Initial Environmental and Social Examination Report

PUBLIC

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Bangladesh: Muktagacha Solar Power Project

PART 5

Prepared by EQMS Consulting Limited for the Asian Development Bank (ADB).

APPENDIX D

Appendix D: List of Landowners and Affected Person

Appendix D-1: List of Landowner

Appendix D-2: List of Affected Person

Sl No	Name	Occupation	Type Of Losses
1	Md Abdul Hannan Talukder	Commercial Business, Shop Etc.	Land
2	Tarak Hasan	Service	Land
3	Ziyaul Kabir Murad	Service	Land
4	Zubayer Hossen	Commercial Business, Shop Etc.	Land
5	Rezaul Karim	Commercial Business, Shop Etc.	Land
6	Rofiqul Islam	Farming	Land
7	Sulaiman Sheikh	Farming	Both (Land and Livelihood)
8	Hasibur Rahman Liton	Farming	Land
9	Mahbub Alom Kazol	Farming	Land
10	Saiful Islam	Farming	Land
11	Sourov	Farming	Both (Land and Livelihood)
12	Abdul Kalam	Farming	Land
13	Shahiruddin	Farming	Land
14	Abdul Mannan	Farming	Land
15	Mainuddin	Farming	Land
16	Abdul	Farming	Land
17	Firoz Ali	Farming	Land
18	Zubayed Hossein	Commercial Business, Shop Etc.	Land
19	Gofur Talukder	Farming	Land
20	Nuruddin	Commercial Business, Shop Etc., Farming	Both (Land and Livelihood)
21	Faruk	Commercial Business, Shop Etc.	Land
22	Zahidul Amin	Service	Land
23	Sumon Mia	Commercial Business, Shop Etc.	Land
24	Tuta Mia	Daily Labor	Land
25	Hakim	Farming	Land
26	Abdul Hossen	Farming	Both (Land and Livelihood)
27	Rakib	Farming	Land
28	Halim	Farming	Land
29	Harunur	Farming	Land
30	Sofikul Islam	Farming	Land
31	Yusuf	Commercial Business, Shop Etc.	Land
32	Mahbub Rahman	Farming	Land
33	Atikur	Farming	Land
34	Habibur	Farming	Land

Sl No	Name	Occupation	Type Of Losses
35	Motaleb	Farming	Land
36	Lotif	Service	Land
37	Osman	Teacher	Land
38	Yusuf	Farming	Land
39	Ibrahim Sorkar	Farming	Land
40	Kalam	Farming	Land
41	Kholilur	Farming	Land
42	Ahad Ali	Farming	Land
43	Arafat	Commercial Business, Shop Etc., Farming	Land
44	Hasen Ali	Farming	Land
45	Yunus Ali	Farming	Land
46	Jahanara	Unpaid Family Work/ Housewife	Land
47	Farzana	Service	Land
48	Habibur	Farming	Land
49	Atikur	Farming	Land
50	Arif Hosen	Commercial Business, Shop Etc., Farming	Both (Land and Livelihood)
51	Ruhul Amin	Commercial Business, Shop Etc., Farming	Both (Land and Livelihood)
52	Monjurul Islam	Commercial Business, Shop Etc.	Land
53	Shafiqul Islam	Commercial Business, Shop Etc.	Land
54	Shohidul Islam	Commercial Business, Shop Etc.	Land
55	Azizur Rahman	Farming	Both (Land and Livelihood)
56	Harun	Agricultural Labor	Livelihood
57	Rasedul Islam	Agricultural Labor	Livelihood
58	Alal	Agricultural Labor	Livelihood
59	Aminul	Agricultural Labor	Livelihood
60	Lal Mia	Commercial Business, Shop Etc., Fish Farm Worker	Livelihood
61	Asmot	Agricultural Labor	Livelihood
62	Asraful	Farming	Livelihood
63	Suruj	Farming	Livelihood
64	Dulal	Farming	Livelihood
65	Tuta Mia	Farming	Livelihood
66	Jiaur	Farming	Livelihood
67	Monir	Farming	Livelihood
68	Mofazzol	Farming	Livelihood
69	Hanif Mia	Driver, Fish Farm Worker	Livelihood
70	Billal	Farming	Livelihood
71	Sajahan	Farming	Livelihood
72	Lukman	Daily Labor, Agricultural Labor	Livelihood
73	Zillur	Agricultural Labor	Livelihood
74	Mamun	Daily Labor	Livelihood
75	Selim	Daily Labor	Livelihood

Sl No	Name	Occupation	Type Of Losses
76	Nurul	Farming	Livelihood

Appendix E: Applicable Standards of DOE

Appendix E-1: Standards for Ambient Air Quality in Bangladesh

Air Pollutant	Unit	Average Time	Bangladesh Standards	WHO Guidelines
Carbon Monoxide (CO)	mg/m^3	24-hour	-	4
	mg/m^3	8-hour	5	10
	mg/m^3	1-hour	20	35
Lead (Pb)	$\mu g/m^3$	Annual	0.25	-
	$\mu g/m^3$	24-hour	0.50	-
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	Annual	40	10
	$\mu g/m^3$	24-hour	80	25
Coarse Particulates (PM_{10})	$\mu g/m^3$	Annual	50	15
	$\mu g/m^3$	24-hour	150	45
Fine Particulates ($PM_{2.5}$)	$\mu g/m^3$	Annual	35	5
	$\mu g/m^3$	24-hour	65	15
Ozone (O_3)	$\mu g/m^3$	8-hour	100	100
	$\mu g/m^3$	1-hour	180	-
Sulfur Dioxide (SO_2)	$\mu g/m^3$	24-hour	80	40
	$\mu g/m^3$	1-hour	250	-
Ammonia (NH_3)	$\mu g/m^3$	Annual	100	-
	$\mu g/m^3$	24-hour	400	-

Source: Air Pollution (Control) Rules, 2022 and WHO global air quality guidelines, 2021

Appendix E-2: Standards for Odor in Bangladesh

S/N	Parameter	Unit	Standard Limit
1	Acetaldehyde (C_2H_4O)	ppm	0.5 - 5.0
2	Ammonia (NH_3)	ppm	1 - 5
3	Hydrogen Sulfide (H_2S)	ppm	0.02 - 0.20
4	Methyl Disulfide ($C_2H_6S_2$)	ppm	0.009 - 0.10
5	Methyl Mercaptan (CH_4S)	ppm	0.02 - 0.20
6	Methyl Sulfide (C_2H_6S)	ppm	0.01 - 0.20
7	Styrene (C_8H_8)	ppm	0.4 - 2.0
8	Trimethylamine (C_3H_9N)	ppm	0.005 - 0.07

Source: Air Pollution (Control) Rules, 2022

Appendix E-3: Noise Level Standards/Guidelines

Appendix E-3.1: Standards for Sound in Bangladesh

S/N	Category of Area/Zone	Limit in dB(A) Leq*	
		Day-time	Night-time
1	Silent zone	50	40
2	Residential area	55	45
3	Mixed area	60	50
4	Commercial area	70	60
5	Industrial area	75	70

Notes:

1. The time from 6 am to 9 pm is counted as day-time.
2. The time from 9 pm to 6 am is counted as night-time.

* The time-weighted average of sounds related to the human ear for a certain period is expressed by dB(A) Leq which is indicated in dB(A) scale.

Source: Noise Pollution (Control) Rules, 2006

Appendix E-4: Standards for Water Quality

Appendix E-4.1: Standards for Inland Surface Water in Bangladesh

S/N	Best Practice-Based Classification	Parameters											
		pH	DO	BOD	NO_3-N	NH_4-N	PO_4-P	Total Cr	Pb	Hg	Total Coliform	TDS	COD
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L
1	Source of drinking water for supply only after disinfecting	6.5 - 8.5	≥ 6	≤ 2	7.0	0.1	0.1	0.02	0.03	0.001	≤ 100	1000	10
2	Water usable for recreational activity	6.5 - 8.5	≥ 5	≤ 3	7.0	0.3	0.5	0.2	0.05	0.001	≤ 50	1000	10
3	Source of drinking water for supply after conventional treatment	6.0 - 9.0	≥ 5	≤ 3	7.0	0.3	0.5	0.02	0.03	0.001	≤ 5000	1000	25
4	Water usable by fisheries	6.0 - 9.0	≥ 5	≤ 6	7.0	0.3	0.5	0.05	0.1	0.004	≤ 5000	1000	50
5	Water usable by various process and cooling industries	6.5 - 8.5	≥ 1	12	-	2.7	-	0.1	0.1	0.05	-	1000	100
6	Water usable for irrigation	6.5 - 8.5	-	≤ 12	5.0	1.5	2.0	0.1	0.1	0.002	≤ 50000	1000	100

Notes:

1. In water used for irrigation water, electrical conductivity is 2250 µS/cm (at a temperature of 25°C); Sodium is less than 26%; boron is less than 0.2%.

Source: The Environment Conservation Rules, 2023 (Schedule-2)

Appendix E-4.2: Standards for Coastal Water

Category		Conservation		Recreation		Fisheries	Industry
Class		Coral Community	Natural Area[1]	Direct Contact[2]	Indirect Contact[3]	Aquaculture and shellfish Culture	Industries and Others
Parameters	Unit						
pH	-	7.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0
Suspended Solids	mg/L	2	25	5	10	50	100
Dissolved Oxygen (DO)	mg/L	≥ 5	≥ 5	-	-	≥ 5	≥ 4
COD	mg/L	2	8	-	-	5	5
Total Coliform	CFU/100 mL	1000	1000	1000	5000	1000	-
Fecal Coliform	CFU/100 mL	200	200	200	1000	200	-
Nitrate-Nitrogen (NO_3^--N)	mg/L	0.2	0.3	0.8	0.8	0.8	1.0
Phosphate (PO_4^{3-})	mg/L	0.04	0.05	0.08	0.08	0.08	0.1
Oil and Grease	mg/L	0.01		-	-	0.14	5.0
Phenols	mg/L	0.05		-	-	0.05	0.05
Arsenic (As)	mg/L	0.001		-	-	0.003	0.003
Cadmium (Cd)	mg/L	0.005		-	-	0.005	0.005
Cyanide (Cn)	mg/L	0.002		-	-	0.007	0.0014
Chromium (Hexavalent Cr)	mg/L	0.05		-	-	0.05	0.1
Lead (Pb)	mg/L	0.05		-	-	0.05	-
Mercury (Hg)	mg/L	0.0001		-	-	0.0001	0.0001

Note:

1. Conservation of natural area i.e., mangrove, sea grass, wildlife habitat and marine spawning, nursing and feeding ground.
2. Water sports i.e., swimming, diving, surfing where there is direct contact with water.

Category		Conservation		Recreation		Fisheries	Industry
Class		Coral Community	Natural Area[1]	Direct Contact[2]	Indirect Contact[3]	Aquaculture and shellfish Culture	Industries and Others
Parameters	Unit						

3. Water sports i.e., sailing, fishing, and other activities where the possibility of contact with water is minimal.

Source: The Environment Conservation Rules, 2023 (Schedule-2)

Appendix E-4.3: Standards for Drinking Water

S/N	Parameters	Unit	Bangladesh Standards	WHO Guideline
1	Aldrin/Dieldrin	µg/L	0.03	
2	Aluminum (Al)	mg/L	0.20	
3	Ammonia (NH_3)	mg/L	1.50	
4	Anionic Detergent	mg/L	0.20	
5	Arsenic (As)	mg/L	0.05	0.01
6	Barium (Ba)	mg/L	0.70	
7	Benzene (C_6H_6)	mg/L	0.01	
8	Boron (B)	mg/L	1.0	
9	Cadmium (Cd)	mg/L	0.003	
10	Calcium (Ca)	mg/L	75	
11	Chloride	mg/L	250[a]	
	Chlorinated Alkanes			
12	Carbon Tetrachloride (CCl_4)	mg/L	0.005	
13	1,1 Dichloroethane (1,1 $C_2H_4Cl_2$)	mg/L	0.03	
14	1,2 Dichloroethane (1,1 $C_2H_4Cl_2$)	mg/L	0.03	
15	Tetrachloroethane ($C_2H_2Cl_2$)	mg/L	0.04	
16	Trichloroethane ($C_2H_3Cl_3$)	mg/L	0.02	
	Chlorinated Phenols			
17	Pentachlorophenol	mg/L	0.009	
18	2,4,6 Trichlorophenol	mg/L	0.20	
19	Chlorine (Free Residual)	mg/L	0.20	
20	Chloroform ($CHCl_3$)	mg/L	0.09	
21	Chromium (Total Cr)	mg/L	0.05	
22	Coliform (Fecal)	CFU/100 mL	0	
23	Coliform (Total)	CFU/100 mL	0	
24	Color	Hazen unit	15	
25	Copper (Cu)	mg/L	1.5	
26	Cyanide (CN)	mg/L	0.05	
27	Fluoride	mg/L	1.0	
28	Hardness (as $CaCO_3$)	mg/L	500	
29	Iron (Fe)	mg/L	0.3–1.0	
30	Kjeldhl Nitrogen (Total)	mg/L	1.0	

S/N	Parameters	Unit	Bangladesh Standards	WHO Guideline
31	Lead (Pb)	mg/L	0.01	
32	Magnesium (Mg)	mg/L	30–35	
33	Manganese (Mn)	mg/L	0.40	
34	Mercury (Hg)	mg/L	0.001	
35	Nickel (Ni)	mg/L	0.05	
36	Nitrate (NO_3^-)	mg/L	45	
37	Nitrite (NO_2^-)	mg/L	1.0	
38	Odor	-	Odorless	
39	Oil and Grease	mg/L	0.01	
40	pH	-	6.5 - 8.5	6.5 - 8.5
41	Phenolic Compounds (Phenols)	mg/L	0.002	
42	Potassium (K)	mg/L	12	
43	Radioactive Materials (Gross Alpha Activity)	Bq/L	0.1	
44	Radioactive Materials (Gross Beta Activity)	Bq/L	1.0	
45	Selenium (Se)	mg/L	0.01	
46	Silver (Ag)	mg/L	0.02	
47	Sodium (Na)	mg/L	200	
48	Suspended Particulate Matters	mg/L	10	
49	Sulfide as Hydrogen Sulfide (Sulfide as H_2S)	mg/L	0.05	
50	Sulfate (SO_4^{-2})	mg/L	250	
51	Total Dissolved Solids (TDS)	mg/L	1,000	
52	Temperature	°C	20 - 30	
53	Tin (Sn)	mg/L	2.0	
54	Turbidity	NTU	5.0	
55	Zinc (Zn)	mg/L	5.0	

Note:

a. In coastal area, the standard for chlorine is 1000 mg/L.

