



भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. of India Undertaking)

TCN – 02

Ref: PSER:SCT:KLN-C1785:TCN-02

Date: 09-12-2016

Sub	Tender change notice (TCN) 02	
Job	Design, Engineering, procurement, supply, construction, erection, commissioning of construction water system (20 cum / hour) & potable water system (1 cum / hour) on EPC basis and construction of reservoir as per technical specification for 2x660 mw maitree super thermal power project at moidara village, rampalupazila, bagerhat district, Bangladesh.	
Ref	1.0	Tender No. PSER:SCT:KLN-C1785:16.
	2.0	BHEL's NIT, vide reference no PSER:SCT:KLN-C1785:5303 , dated 22-11-2016
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:KLN-C1785:TCN-01, dated 06-12-2016.
	4.0	All other pertinent issues till date.

With reference to above, following points/ documents, relevant to tender, may please be noted and complied with while submitting offer.

- 1.0 The clarifications to bidders queries are attached at Annexure-A.
- 2.0 Modification of Clause of SCC, Volume-IC&ID is attached at Annexure-B.
- 3.0 Revised Technical specification superseding Technical specification issued along with TCN-01 is attached herewith as Revision -02.
- 4.0 Revised 'No deviation certificate' as per enclosed Annexure-2. Bidder shall submit no deviation certificate as per enclosed format only.
- 5.0 All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

Sr. ENGR (SCT)

Encl

- 1.0 As above.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)

POWER SECTOR EASTERN REGION, DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091

फैक्स/Fax : (033) 23211960

फोन/Phone : बोर्ड/EPABX : 23211691, 23211798, 23211796

ANNEXURE A to TCN-02**Page 01 of 02**

JOB	Design, Engineering, procurement, supply, construction, erection, commissioning of construction water system (20 cum/hr) & potable water system (1 cm/hr) on EPC basis and construction of reservoir as per technical specification for 2x660 mw maître super thermal power project at Moidara village, Rampalupazila, Bagerhat district, Bangladesh
TENDER NO	PSER-SCT:KLN-C1785 :16

SINo	Reference clause of tender document	Existing provision	Bidder' s query	BHEL's clarification
01	Technical Specification in TCN-01	In process flow diagram, Number of Filter feed pump – 2nos (1w + 1s) but in technical spec number of pump - 3nos.(2w +1s)	Which will be considered	2 nos RO plant (Each 10 m ³ /hour capacity) is required with separate pretreatment as dual media filter, activated carbon filter, bag filter, cartridge filter, high pressure pump & pH correction system.
02	Technical Specification in TCN-01	In process flow diagram, number of Dual media filter is 1no. but in technical spec number of dual media filter is 2nos	Which will be considered	Do
03	Technical Specification in TCN-01	In process flow diagram, number of activated carbon filter is 1no. but in technical spec number of activated carbon filter is 2nos	Which will be considered	Do
04	Technical Specification in TCN-01	In process flow diagram, number of bag filter is 1no. but in technical spec number of bag is 2nos	Which will be considered	Do
05	Technical Specification in TCN-01	In process flow diagram, number of cartridge filter is 1no. but in technical spec number of cartridge filter is 2nos	Which will be considered	Do
06	Technical Specification in TCN-01	In process flow diagram, number of High Pr. Pump for RO is 2nos (1w+1S). but in technical spec number of high pr. pump is 3nos.(2w+1S)	Which will be considered	Do
07	Technical Specification in TCN-01	In process flow diagram, number of RO - 20.0m ³ /hr is 1no. but in technical spec number of RO-10.5m ³ /hr is 2nos	Which will be considered	Do

ANNEXURE A to TCN-02

Page 02 of 02

JOB	Design, Engineering, procurement, supply, construction, erection, commissioning of construction water system (20 cum/hr) & potable water system (1 cm/hr) on EPC basis and construction of reservoir as per technical specification for 2x660 mw maître super thermal power project at Moidara village, Rampalupazila, Bagerhat district, Bangladesh
TENDER NO	PSER-SCT:KLN-C1785 :16

SINo	Reference clause of tender document	Existing provision	Bidder' s query	BHEL's clarification
08	Technical Specification in TCN-01	In process flow diagram , there is no pH correction dosing system but in technical spec pH correction dosing system are mentioned.	Should we consider the pH correction dosing system? If we consider, where will be the location? Please calrify.	Please follow revised process flow diagram & Revised Technical Specification issued along with this TCN-02.
09.	Technical Specification in TCN-01	In process flow diagram, no pretreatment are mentioned for potable RO -1.0m3/hr but in technical spec, pretreatment such as Sand filter, iron removal filter, carbon filter are mentioned.	Please clarify.	Complete pre-treatment as multi-grade filter, iron removal, activated carbon is required for using bore-well water as raw water source for potable water.

ANNEXURE B TO TCN-02

Design, Engineering, procurement, supply, construction, erection, commissioning of construction water system (20 cum / hour) & potable water system (1 cum / hour) on EPC basis and construction of reservoir as per technical specification for 2x660 mw maitree super thermal power project at moidara village, rampalupazila, bagerhat district, Bangladesh.

