

**PROCUREMENT DOCUMENTS**

**Bidding Document for  
Procurement of Goods**

**Procurement of:**

**Automatic Water Level Stations, Upgrade Existing Climate  
Stations and Rain Gauges to Automatic and Real Time, Including  
Related Services and Annual Maintenance Services**

**ICB No.: BWDB-G2/2020-21**

**Project- BWCSRP: Component-B SHEWS**

**Purchaser- Bangladesh Water Development Board**

**Country-Bangladesh**

**Issued on: September 23, 2020.**

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## **PART 1 – Bidding Procedures**

# Section I. Instructions to Bidders

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## Section I. Instructions to Bidders

### A. General

- 1. Scope of Bid**

  - 1.1 In connection with the Invitation for Bids, **specified in the Bid Data Sheet (BDS)**, the Purchaser, **as specified in the BDS**, issues these Bidding Documents for the supply of Goods and Related Services incidental thereto as specified in Section VII, Schedule of Requirements. The name, identification and number of lots (contracts) of this International Competitive Bidding (ICB) procurement are **specified in the BDS**.
  - 1.2 Throughout these Bidding Documents:

    - (a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, telex) with proof of receipt;
    - (b) if the context so requires, “singular” means “plural” and vice versa; and
    - (c) “Day” means calendar day.
- 2. Source of Funds**

  - 2.1 The Borrower or Recipient (hereinafter called “Borrower”) **specified in the BDS** has applied for or received financing (hereinafter called “funds”) from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called “the Bank”) in an amount **specified in BDS**, toward the project named **in BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract for which these Bidding Documents are issued.
  - 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

- 3. Corrupt and Fraudulent Practices**
- 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.
- 3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (where declared or not), sub-contractors, sub-consultants, service providers or suppliers and to permit the Bank to inspect all accounts, records and other documents relating to the submission of the application, bid submission (in case prequalified), and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.
- 4. Eligible Bidders**
- 4.1 A Bidder may be a firm that is a private entity, a government-owned entity—subject to ITB 4.5—or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution. **Unless specified in the BDS,** there is no limit on the number of members in a JV.
- 4.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:
- (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or
  - (b) receives or has received any direct or indirect subsidy from another Bidder; or
  - (c) has the same legal representative as another Bidder; or
  - (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Purchaser regarding this bidding process; or
  - (e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

- (f) any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
  - (g) any of its affiliates has been hired (or is proposed to be hired) by the Purchaser or Borrower for the Contract implementation; or
  - (h) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
  - (i) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract
- 4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.
- 4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address **specified in the BDS**.



- 4.5 Bidders that are Government-owned enterprises or institutions in the Purchaser's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Purchaser. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.
- 4.6 A Bidder shall not be under suspension from bidding by the Purchaser as the result of the operation of a Bid-Securing Declaration.
- 4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.
- 4.8 A Bidder shall provide such evidence of eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.
- 5. Eligible Goods and Related Services**
- 5.1 All the Goods and Related Services to be supplied under the Contract and financed by the Bank may have their origin in any country in accordance with Section V, Eligible Countries.
- 5.2 For purposes of this Clause, the term "goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "related services" includes services such as insurance, installation, training, and initial maintenance.
- 5.3 The term "origin" means the country where the goods have been

mined, grown, cultivated, produced, manufactured or processed; or, through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

## **B. Contents of Bidding Document**

### **6. Sections of Bidding Document**

- 6.1 The Bidding Documents consist of Parts 1, 2, and 3, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

#### **PART 1 Bidding Procedures**

- Section I. Instructions to Bidders (ITB)
- Section II. Bidding Data Sheet (BDS)
- Section III. Evaluation and Qualification Criteria
- Section IV. Bidding Forms
- Section V. Eligible Countries
- Section VI. Bank Policy-Corrupt and Fraudulent Practices

#### **PART 2 Supply Requirements**

- Section VII. Schedule of Requirements

#### **PART 3 Contract**

- Section VIII. General Conditions of Contract (GCC)
- Section IX. Special Conditions of Contract (SCC)
- Section X. Contract Forms

- 6.2 The Invitation for Bids issued by the Purchaser is not part of the Bidding Document.
- 6.3 Unless obtained directly from the Purchaser, the Purchaser is not responsible for the completeness of the document, responses to requests for clarification, the Minutes of the pre-Bid meeting (if any), or Addenda to the Bidding Document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Purchaser shall prevail.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents and to furnish with its Bid all information or documentation as is required by the Bidding Documents.

- 7. Clarification of Bidding Documents**
- 7.1 A Bidder requiring any clarification of the Bidding Document shall contact the Purchaser in writing at the Purchaser's address **specified in the BDS**. The Purchaser will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of bids within a period **specified in the BDS**. The Purchaser shall forward copies of its response to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so **specified in the BDS**, the Purchaser shall also promptly publish its response at the web page **identified in the BDS**. Should the clarification result in changes to the essential elements of the Bidding Documents, the Purchaser shall amend the Bidding Documents following the procedure under ITB 8 and ITB 22.2.
- 8. Amendment of Bidding Document**
- 8.1 At any time prior to the deadline for submission of bids, the Purchaser may amend the Bidding Documents by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Documents and shall be communicated in writing to all who have obtained the Bidding Documents from the Purchaser in accordance with ITB 6.3. The Purchaser shall also promptly publish the addendum on the Purchaser's web page in accordance with ITB 7.1.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 22.2.

### **C. Preparation of Bids**

- 9. Cost of Bidding**
- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid**
- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, shall be written in the language **specified in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into the language **specified in the BDS**, in which case, for purposes of interpretation of the Bid, such translation shall govern.

**11. Documents  
Comprising the  
Bid**

- 11.1 The Bid shall comprise the following:
- (a) Letter of Bid in accordance with ITB 12;
  - (b) completed schedules, in accordance with ITB 12 and 14
  - (c) Bid Security or Bid-Securing Declaration, in accordance with ITB 19.1;
  - (d) alternative bids, if permissible, in accordance with ITB 13;
  - (e) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
  - (f) documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract if its bid is accepted;
  - (g) documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to bid;
  - (h) documentary evidence in accordance with ITB 16, that the Goods and Related Services to be supplied by the Bidder are of eligible origin;
  - (i) documentary evidence in accordance with ITB 16 and 30, that the Goods and Related Services conform to the Bidding Documents;
  - (j) any other document **required in the BDS.**

11.2 In addition to the requirements under ITB 11.1, bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all members and submitted with the bid, together with a copy of the proposed Agreement.

11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

**12. Letter of Bid  
and Price  
Schedules**

12.1. The Letter of Bid and Price Schedules shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.2. All blank spaces shall be filled in with the information requested.

**13. Alternative Bids**

13.1. Unless otherwise **specified in the BDS**, alternative bids

shall not be considered.

**14. Bid Prices and Discounts**

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Price Schedules shall conform to the requirements specified below.
- 14.2 All lots (contracts) and line items must be listed and priced separately in the Price Schedules.
- 14.3 The price to be quoted in the Letter of Bid in accordance with ITB 12.1 shall be the total price of the bid, excluding any discounts offered.
- 14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid, in accordance with ITB 12.1.
- 14.5 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account, **unless otherwise specified in the BDS**. A bid submitted with an adjustable price quotation shall be treated as nonresponsive and shall be rejected, pursuant to ITB 29. However, if in accordance with the BDS, prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract, a bid submitted with a fixed price quotation shall not be rejected, but the price adjustment shall be treated as zero.
- 14.6 If so specified in ITB 1.1, bids are being invited for individual lots (contracts) or for any combination of lots (packages). Unless otherwise **specified in the BDS**, prices quoted shall correspond to 100 % of the items specified for each lot and to 100% of the quantities specified for each item of a lot. Bidders wishing to offer discounts for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4 provided the bids for all lots (contracts) are opened at the same time.
- 14.7 The terms EXW, CIP, and other similar terms shall be governed by the rules prescribed in the current edition of Incoterms, published by The International Chamber of Commerce, **as specified in the BDS**.
- 14.8 Prices shall be quoted as specified in each Price Schedule included in Section IV, Bidding Forms. The disaggregation of price components is required solely for the purpose of facilitating the comparison of bids by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms

offered. In quoting prices, the Bidder shall be free to use transportation through carriers registered in any eligible country, in accordance with Section V, Eligible Countries. Similarly, the Bidder may obtain insurance services from any eligible country in accordance with Section V, Eligible Countries. Prices shall be entered in the following manner:

- (a) For Goods manufactured in the Purchaser's Country:
  - (i) the price of the Goods quoted EXW (ex-works, ex-factory, ex warehouse, ex showroom, or off-the-shelf, as applicable), including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Goods;
  - (ii) any Purchaser's Country sales tax and other taxes which will be payable on the Goods if the contract is awarded to the Bidder; and
  - (iii) the price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) **specified in the BDS.**
- (b) For Goods manufactured outside the Purchaser's Country, to be imported:
  - (i) the price of the Goods, quoted CIP named place of destination, in the Purchaser's Country, as **specified in the BDS;**
  - (ii) the price for inland transportation, insurance, and other local services required to convey the Goods from the named place of destination to their final destination (Project Site) **specified in the BDS;**
- (c) For Goods manufactured outside the Purchaser's Country, already imported:
  - (i) the price of the Goods, including the original import value of the Goods; plus, any mark-up (or rebate); plus any other related local cost, and custom duties and other import taxes already paid or to be paid on the Goods already imported.
  - (ii) the custom duties and other import taxes already paid (need to be supported with documentary evidence) or to be paid on the Goods already imported;

- (iii) the price of the Goods, obtained as the difference between (i) and (ii) above;
  - (iv) any Purchaser's Country sales and other taxes which will be payable on the Goods if the contract is awarded to the Bidder; and
  - (v) the price for inland transportation, insurance, and other local services required to convey the Goods from the named place of destination to their final destination (Project Site) **specified in the BDS.**
- (d) for Related Services, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in the Schedule of Requirements:
- (i) the price of each item comprising the Related Services (inclusive of any applicable taxes).

**15. Currencies of Bid and Payment**

- 15.1 The currency(ies) of the bid and the currency(ies) of payments shall be **as specified in the BDS.** The Bidder shall quote in the currency of the Purchaser's Country the portion of the bid price that corresponds to expenditures incurred in the currency of the Purchaser's country, unless otherwise **specified in the BDS.**
- 15.2 The Bidder may express the bid price in any currency. If the Bidder wishes to be paid in a combination of amounts in different currencies, it may quote its price accordingly but shall use no more than three foreign currencies in addition to the currency of the Purchaser's Country.

**16. Documents Establishing the Eligibility and Conformity of the Goods and Related Services**

- 16.1 To establish the eligibility of the Goods and Related Services in accordance with ITB 5, Bidders shall complete the country of origin declarations in the Price Schedule Forms, included in Section IV, Bidding Forms.
- 16.2 To establish the conformity of the Goods and Related Services to the Bidding Documents, the Bidder shall furnish as part of its Bid the documentary evidence that the Goods conform to the technical specifications and standards specified in Section VII, Schedule of Requirements.
- 16.3 The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item by item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to the technical specification, and if applicable, a statement of

deviations and exceptions to the provisions of the Section VII, Schedule of Requirements.

- 16.4 The Bidder shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period **specified in the BDS** following commencement of the use of the goods by the Purchaser.
- 16.5 Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by the Purchaser in the Schedule of Requirements, are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to the Purchaser's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII, Schedule of Requirements.

**17. Documents  
Establishing the  
Eligibility and  
Qualifications  
of the Bidder**

- 17.1 To establish Bidder's their eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid, included in Section IV, Bidding Forms.
- 17.2 The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted shall establish to the Purchaser's satisfaction:
  - (a) that, if **required in the BDS**, a Bidder that does not manufacture or produce the Goods it offers to supply shall submit the Manufacturer's Authorization using the form included in Section IV, Bidding Forms to demonstrate that it has been duly authorized by the manufacturer or producer of the Goods to supply these Goods in the Purchaser's Country;
  - (b) that, if **required in the BDS**, in case of a Bidder not doing business within the Purchaser's Country, the Bidder is or will be (if awarded the contract) represented by an Agent in the country equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications; and
  - (c) that the Bidder meets each of the qualification criterion specified in Section III, Evaluation and Qualification Criteria.

**18. Period of  
Validity of Bids**

- 18.1. Bids shall remain valid for the period **specified in the BDS** after the bid submission deadline date prescribed by the Purchaser in



accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Purchaser as nonresponsive.

- 18.2. In exceptional circumstances, prior to the expiration of the bid validity period, the Purchaser may request bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a Bid Security is requested in accordance with ITB Clause 19, it shall also be extended for a corresponding period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in ITB 18.3.
- 18.3. If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be determined as follows:
- (a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS**.
  - (b) In the case of adjustable price contracts, no adjustment shall be made.
  - (c) In any case, bid evaluation shall be based on the bid price without taking into consideration the applicable correction from those indicated above.

## **19. Bid Security**

- 19.1. The Bidder shall furnish as part of its bid, either a Bid-Securing Declaration or a bid security, as **specified in the BDS**, in original form and, in the case of a bid security. In the amount and currency **specified in the BDS**.
- 19.2. A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms.
- 19.3. If a bid security is specified pursuant to ITB 19.1, the bid security shall be a demand guarantee in any of the following forms at the Bidder's option:
- (a) an unconditional guarantee issued by a bank or financial institution (such as an insurance, bonding or surety company);
  - (b) an irrevocable letter of credit;
  - (c) a cashier's or certified check; or
  - (d) another security **specified in the BDS**,

from a reputable source from an eligible country. If the unconditional guarantee is issued by a financial institution located outside the Purchaser's Country, the issuing financial institution shall have a correspondent financial institution located in the Purchaser's Country to make it enforceable. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Purchaser prior to bid submission. The bid security shall be valid for twenty-eight (28) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

- 19.4. If a Bid Security is specified pursuant to ITB 19.1, any bid not accompanied by a substantially responsive Bid Security shall be rejected by the Purchaser as non-responsive.
- 19.5. If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the contract and furnishing the Performance Security pursuant to ITB 42.
- 19.6. The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the contract and furnished the required performance security.
- 19.7. The Bid Security may be forfeited or the Bid Securing Declaration executed:
  - (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or any extension thereto provided by the Bidder; or
  - (b) if the successful Bidder fails to:
    - (i) sign the Contract in accordance with ITB41; or
    - (ii) furnish a performance security in accordance with ITB 42.
- 19.8. The bid security or Bid- Securing Declaration of a JV must be in the name of the JV that submits the bid. If the JV has not been legally constituted into a legally enforceable JV at the time of bidding, the bid security or Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITB 4.1 and ITB 11.2.
- 19.9. If a bid security is **not required in the BDS**, pursuant to ITB 19.1, and

- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or
- (b) if the successful Bidder fails to: sign the Contract in accordance with ITB41; or furnish a performance security in accordance with ITB 42;

the Borrower may, **if provided for in the BDS**, declare the Bidder ineligible to be awarded a contract by the Purchaser for a period of time **as stated in the BDS**.

## **20. Format and Signing of Bid**

- 20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "ORIGINAL." Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE." In addition, the Bidder shall submit copies of the bid, in the number **specified in the BDS** and clearly mark them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation **as specified in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 20.3 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.
- 20.4 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

## **D. Submission and Opening of Bids**

## **21. Sealing and Marking of Bids**

- 21.1. The Bidder shall enclose the original and all copies of the bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL", "ALTERNATIVE" and "COPY." These envelopes containing the original and the copies shall then be enclosed in one single envelope.
- 21.2. The inner and outer envelopes shall:
  - (a) bear the name and address of the Bidder;

- (b) be addressed to the Purchaser in accordance with ITB 24.1;
- (c) bear the specific identification of this bidding process indicated in ITB1.1; and
- (d) bear a warning not to open before the time and date for bid opening.

21.3. If all envelopes are not sealed and marked as required, the Purchaser will assume no responsibility for the misplacement or premature opening of the bid.

## 22. Deadline for Submission of Bids

22.1. Bids must be received by the Purchaser at the address and no later than the date and time **specified in the BDS**. When so **specified in the BDS**, bidders shall have the option of submitting their bids electronically. Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.

22.2. The Purchaser may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents in accordance with ITB 8, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

## 23. Late Bids

23.1. The Purchaser shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Purchaser after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

## 24. Withdrawal, Substitution, and Modification of Bids

24.1. A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization (the power of attorney) in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:

- (a) prepared and submitted in accordance with ITB 20 and 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” or “MODIFICATION;” and
- (b) received by the Purchaser prior to the deadline prescribed for submission of bids, in accordance with ITB 22.

- 24.2. Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.
- 24.3. No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

## 25. Bid Opening

- 25.1. Except as in the cases specified in ITB 23 and 24, the Purchaser shall publicly open and read out in accordance with ITB25.3 all bids received by the deadline at the date, time and place **specified in the BDS** in the presence of Bidders' designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be as **specified in the BDS**.
- 25.2. First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. If the withdrawal envelope does not contain a copy of the "power of attorney" confirming the signature as a person duly authorized to sign on behalf of the Bidder, the corresponding bid will be opened. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening. Only bids that are opened and read out at Bid opening shall be considered further.
- 25.3. All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total Bid Prices, per lot (contract) if applicable, including any discounts and alternative bids; the presence or absence of a Bid Security, if required; and any other details as the Purchaser may consider appropriate. Only discounts and alternative bids read out at Bid opening shall be considered for evaluation. The Letter of Bid and the Price Schedules are to be initialed by representatives of the

Purchaser attending bid opening in the manner **specified in the BDS**. The Purchaser shall neither discuss the merits of any bid nor reject any bid (except for late bids, in accordance with ITB 25.1).