Source: The Environment Conservation Rules, 2023 (Schedule-2)

Appendix E-5: Standards for Sewage Discharge in Bangladesh

S/N	Parameter	Unit	Standard Limit
1	Temperature	°C	30
2	pH	-	6.0 - 9.0
3	BOD_5 at 20°C	mg/L	30
4	COD	mg/L	125

S/N	Parameter	Unit	Standard Limit
5	Suspended Solids (SS)	mg/L	100
6	Oil and Grease	mg/L	10
7	Nitrate (NO_3)	mg/L	50
8	Phosphate	mg/L	15
9	Total Coliform	CFU/100 mg/L	1000

Source: The Environment Conservation Rules, 2023 (Schedule-3)

Appendix E-6: Standards for Waste from Industrial Units or Projects

S/N	Parameter	Unit	Guideline Values			
			National Standards			GIIP
			Place 1[49]	Place 2[50]	Place 3[51]	
1	Ammoniacal Nitrogen (as elementary N)	mg/L	50	50	50	5
2	Ammonia (as free ammonia)	mg/L	5	5	5	-
3	Arsenic (as As)	mg/L	0.2	0.2	0.2	-
4	BOD_5 at 20°C	mg/L	30	250	100	-
5	Boron (B)	mg/L	2.0	2.0	4.0	-
6	Cadmium (as Cd)	mg/L	2.0	1.0	2.0	0.1
7	Chloride (Cl^-)	mg/L	600	600	-	-
8	Chromium (as total Cr)	mg/L	0.5	1.0	1.0	0.5
9	COD	mg/L	200	400	250	250
10	Chromium (as hexavalent Cr)	mg/L	0.1	2.0	1.0	0.1
11	Copper (as Cu)	mg/L	3.0	3.0	3.0	0.5
14	Fluoride (as F)	mg/L	2	15	10	5
15	Sulfide (as S)	mg/L	1	-	5	0.1
16	Iron (as Fe)	mg/L	3	3	3	-
17	Iron	mg/L	-	-	-	5
18	Total Kjeldahl Nitrogen (as N)	mg/L	100	-	100	-
19	Total Nitrogen	mg/L	-	-	-	30
20	Lead (as Pb)	mg/L	0.1	1.0	2.0	0.2
21	Manganese (as Mn)	mg/L	2.0	2.0	2.0	-
22	Mercury (as Hg)	mg/L	0.01	0.01	0.01	0.1

[49] Inland surface water.

[50] Public sewerage system connected to treatment at second stage.

[51] Coastal areas.

S/N	Parameter	Unit	Guideline Values			
			National Standards			GIIP
			Place 1[49]	Place 2[50]	Place 3[51]	
23	Nickel (as Ni)	mg/L	1.0	2.0	5.0	0.5
24	Nitrate (as elementary N)	mg/L	10.0	-	20.0	
25	Oil and Grease	mg/L	10	20	20	10
26	Phenolic Compounds (as C_6H_5OH)	mg/L	1.0	5.0	5.0	0.5
27	Dissolved Phosphorus (as P)	mg/L	5.0	-	-	-
28	Total Phosphorus	mg/L	-	-	-	2
29	Radioactive substance a. Alpha particle radiation b. Beta particle adiation	µCi/L	To be specified by Bangladesh Atomic Energy Commission			-
30	pH	-	6-9	6-9	6-9	6-9
31	Selenium (as Se)	mg/L	0.05	0.05	0.05	-
32	Zinc (as Zn)	mg/L	5	15	15	2
34	Temperature	°C	Not more than 5°C of waterbody temperature	-	Not more than 5°C of waterbody temperature	-
36	Suspended Solids (SS)	mg/L	100	500	100	35
37	Cyanide (as Cn)	mg/L	0.1	2.0	0.2	-
38	Cyanide (free)	mg/L	-	-	-	0.1
39	Cyanide (total)	mg/L	-	-	-	0.5
40	Total Residual Chlorine	mg/L	1.0	-	1.2	-
41	Bio assay test[52]	-	90% of fisheries can survive in treated wastewater even after 96 hours			-

Source: The Environment Conservation Rules, 2023 (Schedule-4) and Bangladesh Bank Guidelines on Environmental and Social Risk Management (ESRM) for Banks and Financial Institutions in Bangladesh, June 2022.

[52] Only applicable for pesticide and pharmaceutical industries.

APPENDIX F

Appendix F: Laboratory Test Report (will be included during Final IESE)

Ref: EQMS/Air Quality/202418101272

EQMS ENVIRONMENTAL LABORATORY

Analysis Results of Ambient Air Quality

Project Name	:	Initial Environmental and Social Examination of Muktagacha Solar Power Project at Muktagacha, Mymensingh
Description of Monitoring	:	Ambient Air Quality
Monitored By	:	EQMS Environmental Monitoring Team
Monitoring Location	:	AQ1: Nimuria Middle Para at the northwestern side of the proposed solar power plant and at transmission line route AQ2: In Front of Monir Mondal House, Raghunathpur at the southeast side of the proposed solar plant AQ3: Proposed Solar power plant AQ4: Tota Mia House, Nimuria at the eastern side of the Transmission line route
GPS Coordinate	:	24°44'1" N 90°11'40" E, 24°43'36" N 90°11'60" E, 24°43'59" N 90°11'45" E, 24°43'56" N 90°11'32" E
Monitoring Date	:	17.04.2024- 19.04.2024
Date of Analysis	:	21.04.2024

Description of Analysis:

Sl. No.	Code	Ambient Air Pollutants Concentration				
		PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1	AQ1	76.67	22.75	11.54	14.33 0.20	0.20
2	AQ2	28.47	18.17	14.16	20.24	0.14
3	AQ3	66.15	28.82	10.38	22.73	0.12
4	AQ4	39.78	19.27	15.62	24.40	0.19
Duration (hours)		24	24	24	24	8
Air Pollution (Control) Rules, 2022*		150	65	80	80	5
WHO Standard**		50	25	40 (Annual)	20	4
Instrument Use		*Particulates Sensor Light Scattering Nephelometer*		*High Sensitivity Electrochemical (HSE)*		

Note: "Regular Checkup and calibration of the equipment are done by the manufacturers and EQMS personnel to avoid any error".

** Air Pollution (Control) Rules 2022, Schedule 1: Ambient Air Quality Standards.*

***WHO- World Health Organization, PM_{10} -Particulate Matter of a diameter of 10 microns or less, $PM_{2.5}$ -Particulate Matter of a diameter of 2.5 microns or less, SO_2 –Sulphur Dioxide, NOx – Oxides of Nitrogen, CO –Carbon Monoxide,*

Received By:

Israt Jahan
Consultant
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Analyzed By:

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Ref: EQMS/Noise Level/202418101273

EQMS ENVIRONMENTAL LABORATORY

Analysis Results of Noise Level

Project Name	:	Initial Environmental and Social Examination of Muktagacha Solar Power Project at Muktagacha, Mymensingh
Description of Monitoring	:	Noise Level
Monitored By	:	EQMS Environmental Monitoring Team
Monitoring Location	:	NL1: Forhad Khan House, Nimuria at northeastern part of the transmission line NL2: Fala Mondal Jame Madrasa and Mosque, Raghunatpur at the north side of the solar power plant NL3: Nimuria at the proposed solar power plant NL4: Nimuria Middle Para, near proposed transmission line route NL5: Babul Mia House, Nimuria at northwestern side of the solar power plant
GPS Coordinate	:	24°44'0" N 90°11'50" E, 24°43'32" N 90°12'1" E, 24°43'54" N 90°11'46" E, 24°43'59" N 90°11'39" E, 24°43'57" N 90°11'32" E
Sampling Date	:	17.04.2024- 19.04.2024
Date of Analysis	:	21.04.2024

Description of Analysis:

Location-Date		Average Noise Level [dB(A)]		Noise Pollution (Control) Rules, 2006* [dB(A)]		IFC/WB Standard** [dB(A)]	
		Leq_{day}	Leq_{night}	Day	Night	Day	Night
NL1	02.10. 2024	44.47	33.10	55	45	55	45
NL2	03.10. 2024	57.66	51.08	50	40	55	45
NL3	02.10. 2024	55.87	40.71	-	-	-	-
NL4	04.10. 2024	53.96	46.49	-	-	-	-
NL5	04.10. 2024	47.87	29.15	55	45	55	45

** Noise Pollution (Control) Rules, 2006, Schedule 1: Area-wise Noise Standards.*

*** IFC EHS General Guidelines*

Received By:

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Ref: EQMS/Water Quality/202418101274

EQMS WET LABORATORY

Test Results of Surface Water Quality

Project Name	:	Initial Environmental and Social Examination of Muktagacha Solar Power Project a Muktagacha, Mymensingh
Description of Sample	:	Surface Water
Sample Collector	:	EQMS Environmental Monitoring Team
Sampling Location	:	SW1: Near Nimuria Moral Bari, at the north side of the proposed solar plant SW2: Raghunathpur, inside the power plant boundary
GPS Coordinate	:	24°43'58" N 90°11'53" E, 24°43'40" N 90°11'51" E
Sampling Date	:	20.04. 2024
Reporting Date	:	13.05.2024

Description of Analysis

Parameter	Unit	Concentration		ECR'23 Standards*	
		SW1	SW2	Water Usable by Fisheries	Water Usable for Irrigation
Temperature	°C	22	22	-	-
pH	-	6.65	6.44	6-9	6.5 - 8.5
DO	mg/l	5.8	5.6	5 or more	-
TDS	mg/l	170	170	1000	1000
BOD	mg/l	3.6	3.9	6 or less	12 or less
COD	mg/l	42	45	50	100
Nitrate	mg/l	1.5	0.7	-	-
Ammonia	mg/l	0.25	0.29	-	-
Total Chromium	mg/l	0.004	0.003	-	-
Phosphate	mg/l	1.3	0.9	-	-
Total Coliform	n/100 ml	64	58	-	-
Fecal Coliform	n/100 ml	18	15	-	-

** The Environment Conservation Rules (ECR) 2023, Schedule 2(A); Inland Surface Water Quality (Water Usable for Fisheries and Irrigation)*

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Ref: EQMS/Water Quality/202418101275

EQMS WET LABORATORY

Test Results of Ground Water Quality

Project Name	:	Initial Environmental and Social Examination of Muktagacha Solar Power Project at Muktagacha, Mymensingh
Description of Sample	:	Ground Water
Sample Collector	:	EQMS Environmental Monitoring Team
Sampling Location	:	GW1: Ruhul Amin House, Nimuria, at north side of the proposed power plan GW2: Monir Mondal House, Raghunatpur at southeast side of the prosed power plant
GPS Coordinate	:	24°43'60" N 90°11'45" E, 24°43'35" N 90°12'2" E
Sampling Date	:	19.04. 2024
Reporting Date	:	13.05.2024
Description of Analysis	:	

Parameter	Unit	Concentration		ECR'23 Standards*
		GW1	GW2	
Aluminum	mg/l	<0.01	<0.01	0.20
Ammonia (NH3)	mg/l	0.07	<0.01	1.50
Arsenic	mg/l	<0.01	<0.01	0.05
Calcium	mg/l	10.0	12.1	75
Chloride	mg/l	3.0	1.5	250
Chromium (total)	mg/l	<0.01	<0.01	0.05
Copper	mg/l	0.06	0.03	1.5
Cyanide	mg/l	<0.001	<0.001	0.05
Fluoride	mg/l	<0.01	<0.01	1.0
Iron	mg/l	0.03	0.02	0.3-1.0
Magnesium	mg/l	7	10	30-35
Manganese	mg/l	0.01	0.01	0.4
Nickel	mg/l	<0.01	<0.01	0.05
Nitrate	mg/l	0.1	<0.01	45
Nitrite	mg/l	<0.01	<0.01	1.0
Oil and grease	mg/l	<0.01	<0.01	0.01
pH	---	6.54	6.57	6.5-8.5
Potassium	mg/L	2.1	2.4	12
Fecal Coliform	mg/L	0	0	0
Total Coliform	mg/L	0	0	0

** The Environment Conservation Rules (ECR), 2023, Schedule 2(B): Standards for Water (Drinking Water Quality).*

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Ref: EQMS/Soil Quality/202418101276

EQMS WET LABORATORY

Test Results of Soil Quality

Project Name	:	Initial Environmental and Social Examination of Muktagacha Solar Power Project at Muktagacha, Mymensingh
Description of Sample	:	Soil Quality
Sample Collector	:	EQMS Environmental Monitoring Team
Sampling Location	:	SQ1: Inside the solar power plant area SQ2: Nimuria, west side of the solar power plant area
GPS Coordinate	:	24°43'57" N 90°11'45" E, 24°44'2" N 90°11'36" E
Sampling Date	:	17.04. 2024
Reporting Date	:	13.05.2024
Description of Analysis	:	

Parameter	Unit	Concentration		Duetch Intervention Values 2013 (Soil Remediation Circular, July 2013)
		SQ1	SQ2	
pH	-	5.02	4.81	
Electrical Conductivity	dS/m	0.089	0.079	
Temperature	^{0}C	24.8	24.9	
TDS	mg/l	56.96	50.56	
Salinity	ppt	0.057	0.050	
Mercury	mg/kg	1.29	2.16	36
Arsenic	ppb	1.20	1.72	10000
Zinc	ppm	1.50	1.08	-
Copper	ppm	6.40	1.76	190
Iron	ppm	117.63	97.07	-
Manganese	ppm	30.55	26.36	-
Lead	ppm	6.74	15.69	530
Cadmium	ppm	0.39	0.23	13
Chromium	ppm	48.58	27.58	-
Nickel	ppm	48.75	21.61	100

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APPENDIX G

Appendix G: Environmental Compliance Audit of Completed and/or Ongoing Activities

The project is currently in the greenfield stage. Key milestone activities of the project are shown in below:

Table 1: Project Key Status

SL#	Key Milestones	Planned
1	Project Value	34.67 million USD
2	COD	After 335 days of construction work initiation

