Annex-7.6.1: Analysis Sheets of Surface Water Quality

Analysis Sheet of River water of Dakatia River,Chandpur.

Sample Location	Date	Temperature ^{0}C	PH	EC .µS/cm	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BOD mg/1	COD mg/1	Salinity %	Note
Dakatia River Side,Notun Bazar, Chandpur	14/07/07	30.5	7.1	132	11	66	67	5.2	04	1	-	-
Dakatia River Middle,Notun bazar,Chandpur		30.6	7.0	126	10	63	41	5.6	0.3	1	-	-
Standard as per ECR 1997 in Bangladesh.		40	6.5-8.5	1200	150-600	2100	100	4.5-8.5	50	200	-	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Sangu River, Under Toylardip Bridge, Bashkhali, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Sangu River, Under Toylardip Bridge, Baskhali, Chittagong	15/08/08	30.1	7.32	23	98	2.39	5.4	0.4	0	0.02	3.1	0.0	-
Standard as per ECR 1997 in Bangladesh		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Canal (Khal), Raozan Side, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	**BODs mg/1**	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Canal Water under Bridge Gohira, Raozan	24/10/10	30.5	7.22	09	76	11	5.3	0.3	0	0.02	2.5	0.0	-
Standard as per ECR 1997 in Bangladesh		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Canal (Khal) water Beside Mohamaya Chara Irregation Project,Mirarsharai, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Surface water of Canel (Khal), Mirarsharai, Ctg.	16/02/07	24.0	7.61	112	251	32	5.4	0.4	0	0.26	3.0	0.0	-
Standard as per ECR 1997 in Bangladesh		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Canal (Khal), Laksam, Comilla

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Canal (Khal)Beside NoakhaliRoad, Laksam,Comilla	20/05/06	30.2	7.24	41	116	35	5.2	0.5	0	0.07	2.8	0.0	-
Standard as per ECR 1997 in Bangladesh		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Karnafully River Water Beside Char Khldirpur, Boalkhali, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Karnafully River water Char Khidirpur,Boalkhali Side,Ctg.	11/06/10	30.5	7.62	1254	2710	179	5.5	0.4	135	2.26	4.0	0.0	Jhoar
Karnafully River water Charkhidirpur, Boalkhali Side,Ctg.	11/06/10	31.1	7.21	36	154	153	5.3	0.5	31	0.06	3.5	0.0	Vata
Standard Limit		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Pond & Surface water of Shahid Nagar, Daudkandi,Comilla.

Sample Location	Date	Temperature ^{0} C	PH	EC µ S./cm	Chloride mg/1	TDS mg/1	SS mg/1	DOmg/1	BOD mg/1	COD mg/1	Salinity %	Note
Water Body Beside Daudkandi Bus Stand Comilla.	13/07/10	30.0	7.12	122	7	56	09	5.0	0.5	1	-	-
Standard Limit		40	6.5-8.5	1200	150-600	2100	100	4.5-8.5	50	200	-	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Feni River,Feni.

Sample Location	Date	Temperature ^{0} C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Feni River Under Bridge.Bishow Road,Feni.	16/06/07	30.0	7.24	19	86	213	5.5	0.3	0	0.01	3.2	0.0	-
Standard Limit		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Pond, Fotickchori, Chittagong.

Sample Location	Date	Temperature ^{0} C	PH	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	BODs mg/1	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Pond water of Paharica Farm Ltd. Nannupur,Fotickchari, Chittagong	13/08/11	31.0	7.14	15	114	23	5.2	0.5	0	0.03	2.2	0.0	-
Standard Limit		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Waste Water of. Shikalbaha Khal Potiya, in Chittagong.

Sample Location	Date	Temperature ^{0}C	P^H	EC µ S./cm	Chloride mg/1	TDS mg/1	SS mg/1	**DOmg/1**	BOD_5 mg/1	COD mg/1	Salinity %	Note
Waste Water of Middie, Shikalbaha Khal, Potiya, Chittagong.	11/07/09	29.7	7.6	154	21	87	63	5.4	0.3	03	0.03	-
Standard Limit		40	6.5-8.5	1200	150-600	2100	100	4.5-8.5	50	200	-	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Surface water of Karnafully River Water at CUFL,Side Anowara,Chittagong.

Sample Location	Date	Temperature ^{0}C	P^H	Chloride mg/1	TDS mg/1	SS mg/1	DO mg/1	**BODs mg/1**	COD mg/1	Salinity %	Oil & Grease mg/1	Arsenic mg/1	Note
Karnafully River water CUFL Side, Anowara, Ctg..	11/07/09	31.0	7.8	10890	18540	357	5.4	0.5	467	19.60	5.5	0.0	Jhoar
Karnafully River water CUFL Side, Anowara, Ctg..	11/07/09	31.4	7.34	1246	2614	315	5.2	0.6	139	2.24	4.1	0.0	Vata
Standard Limit		40	6.5-8.5	150-600	2100	100	4.5-8.5	50	200				

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Annex-7.6.2: Analysis Sheets of Ground Water Quality

Analysis sheet of Deep Tubewell water, Chandpur City Area.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^{5}	COD mgl1	Note
Deep Tubewell of Mohammadia Jame Mosque Puran Bazar, Chandpur	07/04/10	30.0	8.0	1284	4175	03	0.18	2.2	0	2.31	3.7	0.3	1	-
Deep Tubewell of Hotel Taj, Mukti Sharoni Road, Chandpur	07/04/10	30.1	7.8	371	1208	02	0.10	1.6	0	0.67	4.0	0.3	0	-
Standard as per ECR 1997 in Bangladesh.		40	6.5-8.5	150-600	Below 1000	Below 10	Below 0.05	Below1.0	Below 200	-	4.5-8.5	Below 02	Below 04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Analyisis Sheet of Deep Tubewell Water of Bashkhali, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^{5}	COD mgl1	Note
Deep Tubewell of Jioldi Bazar Area Bashkhali, Chittagong	16/03/06	27.2	6.7	113	277	02	0.03	2.6	0	0.21	3.6	0.4	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Analyisis Sheet of Deep Tubewell Water of Raozan, Chittagong.

Sample Location	Date	Temperature ^{0} C	P^H	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %q	DO	BOD^5	COD mgl1	Note
Deep Tubewell of Gohira Bazar, Raozan Chittagong	12/07/13`	29.3	6.7	77	152	02	0.0	0.32	0	0.13	3.8	0.4	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet Deep Tubewell Mirsharai,Chittagong.

Sample Location	Date	Temperature ^{0} C	P^H	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^5 mgl1	COD mgl1	Note
Deep Tubewell Water Mosque of Sona Pahar Area, Mirsharai,Chittagong	16/02/10`	28.3	7.56	302	457	04	0.04	3.1	0	0.54	3.7	0.2	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Deep Tubewell Water of Laksam, Comilla.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^5 mg/1	COD mg/1	Note
Deep Tubewell Beside Railway Station, Laksam, Comilla.	14/07/12`	29.2	7.34	73	169	02	0.02	0.56	0	0.13	4.0	0.1	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Analyisis Sheet of Deep Tubewell Water of Char Khidirpur, Boalkhali,Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^5 mg/1	COD mg/1	Note
Deep Tubewell of Char khidirpur,Boalkhali,Chittagong.	12/07/10	29.5	6.9	92	214	01	0.0	0.23	0	0.08	4.0	0.2	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Deep Tubewell Water of Shahid Nagar, Daudkandi,Comilla.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD_5 mg/1	COD mg/1	Note
Goripore Bazar area.Daudkandi, Comilla.	20/05/09	29.4	7.62	86	263	03	0.03	1.52	0	0.14	3.6	0.3	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Analyisis Sheet of Deep Tubewell Water of Feni Sadar Feni.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD_5 mg/1	COD mg/1	Note
Deep Tubewell of Mohipal Zame Mosque, Feni.	30/07/09	28.5	6.94	153	307	02	0.03	0.95	0	0.24	3.8	0.2	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Analyisis Sheet of Deep Tubewell Water of Fotickchori, Chittagong

Sample Location	Date	Temperature ^{0}C	P^{H}	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^{5} mg/1	COD mg/1	Note
Deep Tubewell of Nannupur, Fotickchari, Chittagong..	13/08/11	29.1	6.82	63	138	01	0.0	0.27	0	0.12	3.8	0.4	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Deep Tubewell Water of Potiya, Chittagong.

Sample Location	Date	Temperature ^{0}C	P^{H}	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD^{5} mg/1	COD mg/1	Note
Deep Tubewell of Shatirhat,Potiya, Chittagong...	10/01/10	29.3	6.82	65	134	01	0.01	0.69	0	0.11	3.9	0.2	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Analyisis Sheet of Deep Tubewell Water of Anowara, Chittagong.

Sample Location	Date	Temperature ^{0}C	PH	Chloride mg/1	TDS mg/1	SS mg/1	Arsenic mg/1	Fe mg/1	Coli Form n/100 ml	Salinity %	DO	BOD_5 mg/1	COD mg/1	Note
Deep Tubewell water Beside Korean EPZ. Dangerchar, Anowara, Ctg	20/11/11	29.2	6.83	2564	720	1282	04	0.06	0.92	0	3.8	0.2	0	-
Standard Limit		40	6.5-8.5	150-600	1000	10	0.05	1.0	200	-	4.5-8.5	02	04	-

Source : BUET, CUET, Environmental Science (CU), DU and BCSIR

Annex-7.8.1: Report on Survey of Flora and Fauna

PREPARATORY SURVEY ON DHAKA-CHITTAGONG MAIN POWER GRID STRENGTHENING PROJECT



FINAL REPORT

ON

Survey of Flora and Fauna along the route of 400kV Transmission Line from Meghnaghat to Matarbari via Modunaghat

(Rainy Season)

SUBMITTED BY

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September 22, 2014

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Report on Survey of Flora and Fauna along the Route of 400kV Transmission Line from Meghnaghat to Matarbari via Modunghat (Rainy Season)

1.0 Introduction

Given a steep increase in the power demand in Dhaka and surrounding area, the Power Grid Company of Bangladesh Limited (PGCB) is facing urgent needs to increase transmission capacity from power generation facilities located in Chittagong to Dhaka. For assessing the project viability of capacity enhancement of the power transmission capacities with high voltage and facility improvement of the National Load Dispatching Center (NLDC), the Government of Bangladesh (GOB) has agreed with Japan International Cooperation Agency (JICA) to jointly conduct a feasibility study on high voltage transmission line network between Dhaka and Chittagong and signed the minutes of meeting.

So, Japan International Cooperation Agency (JICA) has appointed Tokyo Electric Power Company Limited (TEPCO), hereafter "JICA Study Team" to conduct a preparatory survey on Dhaka-Chittagong main power grid strengthening project.

Bangladesh Power Development Board (BPDB) is planning to develop a (2x600) 1200 MW Thermal Power Projects based on imported coal each at Matarbari (Cox'sbazar).Power from the generation projects at Matarbari would be partly consumed at the nearby areas like Chittagong, while the major portion of the power would be brought to the capital city Dhaka. Power from Matrbari to Dhaka is envisaged to be transferred through Meghnaghat-Madunaghat-Matarbari 400kV high capacity transmission system.

BPDB is also envisaging to develop various high capacity generation projects in the Maheshkhali and Anowara area. Powers from these projects areenvisaged to be brought to Dhaka area through high capacity 400kV corridors. The proposed MeghnaghatMadunaghat-Matarbari 400kV line would be integrated with the future high capacity transmission system for evacuation of power from generation projects in the Maheshkhali & Anowara area to Dhaka.

Presently, environmental conservation is being given top priority worldwide. In Bangladesh also, for any new project, as well as plants under operation, it is mandatory to obtain environmental clearance from the Department of Environment (DoE), under Environment Conservation Act 1995, amended from time to time.

According to Bangladesh Environment Conservation Rules 1997 (ECR), the 400kV transmission line project falls under the "Red Category", so far as environmental impact is concerned. Initial Environment Examination (IEE) followed by Environmental Impact Assessment (EIA), including Environmental Management Plan (EMP) are required for these types of installations for getting environmental clearance from DoE.

PGCB has initiated the environmental clearance from DoE and in the process, the company has already obtained IEE clearance from DoE. It is now required to obtain EIA clearance. TEPCO (JICA Study Team) has been engaged by JICA for such activities, for preparation of EIA.

In order to fulfill the requirements of DoE and also JICA, survey of flora and fauna along the proposed 400kV transmission line from Meghnaghat to Matarbari via Modunghat are being conducted in the rainy and dry season respectively. The present report contains the survey results of flora and fauna in the rainy season only.

2.0 Sampling Stations

In order to conduct the survey of flora and fauna, seven sampling stations have been selected along the proposed 400kV transmission line. The list of sampling stations are given in the **Table-2-1**

Table-2.1: List of Sampling Stations

Candidate Survey Site		Place		Environmental Conditions	
No.	Name	District	Upazilla	Natural Conditions	Social Conditions
1 (A, B, C)	Meghnaghat S/S, its surroundings.	Narayangonj Munshigonj	Sonergaon, Gozaria	-Reclaimed land with no natural vegetation -Waterfowls such as shore birds are habiting at Tidal mudflat adjacent to Reclaimed land	-A small village, Kaijjar Gao, with 100 population adjacent to planned T/L -NoLand acquisition required
2 (A, B)	Laksham East	Comilla	Laksham	-Small forest near planned T/L	-Paddy field, corn field and other vegetable field -No houses
3 (A, B)	Chittagong Hill Tracts	Chittagong	Mirsarai	-Designatedas “reserved forest” -Common Tropical evergreen/semi evergreen forest but almost all of these forests are not natural forests. -Teak and rubber trees are planted along road side passing through in forest. -Monkey, Wild Bear, Samvar, King cobra, Monitor Lizard inhabit	-National forest owned by Government
4 (A, B, C)	Madunaghat S/S,	Chittagong	Raujan	-Paddy field and Small forest adjacent to paddy field.	-Land acquisition required
5	Surroundings of existing Madunaghat S/S	Chittagong	Raujan	-Paddy field and Small forest adjacent to paddy field.	-No Land acquisition required

Candidate Survey Site		Place		Environmental Conditions	
6	Burumchhara （River's Surroundings）	Chittagong	Anwara	-Paddy field and Small forest adjacent to paddy field. -Some reptiles and amphibians are habiting -Waterfowls such as shore birds are habiting	-There are a few houses near planned T/L (Necessity of Land acquisition or resettlement is not clear so far)
7 (A, B)	East of Anowara PPH	Chittagong	Banshkali	-Some reptiles and amphibians are habiting -Waterfowls such as shore birds are habiting	-There are a few houses near planned T/L (Necessity of Land acquisition or resettlement is not clear so far)

A map of Bangladesh showing locations of sampling stations is given in **Figure-2-1.**

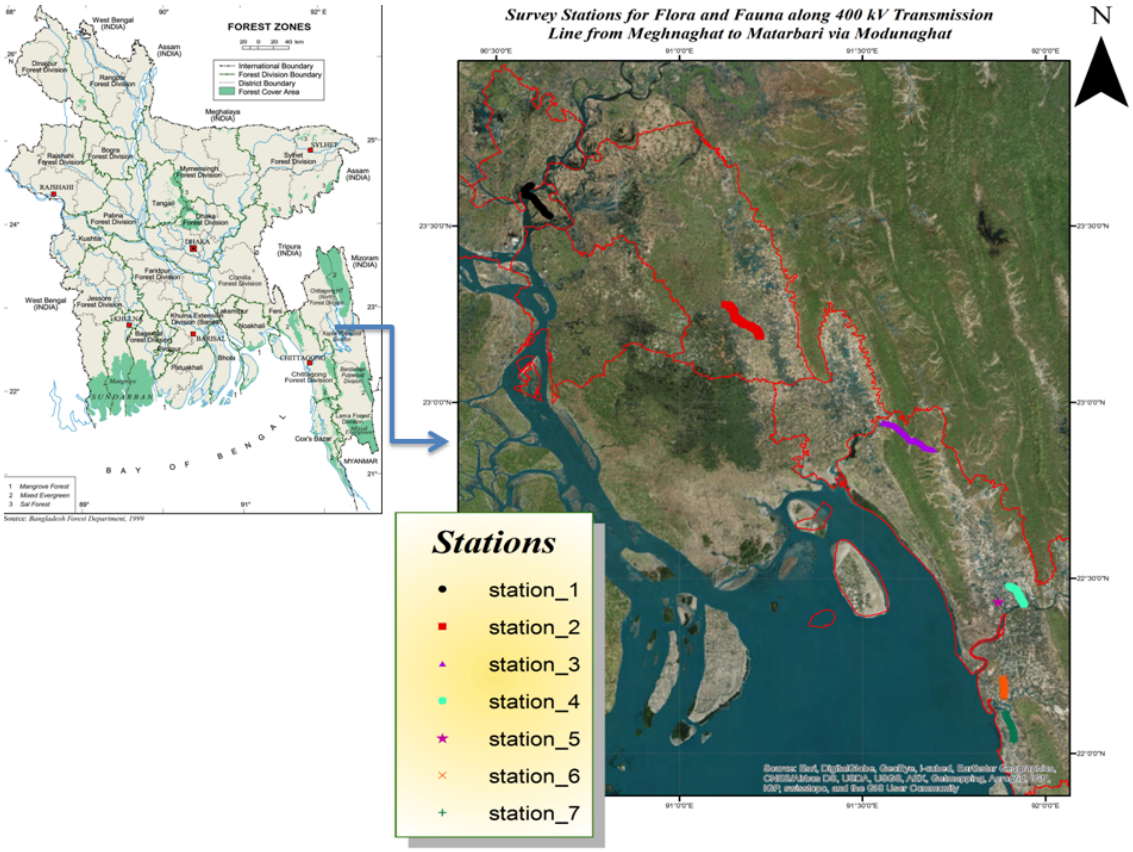

Figure-2-1 Map of Bangladesh showing location of sampling stations

Satellite images showing location of sampling stations are given below:

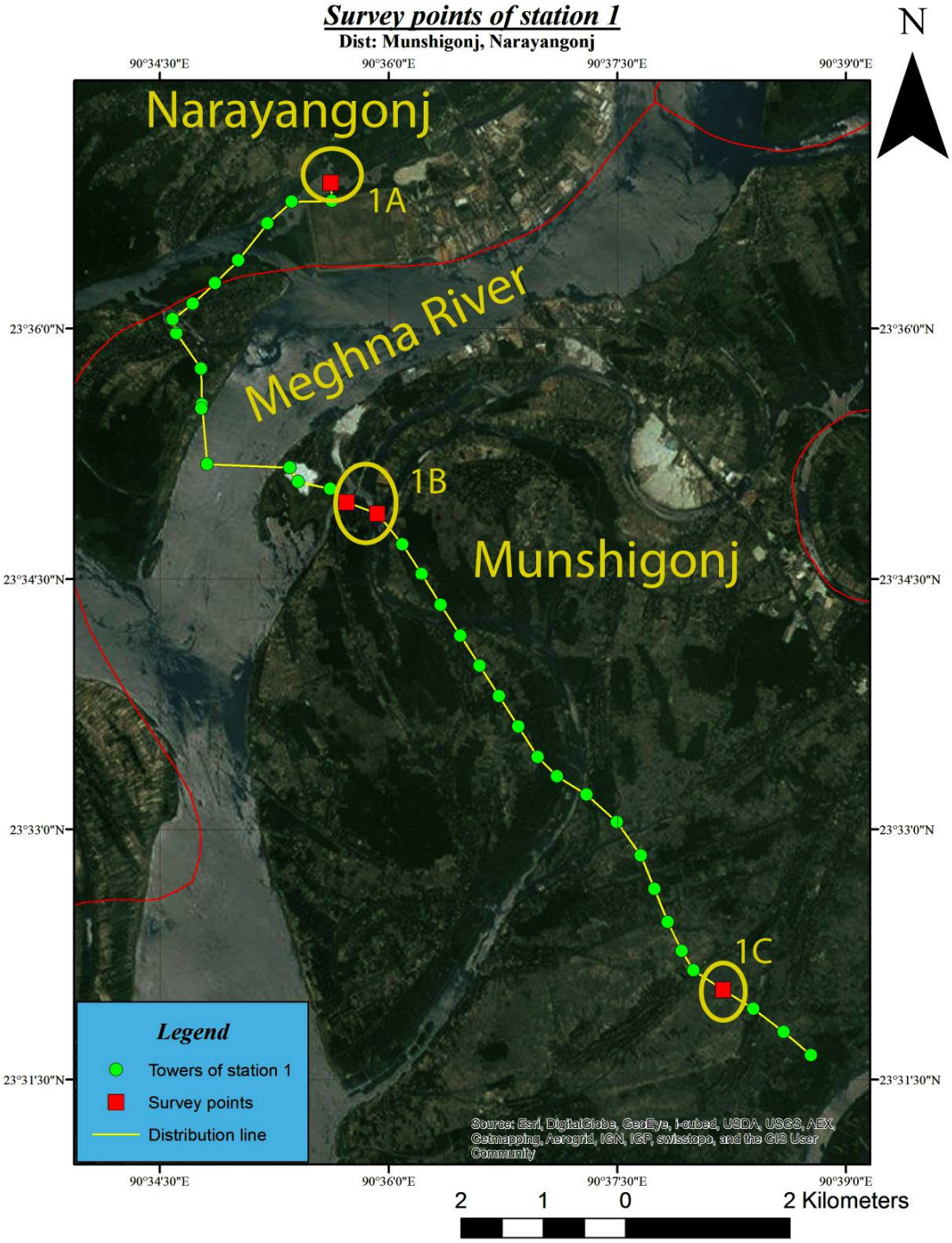

Figure 2.2 Map showing Survey Station-01 (1A, 1B, 1C)

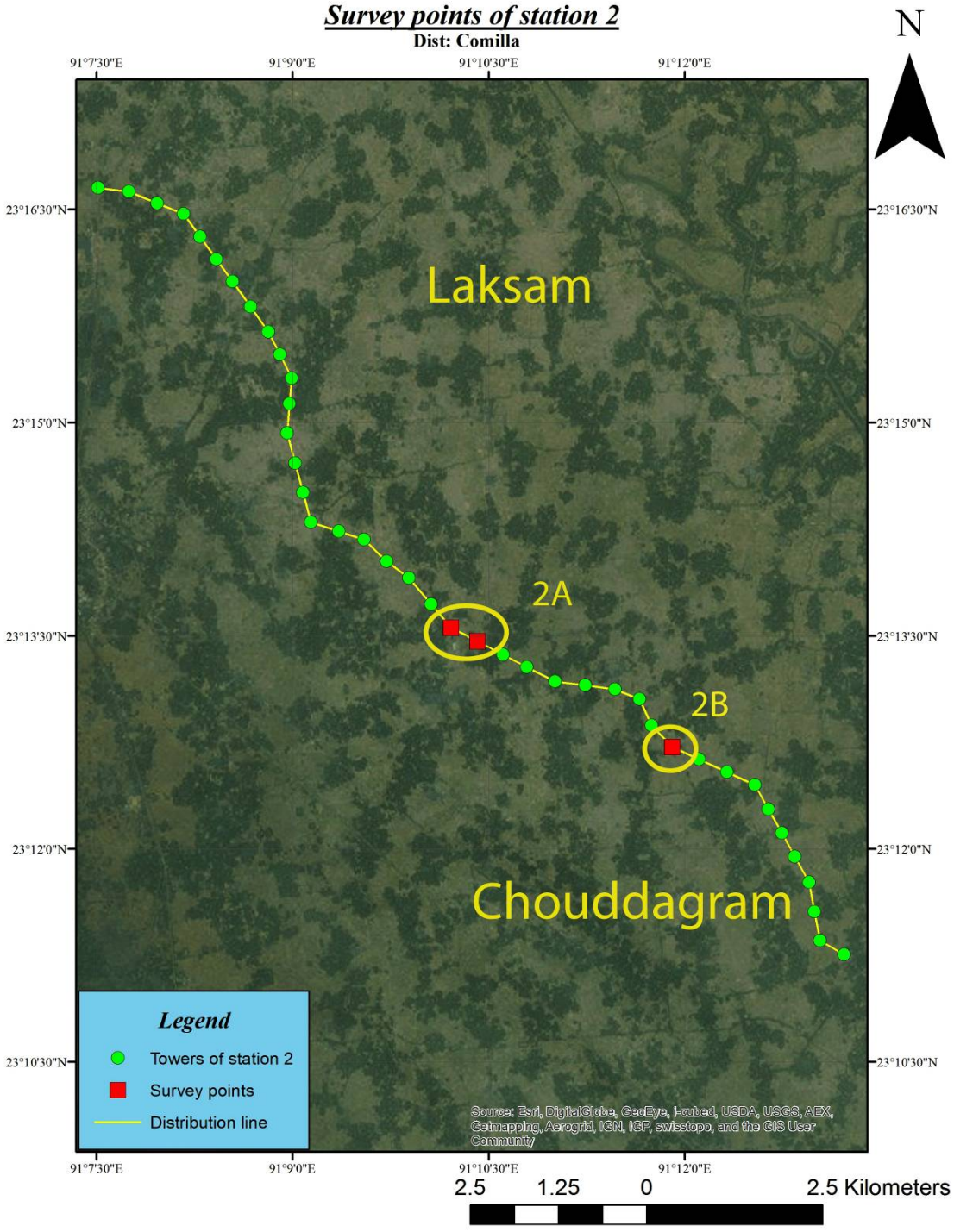

Figure 2.3 Map showing Survey Station-02 (2A, 2B)