TENDER NO : PSER:SCT:KLN-C1785:16

REVISION OF CLAUSES OF SCC, Volume-IC&ID

Sl. no.	Clause No.	Existing clause	Revised clause
1	Clause No.2.1.2,1C & ID-Special Condions of Contract(Supply & Service)	<p>The scope of the above work shall generally include but not limited to the construction / Installation of the following.</p> <p>You are required to carry out the entire scope of work as mentioned hereunder and elsewhere in the tender documents:</p> <ul style="list-style-type: none"> • Structural work • Civil work • Scaffolding & Formwork, as required • Finishing works • Electrification of Building by providing Incoming cable, Main Distribution Board, Wiring for all installation Light fixtures, power sockets, Energy meter etc. • Drainage (open and covered) • Any Misc. works which are required for completion and handing over the above is also a part of scope of work of bidder. BHEL shall not be paid any extra amount for the above works • Cutting / removal, disposal of any vegetation, trees, grass etc. at various work fronts within the project premises is in the scope of work and shall be carried out by you as per direction of BHEL engineer. 	<p>The scope of the above work shall generally include but not limited to the construction / Installation of the following.</p> <p>You are required to carry out the entire scope of work as mentioned hereunder and elsewhere in the tender documents:</p> <ul style="list-style-type: none"> • Structural work • Civil work • Scaffolding & Formwork, as required • Finishing works • Agency to draw power from nearest Transformer/ 3 phase Electrical line (Approx distance 200m from proposed RO/Construction Water Treatment Plant) supply with desired power cable (minimum 4 core). Electrification of Building, Equipment etc. by providing Incoming cable, Main Distribution Board, Wiring for all installation Light fixtures, power sockets, Energy meter etc. • Drainage (open and covered) • Any Misc. works which are required for completion and handing over the above is also a part of scope of work of bidder. BHEL shall not be paid any extra amount for the above works • Cutting / removal, disposal of any vegetation, trees, grass etc. at various work fronts within the project premises is in the scope of work and shall be carried out by you as per direction of BHEL engineer.

REVISION 2, DATED 08.12.2016**TECHNICAL SPECIFICATION****DESIGN, ENGINEERING, PROCUREMENT, SUPPLY, CONSTRUCTION, ERECTION, INSTALLATION, COMMISSIONING ETC. FOR CONSTRUCTION (20 CUM/HOUR) & POTABLE WATER SYSTEM (1 CUM/HOUR) ON EPC FOR 2x660 MW MAITREE RAMPAL PROJECT****DESIGN INFORMATION**

No. of Desalination unit	:	02 Units.
Capacity of each desalination unit	:	10 m ³ /h.
Raw water input of each desalination unit	:	Vendor to furnish
Total raw water requirement	:	Vendor to furnish
Total power requirement	:	Vendor to furnish

A. River Water Intake Pump:		
SI	Parameter	Specification
1.	Type	Submersible sewage Pump for turbid, Corrosive, Saline river Water.
2.	Flow (Q) in m ³	Min. 36 m ³ /h
3.	Head (H) in meter	27 meter
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Vendor to furnish
8.	RPM	Vendor to furnish
9.	Discharge diameter in mm	Vendor to furnish
10.	Power requirement of motor	Vendor to furnish
11.	Quantity	(1 working + 1 standby)
12.	River water delivery pipeline	
a.	Flexible pipeline	Diameter 4 inch, specification : Vendor to furnish
b.	HDPE pipeline	Diameter 4 inch, specification : Vendor to furnish

B. Floating structure for intake pump:		
SI	Parameter	Specification
1.	Type	Floating and movable
2.	Utility	Will be used to house 2 nos submersible river water intake pumps
3.	Material of construction	Mild steel epoxy painted/non corrosive pipe/appropriate materials
4.	Dimension & drawing	Vendor to furnish

C. HYPO (NaOCl) DOSING SYSTEM		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	2 pcs (1W+1S)
10.	Type of installation	Installation on mild steel frame
b. Dosing tank		
11.	Capacity of Dosing Tank	80 Liter
12.	MOC of Tank	HDPE
13.	Qty of dosing tank	1 pc

D. STATIC SCREEN FOR RIVER WATER:		
SI	Parameter	Specification
1.	Type	Basket type
2.	Maximum Flow (Q) in m ³	60 m ³ /h
3.	No of coarse screen	01 pc
4.	No of fine scree	01 pc
5.	Material of construction	SS-304/PVC

E. EQUALIZATION TANK/STILLING TANK		
SL	Parameter	Specification
1.	Type	RCC tank with baffle wall system
2.	Capacity in m ³ (CUM)	Min.80 CUM
3.	Quantity	01 unit
4.	Dimension	Vendor to furnish
5.	Drain valve	1 pc for each tank

F. Dewatering sump pump in stilling tank:		
SI	Parameter	Specification
1.	Type	Non clog Submersible sewage pump
2.	Flow (Q) in m ³	10.8
3.	Head (H) in meter	8
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	SS-316

8.	RPM	Vendor to furnish
9.	Discharge diameter in mm	50 mm
10.	Power requirement of motor	Vendor to furnish
11.	Electric connection	Vendor to furnish
12.	Quantity	01 no

G. Air blower for stilling tank		
Sl	Parameter	Specification
1.	Type	Tri lobe
2.	Flow (Q) in m ³	200 m ³ /h
3.	Head (H) in meter	Vendor to furnish
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	RPM of blower & motor	Vendor to furnish
8.	Discharge diameter in mm	Vendor to furnish
9.	Power requirement of motor	Vendor to furnish
10.	Electric connection	Vendor to furnish
11.	Quantity	(1 working + 1 Standby)

H. Clarifier feed Pump:		
Sl	Parameter	Specification
1.	Type	Submersible sewage Pump for turbid, Corrosive, Saline river Water.
2.	Flow (Q) in m ³	Min.36 m ³ /h
3.	Head (H) in meter	10 meter
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish