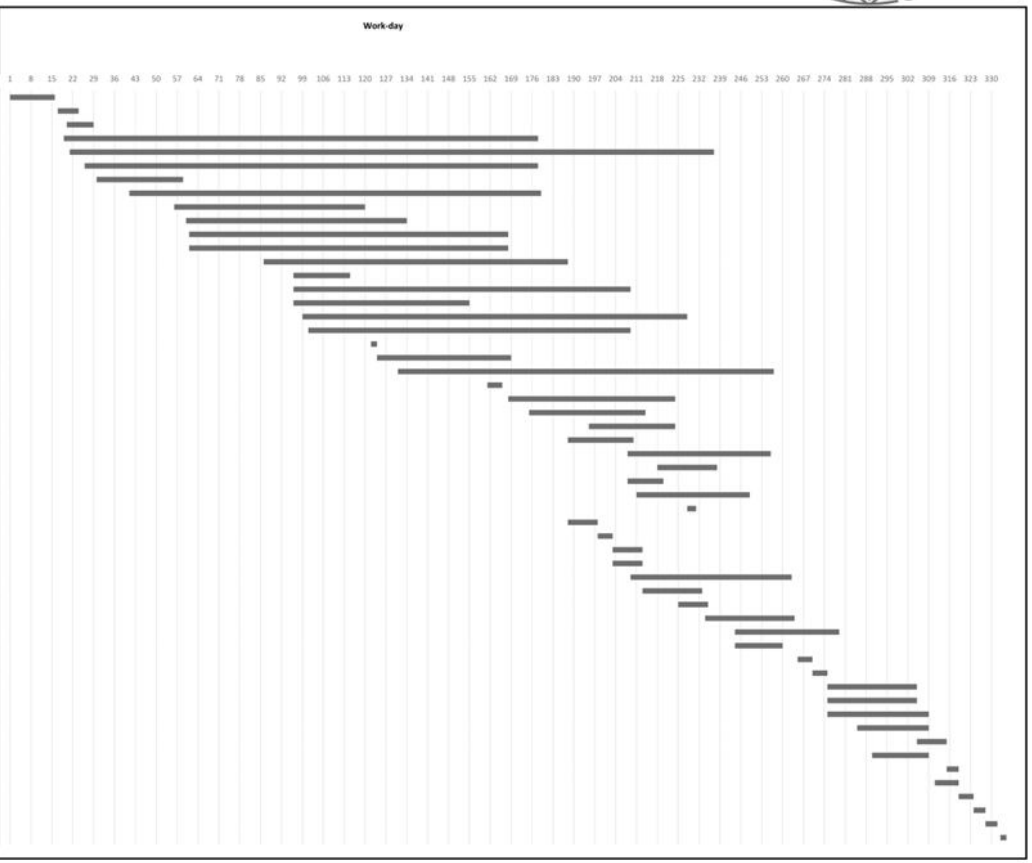
Source, MSEL, May 2024

Figure 1: Project Activity Schedule Leading to COD

SCUBE Technologies Limited

Project Capacity: 29.212 MWp

	START DATE	END DATE	DESCRIPTION	DURATION (Days)
1	1	16	Foreign LCs Transmission	15
2	17	24	Temporary shed materials (storage & Labour Accommodation), Security Camera & Light Delivery.	7
3	20	29	Temporary shed materials (storage & Labour Accommodation), Security Camera, post & Light Installation.	9
4	19	180	Access development for ground mount area.	159
5	21	240	Project substation to PDB substation 33kV transmission line installation.	216
6	26	180	PHC pile installation	152
7	30	60	Civil material delivery 1st Lot for road construction & boundary fencing base construction.	29
8	41	180	Soil filling for road area.	138
9	56	120	Module mounting Structure & fencing delivery	64
10	60	135	Geo sheet and bag delivery.	74
11	61	170	Soil compress and leveling for Internal road.	107
12	61	170	Soil compress and leveling for outside road.	107
13	86	190	Ground mounting Structure installation.	102
14	96	115	Civil material Delivery 2nd Lot for residential, substation & office building.	19
15	96	210	Geo bag filling and placing Work for out side road construction.	113
16	96	156	Geo sheet placing Work for Internal road construction.	59
17	99	230	Residential, Substation & office Building Work	129
18	101	210	Civil material Delivery 3rd Lot for module inverter station and rest buildings.	108
19	122	124	Module delivery 1st lot	2
20	124	170	Module Installation (1st phase)	45
21	131	260	Road construction & boundary fencing base construction work.	126
22	161	166	Module delivery 2nd lot.	5
23	168	225	Module Installation (2nd phase)	56
24	175	215	Civil & mechanical work for inverter station.	39
25	195	225	Local material delivery for AC & DC cabling.	29
31	188	210	Cleaning System -water line materials delivery	22
26	208	258	Cleaning System -water line installation.	48
27	218	238	DC cabling path installation	20
28	208	221	LPS & earthing materials delivery.	12
29	211	251	LPS & earthing materials installation work.	38
30	228	231	DC cable delivery.	3
32	188	198	Inverter Delivery.	10
33	198	203	communication & Online monitoring Scada -material Delivery.	5
34	203	213	communication & Online monitoring Scada installation.	10
35	203	213	Weather station delivery.	10
36	209	265	DC cabling.	54
37	213	233	Inverter installation.	20
38	225	235	Weather station installation.	10
39	234	265	LT & HT AC cable path installation.	30
40	244	279	Fencing installation.	35
41	244	260	Security post installation.	16
42	265	270	Transformer,LT & HT Switchgear delivery.	5
43	270	275	LT & HT AC cable delivery.	5
44	275	305	HT cable installation.	30
45	275	305	Transformer, LT & HT Switchgear installation.	30
46	275	310	LT cable installation.	34
47	285	310	DC Side testing.	24
48	305	315	LT side testing.	10
49	290	310	HT side testing.	19
50	315	319	PDB backfeed test.	4
51	311	319	Transformer & HT panel commissioning.	8
52	319	324	Inverter commissioning.	5
53	324	328	Test run.	4
54	328	332	COD	4
55	333	335	Others	2



Development and Construction Progress of the Project

The Muktagacha Solartech Energy Limited (MSEL), a wholly owned subsidiary of Joules Power Limited, is currently developing a 20MWAC solar PV plant along with stringing of the transmission line in Muktagacha, Mymensingh, Bangladesh. This project is being carried out in collaboration with the Bangladesh Power Development Board (BPDB) through a Power Purchase Agreement, with the aim of enhancing the renewable energy capacity in Bangladesh. MSEL will supply contracted electricity to the Bangladesh Power Development Board on a Build-Own-Operate (BOO) basis for a duration of 20 years.

According to the signed agreement between Muktagacha Solartech Energy Limited (MSEL) and Scube Technologies Limited (STL) in May 2024, STL is responsible for the development of the project as the EPC contractor. After obtaining the Site Clearance Certificate ("SCC") for this Project, MSEL directed STL to start their work. The land area is 76.4 acres.

As per shared project progress report of the STL, currently (up to July 30, 2024) the major milestones for the project development and construction are as follows:

- Land Development (land Filling): On May 19,2024, the land development process commenced and has been progressing steadily. As of July 17, 2024, the land filling workers have completed 2.72% (408,929 cubic feet) of the total work.
- Site Preparation (Water Hyacinth Removal): As of June 10, 2024, a total of 39,760 square feet of water hyacinths had been removed. On that particular day, an additional 12,780 square feet were cleared, bringing the total progress to 4% of the overall task.
- Temporary Storage and Labour Accommodation: On May 19, 2024, the development of the temporary storage and labor accommodation work commenced. As of August 1, 2024, 50% of the total scope of the storage and labor accommodation work has been completed.
- Road Construction: On April 15, 2024, the road construction phase of the project commenced. As of July 17, 2024, 4% of the total road construction work has been completed.
- Site Office: On May 19, 2024, site office installation work commenced and remarkably, 70% of the total work was completed in just one day. Site office is now in operation.

Key Findings and Compliance Assessment

Regulatory EHSS Compliance

The risk is defined as per the following definitions (Table 2):

Table 2: Risk Rating Definition

Rating	Description
High	Significant deviation/departure from EHSS regulations leading to legal prosecution, imposition of substantial fines/penalties, and or both requiring senior management intervention
Medium	Substantial deviation from EHSS regulations resulting in limited legal liability managed through interventions at the site management level
Low	Minor deviation from EHSS regulations managed through the intervention of project EHSS manager/personnel
Compliant	Project was in compliance with the applicable requirement for the specific EHSS monitoring assessment
Cannot be Determined	Available information is not deemed to be adequate to ascertain compliance.
Not Applicable	Some important regulatory provisions that are not applicable per the current site operation

A summary of compliance and associated risks related to the national regulatory EHSS compliance requirements is provided in Table 2.and Project status requirement is in Table 3

Table 2: Status of Regulatory EHSS Compliance

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
1.	Site Clearance Certificate (SCC) from the Department of Environment (DOE), Bangladesh	MSEL obtained the Site Clearance Certificate (SCC) from the Department of Environment (DOE), Bangladesh on 06/03/2024 and is valid up to 05/03/2026.Clerence certificate has been issued based on certain conditions. Key conditions are as follows: As part of infrastructure development, it's necessary to obtain an Environmental Clearance Certificate (ECC) alongside an Environmental Management Plan. Industrial operations cannot commence commercial activities or trial runs without securing an ECC. Any filling activities in ponds, lakes, or rivers are strictly prohibited during the project's establishment phase. There must be no actions that lead to waterlogging or hinder the water drainage system during project implementation. Water spraying is required during land development, infrastructure setup, and equipment installation to mitigate air pollution. Construction equipment must be covered as per the Air Pollution (Control) Rules, 2022. Compliance with the Bangladesh National Building Codes and Fire License conditions for fire safety is mandatory. Unoccupied areas should be landscaped by planting indigenous trees. Stringent occupational health and safety measures must be always upheld. Clean drinking water and hygienic toilet facilities are essential provisions within the institution. All necessary licenses and No Objection Certificates (NOCs) from relevant departments must be obtained.	Compliant	

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
		Adherence to the standards outlined in the Noise Pollution (Control) Rules, 2006, is mandatory. Solid waste will be handled and disposed as stated in the Solid Watse Management Rules, 2021. However, as per project design no water drainage system will be developed.		
2.	Environmental Clearence Certificate (ECC) from the Department of Environment (DOE), Bangladesh for Operation of MSEL	As per Rule 6 (4) of the Environmental Conservation Rules, 2023: Industrial units are not permitted to commence commercial operation or conduct trial runs without obtaining an ECC.	Not yet triggered.	MSEL to obtain the Environmental Clearance (covering the project scope – solar power plant and transmission line) after COD
3.	Factory License under Department of Factory Establishment	The Factories Act, 1965 Bangladesh Labour Law, 2006 and amendment 2013 pertain to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions. As per factory Act, the project need take factory license for operational phase	High	MSEL to take factory License prior to trail run of the plant.
4.	No Objection Certificate for the installation, construction and operation of a deep tube well from Local Authority/Water Resources Planning Organization	According to Clause-16 of Bangladesh Water Rules, 2018, an NOC is required to be taken from the DG of WARPO, District Committee/DC, Upazila Committee/UNO, and Union Committee/Chairman -for groundwater extraction, supply, & use related project & part of the project. Moreover, as per cluse 30 of Bangladesh Water Rules, 2018-it is needed to obtain permission, if the mode water withdrawal is suction and purpose of the installation of the tubewell, is for no agricultural, small or medium industry.	High	MSEL to obtain permission from Local authority/WARPO for Tube well installation prior to installation MSEL to obtain permission from WARPO for groundwater extraction, supply, & use prior to installation

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
		Moreover, as per cluse 30 (3) of Bangladesh Water Rules, 2018 it is needed to obtain permission from WARPO if the mode of water withdrawal is forced. Moreover, as per cluse 32 of Bangladesh Water Rules, 2018- need to obtain permission from WARPO for groundwater extraction, supply, & use. However, no such document has been made available for review.		
5.	Bangladesh Investment Development Authority (BIDA) Registration from Prime Minister's Office	BIDA registration of the company made available for review.	Compliant	
6.	Work Permit under Ministry of Home Affairs	As per MSEL, it does not include any foreign employee to work for the project.	Not Applicable	
7.	Fire License from Fire Service and Civil Defense	Fire Prevention Act 2003-to form rules and regulations for Fire Prevention and Extinction and Rescue Work from Fire Combustion. Fire Prevention and Extinguishing Act, 2003 and the Fire Prevention and Extinction Rules, 2014. Section 7 of the Act requires the approval of the Directorate General of Fire Service and Civil Defense for any structural design or layout of a multi-storied commercial building. Rule 22 of the 2014 Rules supplements the Act by requiring an occupancy certificate to ensure building compliance with safety requirements. However, no such documents have been made available for review.	High	MSEL to obtain Fire license prior to trail run of the plant

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
8.	No Objection Certificate (NOC) from Department of Agricultural Extension	MSEL obtained NOC from Department of Agricultural Extension for the establishment and operation of the project. Further renewal is not required. As per the NOC: Name of the Project: 20 MW (AC) Grid Tied Solar Power Plant Location of the Project Site: Union: 6 no Mankin, Mouza: Nimuria, Muktagacha, Mymensingh Total Area: 75.04 Acres Type of Land Ownership: Private Land Type of Land: Nama and the land identified as fallow land.	Compliant	
9.	No Objection Certificate (NOC) from Local Authority Parishad under Jurisdiction of District Commission	MSEL obtained NOC from 6 no Manon Union Parishad, Muktagacha, Mymensingh for the establishment and operation of the project. The NOC was issued on 27/08/2023 following DOE prescribed template and further renewal is not required. NOC has been issued on a total of 100 acres land. NOC has been issued based on certain conditions, these are as follows: MSEL will adhere to Environmental Conservation Rules and Regulations during the establishment and operation of its activities. Clearance from the Department of Environment must be obtained in accordance with the prescribed rules. – Ensure workplace health and safety of the workers. – An adequate fire extinguishing system should be kept, and proper emergency evacuation system should be developed. – Air and noise pollution shall not be allowed. – Wastewater will not be released outdoors without undergoing appropriate treatment	Compliant	

