

- **Auxiliary plant systems** (refer to **Section B12**)
 - Compressed air system
 - Hydrogen system
 - Workshop and store
 - Chemical laboratory
 - Fire fighting system
 - De-dusting system
 - HVAC system

B0.2.3 Interface points

For interface points see below.

B0.2.4 Site conditions

The following information on local conditions is investigated or compiled by the Employer. The Contractor is hereby in no way relieved from his duties of carrying out all investigations required for satisfactory performance of his works. The Contractor shall perform his own Site visits and investigations, prior to Contract award in order to familiarize him with the existing conditions of the Site and the surrounding area.

Location, accessibility and present condition of the Site

The site for the Maitree-STPP Project is geographically located between 22° 37'0'' N to 22°34'30''N and 89°32'0''E to 89°34'5''E, approximately 14 km northeast of the Mongla Port and 14 km northwest of the Sundarbans, is infringed by the Passur and Moidara Rivers to the west and south east respectively. The project requires an area of approximately 500 acres.

The topographical survey indicates a natural ground level of +1.15 to + 1.35 meters above sea level. A severe cyclone in 2009 raised the level to 4.47 meters and it was decided to raise the Plant level to +5.00 meters.

Politically, the site is located in Rampal Upazila of the Bagherat District in the Rajnagar Union

Currently, the Site is accessible by boat only.

The nearest inland port is Mongla port at around 14km direct distance.

The proposed Khan Jahan Ali Airport is located at a distance of approximately 12 km from the project site.

Soil conditions

First soil investigations of the Plant site and adjacent areas have been carried out. For information only the findings of these initial soil investigations are attached in Part C Annexes.



In general the subsoil conditions can be described as follows:

- top layer filled sand (with unknown silt content) in Plant area
- underlying layers of clay
- underlying fine sand.

The Contractor shall conduct soil improvement measures at site. Beside other aspects, consolidation of filling shall be incorporated in soil improvement concept.

Seismic zone

Attention shall be paid to seismic parameters. Related to soil type as identified to Soil Investigation Report, the effect of local soils on earthquake ground motion shall be determined.

For site class "S1" and "S", as expected for the Project, site specific studies shall be carried out to determine the design acceleration response spectrum. During field study minimum the following tests shall be executed:

- Seismic cross hole test; and
- Seismic refraction test.

Based on these results a site specific Response Spectra shall be established. Peak spectral acceleration shall be determined, but shall be not less than 0.12g, as mentioned in BNBC 2012, Table 2.5.2.

Site climatic conditions

The Plant site is from the climatic point of view under maritime tropical conditions. The assumed meteorological conditions for the Site are as follows:

The project site is located in the country's South Central Zone consisting of three dominant seasons:

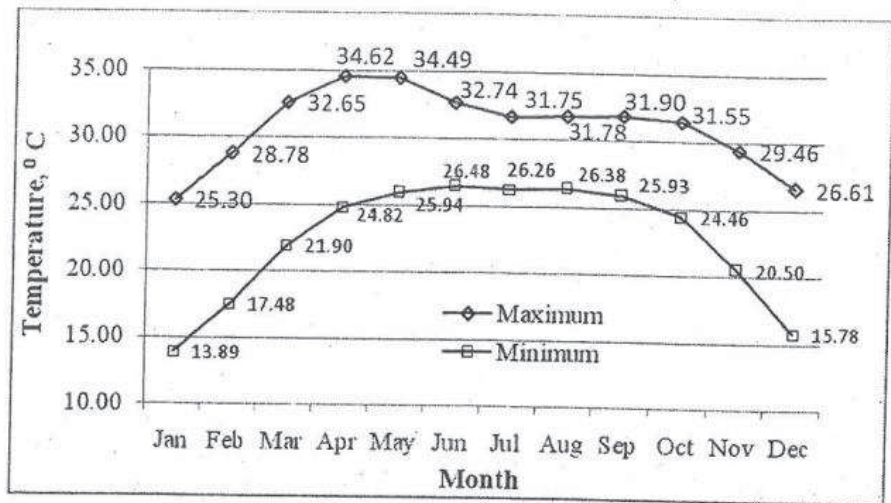
- summer season-March to May
- monsoon season-June to October
- winter season-November to February.

During the Monsoon Season occasional cyclonic storms can occur.

