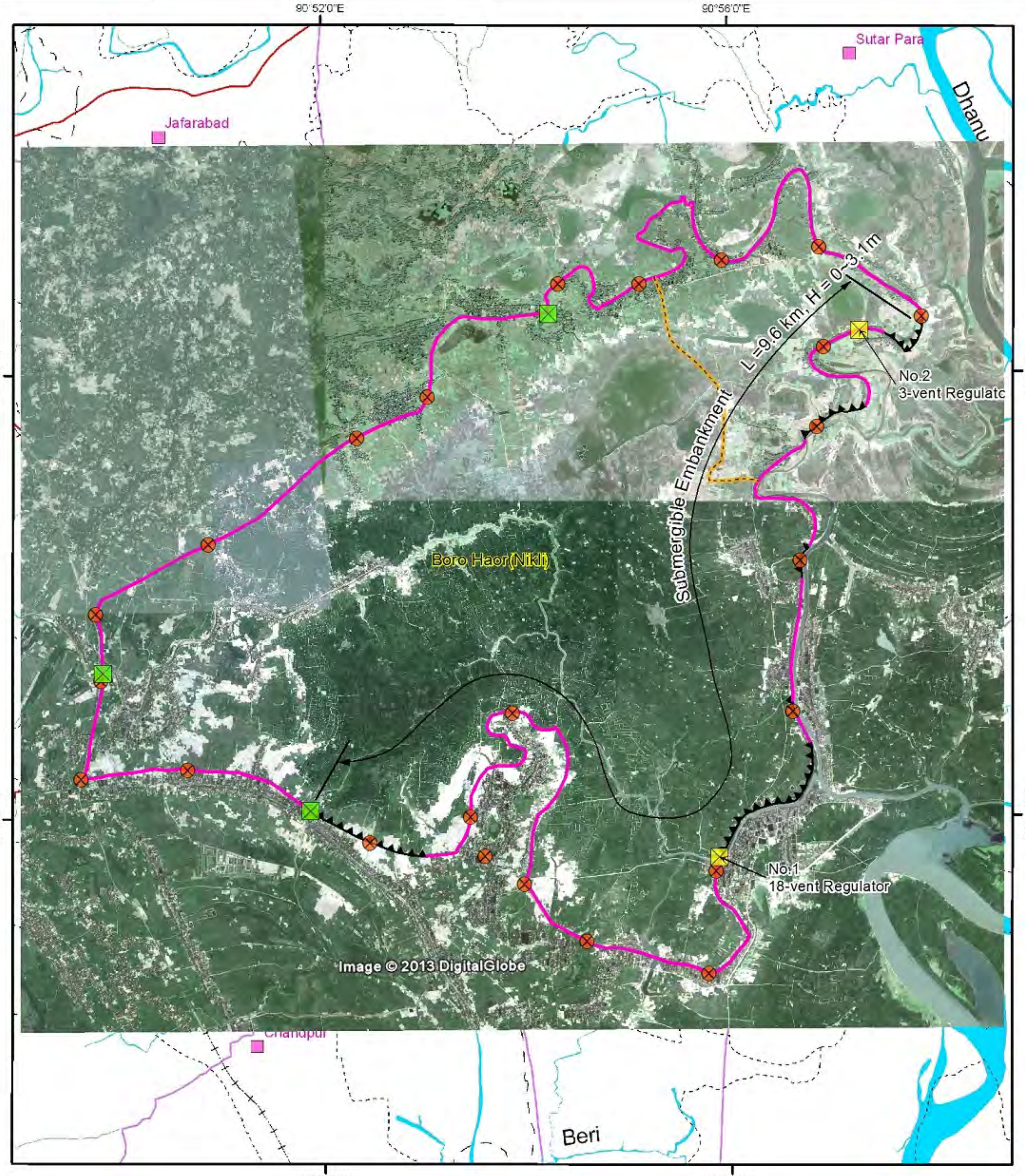


New Project List

	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	


90°52'0"E
90°56'0"E
24°24'0"N
24°20'0"N
Sutar Para
Dhanu
Jafarabad
L =9.6 km, H = 0~3.1m
Submergible Embankment
No.2
3-vent Regulato
Boro Haor(Nikli)
No.1
18-vent Regulator
Image © 2013 DigitalGlobe
Chandpur
Beri

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

Boro Haor (Nikli) Scheme

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

2 0 2 Km

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Bangladesh
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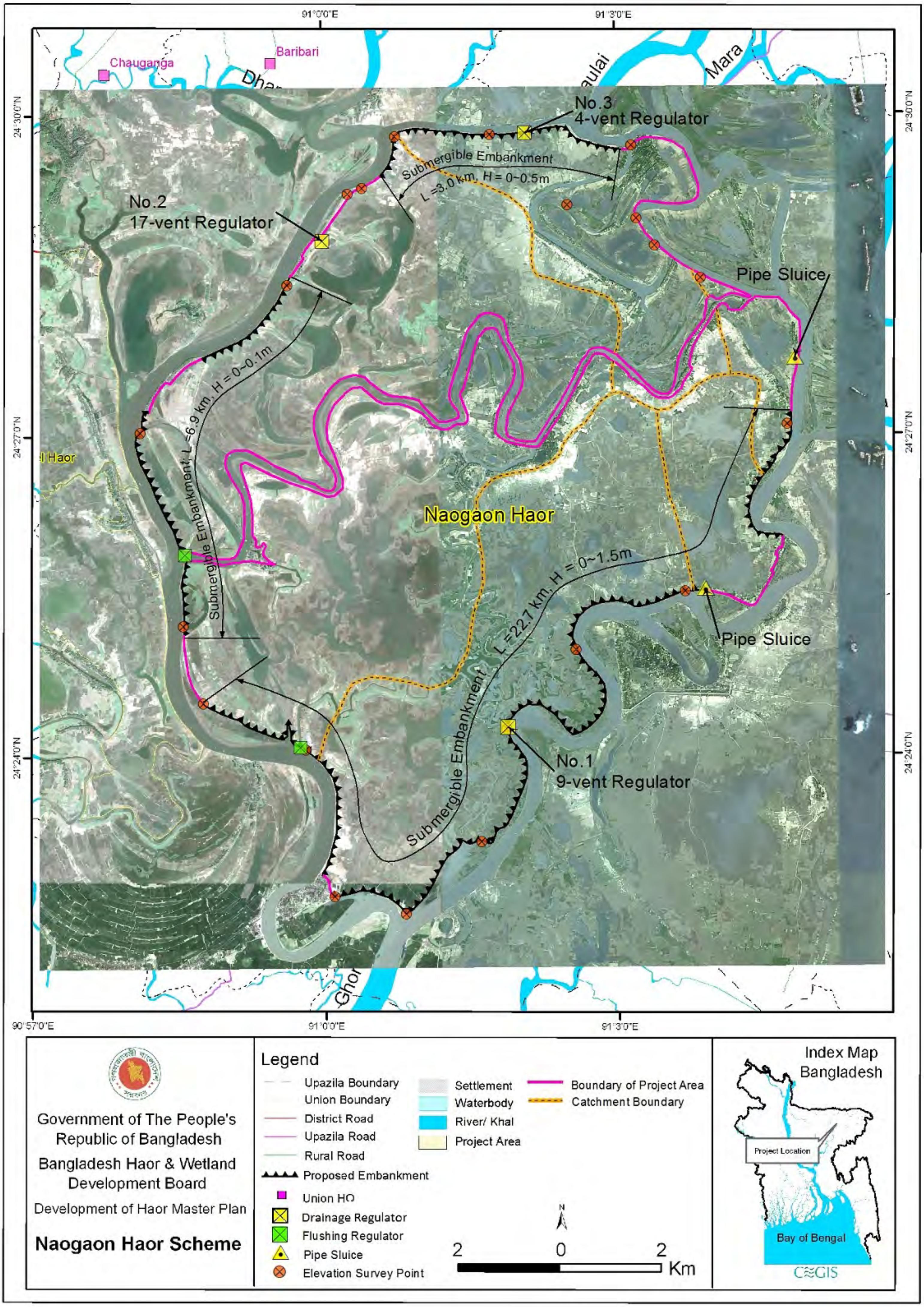
91°0'0"E
91°3'0"E
90°57'0"E
24°30'0"N
24°27'0"N
24°24'0"N
Chauganga
Baribari
Dhan
Baulai
Mara
Ghor
l Haor
No.3
4-vent Regulator
Submergible Embankment
L =3.0 km, H = 0~0.5m
No.2
17-vent Regulator
Pipe Sluice
Submergible Embankment, L =6.9 km, H = 0~0.1m
Naogaon Haor
L =22.7 km, H = 0~1.5m
Submergible Embankment
Pipe Sluice
No.1
9-vent Regulator
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
N
2
0
2
Km
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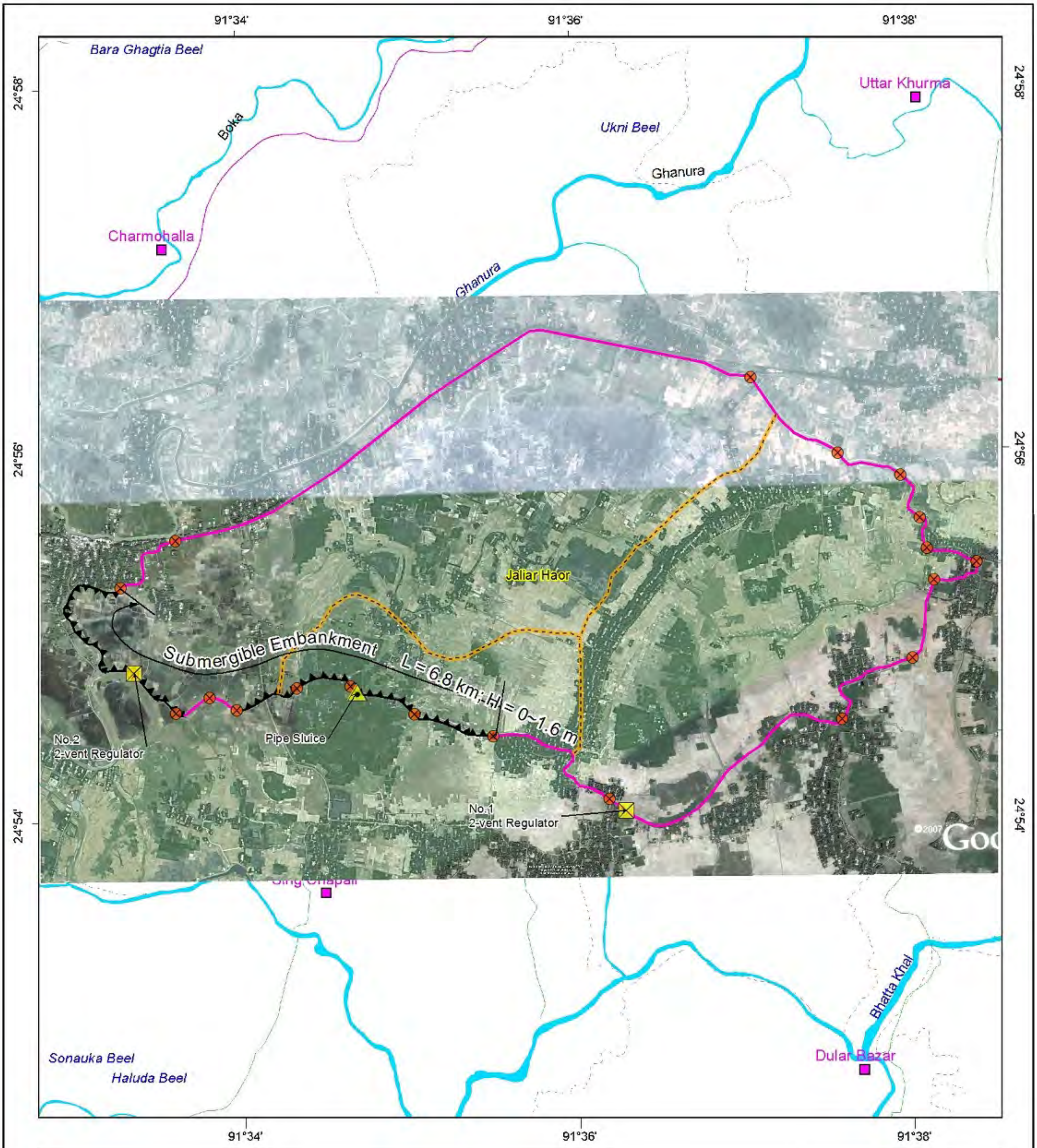
Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Naogaon Haor Scheme


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
©2007
Goo

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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

0.5 0 0.5 Km.

1:50,000

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Bangladesh
Project Location
Bay of Bengal

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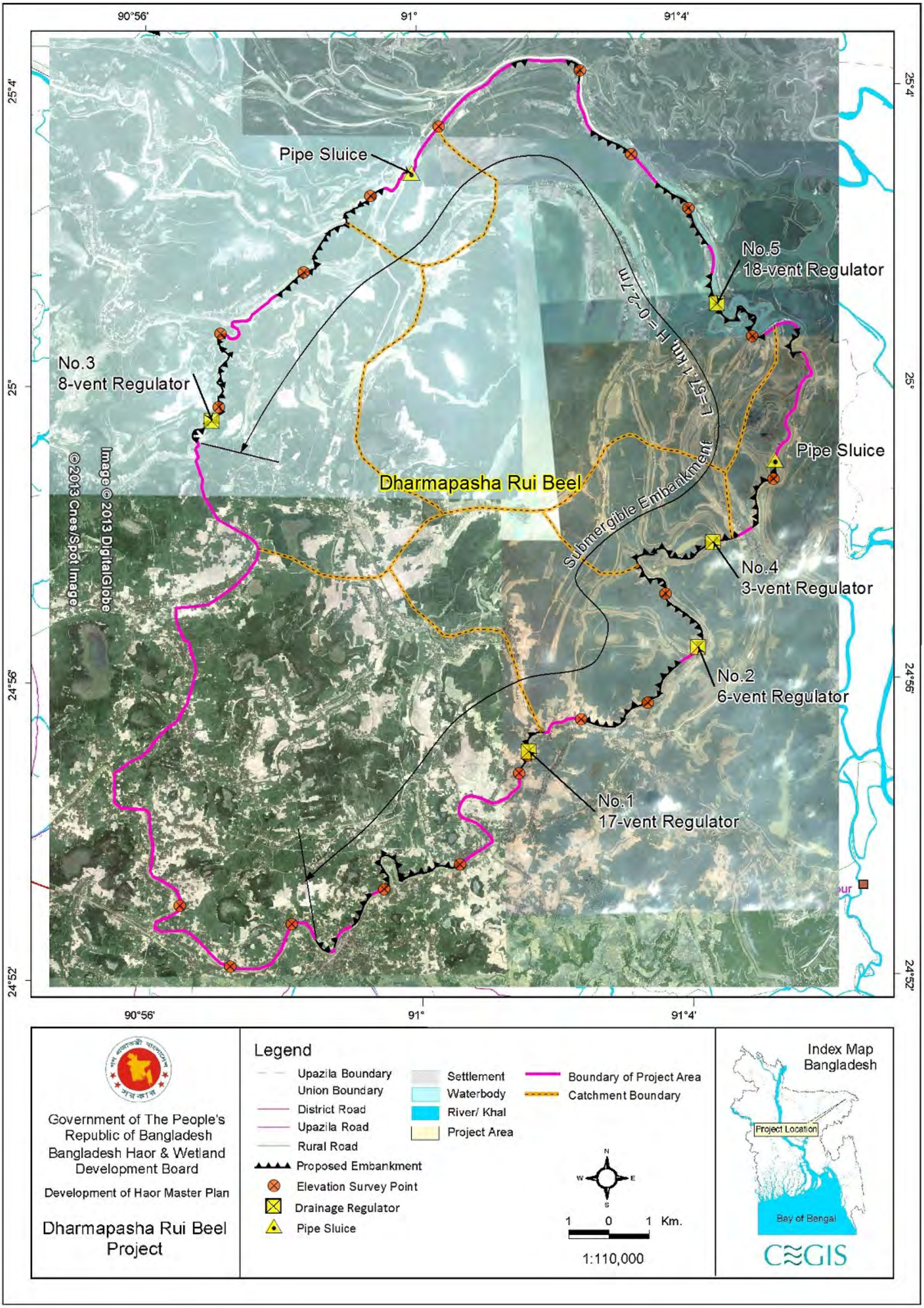

Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Dharmapasha Rui Beel Project

90°56'
91°
91°4'
25°4'
25°
24°56'
24°52'
Pipe Sluice
No.5
18-vent Regulator
No.3
8-vent Regulator
L=57.1 km, H=0-2.7 m
Submergible Embankment
Pipe Sluice
Dharmapasha Rui Beel
Image © 2013 DigitalGlobe
© 2013 Cnes/Spot Image
No.4
3-vent Regulator
No.2
6-vent Regulator
No.1
17-vent Regulator
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
N
W
E
S
1 0 1 Km.
1:110,000
Index Map Bangladesh
Project Location
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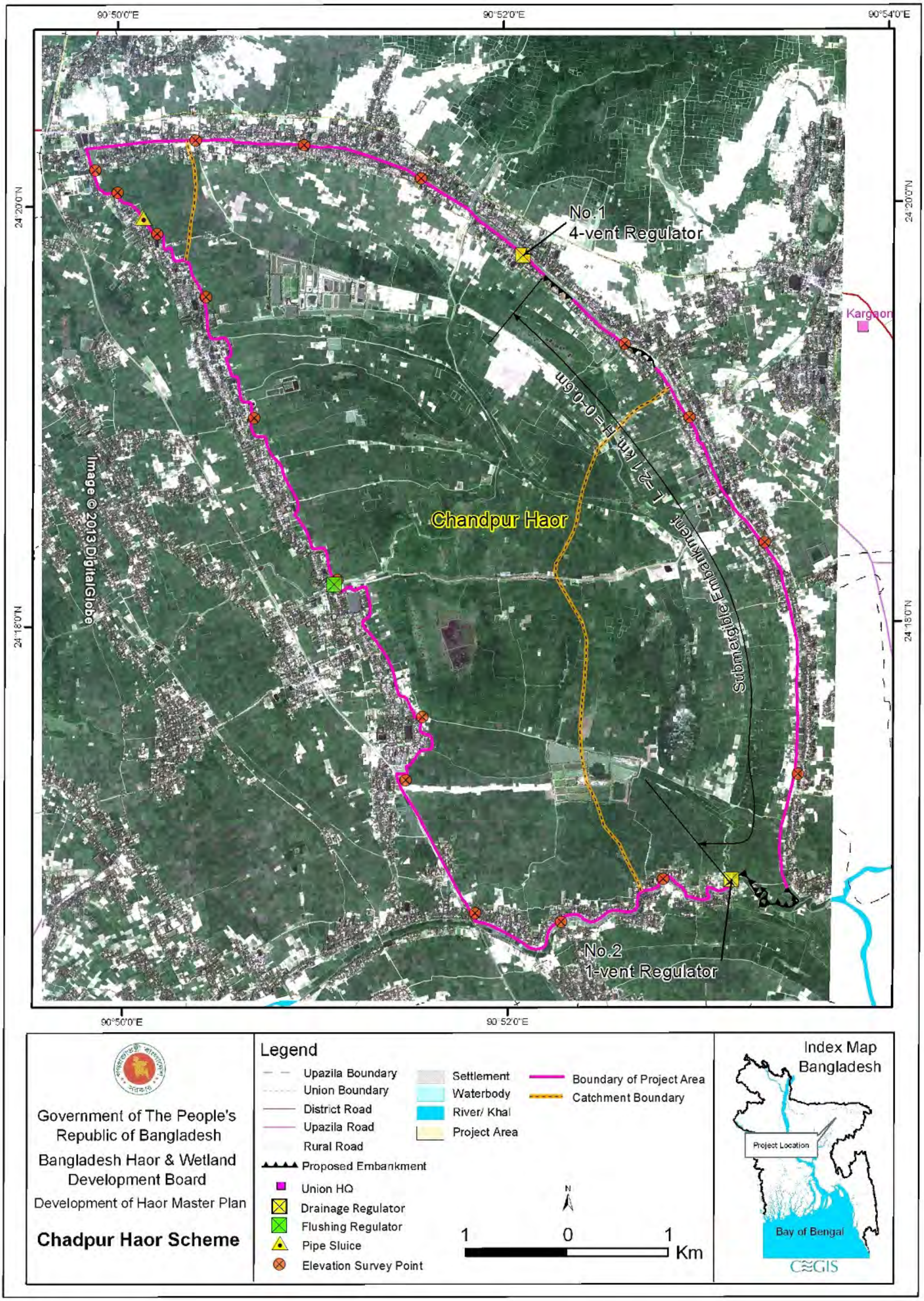
Chadpur Haor Scheme

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan



90°50'0"E
90°52'0"E
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
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
N
1
0
1
Km
Index Map
Bangladesh
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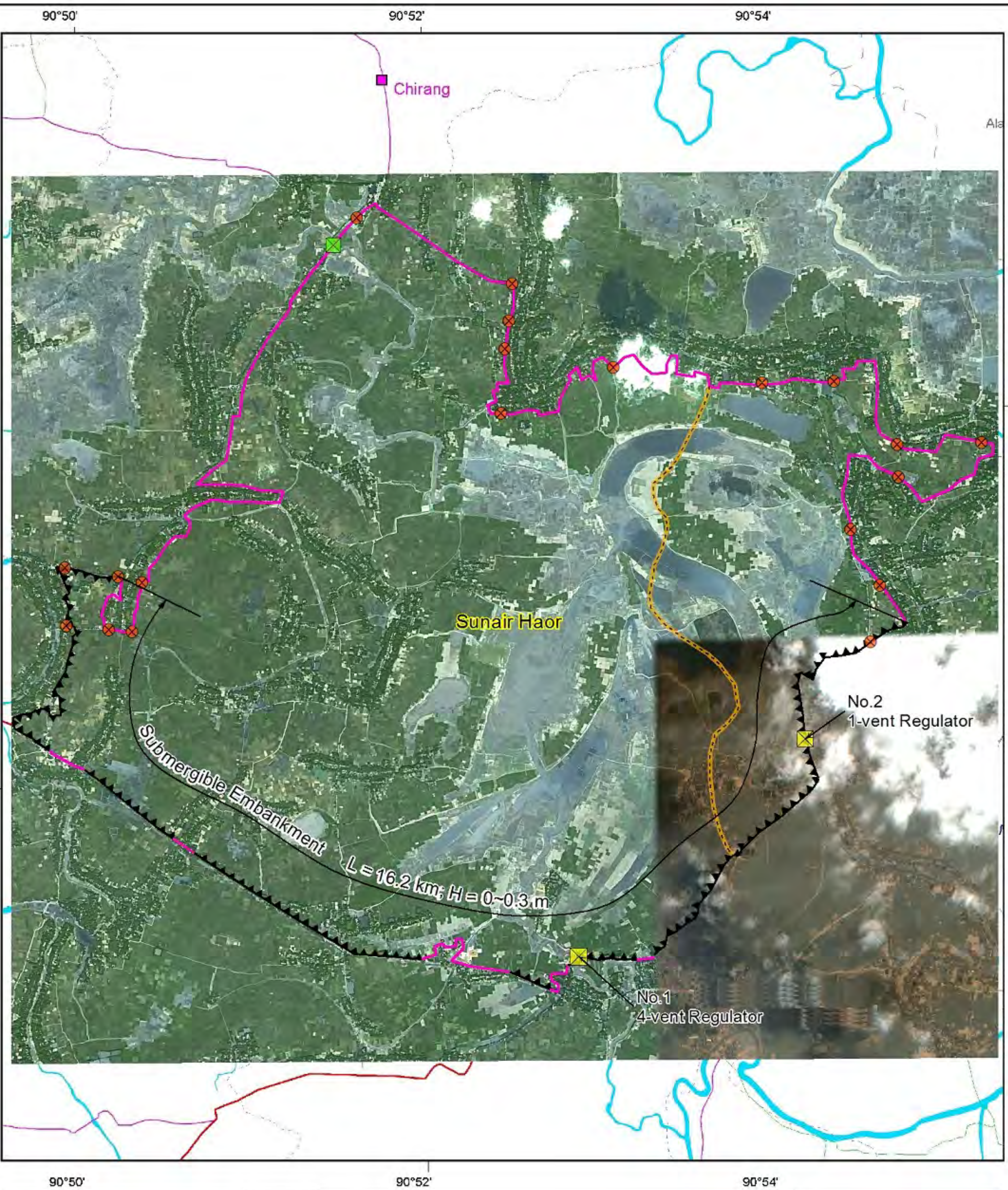
CEGIS


90°50'
90°52'
90°54'
24°36'
24°34'
Chirang
Ala
Sunair Haor
Submergible Embankment
L = 16.2 km; H = 0~0.3 m
No.2
1-vent Regulator
No.1
4-vent Regulator

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Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Sunair Haor Project

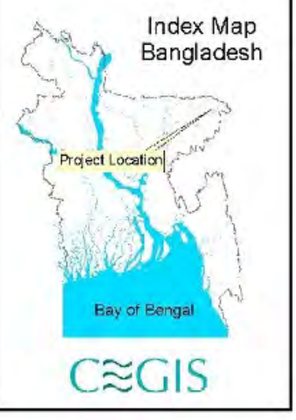
Legend

- 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

N
W E
S

0.5 0 0.5 Km.

1:50,000


Index Map
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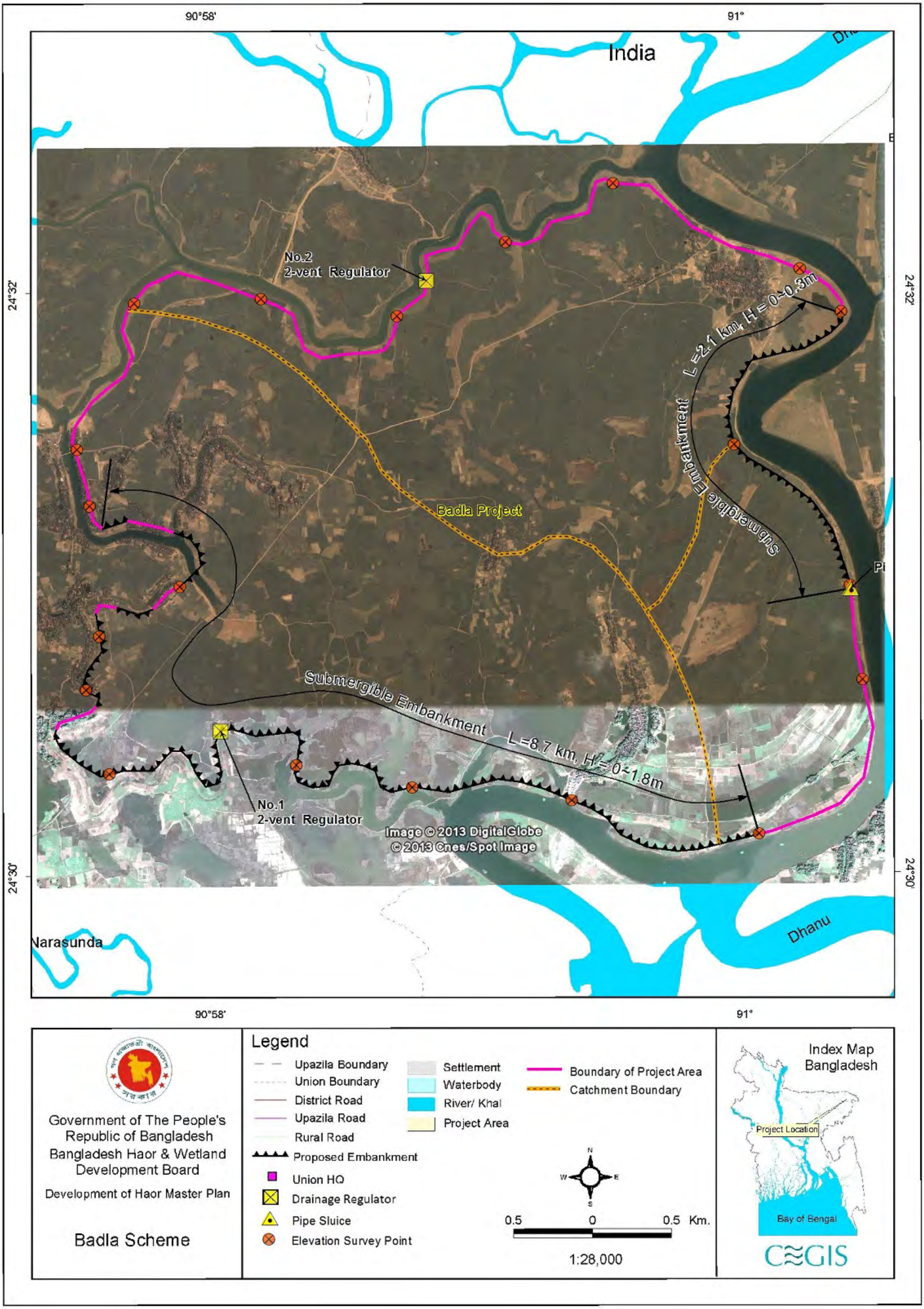
90°58'
91°
India
24°32'
24°30'
No.2
2-vent Regulator
Badla Project
Submergible Embankment
L =2.1 km, H = 0~0.3m
Submergible Embankment
L =8.7 km, H = 0~1.8m
No.1
2-vent Regulator
Image © 2013 DigitalGlobe
© 2013 Cnes/Spot Image
Narasunda
Dhanu
Legend
Upazila Boundary
Union Boundary
District Road
Upazila 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.
1:28,000
Index Map
Bangladesh
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Bay of Bengal
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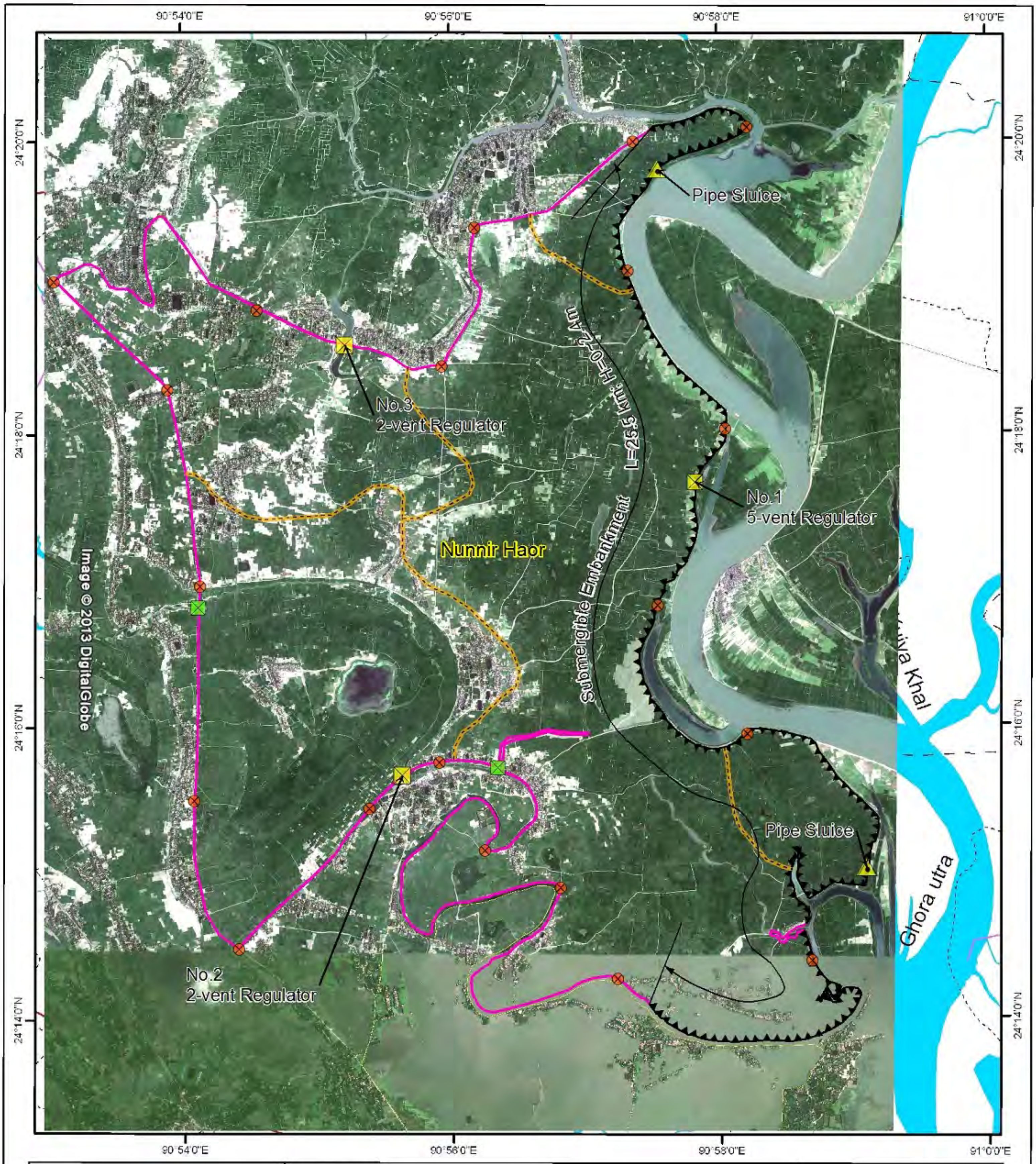
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan
Badla Scheme