- 25.4. The Purchaser shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot (contract) if applicable, including any discounts, and alternative bids; and the presence or absence of a Bid Security, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

### **E. Evaluation and Comparison of Bids**

- 26. Confidentiality**
- 26.1 Information relating to the evaluation of bids and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with the bidding process until information on Contract Award is communication to all Bidders in accordance with ITB 40.
- 26.2 Any effort by a Bidder to influence the Purchaser in the evaluation or contract award decisions may result in the rejection of its Bid.
- 26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract Award, if any Bidder wishes to contact the Purchaser on any matter related to the bidding process, it should do so in writing.

- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, comparison of the bids, and qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered. The Purchaser's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the Evaluation of the bids, in accordance with ITB 31.
- 27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Purchaser's request for clarification, its bid may be rejected.
- 28. Deviations, Reservations, and Omissions**
- 28.1 During the evaluation of bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Bidding Documents;
  - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Documents; and
  - (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Documents.
- 29. Determination of Responsiveness**
- 29.1 The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.
- 29.2 A substantially responsive Bid is one that meets the requirements of the Bidding Documents without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:
- (a) if accepted, would
    - (i) affect in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or
    - (ii) limit in any substantial way, inconsistent with the Bidding Documents, the Purchaser's rights or the Bidder's obligations under the Contract; or

- (b) if rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

29.3 The Purchaser shall examine the technical aspects of the bid submitted in accordance with ITB 16 and ITB 17, in particular, to confirm that all requirements of Section VII, Schedule of Requirements have been met without any material deviation or reservation, or omission.

29.4 If a bid is not substantially responsive to the requirements of Bidding Documents, it shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

**30. Nonconformities, Errors and Omissions**

30.1 Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformities in the Bid.

30.2 Provided that a bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

30.3 Provided that a bid is substantially responsive, the Purchaser shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component.

**31. Correction of Arithmetical Errors**

31.1 Provided that the Bid is substantially responsive, the Purchaser shall correct arithmetical errors on the following basis:

- (a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the



amount in figures shall prevail subject to (a) and (b) above.

- 31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid.
- 32. Conversion to Single Currency** 32.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted in a single currency as **specified in the BDS**.
- 33. Margin of Preference** 33.1 **Unless otherwise specified in the BDS**, a margin of preference shall not apply.
- 34. Evaluation of Bids** 34.1 The Purchaser shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.
- 34.2 To evaluate a Bid, the Purchaser shall consider the following:
- (a) evaluation will be done for Items or Lots (contracts), as **specified in the BDS**; and the Bid Price as quoted in accordance with clause 14;
  - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
  - (c) price adjustment due to discounts offered in accordance with ITB 14.3
  - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 32;
  - (e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 30.3;
  - (f) the additional evaluation factors are specified in Section III, Evaluation and Qualification Criteria;
- 34.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
- 34.4 If these Bidding Documents allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated price of the lot (contract) combinations, including any discounts offered in the Letter of Bid Form, is specified in Section III, Evaluation and Qualification Criteria
- 34.5 The Purchaser's evaluation of a bid will exclude and not take

into account:

- (a) in the case of Goods manufactured in the Purchaser's Country, sales and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder;
- (b) in the case of Goods manufactured outside the Purchaser's Country, already imported or to be imported, customs duties and other import taxes levied on the imported Good, sales and other similar taxes, which will be payable on the Goods if the contract is awarded to the Bidder;
- (c) any allowance for price adjustment during the period of execution of the contract, if provided in the bid.

34.6 The Purchaser's evaluation of a bid may require the consideration of other factors, in addition to the Bid Price quoted in accordance with ITB 14. These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of bids, unless otherwise **specified in the BDS** from amongst those set out in Section III, Evaluation and Qualification Criteria. The criteria and methodologies to be used shall be as specified in ITB 34.2 (f).

### **35. Comparison of Bids**

35.1 The Purchaser shall compare the evaluated prices of all substantially responsive bids established in accordance with ITB 34.2 to determine the lowest evaluated bid. The comparison shall be on the basis of CIP (place of final destination) prices for imported goods and EXW prices, plus cost of inland transportation and insurance to place of destination, for goods manufactured within the Borrower's country, together with prices for any required installation, training, commissioning and other services. The evaluation of prices shall not take into account custom duties and other taxes levied on imported goods quoted CIP and sales and similar taxes levied in connection with the sale or delivery of goods.

### **36. Qualification of the Bidder**

36.1 The Purchaser shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

36.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.

36.3 An affirmative determination shall be a prerequisite for award of

the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Purchaser shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

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| <b>37. Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids</b> | 37.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders. |
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### F. Award of Contract

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| <b>38. Award Criteria</b>  | 38.1 Subject to ITB 37.1, the Purchaser shall award the Contract to the Bidder whose bid has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Documents, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.   |
| <b>39. Purchaser's Right to Vary Quantities at Time of Award</b> | 39.1 At the time the Contract is awarded, the Purchaser reserves the right to increase or decrease the quantity of Goods and Related Services originally specified in Section VII, Schedule of Requirements, provided this does not exceed the percentages <b>specified in the BDS</b> , and without any change in the unit prices or other terms and conditions of the bid and the Bidding Documents.   |
| <b>40. Notification of Award</b>                                 | 40.1 Prior to the expiration of the period of bid validity, the Purchaser shall notify the successful Bidder, in writing, that its Bid has been accepted. The notification letter (hereinafter and in the Conditions of Contract and Contract Forms called the "Letter of Acceptance") shall specify the sum that the Purchaser will pay the Supplier in consideration of the supply of Goods (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price"). At the same time, the Purchaser shall also notify all other Bidders of the results of the bidding and shall publish in <i>UNDB online</i> the results identifying the bid and lot (contract) numbers and the following information: <ul style="list-style-type: none"> <li>(i) name of each Bidder who submitted a Bid;</li> <li>(ii) bid prices as read out at Bid Opening;</li> <li>(iii) name and evaluated prices of each Bid that was evaluated;</li> <li>(iv) name of bidders whose bids were rejected and the reasons for their rejection; and</li> </ul> |

- (v) name of the successful Bidder, and the Price it offered, as well as the duration and summary scope of the contract awarded.

40.2 Until a formal Contract is prepared and executed, the notification of award shall constitute a binding Contract.

40.3 The Purchaser shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with ITB 40.1, requests in writing the grounds on which its bid was not selected.

#### **41. Signing of Contract**

41.1 Promptly after notification, the Purchaser shall send the successful Bidder the Contract Agreement.

41.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Purchaser.

41.3 Notwithstanding ITB 41.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, where such export restrictions arise from trade regulations from a country supplying those products/goods, systems or services, the Bidder shall not be bound by its bid, always provided however, that the Bidder can demonstrate to the satisfaction of the Purchaser and of the Bank that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract.

#### **42. Performance Security**

42.1 Within twenty-eight (28) days of the receipt of notification of award from the Purchaser, the successful Bidder, if required, shall furnish the Performance Security in accordance with the GCC, subject to ITB 34.5, using for that purpose the Performance Security Form included in Section X, Contract Forms, or another Form acceptable to the Purchaser. If the Performance Security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Purchaser. A foreign institution providing a bond shall have a correspondent financial institution located in the Purchaser's Country.

42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture

of the Bid Security. In that event the Purchaser may award the Contract to the next lowest evaluated Bidder, whose bid is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract satisfactorily.

## Section II. Bid Data Sheet (BDS)

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

ITB Clause Reference	A. General
ITB 1.1 (Scope of Bid)	The reference number of the Invitation for Bids is: WCS/G2/2020/3882 Dated: 22.09.2020
ITB 1.1 (Scope of Bid)	The Purchaser is: Bangladesh Water Development Board represented by <b>Project Director, Bangladesh Weather and Climate Services Regional Project (BWCSRP); Component-B: Strengthening Hydrological Information Services and Early Warning Systems (SHEWS).</b>
ITB 1.1 (Scope of Bid)	<b>The name of the ICB is: Automatic Water Level Stations, Upgrade Existing Climate Stations and Rain Gauges to Automatic and Real Time, Including Related Services and Annual Maintenance Services as specified in the bidding document.</b> The identification number of the ICB is: BWDB-G2 The number and identification of lots (contracts) comprising this ICB is: Single Lot
ITB 2.1 (Source of funds)	The Borrower is: <b>People's Republic of Bangladesh</b>
ITB 2.1 (Source of funds)	Loan or Financing Agreement amount: USD 113.00 million (for BWDB Component USD 36.00million).
ITB 2.1 (Source of funds)	The name of the Project is: <b>Bangladesh Weather and Climate Services Regional Project (BWCSRP): Component-B Strengthening Hydrological Information Services and Early Warning Systems (SHEWS)</b>
ITB 4.1 (Eligible Bidders)	Maximum number of members in the JV shall be: 03 (three).
IITB 4.4 (Eligible Bidders)	A list of debarred firms and individuals is available on the Bank's external website: <u><a href="http://www.worldbank.org/debarr">http://www.worldbank.org/debarr</a></u> .

	<b>B. Contents of Bidding Documents</b>
ITB 7.1 (Clarification of Bidding Documents)	For <b><u>Clarification of bid purposes</u></b> only, the Purchaser's address is:  Attention: <b>Mashiur Rahman, Project Director</b> Address: <b>Firoz Tower, 152/3/B, Panthapath</b> Floor/ Room number: <b>2<sup>nd</sup> Floor</b> City: <b>Dhaka</b> ZIP Code: <b>1205</b> Country: <b>Bangladesh</b> Telephone: <b>+88 02 58153785-86</b> Facsimile number: <b>Not Available</b> Electronic mail address: <b>pd.bwcsrp.shews@gmail.com</b> Requests for clarification should be received by the Employer no later than: <b>14 (fourteen) days</b> prior to the deadline for submission of bids.
ITB 7.1 (Clarification of Bidding Documents)	Clarifications will not be published in the website.
	<b>C. Preparation of Bids</b>
ITB 10.1 (Language of Bid)	The language of the bid is: <b>English</b> .  All correspondence exchange shall be in <b>English</b> language.  Language for translation of supporting documents and printed literature is <b>English</b> .
ITB 11.1 (j) (Documents Comprising the Bid)	1. Manufacturer's catalogue/brochure/leaflets or any other similar documents of the offered product. 2. Supply record of the manufacturer for last 7 years using the form in Section III. 3. The following details shall also be provided by Bangladeshi Bidders: a. Valid Trade Licence; b. TIN Certificate; c. VAT Registration Certificate.  4. In case the Bidder appoints an agent to act on behalf of the Bidder for this procurement, An Agreement signed between the Bidder and the agent, clearly mentioning specific roles and responsibilities of the Agent and the Bidder.
<b>ITB 13.1(Alternative Bids)</b>	<b>Alternative Bids <i>shall not be</i> considered.</b>
ITB 14.5 (Bid Prices and	The prices quoted by the Bidder <b>shall not</b> be subject to adjustment during

Discounts)	the performance of the Contract.
<b>ITB 14.6</b>	Prices quoted for each lot (contract) shall correspond <b>to 100</b> percent of the items specified for each lot (contract).  Prices quoted for each item of a lot shall correspond <b>to 100</b> percent of the quantities specified for this item of a lot.
ITB 14.7 (Bid Prices and Discounts)	The Incoterms edition is: <b>Incoterms 2020</b> .
ITB 14.8(b)(i) (Bid Prices and Discounts)	Place of Destination: Hazrat Shah Jalal International Air Port, Dhaka.  Customs Duties and Value Added Taxes (CD-VAT) of the imported Goods under the Contract (incurred at the port of entry) will be paid by the Purchaser. However, the supplier shall work in close contact with purchaser's appointed Clearing & Forwarding (C & F) Agent.
ITB 14.8 (a) (iii);(b)(ii) and (c)(v)(Bid Prices and Discounts)	"Final destination (Remote Sites as per <b>Annexure- A in Schedule of Requirement in Section VII.)</b> "
ITB 15.1 (Currencies of Bid and payment)	The prices shall be quoted by the bidder in: any freely convertible currency up to a maximum of three foreign currencies.  The Bidder is required to quote in Bangladesh Taka (BDT) for the portion of the bid price that corresponds to expenditures incurred in Bangladesh Taka (BDT).
<b>ITB 16.4</b>	Period of time the Goods are expected to be functioning (for the purpose of spare parts): <b>10 (ten) years</b> .
<b>ITB 17.2 (a)</b> (Documents Establishing the Eligibility and Qualifications of the Bidder)	<b>1. Manufacturer's authorization certificate is required for the items: (i) GSM/GPRS data transmission Modem; (ii) Data Logger; &amp; (iii) All meteorological and hydrological Sensors. (Line Item no. 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c, 4a to 4g of List of Goods and Delivery Schedule, Section-VII).</b> <b>2. Manufacturer's authorization certificate is required for the items: (i) Data Servers (Line Item no. 5a &amp; 5b of List of Goods and Delivery Schedule, Section-VII).</b>
<b>ITB 17.2 (b)</b> (Documents Establishing	After sales service is: <b>required</b> .  In case a Bidder not doing business within the Purchaser's Country, the Bidder is, <i>or will be (if awarded the contract)</i> represented by an Agent in



the Eligibility and Qualifications of the Bidder)	<p>the purchaser's country equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications, to ensure repair of the equipment and have enough inventory of spare parts to replace the equipment within 3 days during the Warranty and Post-Warranty Annual Operation &amp; Maintenance Services periods. The agent should have minimum three (03) years similar (similar means experience in monitoring systems in outdoor environment for hydrological / meteorological / groundwater / telemetry system for providing goods and services) service experience in purchaser's country.</p> <p>In case of joint venture, the representation through the agent is not allowed.</p> <p>Bidder should open local office and service centre in the country within 6 months of award of contract. The service centre should have facilities to repair the equipment or have enough inventories of spare parts to replace the equipment within 3 days during Warranty and Post-Warranty Annual Operation &amp; Maintenance Services periods.</p>
ITB 18.1 (Period of Validity of Bids)	The bid validity period shall be <b>120 days</b> .
ITB 18.3 (a) (Period of Validity of Bids)	The bid price shall be adjusted by the following factor(s): <b>Applicable</b> . If the contract award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, then at the time of contract award the contract price shall be adjusted by applying LIBOR+1 interest rate prevailing on the date of contract award, prorated to the period between fifty-six (56) days beyond the expiry of the initial bid validity and the date of contract award.
ITB 19.1 (Bid Security)	<p>A <i>Bid Security</i> <b>shall be</b> required.</p> <p>The amount of the Bid Security shall be United States Dollar 75,000.00 or an equivalent amount in any freely convertible currency.</p>
ITB 19.3 (Bid Security)	(c) Not applicable
ITB 19.9	<b>Not Applicable</b>
ITB 20.1	In addition to the original of the bid, the number of copies is: <b>One (01) along with a softcopy</b> . The form of the softcopy should be CD/ thumb-drive.
ITB 20.2 (Format and Signing of Bid)	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Power of attorney to sign the bid in accordance with ITB clause 20, with supporting document that the person(s) signing the power of attorney has the authority to delegate his/her authority to other person (for example, constitutional document or board resolution).