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
10.	Trade License from Dhaka North City Corporation for Power Generation	The trade license for the company has been given in the context of Model Tax Schedule 2016 (Paragraph no 10) which has powered by section 84 Local Government (City Corporation) Rules, 2009. This Corporate Trade License has been obtained for Power Generation from Dhaka North City Corporation. License has been issued dated 06 August 2023. The renewal validity period for this license is 2023-2024 fiscal year. As per Municipal Corporation (Taxation) Rules 1986 sec (42-48): After the license expires, it needs to be renewed in the current year (in between dated July 1 to 30 September).	Compliant	
11.	Taxpayer's Identification Number (TIN) Certificate from National Board of Revenue	MSEL obtained a TIN Certificate from the National Board of Revenue (NBR) on 11/06/2023. Further renewal is not required. As per condition of this certificate - A Taxpayer is liable to file the Return of Income under section 75 of the Income Tax Ordinance, 1984failure to return of Income under section 75 is liable topenalty under section 124; and prosecution under section 164 of the Income Tax Ordinance, 1984	Compliant	
12.	Certificate of Incorporation under Register of Joint Stock Companies and Firms	Under Company Act (Act XVIII of 1994) a certificate has been issued No. C-189080/2023 for Muktagacha Energytech Limited dated on 04 June 2023.Further renewal is not required	Compliant	
13.	Value Added Tax (VAT) Registration Certificate from National Board of Revenue	MSEL obtained VAT registration certificate from the National Board of Revenue (NBR) on 21/08/2023 under Value Added Tax and Supplementary Duty Act, 2012. Further renewal is not required.	Compliant	

SL#	Regulatory Requirement	Findings/observation	Level of Compliance	Recommendation
14.	Import Registration Certificate (IRC) from Ministry of Commerce	MSEL obtained Import Registration Certificate from the Office of the Chief Controller of Imports and Exports under Ministry of Commerce on 06/12/2023 and valid up to 05/12/2024. Certificate has been issued based on certain conditions. Key conditions are as follows:Certification will have to be renewed every financial year. Prohibited goods cannot be imported and in the case of controlled/restricted goods, all the terms and conditions of the import policy order should be maintained properly.	Compliant	
15.	Export Registration Certificate (ERC) under Ministry of Commerce	MSEL obtained Export Registration Certificate from the Office of the Chief Controller of Imports and Exports under Ministry of Commerce on 20/02/2024 and valid up to 19/02/2025. Certificate has been issued based on certain conditions. Key conditions are as follows:Certification will have to be renewed every financial year.Prohibited goods cannot be exported and in the case of controlled/restricted goods, all the terms and conditions of the import policy order should be maintained properly.	Compliant	

Table 3: Status of Environmental Compliance Evaluation

Sl#	Project Activity	Environmental Component	Observation/GAP	Level of compliance	Required Actions
1.	Land Development (Land Filling)	○ Ambient Air Quality ○ Ambient Noise Quality ○ Surface Water Quality ○ Soil Quality	According to the project progress report, sand and bricks have been sourced for the land development work. Moreover, water hyacinth removal work was initiated, and total progress was 4% Till	High	MSEL/EPC contractor to develop mitigation plans to avoid environmental pollution. The pertaining plans should be included but not limited to the following: **Air quality management Plan**

Sl#	Project Activity	Environmental Component	Observation/GAP	Level of compliance	Required Actions
	Site Preparation (Water Hyacinth removal)	○ Landscape Changes ○ Fisheries Resources ○ Waste Management ○ Biodiversity	august 1, 2024. Till now no mitigation measures have been taken. Specific environmental mitigation measures must be undertaken for effective environmental management of the project. EPC contractor agreement copy was provided for review. However, the shared agreement does not include a clause regarding the assurance of environmental compliance throughout the construction phase of the project.		– *Dusty materials need to be covered with impermeable sheet cover.* – *Rescheduling the dusty activities where possible if high-wind conditions are encountered.* – *No cleared vegetation to be burnt. Cleared vegetation will either be composed or reused for stabilization purposes.* **Noise Level Management Plan** – *Construction work should be restricted from 7 pm to 7 am to avoid disturbance to the nearest residence (which is within 20 m form the power plant boundary) as per Noise Pollution (Control) Rules, 2006.* – *Acoustic covers for all equipment and machinery that generate excessive noise.* – *Compliance with the Occupational Safety and Health Administration (OSHA) requirements and the Bangladesh Codes to ensure that for activities associated with high noise levels, workers are equipped with proper PPE (e.g., Earmuffs).* **Wastewater Management Plan** – *Designing drainage systems to manage and direct runoff*
2.	Temporary Storage and Labour Accommodation	○ Ambient Air Quality ○ Ambient Noise Quality ○ Soil Quality ○ Groundwater resources ○ Land use Changes	As per the project progress report, temporary storage and accommodation of labor facilities were developed to maintain worker welfare and ensure compliance with health and safety requirements. Moreover, it is stated in the progress report that health and safety was maintained during construction progress upheld. However, no such document regarding how they are maintaining health and safety was made available for review.	High	
3.	Road Construction Work	○ Ambient Air Quality	According to the project progress report, sand, bricks, cement, re-bar, door, profile tin, and container have been sourced for	High	

Sl#	Project Activity	Environmental Component	Observation/GAP	Level of compliance	Required Actions
		○ Ambient Noise Quality ○ Vibration ○ Surface Water Quality ○ Soil Quality ○ Landscape Changes ○ Fisheries Resources ○ Waste Management ○ Biodiversity	access road development work. The work involves not only the physical construction of the roads but also ensuring that they are built to withstand the heavy usage they will endure throughout the project. Till now no mitigation measures have been taken. Specific environmental mitigation measures must be undertaken for effective environmental management of the project.		*effectively, minimizing the impact on local water bodies.* – *Timely disposal of the construction/chemical/hazardous waste to prevent leaching of any pollutant to the water bodies.* **Spoil Management Plan** – *Secure loads and use cover to prevent spoil from spilling or blowing away during transportation.* – *Keep record of spoil that generated onsite.* **Ground Water Use Management Plan** – *Designing drainage systems to manage and direct runoff effectively, minimizing the impact on local water bodies.* – *Restoring vegetation in cleared areas to improve soil stability and reduce runoff after construction activities are completed.* **Soil and Erosion Management Plan** – *Activities to be scheduled to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking* – *Implement slope stabilization measures, such as retaining walls, soil reinforcement, or grading adjustments.*

Sl#	Project Activity	Environmental Component	Observation/GAP	Level of compliance	Required Actions
					Biodiversity Management Plan – *Restrict land clearing and leveling to the areas absolutely necessary for construction and avoid areas with high ecological value* – *Implement buffer zones around key aquatic habitats to protect them from direct disturbance.* MSEL/EPC contractor to share implementation evidence of the health and safety measures during construction work. Update the EPC contract agreement.

Corrective Action Plan

This section presents the project Corrective Action Plan (CAP). This CAP is based on the Audit Team's understanding of the project documentation provided, project status at the time of auditing and writing the report, and requirements of the lenders moving forward. The CAP must be reviewed and amended in discussion between the lenders and MSEL to ensure that all parties are aware of the obligations imposed by the CAP and accept the obligations herein. Any changes to the project description or any of the documentation provided will require the CAP to be reviewed and amended if considered necessary. The implementation of the CAP is the responsibility of the MSEL.

The CAP has been organized to include the following:

- Proposed measures based on findings of the audit team's review and recommendations to achieve compliance with the applicable regulations
- Reference to the findings in the report
- Significance
- Recommended responsibility for implementing the action
- Deliverables that demonstrate the action has been completed
- Timelines for completion

Table 4: Corrective Action Plan

SL#	Aspect	Reference in the Report	Significance	Responsibility	Required Action	Deliverables	Suggested Timeline for Completion
1.	Land Development (Land Filling) and Site Preparation (Water Hyacinth removal)	Table 3 SL1	High	MSEL/EPC Contractor	○ MSEL/EPC contractor to develop mitigation plans to avoid environmental pollution. The pertaining plans should be: - *Air Quality Management Plan* - *Noise Level Management Plan* - *Wastewater Management Plan* - *Spoil Management Plan* - *Ground Water Management Plan* - *Soil and Erosion Management Plan* - *Biodiversity Management Plan* ○ MSEL/EPC contractor to share implementation evidence of the health and	- Construction Phase Environmental and Social Management Plan covering the identified the plans - implementation evidence of the health and safety measures during construction work - Updated EPC contractor agreemnet	Prior to 1st Disbursement
2.	Temporary Storage and Labour Accommodation	Table 3 SL 2	High	MSEL/EPC Contractor			
3.	Road Construction Work	Table 3 SL 3	High	MSEL/EPC Contractor			

SL#	Aspect	Reference in the Report	Significance	Responsibility	Required Action	Deliverables	Suggested Timeline for Completion
					safety measures during construction work. o Update the EPC contract agreement.		

Table 5: Corrective Action CAP for Key Regulatory Requirements

SL#	Aspect	Significance	Responsibility	Required Action	Deliverables	Suggested Timeline for Completion
1.	Environmental Clearence Certificate (ECC) from the Department of Environment (DOE), Bangladesh for Operation of MSEL	High	MSEL	MSEL to obtain ECC (covering the project scope – solar power plant and transmission line)	ECC.	After COD
2.	Factory License	High	MSEL	MSEL to obtain Factory license	License	Prior to trial run of the plant
3.	No Objection Certificate for the installation, construction	High	MSEL	Obtain permission from WARPO for tubewell installation and groundwater usage	NOC from WARPO for tubewell installation and Groundwater usage	Prior to installation

SL#	Aspect	Significance	Responsibility	Required Action	Deliverables	Suggested Timeline for Completion
	and operation of a deep tube well from Local Authority/Water Resources Planning Organization					
4.	Fire License from Fire Service and Civil Defense	High	MSEL	MSEL to obtain NOC from FSCD	NOC	Prior to trial run of the plant

Photo Documentation from Progress Report

Land Development (ongoing)

Site Cleaning (Water Hyachinth Removal)-Ongoing

Temporaray Storage and Labour Acoomodation Development (ongoing

Site office Installment

Access Road Development (ongoing)

Appendix H: Critical Habitat Screening Report

INTRODUCTION

Project Background

Joules Power Limited, acting as the project Sponsor, is seeking project financing from the Asian Development Bank (ADB) for the development, construction, and operation of the Muktagacha Solar Power Project (the Project). The project entails establishing a 20MW Grid Tied Solar Power Project as an independent power producer. It will supply contracted electricity to the Bangladesh Power Development Board on a Build-Own-Operate (BOO) basis for a duration of 20 years. The plant will be located in Nimoria, Muktagacha, Mymensingh, Bangladesh.

In accordance with the Asian Development Bank's (ADB) Safeguard Policy Statement, which focus on safeguarding the environment, addressing involuntary resettlement, and respecting the rights of indigenous peoples. This Terms of Reference aims to direct the prospective Environmental and Social (E&S) consultant in performing an Initial Environmental and Social Examination (IESE) to identify potential environmental and social risks and impacts linked with the Project and develop appropriate mitigation measures for the Project. Furthermore, considering that land lease and land development activities for the Project have already commenced, a social compliance audit and an environmental compliance audit covering the existing project activities on site will also be conducted as per ADB SPS – Safeguard Requirements 4.

Critical and Natural Habitat Screening

Critical and Natural Habitat Screening is a process used to assess the potential impacts of development projects on habitats that are deemed ecologically important. It involves identifying and evaluating areas that support rare, threatened, or sensitive species, as well as ecosystems vital for biodiversity conservation. Through this screening, authorities aim to minimize adverse effects on these habitats while promoting sustainable development.

Objectives

The objectives of Critical and Natural Habitat Screening are:

(i) to identify the major potential biodiversity risks of a project at an early stage, to facilitate consideration of high-level design changes; and
(ii) to focus on-site biodiversity surveys on highest-risk biodiversity.

STUDY AREA

Project Location

The Project is located under Mankon Union, Muktagacha Upazila in Mymensingh District. Geographically, the Project is located in the Northern region of Bangladesh within the Longitude of 90.195806° E and Latitude of 24.731430°N. The total project area is 80 acres.

The site is accessible from Dhaka. Muktagacha Upazila approximate distance is 140KM from capital Dhaka and 30KM distance from Mymensingh. Road transportation is very good to visit the site. The proposed project site is located just beside of the Mymensingh-Tangail highway road in Nimoria of under Muktagacha Upazila of Mymensingh district. It will take around max Four hours through own road transport.

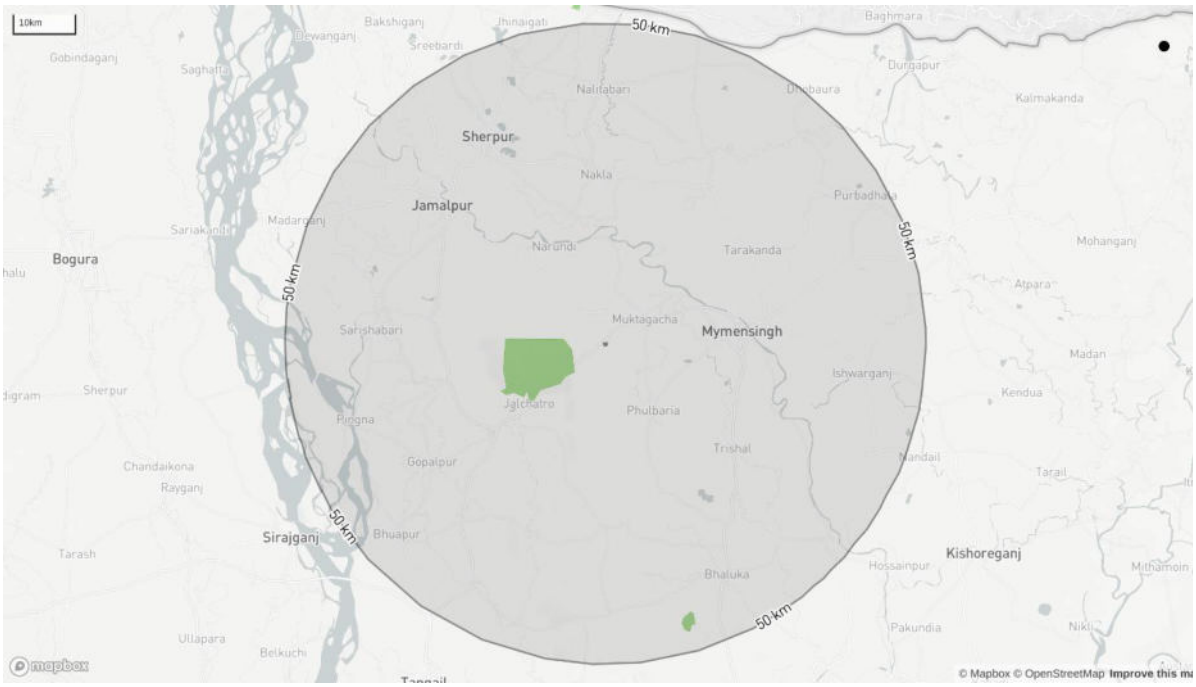
STEPS OF CRITICAL AND NATURAL HABITAT SCREENING

Terrestrial Ecology Expert and Aquatic Ecology Expert of EQMS Consulting Limited began the screening of critical and natural habitats before biodiversity surveys commenced on-site. The expert team followed the subsequent steps for this assessment purpose:

Key Site Screening Using Integrated Biodiversity Assessment Tool (IBAT)

Terrestrial and freshwater biomes were screened using the IBAT tool with a buffer of 50 km. This screening is one part of a package generated by IBAT on March 30, 2024 (GMT), which includes a full list of all species, protected areas, and Key Biodiversity Areas in CSV format, along with maps showing the area of interest in relation to these features. During the initial screening with a 50 km buffer, two protected areas and two key biodiversity areas overlapped. A total of 56 IUCN Red-listed species were identified during this assessment.