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
No.1
5-vent Regulator
Nunnir Haor
Submergible Embankment
L=25.5 km; H=0-2.4m
Image © 2013 DigitalGlobe
...iya Khal
Pipe Sluice
Ghora utra
No.2
2-vent Regulator

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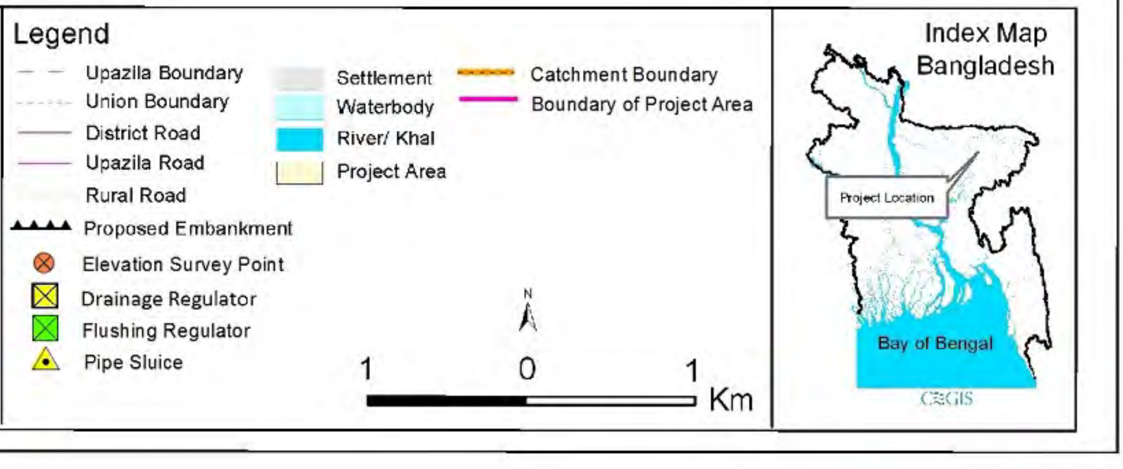
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Nunnir 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
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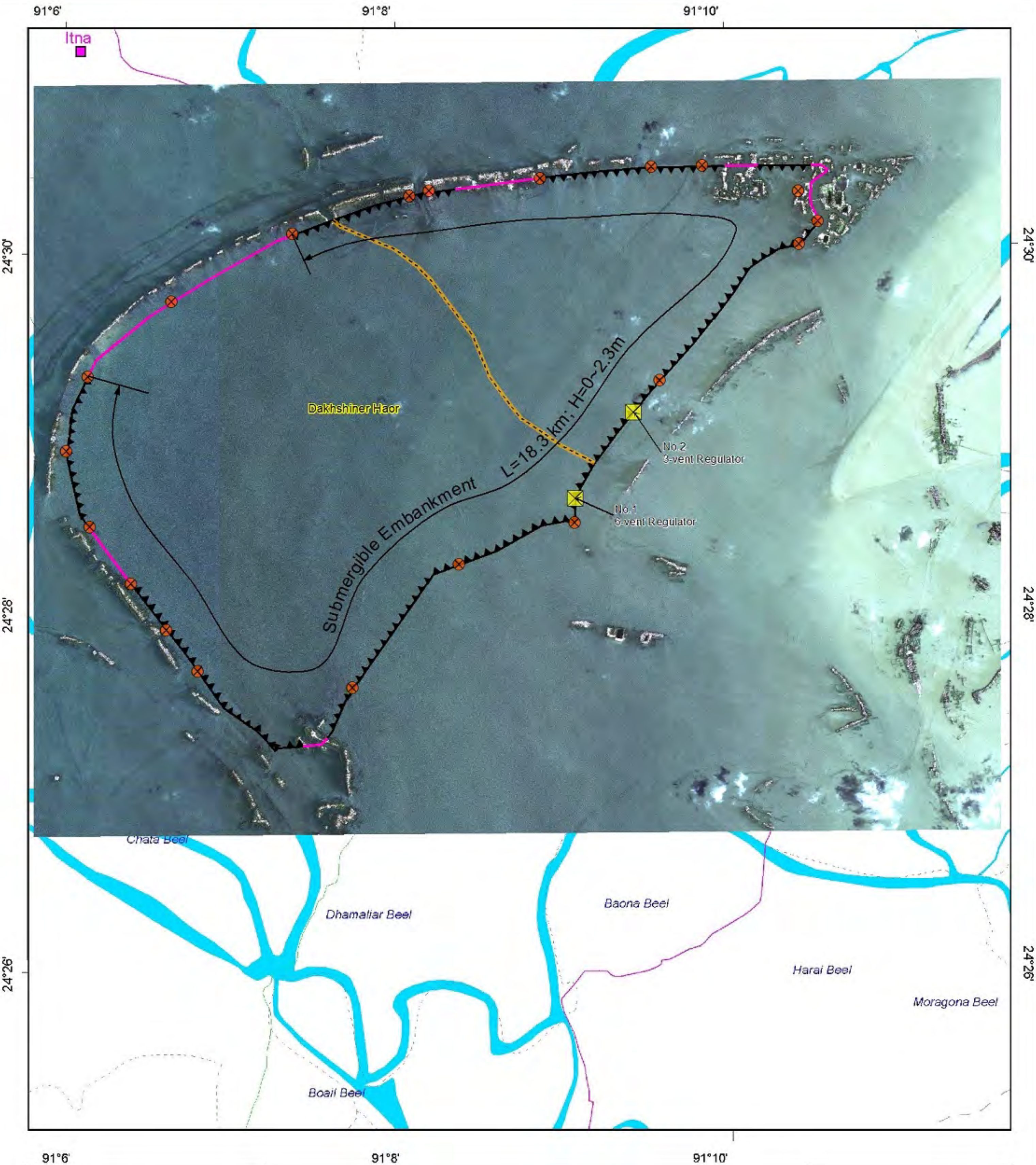
91°6'
91°8'
91°10'
24°30'
24°28'
24°26'
Itna
Dakhshiner Haor
L=18.3 km; H=0~2.3m
Submergible Embankment
No.2
3-vent Regulator
No.1
6-vent Regulator
Chata Beel
Dhamaliar Beel
Baona Beel
Harai Beel
Moragona Beel
Boail Beel

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Dakshiner Haor Project

Legend

Upazila Boundary	Settlement	Boundary of Project Area
Union Boundary	Waterbody	Catchment Boundary
District Road	River/ Khal	
Upazila Road	Project Area	
Rural Road		
▲▲▲▲ Proposed Embankment		
■ Union HQ		
☒ Drainage Regulator		
⊗ Elevation Survey Point		

N
W E
S

0.5 0 0.5 Km.

1:52,000

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Bangladesh
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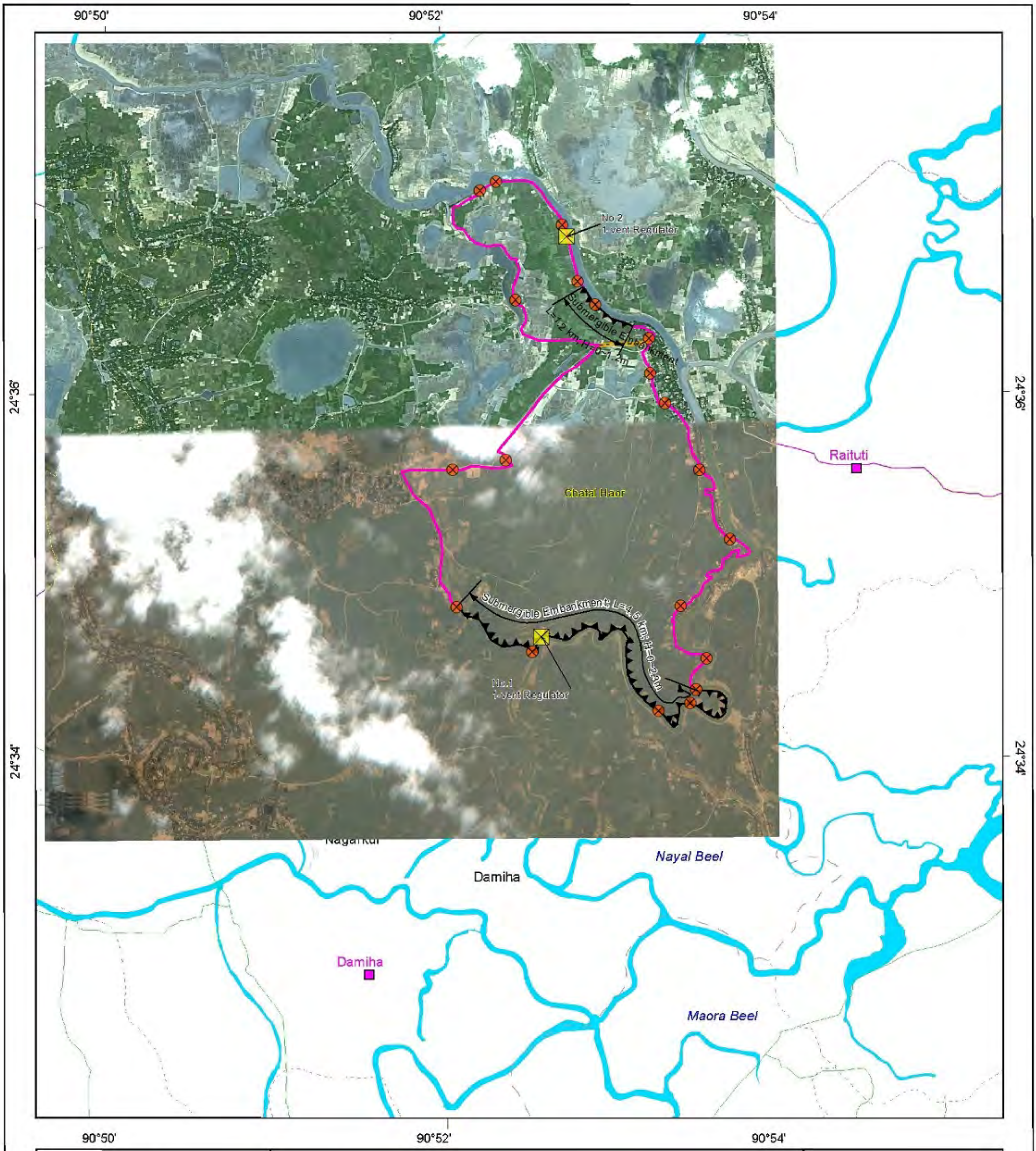
90°50'
90°52'
90°54'
24°36'
24°34'
No.2
1-vent Regulator
Submergible Embankment
L=1.2 km; H=0~1.2m
Chatal Haor
Raituti
Submergible Embankment; L=4.5 km; H=0~2.2m
No.1
1-vent Regulator
Nagarkul
Damiha
Nayal Beel
Damiha
Maora Beel
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural 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.
1:50,000