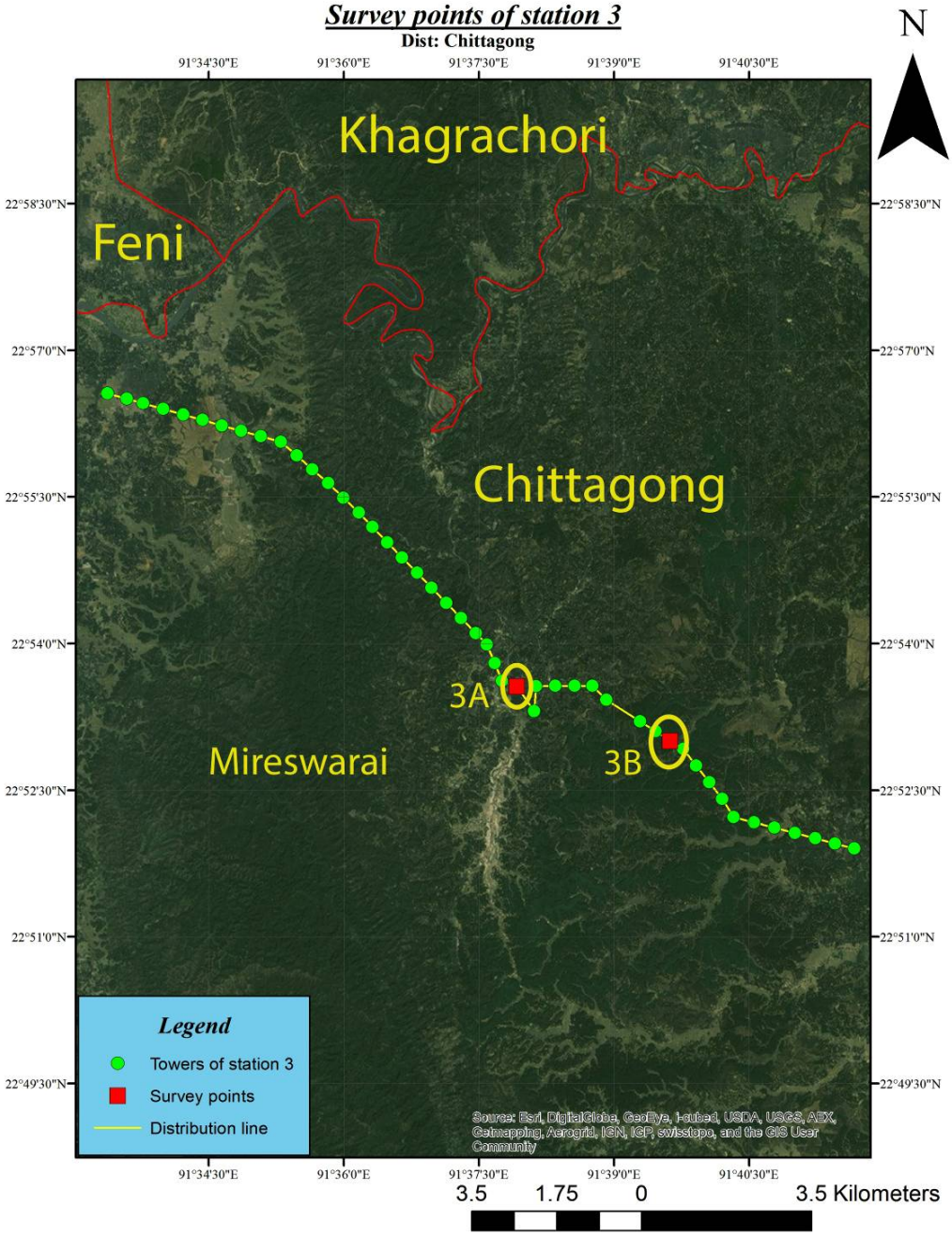

Figure 2.4 Map showing Survey Station-03 (3A, 3B)

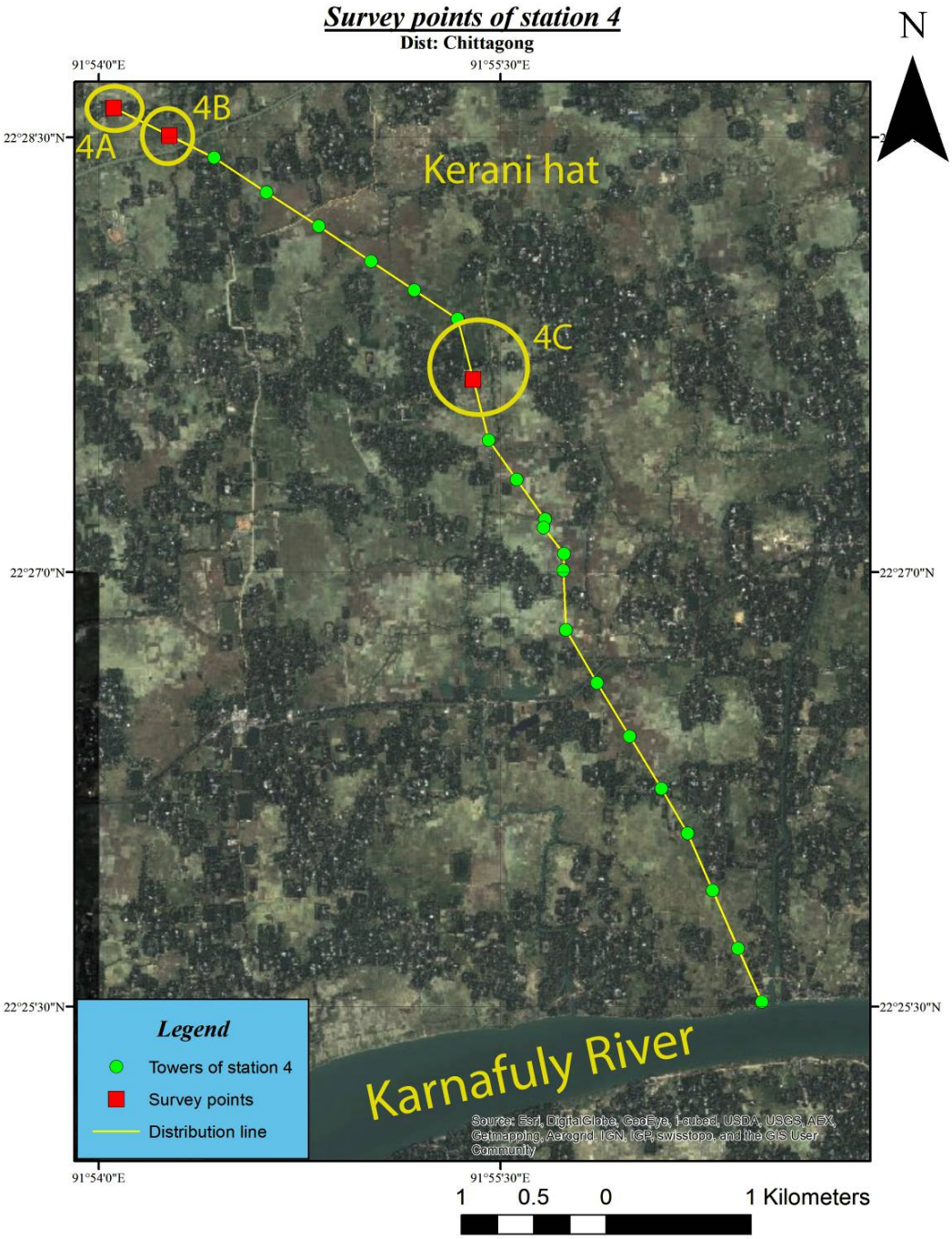

Figure 2.5 Map showing Survey Station-04 (4A, 4B, 4C)

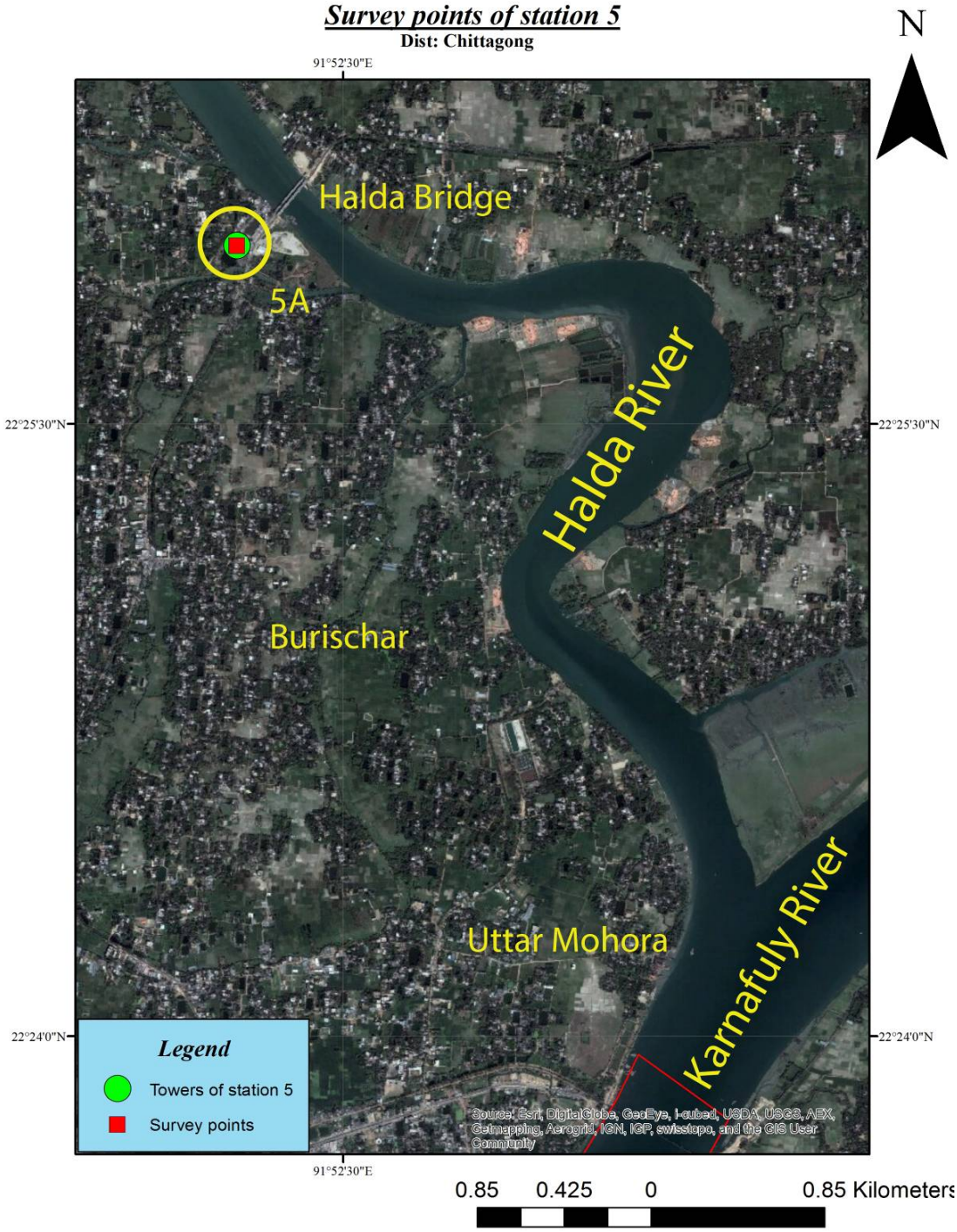

Figure 2.6 Map showing Survey Station-05

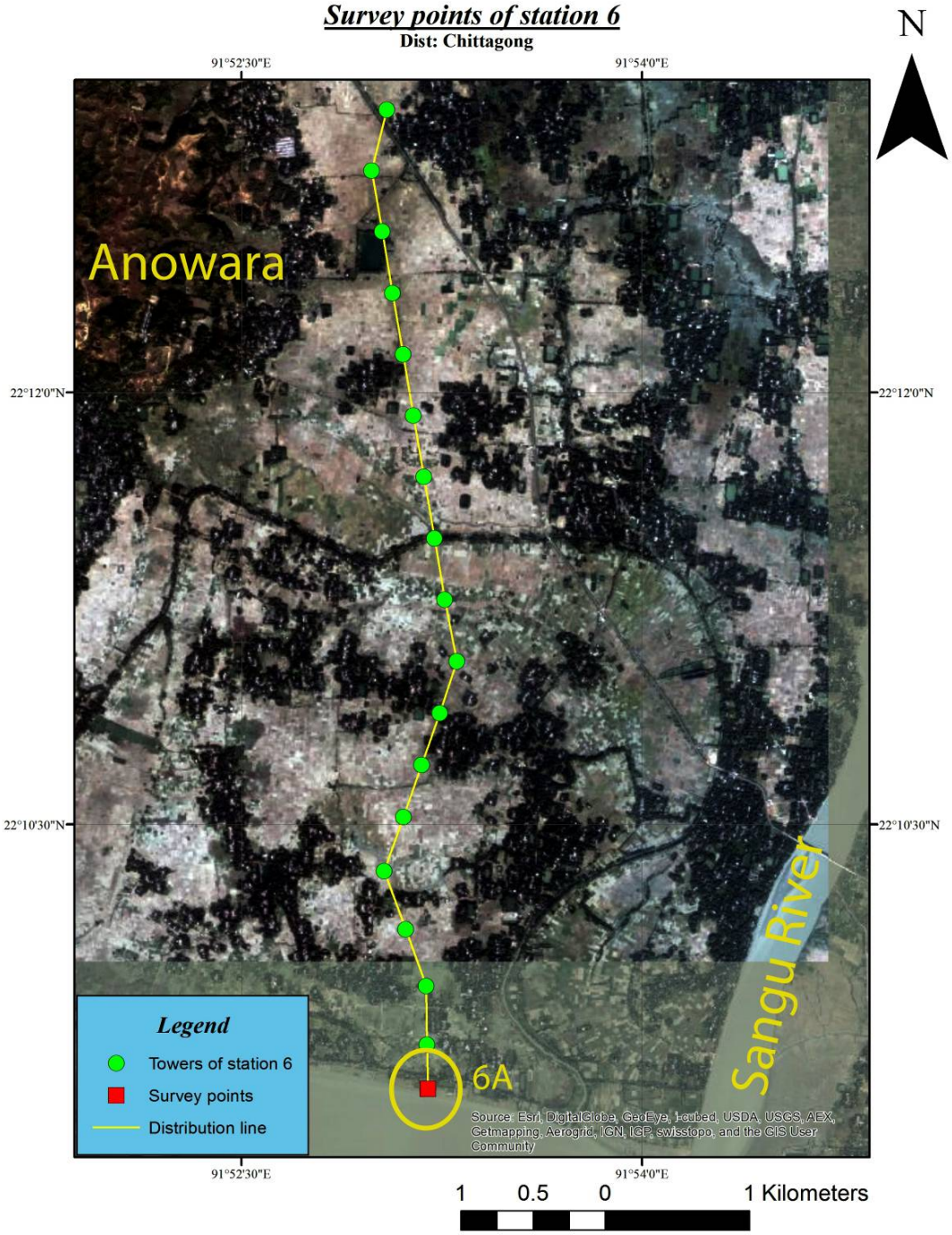

Figure 2.7 Map showing Survey Station-06 (6A)

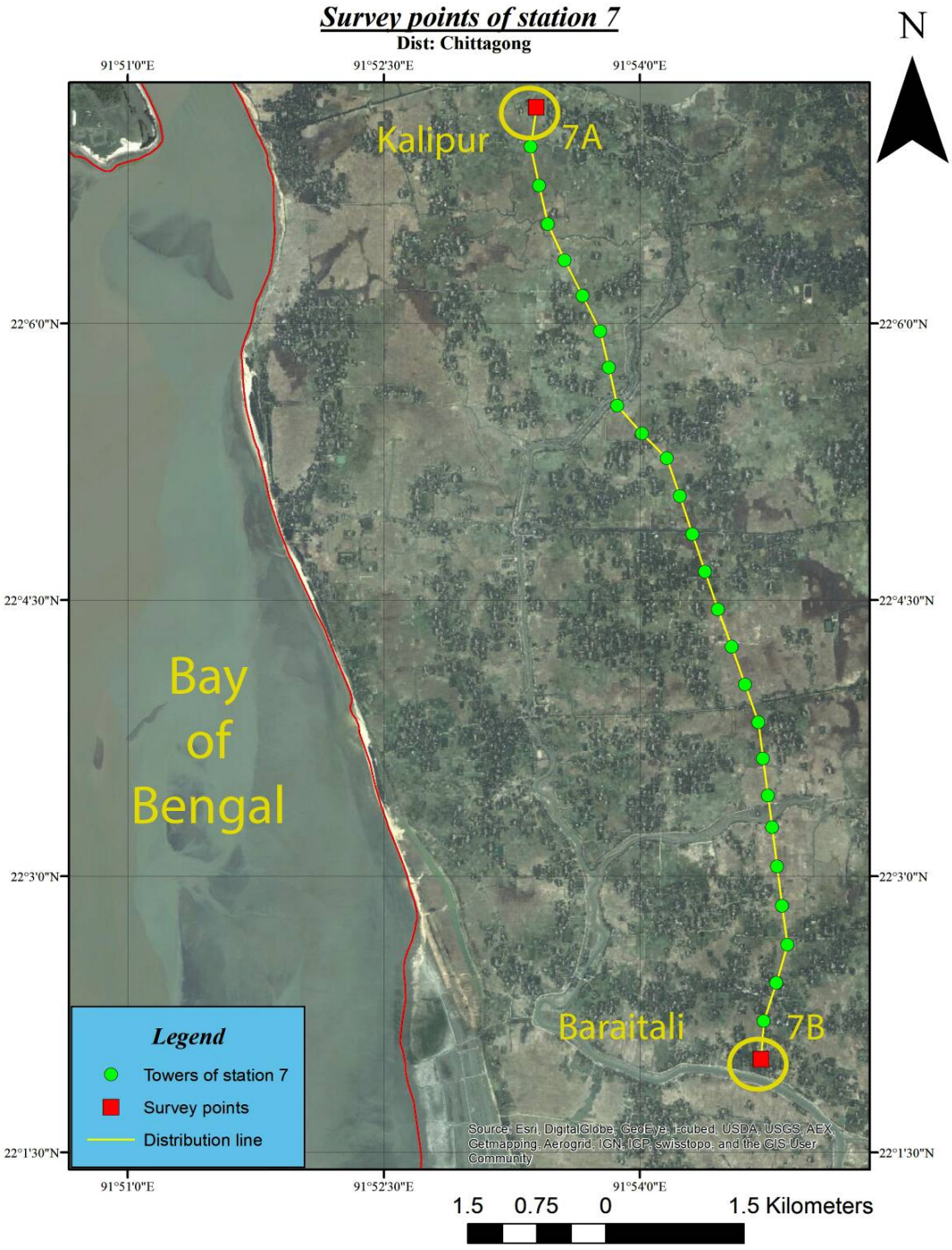

Figure 2.8 Map showing Survey Station-07 (7A, 7B)

3.0 Methodology

A list of fauna and flora (including rare, endangered, and protected species) potentially found in the project area has been prepared before field survey conducted. Broad survey or opportunistic survey has been employed to identify and

record fauna and flora in the project site and surrounding habitat.GPS has been used to record geographic coordinate and plotted to the map of it identified plots. In addition, interview to the local people has been done to gain information about species. Information concerning on rare, endangered, and protected species has been collected through analyses of various sources of scientific reports, interviews with beneficiaries, partner agencies (including international natural conservation organizations), project staff and local people.

Detailed survey methods on each Taxa is given below:

3.1 Flora

For vegetation assessment, broad survey and quadrate sampling has been used. Broad survey has been used to record species of plants in the area. Quadrate sampling has been used todetermine a vegetation profile and to estimate number of important tree* (with Diameter at BreastHigh or DBH more than 35 cm) that will be cut during the construction of facilities. The quadrate dimension used for tree(DBH ≥ 35 cm) is 20 m x 20 m, for pole (10 cm ≤ DBH < 35 cm) is 10 m x 10 m, for sapling(DBH < 10 cm) is 5 m x 5 m, and for seedling (height < 50 cm) and undergrowth (grasses, vines,herbs, shrubs, ferns species) is 1 m x 1 m **(Figure 3.1).** Individual plants have been identified to theircorresponding taxon (family, genus, and species). In term of vegetation analyze, the habitat type, stratum, biometric, and ecologyhas been assessed. Unidentified plant has been collected and brought to the laboratory of Botany at (University of Chittagong or research centers) forprocessing, verification, and authentication.

(*)=trees which are protected by Treaty or local Law

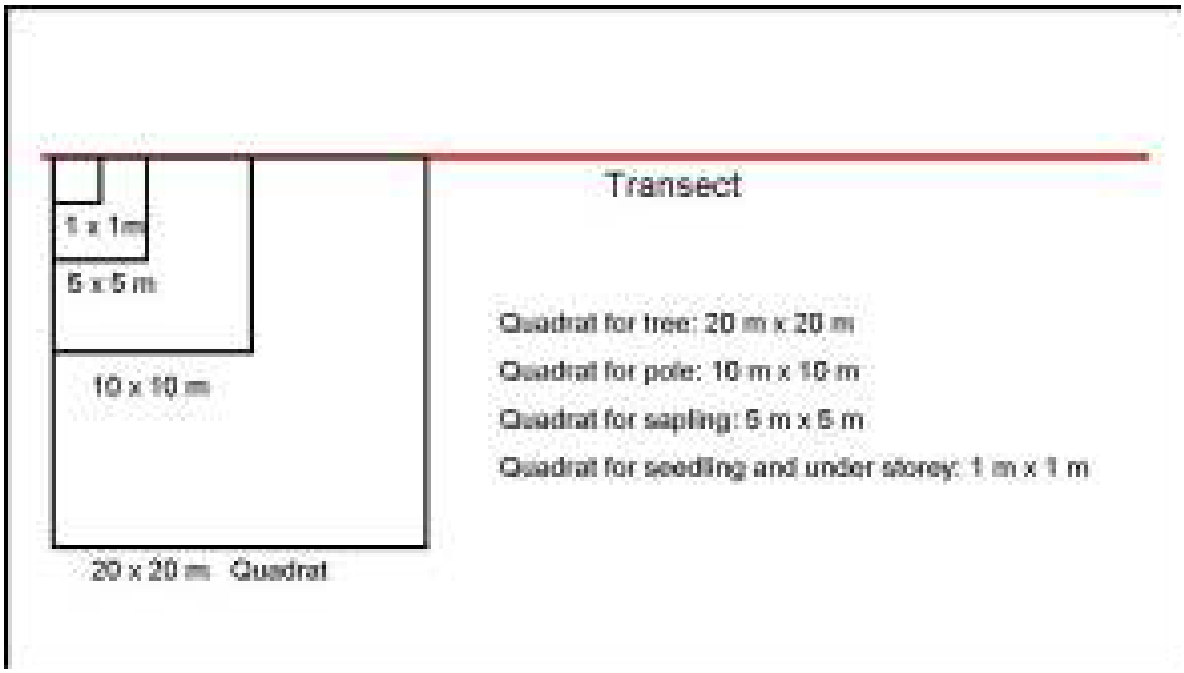

Figure-3.1: Size of Quadrat

3.2 Fauna

Species list were collected from various sources such as, Department of Agriculture, Fisheries, Forests and Environment and previous literatures for the specific survey location and their adjacent areas. The field survey of fauna was conducted by five groups of surveyor. These groups were as Insects group, Amphibian-Reptile-Turtles group, Migratory-Resident Bird group, Dolphin group, and Mammal group. Each group consists of two members; whose have previous experiences on related field and few more volunteers including local people. Then the survey teams have been sent to the identified areas to verify the list of fauna for addition or deletion of the species from the list. To enrich the survey and to get specific data of different animal groups different methods have been applied. GPS were used to record geographical coordinate. In addition interview to the local people were conducted to get information about species existence and its socio-economic-cultural utilization by the locals. Photographs of species were also taken as many as possible. A final list of fauna for each survey point has been prepared.

3.2.1. Insects

Insect survey was carried out in a manual of technique to monitor insects in selected zones. During the investigation, terrestrial insects especially pollinators (entomophilies) as well as environmental bio-indicators were major concerned. Collection by swept nets and hand picking of many adults were collected/ caught by general sweeping. The collections were preserved in the following way. All

specimens were kept in the Insect museum, Department of Zoology, University of Chittagong. Unidentified specimens were preserved for farther works. As no conservation status against Bangladesh insects were published, no comments were put down in the column.

a. Wet preservation: Fresh specimens were preserved in 80% alcohol. Few of those specimens were collected in 100% alcohol for DNA barcode. Separate vials and jars with data labels were used for different groups. They were placed in a cool and dark place.

b. Dry preservation: The collected adult specimens were carried to the laboratory in separate plastic jars or vials. In small size specimens, they were kept in 70% ethanol for 10 minutes and then transferred to 80% and kept for another 10 minutes. After removing from 80% ethanol 90% ethanol was put in the vial and kept for 10 mutes. Finally the specimens were put in 100% ethanol and kept them for at least 20 minutes then dried with HMDS by taking safety measurements. The specimens from 100% ethanol were straightaway transferred to HMDS. The procedure of transferring HMDS into the vials was done inside a bio-safety cabinet. This safety measure was taken because the HMDS has a carcinogenic effect. As the HMDS is highly volatile they evaporate very fast. The exhaust fan of the bio-safety cabinet sucks away the vapors evaporated from the vials and expel outside as fresh air. About after 24 hours these specimens were completely dry. Sundry and oven at 45 □C temperature were used for comparatively large specimens.