Figure 12-1 Displaying Project Location and Buffers: 50 km



Source: IBAT Screening, March 2024

Protected Areas (PAs)

A protected area is a clearly defined geographical space, recognized, dedicated, and managed to achieve the long-term conservation of nature, associated ecosystem services, and cultural values. Protected areas (PA) or conservation areas are locations which receive protection because of their recognized natural, ecological, or cultural values. There are several kinds of protected areas, which vary by level of protection, depending on the enabling laws of each country or the regulations of the international organizations involved.

In Bangladesh, the Forest Department defines and designates the number of “Protected Areas” viz. Wildlife Sanctuary, National Park, Safari Park, Eco-Park, Botanical Garden, Special Biodiversity Conservation Area, Marine Protected Area, Aviary Park, etc. There are 53 (Fifty-three) Protected Areas in Bangladesh according to the Forest Department Website (February 2024).

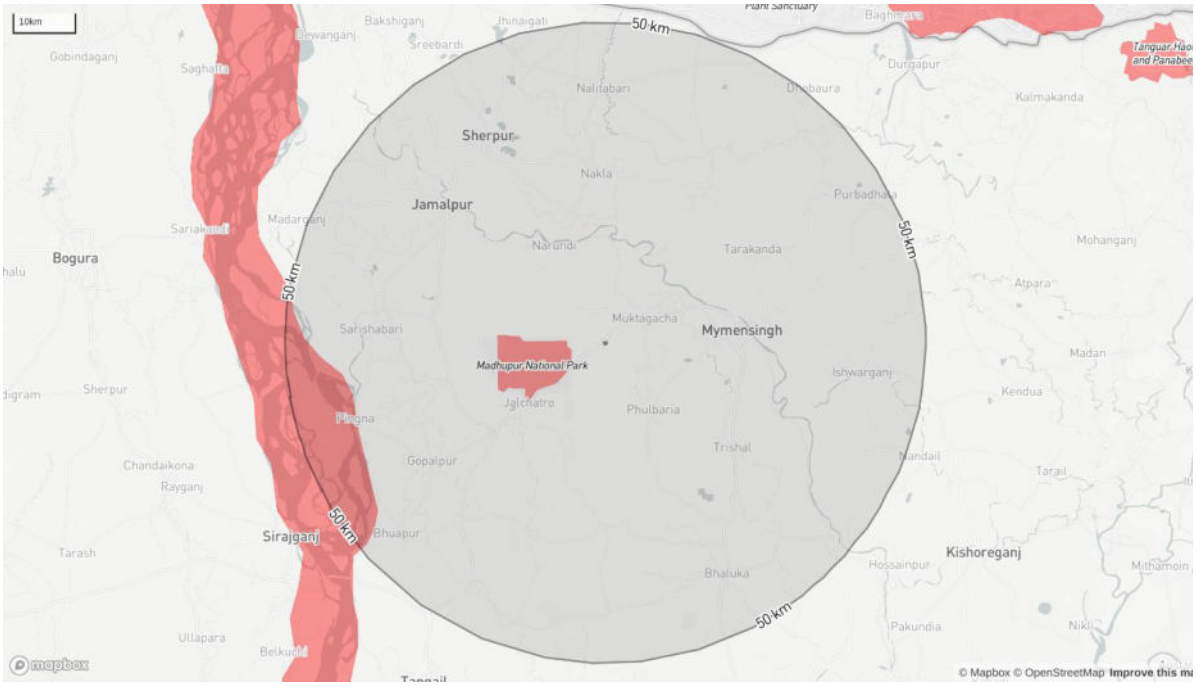
The following protected areas are found within 50 km of the area of interest as per IBAT screening (Table 12-1, Figure 12-2).

Table 12-1 Protected Area Status of the Project as per IBAT Screening

Sl. No.	Area name	Within buffer of
1.	Kadigarh	50 km
2.	Madhupur	50 km

Source: EQMS IBAT Screening, March 2024

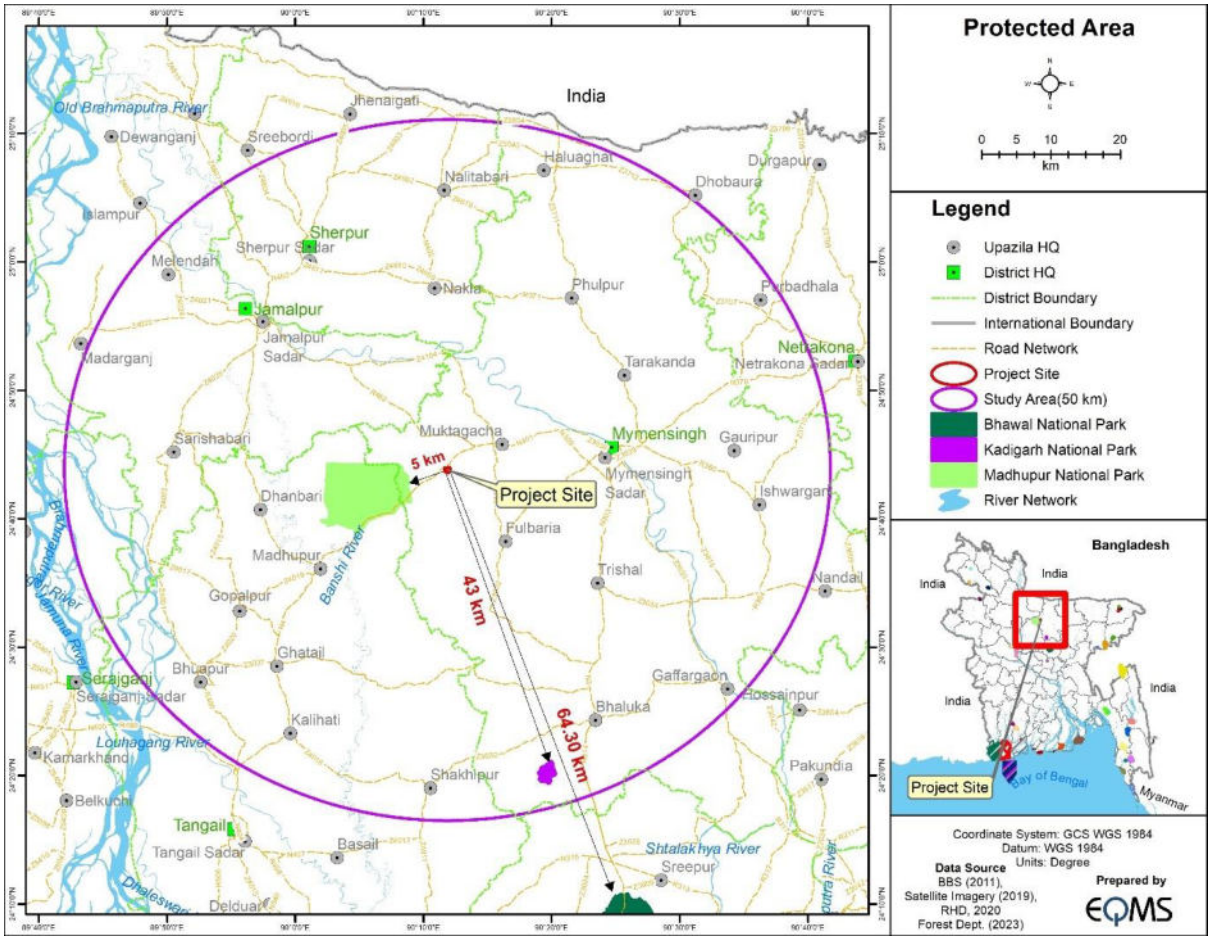
Figure 12-2 Protected Area Status of the Project as per IBAT Screening



Source: IBAT Protected Area Screening, March 2024

The GIS and Remote Sensing Expert of EQMS conducted further assessment on the protected areas associated with the project. It was found that the nearest protected area to the project site is Modhupur National Park, located only 5 km away and Kadigarth National Park, located 43 km away (Figure 12-3).

Figure 12-3 Protected Area Status of the Project



Source: EQMS Protected Area Screening, March 2024

Key Biodiversity Areas (KBAs)

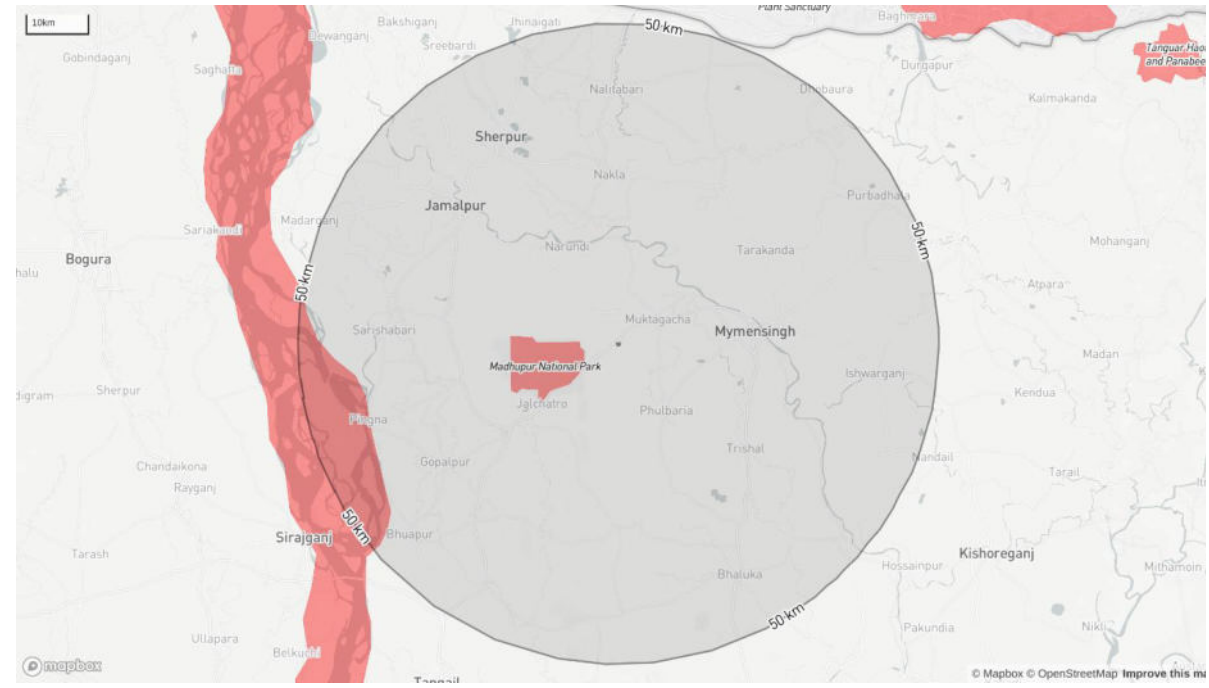
The following key biodiversity areas are found within 50 km of the area of interest as per IBAT screening (Table 12-2, Figure 12-4).

Table 12-2 KBA Status of the Project as per IBAT Screening

Sl. No.	Area name	Distance
1.	Jamuna-Brahmaputra River	50 km
2.	Madhupur National Park	50 km

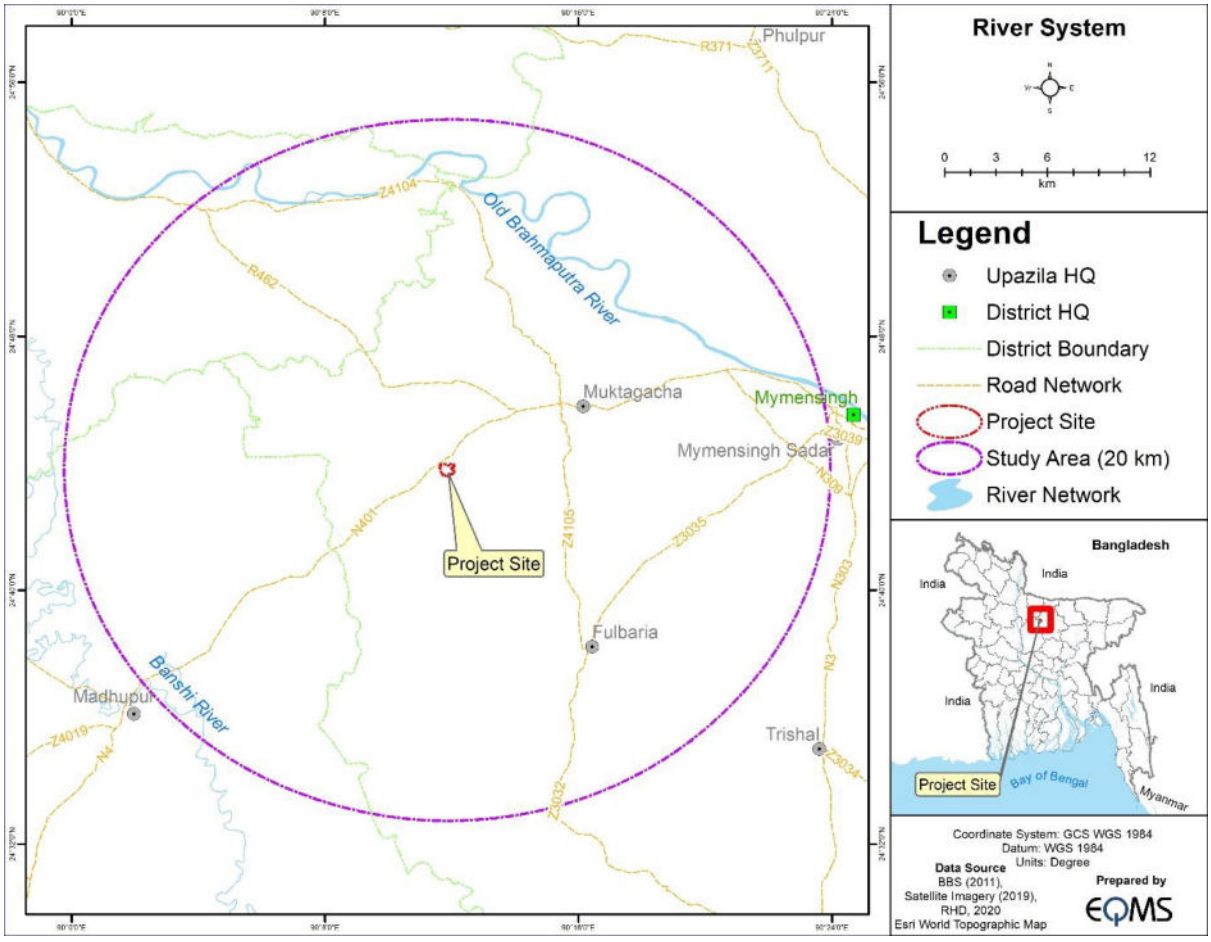
Source: IBAT Screening, March 2024

Figure 12-4 KBA Status of the Project as per IBAT Screening



Source: IBAT KBA Screening, March 2024

Figure 12-5 River System as per EQMS GIS Based Screening



Besides the aforementioned screenings, the EQMS team also utilized GIS and remote sensing tools to assess the following areas:

Ecologically Critical Areas (ECAs)

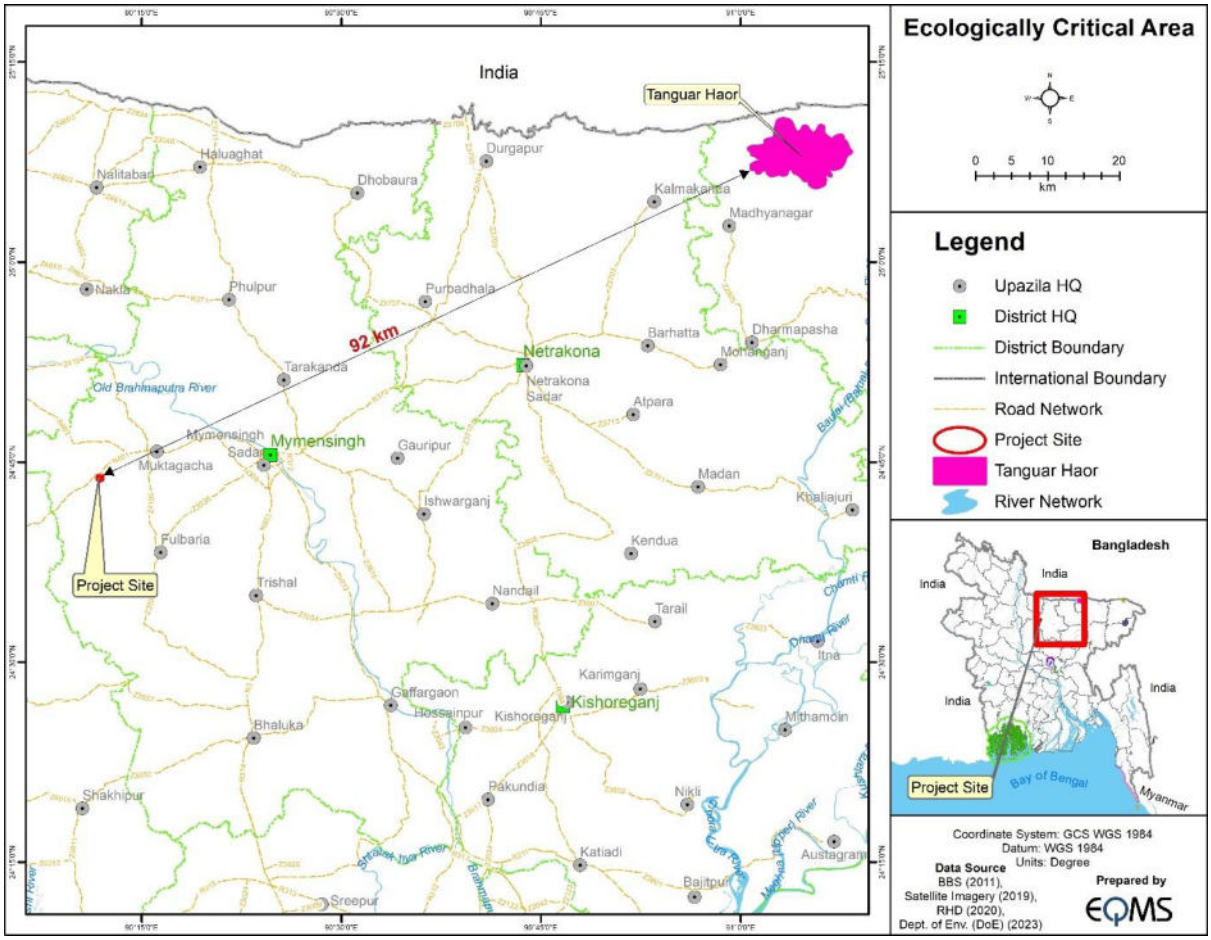
The Ecologically Critical Areas (ECAs) are ecologically defined areas or ecosystems affected adversely by the changes brought through human activities. An area which is enriched with unique biodiversity and environmentally significant and shall need protection or conservation from destructive activities can be declared as ECA. To improve the condition of ecosystems, the government declared thirteen ECAs till now with varying levels of degradation, comprising coastal areas, islands, wetlands, and rivers in different parts of the country. The Ministry of Environment, Forest and Climate Change (MoEFCC) has declared 13 areas as ECAs.

Ecologically Critical Area has restriction on-

- Natural forest and trees cutting
- Any type of wild animal killing
- Oysters, corals, turtles, and other wildlife hunting
- Any type of activities which may destroy the flora and faunal residence.
- Any type of activity which may destroy/change the quality of land and water.
- Construction of industry/plant which produces soil, water, and noise pollution.
- Any functions which is bad for fish and aquatic species
- Any functions which can produce solid and liquid waste.
- Stone or Mineral resource extraction using Auto or Manual or other methods

There is no Ecologically Critical Area present within the project AOI. The nearest ecologically critical area is Tanguar Haor, which is approximately 92 km away from the project site.

Figure 12-6 ECA Status of the Project as per GIS Screening



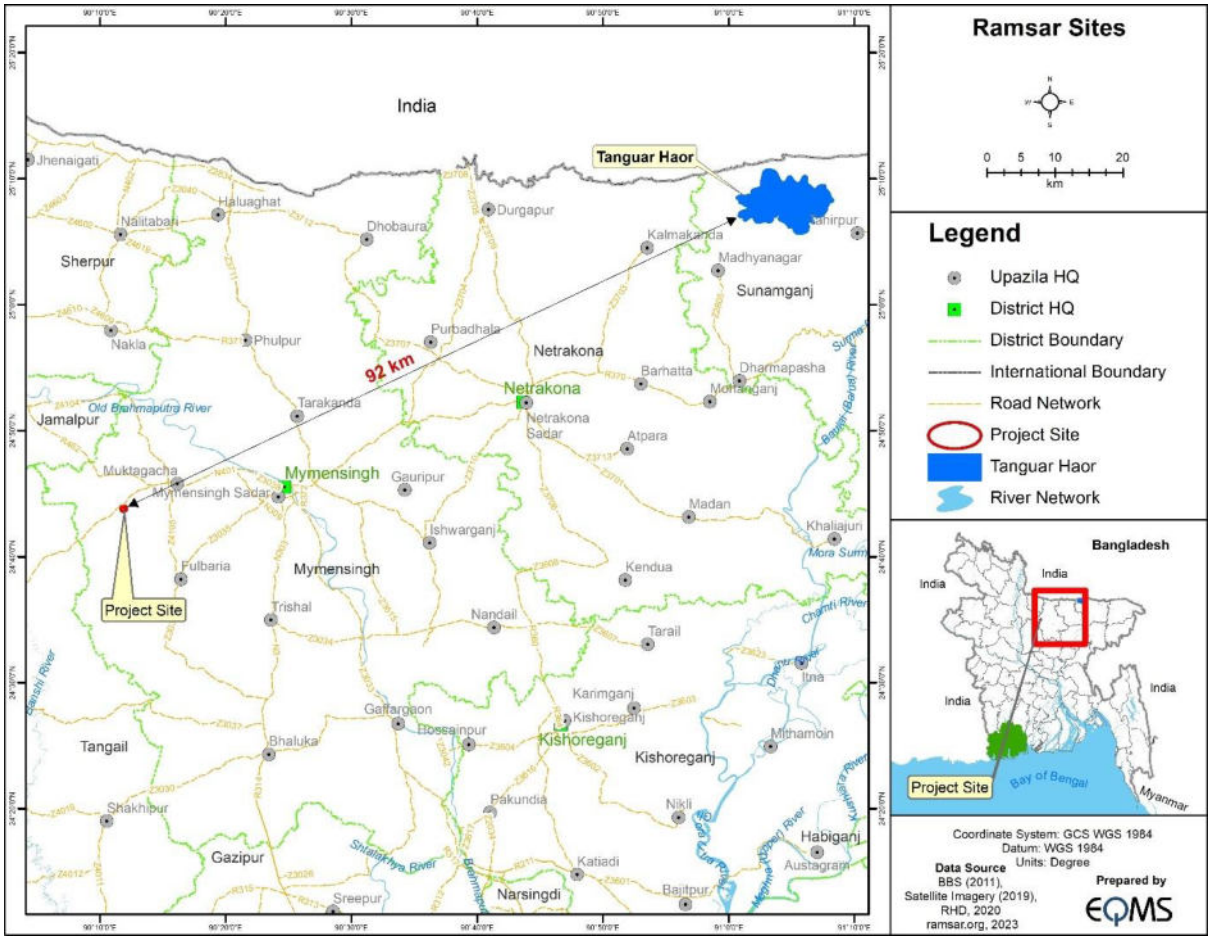
Source: EQMS ECAs Screening, March 2024

Ramsar Sites

Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975. It provides support for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources.

Bangladesh currently has two (2) sites designated as Wetlands of International Importance (Ramsar Sites) with a surface area of 611,200 hectares which are Sundarbans Reserved Forest (160 km from the project site) and Tanguar Haor. However, no Ramsar Sites were found within the 50 km buffer of the project site during this screening period. The Map of Ramsar site presented in the Figure 12-7.

Figure 12-7 Ramsar Site Status of the Project as per GIS Screening

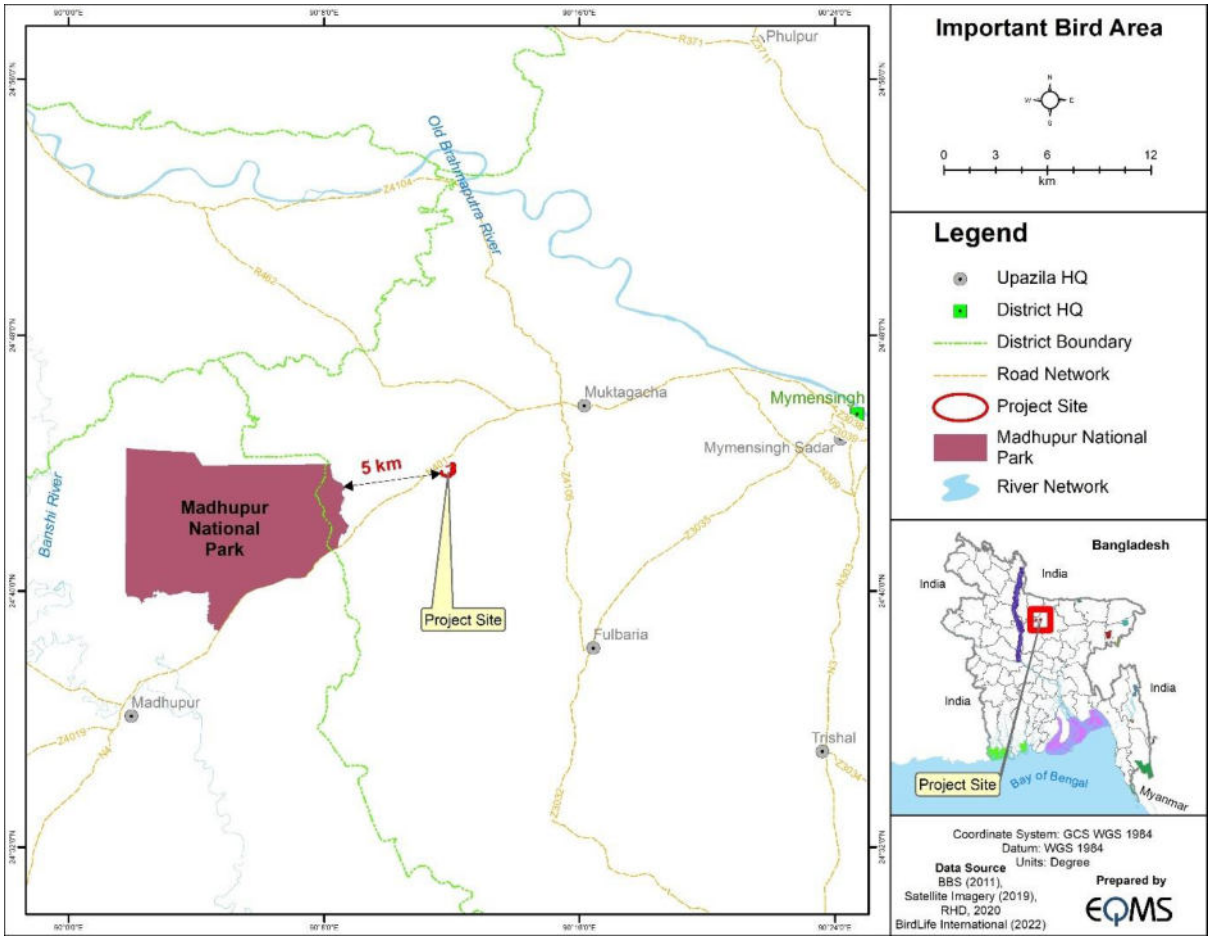


Source: EQMS Ramsar Site Screening, March 2024

Important Bird and Biodiversity Areas (IBAs)

According to BirdLife International (2023), there are 20 (twenty) Important Bird & Biodiversity Areas (IBAs) in Bangladesh with a total area of 544,438 ha. The nearest IBA is Modhupur National Park (Figure 1 22) Which is only 5 km away from the project site.