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Chatal Haor Project

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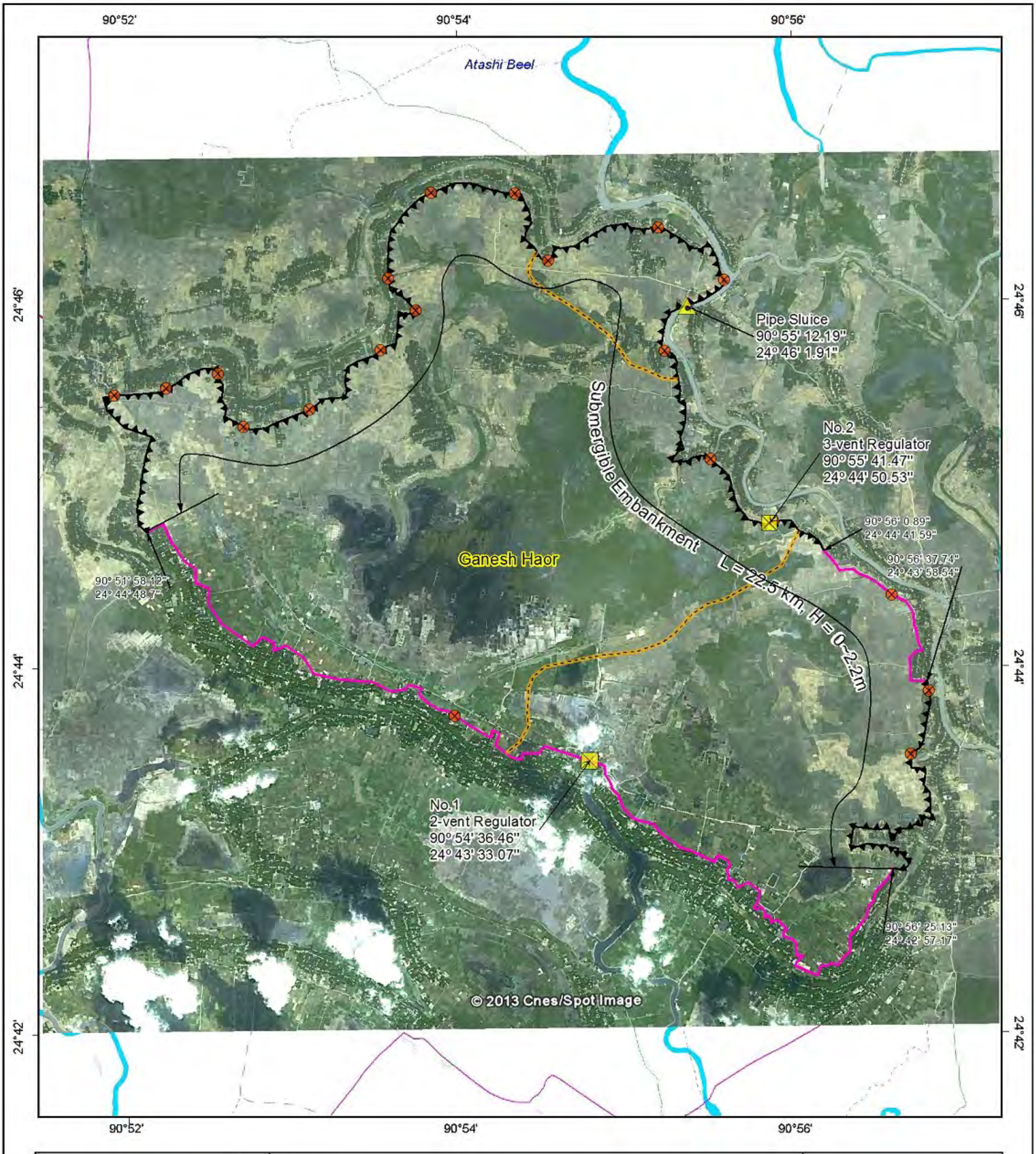
90°52'
90°54'
90°56'
24°46'
24°44'
24°42'
Atashi Beel
Pipe Sluice
90° 55' 12.19"
24° 46' 1.91"
No.2
3-vent Regulator
90° 55' 41.47"
24° 44' 50.53"
90° 56' 0.89"
24° 44' 41.59"
90° 56' 37.74"
24° 43' 58.54"
Submergible Embankment
L = 22.5 km, H = 0~2.2m
Ganesh Haor
90° 51' 58.12"
24° 44' 48.7"
No.1
2-vent Regulator
90° 54' 36.46"
24° 43' 33.07"
90° 56' 25.13"
24° 42' 57.17"
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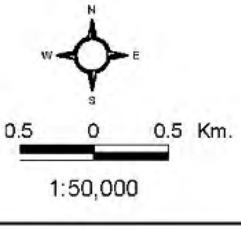
Bangladesh Haor & Wetland Development Board

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

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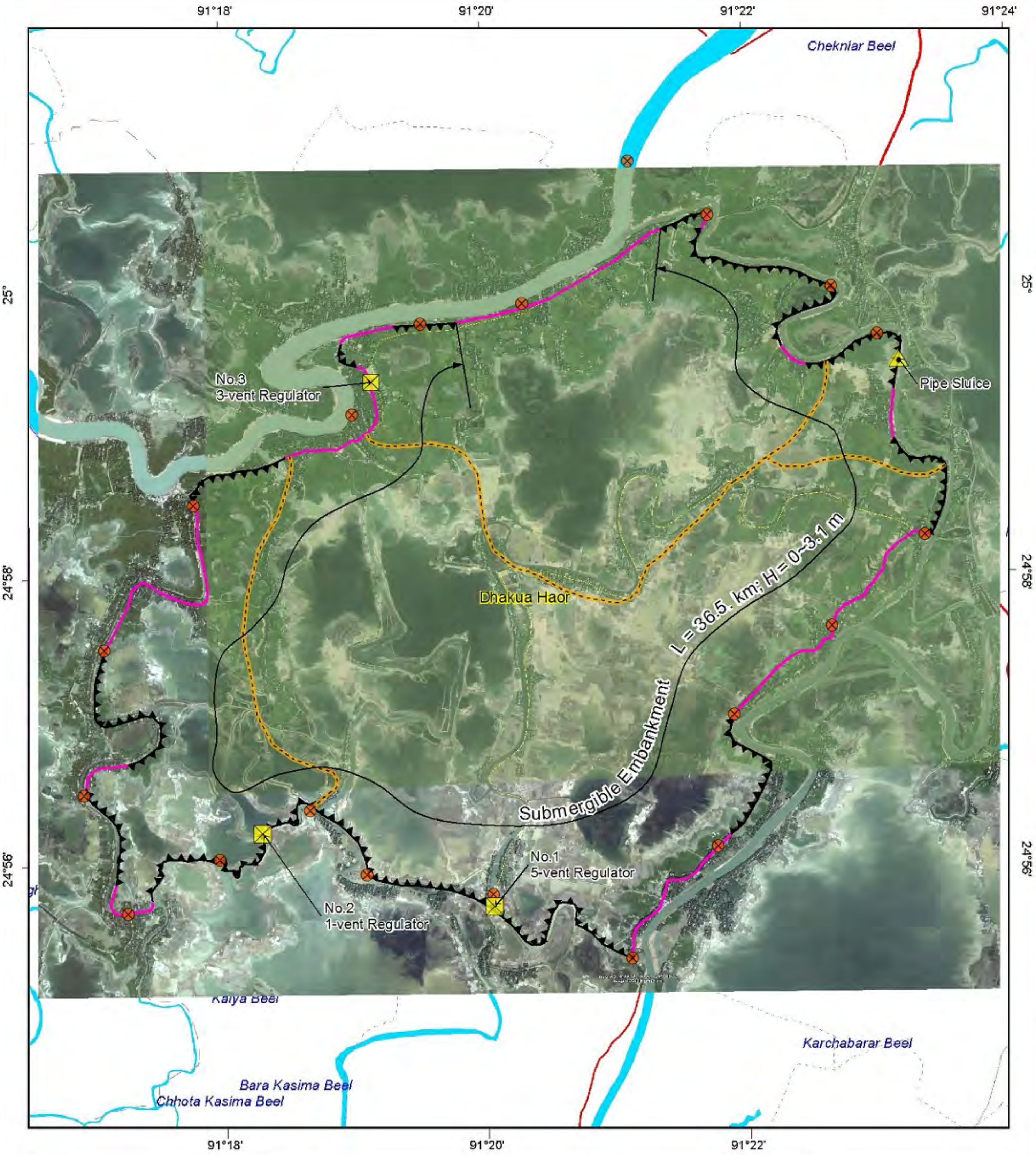
91°18'
91°20'
91°22'
91°24'
25°
24°58'
24°56'
Chekniar Beel
No.3
3-vent Regulator
Pipe Sluice
Dhakua Haor
L = 36.5. km; H = 0~3.1 m
Submergible Embankment
No.1
5-vent Regulator
No.2
1-vent Regulator
Kalya Beel
Karchabarar Beel
Bara Kasima Beel
Chhota Kasima Beel

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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

0.5 0 0.5 Km.

1:65,000

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Bangladesh
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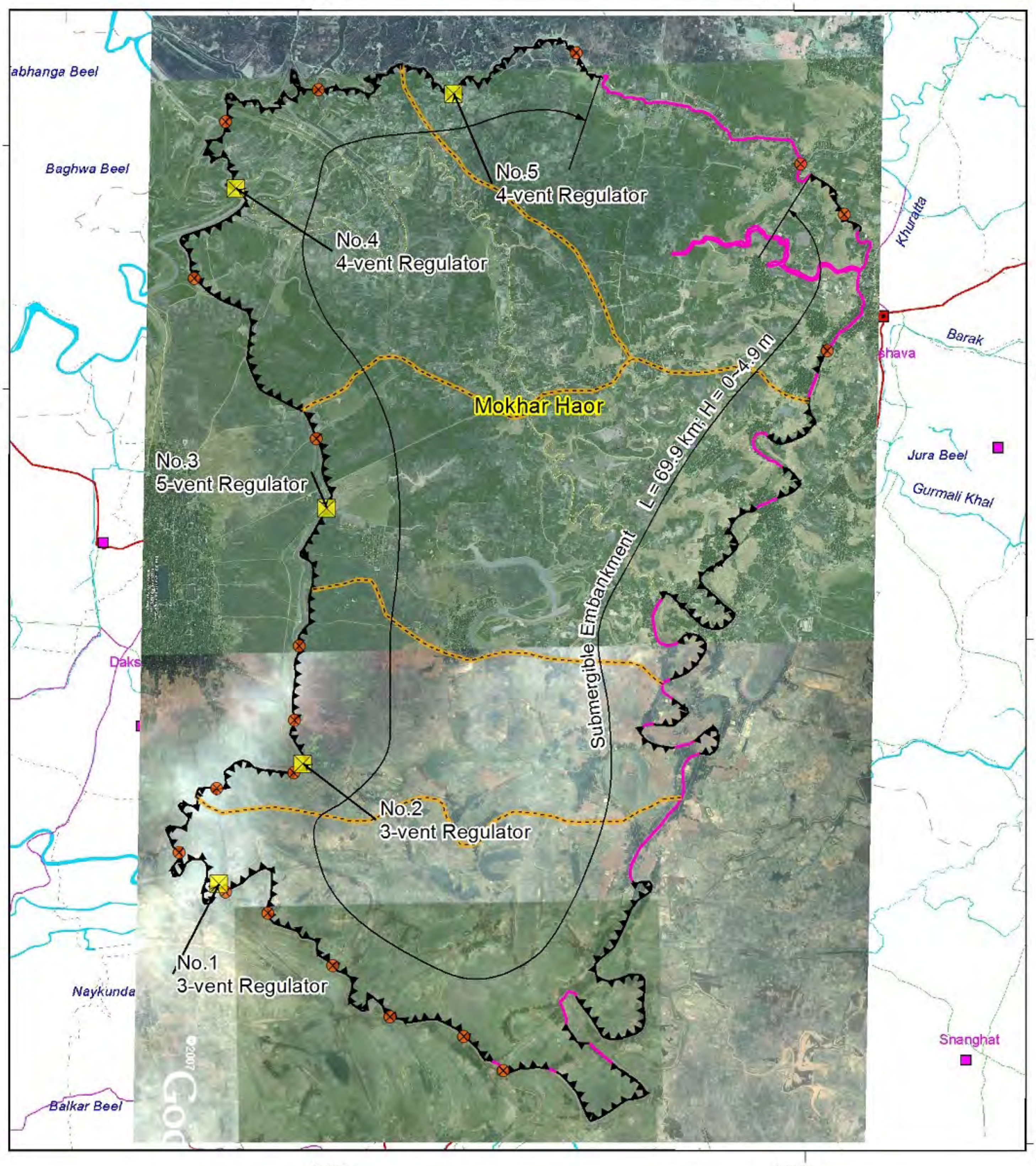
Bay of Bengal


91°24'
91°30'
24°36'
24°33'
24°30'
24°24'
abhanga Beel
Baghwa Beel
No.5
4-vent Regulator
No.4
4-vent Regulator
Khuratta
Barak
shava
Mokhar Haor
L = 69.9 km; H = 0-4.9 m
Submergible Embankment
No.3
5-vent Regulator
Jura Beel
Gurmali Khal
Daks
No.2
3-vent Regulator
No.1
3-vent Regulator
Naykunda
Snanghat
Balkar Beel
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Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Mokhar Haor Project

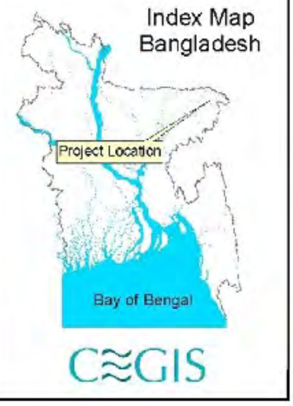
Legend

Symbol	Feature
■	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
W E
S

1 0 1 Km.