	In case the Bidder authorizes a person who is not the payroll employee of the Bidder, the Bidder and the authorized person must include in the bid an Agent Agreement with specific roles and responsibilities with respect to this procurement.
	<b>D. Submission and Opening of Bids</b>
ITB 22.1 (Deadline for Submission of Bids)	For <b><u>bid submission purposes</u></b> only, the Purchaser's address is  Attention: Project Director Bangladesh Weather and Climate Services Regional Project (BWCSR) Component-B: Strengthening Hydrological Information Services and Early Warning Systems (SHEWS) Address: Firoz Tower, 152/3/B, Panthapath Floor/ Room number: 2 <sup>nd</sup> Floor City: Dhaka, ZIP Code: 1205 Country: Bangladesh <b>The deadline for bid submission is:</b> <b>Date:</b> November 04, 2020 <b>Time:</b> 15.00 Local (GMT+ 6 hours) <b>Bidders shall not have the option of submitting their bids electronically.</b>
ITB 25.1 (Bid Opening)	The bid opening shall take place at: Street Address: <b>Firoz Tower, 152/3/B Panthapath.</b> Floor/ Room number: 2 <sup>nd</sup> Floor. City: <b>Dhaka.</b> Country: <b>Bangladesh.</b> <b>Date:</b> November 04, 2020. <b>Time:</b> 15.30 Local (GMT+ 6 hours)  The bid opening meeting will also be conducted live through Zoom for those bidders who may be unable to attend in person. The virtual connection details will be sent 7 calendar days before the deadline date of bid opening through email to all bidders who purchased the bidding documents.
ITB 25.3 (Bid Opening)	The Letter of Bid and Price Schedules shall be initialed by <b>03 (three)</b> representatives of the Purchaser conducting Bid opening. Procedure: The Letter of Bid and Price Schedules of each Bid shall be initialed by all representatives of the Purchaser and shall be numbered. Any inter-lineation, erasures, or overwriting that were already made by the bidder prior to the bid submission deadline, which shall be valid only if they are signed or initialed by the person signing the bid, shall also be initialed by the representatives of the Purchaser at the time of bid opening.
<b>E. Evaluation and Comparison of Bids</b>	
ITB 32.1 (Conversion to	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: <b>Bangladesh Taka.</b> The source of exchange rate shall

Single Currency)	<p>be: Bangladesh Bank webpage at “<a href="http://www.bangladesh-bank.org/econdata/exchangerate.php">http://www.bangladesh-bank.org/econdata/exchangerate.php</a>” and the rate shall be the BC selling exchange rate.</p> <p>If the exchange rates are not available from the above source on the particular date, the exchange rates published in the Wall Street Journal would be used for currency conversion in US Dollar.</p> <p><b>The date for the exchange rate shall be 14(fourteen) days prior to the bid submission deadline.</b></p>
ITB 33.1 (Margin of Preference)	<p>A margin of domestic preference shall apply.</p> <p>The application methodology is defined in Section III Evaluation and Qualification Criteria.</p> <p><b>Group A Bidder will provide detail of the cost breakdown of items in its bid if the Bidder wishes to get margin of preference.</b></p>
ITB 34.2 (a) (Evaluation of Bids)	<p>Evaluation will be done for all items together (contract).</p> <p>Bids will be evaluated by contract, i.e. all items together. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items. An item not listed in the Price Schedule shall be assumed to be not included in the bid and such bid may be treated as non-responsive.</p>
ITB 34.6 (Evaluation of Bids)	No other evaluation factors shall be considered in the bid evaluation.
	<b>F. Award of Contract</b>
ITB 39.1(Purchaser's Right to Vary Quantities at Time of Award)	<p>The maximum percentage by which quantities may be increased is: 15%.</p> <p>The maximum percentage by which quantities may be decreased is: 15%</p>

## **Section III. Evaluation and Qualification Criteria**

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### 1. Margin of Preference (ITB 33)

If the Bidding Data Sheet so specifies, the Purchaser will grant a margin of preference to goods manufactured in the Purchaser's country for the purpose of bid comparison, in accordance with the procedures outlined in subsequent paragraphs.

Bids will be classified in one of three groups, as follows:

- (a) **Group A:** Bids offering goods manufactured in the Purchaser's Country, for which (i) labor, raw materials, and components from within the Purchaser's Country account for more than thirty (30) percent of the EXW price; and (ii) the production facility in which they will be manufactured or assembled has been engaged in manufacturing or assembling such goods at least since the date of bid submission.
- (b) **Group B:** All other bids offering Goods manufactured in the Purchaser's Country.
- (c) **Group C:** Bids offering Goods manufactured outside the Purchaser's Country that have been already imported or that will be imported.

To facilitate this classification by the Purchaser, the Bidder shall complete whichever version of the Price Schedule furnished in the Bidding Documents is appropriate provided, however, that the completion of an incorrect version of the Price Schedule by the Bidder shall not result in rejection of its bid, but merely in the Purchaser's reclassification of the bid into its appropriate bid group.

The Purchaser will first review the bids to confirm the appropriateness of, and to modify as necessary, the bid group classification to which bidders assigned their bids in preparing their Bid Forms and Price Schedules.

All evaluated bids in each group will then be compared to determine the lowest evaluated bid of each group. Such lowest evaluated bids shall be compared with each other and if as a result of this comparison a bid from Group A or Group B is the lowest, it shall be selected for the award.

If as a result of the preceding comparison, the lowest evaluated bid is a bid from Group C, all bids from Group C shall be further compared with the lowest evaluated bid from Group A after adding to the evaluated price of goods offered in each bid from Group C, for the purpose of this further comparison only, an amount equal to 15% (fifteen percent) of the respective CIP bid price for goods to be imported and already imported goods. Both prices shall include unconditional discounts and be corrected for arithmetical errors. If the bid from Group A is the lowest, it shall be selected for award. If not, the lowest evaluated bid from Group C shall be selected as paragraph above."

**Group A Bidder will provide detail of the cost breakdown of items in its bid if the Bidder wishes to get margin of preference.**

## 2. Evaluation (ITB 34)

### 2.1. Evaluation Criteria (ITB 34.6)

No additional factors shall be taken into account in the bid evaluation. The evaluation of bids shall be in accordance with ITB 34 and based on the Bid Price quoted in accordance with ITB Clause 14.8 in the applicable Price Schedules provided in Section IV (list of price schedules shown below for ease of reference).

(i) Price Schedule A: Goods Manufactured Outside the Purchaser's Country, to be imported; AND

(ii) Price Schedule B: Goods Manufactured Outside the Purchaser's Country, already imported; AND

(iii) Price Schedule C: Goods Manufactured in the Purchaser's Country; AND

(iv) Price and Completion Schedule: Related services (Part-1 and Part-2, of 2 parts).

### 2.2. Multiple Contracts (ITB 34.4) -Not applicable for this procurement

### 2.3. Alternative Bids (ITB 13.1)-Not applicable for this procurement

## 3. Qualification (ITB 36)

### 3.1 Postqualification Requirements (ITB 36.1)

After determining the lowest-evaluated bid in accordance with ITB 35.1, the Purchaser shall carry out the post-qualification of the Bidder in accordance with ITB 36, using only the requirements specified. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

#### A. If the bidder is the manufacturer:

##### (i) Financial Capability

The Bidder will furnish documentary evidence that it meets the following financial requirements:

##### (a) Average Annual Turnover

**Bidder shall have average annual turnover of at least USD 09 (Nine) million or equivalent** over a period of best 03 (three) years within last 05 (five years) prior to the deadline date for bid submission.

*Bidder shall submit audited financial reports along with the bid if Annual Turnover remains mentioned in the audited financial reports, or if not required by the law of the Applicant's country other financial statements (third party statements*

*enough to substantiate annual turnover) or payment receipts acceptable to the Employer, for the last five (5) years to substantiate average annual turnover.*

**(b) Liquid Asset**

The Bidder at the time of bid submission should have at least the amount of **USD 02 (two) million or equivalent** liquid asset or working capital or credit facilities or their combination.

**(ii) Experience and Technical Capacity of the Bidder**

The Bidder will furnish documentary evidence that it meets the following requirements:

The Bidder should have at least seven (07) years experience prior to the bid submission deadline date in supply of equipment related to Hydrological monitoring of rivers/ reservoirs.

**B. If Bidder is not a manufacturer:**

- (i) If a Bidder is not a manufacturer, but is offering the Goods on behalf of the Manufacturer under Manufacturer's Authorization Form (Section IV, Bidding Forms), the Manufacturer shall demonstrate the above qualifications A(i)(a), A(i)(b), and A(ii); AND
- (ii) the Bidder shall demonstrate that it has successfully completed supply of at least USD 06 (six) million in not more than 2 (two) contracts of similar goods within the last 07 (seven) years prior to the bid submission deadline date and each contract should include the following characteristic (a) below. For the characteristic (b) below which should also be met, it can be under the above two contracts or any other contracts that have been performed in the last 07 (seven) years

(a) Supply, installation and commissioning of sensors, data loggers, telemetry and similar equipment at a minimum of 175 Hydrological monitoring sites.

(b) Provision of Operation and Maintenance services related to Hydrological monitoring at a minimum of 175 Hydrological monitoring sites.

(iii) Further, bidder should furnish the documentary evidence from the manufacturer of the hydro-meteorological equipment to establish that the manufacturer has manufactured and supplied the quantity of the hydro-meteorological equipment of similar make and model as proposed in this bid, as per Table-1 below in any two years during the last 07 (seven) years prior to the bid submission deadline date. In case the bidder manufactures some equipment and propose to procure remaining equipment from different manufactures, this requirement should be collectively met by the bidder for the equipment manufactured by itself and by the respective manufacturers of the procured equipment.

**Table-1 Compliance for equipment manufacturer**

<b>I. No</b>	<b>Item</b>	<b>Total quantity as per schedule of requirement</b>	<b>Minimum number of required quantity manufactured in any two years during last 7 years</b>	<b>Supplier's Supply Record with date and certificate.</b>
1.	Automatic Radar Water Level Gauge (AWLG) sensor	315	200	
2.	Automatic Rain Gauge (ARG) Sensor	272	150	
3.	Air Temperature and Humidity Sensor	03	10	
4.	Wind Speed and Direction Sensor	03	10	
5.	Atmospheric Pressure Sensor	03	10	
6.	Solar Radiation Sensor	03	10	
7.	Evaporation Sensor	03	10	
8	Data loggers with 2 AI (Analogue input) channels	587	300	
9	Data loggers with 8 (Analogue input) AI channels	03	10	
10	GSM / GPRSTelemetry Modem	575	300	
11	Server	07	04	



## Section IV. Bidding Forms

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## Letter of Bid

*The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address.*

***Note: All italicized text is for use in preparing these form and shall be deleted from the final products.***

Date: [insert date (as day, month and year) of Bid Submission]

ICB No.: [insert number of bidding process]

Invitation for Bid No.: [insert identification]

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[insert complete name of Purchaser]*

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB 8)\_\_\_;
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We have not been suspended nor declared ineligible by the Purchaser based on execution of a Bid Securing Declaration in the Purchaser's country in accordance with ITB 4.6
- (d) We offer to supplying conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods: [insert a brief description of the Goods and Related Services];
- (e) The total price of our Bid, excluding any discounts offered in item (f) below is:  
  
In case of only one lot, total price of the Bid [insert the total price of the bid in words and figures, indicating the various amounts and the respective currencies];
- (f) The discounts offered and the methodology for their application are:
  - (i) The discounts offered are: [Specify in detail each discount offered.]
  - (ii) The exact method of calculations to determine the net price after application of discounts is shown below: [Specify in detail the method that shall be used to apply the discounts];
- (g) Our bid shall be valid for a period of *[specify the number of calendar days as required under ITB]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

- (h) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;
- (i) Wearer not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.2(e), other than alternative bids submitted in accordance with ITB 13;
- (j) We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by a member of the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Employer's country laws or official regulations or pursuant to a decision of the United Nations Security Council;
- (k) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB 4.5;<sup>1</sup>
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: **[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]**

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

- (m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (o) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption

Name of the Bidder\* **[insert complete name of person signing the Bid]**

<sup>1</sup>Bidder to use as appropriate

Name of the person duly authorized to sign the Bid on behalf of the Bidder\*\* **[insert complete name of person duly authorized to sign the Bid]**

Title of the person signing the Bid **[insert complete title of the person signing the Bid]**

Signature of the person named above **[insert signature of person whose name and capacity are shown above]**

Date signed **[insert date of signing]** day of **[insert month]**, **[insert year]**

\*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

\*\*: Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid Schedules.

## Bidder Information Form

*[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]*

Date: *[insert date (as day, month and year) of Bid Submission]*

ICB No.: *[insert number of bidding process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page \_\_\_\_\_ of \_\_\_\_\_ pages

1. Bidder's Name <i>[insert Bidder's legal name]</i>
2. In case of JV, legal name of each member : <i>[insert legal name of each member in JV]</i>
3. Bidder's actual or intended country of registration: <i>[insert actual or intended country of registration]</i>
4. Bidder's year of registration: <i>[insert Bidder's year of registration]</i>
5. Bidder's Address in country of registration: <i>[insert Bidder's legal address in country of registration]</i>
6. Bidder's Authorized Representative Information Name: <i>[insert Authorized Representative's name]</i> Address: <i>[insert Authorized Representative's Address]</i> Telephone/Fax numbers: <i>[insert Authorized Representative's telephone/fax numbers]</i> Email Address: <i>[insert Authorized Representative's email address]</i>
7. Attached are copies of original documents of <i>[check the box(es) of the attached original documents]</i> <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.3. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> In case of Government-owned enterprise or institution, in accordance with ITB 4.5 documents establishing: <ul style="list-style-type: none"> <li>• Legal and financial autonomy</li> <li>• Operation under commercial law</li> <li>• Establishing that the Bidder is not dependent agency of the Purchaser</li> </ul>
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

## Bidder's JV Members Information Form

*[The Bidder shall fill in this Form in accordance with the instructions indicated below. The following table shall be filled in for the Bidder and for each member of a Joint Venture].*

Date: *[insert date (as day, month and year) of Bid Submission]*

ICB No.: *[insert number of bidding process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page \_\_\_\_\_ of \_\_\_\_\_ pages

1. Bidder's Name: <i>[insert Bidder's legal name]</i>
2. Bidder's JV Member's name: <i>[insert JV's Member legal name]</i>
3. Bidder's JV Member's country of registration: <i>[insert JV's Member country of registration]</i>
4. Bidder's JV Member's year of registration: <i>[insert JV's Member year of registration]</i>
5. Bidder's JV Member's legal address in country of registration: <i>[insert JV's Member legal address in country of registration]</i>
6. Bidder's JV Member's authorized representative information Name: <i>[insert name of JV's Member authorized representative]</i> Address: <i>[insert address of JV's Member authorized representative]</i> Telephone/Fax numbers: <i>[insert telephone/fax numbers of JV's Member authorized representative]</i> Email Address: <i>[insert email address of JV's Member authorized representative]</i>
7. Attached are copies of original documents of <i>[check the box(es) of the attached original documents]</i> <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.3. <input type="checkbox"/> In case of a Government-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and absence of dependent status, in accordance with ITB 4.5.
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

## Price Schedule Forms

*[The Bidder shall fill in these Price Schedule Forms in accordance with the instructions indicated. The list of line items in column 1 of the **Price Schedules** shall coincide with the List of Goods and Related Services specified by the Purchaser in the Schedule of Requirements.]*

<b>Price Schedule: Goods Manufactured Outside the Purchaser's Country, to be Imported</b>								
(Group C bids, goods to be imported)							Date: _____ ICB No: _____	
Currencies in accordance with ITB 15							Alternative No: _____ Page N° _____ of _____	
1	2	3	4	5	6	7	8	9
Line Item N°	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price CIP Hazrat Shah Jalal International Airport in accordance with ITB 14.8(b)(i)	CIP Price per line item (Col. 5x6)	Price per line item for inland transportation and other services required in the Purchaser's country to convey the Goods to their final destination specified in BDS	Total Price per Line item (Col. 7+8)
<b>1</b>	<b>Automatic Water Level Gauge (AWLG) - Bridge/Barrage mounted Permanent Radar type RTDAS Station</b>							
1a.	Supply of Radar Sensor for Automatic Water Level Gauge station ( As per Specification)			280Nos.				

1b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)			280 Nos				
1c	Supply of GSM/GPRS Modem with SIM card for Automatic Water Level Gauge station to be installed ( As per Specification)			280 Nos				
1d	Supply of Solar Panel for Automatic Water Level Gauge station ( As per Specification)			280 Nos				
1e	Supply of Battery for Automatic Water Level Gauge station ( As per Specification)			280 Nos				
1f	Supply of Charge controller (to maintain required/stable voltage to device).			280 Nos				
3g	Supply of Portable field calibration device for AWLG station			04 Nos				
1h	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)			280 Nos				
1i	Supply of Compact platform within which all the sensor and devices such as AWLG sensor, Data logger, Modem, Solar Panel, Battery, Charge controller including enclosure are fixed/			280 Nos				



1j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles( As per Specification)			280 Nos				
1k	Supply of Safety and tools kit for maintenance and repair of AWLG station which is fixed on the top of a permanent structure like Bridge/Barrage ( As per Specification)			280 Nos				
1l	Supply of ancillary equipment required for AWLG station not listed in items 1a-1j but required for operation of system.,			280 Nos				
<b>2</b>	<b>Automatic Water Level Gauge (AWLG) –Pole mounted Radartype RTDAS Station</b>							
2a.	Supply of Automatic Water Level Gauge Sensor for pole mounted AWLG station ( As per Specification)			35 Nos				
2b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)			35 Nos				
2c	Supply of GSM/GPRS Modem with SIMcard for Automatic Water Level Gauge Station ( As per Specification)			35 Nos				
2d	Supply of Solar Panel for Automatic Water Level Gauge Station ( As per Specification)			35 Nos				

2e	Supply of Internal Battery for Automatic Water Level Gauge Station ( As per Specification)			35 Nos				
2f	Supply of Charge controller (to maintain required/stable voltage to device).			35 Nos				
2g	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)			35 Nos				
2h	Supply of poles for fixing in the ground alongwithlong boom cantilever arm for mounting AWLG sensor ( As per Specification) Type 1			16Nos				
2i	Supply of poles for fixing in the ground along with short arm for mounting AWLG sensor ( As per Specification) Type 2			12 Nos				
2j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles( As per Specification)			35 Nos				
2k	Supply of ancillary equipment required for AWLG station not listed in items 2a-2j but required for operation of system..			35 Nos				
<b>3</b>	<b>Automatic Rain Gauge (ARG) station</b>							
3a.	Supply of Automatic Rain Gauge sensor for ARG station ( As per Specification)			272Nos.				