After drying, the insects were serially arranged in specially made paper or wooden insect boxes and were stored for Identification. To prevent pest insect and fungal attack, boxes were treated with aerosol spray. Naphthalene balls and paradichlorobcnzcnc were also kept inside the boxes as repellant. The specimens were mounted in a variety of ways depending on their size. Stainless steel, continental size pins with heads were used for all mounting methods. Direct pinning was followed for larger specimens such as ichneumonids and braconids. Larger specimens were directly pinned which only require minor rearrangement of wings, legs, antennae, etc. A small batch of specimens were transferred into fresh alcohol in a Petridis and agitated gently. Selected specimens were laid, a few, at a time on filter paper and allowed to become damp dry. Antennae, legs etc. were positioned to leave the space around the top of the pins and space for labels and pinned. Other specimens were glued to the pins, laid out a few in a row (each facing to the right) on filter paper and adjusted positions of legs, wings, etc. A small amount of glue (shellac) was transferred to a pin and a narrow band of glue completely encircles the

pin. The head of the pin was then rested on the filter paper above the specimen and the pin gently sprung down so that the glue adhere to the right hand side of the mesothorax. Indirect pinning for smaller specimens were pinned with stainless steel micro pin, triangular cards were used for agromyzid flies and smaller parasitoids, but for Chalcidoidea the cards of rectangular in size. The specimens were glued across the apex of a small narrow triangular card using a minimum amount of glue and with the glue under the thorax or mesothorax. The legs and wings were arranged to display any character they may possess. A continental pin was run through the centre of the base of the card triangle and pushed up the shaft of the pin. Data labels were prepared reasonably small neat and legible and logically arranged. Names of localities were abbreviated and in writing dates roman numerals were used for the month to avoid confusion. The dried specimens were checked under a dissecting binocular microscope for selection of the right specimen for card mounting. Small card points and minute pins were kept ready for mounting. Cards were mounted at ¾ heights from the top of the insect pin by using a height manipulator. Very minute amount of special glue was put at the tip of the card or minute pin with the help of a needle. The card was placed at the lateral side of thorax of the specimen. A data label was then mounted on the pin. The mounted specimens were imaged with Dissecting binocular microscope (Olympus) and Digital 3D imaging Microscope which produced sharp. Identifying of insects has done by using morphologically in this moments. During identification and information were collected by following: Kirbey, 1914; Brunetti, 1923 Fraser, 1933 and 1936 Ahmed, 2008a; Ahmed, 2008b; Ahmed, 2009; Mazumdar, *et al.* 2010 and 2011; Chowdhury and Hossain, 2011.

3.2.2. Amphibians and Reptiles

Most frogs of are nocturnal, so observations were made at night (2000-0100 hr). Other factors influencing fieldwork activities were the localization of good breeding sites or third-party information about any special or previously unseen animals. The habitat study and manipulation of captured animals were accomplished on the day following the night fieldwork. Photographs of live animals are important sources of morphological information and can in many cases be helpful to identify the genus or species of an animal. A standardized form was adapted from (Lips *et al*., 2001) and modified according to the needs of the present survey. Animal catching and handling and behaviour in the field strictly followed the DAPTF fieldwork code of practice (Declining Amphibian Population Task Force, 2001) and the ASIH Guidelines for Use of Live Amphibians and Reptiles in Field and Laboratory Research (ASIH, 2004). For reptiles, diurnal and nocturnal both surveys were conducted. Especially any news

from local inhabitants regarding sightings of reptiles was considered and specific places were visited. Most of the reptiles were identified in field, but very small number of individuals has been collected for species confirmation.

3.2.3. Birds

Bird survey were employed to identify and record any rare, endangered and protected species found in the project site and surround habitat that predicted to be impacted. Bird survey along the stream side were employed to record bird species which strongly associate with stream ecosystem as well as forest around the stream. Point observations placed with 100 m interval along 1 km line transect. Line transect across the streams (500 to the right and left of stream) were also employed to count number, density, and biodiversity indices of birds communities. All individuals observed and/or heard were noted by following information: species name, number of individual, elevation, geographic coordination, flies singly or in flocks and other information needed. Independent observation teams were used to obtain concurrent record of birds.

3.2.4. Mammals

Separate Day and Night survey were conducted for diurnal and nocturnal mammals respectively. Two time schedules were maintained: (a) morning to evening (0600 h to 1200 h and 1600 to 1800 h), when observations were made on diurnal mammals ; and (b) evening to early morning (i.e., 1900 h to 0400 h) on nocturnal mammals. Local people interview were conducted to get proper descriptions of mammals found in respective survey point. Droppings, scratch on soil and foot marks were also identified and considered as the presence of respective mammal.

4.0 Vegetation of the Study area:

Diversity of the study areas is very poor because maximum lands are cultivated (Paddy field), swamp, marshy and water logging condition during rainy season. There are some small and scattered forests (not dense) and vegetable field adjacent to the paddy field. There are some trees are planted along road side viz: *Albizia saman (*Rain tree), *Eucalyptus globulus* (Eucalyptus), *Acacia mangium* (Wattle) etc. There are few houses near the transmission line. Around these houses some ornamental, vegetables, trees are planted. We have visited many areas according to GPS reading (Tower).

1A (Tower no 01 & new Meghnaghat):

Adjacent to the meghnaghat power station. Marginal land and industrial areas. Abundant species are Calotropis gigantea, Solanum sisymbrifolium, Senna sophera, Croton bonplandianus etc.

1B (Tower no. 17,18):

Water logging condition under Hosendy breeze. There are some aquatic plants species, which are abundant in this region, Viz. *Corchorus capsularis, Ipomoea aquatica, Ipomoea fistulosa, Sesbania bispinosa, Polygonum orientalis etc.* Beside this tower there are some rice field (Aman) and one brickfield.

Photograph: Flora survey at Gojaria, water logging condition during rainy season..

1C (Tower no 35):

Marshy land, water logging areas, most of the plant species are cultivated along with the road and around the houses. Abundant species are *Ipomoea aquatica, Sesbania bispinosa, crateva magna, Coccinia grandis, Nymphaea nouchali* etc.

2A (Tower no 217,218), 2B (226):

Maximum lands are cultivated (Paddy field), swamp and marshy. There are some scattered vegetable field adjacent to the paddy field. There are some trees are planted along road side. Abundant plant species are *Curcuma zedoaria,Clerodendron viscosum, Croton bonplandianus, Phyllanthus emblica, Boerhavia diffusa* etc.

3A (Tower no 383):

Slope of hill, dense forest of tree, herb and shrub. Maximum tree species are *Gmelina arborea* (tree garden of G. arborea), under the canopy there are some abundant species viz. *Passiflora foetida, Urena lobata, Mimosa pudica, Clerodendrum viscosum* etc.

3B (tower no 392):

Marginal land. Natural dense forest of herb, shrub and tree species Maximum tree species are *Tectona grandis* (Teak garden).

4, 5, 6 and 7:

Diversity of the study areas is very poor because maximum lands are cultivated (Paddy field), swamp, marshy and water logging condition during rainy season. There are some small and scattered forests (not dense) and vegetable field adjacent to the paddy field. There are some trees are planted along road side viz: *Albizia saman (*Rain tree), *Eucalyptus globulus* (Eucalyptus), *Acacia mangium* (Wattle) etc. There are few houses near the transmission line. Around these houses some ornamental, vegetables, trees are planted. We have visited many areas according to GPS reading (Tower). From our field survey it is very clear that, vegetation of the study areas more or less same.

5.0 Results of Flora Survey:

From our field survey it is very clear that, vegetation of the study areas more or less same. Recorded plant species from the field are shown in **Table- 5.**

Summary

A total of 152 species in 121 genera under 69 families were recorded from the study site. There were some common plant species, which were present in every survey site. Viz.: *Achyranthes aspera, Alternanthera philoxeroides* etc. According to IUCN category, three threatened plant species were recorded from the study areas. Viz.: *Borassus flabellifer, Dipterocarpus turbinatus, Swietenia mahagon* **(Please see the table below):**

Threatened species observed in Project Sites

Taxa	No.	Scientific Name (English)	Season □Rainy□	Conservation Status		Remarks
				IUCN (2013)	Local Law	
Flora	1	*Borassus flabellifer* L.	○	EN	○	The species is common in some parts of Bangladesh
	2	*Dipterocarpus turbinatus* Gaertn.	○	CR	○	The species is very common in the forest of South-east Bangladesh
	3	*Swietenia mahagoni* (L.) Jacq.	○	EN	○	This is a introduced species. It is widely cultivated in roadsides, homestead forests throughout Bangladesh
Total	03					

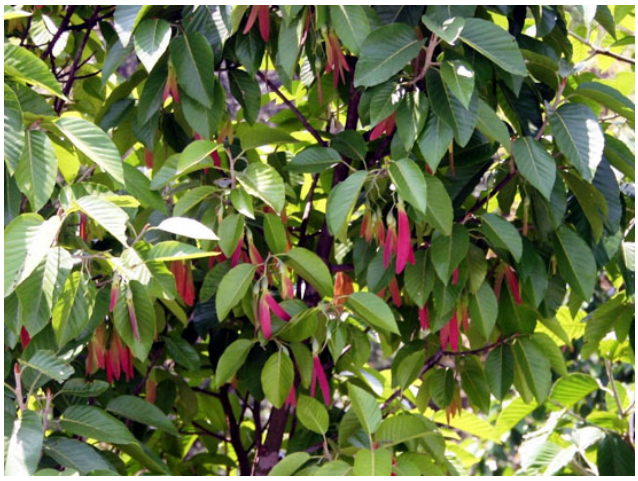

Image: *Dipterocarpus turbinatus* (56)

Image: *Swietenia mahagoni*

Table-5 : List of Plant species in the Rainy Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
1	*Acanthus ilicifolius* L.	Holy-leaved acanthus	Hargoza	Acanthaceae	√																	
2	*Abelmoschus moschatus* Medik	Musk mallow	Bannoderos	Malvaceae					√													
3	*Acacia auriculiformis Benth.*	Ear-pod wattle	Akashi	Mimosaceae	√			√			√											
4	*Acacia catechuoides (Roxb.)* Benth.		Khoira	Mimosaceae								√										
5	*Acacia mangium* Willd.	Wattle	Akashi	Mimosaceae			√	√	√													
6	*Achyranthes aspera* L.	Red chaff tree	Apang	Amaranthaceae	√		√	√		√	√		√					√				
7	*Alstonia macrophylla* Wall. *ex* G.Don	Devil's tree	BaroChhatim	Apocynaceae	√						√								NT			
8	*Ageratum conyzoides* (L.) L.	Tropical white weed	Fulkuri	Asteraceae				√	√		√											
9	*Albizia procera* (Roxb.) Benth.	White siris	Silkorai	Mimosaceae		√		√	√													
10	*Albizia saman* (Jacq.) Merr.	Rain tree	Rain tree	Mimosaceae		√	√		√									√				
11	*Alstonia scholaris* (L.) R.Br.	Dita bark tree	Chatim	Apocynaceae										√					LC			
12	*Alternanthera philoxeroides* (Mart.) Griseb.	Alligator weed	Helencha	Amaranthaceae		√			√	√	√				√			√				
13	*Alternanthera sessilis* (L.) R.Br. *ex* DC.	Sessile joywood	Sachishak	Amaranthaceae														√	LC			
14	*Amaranthus spinosus L.*	Spiny pigweed	Kantamairra	Amaranthaceae											√							
15	*Amaranthus viridis* L.	Green amaranth	MairraShak	Amaranthaceae					√	√												
16	*Ananus comosus*(L.) Merr.	Pineapple	Anaros	Bromeliaceae	√			√											LC			
17	*Artocarpus heterophyllus* Lam.	Jack fruit	Kathal	Moraceae	√	√		√			√											
18	*Artocarpus lacucha* Buch.-Ham.	Monkey jack	Barta	Moraceae	√																	
19	*Averrhoa carambola* L.	Carambola	Kamranga	Fabaceae	√																	

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					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
		apple	shim																			
20	*Avicennia alba* Blume		Barabaen	Verbenaceae	√														LC			
21	*Azadirachta indica* A. Juss.	Neem tree	Nim	Meliaceae		√		√														
22	*Bambusa tulda* Roxb.	Indian bamboo	Mitinga	Poaceae	√						√											
23	*Bambusa vulgaris Schrad.*	Common bamboo	Bangla bans	Poaceae	√				√		√		√									
24	*Barringtonia acutangula* (L.) Gaertn.	Indian oak	Hizal	Lecythidaceae			√		√													
25	*Bombax ceiba* L.	Red silk cotton tree	Simul	Bombacaceae					√													
26	*Borassus flabellifer* L.	Barb tree	Tal	Arecaceae	√	√	√	√			√								EN			
27	*Bougainvillea glabra* Choisy	Bougainvillea	Baganbilas	Nyctaginaceae	√																	
28	*Calotropis gigantea* (L.) Ait.f.	Swallow tree	Akand	Asclepiadaceae												√						
29	*Carica papaya* L.	Papaya	Pepe	Caricaceae	√	√		√			√											
30	*Casuarina equisetifolia* L.	Beefwood	Jau	Casuarinaceae											√							
31	*Catunaregam spinosa* (Thunb.) Tirveng	Common emetic nut	Mankanta	Rubiaceae	√																	
32	*Centella asiatica* (L.) Urban.	Spadeleaf	Thankuni	Apiaceae					√									√	LC			
33	*Cheilocostus speciosus* (J.Konig) C.Specht	Canereed	Kew shak	Costaceae								√										
34	*Chromolaena odorata* (L.) R.M.King & H.Rob.	Paraffin weed	Asamlata	Asteraceae	√		√				√	√										
35	*Citrus maxima* (Burm.f.) Merr.	Pummelo	Jambura	Rutaceae		√																
36	*Clerodendrum viscosum* Vent.		Vat	Verbenaceae	√		√	√				√		√								
37	*Coccinia grandis* (L.) Voigt	Ivy gourd	Kelakachupata	Cucurbitaceae		√	√											√				

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					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
38	*Cocos nucifera* L.	Coconut palm	Nairkel	Arecaceae		√	√	√			√											
39	*Colocasia esculenta* (L.) Schott	Cocoyam	Kachu	Araceae	√		√	√	√		√		√						LC			
40	*Canna indica L.*	Canna lily	Kalaboti	Cannaceae		√	√	√										√				
41	*Commelina benghalensis* L.	Blue commelina	Kanaialata	Commelinaceae	√				√		√				√				LC			
42	*Corchorus capsularis* L.	Jute	Deshi pat	Tiliaceae													√					
43	*Crateva magna* (Lour.) DC.	Three leaved caper	Barun	Capparaceae														√				
44	*Crotalaria pallidaAiton*		Jhunjhuni	Fabaceae						√												
45	*Croton bonplandianus* Baill.	Bonplant's croton	Paglamaric h	Euphorbiaceae			√	√	√					√		√						
46	*Curcuma zedoaria (Christm.)* Roscoe	Indian arrowroot	Soti	Zingiberaceae										√								
47	*Cuscuta reflexa* Roxb.	Dodder	Sunnalata	Cuscutaceae											√							
48	*Cyanthillium cinereum* (L.) H.Rob.	Purple fleabane	Sialimutra	Asteraceae					√													
49	*Cynodon dactylon* (L.) Pers.	Star grass, Couch grass	Durba grass	Poaceae		√												√				
50	*Cyperus rotandus* L.	Nut grass	Nagarmuth a	Cyperaceae	√				√													
51	*Desmodium gangeticum* (L.) DC.		Chalani	Fabaceae								√										
52	*Dioscorea alata* L.	Asiatic yam	Banga alu	Dioscoreaceae											√							
53	*Dioscorea bulbifera* L.	Air potato	Banalu	Dioscoreaceae										√								
54	*Dioscorea pentaphylla* L.	Five-leafyam	Jum alu	Dioscoreaceae								√										
55	*Diplazium esculentum* (Retz.) Sw.		Dhekishak	Woodsiaceae						√									LC			
56	*Dipterocarpus turbinatus*	The eng tree	Garjan	Dipterocarpace							√								CR			

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					A	B	A		A	B	C	A	B	A	B	A	B	C				
	Gaertn.			ae																		
57	*Eclipta prostrata* (L.) L.	False daisy	Kesraj	Asteraceae		√													DD			
58	*Eichhornia crassipes* (Mart.) Solms	Water-hyacinth	Kachuripana	Pontederiaceae		√				√					√		√	√				
59	*Elaeocarpus floribundus* Blume	Indian olive	Jalpai	Elaeocarpaceae	√				√		√											
60	*Elephantopus scaber* L.	Elephant's foot	Shamdalan	Asteraceae					√	√												
61	*Enhydra fluctuans* Lour.	Marsh herb	Hinchashak	Asteraceae		√																
62	*Erythrina variegta var. picta* Maheshw.	Indian coral tree	Mandar	Fabaceae		√		√	√		√				√							
63	*Eucalyptus globules* Labill		Globu eucalyptus	Myrtaceae	√	√																
64	*Eupatorium antiquorum* L.	Malayan spurge	Tesramansa	Euphorbiaceae		√		√			√											
65	*Euphorbia hirta* L.	Snake weed	Dudialata	Euphorbiaceae												√						
66	*Ficus erecta* Thunb.	Japanese fig	Ballagota	Moraceae						√									LC			
67	*Ficus hispida* L.f.	opposite leave fig	Dumur	Moraceae	√					√	√	√										
68	*Ficus rumphii* Blume	Weeping fig	Jhula bot	Moraceae													√					
69	*Gmelina arborea* Roxb.	White teak	Gamari	Verbenaceae	√		√	√	√		√											
70	*Glycosmis pentaphylla* (Retz.) A.DC	Motar tree	Datmagan	Rutaceae			√				√		√									
71	*Heliotropicum indicum* L.	Indian heliotrope	Hatishur	Boraginaceae			√															
72	*Hibiscus rosasinensis* L.	China rose	Joba	Malvaceae		√																
73	*Ipomoea fistulosa* Mart.*ex* Choisy		Dolkolmi	Convolvulaceae		√			√		√						√	√				
74	*Ipomoea aquatica* Forssk.	Water	Kalmi	Convolvulaceae		√											√	√	LC			

Table-5 : List of Plant species in the Rainy Season

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					A	B	A		A	B	C	A	B	A	B	A	B	C				
		spinach																				
75	*Ixora paevetta* Andr.	The torch tree	Gandhalrangan	Rubiaceae		√		√														
76	*Justicia gendarussa* Burm.f.*		Jagatmadan	Convolvulaceae		√			√		√											
77	*Lagerstroemia speciosa* (L.) Pers.		Jarul	Lythraceae									√									
78	*Lannea coromandelica* (Houtt.) Merr.		Badi	Anacardiaceae					√						√							
79	*Lantana camara* L.	Lantana	Khutuskanta	Verbenaceae	√		√	√	√													
80	*Lepisanthes rubiginosa* (Roxb.) Leenh.		Rubihorina	Sapindaceae	√							√										
81	*Lindernia antipoda* (L.) Alston	Sparrow false pimpernel	Zai ghas	Linderniaceae														√	LC			
82	*Lippia alba* (P.Mill.) N.E.Br. ex Britt. & Wilson		Shunk	Verbenaceae						√								√				
83	*Ludwigia adscendens* (L.) Hara		Mulcha	Onagraceae											√							
84	*Ludwigia hyssopifolia* (G.Don) Exell.	Seedbox	Zaikura	Onagraceae						√					√				LC			
85	*Lygodium japonicum* (Thunb.) Sw.		Japanilata fern	Schizaeaceae	√							√										
86	*Mangifera indica* L.	Mango	Aam	Anacardiaceae	√	√		√			√								DD			
87	*Marsilea minuta* L.	Marshy fern	Susnishak	Marsileaceae		√			√		√								LC			
88	*Melastoma malabathricum* L.	Indian rhododendron	Bon tejpata	Melastomaceae	√							√										
89	*Melia azederach* L.	Bead tree	Ghoranim	Meliaceae			√															
90	*Mikania micrantha* kunth	Heartleaf	Asamlata	Asteraceae	√	√		√			√											
91	*Merremia gangetica*		Indukanipana	Convolvulaceae	√														LC			

Table-5 : List of Plant species in the Rainy Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
92	*Microcos paniculata* L.		Asargula	Tiliaceae	√																	
93	*Mikania micrantha* Kunth	Heratleafhempvine	Tufainnalata	Asteraceae	√		√		√	√	√	√	√									
94	*Mimosa himalayna* Gamble*	Giant sensitive plant	Borosarmida	Mimosaceae	√																	
95	*Mimosa pudica* L.	Sensitive plant	Lajjabati	Mimosaceae	√	√		√			√	√							LC			
96	*Momordica charantia* L. *var. charantia*	Bitter melon	Titakorolla	Cucurbitaceae	√				√													
97	*Moringa olifera* Lam.	Horse radish tree	Sajna	Moringaceae	√																	
98	*Momordica cochinensis* (Lour.) Sprengel	Sweet gourd	Kakrul, Akri	Cucurbitaceae							√											
99	*Monochoria hastata* (L.) Solms.	Arrowleaf false pickereweed	Fena	Pontederiaceae						√									LC			
100	*Musa paradisiaca* L.	Banana	Kacha kola	Musaceae	√	√		√			√											
101	*Neolamarckia cadamba* (Roxb.) Bosser		Kadam	Rubiaceae										√								
102	*Nymphaea nouchali* Burm.f.	Water lily	Shapla	Nymphaeaceae														√	LC			
103	*Oryza sativa* L.	Paddy	Dhan	Poaceae										√	√		√					
104	*Pandanus foetidus* Roxb.	Screw pine	Koikikanta	Pandanaceae					√													
105	*Passiflora foetida* L.	Wild passion fruit	Jumkolata	Passifloraceae								√										
106	*Persicaria orientalis* (L.) Spach	The garden gate	Biskatali	Polygonaceae			√															
107	*Phoenix sylvestris* (L.) Roxb.	Date sugar palm	Khajur	Arecaceae					√													
108	*Phyllanthus acidus* (L.) Skeels	Country	Horboroi	Euphorbiaceae	√						√											

Table-5 : List of Plant species in the Rainy Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)													Conservation Sites			Remarks
					7		6	5	4			3		2		1			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
		gooseberry																				
109	*Phyllanthus emblica* L.	Indian gooseberry	Amloki	Euphorbiaceae	√						√											
110	*Phyllanthus reticulatus* Poir.	Reticulated leaf-flaver	Cirkuti	Euphorbiaceae					√	√	√			√								
111	*Phyllanthus sikkimensis* Mull.Arg.*		Sikimamla	Euphorbiaceae		√																
112	*Piper retrofractum* Vahl	Javanese long pepper	Chai lata	Piperaceae											√							
113	*Piper peepuloides* Roxb.		Pipul	Piperaceae							√											
114	*Pistia stratiotes* L.	Tropical duckweed	Futihena	Araceae		√									√				LC			
115	*Pongamia pinnata* (L.) Pierre	indian beach	Koronja	Fabaceae		√													LC			
116	*Pouzolzia zeylanica* (L.) Benn.	Pouzolzia	Kullaruki	Urticaceae		√			√		√											
117	*Premna esculenta* Roxb.		Lalana	Verbenaceae		√																
118	*Psidium guajava*L.	Guava	Peyara	Myrtaceae	√			√	√		√											
119	*Raphanus sativus* L.	Radish	Mula	Brassicaceae		√																
120	*Ricinus communis* L.	Castor	Verenda	Euphorbiaceae														√				
121	*Schumannianthus dichotomus* (Roxb.) Gagnep.		Sitolpati	Marantaceae	√				√		√											
122	*Scoparia dulcis* L.	Goat weed	Bondhone	Scrophulariaceae			√		√													
123	*Senna tora* (L.) Roxb.	Metal seed	Chotokalokeshunde	Caesalpiniaceae					√		√		√									1
124	*Senna sophera* (L.) Roxb.	Pepper-leaved senna	Barokalokeshunde	Caesalpiniaceae												√						
125	*Sesamum indicum* L.	Sesame	Til	Pedaliaceae														√				
126	*Sesbania sesban* (L.) Merr.	Common sesban	Hola	Fabaceae													√	√				

Table-5 : List of Plant species in the Rainy Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
127	*Sida acuta* Burm.f.	Broom weed	Kureta, Ururia	Malvaceae					√	√	√	√						√				
128	*Sida cordifolia* L.	Flannel weed	Shet-berela	Malvaceae			√															
129	*Sida rhombifolia* L.	Cuba jute	Kureta	Malvaceae								√						√				
130	*Smilax ovalifolia* Roxb. *ex* D.Don	Black creeper	Kumairralata	Smilacaceae	√																	
131	*Solanum americanum* Mill.		Tit begun	Solanaceae	√	√					√											
132	*Solanum melongena* L.	Brinjal	Begun	Solanaceae	√	√		√			√											
133	*Solanum nigrum* L.	Black night	Futibegun	Solanaceae											√			√				
134	*Solanum sisymbrifolium* Lam.	Prickly brinjal	Kantikari	Solanaceae												√						
135	*Solanum torvum Sw.*	Cherry eggplant	Titbegun	Solanaceae						√					√							
136	*Spermacoce articularis* L.f.		Atharogia	Rubiaceae						√												
137	*Sphagneticola calendulacea* (L.) Pruski	Trailing daisy	Vimraj	Asteraceae						√												
138	*Spilanthes acmella* (L.) L.		Maricha	Asteraceae			√			√	√											
139	*Stephania japonica* (Thunb.) Miers	Snake vine	Musarralata	Menispermaceae					√		√				√			√				
140	*Streblus asper* Lour.	Toothbrush tree	Horba	Moraceae	√		√	√	√		√											
141	*Swietenia mahagoni* (L.) Jacq.	Spanish mahogany	Mahogany	Meliaceae	√				√		√								EN			
142	*Synedrella nodiflora* (L.) Gaertn.	Nodeweed	Relanodi	Asteraceae			√		√	√					√							
143	*Syzygium cuminii* (L.) Skeels	Java plum		Myrtaceae					√		√	√										
144	*Syzygium fruticosum* (Roxb.) DC.		Kawyagajam	Myrtaceae	√																	
145	*Tabernaemontana alternifolia*		Janglitagar	Apocynaceae	√																	

Table-5 : List of Plant species in the Rainy Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
	L.																					
146	*Tectona grandis* L.f.	Teak	Segun	Verbenaceae	√							√	√									
147	*Tamarindus indica* L.	Tamarind tree	Tetul	Tamaricaceae		√																
148	*Terminalia catappa* L.	Indian almond	Katbadam	Combretaceae					√					√								
149	*Urena lobata* L.	Congo jute	Jangligagra	Malvaceae	√																	
150	*Vitex negundo* L.	Chaste tree	Nishinda	Verbenaceae		√																
151	*Ziziphus mauritiana* Lam.	Plum	Kul	Rhamnaceae		√	√		√													
152	*Ziziphus oenoplia* (L.) Mill.	Jackal jujube	Bonboroi	Rhamnaceae	√																	

6.0 Results of Fauna Survey:

List of Fauna available in 7 sampling stations is given in the following Tables:

Table-6.1 : List of Insects

Table-6.2 : List of Amphibia

Table-6.3 : List of Reptilia

Table-6.4 : List of Aves

Table-6.5 : List of Mammalia

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Summary: A total of 184 species were observed, from seven sampling points, including 62 insects, 11 amphibians, 31 reptilians, 61 birds and 19 mammalian species. These 62 insect were belong to 29 families of 10 orders. All the 11 amphibians were from Order Anura and five Families. The highest six species were recorded under family Dicroglossidae, while one species from each of the following families, viz., Bufonidae, Ranidae and Rhacophoridae. Furthermore, two species recorded from the family Microhylidae. A total of 12 lizards and 19 snake species were recorded, where only one were included in CITES appendix I and three were in appendix II. 19 mammalians taxa were recorded of 6 orders and 11 families. Four mammals were included in CITES appendix III and three in appendix I. None of the observed insect, amphibian and birds taxa found to be enlisted in CITES appendices. All observed insect, amphibian, reptilian and birds were Least Concern of IUCN category whereas only 4 species of mammals (*Panthera pardus* Linnaeus 1758; *Arctonyx collaris* F.G.Cuvier 1825; *Lutra lutra* Linnaeus 1758; *Viverra zibetha* Linnaeus 1758) – were included into Near Threatened category.