1:100,000


Index Map
Bangladesh
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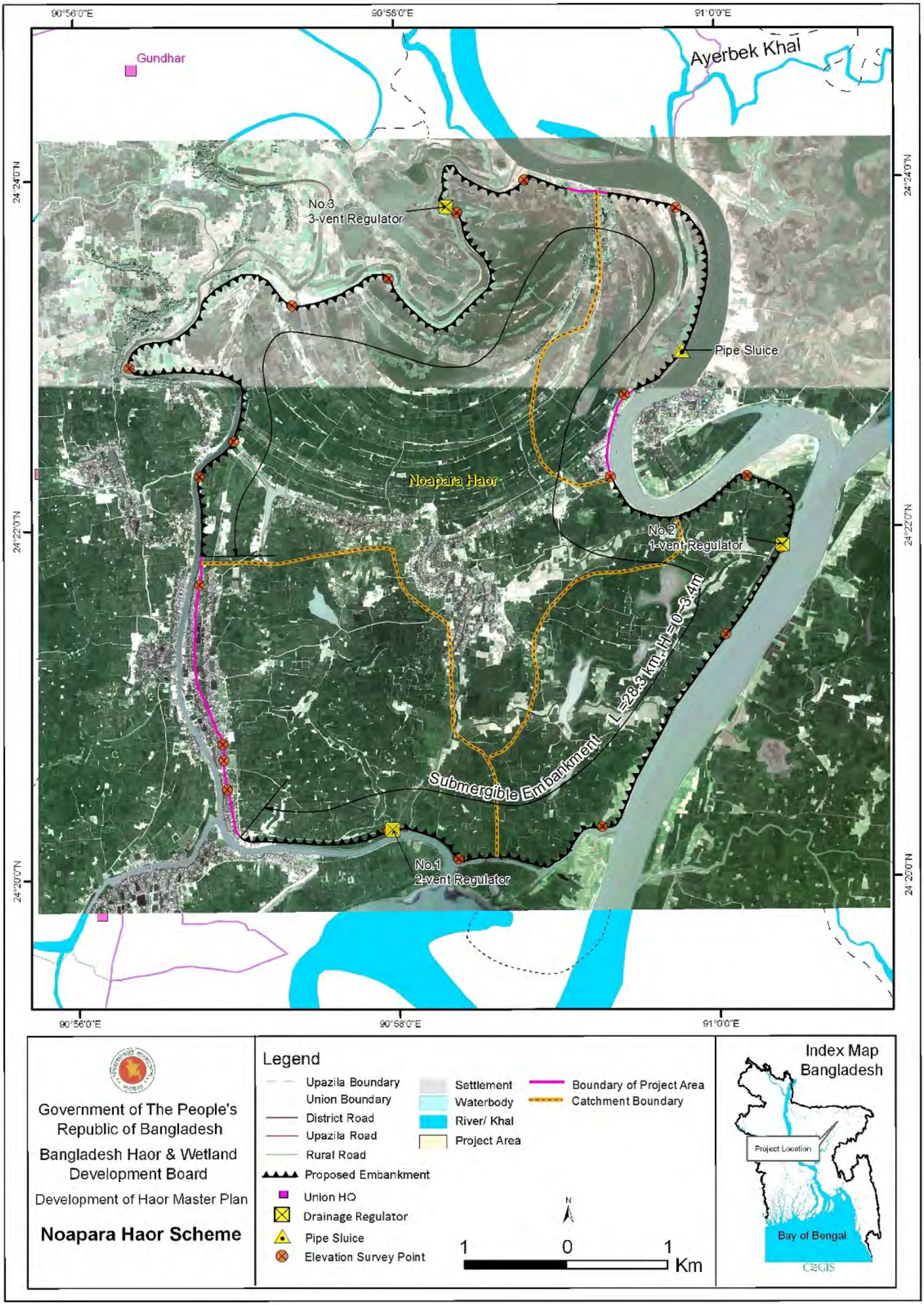

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Noapara Haor Scheme

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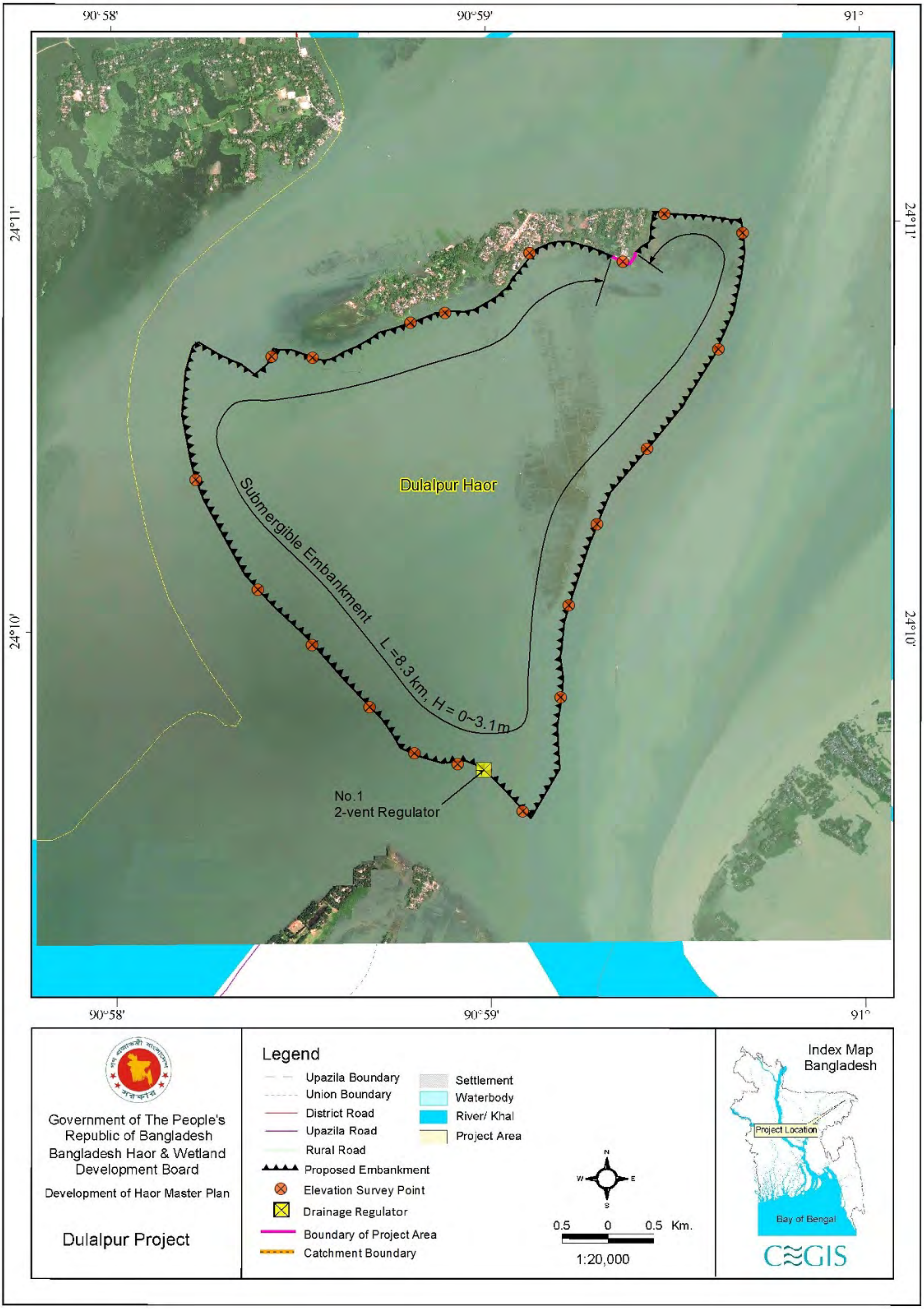
90°58'
90°59'
91°
24°11'
24°10'
Dulalpur Haor
Submergible Embankment
L =8.3 km, H = 0~3.1m
No.1
2-vent Regulator
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Boundary of Project Area
Catchment Boundary
Settlement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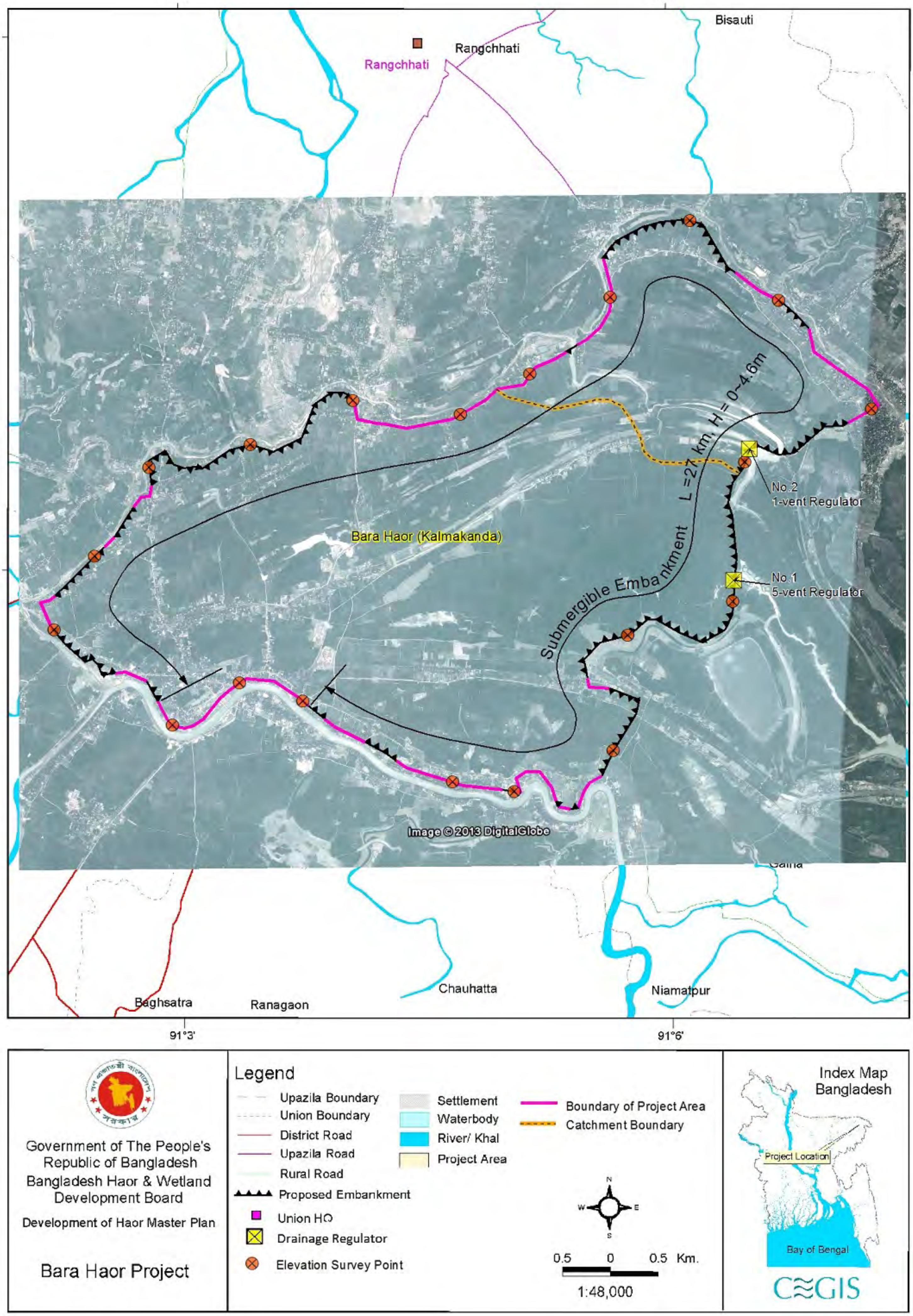
Bangladesh Haor & Wetland Development Board
Development of Haor Master Plan

Dulalpur Project


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
Gaina
Baghsatra
Ranagaon
Chauhatta
Niamatpur
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
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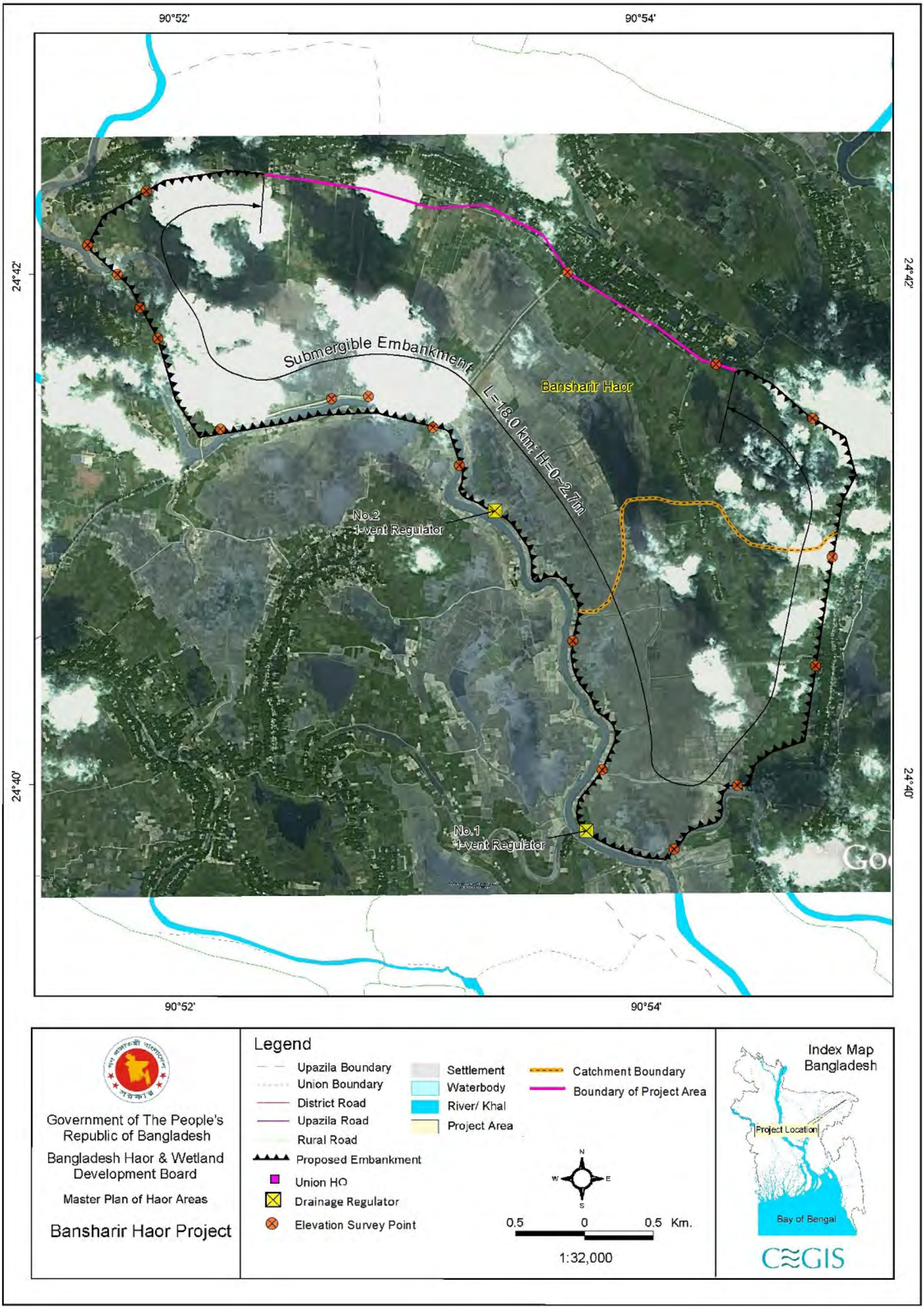
Government of The People's Republic of Bangladesh
Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Bara Haor Project