3b	Supply of Data Logger with 2 AI channels for ARG station ( As per Specification)			272 Nos				
3c	Supply of GSM/GPRS Modem with SIM card for ARG Station ( As per Specification)			272 Nos				
3d	Supply of Solar Panel for ARG Station ( As per Specification)			272 Nos				
3e	Supply of Battery for ARG station ( As per Specification)			272 Nos				
3f	Supply of Charge controller (to maintain required/stable voltage to device).			272 Nos				
3g	Supply of NEMA 4X enclosure for Automatic Rain Gauge station to host the items 3b-3f. ( As per Specification)			272 Nos				
3h	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles( As per Specification)			272 Nos				
3i	Supply of ancillary equipment required for ARG station not listed in items 3a-3h but required for operation of system.			272 Nos				

3j	Supply of Chain-Link Fencing along with lockable gates as per technical specifications for external protection of Sensors and DCP at ARG stations ( if required)			10Nos				
3k	Supply of Portable field calibration device for ARG station			04 Nos				
<b>4</b>	<b>Automatic Weather Station (AWS) - RTDAS Station</b>							
4a.	Supply of temperature and Humidity sensor for AWS (As per specification)			03 Nos				
4b.	Supply of wind speed and direction sensor for AWS (As per specification)			03 Nos				
4c.	Supply of Automatic rain gauge sensor for AWS (As per specification)			03 Nos				
4d.	Supply of Atmospheric pressure sensor for AWS (As per specification)			03 Nos				
4e.	Supply of Solar radiation sensor for AWS (As per specification)			03 Nos				
4f	Supply of Evaporimeter sensor for AWS as per specifications			03 Nos				
4g	Supply of data logger with 8 AI channels for AWS (As per specification)			03 Nos				

4h	Supply of GSM/GPRS Modem with SIM card for AWS (As per Specification)			03 Nos				
4i	Supply of Solar Panel for AWS (As per Specification)			03 Nos				
4j	Supply of Battery for AWS (As per Specification)			03 Nos				
4k	Supply of Charge controller (to maintain required/stable voltage to device).			03 Nos				
4l	Supply of 1 m high wire fencing (3m x3m plot size) along with 1m X 1m MS Gate with locking arrangement complete in all respect including material as per drawing.			03 Nos				
4m	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles( As per Specification)			03Nos				
4n	Supply of ancillary equipment required for AWS station not listed in items 4a-4m but required for installation and operation of system..			03 Nos				
<b>5</b>	<b>Information System Requirements</b>							
5a	Supply of Server for data collection/ acquisition, parsing and decryption ( as per technical specifications).			02 Nos.				

5b	Supply of Server for time series processing and primary validation,(as per technical specifications.)			02 Nos.				
5c	Supply of Back upServer ( Primary) ( as per technical specifications).			01 Nos				
5d	Supply of Back upServer ( Secondary) (as per technical specifications)			01 Nos				
5e	Supply of Monitoring Services Server (as per technical specifications)			01 Nos				
5f	Supply of Next Generation Firewall( as per specifications)			02 Nos				
5g	Supply of Midrange Firewall ( as per specifications)			02 Nos				
5h	Supply of Core switch( as per specifications)			02 Nos.				
5i	Supply of KVM Switch with Console Monitor			01Nos.				
5j	Supply of 16 port Computer Switch			02 Nos.				
5k	Supply of Computer Rack			01Nos.				
5l	Supply of Power Extension materials for the server and related device in the data centre			01Nos.				
5m	Supply of Load Balancer with Anti D-Dos/WAF ( as per specifications)			02 Nos.				

5n	Upgradation of existing SAN Switch (Connectrix DS-6505B) from 12 active ports to 24 active ports with required license and 16 Gbps Short Wave SFP transceivers( as per specifications)			02 Nos.				
5o	Supply of storage area network (SAN) Switch for connecting servers and shared pools of storage devices and is dedicated to moving storage traffic (as per specifications)( as per specifications)			02 Nos.				
5p	Supply of SAN Storage Enclosure ( as per specifications)			02 Nos.				
5q	Supply of software for Data collection/ acquisition software,(as per technical specifications.)			02 Nos				
5r	Supply of Data Management and Time Series Data processing Software,(as per technical specifications.)			02 Nos				
5s	Supply of 2 nodes of Oracle 12c Database with Oracle RAC in database management and processing servers,(as per technical specifications.)			01 Nos.				
5t	Supply of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)			01 Nos				

5u	Supply of Security Information and Event Management (SIEM) Software ( as per specifications)			01 Nos				
5v	Supply of Field Maintenance Tracking Software( as per specifications)			01 Nos				
5w	Supply of Backup Software( as per specifications)			02 Nos				
5x	Supply of Additional 500mbps internet bandwidth			01 Nos				
Total Price								
Name of Bidder <i>[insert complete name of Bidder]</i> Signature of Bidder <i>[signature of person signing the Bid]</i> Date <i>[Insert Date]</i>								



## Price Schedule: Goods Manufactured Outside the Purchaser's Country, already Imported

				(Group C bids, goods to be imported)				Date: _____ ICB No: _____			
				Currencies in accordance with ITB 15				Alternative No: _____ Page N° _____ of _____			
1	2	3	4	5	6	7	8	9	10	11	12
Line Item N°	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price including Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i)	Custom duties and import Taxes paid per unit in accordance with ITB 14.8(c)(ii), (to be supported by documents)	Unit price net of custom duties and import taxes, in accordance with ITB 14.8 C (iii) (Col 6 minus Col 7)	Price per line item net of Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i) (Col. 5×8)	Price per line item for inland transportation and other services required in the Purchaser's country to convey the Goods to their final destination specified in BDS in accordance with ITB 14.8(c)(v)	Sales and other taxes paid or payable per item of contract is awarded in accordance with ITB 14.8 (c) (iv)	Total Price per Line item (Col. 9+10)
<b>1</b>	<b>Automatic Water Level Gauge (AWLG) - Bridge/Barrage mounted Permanent Radar type RTDAS Station</b>										
1a.	Supply of Radar Sensor for Automatic Water Level Gauge station ( As per Specification)			280Nos.							
1b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)			280 Nos							
1c	Supply of GSM/GPRS Modem with SIM card for Automatic Water Level Gauge station to be installed ( As per Specification)			280 Nos							

1d	Supply of Solar Panel for Automatic Water Level Gauge station ( As per Specification)			280 Nos							
1e	Supply of Battery for Automatic Water Level Gauge station ( As per Specification)			280 Nos							
1f	Supply of Charge controller (to maintain required/stable voltage to device).			280 Nos							
1g	Supply of Portable field calibration device for AWLG station			04 Nos							
1h	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)			280 Nos							
1i	Supply of Compact platform within which all the sensor and devices such as AWLG sensor, Data logger, Modem, Solar Panel, Battery, Charge controller including enclosure are fixed			280 Nos							
1j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)			280 Nos							
1k	Supply of Safety and Tools kit for maintenance and repair of AWLG station which is fixed on the top of a permanent structure like Bridge/Barrage ( As per Specification)			280 Nos							

11	Supply of ancillary equipment required for AWLG station not listed in items 1a-1j but required for operation of system.			280 Nos							
<b>2</b>	<b>Automatic Water Level Gauge (AWLG) –Pole mounted Radartype RTDAS Station</b>										
2a.	Supply of Automatic Water Level Gauge Sensor for pole mounted AWLG station ( As per Specification)			35 Nos							
2b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)			35 Nos							
2c	Supply of GSM/GPRS Modem with SIMcard for Automatic Water Level Gauge Station ( As per Specification)			35 Nos							
2d	Supply of Solar Panel for Automatic Water Level Gauge Station ( As per Specification)			35 Nos							
2e	Supply of Internal Battery for Automatic Water Level Gauge Station ( As per Specification)			35 Nos							
2f	Supply of Charge controller (to maintain required/stable voltage to device).			35 Nos							
2g	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)			35 Nos							

2h	Supply of poles for fixing in the ground alongwith long boom cantilever arm for mounting AWLG sensor ( As per Specification) Type 1			16Nos							
2i	Supply of poles for fixing in the ground along with short arm for mounting AWLG sensor ( As per Specification) Type 2			12 Nos							
2j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)			35 Nos							
2k	Supply of ancillary equipment required for AWLG station not listed in items 2a-2j but required for operation of system.			35 Nos							
<b>3</b>	<b>Automatic Rain Gauge (ARG) station</b>										
3a.	Supply of Automatic Rain Gauge sensor for ARG station ( As per Specification)			272Nos							
3b	Supply of Data Logger with 2 AI channels for ARG station ( As per Specification)			272 Nos							
3c	Supply of GSM/GPRS Modem with SIM card for ARG Station ( As per Specification)			272 Nos							
3d	Supply of Solar Panel for ARG Station ( As per Specification)			272 Nos							
3e	Supply of Battery for ARG station ( As per Specification)			272 Nos							

3f	Supply of Charge controller (to maintain required/stable voltage to device).			272 Nos							
3g	Supply of NEMA 4X enclosure for Automatic Rain Gauge station to host the items 3b-3f. ( As per Specification)			272 Nos							
3h	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)			272 Nos							
3i	Supply of ancillary equipment required for ARG station not listed in items 3a-3h but required for operation of system.			272 Nos							
3j	Supply of Chain-Link Fencing along with lockable gates as per technical specifications for external protection of Sensors and DCP at ARG stations ( if required)			10 Nos							
3k	Supply of Portable field calibration device for ARG station			04 Nos							
<b>4</b>	<b>Automatic Weather Station (AWS) - RTDAS Station</b>										
4a.	Supply of temperature and Humidity sensor for AWS (As per specification)			03 Nos							
4b.	Supply of wind speed and direction sensor for AWS (As per specification)			03 Nos							
4c.	Supply of Automatic rain gauge sensor for AWS (As per specification)			03 Nos							

4d.	Supply of Atmospheric pressure sensor for AWS (As per specification)			03 Nos							
4e.	Supply of Solar radiation sensor for AWS (As per specification)			03 Nos							
4f	Supply of Evaporimeter sensor for AWS as per specifications			03 Nos							
4g	Supply of data logger with 8 AI channels for AWS (As per specification)			03 Nos							
4h	Supply of GSM/GPRS Modem with SIM card for AWS (As per Specification)			03 Nos							
4i	Supply of Solar Panel for AWS (As per Specification)			03 Nos							
4j	Supply of Battery for AWS ( As per Specification)			03 Nos							
4k	Supply of Charge controller (to maintain required/stable voltage to device).			03 Nos							
4l	Supply of 1 m high wire fencing (3m x3m plot size) along with 1m X 1m MS Gate with locking arrangement complete in all respect including material as per drawing.			03 Nos							
4m	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)			03 Nos							

4n	Supply of ancillary equipment required for AWS station not listed in items 4a-4m but required for installation and operation of system.			03 Nos							
<b>5 Information System Requirements</b>											
5a	Supply of Server for data collection/ acquisition,parsing and decryption ( as per technical specifications).			02 Nos							
5b	Supply of Server for time series processing and primary validation,(as per technical specifications.)			02 Nos							
5c	Supply of Back upServer ( Primary) ( as per technical specifications).			01 Nos							
5d	Supply of Back upServer ( Secondary) (as per technical specifications)			01 Nos							
5e	Supply of Monitoring Services Server (as per technical specifications)			01Nos							
5f	Supply of Next Generation Firewall( as per specifications)			02 Nos							
5g	Supply of Midrange Firewall ( as per specifications)			02 Nos							
5h	Supply of Core switch( as per specifications)			02 Nos.							
5i	Supply of KVM Switch with Console Monitor			01Nos.							

5j	Supply of 16 port Computer Switch			02 Nos.							
5k	Supply of Computer Rack			01Nos.							
5l	Supply of Power Extension materials for the server and related device in the data centre			01Nos.							
5m	Supply of Load Balancer with Anti D-Dos/WAF ( as per specifications)			02 Nos.							
5n	Upgradation of exsisting SAN Switch (Connectrix DS-6505B) from 12 active ports to 24 active ports with required license and 16 Gbps Short Wave SFP transceivers( as per specifications)			02 Nos.							
5o	Supply of storage area network (SAN) Switch for connecting servers and shared pools of storage devices and is dedicated to moving storage traffic (as per specifications)( as per specifications)			02 Nos.							
5p	Supply of SAN Storage Enclosure ( as per specifications)			02 Nos.							
5q	Supply of software for Data collection/ acquisitionsoftwae,(as per technical specifications.)			02 Nos							
5r	Supply of Data Management and Time Series Data Processing Software,(as per technical specifications.)			02 Nos							



5s	Supply of 2 nodes of Oracle 12c Database with Oracle RAC in database management and processing servers,(as per technical specifications.)			01 Nos.								
5t	Supply of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)			01 Nos								
5u	Supply of Security Information and Event Management (SIEM) Software ( as per specifications)			01 Nos								
5v	Supply of Field Maintenance Tracking Software( as per specifications)			01 Nos								
5w	Supply of Backup Software( as per specifications)			02 Nos								
5x	Supply of Additional 500mbps internet bandwidth			01 Nos								
				Total Price								
Name of Bidder <i>[insert complete name of Bidder]</i> Signature of Bidder <i>[signature of person signing the Bid]</i> Date <i>[Insert Date]</i>												

*\* [For previously imported Goods, the quoted price shall be distinguishable from the original import value of these Goods declared to customs and shall include any rebate or mark-up of the local agent or representative and all local costs except import duties and taxes, which have been and/or have to be paid by the Purchaser. For clarity the bidders are asked to quote the price including import duties, and additionally to provide the import duties and the price net of import duties which is the difference of those values.]*

## Price Schedule: Goods Manufactured in the Purchaser's Country

Purcher's Country  -----			(Group A and B bids) Currencies in accordance with ITB 15				Date: _____ ICB No: _____ Alternative No: _____ Page N° _____ of _____		
1	2	3	4	5	6	7	8	9	10
Line Item N°	Description of Goods	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price EXW	Total EXW Price per line item (Col. 4x5)	Price per line item for inland transportation and other services required in the Purchaser's country to convey the Goods to their final destination	Cost of local labor, raw materials and components from with origin in the Purchaser's country( % of Col 5)	Sales and other taxes payable per line item if Contract is awarded (in accordance with ITB 14.8(a)(ii))	Total Price per Line item (Col.6+7)
<b>1</b>	<b>Automatic Water Level Gauge (AWLG) - Bridge/Barrage mounted Permanent Radar type RTDAS Station</b>								
1a.	Supply of Radar Sensor for Automatic Water Level Gauge station ( As per Specification)		280Nos.						
1b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)		280 Nos						

1c	Supply of GSM/GPRS Modem with SIM card for Automatic Water Level Gauge station to be installed ( As per Specification)		280 Nos						
1d	Supply of Solar Panel for Automatic Water Level Gauge station ( As per Specification)		280 Nos						
1e	Supply of Battery for Automatic Water Level Gauge station ( As per Specification)		280 Nos						
1f	Supply of Charge controller (to maintain required/stable voltage to device).		280 Nos						
1g	Supply of Portable field calibration device for AWLG station		04 Nos						
1h	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)		280 Nos						

[illegible]

2a.	Supply of Automatic Water Level Gauge Sensor for pole mounted AWLG station ( As per Specification)		35 Nos						
2b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)		35Nos						
2c	Supply of GSM/GPRS Modem with SIMcard for Automatic Water Level Gauge Station ( As per Specification)		35 Nos						
2d	Supply of Solar Panel for Automatic Water Level Gauge Station ( As per Specification)		35 Nos						
2e	Supply of Internal Battery for Automatic Water Level Gauge Station ( As per Specification)		35 Nos						
2f	Supply of Charge controller (to maintain required/stable voltage to device).		35 Nos						

[illegible]

3a.	Supply of Automatic Rain Gauge sensor for ARG station ( As per Specification)		272Nos						
3b	Supply of Data Logger with 2 AI channels for ARG station ( As per Specification)		272 Nos						
3c	Supply of GSM/GPRS Modem with SIM card for ARG Station ( As per Specification)		272 Nos						
3d	Supply of Solar Panel for ARG Station ( As per Specification)		272 Nos						
3e	Supply of Battery for ARG station ( As per Specification)		272 Nos						
3f	Supply of Charge controller (to maintain required/stable voltage to device).		272 Nos						
3g	Supply of NEMA 4X enclosure for Automatic Rain Gauge station to host the items 3b-3f. ( As per Specification)		272 Nos						

3h	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)		272 Nos						
3i	Supply of ancillary equipment required for ARG station not listed in items 3a-3h but required for operation of system..		272 Nos						
3j	Supply of Chain-Link Fencing along with lockable gates as per technical specifications for external protection of Sensors and DCP at ARG stations ( if required)		10 Nos						
3k	Supply of Portable field calibration device for ARG station		04 Nos						
<b>4</b>	<b>Automatic Weather Station (AWS) - RTDAS Station</b>								
4a.	Supply of temperature and Humidity sensor for AWS (As per specification)		03 Nos						