6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	SS-316
8.	RPM	Vendor to furnish
9.	Discharge diameter in mm	Vendor to furnish
10.	Power requirement of motor	Vendor to furnish
11.	Quantity	(1 working + 1 standby)

I. Parshall flume:		
SI	Parameter	Specification
1.	Capacity	Suitable for 50 m ³ /h
2.	Material of construction	RCC/Mild steel epoxy coated, 6mm
3.	Quantity	01 unit

J. Ferric chloride/Alum dosing system		
c. Dosing pump		
SL	Parameter	Specification
1.	Type	Mechanical actuated diaphragm type with adjustable stroke
2.	Flow (Q) in liter/hour	200
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	2 pcs (1W+1S)
10.	Type of installation	Installation on mild steel frame
11. Dosing tank		
12.	Capacity of Dosing Tank	Minimum 500 Liter

13.	MOC of Tank	HDPE
14.	Qty of dosing tank	1 pc
15.	Chemical mixing system	Agitator with gear head motor (1.5 KW)
16.	Drain valve	01 pc

K. Lime dosing system		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Non clog sewage submersible pump (Cutter type)
2.	Flow (Q)	9 m ³ /h@ 5 meter head (a portion of the output will be recycled to dosing tank for lime mixing & agitation)
3.	Maximum Head	7.5 meter
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	SS-316
8.	Power requirement	Vendor to furnish
9.	Qty of pump	2 pcs (1W+1S)
10. Dosing tank		
11.	Capacity of Dosing Tank	Minimum 500 Liter
12.	MOC of Tank	HDPE
13.	Qty of dosing tank	1 pc
14.	Drain valve	01 pc

L. Flash mixing system		
b. Mixing tank		
SL	Parameter	Specification
1.	Volume of tank	Vendor to furnish

2.	MOC of tank	RCC/Mild steel epoxy coated, 5 mm sheet.
3.	Qty of tank	01 unit
a. Mixing system		
4.	Type	Mixing propeller with gearhead motor
5.	MOC of propeller & shaft	SS-316
6.	Qty of propeller	1 unit
7.	Electric connection	3 phase, 2.2 KW

M. Flocculent dosing system		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	2 pcs (1W+1S)
10.	Type of installation	Installation on mild steel frame
Dosing tank		
11.	Capacity of Dosing Tank	Vendor to furnish
12.	MOC of Tank	HDPE
13.	Qty of dosing tank	1 pc
14.	Chemical mixing system	Agitator with gear head motor (1.5 KW)
15.	Drain valve	01 pc

N. Flocculation tank		
a. Mixing tank		
SL	Parameter	Specification
1.	MOC of tank	RCC/Mild steel epoxy coated, 6 mm sheet.
2.	Dimension of tank	Vendor to furnish
3.	Qty of tank	01 unit
4.	Drain valve	01 pc

O. Clarifier with tube settler		
SL	Parameter	Specification
1.	MOC of tank	RCC epoxy coated
2.	Dimension of tank	Vendor to furnish
3.	Qty of clarifier tank	01 unit
4.	Quantity of tube settler	01 lot
5.	Drain valve for sludge drain out	01 pc

P. Sludge transfer pump:		
SI	Parameter	Specification
1.	Type	Non clog Submersible sewage pump
2.	Flow (Q) in m ³	10.8
3.	Head (H) in meter	8
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	SS-316
8.	RPM	Vendor to furnish

9.	Discharge diameter in mm	Vendor to furnish
10.	Power requirement of motor	Vendor to furnish
11.	Quantity	02 nos (1 W + 1S)

Q. Clarified water reservoir

SL	Parameter	Specification
1.	Volume of tank	Minimum 10 m ³
2.	MOC of tank	RCC
3.	Dimension	Vendor to furnish

**Technical specification of 20 m³/h (10.0 m³/h X 2 unit) RO plant
RO plant recovery: minimum 60%**

R. Filter feed Pump:

SI	Parameter	Specification
1.	Type	Horizontal single stage centrifugal pump
2.	Flow (Q) in m ³	Minimum 17 m ³ /hour
3.	Head (H) in meter	Minimum 35 meter
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	SS-316
8.	RPM	Vendor to furnish
9.	Discharge diameter in mm	Vendor to furnish
10.	Power requirement of motor	Vendor to furnish
11.	Quantity	03 nos (2 working + 1 standby)

S. Dual media filter		
SL	Parameter	Specification
1.	Quantity	02 unit
2.	MOC of Vessel	Fiber Reinforced Plastic (FRP)
3.	Diameter of vessel	Minimum 53 inch (To be selected as water loading rate 5 gallon/minute/Ft ²)
4.	Total height of vessel with base	Vendor to furnish
5.	Brand name of vessel	Vendor to furnish
6.	Country of Manufacturer	Vendor to furnish
7.	Type of Media	Quartz Sand, Gravel, Anthracite
8.	Origin of quartz sand	Vendor to furnish
9.	Origin of gravel	Vendor to furnish
10.	Origin of Anthracite	Vendor to furnish
11.	MOC of Frontal Pipe Network	Upvc
12.	Diameter of frontal pipe work	Vendor to furnish
13.	Type of valve	PVC Butterfly
14.	Origin of pipe & fittings	Vendor to furnish
15.	Service of frontal pipe work	Backwash-Rinse-Service

T. SMBS DOSING SYSTEM		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish

7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	4 pcs (2W+2S)
10.	Type of installation	Installation on mild steel frame
11. Dosing tank		
12.	Capacity of Dosing Tank	80 Liter
13.	MOC of Tank	HDPE
14.	Qty of dosing tank	1 pc