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Order: Odonata, Family: Coenagriidae																
1	*Agriocnemis femina* (Brauer), 1890	Narrow-winged Damselfly, (Foring)		√	√	√	√	√	√	√			√	√	√			LC	
2	*Agriocnemis pygmaea* (Rambur)	Damselfly (Foring)		√	√			√	√	√			√	√				LC	
3	*Ceriagrion cerinorubellum*, (Brauer)	Damselfly (Foring)		√	√	√	√	√	√	√			√					LC	
4	*Pseudagrion microcephalum* Rambur, 1842	Damselfly (Foring)		√	√			√	√	√								LC	
5	*Copera vittata* Selys, 1863	Narrow-winged Damselfly, (Foring)		√	√			√	√	√								LC	
6	*Ischnura senegalensis* Rambur	Fork-tail Daselfly (Foring)											√					LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)															Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Family: Libellulidae																
7	*Tholymis tillarga* Fabricius, 1798	Evening Skimmer, (Foring)		√	√			√	√	√								LC	
8	*Orthetrum sabina* Drury, 1770	Slender skimmer (Foring)		√	√	√	√	√	√	√			√					LC	
9	*Orthetrum pruinosum neglectum* Rambur, 1842	Common red skimmer (Foring)		√	√		√	√	√	√								LC	
10	*Orthetrum cancellatum* Linnaeus, 1758	Black-tailed skimmer Dragonfly (Foring)		√	√			√	√	√								LC	
11	*Neurothemis fulvia* Kirby, 1889	Skimmer (Foring)		√	√	√	√	√	√	√								LC	
12	*Hydrobasileus croceus* Brauer, 1867	Common Skimmer (Foring)		√	√	√	√	√	√	√								LC	
13	*Diplacodes trivialis*	Blue darter (Foring)		√	√			√	√	√								LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
14	*Diplacodes nebulosa* Fabricius,1793	Black-tipped percher (Foring)		√	√	√	√	√	√	√								LC	
15	*Brachythemis contaminata* Fabricius,1793	Skimmer (Foring)		√	√	√	√	√	√	√								LC	
16	*Brachydiplax chalybea* Brauer, 1868	Skimmer (not known)		√	√	√	√	√	√	√								LC	
17	*Pantala flavescens, Fabricius*	Wandering Glider, (Foring)												√				LC	
			Order: Orthoptera , Family: Gryllidae																
18	*Gryllusspp.*	Cricket (Urchunga)		√	√			√	√	√	√	√						LC	
			Family: Acrididae																
19	*Oxya chinensis(Thunberg)*	Small Rice Grasshopper, (Ghas Foring)		√	√		√	√	√	√			√	√				LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
21	*Oxya hyla* Serville	Short horned Grasshopper (Ghas Foring)											√	√				LC	
22	*Trilophidia annulata* (Thunberg)	Short Horned Grasshopper (Ghas Foring)											√	√				LC	
23	*Locusta danica*	Short horned grasshopper (Ghas foring)			√		√	√	√	√								LC	
			Order: Dictyoptera , Family: Mantidae																
24	*Mantis religiosa* Linnaeus, 1758	Praying mantis (Shikari mantis)		√	√	√	√	√	√	√	√	√						LC	
			Order: Diptera , Family: Culicidae																
25	*Aedes aegypti* Linnaeus, 1762	Aedes mosquito (Mosha)			√	√		√										LC	
26	*Culex* spp.	Culex mosquito (Mosha)			√	√		√										LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Family: Syrphidae																
27	*Eristalinus quinquelineatus(Fabricius)*	Hoverfly			√			√	√	√								LC	
28	*Episyrphus spp.*	Hover fly			√			√	√	√								LC	
			Family: Muscidae																
29	*Musca domestica* Linn.	House fly		√	√	√	√	√	√	√			√		√	√	√	LC	
			Order: Homoptera , Family: Delphacidae																
30	*Nilaparvata lugens,* Stal, 1924	Brown planthopper (Badami gachh foring)		√	√	√	√	√	√	√								LC	
			Family: Cicadellidae																
31	*Nephotettix nigropictus*	Rice green leaf (Dhaner sabuj pata foring)		√	√			√	√	√			√	√			√	LC	
32	*Nephotettix cincticeps* Matsumura	Spotted jassid			√			√	√	√								LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Family: Alydidae																
33	*Leptocorisa acuta* Thunberg, 1904	Rice bug (Dhaner Gandhi poka)		√	√			√	√	√			√	√			√	LC	
			Family:Pentatomida																
34	*Eurydema pulchrum* Westwood, 1837	Radish bug (Not available)			√		√	√	√	√								LC	
			Order: Lepidoptera , Family: Pieridae																
35	*Eurema hecabe contubernalis* Moore	Common Grass Yellow, (Holud)		√	√	√	√	√	√	√	√	√	√	√			√	LC	
36	*Catopsilia Pomona* (Fabricius)	Common Emigrant (Pairachali)									√	√						LC	
37	*Delias descombesi descombesi* (Boisduval)	Red spot Jezebel (Kanka)				√	√	√	√	√								LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
38	*Appias lalage lalage* Doubleday, 1842	The spot puffin (not available)		√	√	√	√	√	√	√								LC	
			Family: Amathusiidae																
39	*Discophora sondaica zal* Westwood	Common Duffer (Kotkote)									√	√						LC	
			Family: Danaidae																
40	*Danaus melanippus indicus* (Fruhstorfer)	White Tiger (Shushama)									√							LC	
41	*Parantica aglea aglea* (Stoll)	Glassy Tiger (Shetalkuchi)									√	√						LC	
			Family: Nymphalidae																
42	Euthalia monina kesava Moore	Powdered Baron (Tomosha)									√	√						LC	
43	*Junonia atlites* (Linn.)	The grey pansy			√			√	√	√	√	√						LC	
44	*Junonia lemonias* Linnaeus, 1758	The lemon pansy		√	√	√	√	√	√	√								LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Family: Satyridae																
45	*Melanitis phedima bela* Moore	Dark Evening Brown		√	√			√	√	√	√	√						LC	
46	*Mycalesis visala visala* Moore, 1857	The long-brand bushbrown (not available)		√	√	√	√	√	√	√								LC	
			Family: Papilionidae																
47	*Papilio plytes laertias Romulus* Cramer, 1775	Common mormon (not available)		√	√	√	√	√	√	√								LC	
48	*Troides Helena Cerberus* (Felder & Felder)	Common Birdwing (Shonal)									√	√						LC	
			Family: Hesperioidea																
49	*Oriens goloides* Moore	Smaller Darlet		√	√			√	√	√								LC	
			Order: Coleoptera , Family: Chrysomelidae																

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
50	*Aulacophora foveicollis* Lucas	Red pumpkin beetle		√	√			√	√	√	√	√	√	√	√	√	√	LC	
51	*Aulacophora frontalis* Baly	Pumpkin beetle		√	√			√	√	√	√	√	√	√	√	√	√	LC	
			Order: Hymenoptera , Family: Aphidae																
52	*Rhopalosiphum sp.*	Aphis		√	√	√	√	√	√	√			√	√				LC	
			Family: Anthophoridae																
53	*Amegilla* spp.				√			√	√	√	√	√			√	√		LC	
			Family: Halictidae																
54	*Lasioglossum* sp.	Solitary Bee			√			√	√	√	√	√			√	√		LC	
55	*Nomia* sp.															√		LC	
			Family: Trigonidae																
56	*Trigona* sp.	Sweat bee			√			√	√	√								LC	
			Family: Apidae																
57	*Apis mellifera* Linn.	Western Honey bee			√			√	√	√								LC	
58	*Apis dorsata*Linn.	Wild Honey bee, (Bonno									√	√						LC	

Table - 6.1 LIST OF INSECTS

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
		Momachhi)																	
			Family: Vespoidae																
59	*Vespa* sp.	Bolta		√	√	√	√	√	√	√								LC	
			Order: Coleoptera , Family: Coccinellidae																
60	*Micraspis crocea* (Mulsant)	Lady beetle		√	√			√	√	√								LC	
			Order: Dictyoptera , Family: Blattellidae																
61	*Blattella germanica* Linn.	German Cockroach (Telapoka)									√	√						LC	
			Family: Mantidae															LC	
62	*Mantis religiosa* (Linnaeus)	Praying Mantis (Praying Mantis)									√	√						LC	

Table - 6.2 LIST OF AMPHIBIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Order: Anura, Family: Bufonidae																
1	*Duttaphrynus (Bufo) melanostictus*	Southeast Asian toad		√	√	√	√	√	√	√	√	√	√	√		√	√	LC	
			Family: Dicroglossidae																
2	*Hoplobatrachus tigerinus*	Asiatic Bull Frog		√	√	√	√	√		√	√	√	√	√		√	√	LC	
3	*Euphlyctis cyanophlyctis*	Skipper Frog		√	√	√	√		√	√		√	√			√	√	LC	
4	*Fejervarya limnocharis*	Indian Cricket frog			√					√	√	√		√	√	√	√	LC	
5	*Fejervarya nepalensis*	Nepal Cricket frog			√						√			√			√	LC	
6	*Fejervarya syhadrensis*	Forest Cricket frog			√				√		√		√	√		√		LC	
7	*Fejervarya pierrei*	Pierre's cricket frog									√			√				LC	
			Family: Rhacophoridae																
8	*Polypedates leucomystax*	Common Indian tree				√					√		√	√			√	LC	

Table - 6.2 LIST OF AMPHIBIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
		frog																	
			Family:Microhylidae																
9	*Kaloula pulchra*	Painted Bull Frog									√	√		√			√	LC	
10	*Microhyla ornata*	Ornate Narrow-mouthed Frog									√	√	√	√		√	√	LC	
			Family:Ranidae																
11	*Hylarana taipehensis*	Two-striped Grass Frog														√		LC	

Table - 6.3 LIST OF REPTILIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
1	*Calotes versicolor*	Garden Lizard		√	√	√		√	√	√	√	√	√	√				LC	
2	*Calotes jerdoni*	Green garden lizard														√		LC	
3	*Gekko gecko*	South Asian Giant House Gekko		√	√			√	√									LC	
4	*Hemidactylus brookii*	Spotted house Lizard			√	√		√	√	√								LC	
5	*H. garnotii*	Garnot's Gecko		√	√	√		√	√	√								LC	
6	*H. frenatus*	Spotted house Lizard		√	√	√		√	√	√					√		√	LC	
7	*Hemidactylus brookii*	Brooke's house gecko									√	√					√	LC	
8	*Eutropis carinatus*	Common Skink		√	√	√		√		√			√	√				LC	
9	*Mabuya dissimilis*	Stripped shink																LC	
10	*Varanus bengalensis*	Bengle Monitor		√					√		√	√	√	√		√	√	LC	I
11	*V. flavescens*	Yellow Monitor		√	√	√		√	√	√								LC	

Table - 6.3 LIST OF REPTILIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
12	*V.salvator*	Water monitor		√	√	√		√	√	√			√	√		√		LC	
13	*Ahaetulla nasuta*	Common Whipe Snake			√			√	√	√								LC	
14	*Typhlops diardii*	Diard's blind snake															√	LC	
15	*Amphiesma stolata*	Striped keelback		√	√	√		√	√	√								LC	
16	*Tropidonophis mairii*	Keelback														√	√	LC	
17	*Boiga walli*	Cat snake									√	√						LC	
18	*Dendrelaphis tritis*	Green Bronzedback tree snake		√		√			√	√	√	√						LC	
19	*Dendrelaphis pictus*	Painted Bronzeback									√	√						LC	
20	*Trimeresurus albolabris*	White-lipped Pit Viper									√	√						LC	
21	*Coelognathus radiatus*	Copper-headed Trinket Snake									√	√					√	LC	
22	*Coelognathus Helena*	Trinket snake													√		√	LC	
23	*Lycodon aulicus*	Common Wolf Snake						√	√									LC	

Table - 6.3 LIST OF REPTILIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
24	*Ptyas mucosa*	Indian rat snake									√	√	√	√			√	LC	
25	*Ptyas korros*	Indo-chinese Rat Snake		√	√	√		√	√	√								LC	
26	*Rhabdophis subminiatus*	Red-necked Keelback				√				√								LC	
27	*Xenochrophis cerasogaster*	Dark-bellied Marsh Snake		√	√	√		√	√	√								LC	
28	*Bungarus fasciatus*	Banded Krait		√	√			√	√	√								LC	
29	*Naja naja*	Binocellate Cobra		√	√	√		√	√	√			√	√			√	LC	II
30	*Naja kaouthia*	Monocelate Cobra															√	LC	II
31	*Ophiophagus Hannah*	King cobra											√	√				LC	II

Table - 6.4 LIST OF AVES

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
1	*Passer domesticus*	House Sparrow		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
2	*Dicrurus macrocercus*	Black Drongo		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
3	*Sturnus contra*	Pied Myna		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
4	*Sturnus malabaricus*	Chestnut-tailed Starling						√		√								LC	
5	*Acridotheres tristis*	Common Myna		√	√	√		√	√	√	√	√	√	√	√			LC	
6	*Acridotheres fuscus*	Jungle Myna		√	√	√		√	√	√	√	√						LC	
7	*Parus major*	Great Tit		√	√	√		√	√		√	√						LC	
8	*Copsychus saularis*	Oriental Magpie-Robin		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
9	*Orthotomus sutorius*	Common Tailorbird		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
10	*Columba livia*	Common Pigeon			√			√	√	√	√	√	√	√	√	√	√	LC	
11	*Streptopelia decaocto*	Eurasian Collared Dove			√										√			LC	
12	*Streptopelia chinensis*	Spotted Dove		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
13	*Streptopelia tranquebarica*	Red Turtle Dove			√									√		√		LC	

Table - 6.4 LIST OF AVES

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
14	*Pycnonotus cafer*	Red-vented Bulbul		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
15	*Pycnonotus jocosus*	Red-whiskered Bulbul			√	√		√	√	√		√	√		√	√		LC	
16	*Corvus splendens*	House Crow		√	√	√		√	√	√	√	√	√	√	√	√	√	LC	
17	*Corvus macrorhynchos*	Large-billed Crow		√	√			√	√	√	√	√	√	√	√	√	√	LC	
18	*Oriolus xanthornus*	Black-hooded Oriole			√	√		√	√	√		√	√		√	√	√	LC	
19	*Artamus fuscus*	Ashy Woodswallow			√						√		√		√	√	√	LC	
29	*Dendrocitta vagabunda*	Rufous Treepie			√	√		√		√		√	√		√	√	√	LC	
21	*Dicaeum cruentatum*	Scarlet-backet Flowerpecker			√							√				√		LC	
22	*Nectarinia zeylonica*	Purple-rumped Sunbird			√			√				√	√		√	√	√	LC	
23	*Nectarinia asiaticus*	Purple Sunbird			√							√			√	√	√	LC	
24	*Ploceus philippinus*	Baya Weaver		√	√			√	√	√	√	√	√				√	LC	
25	*Lonchura punctulata*	Scaly-breasred Munia			√					√		√	√		√	√	√	LC	

Table - 6.4 LIST OF AVES

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
26	*Anthus rufulus*	Paddyfield Pipit		√	√			√						√			√	LC	
26	*Aegithina tiphia*	Common Iora			√	√		√	√				√			√	√	LC	
28	*Rhipidura albicollis*	White-throated Fantail				√		√					√				√	LC	
29	*Alcedo atthis*	Common Kingfisher		√	√	√		√	√	√	√	√	√	√			√	LC	
30	*Halcyon smyrnensis*	White-throated kingfisher		√	√	√		√	√	√	√	√	√	√			√	LC	
31	*Cacomantis merulinus*	Plaintive Cuckoo			√				√									LC	
32	*Eudynamys scolopaceus*	Asian Koel			√			√	√			√	√				√	LC	
33	*Dinopium bengalensis*	Lesser goldenback						√		√		√				√	√	LC	
34	*Dendrocopos macei*	Fulvous-breasted Woodpecker				√		√	√	√		√	√		√	√	√	LC	
35	*Megalaima lineata*	Lineated Barbet				√		√	√								√	LC	
36	*Centropus sinensis*	Greater Coucal													√				
37	*Centropus bengalensis*	Lesser Coucal		√		√				√					√	√		LC	

Table - 6.4 LIST OF AVES

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
38	*Lanius schach*	Long-tailed shrike				√		√	√			√	√	√	√	√	√	LC	
39	*Psittacula alexandri*	Red-breasrted Parakeet			√				√	√			√				√	LC	
40	*Cypsiurus balasiensis*	Asian Palm Swift			√	√		√	√				√				√	LC	
41	*Athene brama*	Spotted Owlet			√	√		√	√			√	√		√	√	√	LC	
42	*Haliastur indus*	Brahminy Kite			√			√	√	√	√	√	√	√			√	LC	
43	*Milvus migrans*	Black Kite									√			√					
44	*Ichthyophaga ichthyaetus*	Grey-headed Fish Eagle			√	√							√				√	NT	
45	*Spilornis Cheela*	Crested Serpent Eagle				√		√	√	√	√		√					LC	
46	*Phalacrocorax niger*	Little Cormorant		√	√	√		√	√	√	√	√	√	√				LC	
47	*Egretta garzetta*	Little Egret		√	√	√		√	√	√	√	√						LC	
48	*Casmerudias albus*	Great Egret						√			√							LC	
49	*Bubulcus ibis*	Cattle Egret		√	√	√		√	√	√	√	√	√	√		√	√	LC	
50	*Ardeola grayii*	Indian Pond Heron		√	√	√		√	√	√	√	√	√	√		√	√	LC	
51	*Ixobrychus cinnamomeus*	Cinnamon Bittern		√		√		√			√	√						LC	
52	*Ixobrychus sinensis*	Yellow Bittern										√							

Table - 6.4 LIST OF AVES

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
53	*Anastomus oscitans*	Asian Openbill						√										LC	
54	*Amaurornis phoenicurus*	White-breasted Waterhen		√		√		√	√	√	√	√	√				√	LC	
55	*Gallinago gallinago*	Common Snipe		√	√			√			√	√	√				√	LC	
56	*Tringa glareola*	Wood Sandpiper		√				√										LC	
57	*Actitis hypoleucos*	Common Sandpiper		√		√		√	√									LC	
58	*Metopidius indicus*	Bronzed-winged jacana		√	√	√		√	√	√	√	√						LC	
59	*Vanellus indicus*	Red-wattled Lapwing		√														LC	
60	*Garrulax ruficollis*	Rufous-neck laughingthrush						LC							√				
61	*Cissa chinensis*	Common Green Magpie													√			LC	

Table - 6.5 LIST OF MAMMALIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Order: Insectivora, Family: Soricidae																
1	*Suncus murinus* (Linnaeus 1766)	Grey Musk Shrew		√	√	√	√	√	√	√									
			Order: Chiroptera, Family: Pteropidae																
2	*Cynopterus sphinx* (Vahl 1797)	Short-nosed Fruit Bat		√	√	√		√	√	√	√	√	√	√		√	√	LC	
3	*Pteropus giganteus* Brunnich 1782	Indian Flying Fox		√	√	√		√	√	√	√	√	√	√		√	√	LC	
4	*Scotophilus heathii, (Horsfield, 1831)*	Greater Asiatic Yellow House Bat									√	√	√	√			√	LC	
5	*Megaderma lyra, É. Geoffroy, 1810*	Greater False Vampire									√	√						LC	

Table - 6.5 LIST OF MAMMALIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Order: Primates, Family: Cercopithecidae																
6	*Macaca mulatta* (Zimmermann 1780)	Rhesus Monkey*									√	√						LC	
			Order: Carnivora, Family: Canidae																
7	*Canis aureus* Linnaeus 1758	Asiatic Jackal		√	√	√		√	√	√			√	√		√		LC	III
8	*Vulpes bengalensis* (Shaw 1800)	Bengal Fox											√	√		√		LC	III
			Family: Felidae																
9	*Felis chaus* Schreber 1777	Wildcat		√	√	√		√	√	√	√	√	√	√				LC	
10	*Prionailurus bengalensis* (Bennett 1833), (=Felis bengalensis)	Leopard Cat		√	√	√					√	√						LC	I
11	*Panthera pardus* (Linnaeus 1758)	Black Panther* (Leopard)			√	√												NT	I
			Family: Herpestidae																

Table - 6.5 LIST OF MAMMALIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
12	*Herpestes edwardsi, (E.Geoffroy-Saint-Hillare 1818)*	Common Mongoose		√	√	√	√	√	√	√	√	√						LC	III
			Family: Mustelidae																
13	*Arctonyx collaris* F.G.Cuvier 1825	Hog Badger*		√	√			√	√	√								NT	
14	*Lutra lutra* (Linnaeus 1758)	Common Otter*		√	√	√		√	√	√								NT	I
			Family: Viverridae																
15	*Viverra zibetha* Linnaeus 1758	Large Indian Civet		√	√	√		√	√	√	√	√					√	NT	III
			Order: Artiodactyla, Family: Cervidae																
16	*Muntiacus vaginalis* (Boddaest 1785), (=M. muntjak) (Zimmermann 1780)	Barking Deer		√	√	√					√	√						LC	
			Order: Rodentia, Family: Sciuridae																
17	*Callosciurus pygerythrus, (I. Geoffroy Saint Hilarie 1832)*	Hoary-bellied Himalayan Squirrel		√	√	√	√	√	√	√	√	√	√	√		√	√	LC	

Table - 6.5 LIST OF MAMMALIA

No.	Species Name			Sampling Stations (Survey Points)														Conservation sites	
				7		6	5	4			3		2		1			IUCN	CITES
	Scientific Name	Common Name	Order, Family	A	B			A	B	C	A	B	A	B	A	B	C		
			Family: Muridae																
18	*Bandicota bengalensis, (Gray & Hardwicke 1823)*	Indian Mole Rat		√	√	√		√	√	√								LC	
19	*Rattus rattus* (Linnaeus 1758)	Common House Rat		√	√	√	√	√	√	√			√	√			√	LC	

Species are classified by the IUCN Red List into nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

- ✓ **Extinct (EX) –** No known individuals remaining.
- ✓ **Extinct in the Wild (EW)** – Known only to survive in captivity, or as a naturalized population outside its historic range.
- ✓ **Critically Endangered (CR)** – Extremely high risk of extinction in the wild.
- ✓ **Endangered (EN)** – High risk of extinction in the wild.
- ✓ **Vulnerable (VU)** – High risk of endangerment in the wild.
- ✓ **Near Threatened (NT)** – Likely to become endangered in the near future.
- ✓ **Least Concern (LC)** – Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
- ✓ **Data Deficient (DD)** – Not enough data to make an assessment of its risk of extinction.
- ✓ **Not Evaluated (NE)** – Has not yet been evaluated against the criteria.