4b.	Supply of wind speed and direction sensor for AWS (As per specification)		03 Nos						
4c.	Supply of Automatic rain gauge sensor for AWS (As per specification)		03 Nos						
4d.	Supply of Atmospheric pressure sensor for AWS (As per specification)		03 Nos						
4e.	Supply of Solar radiation sensor for AWS (As per specification)		03 Nos						
4f	Supply of Evaporimeter sensor for AWS (As per specification)		03 Nos						
4g	Supply of data logger with 8 AI channels for AWS (As per specification)		03 Nos						
4h	Supply of GSM/GPRS Modem with SIM card for AWS (As per Specification)		03 Nos						
4i	Supply of Solar Panel for AWS (As per Specification)		03 Nos						

[illegible]

5a	Supply of Server for data collection/ acquisition,parsing and decryption ( as per technical specifications).		02 Nos						
5b	Supply of Server for time series processing and primary validation,(as per technical specifications.)		02 Nos						
5c	Supply of Back upServer ( Primary) ( as per technical specifications).		01 Nos						
5d	Supply of Back upServer ( Secondary) (as per technical specifications)		01 Nos						
5e	Supply of Monitoring Services Server (as per technical specifications)		01 Nos						
5f	Supply of Next Generation Firewall( as per specifications)		02 Nos						
5g	Supply of Midrange Firewall ( as per specifications)		02 Nos						
5h	Supply of Core switch( as per specifications)		02 Nos						

5i	Supply of KVM Switch with Console Monitor		01Nos						
5j	Supply of 16 port Computer Switch		02 Nos						
5k	Supply of Computer Rack		01Nos						
5l	Supply of Power Extension materials for the server and related device in the data centre		01Nos						
5m	Supply of Load Balancer with Anti D-Dos/WAF ( as per specifications)		02 Nos						
5n	Upgradation of exsisting SAN Switch (Connectrix DS-6505B) from 12 active ports to 24 active ports with required license and 16 Gbps Short Wave SFP transceivers( as per specifications)		02Nos						

5o	Supply of storage area network (SAN) Switch for connecting servers and shared pools of storage devices and is dedicated to moving storage traffic (as per specifications)( as per specifications)		02 Nos						
5p	Supply of SAN Storage Enclosure ( as per specifications)		02 Nos						
5q	Supply of software for Data collection/ acquisition software,(as per technical specifications.)		02 Nos						
5r	Supply of Data Management and Time Series Data Processing Software,(as per technical specifications.)		02 Nos						
5s	Supply of 2 nodes of Oracle 12c Database with Oracle RAC in database management and processing servers,(as per technical specifications.)		01 Nos						

5t	Supply of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)		01 Nos						
5u	Supply of Security Information and Event Management (SIEM) Software ( as per specifications)		01 Nos						
5v	Supply of Field Maintenance Tracking Software( as per specifications)		01 Nos						
5w	Supply of Backup Software( as per specifications)		02 Nos						
5x	Supply of Additional 500mbps internet bandwidth		01 Nos						
Total Price									
Name of Bidder <i>[insert complete name of Bidder]</i> Signature of Bidder <i>[signature of person signing the Bid]</i> Date <i>[Insert Date]</i>									

<b>Price and Completion Schedule: Related Services Part 1 of 2 Parts.</b>						
		Currencies in accordance with ITB 15			Date: _____ ICB No: _____ Alternative No: _____ Page N° _____ of _____	
1	2	3	4	5	6	7
Service N°	Description of Services (excludes inland transportation and other services required in the Purchaser's country to convey the goods to their final destination)	Country of Origin	Delivery Date at place of Final destination	Quantity and Physical unit	Unit price	Total Price per Service (Col. 5*6)
1.	Installation, commissioning & making functional all the Equipment related to Automatic Water Level Gauge (AWLG) (Bridge/Barrage mounted) station			280AWLGsensors (Bridge/barrage mounted) Nos		
2	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations in the existing poles			7AWLG(polemounted) sensors Nos		
3	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations including erections of poles with long arm cantilever ( Type 1) at site ( as per specifications)			16AWLG (pole mounted Type 1) sensors Nos		

4	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations including erections of poles with short arm cantilever ( Type 2) at site ( as per specifications)			12 AWLG (pole mounted Type 2) sensors Nos		
5	Installation, commissioning & making functional all the Equipment related to Automatic Rain Gauge Station			272ARG.Nos		
6	Installation, commissioning & making functional all the Equipment related to Automatic Weather station			03 AWS Nos.		
7	Installation of Computer Servers, Associated Peripherals (Install computer servers in Bidder supplied rack)			1 LS		
8	Installation, testing and commissioning of Next Generation Firewall			02Nos		
9	Installation, testing and commissioning of Midgrade Firewall			02 Nos		
10	Installation, testing and commissioning of Load Balancer with Anti D-Dos/WAF			02 Nos		
11	Upgradation,Installation, testing and commissioning of Storage Area Network (SAN) Switch, San Switches and SAN Storage Enclosure			1 LS		



12	Installation and Configuration of data acquisition Software (as per description in technical section) on respective Computer Servers			02 Nos		
13	Installation and Configuration of data management and time series data processing software in the respective (as per description in technical section) on respective Computer Servers			02 Nos		
14	Installation and Configuration of Oracle Database Management Software (12c) (as per description in technical section) on respective Computer Servers			02 Nos		
15	Installation and Configuration of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)			01 Nos		
16	Installation and Configuration Security Information and Event Management (SIEM) Software (as per description in technical section) on respective Computer Servers			01 Nos		

17	Installation and Configuration of field maintenance and tracing software in the respective (as per description in technical section)			01 Nos		
18	Installation and Configuration of Backup software ( as per specifications)			02 Nos		
19	Provide Training after completion of the implementation for operation and system support of all the software and hardware ( as per specifications 12.Training and Documentation : IT Rerated Training)			01 Lot		
20	Services of one Full time Systems Supervising Engineer dedicated to the project at Data Centre in Dhaka during one year warranty period (Perform supervision of all measuring divisions of BWDB and coordination with Project & Organizations related to the smooth operations of the total system, monthly overall reporting to the project). The Systems Supervising Engineer shall be supported with a full time cross contry vehicle, Laptop Computer, Electronic test equipment, etc.			12 Man-months		

21	Services of two Full time service engineers dedicated to the project at Data centre in Dhaka during one year warranty period (Perform all software and hardware operation and maintenance tasks, monthly reports)			24Man-months		
22	Services of eight Full time Hydro-met Technicians dedicated to the project at 4 measuring divisions of BWDB consisting a team of 2 persons per division during one year Warranty period (Perform operation and maintenance all equipment, monthly reports with coordination of the persons stationed in Dhaka). The Hydro-met Technicians shall be supported with 04 (four) nos. full time Double-Cabin Pick-Up, Laptop Computer, Electronic test equipment, etc.			96 Man-months		

23	<p>Technology transfer and trainings of BWDB Personnel</p> <p>One Training in Dhaka Head quarter of BWDB(five days; twenty personnel), fourTrainings in each Divisionsof BWDB (duration of each training course- five days; participants of each training course -ten personnel ) during installation period and ;</p> <p>One Training in Dhaka Head quarter of BWDB (five days; twenty personnel), four Trainings in each Divisions of BWDB (duration of each training course- five days; participants of each training course -ten personnel) during one-year warranty period</p>			10 Trainings (5 during installation phase and 5 during Warranty period)		
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24	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period for 280 AWLG (bridge mounted), hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.			280AWLG (bridge mounted), Nos.		
25	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period 34AWLG (Pole mounted Radar), hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.			35AWLG (Pole mounted Radar) Nos.		

26	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period 272 ARG nos. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.			272 ARG nos.		
27	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period for 03 AWS nos. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.			03 AWS Nos		

28	Operation, Trouble-shooting and Maintenance Requirements of all the software and hardware installation During 1 (one) Year Comprehensive Warranty Period. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.			1 Nos		
				Total Bid Price		
Name of Bidder <i>[insert complete name of Bidder]</i> Signature of Bidder <i>[signature of person signing the Bid]</i> Date <i>[insert date]</i>						

## Price and Completion Schedule: – Related Services Part 2 (Annual Operation & Maintenance Services) of 2 Parts.

(to be used for evaluation purpose and establishing Annual Operation & Maintenance Services)

						Date: _____	
						ICB No: _____	
						Alternative No: _____	
						Page N° _____ of _____	
1	2	3	4	5	6	7	8
Service N°	Description of Services (excludes inland transportation and other services required in the Purchaser's country to convey the goods to their final destination)	Country of Origin	Delivery Date at place of Final destination	Quantity	Physical unit	Unit price in BDT (inclusive of AIT & VAT)	Total Price per Service in BDT (Col. 5*7)
		<i>[insert country of origin of the Services]</i>	<i>[insert delivery date at place of final destination per Service]</i>			<i>[insert unit price per item]</i>	<i>[insert total price per item]</i>
1.	Operations, Trouble-shooting & Maintenance during <u>Ist year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u> for 280 AWLG (bridge/barrage mounted), 35AWLG (Pole mounted Radar), 272 ARG and 03 AWS nos. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM & GPRS telemetry for Data transmission shall be borne by the Bidder.			Year 1(one) after expiry of Warranty period of 01 (one) year.	Lump-sum		



2.	Operation, Trouble-shooting & Maintenance during <u>2<sup>nd</sup> year</u> of <u>Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u> for 280 AWLG (bridge mounted), 35 AWLG (Pole mounted Radar), 272 ARG and 03 AWS. Hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM & GPRS telemetry for Data transmission shall be borne by the Bidder..			Year 2(two) after expiry of Warranty period of 01 (one) year.	Lump-sum		
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3.	Operation, Trouble-shooting & Maintenance during <b><u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280 AWLG (bridge mounted), 35AWLG (Pole mounted Radar), 272 ARG and 03 AWS. Hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM & GPRS telemetry for Data transmission shall be borne by the Bidder.			Year 3(three) after expiry of Warranty period of 01 (one) year.	Lump-sum		
4	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <b><u>Ist year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b>			Year 1(one) after expiry of Warranty period of 01 (one) year.			
5	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <b><u>2<sup>nd</sup> year of Comprehensive Annual Maintenance Services period after completion of 01 (one) year Warranty period</u></b>			Year 2(two) after expiry of Warranty period of 01 (one) year.			

6	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <b><u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b>			Year 3(three) after expiry of Warranty period of 01 (one) year.			
7	Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <b><u>First year</u></b> of Annual Operation & Maintenance Services period after one year Warranty period One Training in Dhaka Head quarter of BWDB (five days; twenty personnel) Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings)			3 training in Year 1(one) of Annual Operation & Maintenance Services period after expiry of Warranty period of 01 (one) year.			

8	<p>Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <b><u>Second year</u></b> of Annual Operation &amp; Maintenance Services period after one-year Warranty period.</p> <p>One Training in Dhaka Head quarter of BWDB (five days; twenty personnel)</p> <p>Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings).</p>			<p>3 training in Year 2 (Two) of Annual Operation &amp; Maintenance Services period after expiry of Warranty period of 01 (one) year.</p>			
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9	<p>Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <b><u>Third year</u></b> of Annual Operations &amp; Maintenance Services period after one-year Warranty period</p> <p>One Training in Dhaka Head quarter of BWDB (five days; twenty personnel)</p> <p>Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings)</p>			<p>3 training in Year 3 (Three) of Annual Operation &amp; Maintenance Services period after expiry of Warranty period of 01 (one) year</p>			
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10	Services of one Full time Systems Supervising Engineer dedicated to the project at Data Centre in Dhaka during three years Annual Operation & Maintenance period with a full time cross country vehicle, laptop, electronic testing equipment (Perform supervision of all measuring divisions of BWDB and coordination with Project & Organizations related to the smooth operations of the total system, monthly overall reporting to the project).			36	Manmonths		
11	Services of two Full time Computer System & one full time Software Specialist dedicated to the project at Data centre in Dhaka during three year Annual Operation & Maintenance Services period (Perform all software and hardware operation and maintenance tasks, monthly reports)			72	Manmonths		
12	Services of eight Full time Hydro-met Technicians dedicated to the project at 4 measuring divisions of BWDB consisting a team of 2 persons per division during three year Annual Operation & Maintenance period with eight (08) nos. full time double-cabin pick-up, laptops, electronic testing equipment (Perform operation and maintenance all equipment , monthly reports with coordination of the persons stationed in Dhaka)			288	Manmonths		
Total Annual Operation and Maintenance Agreement Price							
Name of Bidder <i>[insert complete name of Bidder]</i> Signature of Bidder <i>[signature of person signing the Bid]</i> Date <i>[insert date]</i>							

## Form of Bid Security

### (Bank Guarantee)

*[The bank shall fill in this Bank Guarantee Form in accordance with the instructions indicated.]*

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[Purchaser to insert its name and address]*

**IFB No.:** *[Purchaser to insert reference number for the Invitation for Bids]*

**Alternative No.:** *[Insert identification No if this is a Bid for an alternative]*

**Date:** *[Insert date of issue]*

**BID GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that \_\_\_\_\_ *[insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its bid (hereinafter called "the Bid") for the execution of \_\_\_\_\_ under Invitation for Bids No. \_\_\_\_\_ ("the IFB").

Furthermore, we understand that, according to the Beneficiary's conditions, bids must be supported by a bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of \_\_\_\_\_ (\_\_\_\_\_) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

- (a) has withdrawn its Bid during the period of bid validity set forth in the Applicant's Letter of Bid ("the Bid Validity Period"), or any extension thereto provided by the Applicant; or
- (b) having been notified of the acceptance of its Bid by the Beneficiary during the Bid Validity Period or any extension thereto provided by the Applicant, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful bidder, upon our receipt of copies of the contract agreement signed by the Applicant and the performance security issued to the Beneficiary in relation to such contract agreement; or (b) if the Applicant is not the successful bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the bidding process; or (ii) twenty-eight days after the end of the Bid Validity Period.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

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*[Signature(s)]*

***Note: All italicized text is for use in preparing this form and shall be deleted from the final product.***

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## Form of Bid Security (Bid Bond)- Not Applicable

*[The Surety shall fill in this Bid Bond Form in accordance with the instructions indicated.]*

BOND NO. \_\_\_\_\_

BY THIS BOND *[name of Bidder]* as Principal (hereinafter called “the Principal”), and *[name, legal title, and address of surety]*, **authorized to transact business in** *[name of country of Purchaser]*, as Surety (hereinafter called “the Surety”), are held and firmly bound unto *[name of Purchaser]* as Oblige (hereinafter called “the Purchaser”) in the sum of *[amount of Bond]*<sup>2</sup>*[amount in words]*, for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted or will submit a written Bid to the Purchaser dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_, for the supply of *[name of Contract]* (hereinafter called the “Bid”).

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

- (a) \_\_\_\_\_ has withdrawn its Bid during the period of bid validity set forth in the Principal’s Letter of Bid (“the Bid Validity Period”), or any extension thereto provided by the Principal; or
- (b) \_\_\_\_\_ having been notified of the acceptance of its Bid by the Purchaser during the Bid Validity Period or any extension thereto provided by the Principal; (i) failed to execute the contract agreement; or (ii) has failed to furnish the Performance Security, in accordance with the Instructions to Bidders (“ITB”) of the Purchaser’s bidding document.

then the Surety undertakes to immediately pay to the Purchaser up to the above amount upon receipt of the Purchaser’s first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiration of the Bid Validity Period set forth in the Principal’s Letter of Bid or any extension thereto provided by the Principal.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this \_\_\_\_ day of \_\_\_\_\_ 20\_\_.

Principal: \_\_\_\_\_ Surety: \_\_\_\_\_  
Corporate Seal (where appropriate)

\_\_\_\_\_  
(Signature)  
(Printed name and title)

\_\_\_\_\_  
(Signature)  
(Printed name and title)

<sup>2</sup> The amount of the Bond shall be denominated in the currency of the Purchaser’s country or the equivalent amount in a freely convertible currency.

## Form of Bid-Securing Declaration- Not Applicable

*[The Bidder shall fill in this Form in accordance with the instructions indicated.]*

Date: *[date (as day, month and year)]*

Bid No.: *[number of bidding process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[complete name of Purchaser]*

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the Purchaser for the period of time of *[number of months or years]* starting on *[date]*, if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or
- (b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract; or (ii) fail or refuse to furnish the Performance Security, if required, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Name of the Bidder\* \_\_\_\_\_

Name of the person duly authorized to sign the Bid on behalf of the Bidder\*\* \_\_\_\_\_

Title of the person signing the Bid \_\_\_\_\_

Signature of the person named above \_\_\_\_\_

Date signed \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

\*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

\*\* : Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid

*[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the bid.]*

## Manufacturer's Authorization

*[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its bid, if so indicated in the **BDS**.]*

Date: *[insert date (as day, month and year) of Bid Submission]*

ICB No.: *[insert number of bidding process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[insert complete name of Purchaser]*

### WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ *[insert date of signing]*

## Manufacturer's/Distributor's Authorization for IT Equipment

*[The Bidder shall require the Manufacturer/ Distributor to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its bid, if so indicated in the **BDS**.*

Date: *[insert date (as day, month and year) of Bid Submission]*  
ICB No.: *[insert number of bidding process]*

To: *[insert complete name of Purchaser]*

### WHEREAS

We *[insert complete name of Manufacturer/Distributor]*, who are official manufacturers/  
Distributor of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured/ Distributed by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer Distributor /]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer/Distributor]*

Title: *[insert title]*

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ *[insert date of signing]*

## Section V. Eligible Countries

### **Eligibility for the Provision of Goods, Works and Non Consulting Services in Bank-Financed Procurement**

In reference to ITB 4.7 and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7(a) and 5.1: **Israel**

Under ITB 4.7(b) and 5.1: **None**

## Section VI. Bank Policy - Corrupt and Fraudulent Practices

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

### “Fraud and Corruption:

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>3</sup> In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
  - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>4</sup>
  - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>5</sup>
  - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>6</sup>
  - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>7</sup>
  - (v) "obstructive practice" is:
    - (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in

<sup>3</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>4</sup> For the purpose of this sub-paragraph, “*another party*” refers to a public official acting in relation to the procurement process or contract execution. In this context, “*public official*” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>5</sup> For the purpose of this sub-paragraph, “*party*” refers to a public official; the terms “*benefit*” and “*obligation*” relate to the procurement process or contract execution; and the “*act or omission*” is intended to influence the procurement process or contract execution.