U. Activated carbon filter		
SL	Parameter	Specification
1.	Quantity	02 unit
2.	MOC of Vessel	Fiber Reinforced Plastic (FRP)
3.	Diameter of vessel	Minimum 53 inch (To be selected as water loading rate 5 gallon/minute/Ft ²)
4.	Total height of vessel with base	Vendor to furnish
5.	Brand name of vessel	Vendor to furnish
6.	Country of Manufacturer	Vendor to furnish
7.	Type of Media	Gravel, Activated carbon (Iodine value : minimum 1000)
8.	Origin of Activated carbon	Vendor to furnish
9.	MOC of Frontal Pipe Network	Upvc
10.	Diameter of frontal pipe work	Vendor to furnish
11.	Type of valve	PVC Butterfly
12.	Origin of pipe & fittings	Vendor to furnish
13.	Service of frontal pipe work	Backwash-Rinse-Service

V. Bag filter unit		
SL	Parameter	Specification
1.	Quantity	02 unit
2.	No. of bag filter in housing	01 unit
3.	Material of construction of housing	PVC/SS-316
4.	Material of filter bag	PP

W. ANTISCALANT DOSING SYSTEM		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	4 pcs (2W+2S)
10.	Type of installation	Installation on mild steel frame
11. Dosing tank		
12.	Capacity of Dosing Tank	80 Liter
13.	MOC of Tank	HDPE
14.	Qty of dosing tank	1 pc
15.	Qty of static mixture	02 unit

Y. Cartridge filter unit		
SI	Parameter	Specification
1.	Quantity	02 unit
2.	No. of micro-filter in housing	09 unit
3.	Length of filter	1000 mm
4.	Material of construction of housing	PVC
5.	Material of cartridge filter	PP

Z. DESALINATION HIGH PRESURE PUMP		
SL	Parameter	Specification
1.	Type	Vertical/horizontal multistage High pressure pump
2.	Flow (Q) in m ³	18 m ³ /h
3.	Head (H) in meter	380 m
4.	Model no	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	RPM	Vendor to furnish
8.	Power requirement of motor	Vendor to furnish
9.	Quantity	03 set (2 working + 1 Standby)
10.	VFD	Suitable VFD have to offer to save electricity.

(Note : The required pressure of the RO plant varies with the variation of river water TDS and same pump will be operated at variable pressure by VFD.)

A1.REVERESE OSMOSIS (RO) PRESSURE VESSEL		
SL	Parameter	Specification
1.	Brand	Vendor to furnish
2.	Manufacture country	Vendor to furnish
3.	Design pressure	600 PSIG at 190°F
4.	Qualification pressure	3600 PSI
5.	Operating pH Range	3 – 11
6.	O-Ring	EPDM
7.	Adaptor	ABS

8.	Sealing Plate	PVC / ABS
9.	Permeate Port Locknut	ABS
10.	Securing Ring	Plastic
11.	Certification	NFS approved
12.	Diameter of RO housing	8.0 inch
13.	Quantity of RO housing	Vendor to furnish
14.	No. of element of RO housing	Vendor to furnish
15.	Connection system of RO housing	Side port
16.	Material of construction of RO housing	Fiber reinforced plastic (FRP)

B1.REVERESE OSMOSIS (RO) MEMBRANE		
SL	Parameter	Specification
1.	Type of membrane	Sea water membrane
2.	Brand name of RO membrane	Vendor to furnish
3.	Diameter of membrane	8 inch
4.	Total length of membrane	40.0 inch
5.	Quantity of RO membrane	Vendor to furnish

C1. pH adjustment system		
a. Dosing pump		
SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish
5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	2 pcs (1W+1S)
10.	Type of installation	Installation on mild steel frame
11. Dosing tank		
12.	Capacity of Dosing Tank	80 Liter

13.	MOC of Tank	HDPE
14.	Qty of dosing tank	1 pc

D1.ELECTROMAGNETIC EQUIPMENT		
SL	Parameter	Specification
1.	Electro Magnetic Equipment	Electro Magnetic Equipment consist of Flow Meter, Pressure Gauge, Pressure Switch, Magnetic Conductor, Overload Relay, Timer-auto flush, Automatic Star Delta Starting System, VFD, Indicator Lamp and necessary equipment to run the plant efficiently, water quality monitor etc.
2.	Brand of electric control equipment	Vendor to furnish
3.	Dry run protection system	Dry run protection system for all dosing pump & water transfer pump have to be installed.
4.	Tank overflow protection system	Electrical /electronic water level controller have to be installed to protect tank overflow.

E1. PIPE FITTINGS AND VALVE		
SL	Parameter	Specification
1.	High Pressure Line	Construction material, pipe fittings and Valve will be AISI 316 materials.
2.	Low Pressure Line	Construction material pipe fittings and Valve will be 40 Schedule uPVC

F1. SKID FOR DESALINATION PLANT		
SL	Parameter	Specification
1.	Skid Materials	Vendor to furnish
2.	Type of skid materials	Vendor to furnish

G1. CIP (Cleaning in Place) pump		
SL	Parameter	Specification
1.	Type	Multistage Centrifugal Pump suitable for handling highly corrosive liquid at high pressure.
2.	Flow (Q) in m ³	16 m ³ /h
3.	Head (H) in meter	40 m