PREPARATORY SURVEY ON DHAKA-CHITTAGONG MAIN POWER GRID STRENGTHENING PROJECT



FINAL REPORT

ON

Survey of Flora and Fauna along the route of 400kV Transmission Line from Meghnaghat to Matarbari via Madunaghat

(Dry Season)

SUBMITTED BY

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December 23, 2014

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Final Report on Survey of Flora and Fauna along the Route of 400kV Transmission Line from Meghnaghat to Matarbari via Madunghat (Dry Season)

1.0 Introduction

Given a steep increase in the power demand in Dhaka and surrounding area, the Power Grid Company of Bangladesh Limited (PGCB) is facing urgent needs to increase transmission capacity from power generation facilities located in Chittagong to Dhaka. For assessing the project viability of capacity enhancement of the power transmission capacities with high voltage and facility improvement of the National Load Dispatching Center (NLDC), the Government of Bangladesh (GOB) has agreed with Japan International Cooperation Agency (JICA) to jointly conduct a feasibility study on high voltage transmission line network between Dhaka and Chittagong and signed the minutes of meeting.

So, Japan International Cooperation Agency (JICA) has appointed Tokyo Electric Power Company Limited (TEPCO), hereafter “JICA Study Team” to conduct a preparatory survey on Dhaka-Chittagong main power grid strengthening project.

Bangladesh Power Development Board (BPDB) is planning to develop a (2x600) 1200 MW Thermal Power Projects based on imported coal each at Matarbari (Cox’sbazar).Power from the generation projects at Matarbari would be partly consumed at the nearby areas like Chittagong, while the major portion of the power would be brought to the capital city Dhaka. Power from Matarbari to Dhaka is envisaged to be transferred through Meghnaghat-Madunaghat-Matarbari 400kV high capacity transmission system.

BPDB is also envisaging developing various high capacity generation projects in the Maheshkhali and Anowara area. Powers from these projects are envisaged to be brought to Dhaka area through high capacity 400kV corridors. The proposed MeghnaghatMadunaghat-Matarbari 400kV line would be integrated with the future high capacity transmission system for evacuation of power from generation projects in the Maheshkhali & Anowara area to Dhaka.

Presently, environmental conservation is being given top priority worldwide. It is mandatory to obtain environmental clearance from the Department of Environment (DoE), under Environment Conservation Act 1995, amended from time to time to initiate a new project, as well as plants under operation in Bangladesh too.

According to Bangladesh Environment Conservation Rules 1997 (ECR), the 400kV transmission line project falls under the "Red Category", so far as environmental impact is concerned. Initial Environment Examination (IEE) followed by Environmental Impact Assessment (EIA), including Environmental Management Plan (EMP) are required for these types of installations in order to get environmental clearance from DoE.

PGCB has initiated the environmental clearance from DoE and is under way. The company has already obtained IEE clearance from DoE. It is now required to obtain EIA clearance. TEPCO (JICA Study Team) has been engaged by JICA for such activities, for preparation of EIA.

In order to fulfill the requirements of DoE as well as JICA, survey of flora and fauna along the proposed 400kV transmission line from Meghnaghat to Matarbari via Modunghat has already been conducted in the rainy and dry season. The rainy season report was submitted earlier in September' 2014 while present report contains the survey results of flora and fauna in the dry season only.

2.0 Sampling Stations

In order to conduct the survey of flora and fauna, seven sampling stations have been selected along the proposed 400kV transmission line. The list of sampling stations with some basic information is given in the **Table-2-1:**

Table-2.1: List of Sampling Stations

Candidate Survey Site		Place		Environmental Conditions	
No.	Name	District	Upazilla	Natural Conditions	Social Conditions
1 (A, B, C)	Meghnaghat S/S, its surroundings.	Narayangonj Munshigonj	Sonergaon, Gozaria	-Reclaimed land with no natural vegetation -Waterfowls such as shore birds are habiting at Tidal mudflat adjacent to Reclaimed land	-A small village, Kaijjar Gao, with 100 population adjacent to planned T/L -NoLand acquisition required
2 (A, B)	Laksham East	Comilla	Laksham	-Small forest near planned T/L	-Paddy field, corn field and other vegetable field -No houses
3 (A, B)	Chittagong Hill Tracts	Chittagong	Mirsarai	-Designatedas "reserved forest" -Common Tropical evergreen/semi evergreen forest but almost all of these forests are not natural forests. -Teak and rubber trees are planted along road side passing through in forest. -Monkey, Wild Bear, Samvar, King cobra, Monitor Lizard inhabit	-National forest owned by Government
4 (A, B, C)	Madunaghat S/S,	Chittagong	Raujan	-Paddy field and Small forest adjacent to paddy field.	-Land acquisition required
5	Surroundings of	Chittagong	Raujan	-Paddy field and Small forest	-No Land acquisition

Candidate Survey Site		Place		Environmental Conditions	
	existing Madunaghat S/S			adjacent to paddy field.	required
6	Burumchhara （River's Surroundings）	Chittagong	Anwara	-Paddy field and Small forest adjacent to paddy field. -Some reptiles and amphibians are habiting -Waterfowls such as shore birds are habiting	-There are a few houses near planned T/L (Necessity of Land acquisition or resettlement is not clear so far)
7 (A, B)	East of Anowara PPH	Chittagong	Banshkali	-Some reptiles and amphibians are habiting -Waterfowls such as shore birds are habiting	-There are a few houses near planned T/L (Necessity of Land acquisition or resettlement is not clear so far)

The locations of survey stations are shown in the following GIS based satellite map in **Figure-2-1:**

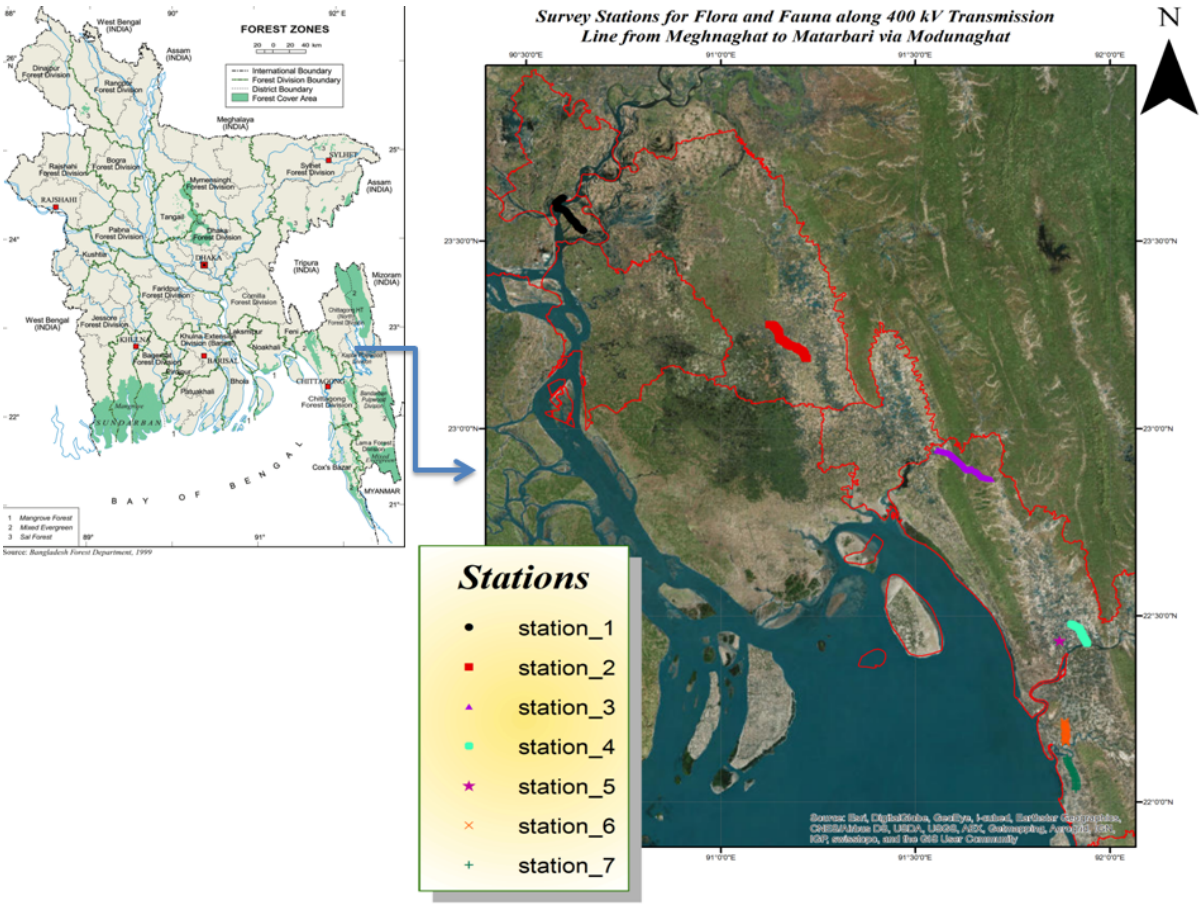

Figure-2-1 GIS Map showing location of sampling stations in Bangladesh

Location survey points for each survey station is shown in the following GIS based satellite images (Figure 2.2 to 2.8):

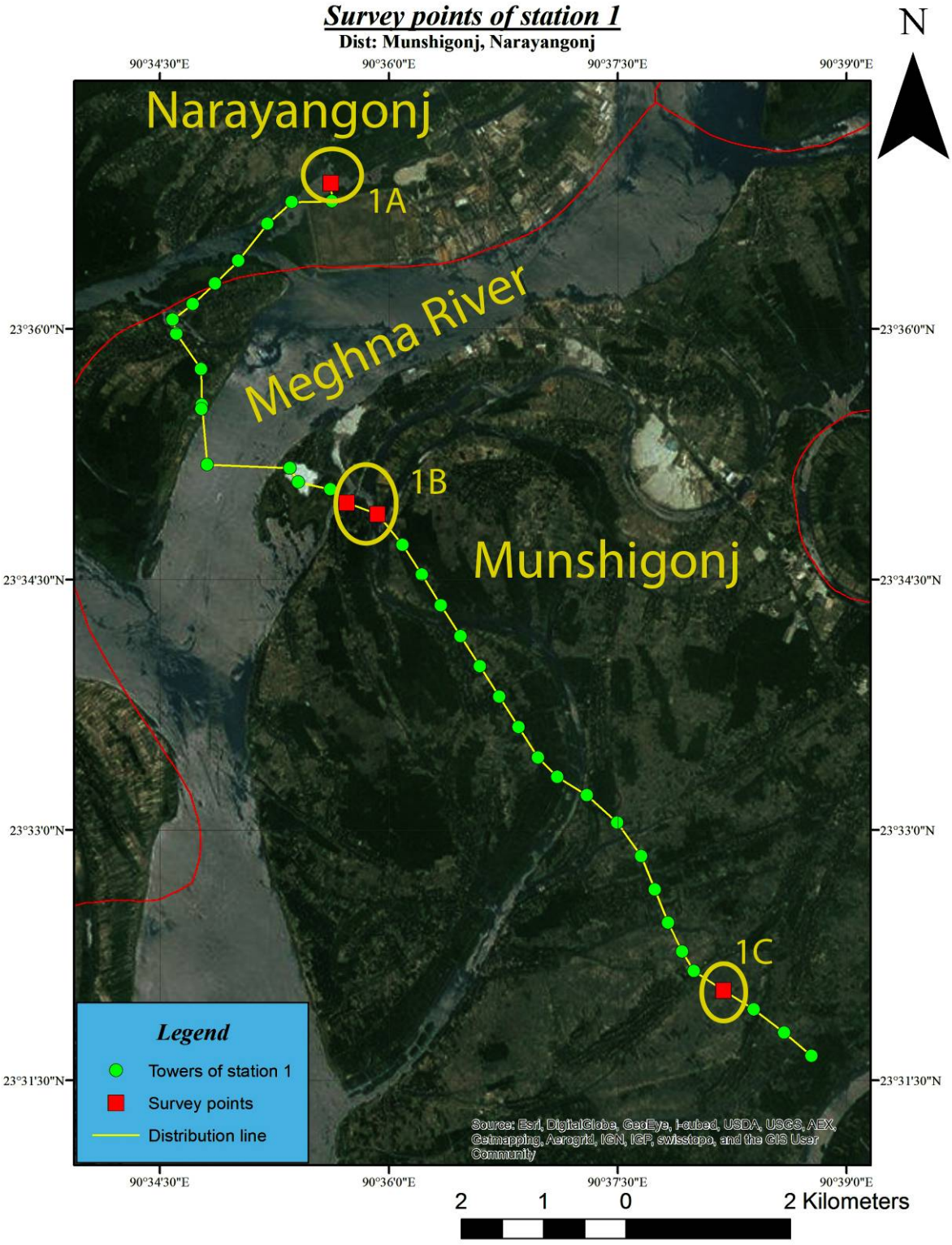

Figure 2.2 GIS based satellite image showing Survey points (1A, 1B, 1C) in survey station-01

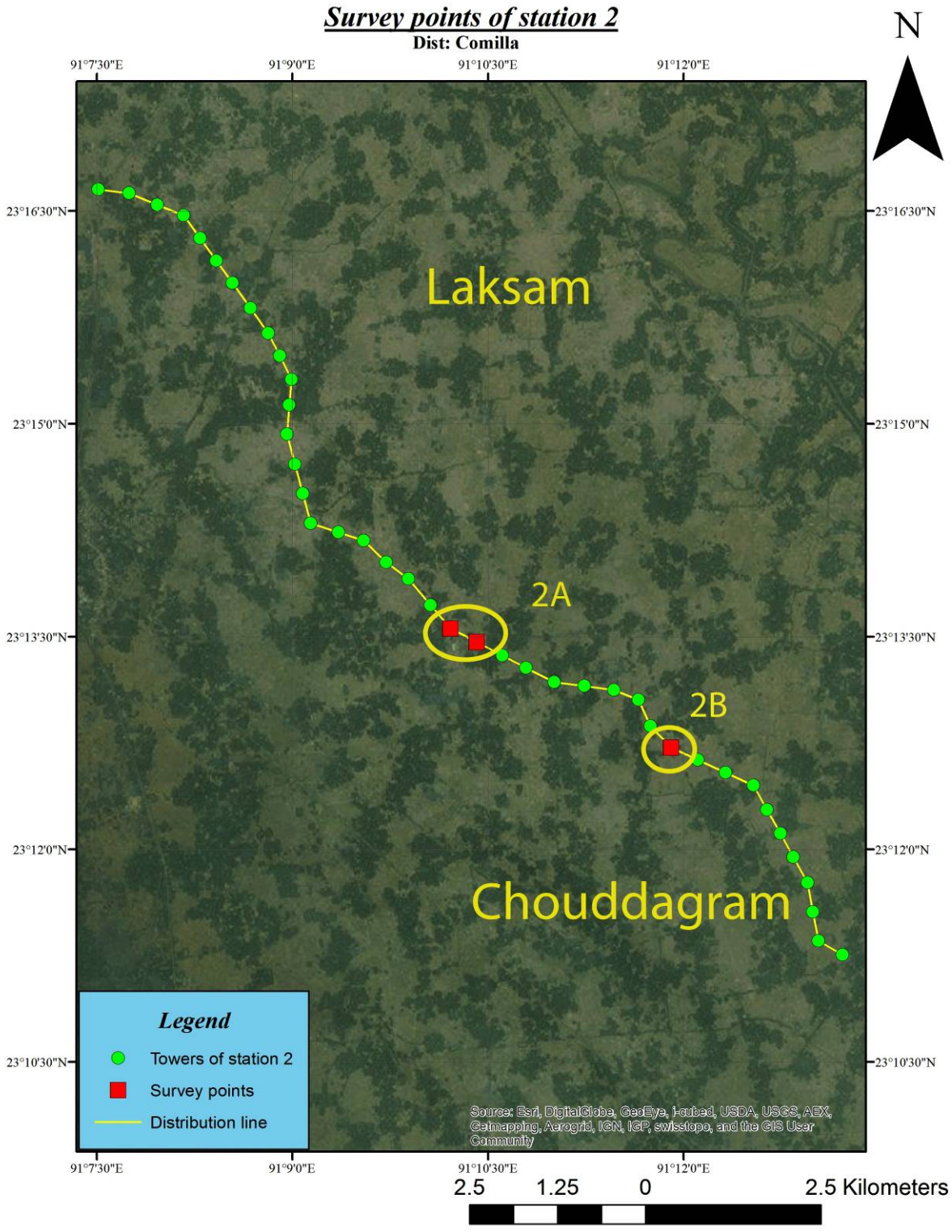

Figure 2.3 GIS based satellite image showing survey points (2A, 2B) in survey station-02

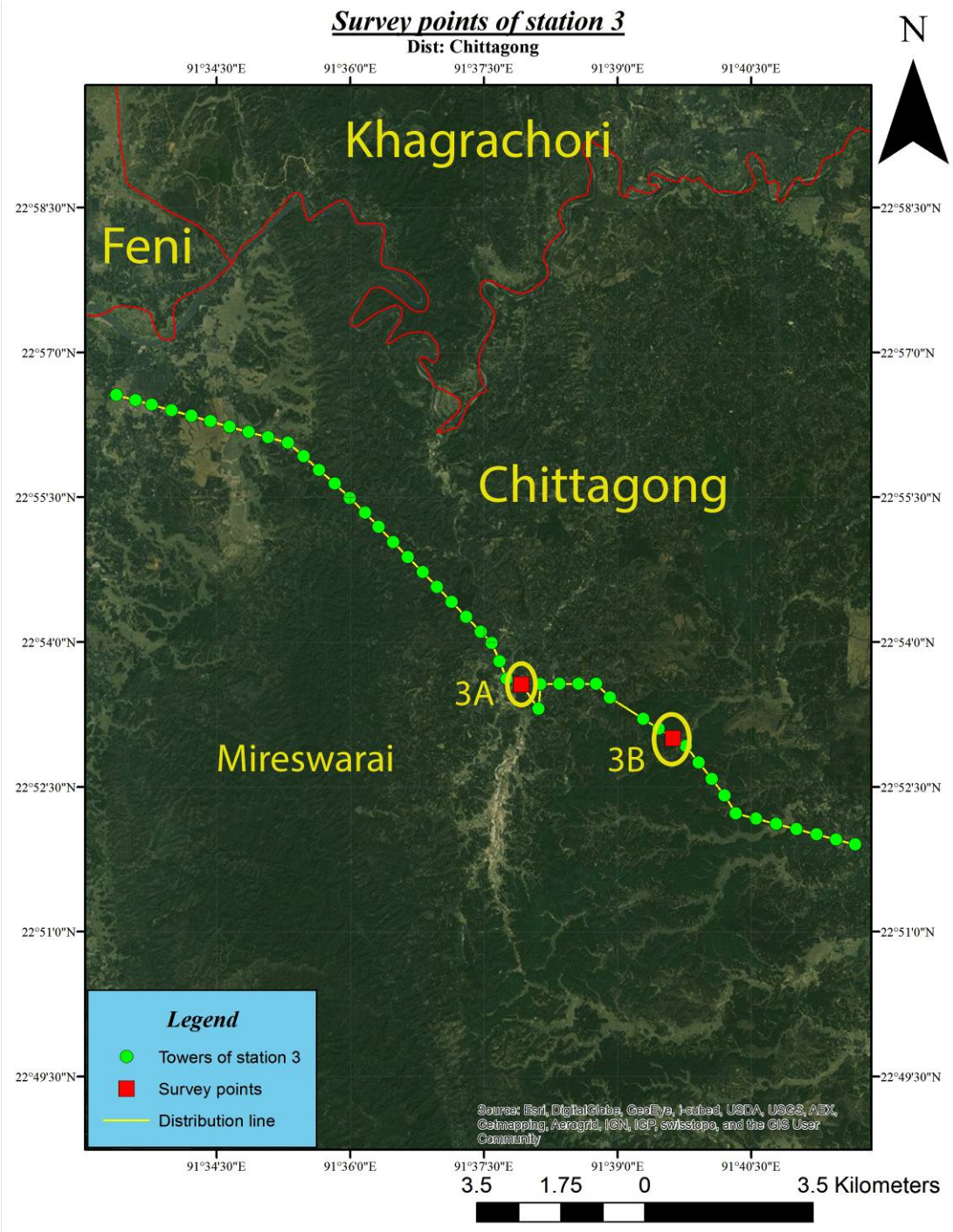

Figure 2.4 GIS based satellite image showing survey points (3A, 3B) in survey station-03

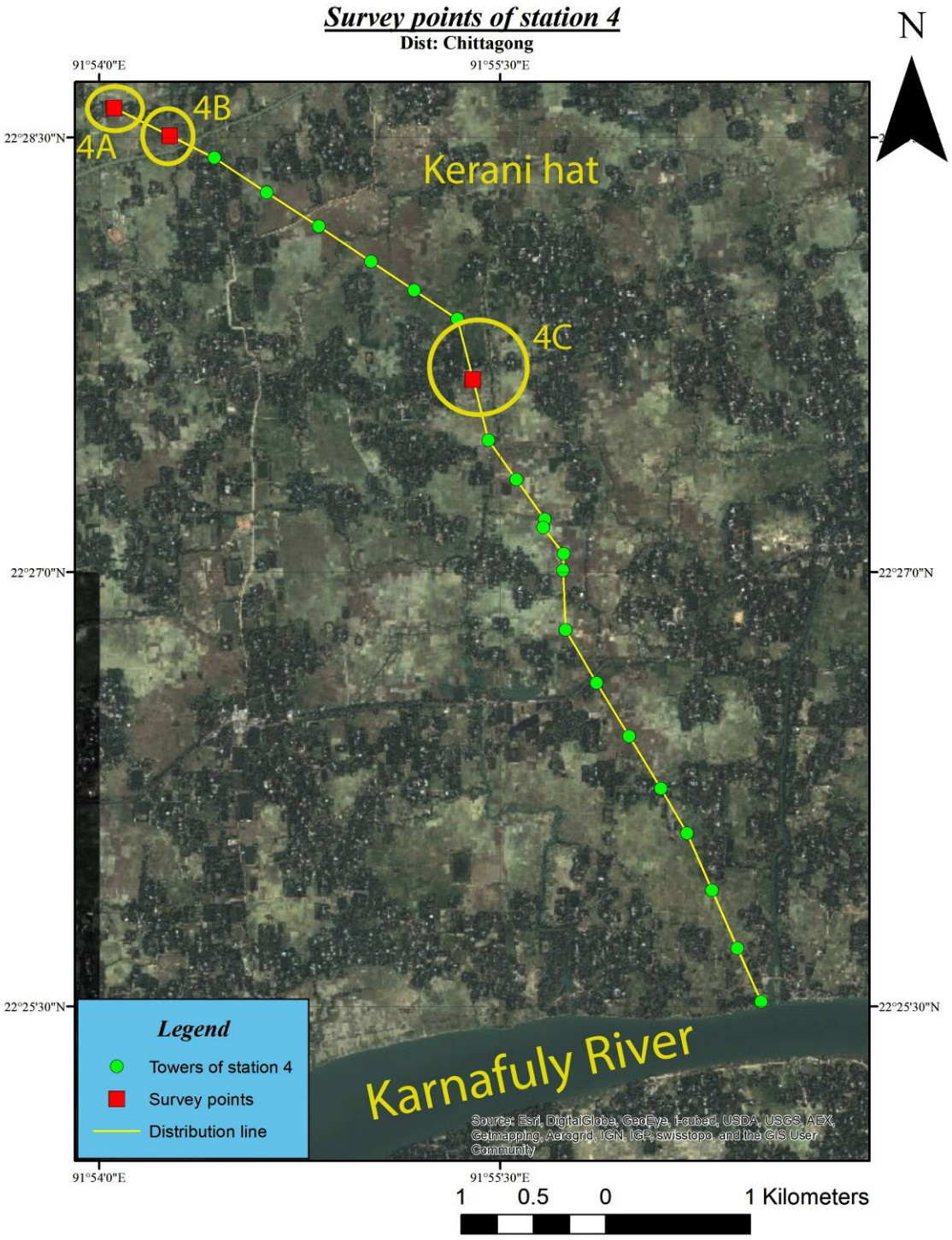

Figure 2.5 GIS based satellite image survey points (4A, 4B, 4C) in survey station-04