<sup>6</sup> For the purpose of this sub-paragraph, “*parties*” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

<sup>7</sup> For the purpose of this sub-paragraph, “*party*” refers to a participant in the procurement process or contract execution.

order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

- (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,<sup>8</sup> including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>9</sup>;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

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<sup>8</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

<sup>9</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

## **PART 2 – Supply Requirements**



## **Section VII. Schedule of Requirements**

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## 1. List of Goods and Delivery Schedule

	List of Goods and Delivery Schedule					
	Description of Goods	Quantit y	Physical unit	Final (Site) Destination as specified in BDS	Delivery (as per Incoterms) Date	
					Delivery Date	Bidder’s offered Delivery date [to be provided by the bidder]
1.	Automatic Water Level Gauge (AWLG) - Bridge/Barrage mounted Permanent Radar type RTDAS Station					
1a.	Supply of Radar Sensor for Automatic Water Level Gauge station ( As per Specification)	280	Number.	At respective Locations as decided by engineer in- charge/as per list of locationsprovided in Annexure A	180 days from date of signing of contract	
1b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)	280	Number	At respective Locations as decided by engineer in- charge/as per list of locationsprovided in Annexure A	180 days from date of signing of contract	
1c	Supply of GSM/GPRS Modem with SIM card for Automatic Water Level Gauge station to be installed ( As per Specification)	280	Number	At respective Locations as decided by engineer in- charge/as per list of locationsprovided in Annexure A	180 days from date of signing of contract	
1d	Supply of Solar Panel for Automatic Water Level Gauge station ( As per Specification)	280	Number	At respective Locations as decided by engineer in- charge/as per list of locationsprovided in Annexure A	180 days from date of signing of contract	
1e	Supply of Battery for Automatic Water Level Gauge station ( As per Specification)	280	Number	At respective Locations as decided by engineer in- charge/as per list of locationsprovided in	180 days from date of signing of contract	

				<i>Annexure A</i>		
1f	Supply of Charge controller (to maintain required/stable voltage to device).	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1g	Supply of Portable field calibration device for AWLG station	04	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1h	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station (As per Specification).	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1i	Supply of Compact platform within which all the sensor and devices such as AWLG sensor, Data logger, Modem, Solar Panel, Battery, Charge controller including enclosure are fixed	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1k	Supply of Safety and Tools kit for maintenance and repair of AWLG station which is fixed on the top of a permanent structure like Bridge/Barrage ( As per Specification)	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
1l	Supply of ancillary equipment required for AWLG station not listed in items 1a-1j but required for operation of the system.	280	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
<b>2.</b>	<b>Automatic Water Level Gauge (AWLG) –Pole mounted Radar type RTDAS Station</b>					
2a.	Supply of Automatic Water Level Gauge Sensor for pole mounted AWLG station ( As per Specification)	34	Number.	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in</i>	<i>180 days from date of signing of contract</i>	

				<i>Annexure A</i>		
2b	Supply of Data Logger with 2 AI channels for Automatic Water Level Gauge station ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2c	Supply of GSM/GPRS Modem with SIMcard for Automatic Water Level Gauge Station ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2d	Supply of Solar Panel for Automatic Water Level Gauge Station ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2e	Supply of Internal Battery for Automatic Water Level Gauge Station ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2f	Supply of Charge controller (to maintain required/stable voltage to device).	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2g	Supply of NEMA 4X enclosure for Automatic Water Level Gauge station ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2h	Supply of poles for fixing in the ground alongwith long boom cantilever arm for mounting AWLG sensor ( As per Specification) Type 1	16	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	

2i	Supply of poles for fixing in the ground along with short arm for mounting AWLG sensor ( As per Specification) Type 2	12	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2j	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)	34	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
2k	Supply of ancillary equipment required for AWLG station not listed in items 2a-2j but required for operation of system.	34	Number		<i>180 days from date of signing of contract</i>	
<b>3.</b>	<b>Automatic Rain Gauge (ARG) RTDAS Station</b>					
3a.	Supply of Automatic Rain Gauge sensor for ARG station ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3b	Supply of Data Logger with 2 AI channels for ARG station ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3c	Supply of GSM/GPRS Modem with SIM card for ARG Station ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3d	Supply of Solar Panel for ARG Station ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3e	Supply of Battery for ARG station ( As per Specification)	272	Number	<i>At respective Locations as</i>	<i>180 days from date of signing</i>	

				<i>decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>of contract</i>	
3f	Supply of Charge controller (to maintain required/stable voltage to device).	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3g	Supply of NEMA 4X enclosure for Automatic Rain Gauge station to host the items 1b-1f. ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3h	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3h	Supply of ancillary equipment required for ARG station not listed in items 3a-3h but required for operation of system.	272	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3i	Supply of Chain-Link Fencing along with lockable gates as per technical specifications for external protection of Sensors and DCP at ARG stations ( if required)	10	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
3k	Supply of Portable field calibration device for ARG station	04	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
<b>4</b>	<b>Automatic Weather Station (AWS) - RTDAS Station</b>					
4a.	Supply of temperature and Humidity sensor for AWS (As per specification)	03	Number Set	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4b.	Supply of wind speed and direction sensor for AWS (As	03	Number	<i>At respective Locations as</i>	<i>180 days from date of signing</i>	

	per specification)			<i>decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>of contract</i>	
4c.	Supply of Automatic rain gauge sensor for AWS (As per specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4d.	Supply of Atmospheric pressure sensor for AWS (As per specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4e.	Supply of Solar radiation sensor for AWS (As per specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4f.	Supply of evaporimeter sensor for AWS (As per specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4g	Supply of data logger with 8 AI channels for AWS (As per specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4h	Supply of GSM/GPRS Modem with SIM card for AWS (As per Specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4i	Supply of Solar Panel for AWS (As per Specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4j	Supply of Battery for AWS ( As per Specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in</i>	<i>180 days from date of signing of contract</i>	

				<i>Annexure A</i>		
4k	Supply of Charge controller (to maintain required/stable voltage to device).	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4l	Supply of 1 m high wire fencing (3m x3m plot size) along with 1m X 1m MS Gate with locking arrangement complete in all respect including material as per drawing.	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4m	Supply of lightning Arrester including earthing, surge protector, cables, mounting poles ( As per Specification)	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
4n	Supply of ancillary equipment required for AWS station not listed in items 4a-4m but required for installation and operation of system.	03	Number	<i>At respective Locations as decided by engineer in-charge/as per list of locations provided in Annexure A</i>	<i>180 days from date of signing of contract</i>	
<b>5</b>	<b>Information System Requirement</b>					
5a	Supply of Server for data collection/ acquisition, parsing and decryption ( as per technical specifications).	02	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5b	Supply of Server for time series processing and primary validation, (as per technical specifications.)	02	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5c	Supply of Back up Server ( Primary) ( as per technical specifications).	01		<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5d	Supply of Back up Server ( Secondary) (as per technical specifications)	01	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5e	Supply of Monitoring Services Server (as per technical specifications)	01	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5f	Supply of Next Generation Firewall( as per specifications)	02	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5g	Supply of Midrange Firewall ( as per specifications)	02	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	



5h	Supply of Core switch( as per specifications)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5i	Supply of KVM Switch with Console Monitor	01	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5j	Supply of 16 port Computer Switch	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5k	Supply of Computer Rack	01	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5l	Supply of Power Extension materials for the server and related device in the data centre	01	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5m	Supply of Load Balancer with Anti D-Dos/WAF ( as per specifications)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5n	Upgradation of exsisting SAN Switch (Connectrix DS-6505B) from 12 active ports to 24 active ports with required license and 16 Gbps Short Wave SFP transceivers( as per specifications)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5o	Supply of storage area network (SAN) Switch for connecting servers and shared pools of storage devices and is dedicated to moving storage traffic (as per specifications)( as per specifications)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5p	Supply of SAN Storage Enclosure ( as per specifications)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5q	Supply of software for Data collection/ acquisition software,(as per technical specifications.)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5r	Supply of Data Management and Time Series data processing Software,(as per technical specifications.)	02	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5s	Supply of 2 nodes of Oracle 12c Database with Oracle RAC in database management and processing servers,(as per technical specifications.)	01	Number	At New Data Center Dhaka	180 days from date of signing of contract	
5t	Supply of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)	01	Number	At New Data Center Dhaka	180 days from date of signing of contract	

5u	Supply of Security Information and Event Management (SIEM) Software ( as per specifications)	01	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5v	Supply of Field Maintenance Tracking Software( as per specifications)	01	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5w	Supply of Backup Software( as per specifications)	02	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	
5x	Supply of Additional 500mbps internet bandwidth	01	Number	<i>At New Data Center Dhaka</i>	<i>180 days from date of signing of contract</i>	

## 2. List of Related Services Part-1 and Completion Schedule

Service	Description of Service	Quantity <sup>1</sup>	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
	<b>Installation of the systems including civil works which also includes Performance and supervision of the on-site assembly and/or start-up of the supplied Goods</b>				
1	Installation, commissioning & making functional all the Equipment related to Automatic Water Level Gauge (AWLG) (Bridge/Barrage mounted) station	280	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>
2	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations in the existing poles	7	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>
3	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations including erections of poles with long arm cantilever ( Type 1) at site ( as per specifications)	16	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>
4	Installation, commissioning & making functional all the pole mounted Automatic Water Level Gauge (AWLG) stations including erections of poles with short arm cantilever ( Type 2) at site ( as per specifications)	12	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>
5	Installation, commissioning & making functional all the Equipment related to Automatic Rain Gauge Station	272	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>
6	Installation, commissioning & making functional all the Equipment related to Automatic Weather station	03	Number	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	<i>12 months from date of signing of contract</i>

Service	Description of Service	Quantity <sup>1</sup>	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
7	Installation, testing and commissioning of Servers along with monitor, computer rack, 3KVA onlineUPS, computer node ( work station) , LED display, high speed synchronous internet connections, IT hardware which includes required IP, routers, switches, firewall system and GPS/ GPRs system for data receiving system complete as per specification at the New BWDB Data Centre..	07	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
8	Installation, testing and commissioning of Next Generation Firewall	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
9	Installation, testing and commissioning of Midgrade Firewall	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
10	Installation, testing and commissioning of Load Balancer with Anti D-Dos/WAF	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
11	Installation, testing and commissioning of Storage Area Network (SAN) Switch, San Switches and SAN Storage Enclosure	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
12	Installation and Configuration of data acquisition Software e in the respective (as per description in technical section) on respective Computer Servers	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
13	Installation and Configuration of Data management Time Series Database software (Aquatics Informatics). (as per description in technical section) on respective Computer Servers	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
14	Installation and Configuration of Oracle Database Management Software (12c) (as per description in technical section) on respective Computer Servers	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
15	Installation and Configuration of NMS/Server Monitoring (For the purpose of monitoring all the server related device and network as per specifications)	01	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
16	Installation and Configuration Security Information and Event Management	01	Number	Data Center Dhaka	<i>12 months from</i>

Service	Description of Service	Quantity <sup>1</sup>	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
	(SIEM) Software (as per description in technical section) on respective Computer Servers				<i>date of signing of contract</i>
17	Installation and Configuration of field maintenance and tracing software in the respective (as per description in technical section)	01	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
18	Installation and Configuration of Backup software ( as per specifications)	02	Number	Data Center Dhaka	<i>12 months from date of signing of contract</i>
19	Provide Training after completion of the implementation for operation and system support of all the software and hardware ( as per specifications)	01	Lot	Data Center Dhaka	<i>12 months from date of signing of contract</i>
20	Services of one Full time Systems Supervising Engineer dedicated to the project at Data Centre in Dhaka during one year warranty period with a full time cross country vehicle, laptop, electronic testing equipment (Perform supervision of all measuring divisions of BWDB and coordination with Project & Organizations related to the smooth operations of the total system, monthly overall reporting to the project).	12	Man-month	Data Center Dhaka	During 1 yearwarranty period
21	Services of two Full time service engineers dedicated to the project at Data centre in Dhaka during one-year warranty period (Perform all software and hardware operation and maintenance tasks, monthly reports)	24	Manmonth	Data Center Dhaka	During 1 yearwarranty period
22	Services of eight Full time Hydrologic Technicians dedicated to the project at 4 measuring divisions of BWDB consisting a team of 2 persons per measuring division during one yearwarranty period with eight (08) nos. full time double-cabin pick-up, laptops, electronic testing equipment (Perform operation and maintenance all equipment , monthly reports with coordination of the persons stationed in Dhaka)	96	Manmonth	4 measuring divisions of BWDB	During 1 year warranty period
23	Technology transfer and trainings of BWDB Personnel  One Traing in Dhaka Head quarter of BWDB Four Traings in each Measuring divisions of BWDB during installation period (5	10	Number	Dhaka, 4 measuring divisions office and various field	<i>5 nos 12 months from date of signing of contract during Installation period and 5 nos</i>

Service	Description of Service	Quantity <sup>1</sup>	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
	total) and; One Training in Dhaka Head quarter of BWDB Four Trainings in each Measuring divisions of BWDB during one-year warranty period (5 total)				during Warranty Period
24	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period for 280 AWLG (bridge mounted),. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.	1	Lot	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	1 years after successful commissioning and final acceptance certificate of RTDAS
25	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period 34AWLG (Pole mounted Radar), hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.	1	Lot	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	1 years after successful commissioning and final acceptance certificate of RTDAS
26	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period 272 ARG nos. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.	1	Lot	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	1 years after successful commissioning and final acceptance certificate of RTDAS
27	Operations, Trouble-shooting & Maintenance during 01 (one) year Comprehensive Warranty Period for 03 AWS nos. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation,	1	Lot	Various locations in Bangladesh as per table in Schedule of Requirement as provided in Annexure A	1 years after successful commissioning and final acceptance

Service	Description of Service	Quantity <sup>1</sup>	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
	Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.				certificate of RTDAS
28	Operation, Trouble-shooting and Maintenance Requirements of all the software and hardware installation During 1 (one) Year Comprehensive Warranty Period .This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.	1	Lot	Dhaka data center and four measuring divisions offices	1 years after successful commissioning and final acceptance certificate of RTDAS

## List of Related Services Part-2 and Completion Schedule (Annual Operation & Maintenance Services)

(to be used for evaluation purpose and establishing Annual Operation and Maintenance Services)

Sl No	Service	Description of Service	Quantity	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
1.	Operation, Trouble-shooting & Maintenance during <b><u>1st year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar) and 272 ARG and 03 AWS Monitoring Stations with Telemetry including Information System requirement as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total AWLG and ARG Monitoring System. This includes replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder..	Operations, Trouble-shooting & Maintenance for <b><u>1st year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar) and 272 ARG and 3 AWS Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations and Data Center equipment after final acceptance of total Hydro-met obs. system. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM / GPRS telemetry for Data transmission shall be borne by the Bidder.	01 (one)	Lump-sum	Various locations of Bangladesh as per list provided in Annexure-A	1st year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period



2.	<p>Operation, Trouble-shooting &amp; Maintenance during <b><u>2nd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS nos. Monitoring Stations with Telemetry systems including Information System requirements as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes replacement of material/goods/spare parts and consumables as &amp; when required at bidder's cost. The Cost of Communication for GSM &amp; GPRS telemetry for Data transmission shall be borne by the Bidder..</p>	<p>Operations, Trouble-shooting &amp; Maintenance for <b><u>2nd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS nos. Hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydro-met Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as &amp; when required at bidder's cost. The Cost of Communication for GSM &amp; GPRS telemetry for Data transmission shall be borne by the Bidder..</p>	01 (one)	Lump-sum	Various locations of Bangladesh as per list provided in Annexure-A	2 <sup>nd</sup> year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period
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3.	Operation, Trouble-shooting & Maintenance during <b><u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS Monitoring Stations with Telemetry systems including Information System requirements as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM & GPRS telemetry for Data transmission shall be borne by the Bidder..	Operations, Trouble-shooting & Maintenance for <b><u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b> for 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS nos. Hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. This includes Local Training, Documentation, Replacement of material/goods/spare parts and consumables as & when required at bidder's cost. The Cost of Communication for GSM & GPRS telemetry for Data transmission shall be borne by the Bidder.	01 (one)	Lump-sum	Various locations of Bangladesh as per list provided in Annexure-A	3 <sup>rd</sup> year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period
4.	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <b><u>1st year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b>	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <b><u>1st year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u></b>	01	Lump sum	In Data Center Dhaka	1st year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period