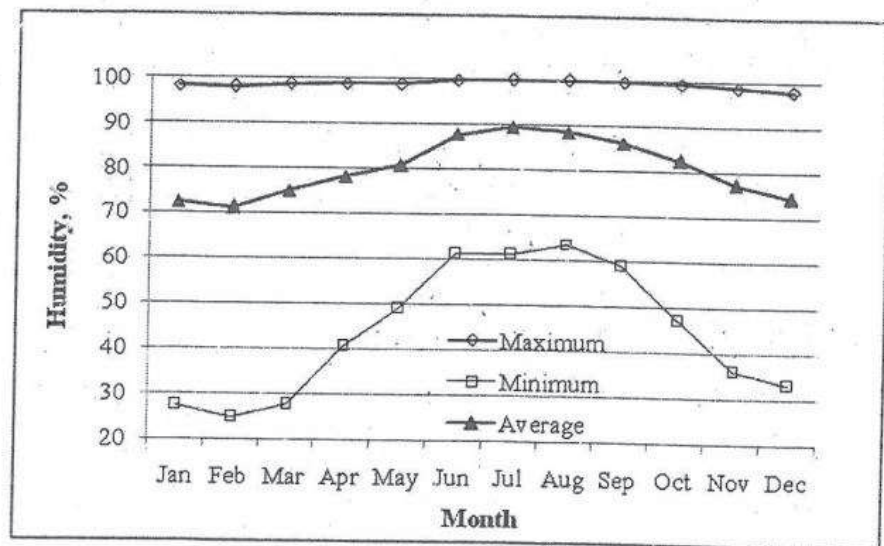
The climatic conditions in the area are continuously monitored by the Bangladesh Meteorological Department (BMD) at the Mongla Meteorological Station.

The temperature varies only slightly throughout the year with the highest temperature of 36.9°C and the lowest temperature of 12.2°C recorded in the period from 1989 to 2008. This distribution is depicted in figure below.



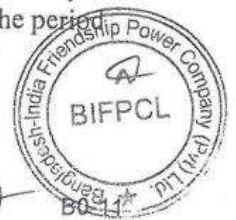


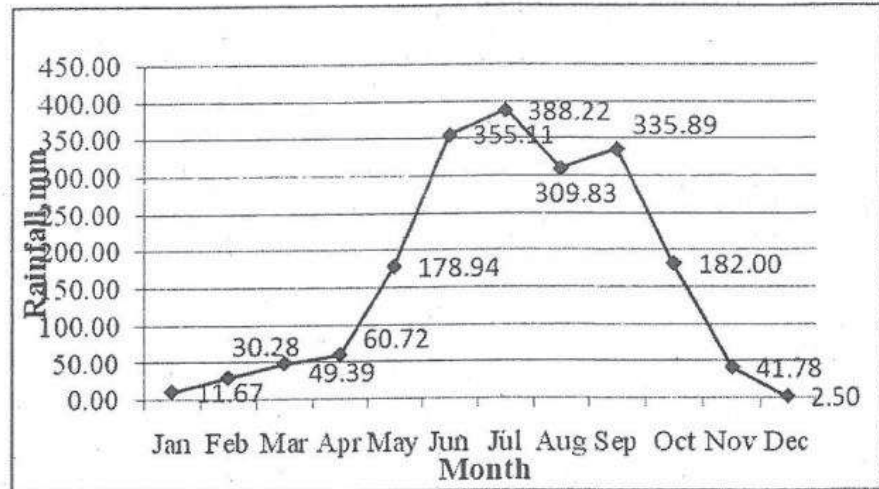
The relative humidity varies drastically during the Monsoon Season with 80% to 90% and the lowest levels of 20% to 30% during the Summer Season. The humidity profile recorded in the same period as the temperature is visualized in below figure.



The maximum rainfall occurs during the Monsoon Season by varying between 300 mm and 350 mm with almost no rainfall during the Winter Season.

The average evaporation in the project area varies between 3 - 5 mm/day with its peak of 16 mm/day during July. The average rainfall for the period between 1991 and 2008 is depicted in below figure.





Below definitions are to be used as typical data for the different climatically seasons at the site.