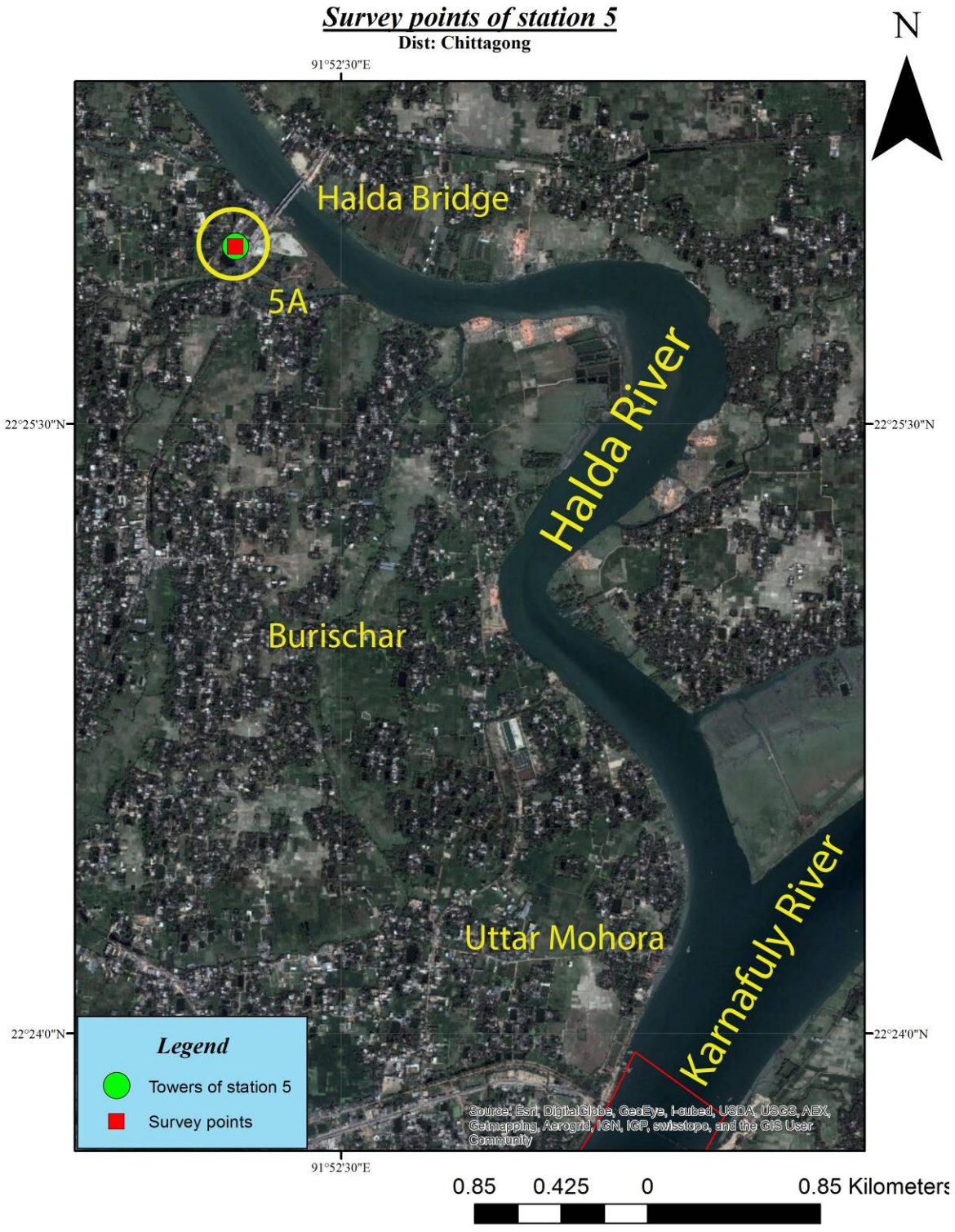

Figure 2.6 GIS based satellite image showing survey point (5A) in survey station-05

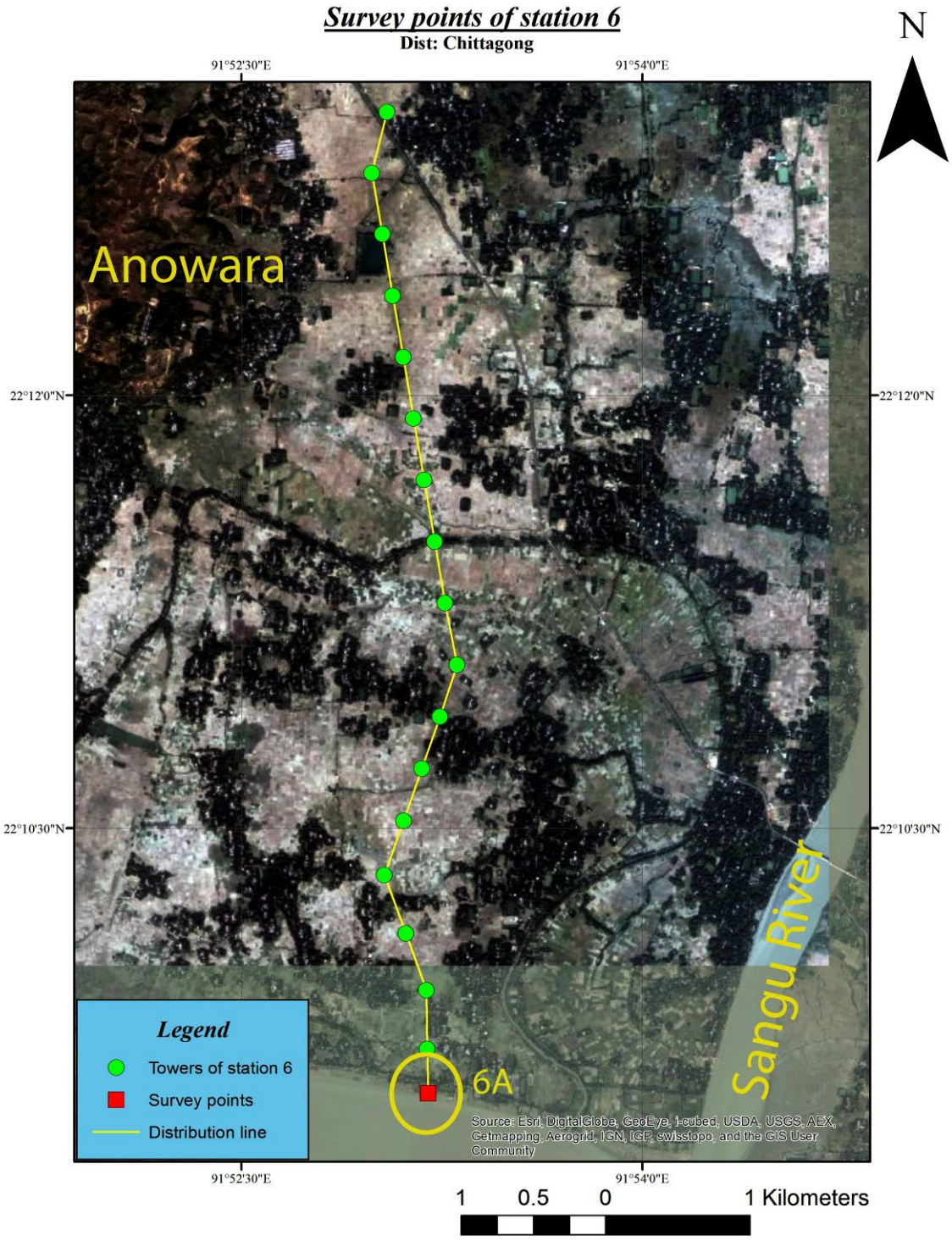

Figure 2.7 GIS based satellite image showing survey point (6A) survey station-06

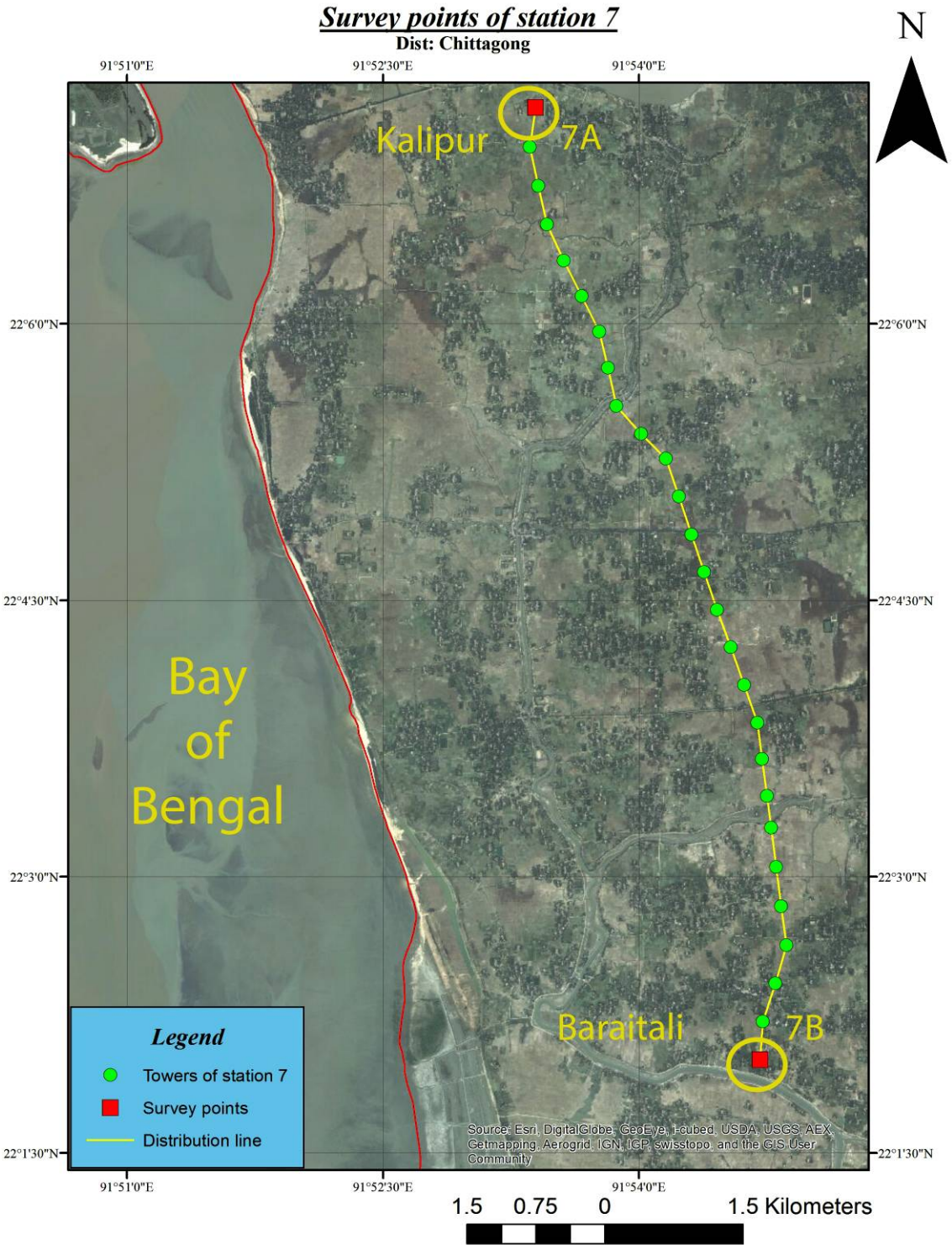

Figure 2.8 GIS based satellite image showing survey points (7A, 7B) in survey station-07

3.0 Methodology

A list of fauna and flora (including rare, endangered, and protected species) potentially found in the project area has been prepared before field survey conducted

following documents existed. Detailed survey has been employed in November 2014 to identify and record fauna and flora in the project site and surrounding habitat for dry season.GPS has been used to record geographic coordinates of the survey points and and a GIS map has been created using those coordinates. In addition, interview to the local people has been done to obtain additional and required information about species and its characteristics. Information concerning on rare, endangered, and protected species has been collected through analyses of various sources of scientific reports, interviews with beneficiaries, partner agencies (including international natural conservation organizations), project staff and local people.

Detailed survey methods on each Taxa is given below:

3.1 Flora

Broad survey and quadrate sampling has been used for vegetation assessment,. Broad survey has been used to record species of plants in the area. Quadrate sampling has been used to determine a vegetation profile and to estimate number of important tree* (with Diameter at BreastHigh or DBH more than 35 cm) that will be cut during the construction of facilities. The quadrate dimension used for tree (DBH ≥ 35 cm) is 20 m x 20 m, for pole (10 cm ≤ DBH < 35 cm) is 10 m x 10 m, for sapling (DBH < 10 cm) is 5 m x 5 m, and for seedling (height < 50 cm) and undergrowth (grasses, vines, herbs, shrubs, ferns species) is 1 m x 1 m **(Figure 3.1).** Individual plants have been identified to their corresponding taxon (family, genus, and species). In term of vegetation analyze, the habitat type, stratum, biometric, and ecology has been assessed as much as possible. Unidentified plant has been collected and brought to the laboratory of Botany at the University of Chittagong for further processing, verification, and authentication.

(*)=trees which are protected by Treaty or local Law

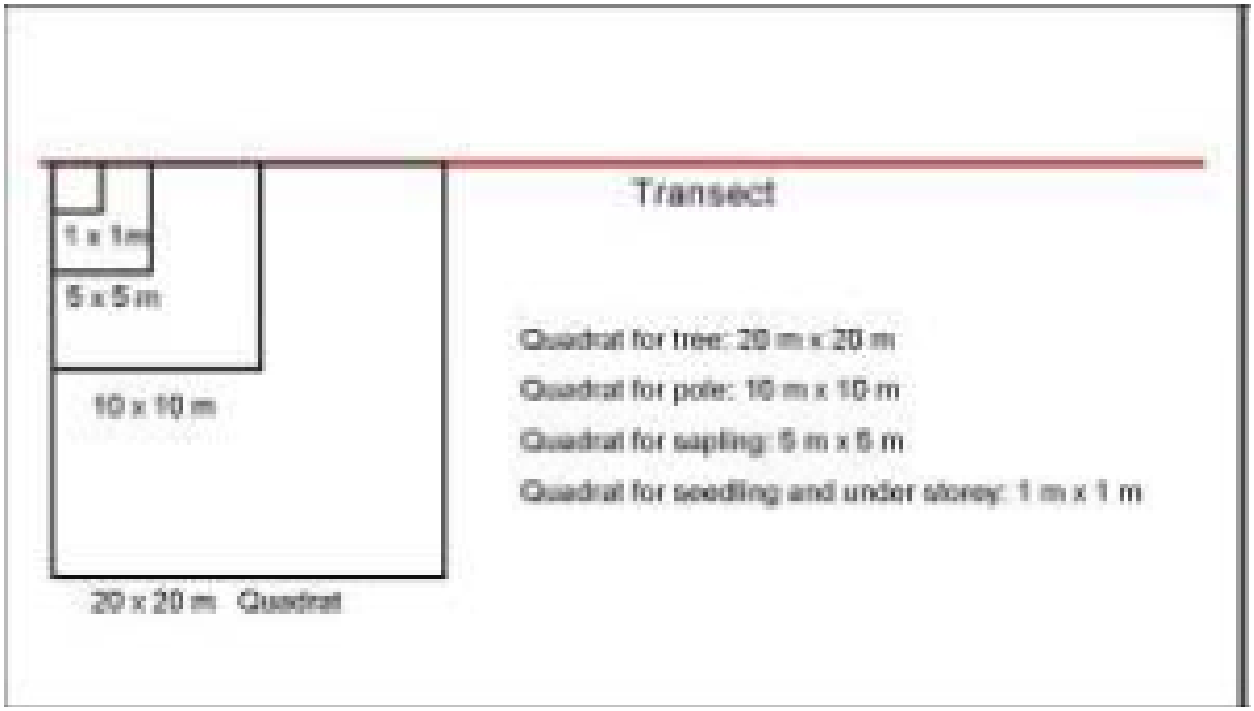

Figure-3.1: a Scheme of sizes of Quadrates

3.2 Fauna

Species list were collected from various sources such as, Department of Agriculture, Fisheries, Forests and Environment and previous literatures for the specific survey location and their adjacent areas. The field survey of fauna was conducted by five groups of surveyors. These groups were Insects group, Amphibian-Reptile-Turtles group, Migratory-Resident Bird group, Dolphin group, and Mammal group. Each group consists of two members; whose have previous experiences on related field and few more volunteers including local people. Then the survey teams have been sent to the identified areas to verify the list of fauna for addition or deletion of the species from the list. To enrich the survey and to get specific data of different animal groups, different methods have been applied. GPS were used to record geographical coordinate. In addition interview to the local people were conducted to get information about species existence and its socio-economic-cultural utilization by the locals. Photographs of species were also taken as many as possible. A final list of fauna for each survey point has been prepared.

***3.2.1. Insects*:** Insect survey was carried out in a manual of technique to monitor insects in selected zones. During the investigation, terrestrial insects especially pollinators (entomophilies) as well as environmental bio-indicators were major concerned. Collection by swept nets and hand picking of many adults were collected/ caught by general sweeping (Figure 3.2). The collections were preserved in the following standard methods. All specimens were kept in the Insect museum, Department of Zoology, University of Chittagong. Unidentified specimens were preserved for farther works. As no conservation

status against Bangladesh insects were published, no comments were put down in the column.

a. Wet preservation: Fresh specimens were preserved in 80% alcohol. Few of those specimens were collected in 100% alcohol for DNA barcode. Separate vials and jars with data labels were used for different groups. They were placed in a cool and dark place.

b. Dry preservation: The collected adult specimens were carried to the laboratory in separate plastic jars or vials. In small size specimens, they were kept in 70% ethanol for 10 minutes and then transferred to 80% and kept for another 10 minutes. After removing from 80% ethanol 90% ethanol was put in the vial and kept for 10 mutes. Finally the specimens were put in 100% ethanol and kept them for at least 20 minutes then dried with HMDS by taking safety measurements. The specimens from 100% ethanol were straightaway transferred to HMDS. The procedure of transferring HMDS into the vials was done inside a bio-safety cabinet. This safety measure was taken because the HMDS has a carcinogenic effect. As the HMDS is highly volatile they evaporate very fast. The exhaust fan of the bio-safety cabinet sucks away the vapors evaporated from the vials and expel outside as fresh air. About after 24 hours these specimens were completely dry. Sundry and oven at 45 □C temperature were used for comparatively large specimens.

After drying, the insects were serially arranged in specially made paper or wooden insect boxes and were stored for Identification. To prevent pest insect and fungal attack, boxes were treated with aerosol spray. Naphthalene balls and paradichlorobenzene were also kept inside the boxes as repellant. The specimens were mounted in a variety of ways depending on their size. Stainless steel, continental size pins with heads were used for all mounting methods. Direct pinning was followed for larger specimens such as ichneumonids and

braconids. Larger specimens were directly pinned which only require minor rearrangement of wings, legs, antennae, etc. A small batch of specimens were transferred into fresh alcohol in a Petridis and agitated gently. Selected specimens were laid, a few, at a time on filter paper and allowed to become damp dry. Antennae, legs etc. were positioned to leave the space around the top of the pins and space for labels and pinned. Other specimens were glued to the pins, laid out a few in a row (each facing to the right) on filter paper and adjusted positions of legs, wings, etc. A small amount of glue (shellac) was transferred to a pin and a narrow band of glue completely encircles the pin. The head of the pin was then rested on the filter paper above the specimen and the pin gently sprung down so that the glue adhere to the right hand side of the mesothorax. Indirect pinning for smaller specimens were pinned with stainless steel micro pin, triangular cards were used for agromyzid flies and smaller parasitoids, but for Chalcidoidea the cards of rectangular in size. The specimens were glued across the apex of a small narrow triangular card using a minimum amount of glue and with the glue under the thorax or mesothorax. The legs and wings were arranged to display any character they may possess. A continental pin was run through the centre of the base of the card triangle and pushed up the shaft of the pin. Data labels were prepared reasonably small neat and legible and logically arranged. Names of localities were abbreviated and in writing dates roman numerals were used for the month to avoid confusion. The dried specimens were checked under a dissecting binocular microscope for selection of the right specimen for card mounting. Small card points and minute pins were kept ready for mounting. Cards were mounted at ¾ heights from the top of the insect pin by using a height manipulator. Very minute amount of special glue was put at the tip of the card or minute pin with the help of a needle. The card was placed at the lateral side of thorax of the specimen. A data label was then mounted on the pin. The mounted specimens were imaged with Dissecting binocular microscope (Olympus) and Digital 3D imaging Microscope which produced sharp. Identifying of insects has done by using morphologically in this moments. During identification and information were collected by following: Kirbey, 1914; Brunetti, 1923 Fraser, 1933 and 1936 Ahmed, 2008a; Ahmed, 2008b; Ahmed, 2009; Mazumdar, *et al.* 2010 and 2011; Chowdhury and Hossain, 2011.

***3.2.2. Amphibians and Reptiles*:** Most frogs of are nocturnal, so observations were made at night (2000-0100 hr). Other factors influencing fieldwork activities were the localization of good breeding sites or third-party information about any special or previously unseen animals. The habitat study and manipulation of captured animals were accomplished on the day following the night fieldwork. Photographs of live animals are important sources of morphological information and can in many cases be helpful to identify the genus or species of an animal. A standardized form was adapted from (Lips *et al*., 2001) and modified according to the needs of the present survey. Animal catching and handling and behaviour in

the field strictly followed the DAPTF fieldwork code of practice (Declining Amphibian Population Task Force, 2001) and the ASIH Guidelines for Use of Live Amphibians and Reptiles in Field and Laboratory Research (ASIH, 2004). For reptiles, diurnal and nocturnal both surveys were conducted. Especially any news from local inhabitants regarding sightings of reptiles was considered and specific places were visited. Most of the reptiles were identified in field, but very small number of individuals has been collected for species confirmation.

***3.2.3. Birds*:** Bird survey were employed to identify and record any rare, endangered and protected species found in the project site and surround habitat that predicted to be impacted. Bird survey along the stream side were employed to record bird species which strongly associate with stream ecosystem as well as forest around the stream. Point observations placed with 100 m interval along 1 km line transect. Line transect across the streams (500 to the right and left of stream) were also employed to count number, density, and biodiversity indices of birds communities. All individuals observed and/or heard were noted by following information: species name, number of individual, elevation, geographic coordination, flies singly or in flocks and other information needed. Independent observation teams were used to obtain concurrent record of birds.

***3.2.4. Mammals*:** Separate Day and Night survey were conducted for diurnal and nocturnal mammals respectively. Two time schedules were maintained: (a) morning to evening (0600 h to 1200 h and 1600 to 1800 h), when observations were made on diurnal mammals ; and (b) evening to early morning (i.e., 1900 h to 0400 h) on nocturnal mammals. Local people interview were conducted to get proper descriptions of mammals found in respective survey point. Droppings, scratch on soil and foot marks were also identified and considered as the presence of respective mammal.

4.0 Vegetation of the Study area:

Diversity of the study areas is not that much rich without maximum land cover found as paddy lands, selected crop lands, swamp, marshy and hilly areas with planted forests and some water logging condition like rainy season. There are some small and scattered forests (not so dense) and vegetable field adjacent to the paddy field. There are some trees are planted along road side viz: *Albizia saman (*Rain tree), *Eucalyptus globulus* (Eucalyptus), *Acacia mangium* (Wattle) etc. There are few houses near the transmission line. Around these houses some ornamental trees and vegetables are planted. We have covered most of the areas following according to GPS coordinates of the towers (Tower).

1A (Tower no 01 & new Meghnaghat):

Marginal land and industrial areas were found adjacent to the meghnaghat power station. . Abundant species are Calotropis gigantea, Solanum sisymbrifolium, Senna sophera, Croton bonplandianus etc.

1B (Tower no. 17, 18):

Water logging condition under Hosendy breeze still exists even if it is dry season. The most common aquatic species found here are: *Corchorus capsularis, Ipomoea aquatica, Ipomoea fistulosa, Sesbania bispinosa, Polygonum orientalis etc.* The area is covered mostly by rice field and a brickfield was also seen there.

1C (Tower no 35):

Marshy land with most of the cultivated plant species along with the road and around the houses as home state forest were found in this area. Abundant species are *Ipomoea aquatica, Sesbania bispinosa, crateva magna, Coccinia grandis, Nymphaea nouchali* etc.

2A (Tower no 217,218), 2B (226):

Maximum lands here are agricultural lands, swamp and marshy in characters. Vegetables and rice are the main vegetation covered here along with roadside planted trees. Abundant plant species are *Curcuma zedoaria,Clerodendron viscosum, Croton bonplandianus, Phyllanthus emblica, Boerhavia diffusa* etc.

3A (Tower no 383):

Slope of hill with dense forest of trees herb and shrub are the main vegetation of this station. Maximum tree species are *Gmelina arborea* (tree garden of G. arborea), under the canopy there are some abundant species viz. *Passiflora foetida, Urena lobata, Mimosa pudica, Clerodendrum viscosum* etc.