5.	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <u>2nd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u>	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <u>2nd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u>	01	Lump sum	In Data Center Dhaka	2 <sup>nd</sup> year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period
6.	Operation, Trouble-shooting and Maintenance Requirements of all the hardware and software installation During <u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u>	Operation, Trouble-shooting and Maintenance Requirements of all the hardware installation During <u>3rd year of Comprehensive Annual Operation &amp; Maintenance Services period after completion of 01 (one) year Warranty period</u>	01	Lump sum	In Data Center Dhaka	3 <sup>rd</sup> year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period
7.	Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <u>First year</u> of Annual operation & maintenance period after one year Warranty period  One Training in Dhaka Head quarter of BWDB (five days; twenty personnel)  Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings.	Provide training on Operations, Trouble-shooting & Maintenance during <u>1<sup>st</sup> year</u> of Comprehensive Annual operation & maintenance period after one year Warranty period for AWLG (bridge/barrage mounted), AWLG (Pole mounted Radar), ARG and AWS and software and hardware. Hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. The training includes one training at the BWDB headquarters and 2 at the sites. This includes Training, Documentation, training on Replacement of material/goods/spare parts and consumables.	03	Lump sum	Dhaka Head quarter of BWDB And in field under the various Measuring divisions of BWDB	1 <sup>st</sup> year of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period

8.	<p>Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <b>Second year</b> of Annual operation &amp; maintenance period after one year Warranty period</p> <p>One Training in Dhaka Head quarter of BWDB (five days; twenty personnel)</p> <p>Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings).</p>	<p>Provide training on Operations, Trouble-shooting &amp; Maintenance during <b>2<sup>nd</sup> year</b> of Comprehensive Annual operation &amp; maintenance after one year Warranty period for AWLG (bridge/barrage mounted), AWLG (Pole mounted Radar), ARG and AWS and software and hardware. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. The training includes one training at the BWDB headquarters and 2 at the sites. This includes Training, Documentation, training on Replacement of material/goods/spare parts and consumables.</p>	03	Lump sum	<p>Dhaka Head quarter of BWDB</p> <p>And in field under the various Measuring divisions of BWDB</p>	<p>2<sup>nd</sup> year of Comprehensive Annual operation &amp; maintenance period after completion of 01 (one) year Warranty period</p>
9.	<p>Provide trainings of BWDB Personnel regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification during <b>Third year</b> of Annual operation &amp; maintenance period after one year Warranty period</p> <p>One Training in Dhaka Head quarter of BWDB (five days; twenty personnel)</p> <p>Two Trainings in field under the measuring divisions of BWDB (five days; twenty personnel in two trainings).</p>	<p>Provide training on Operations, Trouble-shooting &amp; Maintenance during <b>3<sup>rd</sup> year</b> of Comprehensive Annual operation &amp; maintenance period after one year Warranty period for AWLG (bridge/barrage mounted), AWLG (Pole mounted Radar), ARG and AWS and software and hardware. hydromet Monitoring Stations with Telemetry systems as specified in Schedule of Requirement along with accessories installed at designated locations after final acceptance of total Hydromet Monitoring System. The training includes one training at the BWDB headquarters and 2 at the sites. This includes Training, Documentation, training on Replacement of material/goods/spare parts and consumables.</p>	03	Lump sum	<p>Dhaka Head quarter of BWDB</p> <p>And in field under the various Measuring divisions of BWDB</p>	<p>3<sup>rd</sup> year of Comprehensive Annual operation &amp; maintenance period after completion of 01 (one) year Warranty period</p>

10.	Services of one Full time Systems Supervising Engineer dedicated to the project at Data Centre in Dhaka during one year warranty period with a full time cross country vehicle, laptop, electronic testing equipment (Perform supervision of all measuring divisions of BWDB and coordination with Project & Organizations related to the smooth operations of the total system, monthly overall reporting to the project).	Services of one Full time Systems Supervising Engineer dedicated to the project at Data Centre in Dhaka during one year warranty period(Perform supervision of all measuring divisions of BWDB and coordination with Project & Organizations related to the smooth operations of the total system, monthly overall reporting to the project).	36	Man-months		
11.	Services of two Full time service engineers dedicated to the project at Data centre in Dhaka during one-year warranty period (Perform all software and hardware operation and maintenance tasks, monthly reports)	Services of two Full time Computer System & Software Specialist dedicated to the project at Data centre in Dhaka during three year Annual operation & maintenance period (Perform all software and hardware operation and maintenance tasks, monthly reports)	72	Man-months	Data Center Dhaka	Three years of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period
12.	Services of eight Full time Hydrologic Technicians dedicated to the project at 4 measuring divisions of BWDB consisting a team of 2 persons per measuring division during one yearwarranty period with eight (08) nos. full time double-cabin pick-up, laptops, electronic testing equipment (Perform operation and maintenance all equipment , monthly reports with coordination of the persons stationed in Dhaka)	Services of eight Full time Hydro-met Technicians dedicated to the project at 4 measuring divisions of BWDB consisting a team of 2 persons per division during three year Annual operation & maintenance period (Perform operation and maintenance all equipment , monthly reports with coordination of the persons stationed in Dhaka)	288	Man-months	in field under the various Measuring divisionss of BWDB	Three years of Comprehensive Annual operation & maintenance period after completion of 01 (one) year Warranty period

### 3. Technical Specifications

#### 1.0 GENERAL

Real Time Hydro-Met data acquisition network will be implemented under the Project “Component-B: Strengthening Hydrological Information Services and Early Warning System (SHEWS)”. The Real Time Hydro-Met data acquisition network will provide key data required for forecasting, Inflows into the Basin, Basin rainfall amount, flood forecasting and monitoring, data dissemination, and other relevant data. The Real Time Data Acquisition System (**RTDAS**) will consist of a telemetry network of Automatic Water Level Gauges (**AWLG**), Automatic Rainfall Gauges (**ARG**) and Automatic Weather Station (**AWS**) along rivers/reservoirs/catchment areas, which will be installed to capture real-time hydro-met data. The RTDAS has been conceptualized to combine the advantages of modern data loggers, data storages, processing and data communication technologies, with the high availability and sustainability, required by such an important project. Real-time data acquisition system networks ensure high degree of reliability and robustness, which potentially minimize the maintenance of the system.

The sensors like Automatic Water Level Gauge (**AWLG**), Automatic Rainfall Gauge (**ARG**) and Automatic Weather Stations (**AWS**) should be combined, as much as possible, within a single station, which will eliminate the costs of **GSM & GPRS** communication and the recurring costs associated with these devices. It is encouraged to combine data from multiple stations for minimizing the number of **GSM / GPRS** data transmission and the security arrangements.

To minimize corrective maintenance and to increase the performance of the monitoring network, a well-organized preventative maintenance plan is highly recommended. The preventative maintenance is required for all system components, including the infrastructure, to house the electronic data collection components. A strong maintenance plan will be the foundation for sustaining Bangladesh Hydro-meteorological monitoring network operation over the expected lifetime of the technology, which is considered to be minimum 10 years.

The Technical Specifications of the Real-time Data Acquisition System for Bangladesh, consist of design, manufacture, factory testing, delivery to the sites, installation of the associated interface wiring/termination and other accessories, delivery of the computer servers, delivery of software, operating and maintenance knowledge transfers, commissioning, site acceptance testing, supply of mandatory spares, training and documentation, etc.

## 2.0 DESIGN PRINCIPLES

The following basic principles have been applied to the design of the real time hydro-met data acquisition system network for Bangladesh.

Installation of Permanent Automatic Water Level Gauge Station (AWLG) with non-contact RADAR Sensors which will have the primary function of measuring water levels at the installed locations (Rivers / Reservoirs).

Installation of Automatic Rain gauge (ARG) station with Tipping Bucket Rainfall sensor which will have the primary function of measuring hourly and daily accumulated rainfall at the installed locations. The rain gauge will be installed as per the WMO guidelines in as many stations as possible.

Installation of Automatic Weather Station (AWS) station with standard met parameter sensors which will have the primary function of measuring hourly and daily recording of met-parameters. The sensors will be installed as per the WMO guidelines as many as possible.

Recorded data at field stations will be transmitted through GSM/GPRS from field stations will be communicated to the dedicated server computer provided at the New Data Center of BWDB at Dhaka, Bangladesh for further processing. The processed data shall be transferred to the stake holders at various places of Bangladesh via internet & mobile phones

The meteorological sensors with accuracy as per specifications shall be provided. All the sensors supplied by the bidder should have UL/IEC/ANSI/Equivalent certification for particular batch/lot of supply.

Stations or sensors in close proximity to each other will be combined to reduce the number of reporting stations. This is especially important to save the recurring GSM & GPRS charges.

- (a) Some of the AWLG stations shall be placed in a suitable position with existing bridge structure where ever

possible and some fixed on top of poles. The final point of installation will be fixed upon discussion and approval of Client.

- (b) AWS stations shall be placed in a suitable position with a possibility to replace at a different convenient place and the final point of installation will be fixed upon discussion and approval of Client.
- (c) ARG stations shall be placed in a suitable position at the roof of existing building structure where ever possible and the final point of installation will be fixed upon discussion and approval of Client
- (d) The list of stations where AWLG, ARG and AWS to be installed are provided in Annexure A. The list of stations is also given in Maps of Annexure A.

### **3.0 SCOPE OF WORK**

- 1) Complete supply, installation, testing, commissioning of remote stations includes associated civil works, sensors, data logger, software, hardware and ancillaries equipment, solar panel, mounting poles, masts, cables and tethers, electrical and network cabling, lightening arresters etc.
- 2) Supply, installation, testing, commissioning of the real time hydro-meteorological data collection network and establish data communications using GSM / GPRS technology between remote station to the dedicated computer server provided at National Data centre at Dhaka. This includes, but is not limited to acquiring service, and maintaining all aspects of the service during the warranty period as well as during the maintenance period.
- 3) Establish a GSM & GPRS receiving system along with all required data reception arrangement at new data center of BWDB, Dhaka to collect GSM & GPRS data. This shall include a required hardware & computer that will support the reception of the GSM & GPRS Data stream.
- 4) Implement and configure the software for Data Acquisition, Primary validation of data, and Data Reporting



- 5) Assure the collection and seamless flow of Real Time Data from all types of automated sensors to new data center of BWDB /modelling centre at Dhaka.
- 6) Installation, testing and commissioning the required computer servers and associated hardware items, in the New BWDB Data Centre.
- 7) Perform on-site assembly, start-up of the supplied goods.
- 8) Complete commissioning integration, testing & organization of the whole system. Bidder is responsible for, interfaces between the sensors and the DCP, DCP and transmission equipment and that between DCP and modelling centre, and ensure compatible data format as per bid document and trouble free operation of system.
- 9) Provide operation & maintenance services during one (1) year warranty and three (3) years Annual operation & maintenance period to include all components at the remote stations and remote station itself.
- 10) Provide installation and maintenance reports as required by the Purchaser and any delay is not acceptable in time schedule provided by supplier.
- 11) Supply on-site spares to repair any part of the remote stations upon determination of malfunction or failure. This includes, but is not limited to DCP, sensors, batteries, solar panel, data logger and other accessories etc. required in seamless operation of the real time data acquisition system
- 12) Supply detailed operation and maintenance manual for each component in the system and compile Knowledge and working supply type Manual for training purpose (including multimedia training kits).
- 13) Provide classroom and field training to sufficient number of BWDB personnel on the data acquisition system. This includes operation and maintenance procedures. Training will also occur at selected field locations as selected by the Purchaser. This includes startup, operation, maintenance and/or repair of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies.
- 14) Upload the detailed classroom and field trainings of installation and trouble shooting in U-tube for the staff to watch and learn in future.
- 15) Installation and commissioning of sensors and other related equipment should be carried out in the presence of field engineers of the

client for them to understand and learn the whole procedures of installation and commissioning.

16) Onsite Calibration and validation of the installed system and shall continue during the entire contract period including the Annual Operation & Maintenance Services period.

17) All selected sites should conform to the extent practical to **WMO** guidelines as much as possible. The purchaser will be responsible for obtaining permission to use property. River stage, Reservoir Stage and weather data will be logged every 1 hour and transmit data based on a schedule set in the data logger (e.g. once an hour)

18) To provide necessary facility to generate daily report of RTDAS data at specified time and in the specified format as prescribed by Engineer-in-charge.

19) The remote stations DCP's shall store the data for at least one year.

20) A guarantee by the manufacturer that all equipment being provided will have maintenance & Spare support for a minimum of 4 years from the date of issuance of final acceptance certificate by engineer in charge including Warranty and Operation & Maintenance period

#### **4.0 GENERAL FEATURES/ SPECIFICATIONS**

It is imperative that all instrumentation, computer servers and other related equipment shall operate effectively within the Data Collection Platform (DCP) and the DCPs in turn shall operate effectively with the GSM/GPRS systems. In addition, the input/output protocols of individual items of equipment (AWLG, ARG, AWS, DCP's, solar power arrangements, etc) shall interface accurately. For this purpose, the interfaces between the sensors and the DCP, DCP and transmission equipment and that between modeling centres are ensured to be compatible and trouble free. The responsible modeling centre's engineers can be contacted for the compatibility issues and the suppliers are responsible for repairing the system.

1. The specific electrical, electronic and mechanical design parameters mentioned in case of individual sensors are indicative of a typical design and variations therein can be considered provided the output, resolution, accuracy and ruggedness against environment are not compromised in any manner. In such cases where the supplier proposes to deviate from the specifications a full technical justification shall be provided. The Purchaser is not bound to accept such justification.
2. Reliability of operation during normal and extreme weather conditions is imperative.

3. The sensors and all accessories and facilities shall be fully compatible with the data acquisition and transmission system. The sensors and DCP's shall form a complete automated data acquisition storage and transmission system.
4. In case of any of the sensors, the equipment is supplied with certain optional features which are required to be ordered separately and are not included as a part of the offer; the same shall be clearly mentioned in the bid along with the functions of such features. The purchaser shall be provided with all necessary information which shall enable them to take an informed decision at the time of entering into the contract as to the ordering any such feature or otherwise.
5. The Bidder shall enclose technical literature with photographs in respect of all the sensors data logger and other equipment being quoted. The features which are mentioned in the literature but are not being quoted as a part of the current system shall be clearly brought out in the bid. In the event of failure of them, Bidder to explicitly mention any such exclusion, it shall be taken as inclusion of all features mentioned in the bid as a part of the supply and the Bidder shall have to provide all such features/ accessories without claim of extra cost to the purchaser.
6. The Bidder shall enclose or demonstrate a prototype of the whole system during the pre-bid time or before to the client.
7. Although all accessories and fixtures required for installation of the equipment & their specifications have been specified in technical specifications however, bidder shall ensure the satisfactory performance & functioning of RTDAS system complete, for this if any accessory or items are required that shall be provided by bidder, the cost towards that is deemed to be included in the cost tendered by the bidder, no extra cost shall be paid to the bidder on this account.
8. Bidders shall give general layout of all the installations including all civil works for types of stations and materials including that for the equipment at the time of bidding. Afterwards, the successful Bidder shall furnish the details of all the mounting arrangement including civil works and codes and standards. IS codes and standards of practice shall be followed for all civil works and mounting arrangements.
9. The security arrangement provisions for sensors installed in the open ground like Chain-Link fencing, locking etc. shall also be provided by the Bidder.
10. Security of installed equipment against theft and vandalism will be the responsibility of the Bidder till successful installation, commissioning, two stages of site acceptance testing.

11. All fixings shall be non-corrodible. It does not mean that rubber or plastic materials may be used at place where strong metals needs to be used.
12. The Bidder has to specify how the calibration will be carried out and has to use his own calibration equipment during the period of warranty.
13. The computer servers and the requisite software have to be appropriately configured and set up for implementing;
  - a. Fail over mechanism and hardware redundancy, which will ensure no disruption in the 24 X 7 information system services.
  - b. Load balancing, which will ensure satisfactory response to the users, even at a high service request traffic.
14. Ensure that all software licenses and maintenance agreements are in the name of Purchaser and should seek full support and updates for such software for the duration of the **Warranty** Period. Also all the software licenses should be valid for the design life of the system, that is minimum **10 years** from date of commissioning

## **5.0 EQUIPMENT ARRANGEMENT AT REMOTE STATIONS**

### **5.1 Automatic Water Level Gauge (AWLG) For River /Reservoir**

The Automatic Water Level Gauge (AWLG) station shall be equipped with all necessary equipment's and peripherals including the following

Data Collection Platform (DCP) mounted inside an enclosure which will house the following items:

- Data Logger with GSM & GPRS Transmitter with built-in display.
- Sensor (if possible)
- Battery for power requirements.
- Pre-wiring and configuration.
- Solar panel charger regulator.
- Antenna (GSM/GPRS) & required accessories.

Installation of suitable range of Non-contact type Water Level Radar sensor for Automatic Water Level Gauge (AWLG) station with all fittings, accessories and cables.