90°52'
90°54'
24°42'
24°40'
Submergible Embankment
L=18.0 km; H=0~2.7m
Banshari 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
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Catchment Boundary
Boundary of Project Area
N
W
E
S
0.5
0
0.5
Km.
1:32,000
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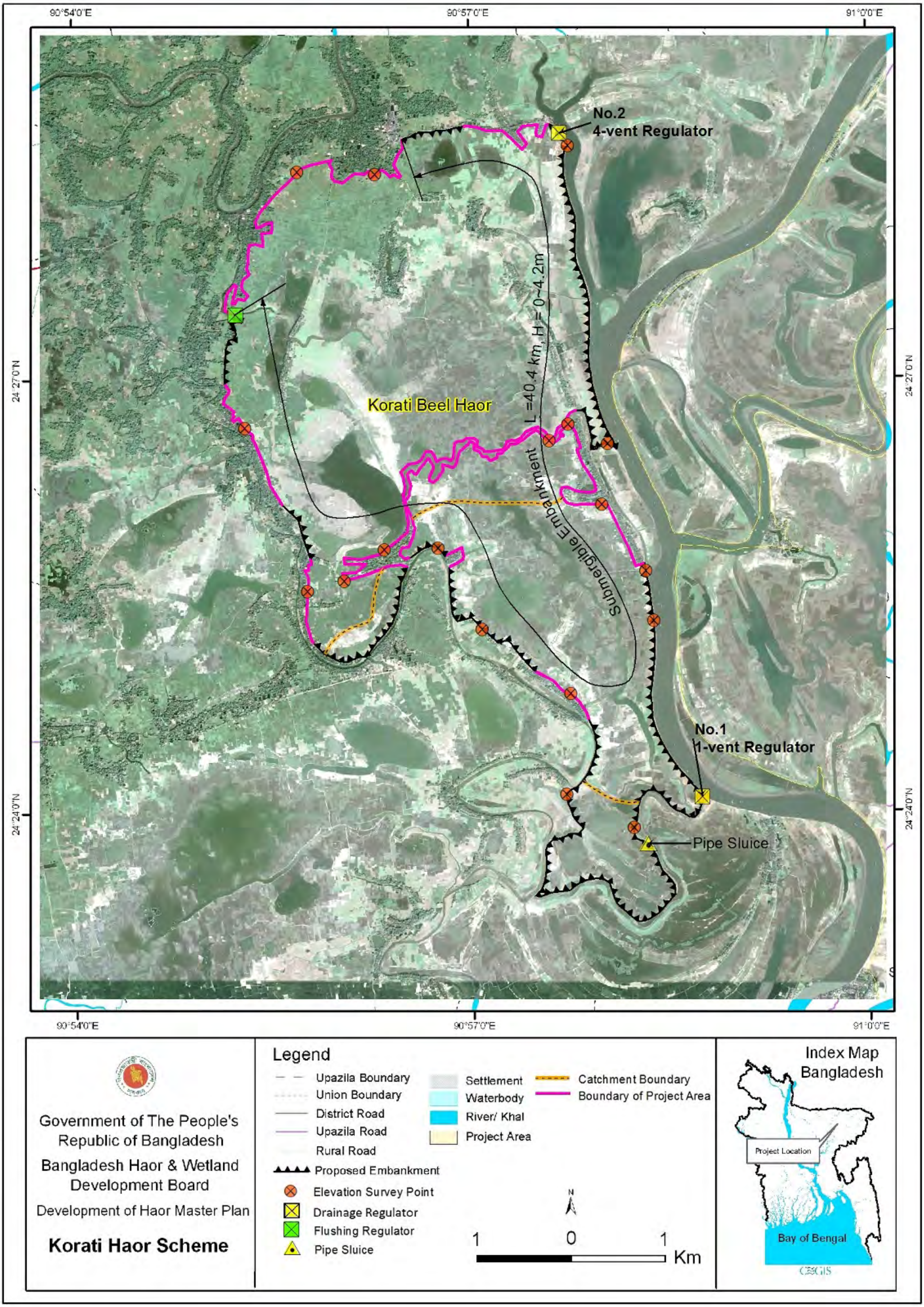
Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Bansharir Haor Project


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
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Flushing Regulator
Pipe Sluice
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Waterbody
River/ Khal
Project Area
Catchment Boundary
Boundary of Project Area
N
1
0
1
Km
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Bangladesh
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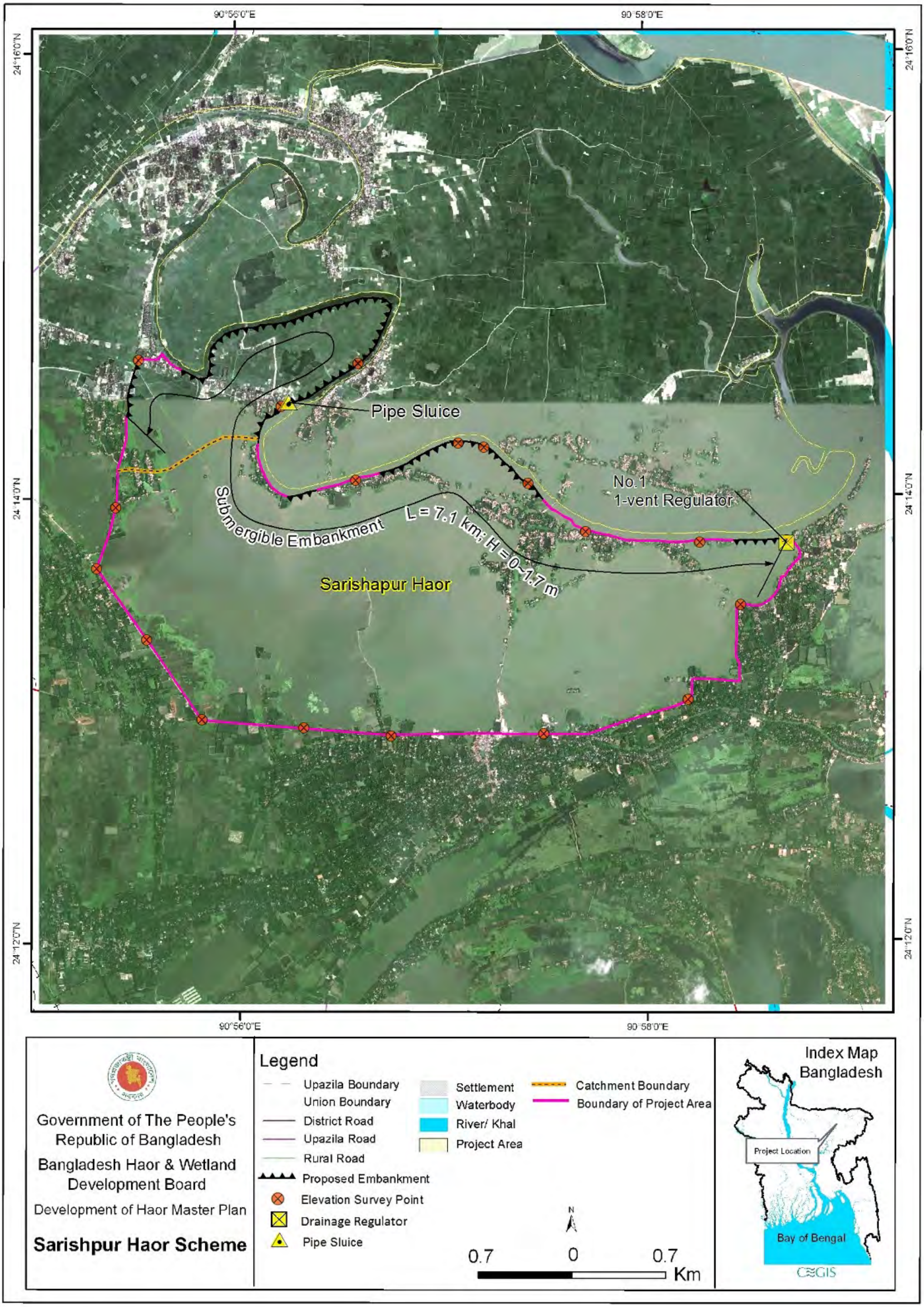
Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Korati Haor Scheme

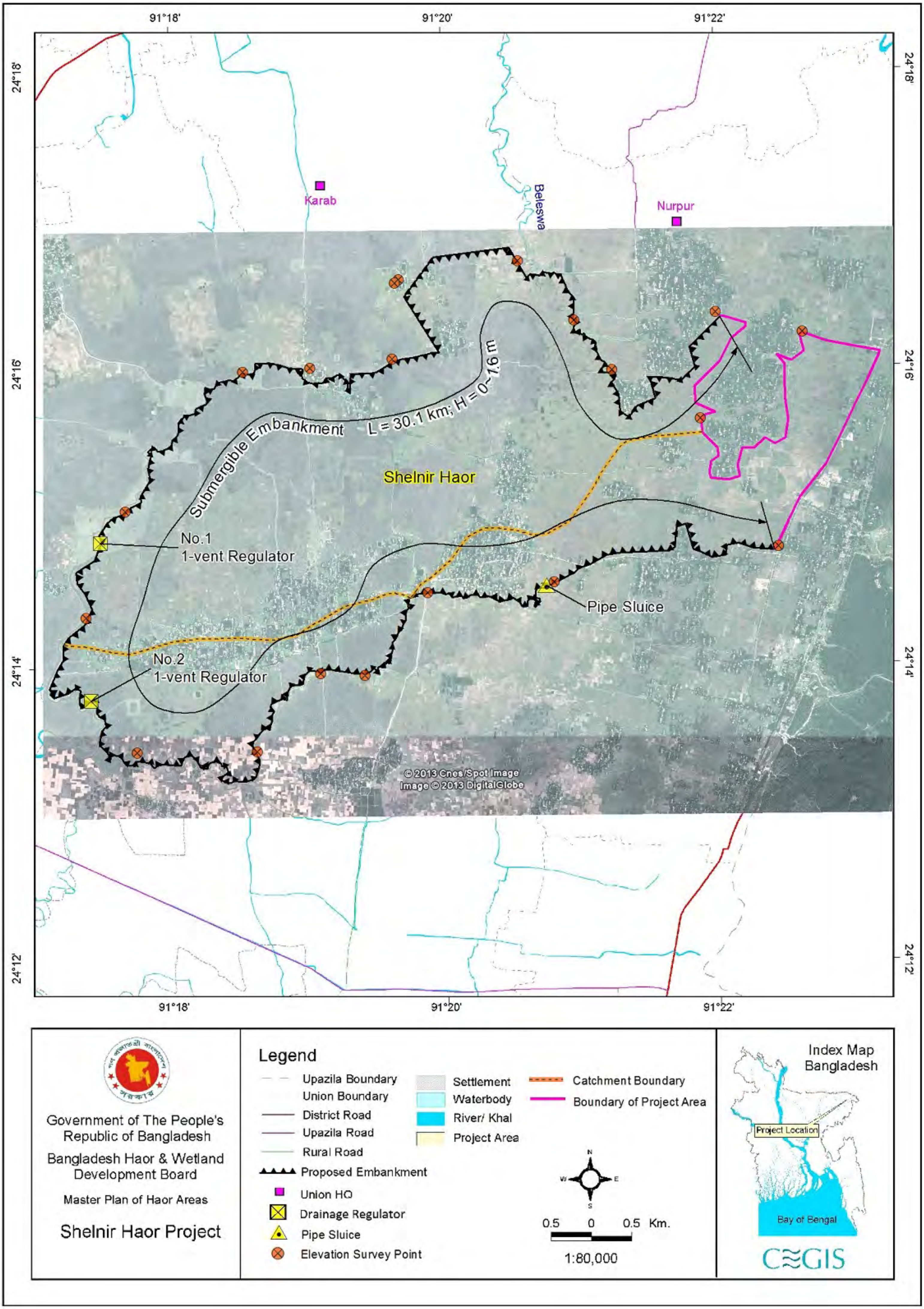

90°56'0"E
90°58'0"E
24°16'0"N
24°14'0"N
24°12'0"N
Pipe Sluice
No.1
1-vent Regulator
Submergible Embankment
L = 7.1 km; H = 0~1.7 m
Sarishapur Haor
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
Elevation Survey Point
Drainage Regulator
Pipe Sluice
Settlement
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

Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Development of Haor Master Plan

Sarishpur Haor Scheme


91°18'
91°20'
91°22'
24°18'
24°16'
24°14'
24°12'
Karab
Beleswa
Nurpur
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
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
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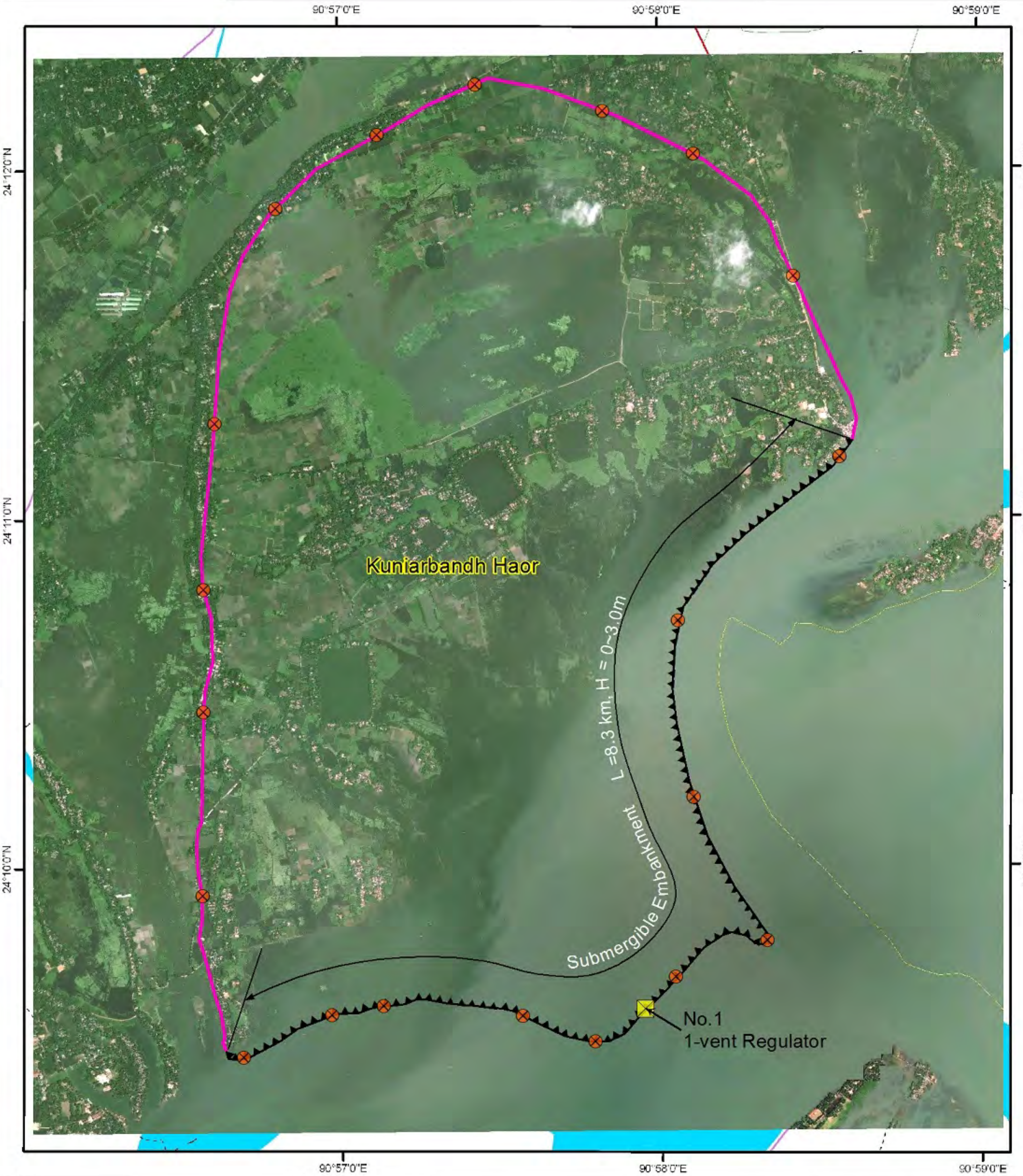
Government of The People's Republic of Bangladesh