4.	Model no	Vendor to furnish
5.	MOC	SS 316
6.	Brand	Vendor to furnish
7.	Country of manufacturing	Vendor to furnish
8.	RPM	Vendor to furnish
9.	Suction diameter in mm	Vendor to furnish
10.	Discharge diameter in mm	Vendor to furnish
11.	Power requirement of motor	Vendor to furnish
12.	Electric connection	Vendor to furnish
13.	Quantity	01 nos

H1. CIP tank

SL	Parameter	Specification
1.	Volume of tank	Minimum 1000 liter
2.	MOC of tank	HDPE vertical tanks
3.	Origin	Vendor to furnish
4.	Drain valve	1 pc
5.	Electric heater	02 pc X 10 KW

I1. Biocide dosing system

a. Dosing pump

SL	Parameter	Specification
1.	Type	Solenoid
2.	Flow (Q) in liter/hour	5
3.	Max. pressure in bar	7
4.	Model no.	Vendor to furnish

5.	Brand	Vendor to furnish
6.	Country of manufacturing	Vendor to furnish
7.	Material of construction	Pump head PTFE, ball valve ceramic, valve seal PTEE, valve cover PTFE
8.	Power requirement	Vendor to furnish
9.	Qty of dosing pump	1 pc
10.	Type of installation	Installation on mild steel frame
11. Dosing tank		
12.	Capacity of Dosing Tank	80 Liter
13.	MOC of Tank	HDPE
14.	Qty of dosing tank	1 pc

J1. Cartridge filter unit		
Sl	Parameter	Specification
1.	Quantity	01 unit
2.	No. of micro-filter in housing	09 unit
3.	Length of filter	1000 mm
4.	Material of construction of housing	PVC
5.	Material of cartridge filter	PP

TECHNICAL SPECIFICATION

Potable Water plant Capacity: 1000LPH
 Pretreatment capacity: Vendor to furnish
 Raw water source: Deep tube well/river water
 Maximum raw water TDS : 2000 mg/liter

01 FEED PUMP

Quantity : 02 unit (1 W + 1S)
 Capacity : Vendor to furnish
 Head : Vendor to furnish
 Type : Centrifugal /Jet
 Brand : Vendor to furnish
 Origin : Vendor to furnish
 Power : Vendor to furnish
 :

02 MULTI-GRADE FILTER

Quantity : 1 Unit
 Mode of Construction : Fiber Reinforced Plastic (FRP)
 Shell Height of Vessel : Minimum 65 Inch
 Diameter of Vessel : Vendor to furnish according to flow rate 5 GPM/Ft²
 Feature of FRP Vessel : Non Corrosive, Maintenance free
 Operating Pressure : 150 psi

FILTER MEDIA ON MULTI-GRADE FILTER

Type of Filter : Quartz Sand, Gravel, Anthracite
 Origin of anthracite : Vendor to furnish

03 IRON REMOVAL FILTER

Quantity : 1 Unit
 Mode of Construction : Fiber Reinforced Plastic (FRP)
 Shell Height of Vessel : Minimum 65 Inch
 Diameter of Vessel : Vendor to furnish according to flow rate 5 GPM/Ft²

FILTER MEDIA FOR IRON REMOVAL FILTER

Type of media : Gravel, birm

04 GRANULAR ACTIVATED CARBON FILTER

Quantity : 1 Unit
Mode of Construction : Fiber Reinforced Plastic (FRP)
 Shell Height of Vessel : Minimum 65 Inch
 Diameter of Vessel : Vendor to furnish according to flow rate 5 GPM/Ft²
 Feature of FRP Vessel : Non Corrosive, Maintenance free
 Operating Pressure : 150 psi

FILTER MEDIA ON ACTIVATED CARBON FILTER

Type of Filter : Gravel, Granular Activated Carbon
Origin of Activated Carbon : Vendor to furnish

05 REVERSE OSMOSIS UNIT

a) BASIC INFORMATION	Quantity	: 01 Set
	Brand	: Vendor to furnish
	Pure Water Capacity	: 1000 Liter Per Hour
	Purification Technology	: Reverse Osmosis
	Model Number	: Vendor to furnish

b) ANTI-SCALANT DOSING	Quantity	: 01 units
	Capacity	: 0.47 LPH
	Maximum Pressure	: 7 Bar
	Power	: 9.20 W
	Connection Size	: 1/2 Inch Male
	Pump Head	: PVC
	Valve Set	: Viton
	Diaphragm	: Viton
	Valve Ball	: Ceramic

Description of Tank

Quantity	1 unit
Capacity	60 Ltr
Materials	HDPE

c) CARTRIDGE FILTER HOUSING	Quantity	: 01 Unit
	Type of Housing	: 20 Inch
	Mode of Construction	: HDPE
	Length of Filter	: 20
	Diameter of Filter	: 4 Inch
	Brand of Micron Filter	: Vendor to furnish
	MOC of Micron Filter	: PP

d) HIGH PRESSURE PUMP	Quantity	: 02 unit (1W+1S)
	Brand of Pump	: Vendor to furnish
	Origin of Pump	: Vendor to furnish
	MOC of Pump	: AISI304
	Power Consumption	: Vendor to furnish
	Duty	: Vendor to furnish
	Shaft	: Stainless Steel
	Impeller	: Stainless Steel
	Cylinder	: Stainless Steel
	Coupling	: Carbon Steel
	Pump Head	: Stainless Steel