3B (tower no 392):

The station is composed of marginal land with natural dense forest of herb, shrub and tree species. Dominant tree species are *Tectona grandis* (Teak garden).

4, 5, 6 and 7:

Diversity of the vegetation all these four stations was found very poor with cultivated crops, vegetables and swampy marshes. Some planted trees along road side viz: *Albizia saman (*Rain tree), *Eucalyptus globulus* (Eucalyptus), *Acacia mangium* (Wattle) etc were common

for all stations. There are few houses near the transmission line with home state forest of some ornamental as home garden, vegetable and trees etc.

5.0 Results of Flora Survey:

Summary

A total of 145 species in 116 genera under 66 families were recorded from the study site. There were some common plant species, which were present in every survey site. Viz.: *Achyranthes aspera, Alternanthera philoxeroides* etc. According to IUCN category, three threatened plant species were recorded from the study areas. Viz.: *Borassus flabellifer, Dipterocarpus turbinatus, Swietenia mahagoni* (Table 5.1).

Diversity of the study areas is very poor because maximum lands are cultivated (Paddy field), marginal land and industrial areas. Some of the lands are swamp, marshy and water logging condition during dry season. There are some small and scattered forests (not dense) and vegetable field adjacent to the paddy field. There are some trees are planted along the roadside viz: *Albizia saman (*Rain tree), *Eucalyptus globulus* (Eucalyptus), *Acacia mangium* (Wattle) etc. There are few houses near the transmission line. Around these houses some ornamental, vegetables, trees are planted. We have visited many areas according to GPS reading (Tower). From our field survey, it is very clear that, vegetation of the study areas more or less same and there were no significant differences between the rainy and dry season's survey.

Abundant species have been found in the study areas are- *Calotropis gigantea, Solanum sisymbrifolium, Senna sophera, Croton bonplandianus ,Corchorus capsularis, Ipomoea aquatica, Ipomoea fistulosa, Sesbania bispinosa, Polygonum orientalis, crateva magna, Coccinia grandis, Nymphaea nouchali , Curcuma zedoaria,Clerodendron viscosum, Phyllanthus emblica, Boerhavia diffusa etc*

Location with coordinates of those three threatened species is given in the following table:

Table 5.1: GPS coordinates of survey points where threatened species (IUCN) were found

Sl. No.	Name of threatened species	Location where found	GPS coordinates		Remarks
			Latitude (N)	Longitude(E)	
1	*Borassus flabellifer* L.	SP01	22°6'40.53"	91°55'32.46"	Please see Map01

Sl. No.	Name of threatened species	Location where found	GPS coordinates		Remarks
			Latitude (N)	Longitude(E)	
2	*Dipterocarpus turbinatus* Gaertn	SP02	22°28'10.28"	91°55'01.00"	Please see Map02
3	*Swietenia mahagoni* (L.) Jacq.	SP03	22°26'45.84"	91°55'37.88"	Please see Map03

Survey points where threatened species (IUCN) were found are also shown in the following maps:

Figure 5.1: Map showing location (SP01) of threatened species (*Borassus flabellifer* L.) found

Figure 5.2: Map showing location (SP02) of threatened species (*Dipterocarpus turbinatus* Gaertn.) found

Figure 5.2: Map showing location (SP03) of threatened species (*Swietenia mahagoni* (L.) Jacq.) found

All recorded plant species from the field during dry season are listed in **Table- 5.2.**

Table-5.2 : List of Plant species in the Dry Season

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
1	*Acanthus ilicifolius* L.	Holy-leaved acanthus	Hargoza	Acanthaceae	√																	
2	*Abelmoschus moschatus* Medik	Musk mallow	Bannoderos	Malvaceae					√													
3	*Acacia auriculiformis Benth.*	Ear-pod wattle	Akashi	Mimosaceae	√			√			√											
4	*Acacia catechuoides (Roxb.)* Benth.		Khoira	Mimosaceae								√										
5	*Acacia mangium* Willd.	Wattle	Akashi	Mimosaceae			√	√	√													
6	*Achyranthes aspera* L.	Red chaff tree	Apang	Amaranthaceae	√		√	√		√	√		√					√				
7	*Alstonia macrophylla* Wall. *ex* G.Don	Devil's tree	BaroChhatim	Apocynaceae	√						√								NT			
8	*Ageratum conyzoides* (L.) L.	Tropical white weed	Fulkuri	Asteraceae				√	√		√											
9	*Albizia procera* (Roxb.) Benth.	White siris	Silkorai	Mimosaceae		√		√	√													
10	*Albizia saman* (Jacq.) Merr.	Rain tree	Rain tree	Mimosaceae		√	√		√									√				
11	*Alstonia scholaris* (L.) R.Br.	Dita bark tree	Chatim	Apocynaceae										√					LC			
12	*Alternanthera philoxeroides* (Mart.) Griseb.	Alligator weed	Helencha	Amaranthaceae		√			√	√	√				√			√				
13	*Alternanthera sessilis* (L.) R.Br. *ex* DC.	Sessile joywood	Sachishak	Amaranthaceae														√	LC			
14	*Amaranthus spinosus L.*	Spiny pigweed	Kantamairra	Amaranthaceae											√							
15	*Amaranthus viridis* L.	Green amaranth	MairraShak	Amaranthaceae					√	√												
16	*Artocarpus heterophyllus* Lam.	Jack fruit	Kathal	Moraceae	√	√		√			√											
17	*Artocarpus lacucha* Buch.-Ham.	Monkey jack	Barta	Moraceae	√																	
18	*Averrhoa carambola* L.	Carambola	Kamranga	Fabaceae	√																	

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
		apple	shim																			
19	*Avicennia alba* Blume		Barabaen	Verbenaceae	√														LC			
20	*Azadirachta indica* A. Juss.	Neem tree	Nim	Meliaceae		√		√														
21	*Bambusa tulda* Roxb.	Indian bamboo	Mitinga	Poaceae	√						√											
22	*Bambusa vulgaris Schrad.*	Common bamboo	Bangla bans	Poaceae	√				√		√		√									
23	*Barringtonia acutangula* (L.) Gaertn.	Indian oak	Hizal	Lecythidaceae			√		√													
24	*Bombax ceiba* L.	Red silk cotton tree	Simul	Bombacaceae					√													
25	*Borassus flabellifer* L.	Barb tree	Tal	Arecaceae	√	√	√	√			√								EN			
26	*Bougainvillea glabra* Choisy	Bougainvillea	Baganbilas	Nyctaginaceae	√																	
27	*Calotropis gigantea* (L.) Ait.f.	Swallow tree	Akand	Asclepiadaceae												√						
28	*Carica papaya* L.	Papaya	Pepe	Caricaceae	√	√		√			√											
29	*Casuarina equisetifolia* L.	Beefwood	Jau	Casuarinaceae											√							
30	*Catunaregam spinosa* (Thunb.) Tirveng	Common emetic nut	Mankanta	Rubiaceae	√																	
31	*Centella asiatica* (L.) Urban.	Spadeleaf	Thankuni	Apiaceae					√									√	LC			
32	*Cheilocostus speciosus* (J.Konig) C.Specht	Canereed	Kew shak	Costaceae								√										
33	*Chromolaena odorata* (L.) R.M.King & H.Rob.	Paraffin weed	Asamlata	Asteraceae	√		√				√	√										
34	*Citrus maxima* (Burm.f.) Merr.	Pummelo	Jambura	Rutaceae		√																
35	*Clerodendrum viscosum* Vent.		Vat	Verbenaceae	√		√	√				√		√								
36	*Coccinia grandis* (L.) Voigt	Ivy gourd	Kelakachupata	Cucurbitaceae		√	√											√				
37	*Cocos nucifera* L.	Coconut palm	Nairkel	Arecaceae		√	√	√			√											

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
38	*Canna indica L.*	Canna lily	Kalaboti	Cannaceae		√	√	√										√				
39	*Commelina benghalensis* L.	Blue commelina	Kanaialata	Commelinaceae	√				√		√				√				LC			
40	*Crateva magna* (Lour.) DC.	Three leaved caper	Barun	Capparaceae														√				
41	*Crotalaria pallidaAiton*		Jhunjhuni	Fabaceae						√												
42	*Croton bonplandianus* Baill.	Bonplant's croton	Paglamaric h	Euphorbiaceae			√	√	√					√		√						
43	*Curcuma zedoaria (Christm.)* Roscoe	Indian arrowroot	Soti	Zingiberaceae										√								
44	*Cyanthillium cinereum* (L.) H.Rob.	Purple fleabane	Sialimutra	Asteraceae					√													
45	*Cynodon dactylon* (L.) Pers.	Star grass, Couch grass	Durba grass	Poaceae		√												√				
46	*Cyperus rotandus* L.	Nut grass	Nagarmuth a	Cyperaceae	√				√													
47	*Desmodium gangeticum* (L.) DC.		Chalani	Fabaceae								√										
48	*Dioscorea alata* L.	Asiatic yam	Banga alu	Dioscoreaceae											√							
49	*Dioscorea bulbifera* L.	Air potato	Banalu	Dioscoreaceae										√								
50	*Dioscorea pentaphylla* L.	Five-leafyam	Jum alu	Dioscoreaceae								√										
51	*Diplazium esculentum* (Retz.) Sw.		Dhekishak	Woodsiaceae						√									LC			
52	*Dipterocarpus turbinatus* Gaertn.	The eng tree	Garjan	Dipterocarpace ae							√								CR			
53	*Eclipta prostrata* (L.) L.	False daisy	Kesraj	Asteraceae		√													DD			
54	*Eichhornia crassipes* (Mart.) Solms	Water-hyacinth	Kachuripan a	Pontederiaceae		√				√					√		√	√				
55	*Elaeocarpus floribundus* Blume	Indian olive	Jalpai	Elaeocarpaceae	√				√		√											
56	*Elephantopus scaber* L.	Elephant's	Shamdalan	Asteraceae					√	√												

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)													Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
		foot																				
57	*Enhydra fluctuans* Lour.	Marsh herb	Hinchashak	Asteraceae		√																
58	*Erythrina variegta var. picta* Maheshw.	Indian coral tree	Mandar	Fabaceae		√		√	√		√				√							
59	*Eucalyptus globules* Labill		Globu eucalyptus	Myrtaceae	√	√																
60	*Eupatorium antiquorum* L.	Malayan spurge	Tesramansa	Euphorbiaceae		√		√			√											
61	*Euphorbia hirta* L.	Snake weed	Dudialata	Euphorbiaceae												√						
62	*Ficus erecta* Thunb.	Japanese fig	Ballagota	Moraceae						√									LC			
63	*Ficus hispida* L.f.	opposite leave fig	Dumur	Moraceae	√					√	√	√										
64	*Ficus rumphii* Blume	Weeping fig	Jhula bot	Moraceae													√					
65	*Gmelina arborea* Roxb.	White teak	Gamari	Verbenaceae	√		√	√	√		√	√										
66	*Glycosmis pentaphylla* (Retz.) A.DC	Motar tree	Datmagan	Rutaceae			√				√		√									
67	*Heliotropicum indicum* L.	Indian heliotrope	Hatishur	Boraginaceae			√															
68	*Hibiscus rosasinensis* L.	China rose	Joba	Malvaceae		√																
69	*Ipomoea fistulosa* Mart.*ex* Choisy		Dolkolmi	Convolvulaceae		√			√		√						√	√				
70	*Ipomoea aquatica* Forssk.	Water spinach	Kalmi	Convolvulaceae		√											√	√	LC			
71	*Ixora paevetta* Andr.	The torch tree	Gandhalrangan	Rubiaceae		√		√														
72	*Justicia gendarussa* Burm.f.*		Jagatmadan	Convolvulaceae		√			√		√											
73	*Lagerstroemia speciosa* (L.) Pers.		Jarul	Lythraceae									√									
74	*Lannea coromandelica* (Houtt.) Merr.		Badi	Anacardiaceae					√						√							

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
75	*Lantana camara* L.	Lantana	Khutuskanta	Verbenaceae	√		√	√	√													
76	*Lepisanthes rubiginosa* (Roxb.) Leenh.		Rubihorina	Sapindaceae	√							√										
77	*Lindernia antipoda* (L.) Alston	Sparrow false pimpernel	Zai ghas	Linderniaceae														√	LC			
78	*Lippia alba* (P.Mill.) N.E.Br. ex Britt. & Wilson		Shunk	Verbenaceae						√								√				
79	*Ludwigia adscendens* (L.) Hara		Mulcha	Onagraceae											√							
80	*Ludwigia hyssopifolia* (G.Don) Exell.	Seedbox	Zaikura	Onagraceae						√					√				LC			
81	*Lygodium japonicum* (Thunb.) Sw.		Japanilata fern	Schizaeaceae	√							√										
82	*Mangifera indica* L.	Mango	Aam	Anacardiaceae	√	√		√			√								DD			
83	*Marsilea minuta* L.	Marshy fern	Susnishak	Marsileaceae		√			√		√								LC			
84	*Melastoma malabathricum* L.	Indian rhododendron	Bon tejpata	Melastomaceae	√							√										
85	*Mikania micrantha* kunth	Heartleaf	Asamlata	Asteraceae	√	√		√			√											
86	*Merremia gangetica*		Indukanipana	Convolvulaceae	√														LC			
87	*Microcos paniculata* L.		Asargula	Tiliaceae	√																	
88	*Mikania micrantha* Kunth	Heratleafhempvine	Tufainnalata	Asteraceae	√		√		√	√	√	√	√									
89	*Mimosa himalayna* Gamble*	Giant sensitive plant	Borosarmida	Mimosaceae	√																	
90	*Mimosa pudica* L.	Sensitive plant	Lajjabati	Mimosaceae	√	√		√			√	√							LC			
91	*Momordica charantia* L. *var. charantia*	Bitter melon	Titakorolla	Cucurbitaceae	√				√													
92	*Moringa olifera* Lam.	Horse radish	Sajna	Moringaceae	√																	

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)															Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**				IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C					
		tree																					
93	*Momordica cochinensis* (Lour.) Sprengel	Sweet gourd	Kakrul, Akri	Cucurbitaceae							√												
94	*Monochoria hastata* (L.)5Solms.	Arrowleaf false pickereweed	Fena	Pontederiaceae						√										LC			
95	*Musa paradisiaca* L.	Banana	Kacha kola	Musaceae	√	√		√			√												
96	*Neolamarckia cadamba* (Roxb.) Bosser		Kadam	Rubiaceae										√									
97	*Nymphaea nouchali* Burm.f.	Water lily	Shapla	Nymphaeaceae														√		LC			
98	*Oryza sativa* L.	Paddy	Dhan	Poaceae										√	√		√						
99	*Pandanus foetidus* Roxb.	Screw pine	Koikikanta	Pandanaceae					√														
100	*Passiflora foetida* L.	Wild passion fruit	Jumkolata	Passifloraceae								√											
101	*Persicaria orientalis* (L.) Spach	The garden gate	Biskatali	Polygonaceae			√																
102	*Phoenix sylvestris* (L.) Roxb.	Date sugar palm	Khajur	Arecaceae					√														
103	*Phyllanthus acidus* (L.) Skeels	Country gooseberry	Horboroi	Euphorbiaceae	√						√												
104	*Phyllanthus emblica* L.	Indian gooseberry	Amloki	Euphorbiaceae	√						√												
105	*Phyllanthus reticulatus* Poir.	Reticulated leaf-flaver	Cirkuti	Euphorbiaceae					√	√	√			√									
106	*Phyllanthus sikkimensis* Mull.Arg.*		Sikimamla	Euphorbiaceae		√																	
107	*Piper retrofractum* Vahl	Javanese long pepper	Chai lata	Piperaceae											√								
108	*Piper peepuloides* Roxb.		Pipul	Piperaceae							√												
109	*Pistia stratiotes* L.	Tropical duckweed	Futihena	Araceae		√									√					LC			

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
110	*Pongamia pinnata* (L.) Pierre	indian beach	Koronja	Fabaceae		√													LC			
111	*Pouzolzia zeylanica* (L.) Benn.	Pouzolzia	Kullaruki	Urticaceae		√			√		√											
112	*Premna esculenta* Roxb.		Lalana	Verbenaceae		√																
113	*Psidium guajava*L.	Guava	Peyara	Myrtaceae	√			√	√		√											
114	*Ricinus communis* L.	Castor	Verenda	Euphorbiaceae														√				
115	*Schumannianthus dichotomus* (Roxb.) Gagnep.		Sitolpati	Marantaceae	√				√		√											
116	*Scoparia dulcis* L.	Goat weed	Bondhone	Scrophulariaceae			√		√													
117	*Senna tora* (L.) Roxb.	Metal seed	Chotokalokeshunde	Caesalpiniaceae					√		√		√									1
118	*Senna sophera* (L.) Roxb.	Pepper-leaved senna	Barokalokeshunde	Caesalpiniaceae												√						
119	*Sesamum indicum* L.	Sesame	Til	Pedaliaceae														√				
120	*Sida acuta* Burm.f.	Broom weed	Kureta, Ururia	Malvaceae					√	√	√	√						√				
121	*Sida cordifolia* L.	Flannel weed	Shet-berela	Malvaceae			√															
122	*Sida rhombifolia* L.	Cuba jute	Kureta	Malvaceae								√						√				
123	*Smilax ovalifolia* Roxb. *ex* D.Don	Black creeper	Kumairralata	Smilacaceae	√																	
124	*Solanum americanum* Mill.		Tit begun	Solanaceae	√	√					√											
125	*Solanum melongena* L.	Brinjal	Begun	Solanaceae	√	√		√			√											
126	*Solanum nigrum* L.	Black night	Futibegun	Solanaceae											√			√				
127	*Solanum sisymbrifolium* Lam.	Prickly brinjal	Kantikari	Solanaceae												√						
128	*Solanum torvum Sw.*	Cherry eggplant	Titbegun	Solanaceae						√					√							
129	*Spermacoce articularis* L.f.		Atharogia	Rubiaceae						√												
130	*Sphagneticola calendulacea*	Trailing daisy	Vimraj	Asteraceae						√												

Sl. No.	*Scientific name*	English name	Local name	Family	Survey sites No. (A,B,C=Number of quadrat)														Conservation Sites			Remarks
					7		**6**	**5**	**4**			**3**		**2**		**1**			IUCN	CITES	Local Law	
					A	B	A		A	B	C	A	B	A	B	A	B	C				
	(L.) Pruski																					
131	*Spilanthes acmella* (L.) L.		Maricha	Asteraceae			√			√	√											
132	*Stephania japonica* (Thunb.) Miers	Snake vine	Musarralata	Menispermaceae					√		√				√			√				
133	*Streblus asper* Lour.	Toothbrush tree	Horba	Moraceae	√		√	√	√		√											
134	*Swietenia mahagoni* (L.) Jacq.	Spanish mahogany	Mahogany	Meliaceae	√				√		√								EN			
135	*Synedrella nodiflora* (L.) Gaertn.	Nodeweed	Relanodi	Asteraceae			√		√	√					√							
136	*Syzygium cuminii* (L.) Skeels	Java plum		Myrtaceae					√		√	√										
137	*Syzygium fruticosum* (Roxb.) DC.		Kawyagajam	Myrtaceae	√																	
138	*Tabernaemontana alternifolia* L.		Janglitagar	Apocynaceae	√																	
139	*Tectona grandis* L.f.	Teak	Segun	Verbenaceae	√							√	√									
140	*Tamarindus indica* L.	Tamarind tree	Tetul	Tamaricaceae		√																
141	*Terminalia catappa* L.	Indian almond	Katbadam	Combretaceae					√					√								
142	*Urena lobata* L.	Congo jute	Jangligagra	Malvaceae	√																	
143	*Vitex negundo* L.	Chaste tree	Nishinda	Verbenaceae		√																
144	*Ziziphus mauritiana* Lam.	Plum	Kul	Rhamnaceae		√	√		√													
145	*Ziziphus oenoplia* (L.) Mill.	Jackal jujube	Bonboroi	Rhamnaceae	√																	

7.0 Results of Fauna Survey:

List of Fauna available in 7 sampling stations is given in the following Tables:

Table-7.1 : List of Insects

Table-7.2 : List of Amphibia

Table-7.3 : List of Reptilia

Table-7.4 : List of Aves

Table-7.5 : List of Mammalia

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Summary: A total of 132 species were observed, from seven sampling points, including 47 insects, 07 amphibians, 12 reptilians, 53 birds and 13 mammalian species. These 47 insects were belonging to 31 families of 12 orders. All the 7 amphibians were under order of Anura and three Families. The highest four species were recorded under family Dicroglossidae, while two species from Microhylidae and one species from Bufonidae. A total of 12 reptile species were recorded, where only one was included in CITES appendix I. 13 mammalians taxa were recorded of 4 orders and 9 families. Three mammals were included in CITES appendix III and one in appendix I. None of the observed insect, amphibian and birds taxa found to be enlisted in CITES appendices. All observed insect, amphibian, reptilian and birds were Least Concern of IUCN category whereas only 3 species of mammals (*Arctonyx collaris* F.G.Cuvier 1825; *Lutra lutra* Linnaeus 1758; *Viverra zibetha* Linnaeus 1758) – were included into Near Threatened category.

All recorded faunal species from the field survey during dry season are listed in **Table 7.1-7.5** in the following pages.

Table - 7.1 LIST OF INSECTS																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	Species Name		Order, Family																	
No.	Scientific Name	Common Name																		
			Order: Odonata, Family: Coenagriidae																	
1	*Agriocnemis pygmaea* (Rambur)	Damselfly (Foring)		√	√			√	√	√			√	√				LC		
2	*Ceriagrion cerinorubellum,* (Brauer)	Damselfly (Foring)		√	√	√	√	√	√	√			√					LC		
3	*Copera vittata* Selys, 1863	Narrow-winged Damselfly, (Foring)		√	√			√	√	√								LC		
			Family: Libellulidae																	
4	*Tholymis tillarga* Fabricius, 1798	Evening Skimmer, (Foring)		√	√			√	√	√								LC		
5	*Orthetrum cancellatum* Linnaeus, 1758	Black-tailed skimmer Dragonfly (Foring)		√	√			√	√	√								LC		
6	*Neurothemis fulvia* Kirby, 1889	Skimmer (Foring)		√	√	√	√	√	√	√								LC		

Table - 7.1 LIST OF INSECTS																			
				7		6	5	4			3		2		1				
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
7	*Diplacodes trivialis*	Blue darter (Foring)		√	√			√	√	√								LC		
8	*Diplacodes nebulosa* Fabricius,1793	Black-tipped percher (Foring)		√	√	√	√	√	√	√								LC		
9	*Brachythemis contaminata* Fabricius,1793	Skimmer (Foring)		√	√	√	√	√	√	√								LC		
10	*Pantala flavescens, Fabricius*	Wandering Glider, (Foring)												√				LC		
			Order: Orthoptera , Family: Gryllidae																	
11	*Gryllus spp.*	Cricket (Urchunga)		√	√			√	√	√	√	√						LC		
			Family: Acrididae																	
12	*Oxya chinensis(Thunberg)*	Small Rice Grasshopper, (Ghas Foring)		√	√		√	√	√	√			√	√				LC		
			Order: Dictyoptera Family: Mantidae																	
13	*Periplaneta Americana* Linn.	American Cockroach		√	√	√	√	√	√	√	√	√	√	√	√	√	√			

Table - 7.1 LIST OF INSECTS																			
				7		6	5	4			3		2		1				
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
14	*Mantis religiosa* Linnaeus, 1758	(Telapoka)		√	√	√	√	√	√	√	√	√						LC		
			Order: Diptera , Family: Culicidae																	
15	*Culex* spp.	Culex mosquito (Mosha)			√	√		√										LC		
			Family: Syrphidae																	
16	*Eristalinus quinquelineatus(Fabricius)*	Hoverfly			√			√	√	√								LC		
17	*Episyrphus spp.*	Hover fly			√			√	√	√								LC		
			Family: Muscidae																	
18	*Musca domestica* Linn.	House fly		√	√	√	√	√	√	√			√		√	√	√	LC		
			Family: Calliphoridae																	
19	*Chrysomya megacephala (Fabricius)*	Oriental latrine fly		√	√	√	√						√		√	√	√			
			Order: Homoptera , Family: Aphidae																	
20	*Rhopalosiphum*	Aphis			√	√	√	√		√				√				LC		

Table - 7.1 LIST OF INSECTS																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	sp.																			
			Family: Halictidae																	
21	*Lasioglossum* sp.	Solitary Bee		√	√			√	√	√			√	√			√	LC		
			Family: Alydidae																	
22	*Leptocorisa acuta* Thunberg, 1904	Rice bug (Dhaner Gandhi poka)		√	√			√	√	√			√	√			√	LC		
			Family:Pentatomida																	
23	*Eurydema pulchrum* Westwood, 1837	Radish bug (Not available)			√		√	√	√	√								LC		
			Order: Lepidoptera , Family: Pieridae																	
24	*Eurema hecabe contubernalis* Moore	Common Grass Yellow, (Holud)		√	√	√	√	√	√	√	√	√	√	√			√	LC		
			Family: Danaidae																	
25	*Danaus melanippus indicus* (Fruhstorfer)	White Tiger (Shushama)									√				√			LC		