Bangladesh Haor & Wetland Development Board

Master Plan of Haor Areas

Shelnir Haor Project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90°58'0"E
90°59'0"E
24°12'0"N
24°11'0"N
24°10'0"N
Kuniarbandh Haor
L =8.3 km, H = 0~3.0m
Submergible Embankment
No.1
1-vent Regulator

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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

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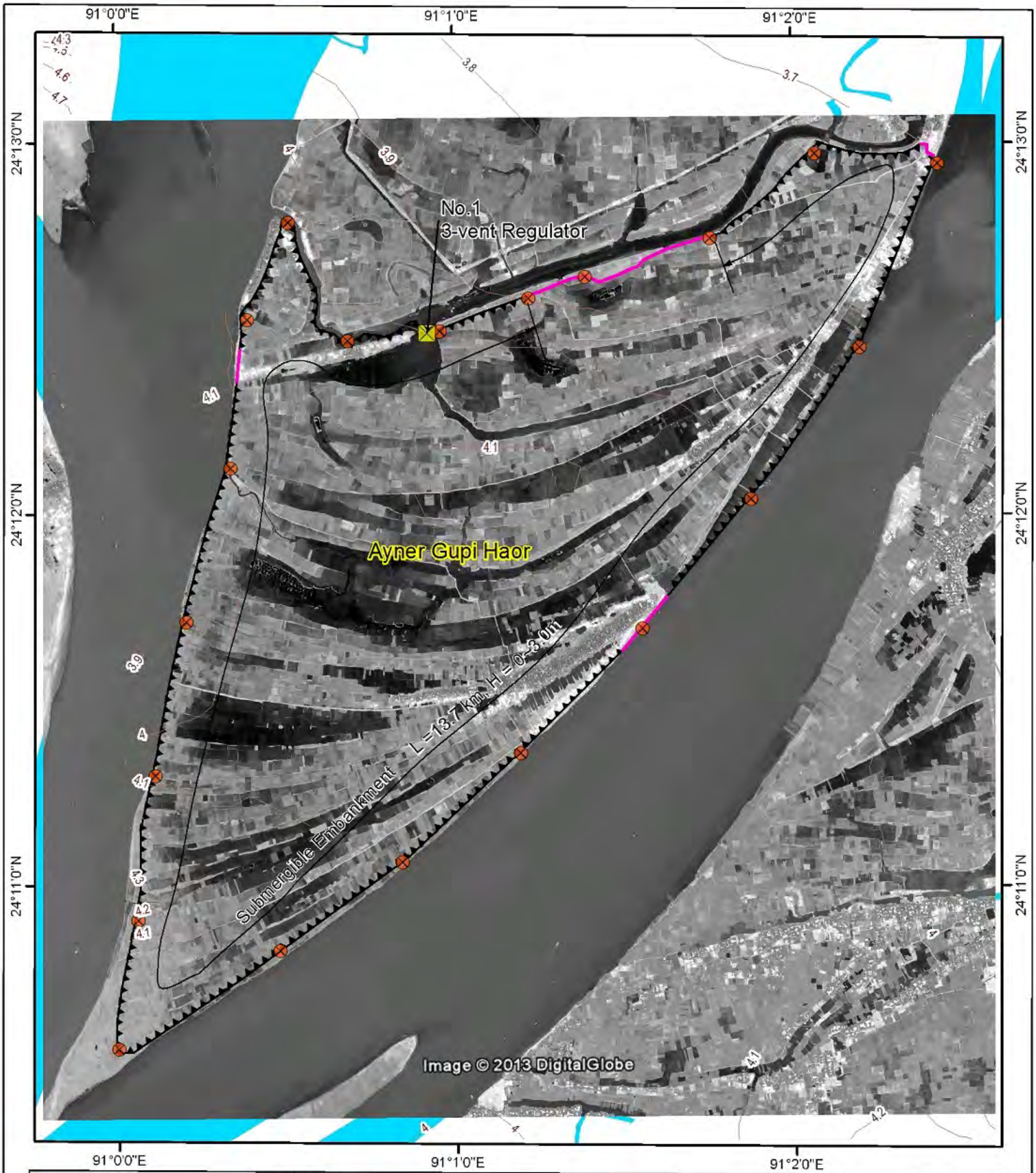
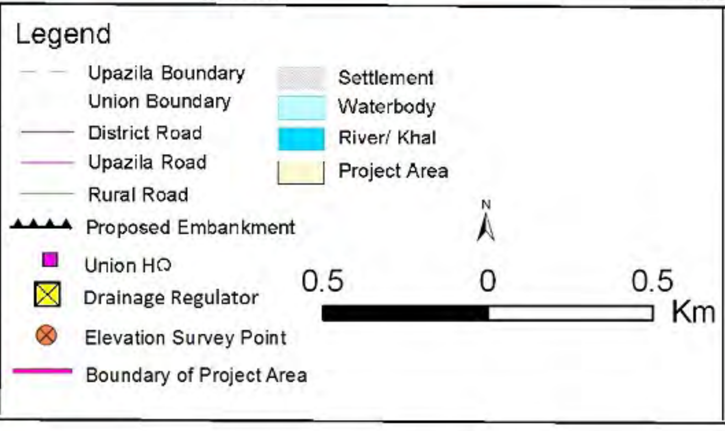

91°0'0"E
91°1'0"E
91°2'0"E
24°13'0"N
24°12'0"N
24°11'0"N
4.3
4.5
4.6
4.7
3.8
3.7
3.9
4
No.1
3-vent Regulator
4.1
Ayner Gupi Haor
L = 13.7 km, H = 0-3.0m
Submergible Embankment
3.9
4
4.1
4.3
4.2
4.1
Image © 2013 DigitalGlobe
4.1
4
4
4.2

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

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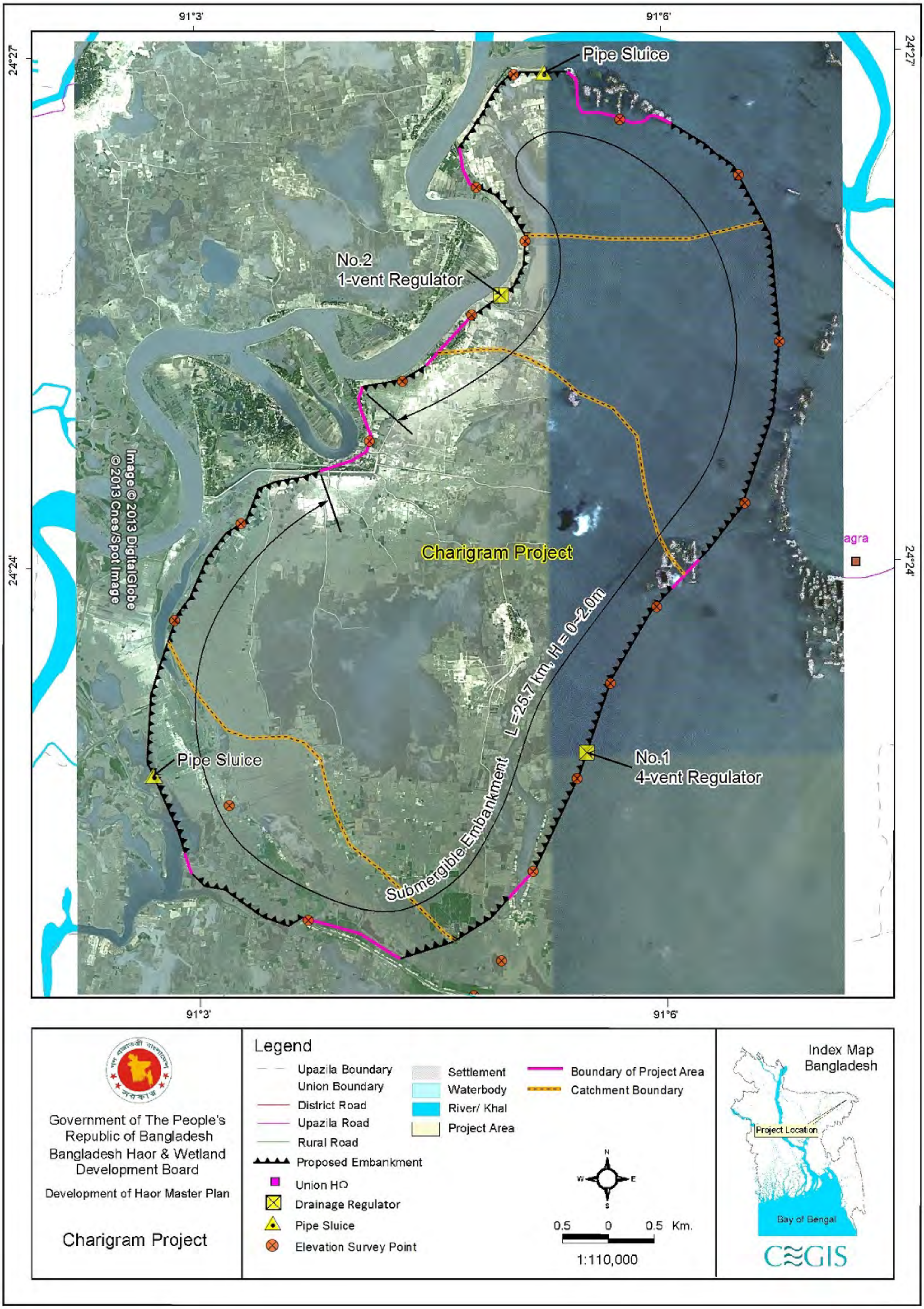
91°3'
91°6'
24°27'
24°24'
Pipe Sluice
No.2
1-vent Regulator
Image © 2013 DigitalGlobe
© 2013 Cnes/Spot Image
Charigram Project
L=25.7 km, H= 0-2.0m
Submergible Embankment
Pipe Sluice
No.1
4-vent Regulator
agra
Legend
Upazila Boundary
Union Boundary
District Road
Upazila Road
Rural Road
Proposed Embankment
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.
1:110,000
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Bangladesh
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Bay of Bengal
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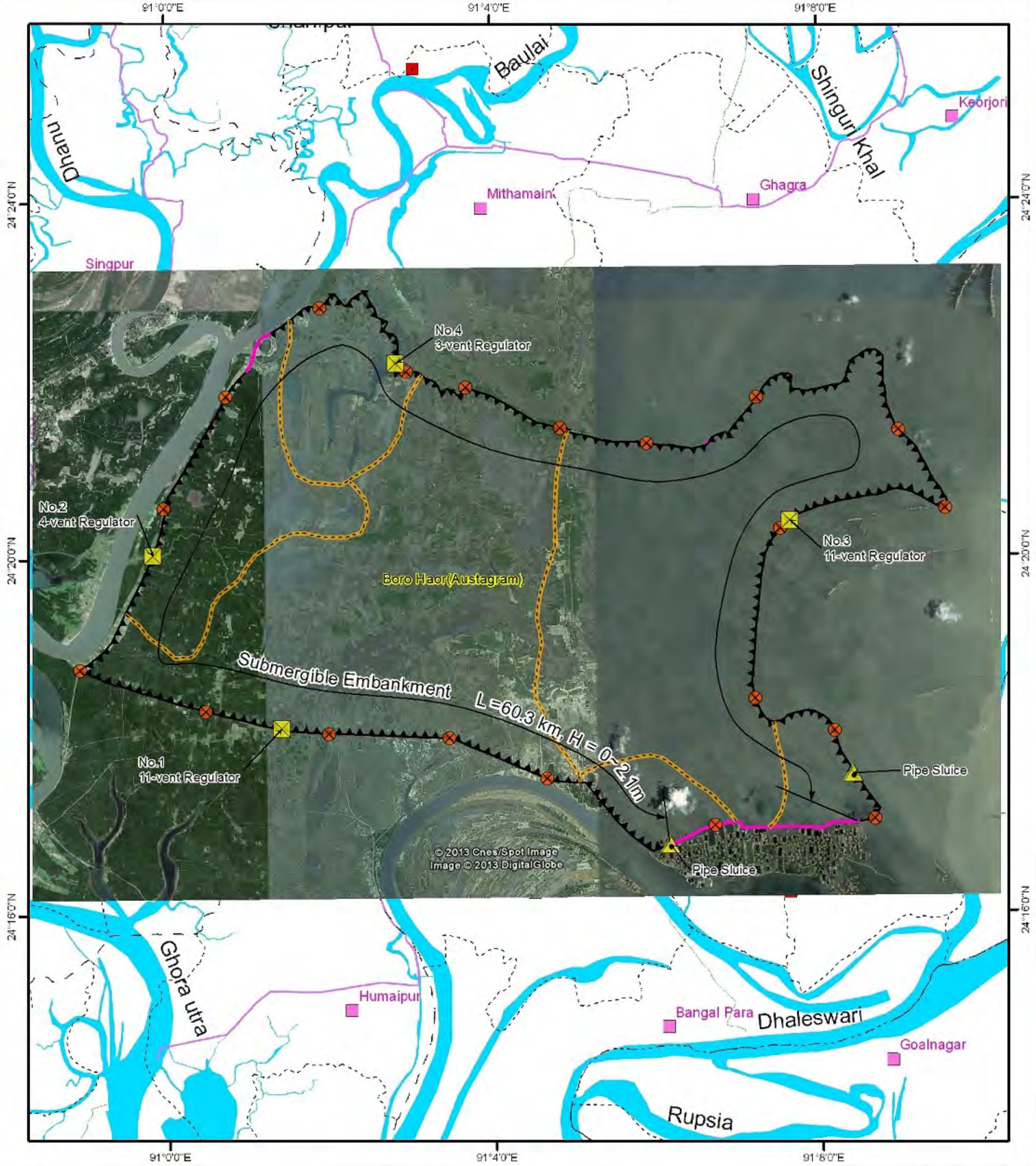
Republic of Bangladesh
Bangladesh Haor & Wetland
Development Board

Development of Haor Master Plan

Charigram Project


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
Shinguri 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
N
2 0 2
Km

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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