Figure 12-8 Nearest IBAs from the Project site



Source: EQMS IBAs Site Screening, March 2024

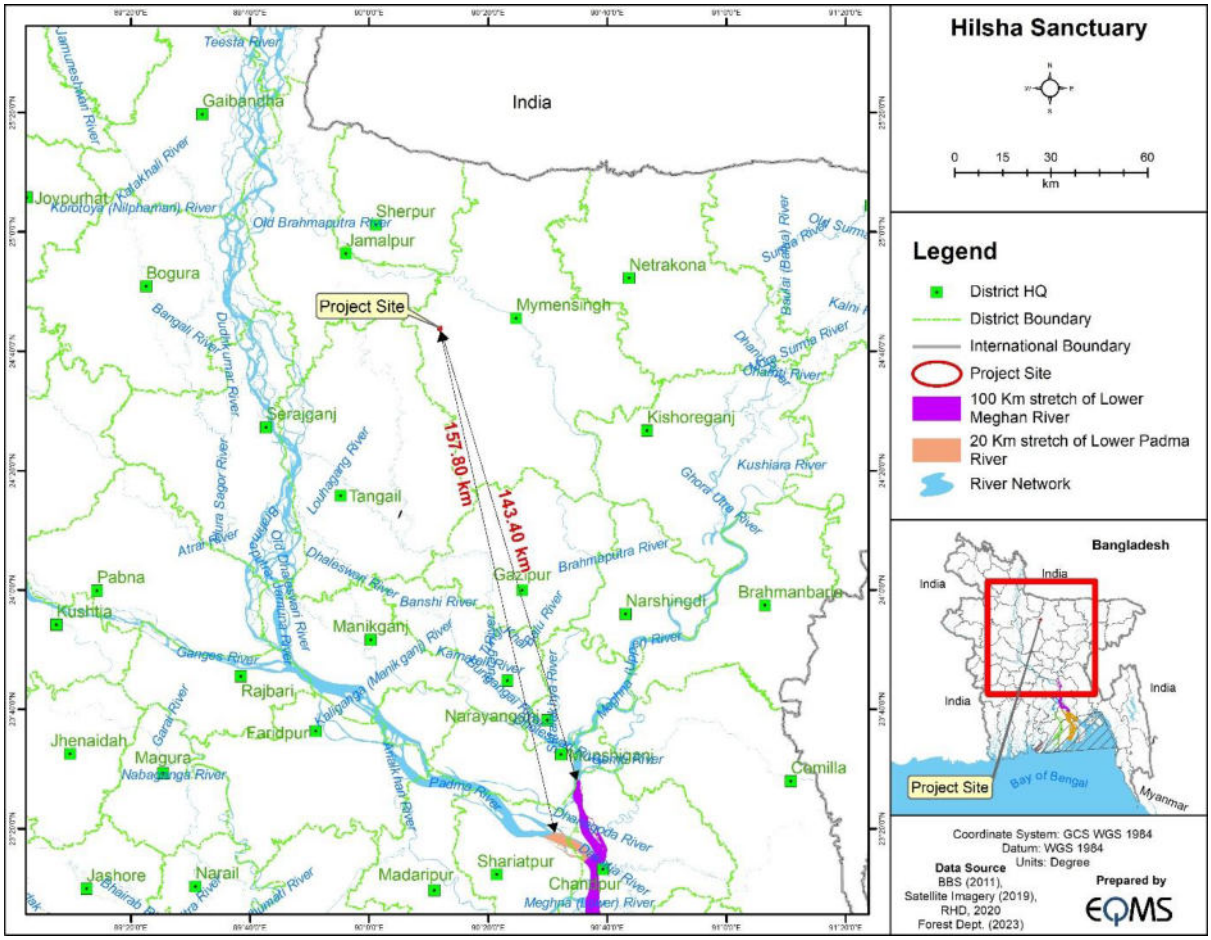
Migratory Flyway

A Migratory Flyway is a route traveled regularly by groups of birds during their annual migration between breeding and non-breeding grounds. These routes often span continents and can include various stopover sites crucial for resting, feeding, and refueling. Migratory flyways are essential for maintaining bird populations and biodiversity on a global scale, making them a focus of conservation efforts worldwide. During GIS-based screening, the nearest migratory flyway found is the East Asian–Australasian Flyway, one of the world's great flyways for migratory birds, which is only 18.12 km away from the project site.

Hilsa Sanctuary

Six Hilsa sanctuaries have been established under the 'Protection and Conservation of Fish Act-1950' for the effective conservation of Jatka and brood Hilsa in the major nursery and spawning areas of riverine ecosystems in Bangladesh (DoF, 2016). However, no hilsa sanctuary found within the 50 km buffer during the screening phase of Critical habitat. The locations of closest Hilsa sanctuary have been presented in Figure 12-9.

Figure 12-9 Nearest Hilsa Sanctuary from the Project site



Source: EQMS Hilsa Sanctuary Site Screening, March 2024

Critical Habitat-qualifying Species

The following threatened species are potentially found within 50 km of the area of interest using the Integrated Biodiversity Assessment Tool (IBAT). However, none of the species are 'endemic' and 'restricted range' species. Besides the global IUCN status, we have also assessed the local status of the IBAT-assessed species (Table 12-3). A complete list of IBAT assessed threatened species is shown in Appendix A.

Table 12-3 List of Critical Habitat-qualifying Species

Sl. No.	Species/ Sub species/Taxa	Common Name	Taxonomic Group	IUCN Global Status	Status in Bangladesh	Population Trend	Biome
1.	*Pangshura sylhetensis*	Assam Roofed Turtle	REPTILIA	CR	EN	Decreasing	Terrestrial, Freshwater
2.	*Batagur dhongoka*	Three-striped Roofed Turtle	REPTILIA	CR	EN	Decreasing	Terrestrial, Freshwater
3.	*Manis pentadactyla*	Chinese Pangolin	MAMMALIA	CR	CR	Decreasing	Terrestrial
4.	*Houbaropsis bengalensis*	Bengal Florican	AVES	CR	RE	Decreasing	Terrestrial
5.	*Gyps bengalensis*	White-rumped Vulture	AVES	CR	CR	Decreasing	Terrestrial
6.	*Aythya baeri*	Baer's Pochard	AVES	CR	CR	Decreasing	Freshwater
7.	*Cuon alpinus*	Dhole	MAMMALIA	EN	EN	Decreasing	Terrestrial
8.	*Elephas maximus*	Asian Elephant	MAMMALIA	EN	CR	Decreasing	Terrestrial
9.	*Geoclemys hamiltonii*	Spotted Pond Turtle	REPTILIA	EN	VU	Decreasing	Terrestrial, Freshwater
10.	*Hardella thurjii*	Crowned River Turtle	REPTILIA	EN	VU	Decreasing	Terrestrial, Freshwater
11.	*Manis crassicaudata*	Indian Pangolin	MAMMALIA	EN	CR	Decreasing	Terrestrial
12.	*Melanochelys tricarinata*	Tricarinate Hill Turtle	REPTILIA	EN	VU	Decreasing	Terrestrial
13.	*Morenia petersi*	Indian EyedT urtle	REPTILIA	EN	VU	Decreasing	Terrestrial, Freshwater
14.	*Varanus flavescens*	Yellow Monitor	REPTILIA	EN	NT	Decreasing	Terrestrial
15.	*Nilssonia gangetica*	Indian Softshell Turtle	REPTILIA	EN	VU	Decreasing	Terrestrial, Freshwater
16.	*Nilssonia hurum*	Indian Peacock SoftshellT urtle	REPTILIA	EN	VU	Decreasing	Terrestrial, Freshwater
17.	*Nycticebus bengalensis*	Bengal Slow Loris	MAMMALIA	EN	EN	Decreasing	Terrestrial
18.	*Hoolock hoolock*	Western Hoolock Gibbon	MAMMALIA	EN	EN	Decreasing	Terrestrial
19.	*Rynchops albicollis*	Indian Skimmer	AVES	EN	VU	Decreasing	Terrestrial, Freshwater
20.	*Sterna acuticauda*	Black-bellied Tern	AVES	EN	EN	Decreasing	Terrestrial, Freshwater
21.	*Haliaeetus leucoryphus*	Pallas's Fish eagle	AVES	EN	VU	Decreasing	Terrestrial, Freshwater
22.	*Aquila nipalensis*	Steppe Eagle	AVES	EN	EN	Decreasing	Terrestrial
23.	*Trachypithecus pileatus ssp. pileatus*	Blond-bellied Langur	MAMMALIA	EN	VU	Decreasing	Terrestrial
24.	*Schistura sijuensis*	ACTINOPTERYGII	EN	Unknown	-	Freshwater	Freshwater
25.	*Platanista gangetica*	Ganges River Dolphin	MAMMALIA	EN	EN	Decreasing	Freshwater
26.	*Urogymnus polylepis*	Giant Freshwater Whipray	CHONDRICHTHYES	EN	-	Decreasing	Marine, Freshwater

Sl. No.	Species/ Sub species/Taxa	Common Name	Taxonomic Group	IUCN Global Status	Status in Bangladesh	Population Trend	Biome
27.	*Tor putitora*	ACTINOPTERYGII	EN	Decreasing	NT	Freshwater	
28.	*Crocodylus palustris*	Mugger	REPTILIA	VU	RE	Stable	Terrestrial, Freshwater
29.	*Helarctos malayanus*	Sun Bear	MAMMALIA	VU	-	Decreasing	Terrestrial
30.	*Lutrogale perspicillata*	Smooth coated Otter	MAMMALIA	VU	CR	Decreasing	Terrestrial, Marine, Freshwater
31.	*Macaca arctoides*	Stump-tailed Macaque	MAMMALIA	VU	DD	Decreasing	Terrestrial
32.	*Prionailurus viverrinus*	Fishing Cat	MAMMALIA	VU	EN	Decreasing	Terrestrial, Freshwater
33.	*Trachypithecus pileatus*	Capped Langur	MAMMALIA	VU	EN	Decreasing	Terrestrial
34.	*Macaca leonina*	Northern Pigtailed Macaque	MAMMALIA	VU	VU	Decreasing	Terrestrial
35.	*Arctictis binturong*	Binturong	MAMMALIA	VU	VU	Decreasing	Terrestrial
36.	*Rusa unicolor*	Sambar	MAMMALIA	VU	VU	Decreasing	Terrestrial
37.	*Aonyx cinereus*	Asian Small clawed Otter	MAMMALIA	VU	EN	Decreasing	Terrestrial, Marine, Freshwater
38.	*Pangshura tecta*	Indian Roofed Turtle	REPTILIA	VU	LC	Decreasing	Terrestrial, Freshwater
39.	*Elaphe taeniura*	Cave Racer	REPTILIA	VU	DD	Decreasing	Terrestrial
40.	*Python bivittatus*	Burmese Python	REPTILIA	VU	VU	Decreasing	Terrestrial
41.	*Aythya ferina*	Common Pochard	AVES	VU	LC	Decreasing	Terrestrial, Marine, Freshwater
42.	*Sterna aurantia*	River Tern	AVES	VU	NT	Decreasing	Terrestrial, Marine, Freshwater
43.	*Clanga clanga*	Greater Spotted Eagle	AVES	VU	VU	Decreasing	Terrestrial, Freshwater
44.	*Aquila heliaca*	Eastern Imperial Eagle	AVES	VU	VU	Decreasing	Terrestrial, Freshwater
45.	*Schoenicola striatus*	Bristled Grass bird	AVES	VU	-	Decreasing	Terrestrial, Freshwater
46.	*Clanga hastata*	Indian Spotted Eagle	AVES	VU	VU	Decreasing	Terrestrial
47.	*Lissemys punctata*	Indian Flap shell Turtle	REPTILIA	VU	LC	Decreasing	Terrestrial, Freshwater
48.	*Capricornis sumatraensis*	Mainland Serow	MAMMALIA	VU	EN	Decreasing	Terrestrial
49.	*Hoolock hoolock ssp. hoolock*	Western Hoolock Gibbon	MAMMALIA	VU	EN	Decreasing	Terrestrial
50.	*Paris polyphylla*	Love Apple	LILIOPSIDA	VU	-	Decreasing	Terrestrial
51.	*Liotelphusa quadrata*	MALACOSTRACA	VU	Unknown	-	Freshwater	Freshwater
52.	*Wallago attu*	ACTINOPTERYGII	VU	Decreasing	NT	Freshwater	Freshwater
53.	*Schistura reticulofasciata*	ACTINOPTERYGII	VU	Unknown	CR	Freshwater	Freshwater
54.	*Xenochrophis cerasogaster*	Painted Keelback	REPTILIA	VU	LC	Decreasing	Freshwater
55.	*Schizothorax plagiostomus*	Snow Trout	ACTINOPTERYGII	VU	-	Decreasing	Freshwater
56.	*Bagarius bagarius*		ACTINOPTERYGII	VU	CR	Decreasing	Freshwater

Source: IBAT IUCN Red List of Threatened Species, March 2024

Screening of CH Qualifying Species

The identification of Critical Habitat-qualifying Species through IBAT is enhanced by a subsequent screening process. This process involves Key Informant Interviews (KIIs) with esteemed experts like Dr. Monirul H. Khan and Dr. M. A. Aziz, Professors of Zoology at Jahangirnagar University, Savar, Dhaka. Additionally, the IUCN Red List of Threatened Species of Bangladesh is used to examine the distribution of these CH-qualifying species. Through this comprehensive approach, only the following species, out of the 56 identified initially, might be occurred within the project site.

Fishing Cat (*Prionailurus viverrinus*)

The fishing cat (*Prionailurus viverrinus*) is a medium-sized wild cat of South and Southeast Asia including Bangladesh. It has deep yellowish-grey fur with black lines and spots. Adults have a head-to-body length of 57 to 78 cm (22 to 31 in), with a tail length of 20 to 30 cm (7.9 to 11.8 in). This species is widely distributed but has a low population density in Bangladesh. Based on existing threats, it is suspected that more than 50% of its population has declined during the last two decades. Its Area of Occupancy and habitat quality have been reduced, and this process is ongoing (IUCN Bangladesh, 2015). The species is assessed as Vulnerable globally and Endangered nationally. Therefore, based on its conservation status, this species requires continuous protection in its natural habitat. Secondary literature suggests that this species has been observed in Madhupur National Park, which is only 5 kilometers away from the project site (Khan and Ahsan, 2011; IUCN Bangladesh, 2015; Monirujjaman and Khan, 2018). Considering all these aspects including the project site has suitable habitat and confirmation of occurrence from local people, it is highly likely that the Study Area qualifies as a potential Critical Habitat (CH) for this species.