Table - 7.1 LIST OF INSECTS																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
26	*Parantica aglea aglea* (Stoll)	Glassy Tiger (Shetalkuchi)					√				√	√						LC		
			Family: Nymphalidae																	
27	*Euthalia monina kesava* Moore	Powdered Baron (Tomosha)									√	√						LC		
28	*Junonia atlites* (Linn.)	The grey pansy			√			√	√	√	√	√						LC		
			Family: Satyridae																	
29	*Melanitis phedima bela* Moore	Dark Evening Brown		√	√			√	√	√	√	√						LC		
			Family: Papilionidae																	
30	*Troides Helena Cerberus* (Felder & Felder)	Common Birdwing (Shonal)				√					√	√						LC		
			Family: Hesperioidea																	
31	*Oriens goloides* Moore	Smaller Darlet		√	√			√	√	√								LC		
32	*Parnara guttatus mangala* Moore	Straight Swift (Nillbijuri)					√			√	√	√					√			

Table - 7.1 LIST OF INSECTS																			
				7		6	5	4			3		2		1				
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
			Order: Coleoptera , Family: Chrysomelidae																	
33	*Aulacophora foveicollis* Lucas	Red pumpkin beetle		√	√			√	√	√	√	√	√	√	√	√	√	LC		
34	*Aulacophora frontalis* Baly	Pumpkin beetle		√	√			√	√	√	√	√	√	√	√	√	√	LC		
			Order: Hymenoptera , Family: Aphidae																	
35	*Rhopalosiphum sp.*	Aphis		√	√	√	√	√	√	√			√	√				LC		
			Family: Anthophoridae																	
36	*Amegilla* spp.				√			√	√	√	√	√			√	√		LC		
			Family: Halictidae																	
37	*Lasioglossum* sp.	Solitary Bee			√			√	√	√	√	√			√	√		LC		
38	*Nomia* sp.															√		LC		
			Family: Trigonidae																	
39	*Trigona* sp.	Sweat bee			√			√	√	√								LC		
			Family: Apidae																	
40	*Apis mellifera* Linn.	Western Honey bee			√			√	√	√								LC		

Table - 7.1 LIST OF INSECTS																				
				7		6	5	4			3		2		1					
				A	**B**			**A**	**B**	**C**	**A**	**B**	**A**	**B**	**A**	**B**	**C**	IUCN	CITES	
41	*Apis dorsata*Linn.	Wild Honey bee, (Bonno Momachhi)									√	√						LC		
			Family: Vespoidae																	
42	*Vespa* sp.	Bolta		√	√	√	√	√	√	√								LC		
			Order: Coleoptera , Family: Coccinellidae																	
43	*Micraspis crocea* (Mulsant)	Lady beetle		√	√			√	√	√								LC		
			Order: Homoptera Family: Deltocephalidae				√		√	√				√			√			
44	*Nephotettix cincticeps* Matsumura	Spotted jassid																		
			Order: Hemiptera Family: Coreidae																	
45	*Leptocorisa acuta Thunb.*	Rice bug				√			√		√	√		√	√		√	LC		
			Order: Dictyoptera , Family: Blattellidae																	

Table - 7.1 LIST OF INSECTS																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
46	*Blattella germanica* Linn.	German Cockroach (Telapoka)									√	√						LC		
			Family: Mantidae															LC		
47	*Mantis religiosa* (Linnaeus)	Praying Mantis (Praying Mantis)									√	√						LC		

Table-7.2 LIST OF AMPHIBIA																				
				7	6	5	4			3		2		1						
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	Species Name																			
	Scientific Name	Common Name	Order, Family																	
			Order: Anura, Family: Bufonidae																	
1	*Duttaphrynus (Bufo) melanostictus*	Southeast Asian toad		√	√	√	√	√	√	√	√	√	√	√		√	√	LC		
			Family: Dicroglossidae																	

Table-7.2 LIST OF AMPHIBIA																				
				7	**6**	**5**	**4**			**3**		**2**		**1**						
				A	**B**			**A**	**B**	**C**	**A**	**B**	**A**	**B**	**A**	**B**	**C**	IUCN	CITES	
2	*Hoplobatrachus tigerinus*	Asiatic Bull Frog			√	√		√		√	√	√	√	√		√	√	LC		
3	*Euphlyctis cyanophlyctis*	Skipper Frog		√	√	√	√	√	√	√		√	√	√	√	√	√	LC		
4	*Fejervarya limnocharis*	Indian Cricket frog					√			√	√		√	√	√			LC		
5	*Fejervarya nepalensis*	Nepal Cricket frog		√			√	√			√				√	√		LC		
			Family:Microhylidae																	
6	*Microhyla ornata*	Ornate Narrow-mouthed Frog				√	√				√			√		√	√	LC		
7	*Microhyla berdmori*	Bardmori Narrow-mouthed Frog		√			√		√						√	√				

Table-7.3 LIST OF REPTILIA																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	Species Name																			
	Scientific Name	Common Name	Order, Family																	
1	*Calotes versicolor*	Garden Lizard	Order: Squamata Family: Agamidae	√	√	√		√	√	√	√	√	√	√				LC		
2	*Calotes jerdoni*	Green garden lizard	Family: Gekkonidae													√		LC		
3	*Hemidactylus brookii*	Spotted house Lizard			√	√		√	√	√								LC		
4	*H. frenatus*	Spotted house Lizard		√	√	√		√	√	√					√		√	LC		
5	*Hemidactylus brookii*	Brooke's house gecko	Family: Scincidae								√	√					√	LC		
6	*Mabuya mabuya*	Shink	Family: Varanidae															LC		
7	*Varanus bengalensis*	Bengle Monitor	Family: Colubridae	√					√		√	√	√	√		√	√	LC	I	
8	*Amphiesma stolata*	Striped keelback		√	√	√		√	√	√								LC		

Table-7.3 LIST OF REPTILIA																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
9	*Dendrelaphis pictus*	Painted Bronzeback									√	√						LC		
10	*Lycodon jara*	Common Wolf Snake						√	√									LC		
11	*Ptyas mucosa*	Indian rat snake	Family: Natricidae								√	√	√	√			√	LC		
12	*Rhabdophis subminiatus*	Red-necked Keelback				√				√								LC		

Table-7.4 LIST OF AVES																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	Species Name																			
	Scientific Name	Common Name																		
1	*Passer domesticus*	House Sparrow			√	√		√		√	√	√				√	√	LC		
2	*Dicrurus macrocercus*	Black Drongo		√		√		√	√	√	√	√	√	√		√	√	LC		
3	*Sturnus contra*	Pied Myna		√		√		√	√	√				√	√	√	√	LC		
4	*Sturnus malabaricus*	Chestnut-tailed Starling		√				√		√								LC		

Table-7.4 LIST OF AVES																			
				7		6	5	4			3		2		1				
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
5	*Acridotheres tristis*	Common Myna		√	√			√	√		√	√		√				LC		
6	*Acridotheres fuscus*	Jungle Myna		√	√	√		√	√	√		√			√	√	√	LC		
7	*Parus major*	Great Tit		√	√	√		√	√		√	√			√	√	√	LC		
8	*Copsychus saularis*	Oriental Magpie-Robin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	LC		
9	*Orthotomus sutorius*	Common Tailorbird			√	√		√	√	√	√	√	√	√	√	√	√	LC		
10	*Columba livia*	Common Pigeon			√						√	√		√	√	√	√	LC		
11	*Treron bicintus*	Orenge-breasted Green Pigeon							√	√			√			√	√			
12	*Treron phoenicopterus*	Yellow-footed Green Pigeon				√	√							√	√	√	√			
13	*Streptopelia decaocto*	Eurasian Collared Dove			√										√			LC		
14	*Streptopelia chinensis*	Spotted Dove						√	√	√	√			√	√	√	√	LC		
15	*Pycnonotus cafer*	Red-vented		√	√	√		√		√	√	√	√	√	√	√	√	LC		

Table-7.4 LIST OF AVES																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
		Bulbul																		
16	*Pycnonotus jocosus*	Red-whiskered Bulbul				√						√	√		√	√		LC		
17	*Corvus splendens*	House Crow		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	LC		
18	*Corvus macrorhynchos*	Large-billed Crow		√	√	√		√	√	√	√	√		√	√	√			LC		
19	*Oriolus xanthornus*	Black-hooded Oriole			√	√		√		√		√	√		√	√			LC		
20	*Phalacrocorax niger*	Little Cormorant			√	√					√		√		√	√					
21	*Phalacrocorax fuscicollis*	Indian Cormorant		√							√										
22	*Artamus fuscus*	Ashy Woodswallow			√				√		√		√	√	√				LC		
23	*Dendrocitta vagabunda*	Rufous Treepie			√	√		√		√		√	√		√	√	√		LC		
24	*Dicaeum cruentatum*	Scarlet-backet Flowerpecker			√							√				√			LC		

Table-7.4 LIST OF AVES																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
25	*Dicaeum erythrorhynchos*	Pale-billed Flowerpecker		√				√	√	√				√						
26	*Nectarinia zeylonica*	Purple-rumped Sunbird			√			√				√	√		√	√	√	LC		
27	*Ploceus philippinus*	Baya Weaver		√				√	√			√	√		√	√	√	LC		
28	*Lonchura punctulata*	Scaly-breasred Munia			√					√		√	√		√	√	√	LC		
29	*Lonchura straiata*	White-rumped Munia				√	√	√							√					
30	*Anthus rufulus*	Paddyfield Pipit		√	√			√						√			√	LC		
31	*Rhipidura albicollis*	White-throated Fantail				√		√					√				√	LC		
32	*Alcedo atthis*	Common Kingfisher		√	√	√		√		√	√			√			√	LC		
33	*Halcyon smyrnensis*	White-throated kingfisher			√	√		√			√	√	√	√	√	√	√	LC		
34	*Eudynamys scolopaceus*	Asian Koel			√			√	√			√	√				√	LC		

Table-7.4 LIST OF AVES																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
35	*Dinopium bengalensis*	Lesser goldenback						√		√		√				√	√	LC		
36	*Hirundo rustica*	Barn Swallow		√		√		√	√	√					√					
37	*Centropus sinensis*	Greater Coucal													√					
38	*Centropus bengalensis*	Lesser Coucal		√	√	√				√		√	√		√	√		LC		
39	*Athene brama*	Spotted Owlet			√			√	√			√	√		√		√	LC		
40	*Haliastur indus*	Brahminy Kite			√			√				√		√			√	LC		
41	*Milvus migrans*	Black Kite							√			√								
42	*Egretta garzetta*	Little Egret		√	√	√	√	√	√	√	√	√		√	√			LC		
43	*Casmerudias albus*	Great Egret		√							√							LC		
44	*Bubulcus ibis*	Cattle Egret			√	√		√						√		√	√	LC		
45	*Ardeola grayii*	Indian Pond Heron		√	√	√	√	√	√	√	√	√	√	√	√	√	√	LC		
46	*Anastomus oscitans*	Asian Openbill						√										LC		
47	*Amaurornis phoenicurus*	White-breasted Waterhen				√		√	√	√		√	√				√	LC		
48	*Gallinago gallinago*	Common Snipe		√	√	√					√						√	LC		

Table-7.4 LIST OF AVES																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
49	*Metopidius indicus*	Bronzed-winged jacana			√	√		√	√	√		√						LC		
50	*Vanellus indicus*	Red-wattled Lapwing					√							√	√			LC		
51	*Cissa chinensis*	Common Green Magpie													√			LC		
52	*Lanius schach*	Long-tail Shrike			√				√						√	√				
53	*Lanius cristatus*	Brown Shrike			√				√						√	√	√			

Table-7.5 LIST OF MAMMALIA																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
	Species Name																			
	Scientific Name	Common Name	Order, Family																	
			Order: Insectivora, Family: Soricidae																	
1	*Suncus murinus* (Linnaeus 1766)	Grey Musk Shrew		√	√	√	√	√	√	√										
			Order: Chiroptera, Family: Pteropidae																	
2	*Pteropus giganteus* Brunnich 1782	Indian Flying Fox		√	√	√		√	√	√	√	√	√	√		√	√	LC		
3	*Rousettus leschenaulti* (Desmarest, 1820)	Leschenault's Rousette									√	√	√	√			√	LC		
4	*Pipistrellus coromandra* (Gray, 1838)	Indian Pipistrelle									√	√						LC		
			Order: Carnivora, Family: Canidae																	
5	*Canis aureus* Linnaeus 1758	Asiatic Jackal		√	√	√		√	√	√			√	√		√		LC	III	
			Family: Felidae																	
6	*Felis chaus* Schreber 1777	Wildcat		√	√	√		√	√	√	√	√	√	√				LC		

Table-7.5 LIST OF MAMMALIA																				
				7		6	5	4			3		2		1					
				A	B			A	B	C	A	B	A	B	A	B	C	IUCN	CITES	
			Family: Herpestidae																	
7	*Herpestes edwardsi*, (E.Geoffroy-Saint-Hillare 1818)	Common Mongoose		√	√	√	√	√	√	√	√	√						LC	III	
			Family: Mustelidae																	
8	*Arctonyx collaris* F.G.Cuvier 1825	Hog Badger		√	√			√	√	√								NT		
9	*Lutra lutra* (Linnaeus 1758)	Common Otter		√	√	√		√	√	√								NT	I	
			Family: Viverridae																	
10	*Viverra zibetha* Linnaeus 1758	Large Indian Civet		√	√	√		√	√	√	√	√					√	NT	III	
			Order: Rodentia, Family: Sciuridae																	
11	*Callosciurus pygerythrus*, (I. Geoffroy Saint Hilarie 1832)	Hoary-bellied Himalayan Squirrel		√	√	√	√	√	√	√	√	√	√	√		√	√	LC		
			Family: Muridae																	
12	*Bandicota bengalensis*, (Gray & Hardwicke 1823)	Indian Mole Rat		√	√	√		√	√	√								LC		

Table-7.5 LIST OF MAMMALIA																				
				7		6	5	4			3		2		1					
				A	**B**			**A**	**B**	**C**	**A**	**B**	**A**	**B**	**A**	**B**	**C**	IUCN	CITES	
13	*Rattus rattus* (Linnaeus 1758)	Common House Rat		√	√	√	√	√	√	√			√	√			√	LC		

Species are classified by the IUCN Red List into nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.

- ✓ **Extinct (EX) –** No known individuals remaining.
- ✓ **Extinct in the Wild (EW)** – Known only to survive in captivity, or as a naturalized population outside its historic range.
- ✓ **Critically Endangered (CR)** – Extremely high risk of extinction in the wild.
- ✓ **Endangered (EN)** – High risk of extinction in the wild.
- ✓ **Vulnerable (VU)** – High risk of endangerment in the wild.
- ✓ **Near Threatened (NT)** – Likely to become endangered in the near future.
- ✓ **Least Concern (LC)** – Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
- ✓ **Data Deficient (DD)** – Not enough data to make an assessment of its risk of extinction.
- ✓ **Not Evaluated (NE)** – Has not yet been evaluated against the criteria

Annex-13.1: Monitoring Forms

Monitoring Forms

Monitoring Forms have been developed to monitor the environmental parametes during operation and construction phase for each transmission lines, substations etc. The monitoring forms for transmission lines, substations etc are given below:

1. Monitoring form (Transmission Line)

Following items should be monitored periodically during each phase.

(1) Pre-Construction phase

1) Land acquisition (Quarterly during the official process)

- Monitor the progress of Government procedure for land acquisition of tower basis
- Monitor if the compensation for the above land acquisition is being paid including top-up payment and livelihood compensation for the entitled people.

2) ROW Compensation (Quarterly during the official process)

- Monitor the progress of Government procedure for general notification of ROW.

(2) Construction Phase

1) Air quality

(Date) (Parameter: PM10, Unit μg/m3)

Parameter	Ave. time	Results							Ambient air quality standards	Remarks
		St1	St2	St3	St4	St5	St6	St7		
SO_2	(1hr)								350 (1hr)	
	(24hr)								125 (24hr)	
NO_2	(1hr)								200 (1hr)	
	(24hr)								100 (24hr)	
PM_{10}	(24hr)								150 (24hr)	

(Meteorological Condition)

Location (Date)	Time		Temperature (^oC)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec
St.5	AM						m/sec
	PM						m/sec
St.6	AM						m/sec
	PM						m/sec
St.7	AM						m/sec
	PM						m/sec

Notice: St.1 to St.7 means the sampling station defined at stage of survey on natural resources.

2) Water quality (Discharge wastewater)

(Date)

Parameter	Unit	Result	Wastewater discharge standards			Remarks (Measurements method)
			Inland surface water	Public sewer	Irrigated land	
Temperature	℃.		-	-	-	
pH	-		6-9	6-9	6-9	
BOD	mg/L		50	250	100	
COD	mg/L		200	400	400	
TSS	mg/L		150	500	200	
Oil & grease	mg/L		10	20	10	
As	mg/L		0.2	0.05	0.2	
Cd	mg/L		0.05	0.5	0.5	
T-Cr	mg/L		0.5	1.0	1.0	
Cu	mg/L		0.5	3.0	3.0	
Fe	mg/L		2	2	2	
Pad	mg/L		0.1	1.0	0.1	
Hg	mg/L		0.01	0.01	0.01	
Total fecal coliform	MPN/100mL		-	-	-	

Notice: Monitoring should be carried out at discharge site of wastewater treatment facility.

3) Waste

(Unit: ton/gm)

Month	Sample Date	Kinds of Waste (Quality)		Rate of recycle/Reuse (%)		Remarks
		Industrial	Domestic	Industrial	Domestic	
		(A)	(B)	(A)	(B)	

4) Noise

(Date) (Unit: dBA)

Location	Result	Noise standards					Remarks
		A	B	C	D	E	
St.1		Day (6AM-9PM): 45 Night (9PM-6AM): 35	Day: 50 Night: 40	Day: 60 Night: 50	Day: 70 Night: 60	Day: 70 Night: 70	
St.2							
St.3							
St.4							
St.5							
St.6							
St.7							

Notes: Category of areas is as follows: A: Silent zone, B: Residential area, C: Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes), D: Commercial area, E: Industrial area.

(Meteorological Condition)

Location (Date)	Time		Temperature (°C)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec
St.5	AM						m/sec
	PM						m/sec
St.6	AM						m/sec
	PM						m/sec
St.7	AM						m/sec
	PM						m/sec

Notice:St.1 to St.7 means the sampling station defined at stage of survey on natural resources

5) Ecosystem

a. Endangered species

(Date)

Scientific name	Local name	English name	Total No. of individuals	Conservation Status		Remarks
				IUCN	Local	

6) Disturbance to the poor (simultaneously)

- Interview with the affected people

7) Deterioration of local economy (simultaneously)

- Interview with the affected people

8) Land use

- Interview with the affected people (simultaneously)

9) Infectious diseases (once a year)

- Monitor the health record through medical check-ups

10) Work Environment (once a year)

- Monitor the record of accidents

11) ROW Compensation (simultaneously)

- Monitor the payment of ROW Compensation by the contractor for the entitled people.

12) Accidents (once a year)

- Monitor the record of accidents

(3) Operation Phase

1) Ecosystem

a. Endangered species

(Date)

Scientific name	Local name	English name	Total No. of individuals	Conservation Status		Remarks
				IUCN	Local	

2) Work Environment (once a year)
- Monitor the record of accidents

3) Accidents (once a year)
- Monitor the record of accidents

2. Monitoring form (Madunaghat substation)

Following items should be monitored periodically during each phase.

(1) Pre-Construction phase

1) Land acquisition (Quarterly during the official process)
- Monitor the progress of Government procedure for land acquisition
- Monitor if the compensation for the above land acquisition is being paid including top-up payment and livelihood compensation for the entitled people.
- Interviewing affected people about their livelihood means.

(2) Construction phase

1) Air quality

(Date) (Parameter: PM10, Unit µg/m3)

Parameter	Ave. time	Site				Ambient air quality standards	Remarks
		St1	St2	St3	St4		
SO_2	(1hr)					350 (1hr)	
	(24hr)					125 (24hr)	
NO_2	(1hr)					200 (1hr)	
	(24hr)					100 (24hr)	
PM_{10}	(24hr)					150 (24hr)	

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

(Meteorological Condition)

Location (Date)	Time		Temperature (^oC)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

2) Water quality (Discharge wastewater)

(Date)

Parameter	Unit	Result	Wastewater discharge standards			Remarks (Measurements method)
			Inland surface water	Public sewer	Irrigated land	
Temperature	^{c}C.		-	-	-	
pH	-		6-9	6-9	6-9	
BOD	mg/L		50	250	100	
COD	mg/L		200	400	400	
TSS	mg/L		150	500	200	
Oil & grease	mg/L		10	20	10	
As	mg/L		0.2	0.05	0.2	
Cd	mg/L		0.05	0.5	0.5	
T-Cr	mg/L		0.5	1.0	1.0	
Cu	mg/L		0.5	3.0	3.0	
Fe	mg/L		2	2	2	
Pad	mg/L		0.1	1.0	0.1	
Hg	mg/L		0.01	0.01	0.01	
Total fecal coliform	MPN/100mL		-	-	-	

Notice: Monitoring should be carried out at discharge site of wastewater treatment facility.

3) Waste

(Unit: ton/gm)

Month	Sample Date	Kinds of Waste (Quality)		Rate of recycle/Reuse (%)		Remarks
		Industrial	Domestic	Industrial	Domestic	
		(A)	(B)	(A)	(B)	

4) Noise

(Date) (Unit: dBA)

Location	Result	Noise standards					Remarks
		A	B	C	D	E	
St.1		Day (6AM-9PM): 45 Night (9PM-6AM): 35	Day: 50 Night: 40	Day: 60 Night: 50	Day: 70 Night: 60	Day: 70 Night: 70	
St.2							
St.3							
St.4							

Notes: Category of areas is as follows: A: Silent zone, B: Residential area, C: Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes), D: Commercial area, E: Industrial area.

(Meteorological Condition)

Location (Date)	Time		Temperature (°C)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

5) Disturbance to the poor (simultaneously)
- Interview with the affected people

6) Deterioration of local economy (simultaneously)
- Interview with the affected people

7) Social Institutions (once after compensation)
- Interview with the affected people

8) Misdistribution of benefits and compensation (once after compensation)
- Monitor the progress of Government procedure for land acquisition
- Interview with the affected people

9) Local conflicts of interest (once after compensation)
- Interview with the affected people

10) Infectious diseases (once a year)
- Monitor the health record through medical check-ups

11) Work Environment (once a year)
- Monitor the record of accidents

12) Accidents (once a year)
- Monitor the record of accidents

(3) Operation stage

2) Waste

(Unit: ton/gm)

Month	Sample Date	Kinds of Waste (Quality)		Rate of recycle/Reuse (%)		Remarks
		Industrial	Domestic	Industrial	Domestic	
		(A)	(B)	(A)	(B)	

2) Disturbance to the poor (simultaneously)
- Interview with the affected people

3) Work Environment (once a year)
- Monitor the record of accidents

4) Accidents (once a year)
- Monitor the record of accidents

3. Monitoring form (Road Expansion to Madunaghat Substation)

Following items should be monitored periodically during each phase.

(1) Pre-Construction phase

1) Land acquisition (Quarterly during the official process)
- Monitor the progress of Government procedure for land acquisition
- Monitor if the compensation for the above land acquisition is being paid including top-up payment and livelihood compensation for the entitled people.
- Interviewing affected people about their livelihood means.

(2) Construction phase

1) Air quality

(Date)

(Parameter: PM10, Unit µg/m3)

Parameter	Ave. time	Site				Ambient air quality standards	Remarks
		St1	St2	St3	St4		
SO_2	(1hr)					350 (1hr)	
	(24hr)					125 (24hr)	
NO_2	(1hr)					200 (1hr)	
	(24hr)					100 (24hr)	
PM_{10}	(24hr)					150 (24hr)	

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

(Meteorological Condition)

Location (Date)	Time		Temperature (^oC)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

2) Waste

(Unit: ton/gm)

Month	Sample Date	Kinds of Waste (Quality)		Rate of recycle/Reuse (%)		Remarks
		Industrial	Domestic	Industrial	Domestic	
		(A)	(B)	(A)	(B)	

3) Noise

(Date) (Unit: dBA)

Location	Result	Noise standards					Remarks
		A	B	C	D	E	
St.1		Day (6AM-9PM): 45 Night (9PM-6AM): 35	Day: 50 Night: 40	Day: 60 Night: 50	Day: 70 Night: 60	Day: 70 Night: 70	
St.2							
St.3							
St.4							

Notes: Category of areas is as follows: A: Silent zone, B: Residential area, C: Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes), D: Commercial area, E: Industrial area.

(Meteorological Condition)

Location (Date)	Time		Temperature (°C)		Moisture (%)	Wind	
			Dry	Wet		Direction	Speed
St.1	AM	:					m/sec
	PM	:					m/sec
St.2	AM	:					m/sec
	PM	:					m/sec
St.3	AM	:					m/sec
	PM	:					m/sec
St.4	AM						m/sec
	PM						m/sec

Notice: St1, St2, St3, and St4 will be defined after drawing up of site location.

4) Disturbance to the poor (simultaneously)
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9) Infectious diseases (once a year)
- Monitor the health record through medical check-ups

10) Work Environment (once a year)
- Monitor the record of accidents

11) Accidents (once a year)
- Monitor the record of accidents

(3) Operation stage
N/A