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Bangladesh

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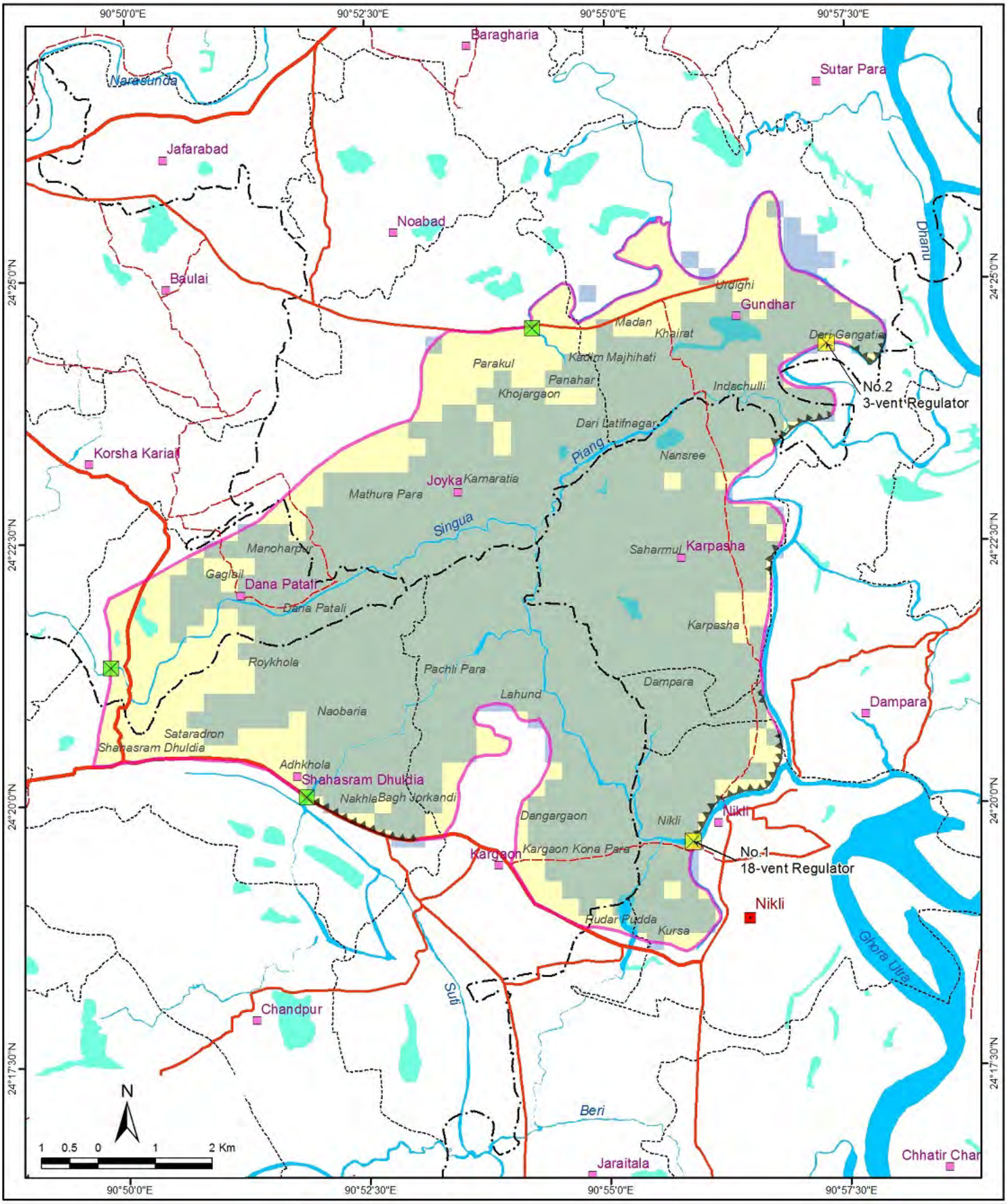
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90°52'30"E
90°55'0"E
90°57'30"E
24°25'0"N
24°22'30"N
24°20'0"N
24°17'30"N
Baragharia
Narasunda
Sutar Para
Jafarabad
Noabad
Dhanu
Baulai
Urdighi
Gundhar
Madan
Khairat
Dari Gangatia
Kadim Majhihati
Parakul
Panahar
Khojargaon
Indachulli
No.2
3-vent Regulator
Dari Latifnagar
Korsha Kariail
Piang
Nansree
Joyka
Kamaratia
Mathura Para
Singua
Manoharpur
Saharmul
Karpasha
Gaglail
Dana Patali
Dana Patali
Karpasha
Roykhola
Pachli Para
Dampara
Lahund
Dampara
Naobaria
Sataradron
Shahasram Dhuldia
Adhkhola
Shahasram Dhuldia
Nakhla
Bagh Jorkandi
Dangargaon
Nikli
Nikli
No.1
18-vent Regulator
Kargaon
Kargaon Kona Para
Nikli
Rudar Pudda
Kursa
Ghora Utra
Suti
Chandpur
N
1 0.5 0 1 2 Km
Beri
Jaraitala
Chhatir Char

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

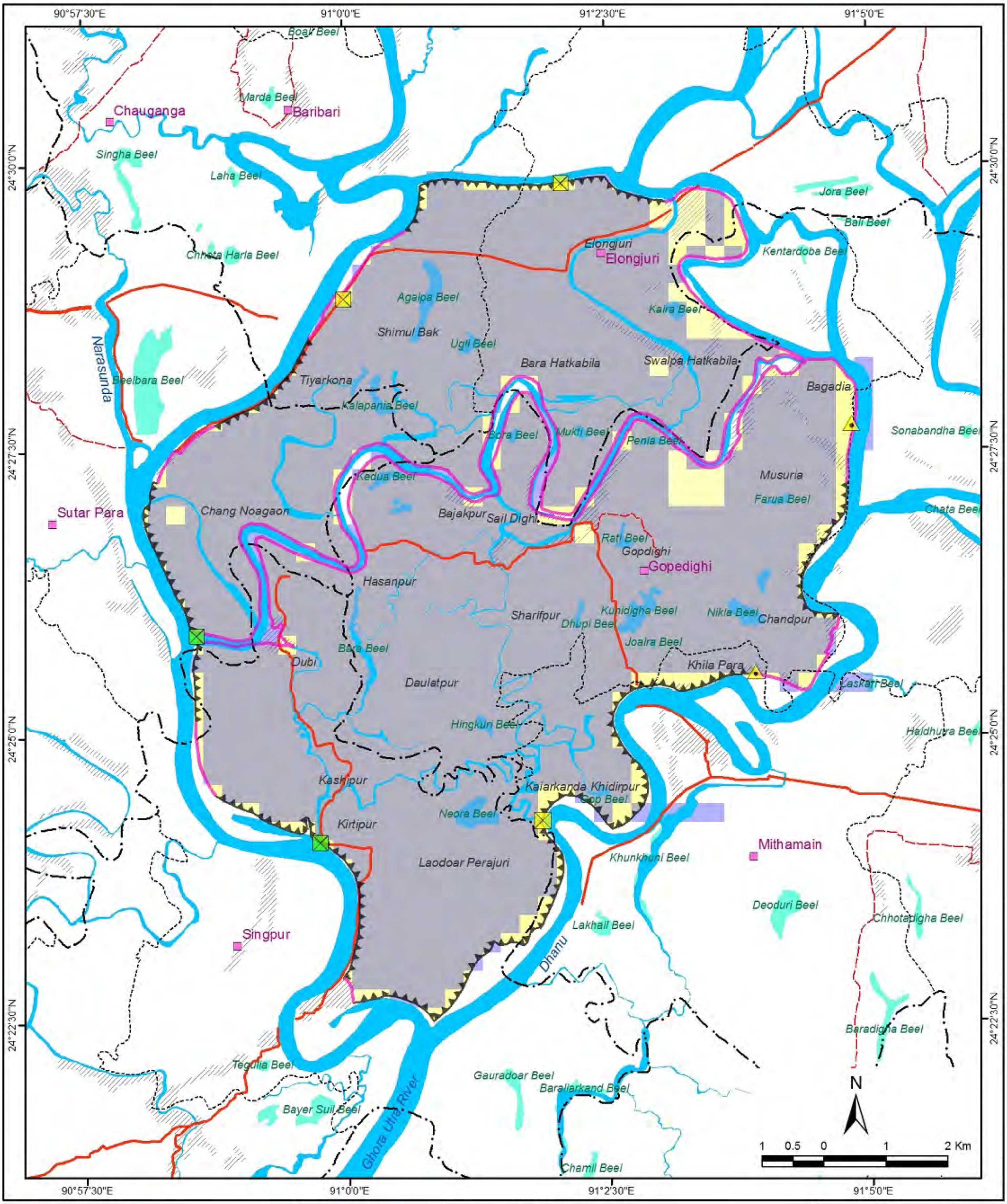
Boro Haor (Nikli) Scheme

Legend

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

Index Map

Project Area
Bay of Bengal


90°57'30"E
91°0'0"E
91°2'30"E
91°5'0"E
24°30'0"N
24°27'30"N
24°25'0"N
24°22'30"N
Boal Beel
Marda Beel
Chauganga
Baribari
Singha Beel
Laha Beel
Chhota Harla Beel
Narasunda
Beelbara Beel
Sutar Para
Jora Beel
Bali Beel
Kentardoba Beel
Elongjuri
Elongjuri
Agalpa Beel
Shimul Bak
Ugli Beel
Kaira Beel
Bara Hatkabila
Swalpa Hatkabila
Bagadia
Tiyarkona
Kalapania Beel
Bora Beel
Mukti Beel
Penla Beel
Sonabandha Beel
Kedua Beel
Musuria
Farua Beel
Chang Noagaon
Bajakpur
Sail Dighi
Chata Beel
Rati Beel
Gopdighi
Gopedighi
Hasanpur
Sharifpur
Kunidigha Beel
Dhupi Beel
Nikla Beel
Chandpur
Bara Beel
Joaira Beel
Dubi
Khila Para
Daulatpur
Laskari Beel
Hingkuri Beel
Haldhura Beel
Kashipur
Kaiarkanda Khidirpur
Gop Beel
Neora Beel
Kirtipur
Khunkhuni Beel
Mithamain
Laodoar Perajuri
Deoduri Beel
Singpur
Lakhail Beel
Chhotadigha Beel
Dhanu
Baradigha Beel
Tegulia Beel
Gauradoar Beel
Baraliarkand Beel
Bayer Suil Beel
Ghora Utra River
Chamil Beel
N
1 0.5 0 1 2 Km
90°57'30"E
91°0'0"E
91°2'30"E
91°5'0"E

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

Naogaon Haor Scheme

Legend

- Upazila Boundary
- Union Boundary
- Upazila Road
- Union Road
- Rural Road
- Project Boundary
- Proposed Embankment
- ■ Union H/Q
- ☒ Drainage Regulator
- ☒ Flushing Regulator
- ▲ Pipe Sluice
- ▨ Settlement
- ▬ River / Khal
- ▬ Water body
- ▬ Inundated area (DWL = 5.0 m+PWD)

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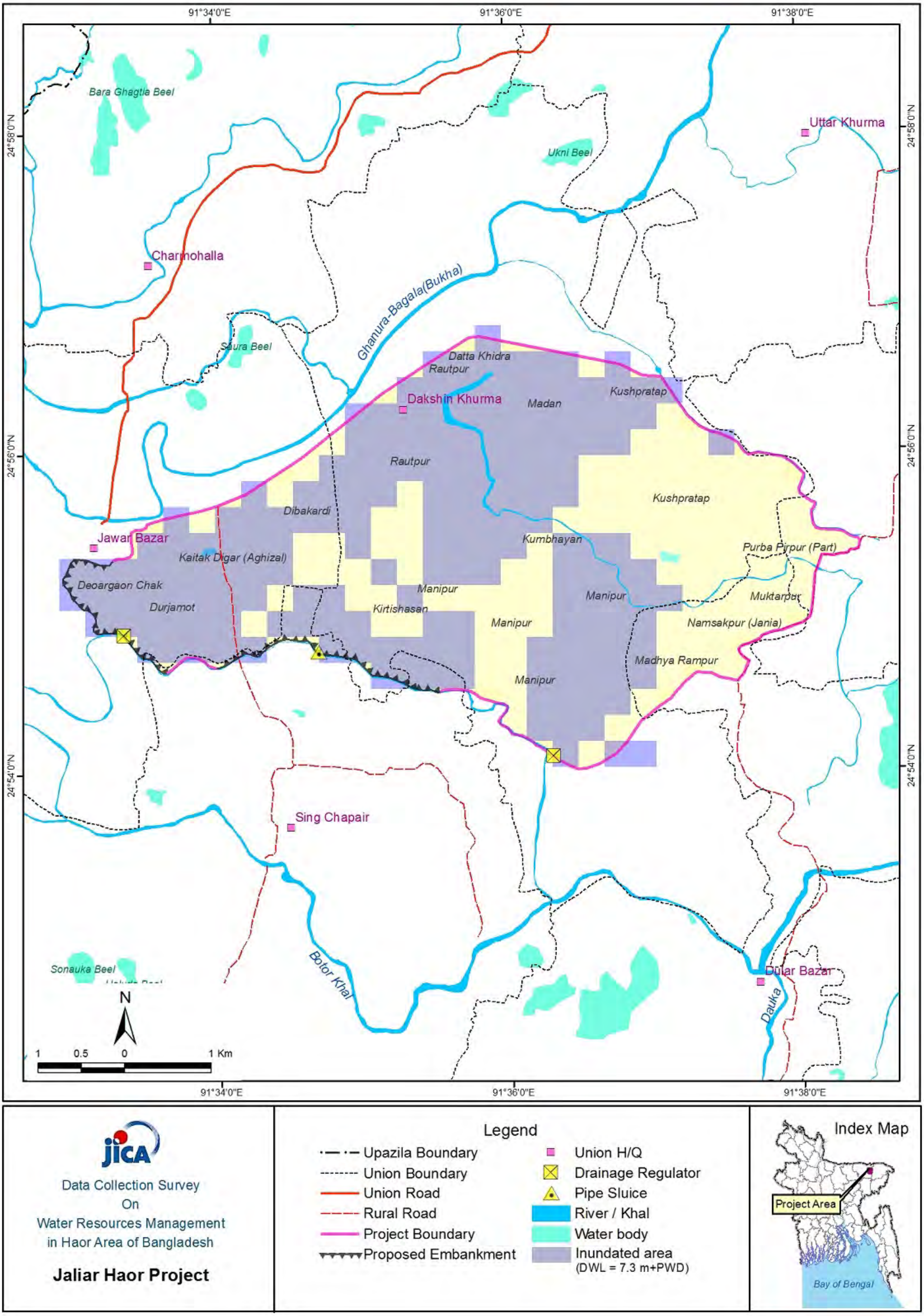

Data Collection Survey
On
Water Resources Management
in Haor Area of Bangladesh

Jaliar Haor Project

91°34'0"E
91°36'0"E
91°38'0"E
24°58'0"N
24°56'0"N
24°54'0"N
Bara Ghagtia Beel
Ukni Beel
Uttar Khurma
Charmohalla
Ghanura-Bagala(Bukha)
Saura Beel
Datta Khidra
Rautpur
Dakshin Khurma
Madan
Kushpratap
Rautpur
Kushpratap
Dibakardi
Jawar Bazar
Kaitak Digar (Aghizal)
Kumbhayan
Purba Pirpur (Part)
Deoargaon Chak
Durjamot
Manipur
Kirtishasan
Manipur
Muktarpur
Manipur
Namsakpur (Jania)
Madhya Rampur
Manipur
Sing Chapair
Sonauka Beel
Botor Khal
Dular Bazar
Dauka
N
1 0.5 0 1 Km
jica
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)
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