Average Site Condition ASC

Ambient Temperature: 27.3 °C
 Ambient Humidity: 87 %
 Ambient Pressure: 1007.6 mbar
 River Water Temperature: 29.8 °C

Summer Site Condition SSC

Ambient Temperature: 36.9 °C
 Ambient Humidity: 60 %
 Ambient Pressure: 1007.9 mbar
 River Water Temperature: 33 °C

Winter Site Conditions WSC

Ambient Temperature: 12.2 °C
 Ambient Humidity: 100 %
 Ambient Pressure: 1017.2 mbar
 River Water Temperature: 20 °C

Reference Site Conditions RSC

Ambient Temperature: 31 °C
 Ambient Humidity: 88 %
 Ambient Pressure: 1007 mbar
 River Water Temperature: 32 °C

Reference Site Condition shall apply for the Guarantee Values as well as for the Guarantee Tests/Performance Test. However, Plant must cope with the Site Conditions as specified.



Wet bulb temperature shall be calculated by Bidder/Contractor based on ambient temperature (dry bulb), ambient humidity and ambient pressure for the different cases.

Bidder/Contractor shall determine the wet bulb temperature for all site conditions and not only for reference site condition.

Design ambient conditions for Electrical Systems

- Maximum design temperature (outdoor) 45°C
- Maximum daily average ambient shade temperature 38°C
- Maximum monthly average temperature (in the shade) 34.6°C
- Maximum annual average temperature (in the shade) 27.3°C
- Maximum design temperature of the electrical equipment installed indoors in air conditioned rooms 40°C
- Maximum design temperature of the electrical equipment installed indoors non in air conditioned rooms 45°C
- Minimum design temperature 0°C

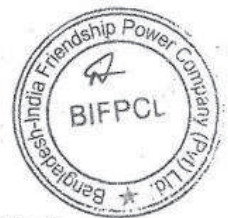
Marine conditions

Two tides (e.g. flood and ebb) are regularly observed in the Passur River, which enters into the project site through numerous connected creeks.

The tidal range varies between 1.2 and 3.1 meters. The mean water level (CD) is about 0.87 meters (PWD=CD-1.17 meters). The mean high water level varies due to spring-neap tide conditions between +1.60 m and +2.6m PWD. The Highest High Water Level (HHW) is about +3.1m PWD and the Lowest Low Water Level (LLW) is about -1.4m PWD.

The marine conditions are detailed in **Section B11**, with details about:

- water levels
- waves
- currents
- river bathymetry, topography.



The salinity of the Passur River system varies with the amount of fresh water entering the system which is highly seasonal dependent. The surface water temperature ranges between 22.9°C and 33.0°C and the different water quality parameters are tabulated in **Part C Annexes**.

The marine conditions as recorded at Mongla Port Gauge Station (approx. 14 km south-east to the site) are as follows:

- Highest High Water Level (HHW) + 2.642 MSL
- Lowest Low Water Level (LWL) - 1.858 MSL

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The Power Plant shall be designed for 100 years flood condition based on data provided by relevant Organization in Bangladesh and taking into account the Highest Astronomical Tide (HAT), the maximum wave conditions (including storm surges) and the potential event of Cyclone. The Contractor is responsible to verify the worst conditions.

These reference data are with respect to LAT, which corresponds to the Chart Datum (CD). The site land data is however with respect to the Bangladesh Land Survey Datum (BLSD), which corresponds to approx. +1.55 m CD (hence the MLSD corresponds to MSL).

Design Wave Height 2.0 m
Design Wave Period 6.0 sec
Sedimentation and Siltation: Soft to stiff clay and alternations of very sandy and stiff clay.

The results of bathymetric investigations of the Passur River can be found in Part C Annexes.

A water analysis from the area adjacent to the site giving salinity and water quality is shown below:

No.	Date	Temp	pH	DO	EC	TSS	Hardness	Ca	Mg	Fe	Mn	NO ₃	NO ₂	SO ₄	CO ₃	Salinity
1	7-Jun	27.8	7.74	3010	879	36	68.7	1545	1510	55	5.1	0.8	55	1.6		
2	7-Jun	27.1	7.72	3020	878.1	36	68.5	1570	1510	60	5.1	0.8	55	1.6		
3	7-Jun	27.8	7.71	3030	879	36	68.8	1565	1510	55	5.1	0.8	55	1.6		
1	11-Feb	29.8	7.66	4380	1263	36	182	2390	2180	210	4.7	1	76	2.3		
2	11-Feb	29.2	7.63	4380	1268	36	178	2390	2190	200	4.7	1	76	2.3		
3	11-Feb	29.1	7.65	4380	1263	36	179	2380	2180	200	4.7	1	76	2.3		
1	9-Mar	32.6	7.56	11780	2944.4	38	176	6080	5890	190	4.7	1.2	76	6.7		
2	9-Mar	32.6	7.57	11780	2945.2	38	178	6080	5890	190	4.7	1.2	76	6.7		
3	9-Mar	32.1	7.55	11780	2946.4	38	177	6090	5890	200	4.7	1.2	76	6.7		
1	17-Apr	32.4	7.59	25300	8273	36	185.6	12950	12700	250	4.6	0.7	136	15.5		
2	17-Apr	32.8	7.59	25300	8273	36	186.2	12950	12700	250	4.6	0.7	136	15.5		
3	17-Apr	32.6	7.59	25300	8273	36	184.8	12950	12700	250	4.6	0.7	136	15.5		
1	5-May	32.6	7.59	29200	9480	36	198.6	14900	14800	300	4.5	1.2	177	17.6		
2	5-May	32.9	7.54	29200	9470	36	198.6	14900	14800	300	4.4	1.2	177	17.6		