- e) **RO MEMBRANE HOUSING**
- Quantity : Vendor to furnish
Brand of Housing : Vendor to furnish
Origin of Housing : Vendor to furnish
MOC of Housing : FRP
Type of Housing : 4040
End Cap of RO Housing : PA66+30% GF
O-Ring of RO Housing : EPDM
Dia of RO Housing : 4 Inch
Feature of Housing : Non Corrosive and Maintenance free
- f) **REVERSE OSMOSIS (RO) MEMBRANE**
- Quantity : Vendor to furnish
Brand of RO Membrane : Vendor to furnish
Type of Membrane : 4040
- g) **PRESSURE METER**
- Quantity : 2 Units
Range of Measurement : Up to 100 and 300 PSI
- h) **FLOW METER**
- Quantity : 2 Units
Range of Measurement : 10 GPM or as per require
- i) **CONDUCTIVITY MONITOR**
- Quantity : 1 Units
Brand : Vendor to furnish
Origin : Vendor to furnish
Type of Conductivity : Online
Operating Temp : 0 ~ 50°C
Installation Mode : Panel Mounted
Display : 3-1/2 Bit LED
Usage : It can measure the pure water quality
- j) **SOLENOID VALVE**
- Quantity : 2 Units
Type : AC
Power : 220V
- k) **FLUSHING SYSTEM**
- Flushing will be automatically and time is adjustable.
Qty : 01 set
- l) **SKID / FRAME**
- It will be made of 1.5 Inch Stainless Steel Box, Grade: AISI304 which is Non Corrosive
- m) **MAJOR ITEMS OF ELECTRIC CONTROL PANEL**
- Circuit Breaker : 01 Unit
Magnetic Contact : 02 Units
Thermal Overload : 02 Units
Timer & Relay with Base : 01 Set
Indicator Lamp : 08 Units

Selector Switch : 04 Units
 MOC of panel box : SS-304

06. PIPE AND FITTINGS

Quantity : 1 Lot
 Origin : Vendor to furnish
 Color : White / Gray
 Brand : Vendor to furnish
 Materials : Food Grade, uPVC

07. Potable water storage tank

Quantity : **RCC**
 Capacity : 20 CUM to be constructed by bidder with the item rate of the contract(Not lump sum or EPC contract). A detailed drawing of construction water tank & potable water tank attached with this specification.

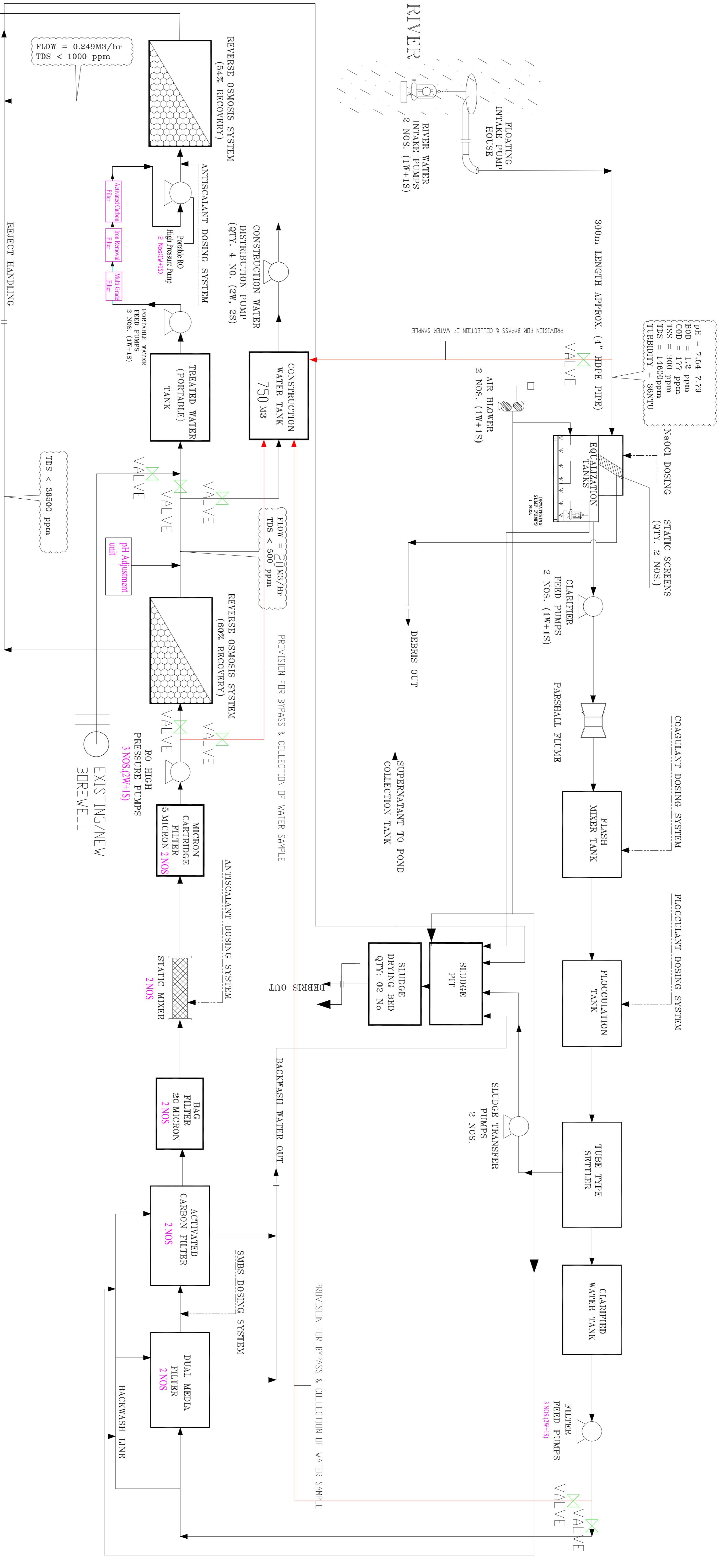
08. Ultraviolet system

Quantity : 1 set
 Capacity : 1000 liter/hour.
 MOC : ss-304
 Power consumption of UV lamp : Vendor to furnish
 Brand & origin of UV lamp : Vendor to furnish