Capped Langur (*Trachypithecus pileatus*)

The capped langur (*Trachypithecus pileatus*) is a primate species belonging to the family Cercopithecidae. It is indigenous to Bangladesh, Bhutan, India, and Myanmar, typically inhabiting subtropical or tropical dry forests. However, its existence is currently under threat due to habitat loss. This species has been classified as Endangered nationally and Vulnerable globally, primarily due to a significant decline in its Extent of Occurrence, Area of Occupancy, and habitat quality over the course of three generations (IUCN Bangladesh, 2015). Therefore, it is imperative that continuous protection measures be implemented to safeguard this species in its natural habitat. This species also occurred in the Madhupur National Park , which is only 5 kilometers away from the project site (Khan and Ahsan, 2011; IUCN Bangladesh, 2015; Monirujjaman and Khan, 2018). Considering all these aspects, the project site does not have any suitable habitat and so, it is highly likely that the Study Area does not qualify as a potential Critical Habitat (CH) for this species.

Steppe Eagle (*Aquila nipalensis*)

The Steppe Eagle is an uncommon winter migrant is widely distributed in Bangladesh. It is not a habitat specialist and occurs in a wide variety of habitats. There is no notable threat to it and there is no indication that the population is declining. So, it has been evaluated as Least Concern nationally (IUCN Bangladesh, 2015). However, globally the Steppe Eagle is listed as Endangered under criteria A2abcd+3bcd+4abcd (IUCN Red List ver 3.1). Considering all these aspects, the project site does not have any suitable habitat or any occurrence data and so, it is highly likely that the Study Area does not qualify as a potential Critical Habitat (CH) for this species

Indian Spotted Eagle (*Clanga hastata*)

Indian Spotted Eagles generally occur in pairs, often hunting from high perches and soaring in circles over forest edges and open fields. Their diet typically includes rodents, frogs, lizards, fish, and birds, although they may occasionally consume carrion. While these eagles can occasionally be found in villages, some individuals also inhabit areas near wetlands (Haque and Kamruzzaman, 2008; Khan, 2008). Notably, the species is classified as Endangered according to IUCN guidelines (IUCN

Bangladesh, 2015). Given their preference for wetland habitats, the probability of encountering this species within the project site is very low and there is no evidence of occurrence in the study area. Therefore, it is highly likely that the Study Area does not qualify as a potential Critical Habitat (CH) for this species

Tricarinate Hill Turtle (*Melanochelys tricarinata*)

Tricarinate Hill Turtle is terrestrial and omnivorous; mainly feeds on vegetable matters (Das 2002, Islam 2009) but eats fruits, as well as fish in captivity (Das 1995). It is crepuscular and spend the day time in retreats in the leaf litter, under fallen tree trunks or tree buttresses, but become active during day in mating period. It is found in northeast, southeast (Cox's Bazar), north (greater Mymensingh) and northwest (Dinajpur) of Bangladesh (Khan 1982, 2004; Hasan et al. 2014). Due to its rarity, scattered distribution, degradation of habitat quality and continuing decline of the area of occurrence the species is assessed as Vulnerable (IUCN Bangladesh, 2015). Considering all these aspects, the project site does not have any suitable habitat or any occurrence data and so, it is highly likely that the Study Area does not qualify as a potential Critical Habitat (CH) for this species

Yellow Monitor (*Varanus flavescens*)

Yellow Monitor occurs almost in every part of the country barring the deep forests, although not uncommon in the periphery. It is partial to countryside and crop fields (Khan 2008). This species inhabits burrows and crevices in a variety of habitats in the country. It is basically terrestrial, burrow dweller, good swimmer and bad climber. But during monsoon it is more often seen in water than on land. The species is categorized Endangered globally (IUCN Red List ver 3.1). Considering all these aspects including the project site has suitable habitat and confirmation of occurrence from local people, it is highly likely that the Study Area qualifies as a potential Critical Habitat (CH) for this species.

Indian Flap-shelled Turtle (*Lissemys punctata*)

The Indian Flap-shelled Turtle is most widely distributed across the country especially in the low-lying flood plains including coastal islands of the Bay of Bengal and hill districts. It does not occur in saltwater environment (Khan 2008). It lives in all kinds of freshwater bodies in the country but avoids saltwater. Most of the time it is found in burrowing conditions under moist soil, piles of vegetation, agriculture fields, betel leaf and pineapple gardens and seen basking on floating material that followed feeding, browsing or in burrowing condition. The species is categorized Vulnerable globally (IUCN Red List ver 3.1). Considering all these aspects, the project site does not have any suitable habitat or any occurrence data and so, it is highly likely that the Study Area does not qualify as a potential Critical Habitat (CH) for this species

Highly Threatened and/or Unique Ecosystems

The Project AoI has not yet been assessed by IUCN towards the IUCN Red List of Ecosystems. However, all the natural and modified habitats present within project alignment are not threatened in Bangladesh and do not meet the criteria for EN or CR ecosystems as detailed by IUCN, IUCN guidelines for red list of Ecosystem categories and criteria, 2015. Therefore, the critical habitat is not triggered under criterion 4 of IFC PS6. Hence, it may be concluded that the ecosystems of the Study Area do not technically qualify as CH Criterion 4 triggers concerning the Study Area.

Key Evolutionary Processes

The overall aim of evaluating the project site and project Area of Interest (AoI) against this criterion is to conserve genetic and species diversity, as well as the processes that drive speciation, to ensure evolutionary flexibility in a rapidly changing climate. The study area is mostly a modified landscape, consisting of agricultural land with marsh areas filled with water hyacinth. It lacks features associated with driving speciation. The structural attributes of this study area, including its topography, geology, soil, temperature, and vegetation, do not influence the evolutionary processes that lead to regional

configurations of species and ecological properties. Therefore, the study area itself is not associated with features that drive speciation. Consequently, it is improbable that the habitats of the study area qualify as a CH Criterion 5 trigger with respect to the study area.

Presence of Protected Areas and Internationally Recognized Areas

Projects located within designated areas that are internationally and/or nationally recognized—such as National Parks, Wildlife Sanctuaries, Conservation Reserves, Reserve Forests, Protected Forests, Community Forests, Conservation Areas notified by the Government of Bangladesh, Ramsar Sites, Important Bird Areas (IBAs), Key Biodiversity Areas (KBAs), Alliance for Zero Extinction (AZE) sites, or UNESCO World Heritage Sites—may necessitate a critical habitat assessment. Although the project area does not overlap with any internationally and/or nationally designated area, it's worth noting that Madhupur National Park, which is a Protected Area of Bangladesh and also an internationally recognized Important Bird and Biodiversity Area (IBA), is located only 5 km away from the project site. This proximity may warrant a critical habitat assessment (Figure 12-3, Figure 12-8).

Species Excluded from CH Qualification

Based on the species identified through the IBAT Tool, except eight species described in section 3.3 all other IBAT identified species have been excluded from consideration for potential Critical Habitat (CH) qualification because these species have no probability to occur in the EOOs which is confirmed by KIIs and Secondary Literature. This decision is based on the fact that while these species may be found within a 50 km radius, there is less likelihood of their occurrence within the Extend of occurrence (EOO).

Sites Excluded from CH Qualification

The Kadigarth National Park, situated 43 km from the project site, has been excluded from the Critical Habitat (CH) Qualification list due to its distance from the project area. Additionally, the Key Biodiversity Area (KBA) along the Jamuna-Brahmaputra river has also been omitted from the list, as it falls outside the project's Area of Interest (AoI).

CH-qualifying Biodiversity

From this assessment (Steps 4-7), it is evident that the project area does not intersect with any internationally or nationally designated area. However, it is noteworthy that Madhupur National Park, recognized both as a Protected Area of Bangladesh and an internationally designated Important Bird and Biodiversity Area (IBA) which is also considered is merely 5 km away from the project site. Given this close proximity, it may be prudent to conduct a critical habitat assessment.

Desktop Assessment of Natural Habitat

Our desk-based assessment suggests that the project site is predominantly a modified landscape, comprising agricultural land with marsh areas filled invasive with water hyacinth species. The natural habitat near this site is Madhupur National Park, located 5 km away. The vegetation which is seen on satellite imagery on the west-central part of the site is also Madhupur National Park. The natural vegetation area is mainly covered with Sal (*Shorea robusta*) trees. Madhupur forests are considered one of the best sal forest in entire Bangladesh. The sal trees grow in association with *Dillenia pentagyna, Lagerstroemia parviflora, Adina cordifolia, Miliusa velutina, Lannea grandis, Albizia* spp., *Bauhinia variegata, Spondias mangifera, Butea frondosa* and *Barringtonia acutangula*. Madhupur National Park is actually a natural sal forest which was officially declared as National park in 1982 under the Bangladesh wildlife (Preservation) Amendment Act of 1947 by considering its ecological value. Notably, the project site lacks any government classification as 'barren land'. The natural habitat of Madhupur National Park is depicted in Figure 12-3.

Biodiversity Field Survey Priorities

Based on the assessment conducted, it has been noted that the Fishing cat (*Prionailurus viverrinus*), Capped langur (*Trachypithecus pileatus*), Steppe Eagle (*Aquila nipalensis*), Tricarinate Hill Turtle (*Melanochelys tricarinata*), Yellow Monitor (*Varanus flavescens*), and Indian Flap-shelled Turtle (*Lissemys punctata*) all of these species classified as threatened species at national and global levels, have been observed in Madhupur National Park, which lies just 5 kilometers away from the project site (Khan and Ahsan, 2011; IUCN Bangladesh, 2015; Monirujjaman and Khan, 2018). Among these species, Fishing cat (*Prionailurus viverrinus*) and Yellow Monitor (*Varanus flavescens*) could be found in the project site, since it contains waterbodies. Therefore, to confirm the presence of these species in the AoI warrants a comprehensive site survey.

CONCLUSIONS AND RECOMMENDATION ON CH SCREENING

Based on the screening conducted, the area qualifies for critical habitat assessment due to several factors:

1. **Presence of Protected Areas and Important Bird & Biodiversity Areas:** The area is in close proximity to protected areas like Madhupur National Park, which is also internationally recognized as an Important Bird and Biodiversity Area (IBA Criteria A3) located only 5 km away from the project site.
2. **Presence of Threatened Species:** Among the potential CH qualifying species, Fishing cat (*Prionailurus viverrinus*) and Yellow Monitor (*Varanus flavescens*) could be found in the project site.

Therefore, it is concluded that the proposed 20MW Grid Tied Solar Power Project area might contain Critical Habitat for Fishing cat (*Prionailurus viverrinus*) and Yellow Monitor (*Varanus flavescens*). This determination is based on the fact that the study area aligns with the criteria outlined in the IFC Performance Standard 6 (2012) and its Guidance Note 6 (2019) during the critical habitat screening process. The findings of this CH screening report underscores the need for further examination of CH assessment.

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IBAT DATA

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Pangshura sylhetensis	Assam Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Batagur dhongoka	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Manis pentadactyla	Chinese Pangolin	MAMMALIA	CR	Decreasing	Terrestrial
Houbaropsis bengalensis	Bengal Florican	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Aythya baeri	Baer's Pochard	AVES	CR	Decreasing	Freshwater
Cuon alpinus	Dhole	MAMMALIA	EN	Decreasing	Terrestrial
Elephas maximus	Asian Elephant	MAMMALIA	EN	Decreasing	Terrestrial
Geoclemys hamiltonii	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Hardella thurjii	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Melanochelys tricarinata	Tricarinate Hill Turtle	REPTILIA	EN	Decreasing	Terrestrial
Morenia petersi	Indian Eyed Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Nilssonia hurum	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Nycticebus bengalensis	Bengal Slow Loris	MAMMALIA	EN	Decreasing	Terrestrial
Hoolock hoolock	Western Hoolock Gibbon	MAMMALIA	EN	Decreasing	Terrestrial
Rynchops albicollis	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Trachypithecus pileatus ssp. pileatus	Blond-bellied Langur	MAMMALIA	EN	Decreasing	Terrestrial
Schistura sijuensis		ACTINOPTERYGII	EN	Unknown	Freshwater
Platanista gangetica	Ganges River Dolphin	MAMMALIA	EN	Decreasing	Freshwater
Urogymnus polylepis	Giant Freshwater Whipray	CHONDRICHTHYES	EN	Decreasing	Marine, Freshwater
Tor putitora		ACTINOPTERYGII	EN	Decreasing	Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Crocodylus palustris	Mugger	REPTILIA	VU	Stable	Terrestrial, Freshwater
Helarctos malayanus	Sun Bear	MAMMALIA	VU	Decreasing	Terrestrial
Lutrogale perspicillata	Smooth-coated Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Macaca arctoides	Stump-tailed Macaque	MAMMALIA	VU	Decreasing	Terrestrial
Prionailurus viverrinus	Fishing Cat	MAMMALIA	VU	Decreasing	Terrestrial, Freshwater
Trachypithecus pileatus	Capped Langur	MAMMALIA	VU	Decreasing	Terrestrial
Macaca leonina	Northern Pig-tailed Macaque	MAMMALIA	VU	Decreasing	Terrestrial
Arctictis binturong	Binturong	MAMMALIA	VU	Decreasing	Terrestrial
Rusa unicolor	Sambar	MAMMALIA	VU	Decreasing	Terrestrial
Aonyx cinereus	Asian Small-clawed Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Pangshura tecta	Indian Roofed Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Elaphe taeniura	Cave Racer	REPTILIA	VU	Decreasing	Terrestrial
Python bivittatus	Burmese Python	REPTILIA	VU	Decreasing	Terrestrial

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Aythya ferina	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Sterna aurantia	River Tern	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Clanga clanga	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Aquila heliaca	Eastern Imperial Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Schoenicola striatus	Bristled Grassbird	AVES	VU	Decreasing	Terrestrial, Freshwater
Clanga hastata	Indian Spotted Eagle	AVES	VU	Decreasing	Terrestrial
Lissemys punctata	Indian Flapshell Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Capricornis sumatraensis	Mainland Serow	MAMMALIA	VU	Decreasing	Terrestrial
Hoolock hoolock ssp. hoolock	Western Hoolock Gibbon	MAMMALIA	VU	Decreasing	Terrestrial
Paris polyphylla	Love Apple	LILIOPSIDA	VU	Decreasing	Terrestrial
Liotelphusa quadrata		MALACOSTRACA	VU	Unknown	Freshwater
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Schistura reticulofasciata		ACTINOPTERYGII	VU	Unknown	Freshwater