Figure 1 Water quality of the Passur River at Mongla point
(Source: EIA-Report)



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Location	Date	Temp °C	pH	EC µS/cm	Cl- mg/l	T. Alkalinity mg/l	Turbidity NTU	TS mg/l	TDS mg/l	SS mg/l	DO mg/l	BOD mg/l	COD mg/l	Salt mg/l
3	5-May	33.2	7.57	29200	9470	36	199.6	14900	14600	300	4.3	1.2	177	17.6
1	13-Jun	31.6	7.69	18000	3820	36	112.8	9200	9000	200	4.7	1.1	97	10.3
2	13-Jun	31.6	7.69	18000	3800	36	113.2	9200	9000	200	4.7	1.1	97	10.3
3	13-Jun	31.6	7.69	18000	3810	36	112.4	9200	9000	200	4.7	1.1	97	10.3
1	1-Jul	31.6	7.69	440	32.6	36	76.6	283	220	63	5.2	0.8	26	-
2	1-Jul	31.6	7.69	440	32.6	36	76.6	283	220	63	5.2	0.8	26	-
3	1-Jul	31.6	7.69	440	32.6	36	76.6	283	220	63	5.2	0.8	26	-
1	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	53	5.3	0.7	22	-
2	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	53	5.3	0.7	22	-
3	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	53	5.3	0.7	22	-
1	8-Sep	31.6	7.74	270	15.6	36	63.6	180	135	43	5.3	0.7	22	-
2	8-Sep	31.6	7.74	270	15.6	36	63.6	180	135	43	5.3	0.7	22	-
3	8-Sep	31.6	7.74	270	15.6	36	63.6	180	135	43	5.3	0.7	22	-
1	13-Oct	30.6	7.79	290	26.6	36	63.6	192	145	47	5.6	0.7	22	-
2	13-Oct	30.6	7.78	290	26.6	36	63.6	192	145	47	5.6	0.7	22	-
3	13-Oct	30.6	7.78	290	26.6	36	63.6	192	145	47	5.6	0.7	22	-
1	5-Nov	24.6	7.79	340	38.6	36	56.6	210	170	40	5.6	0.7	22	-
2	5-Nov	24.6	7.79	340	38.6	36	56.6	210	170	40	5.6	0.7	22	-
3	5-Nov	25.6	7.79	340	38.6	36	56.6	210	170	40	5.6	0.7	22	-
1	12-Dec	21.5	7.72	520	62.6	36	72.6	320	260	60	5.1	0.9	25	0.4
2	12-Dec	20.9	7.71	520	62.6	36	73.6	320	260	60	5.1	0.9	25	0.4
3	12-Dec	21.1	7.72	520	62.6	36	71.6	320	260	60	5.1	0.9	25	0.4

Figure 2 Water quality of the Passur River at Mongia point
(Source: EIA-Report)

Additional information on water quality parameters is shown in Part C Annexes.

Wind data

The project region is characterized by southerly winds from the Bay of Bengal during the Monsoon Season and north-westerly winds from the Himalayas during the Winter Season. During the Summer Season, the wind blows from south-southwest to north-northeast. The annual average wind speed amounts to 1.7 meter/second and the wind rose for the entire year is shown in Figure 5.5.

The wind load calculation for the buildings and structures shall be as per Bangladesh National Building Code -2012, Part 6, Chapter 2.4.

Basic wind Speed, V, shall be taken as 73 m/s, Three-second gust at 10 m above ground in exposure C, having a return period of 50 years.

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