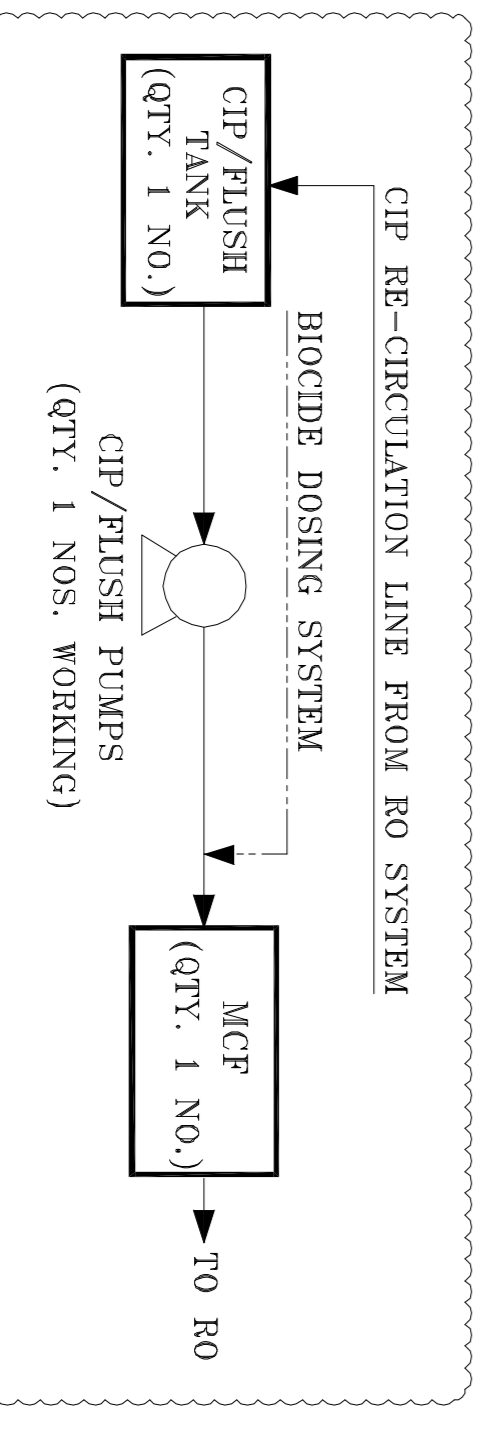
Note: - Bidder are responsible to connect the pipe line of required diameter for removal of the wastage water from water treatment plant to Pasur River. Wastage water should be treated as per Bangladesh standard before discharge the same into the river.

LIST OF THE TENTATIVE CIVIL WORK FOR WATER TREATMENT PACKAGE

SL. NO	Description	Size	Qty	MOC
1.	RO plant Shed by Pre Engineered Structural Building over foundation (as per design of soil investigation report) , one Gate, One Canopy, four window with one layer brick soling and 5” thickness RCC casting on floor.	As per requirement	1	MS, Brick, PCC,RCC.
2.	Civil base for pumps, RO skid etc.	AS required	AS required	RCC
3.	Equalization Tank	As per requirement	AS required	RCC EP
4.	Tube Type Clarifier (Twin Compartment)	As per requirement	AS required	RCC EP
5.	Clarified Water Storage Tank	As per requirement	AS required	RCC EP
6.	Sludge Pit	As per requirement	AS required	RCC
7.	Sludge Dry Bed	As per requirement	AS required	RCC
8.	Supplying and erecting in position 2.4 m high PVC coated gavanised chain linked fencing of minimum 8 gauge (including PVC coating) of mesh size 75 mm and galvanised concertina. The diameter of the steel wire for chain link fencing excluding PVC coating shall not be less than 12 gauge. GI barbed wire fencing at top of chain link fencing shall be provided with 4 stands of height of 600 mm including civil works & all accessories as per specification .	Required size for protection of water treatment plant and Water storage Tank	AS required	As described
9.	Supply, fabrication and installing in position and testing galvanised MS Gates out of channels, joists, angles, flats, plates, pipes & sheets including stiffners, bracings, fabricated hinges, MS Aldrops with locking arrangement, tempered steel pivot, guide track of MS Tee, ball bearing arrangements, castor wheels, anti corrosive synthetic enamel painting over two coats of primer etc. all complete as per drawing, specification and as directed by Engineer-in-charge with 600mm high GI barbed wire fencing at top all complete.	4 M wide	1	As described



Magenta Color Indicates the edited portion in Rev.1 drawing



CIP CLEANING SYSTEM

FOR TENDER PURPOSE ONLY

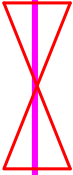
BHARAT HEAVY ELECTRICALS LTD (BHEL)	
INDIA	
PROJECT: CONSTRUCTION & PORTABLE RO WATER TREATMENT PLANT (CAPACITY -20 M3/hr & 1 m3/hr)	
DRG. TITLE: PROCESS FLOW DIAGRAM	
PROJ. NO.	DRAWING NO.
BHEL/RAMPAL/CONSTRUCTION WATER:01	
REV.	DATE
Rev 1-Dtd081216	Rev-24d21016
DRAWN BY	CHECKED BY
S.S	
REVIEWED BY	APPROVED BY
SCALE	

WATER TREATMENT PLANT

WATER STORAGE RCC TANK

(CONSTRUCTION OF RCC STORAGE
TANK IS NOT A PART EPC CONTRACT . IT
WILL BE PAID ON THE ITEM RATE BASIS
AS PER SERVICE PART OF PRICE
SCHEDULE)

2.4M WIDE
SECURITY
FENCING UNDER
SCOPE OF
WATER
TREATMENT PKG


4M WIDE MS
GATE WITH
PAINTED

TENDER PURPOSE ONLY

2X660MW MAITREE RAMPAL
PROJECT

JOB:- CONSTRUCTION OF
CONSTRUCTION WATER & POTABLE
WATER TREATMENT PLANT & RCC
STORAGE TANK

DRAWING TITLE:- LAYOUT OF
WATER TREATMENT PLANT AND
RCC STORAGE TANK

Basic parameters for construction water**A. Permissible limit of Solids in construction water are:-**

Organic- 200mg/L

Inorganic-3000mg/L

Sulphates(as SO₃)-400mg/L

Chlorides(As Cl)- 500mg/L

Suspended Matter -2000mg/L

Ph Value of water shall not be less than 6(ideal 7)

Quantity of 0.02 Nominal NaOH to Neutralize 100ml sample of water using Phenolphthalein as an indicator- Less than 5 ml

Quantity of 0.02 Nominal H₂SO₄ to Neutralize 100ml sample of water using mixed indicator- Less than 25 ml

B. Permissible limit of Solids in drinking/potable RO water are:-

As per international /Bangladesh Standard

- 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

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 MLSL 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:

loc ation	Date	Tem p.	pH	EC	Cl	T. Alkal inity	Turbid ity	T S	TDS	SS	DO	BOD	COD	Sal inity
		°C		µS/cm	mg/l	mg/l	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	7-Jan	27.4	7.74	3010	879	36	68.7	1565	1510	55	5.1	0.8	55	1.6
2	7-Jan	27.1	7.72	3020	878.8	36	68.5	1570	1510	60	5.1	0.8	55	1.6
3	7-Jan	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	1262	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	32.6	7.59	25300	8273	36	185.6	12950	12700	250	4.6	0.7	136	15.5
2	17-Apr	32.6	7.59	25300	8273	36	186.2	12950	12700	250	4.6	0.7	138	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	14600	300	4.5	1.2	177	17.6
2	5-May	32.9	7.54	29200	9470	36	198.6	14900	14600	300	4.4	1.2	177	17.6

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

loc ati on	Date	Tem p.	pH	EC	Cl	T. Alkal inity	Turbid ity	T S	TDS	SS	DO	BOD	COD	Sal inity
		°C		µS/cm	mg/l	mg/l	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
3	5-May	33.2	7.57	29200	9470	36	199.6	14900	14600	300	4.5	1.2	177	17.6
1	13-Jun	31.6	7.69	18000	5820	36	112.6	9200	9000	200	4.7	1.1	97	10.8
2	13-Jun	31.6	7.69	18000	5800	36	113.2	9200	9000	200	4.7	1.1	97	10.8
3	13-Jun	31.6	7.69	18000	5810	36	112.4	9200	9000	200	4.7	1.1	97	10.8
1	1-Jul	31.6	7.69	440	32.6	36	76.6	285	220	65	5.2	0.8	26	-
2	1-Jul	31.6	7.69	440	32.6	36	76.6	285	220	65	5.2	0.8	26	-
3	1-Jul	31.6	7.69	440	32.6	36	76.6	285	220	65	5.2	0.8	26	-
1	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	55	5.3	0.7	22	-
2	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	55	5.3	0.7	22	-
3	5-Aug	31.6	7.69	275	16.6	36	68.6	192	137	55	5.3	0.7	22	-
1	8-Sep	31.6	7.74	270	15.6	36	65.6	180	135	45	5.5	0.7	22	-
2	8-Sep	31.6	7.76	270	15.6	36	65.6	180	135	45	5.5	0.7	22	-
3	8-Sep	31.6	7.74	270	15.6	36	65.6	180	135	45	5.5	0.7	22	-
1	12-Oct	30.6	7.79	290	26.6	36	62.6	192	145	47	5.6	0.7	22	-
2	12-Oct	30.6	7.78	290	26.6	36	62.6	192	145	47	5.6	0.7	22	-
3	12-Oct	30.6	7.78	290	25.6	36	62.6	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	26.6	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 Mongla point
(Source: EIA-Report)**

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
 Power Sector - Eastern Region,
 Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
 Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Design, Engineering, procurement, supply, construction, erection, commissioning of construction water system (20 cum / hour) & potable water system (1 cum / hour) on EPC basis and construction of reservoir as per technical specification for 2x660 mw maitree super thermal power project at moidara village, rampalupazila, bagerhat district, Bangladesh.	
Ref	01	Tender No. PSER:SCT:KLN-C1785:16.
	02	BHEL's NIT, vide reference no PSER:SCT:KLN-C1785:5303 , dated 22-11-2016
	03	BHEL's TCN-01, vide reference no PSER:SCT:KLN-C1785:TCN-01, dated 06-12-2016.
	04	BHEL's TCN-02, vide reference no PSER:SCT:KLN-C1785:TCN-02, dated 09-12-2016.
	05	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized representative of the bidder)

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)

POWER SECTOR EASTERN REGION DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091

फैक्स/Fax : (033) 23211960

फोन/Phone : बोर्ड/EPABX : 23211691, 23211798, 23211796