Mast / tripod to mount DCP at the site (alternatively, where walled enclosure or tower is available, same can be mounted on the same.

Mast / tripod for solar panel (provided locally by the Bidder). Mast can be shared with the DCP mast also.

Conduit for cables GI Flexible conduits and HDPE pipe conduits.

Civil works for mast / tripod (provided locally by the Bidder).

NEMA 4X/IP65 or better Enclosure box and door with lock if required (provided locally by the Bidder)

Power cables with cable conduits.

Grounding and lightning protection (provided locally by the Bidder)

All necessary hardware required for the system to operate properly.

**A Compact/integrated system with data logger, modem, charge controller, Battery, Radar level sensor (RLS) with small size and light weight will be preferred in a common platform. Only solar panel may be outside attached to the Box.**

**Generally, the common platform will be fixed with the existing bridges, barrages and sluices. If it is found that the existing bridge comes under flood during monsoon iron rods, angles may be fixed with the bridge to raise the location of the equipment.**

### **5.2 Pole mounted Automatic Water Level Gauge (AWLG) For River**

The pole mounted Automatic Water Level Gauge (AWLG) station shall be equipped with all necessary equipments and peripherals as mentioned in 5.1. Only the mounting arrangement will be different.

### **5.3 Automatic Rain Gauge (ARG) Station**

The Automatic Rain Gauge (ARG) stations shall be equipped with all necessary equipment's and peripherals including the following:

- i. Data collection Platform (DCP) mounted inside an enclosure, which will house the following items.
  - Data Logger with GSM and GPRS Transmitter with built-in display.
  - Battery for power requirements.
  - Pre-wiring and configuration.
  - Solar panel charger regulator.
  - Antenna (GSM/GPRS) & required accessories.
- ii. Automatic Rain gauge station will have Tipping Bucket Rainfall sensor with all fittings, accessories and cables. The rain gauge will be installed as per the WMO guidelines as much as possible.
- iii. Mast / tripod to mount DCP at the site (alternatively, where walled

- enclosure or tower is available, same can be mounted on the same.
- iv. Mast / tripod for solar panel (provided locally by the Bidder). Mast can be shared with the DCP mast also.
- v. Conduit for cables GI Flexible conduits and HDPE pipe conduits.
- vi. Civil works for mast / tripod (provided locally by the Bidder).
- vii. Chain-Link Fencing (2.5m x 2.5m x 2m height) and gate with lock if required (provided locally by the Bidder)
- viii. Power cables with cable conduits.
- ix. Grounding and lightning protection (provided locally by the Bidder)
- x. All necessary hardware required for the system to operate properly.

#### **5.4 Automatic Weather Stations (AWS)**

The Automatic Weather Station (AWS) shall be equipped with all necessary equipment's and peripherals including the following:

- i. Data Collection Platform (DCP) mounted inside an enclosure which will house the following items.  
 Data logger with GSM and GPRS facilities for transmission of data with built in display  
 Battery for power requirements  
 Pre-wiring and configuration.  
 Solar panel based power supply system.  
 Antenna (GSM/GPRS) & required accessories
- ii. Rain gauge, Wind Speed & Wind Direction, Air Temperature & Relative Humidity, Solar Radiation, evaporation and Atmospheric Pressure Sensor with all fittings, accessories and cables.
- iii. 03m Triangular Tower with guy rope support & required mounting hardware to mount DCP & required sensors as per WMO guidelines for meteorology equipment's (provided locally by the Bidder).
- iv. Tower can be shared with the DCP, solar panel
- v. Tower can be shared with the DCP mast also.
- vi. Conduit for cables GI Flexible conduits and HDPE pipe conduits.
- vii. Civil works for 03 mts Tower and guy support (provided locally by the Bidder).

- viii. Wire fencing (3m \* 3m \* 1m height) and gate with lock if required (provided locally by the Bidder)
- ix. Power cables with conduits.
- x. Grounding and lightning protection (provided locally by the Bidder)
- xi. All necessary hardware required for the system to operate properly.
- xii. The installation should be made as per WMO guidelines at standard height.

### **5.5 Telemetry**

The Telemetry network for BWDB will consist of the Real-time Data Acquisition Network (RTDAS) system, which will operate on GSM / GPRS communication protocol. It will be the responsibility of the bidder to confirm mobile network coverage. The bidder will be ultimately responsible for establishing data communication at all sites, capturing the data files in a server, validating the data, reporting the data, and store the clean data in a database.

The bidder will provide all associated civil works related to the installation of the GSM/GPRS, including cabling, wiring and other such infrastructure.

### **New Data Center**

The New data center (NDC) is being established at Dhaka. The bidder has to make necessary arrangement at NDC for receiving GSM/GPRS data directly from remote stations. The data will be stored in the same data base server at NDC. The system shall be able to accept coded SMS messages from manually operated remote stations as a back-up to the real time data of remote stations. The components include GPRS communication system and workstation for data collection /application /storage backup for the collection, quality. This infrastructure includes all networking devices to connect the equipment via INTRANET to the Web. The space needed at NDC will be provided by the purchaser.

### **GSM & GPRS Data Collection Station**

- Integration of GSM& GPRS data from remote station with Newl Data Center at **Dhaka**
- The GSM & GPRS data collection station will be able to interrogate the DCPs based on a schedule of the NDC choice and as implemented by the bidder.
- The GSM & GPRS Data Collection Station will also be able to receive data sent by the remote real time data of stations whether the data is sent via SMS text or over GPRS internet connectivity.

- In case of failure of telemetry of remote sites, the provision for filling the data by GPRS telemetry so that missing of data is avoided.
- The bidder will provide all civil works related to the installation of the antenna, including cabling, wiring, software for receiving data sets and other such infrastructure required to operate the GSM&GPRS Data Collection Station.

### **5.6 Installation requirements for RTDAS**

#### **A) SITE PREPARATION AND INSTALLATION**

1. The purchaser will provide details of the installation sites before the scheduled installation date to allow the Bidder to perform site inspection and construction of suitable structures before the installation of the hardware.
2. The location of antenna, sensors and related civil work will be decided in consultation with respective Engineer-in-charge depending on the site and river flow conditions.
3. The Bidder should complete the required works at the site for proper installation of the equipment before receipt of the equipment.
4. These are the basic guidelines for installation of RTDAS system however it may vary as per site conditions, in case of variation from installation guidelines stated below drawings shall be approved by engineer-in charge prior to the start of installation work.

### **5.7 Reference of WMO Guidelines for Hydromet Instruments**

Measurement of Precipitation Chapter 6, Guide to Meteorological Instruments and Methods of Observation; WMO technical Report No 8, World Meteorological Organization (WMO), Geneva, Switzerland; ISBN 978-92-63-10008-5

#### **B) SPECIFICATIONS FOR INSTALLATION**

##### **(a) Automated Water Level Gauge (AWLG) sensors (Bridge mounted)**

Automatic Water Level Gauge stations (bridge mounted) are to be installed on the side of the bridge with proper enclosure and railings. The installation should be in such a way that there should not be any disturbance for the observations to be taken. Latest International standards & WMO guidelines are required to be followed for ARG installation as much as possible. AWLGs to be installed at an easily accessible place (for easy O&M).

A Compact/integrated system with data logger, modem, charge controller, Battery, Radar level sensor (RLS) with small size and light weight will be preferred. Only solar panel may be outside but attached to the Box.



In few cases sensor may be separated from the platform depending upon the locations. Assembly should be light weight with a suitable hanging arrangement. The Platform shall be close to the bridges and shall be easily accessible for supervision. Wire from the sensor shall be minimum to avoid the exposure.

If it is found that the existing bridge comes under flood during monsoon season, iron rods, angles may be fixed with the bridge to raise the location of the equipment.

**(b) Pole mounted Automated Water Level Gauge (AWLG) sensors (Manual Staff gauge mounted)**

This equipment will be generally placed in the stable river banks where there is no other permanent structure.

Bidders have to supply and install two types of pole arrangements.

Type 1: MS poles on the stable bank of rivers with folding long arm boom cantilever arrangement as shown in sample drawings and photographs. The poles will be durable, anticorrosive and stable against wind forces and storm surge. The cantilever can be extended and folded as per the water course with rope and pulley arrangement.

Type 2: RCC poles on the stable bank of rivers with short cantilever arm as shown in sample drawings and photographs. The poles will be durable, anticorrosive and stable against wind forces and storm surges.

In few locations equipment will be installed in the existing poles identified by BWDB.

Civil works will be the bidder's responsibility. The Bidders have to provide the design and drawings of the poles along with its foundation considering the standard design and foundation conditions for approval to BWDB for approval before execution at site. Bidders shall furnish details and standard drawings of equipment mounting arrangements and installation to the employer's supervisors. Bidders shall also provide detailed instructions regarding the requirements for lightning protection and power supply as well as recommendations for security arrangements needed for systems and sensors installed in open areas (e.g. fencing, locks, etc.).

**(c) Automatic Rainfall Gauge (ARG) Station**

Automatic Rain Gauges are planned to fix on top of the roof of buildings. However, if not possible to do so due to some reasons, ARG stations will require a hardened enclosure on a structure (pipes, mast, and tower) to make the enclosure stable. The enclosure will be mounted

1.5 m above the ground. The rain gauge will be placed away from objects such that the rain gauge orifice is no closer than the 2 times the difference in height (top of the rain gauge to the top of the nearby objects) to other objects. Latest IS standards & WMO guidelines are required to be followed for ARG installation as much as possible.

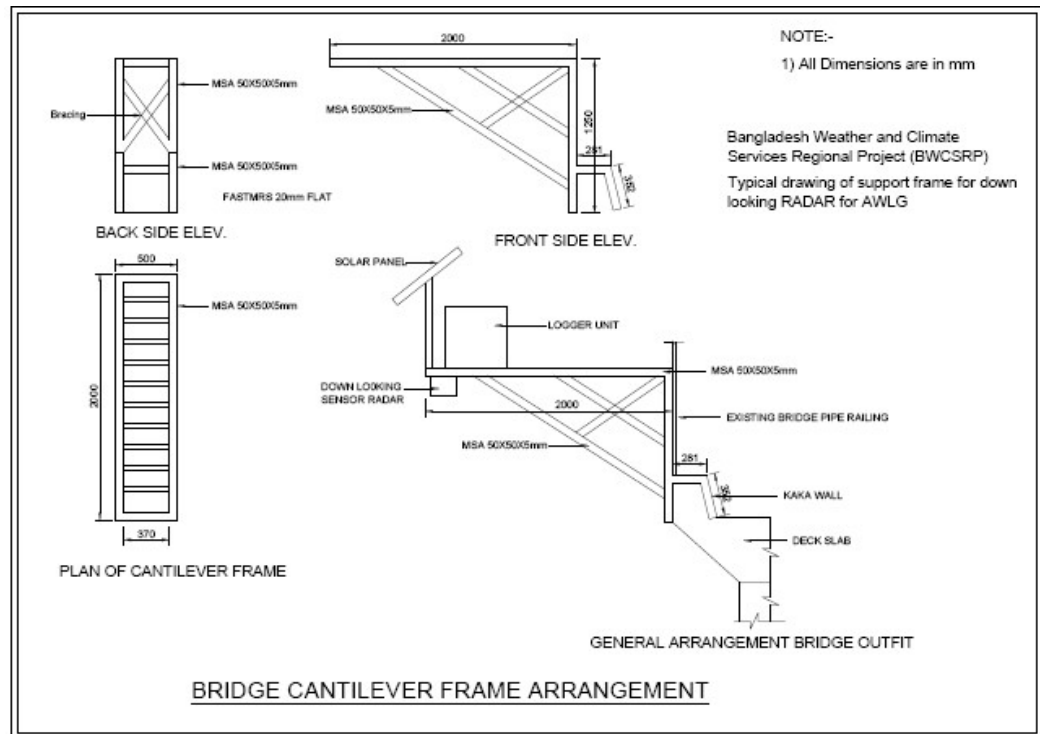
#### **(d) Automatic Weather Station (AWS)**

Automatic Weather Stations are planned to be installed at three existing sites. However, if not possible to do so due to some reasons, AWS stations will be placed in open fields and away from any obstructions which may disturb the measurements. WMO guidelines should be followed during the installation and precise site selection. The AWS stations will require a 03m tower. The hardened enclosure will be attached to the tower at 1.5 m about the ground. Then temperature/relative humidity will be mounted at 2 m above the ground and sufficiently away from any objects that may produce long wave radiation. The wind speed/direction sensor will be placed at the top of the 03 m tower. The rain gauge and evaporimeter will be placed away from the tower, at least 3 m from the tower, and no closer than the 2 times the difference in height (top of the rain gauge to the top of the nearby objects) to other objects.

#### **C) SAFETY REQUIREMENTS**

1. The sensor and its accessories should be protected from theft. The bidder is encouraged for minor modifications in installation of sensor and its accessories so as to minimize the chances of theft. Mortise lock is proposed to avoid theft. Due care must be taken while modifying the installations. In no case the basic principle and working of sensor is allowed to disturb.
2. Radar sensors should be mounted in such a way that they have a direct vertical shot to the water surface with no obstruction of their beams. Beam spread must be determined based on manufacturer's specification and the maximum expected distance to be measured at low flows. Consideration should be made in designing the mounting structure to allow for easy access to the instrument for maintenance
3. Framework support to attach Radar sensor to Bridge Tower: -
4. Framework support made of fabrication of M.S. with gusset plate 8mm thick (0.85m x 0.3m) including welding, riveting, anticorrosive paint, colour etc. complete as per Fig provided below.

*Typical Drawing of support frame for downlooking RADAR for bridge mounted AWLG*



## D) SPECIFICATIONS FOR CIVIL WORKS

### a) Common Enclosure for Site

1. Though it is proposed to install all the ARG's on top of buildings, if it has to install on the ground due to any reason, Area of the ARG and AWS Station should be ideally 5m x 5m x 2m height. If a rare condition demands, then even lesser area (5 m x 4 m) can be demarcated in consultation with officials.
2. The approach to the AWLG site should be made using a removable horizontal ladder extending from the bridge to the enclosure for installation and future maintenance/repair works. Every station should provide with such ladder so that in later stage from the nearest BWDB office, the ladder can be brought to the site for repair.

**b) Fencing for site if required for ARG**

It is decided to install all the ARG's on government building roof tops. However, if this arrangement fails, fencing will require for ground installing ARGs.

1. The height of the fencing for the site must be 2 meters from the ground level.
2. The fencing must be made over a cement foundation which is 230 mm above ground level.
3. Fencing angle should be of size 50mm x 50mm x 6mm and pre coated with red-oxide.
4. The total length of the fencing angle should be 2.8 meters i.e. (2.0m above ground level + 0.8 m below ground level)
5. Two MS angles must be used diagonally at each of the four corner angles of the site. The angles can be attached (with welding or the other appropriate means) from the middle of the existing corner angle to the ground. The depth of the support will remain the same as of main angle.
6. The dimensions of the fencing angle foundation should be 450mm x 450mm (length X width) and at a depth of 800mm. The foundation should be square shaped. Distance between each fencing angle should be 1.5 to 2 meters.

**c) Chain-link**

1. Dimensions of GI Chain-link: 3 inches x 3 inches and of Gauge: 10 (3 mm diameter).
2. GI chain-link mesh must be stretched and welded/fixed properly on the fencing angles.
3. A pipe or angle must be fixed on the upper part of the fencing to have a neat finishing and at the same time to avoid loosening of the fencing over a period of time.
4. The chain-link fencing should be fastened with the help of screws fitted on the fencing angles. Alternately it may be welded neatly at four equidistant positions of 0.5 m each.

**d) Gate**

1. Dimensions: 1 m X 2 m (Width x Height) with locking facility
2. The gate must be fabricated by MS Angle whose dimensions should be minimum 40mm x 40mm x 6mm

3. Suitable locking facility with 3 keys for safety purposes is mandatory. Standard locks should be used.
4. Gate and MS Angle must be well painted with white / silver colour.
5. Gate should have proper support of MS angles with additional support of crossed MS angles. Alternately gate should be fixed with the support of RCC pillars.

**e) ARG sensor foundation:**

1. Rain gauge foundation must be of dimensions 450mm x 450mm (length x width) and 800mm deep.
2. The rain gauge may be located so that it is at a minimum distance of 2 m away from obstructions on all four sides.
3. The raised platform should be 230 mm above the ground level.
4. The orphic rim of rain gauge should be 1.0 to 1.2 meters above ground level. In the case of flood prone areas the base plate on which the rain gauge is mounted should be placed 1.0 m above ground level. The location must be decided after discussion with Field Officer.

**f) Mast Foundation (if required)**

1. Foundation Dimensions: 750mm X 750mm (length x width) and 1.2m deep. The raised platform of the foundation must be 300mm above the ground level.
2. The height of the mast should be minimum 3 meters above raised platform.

**g) Proportions for concrete foundations (if required)**

1. Concrete pillar foundations for the RTDAS mast/tripod/tower, fencing angle should be made in the volumetric mixing proportions as follows:
2. Concrete foundation: 1 (Cement) : 2 (Sand) : 4 (Metal)
3. Fine plastering: 1(Cement) : 3 (Sand)
4. Concrete Pillar must be cemented to achieve smooth finish above the ground level.
5. After 8 hours, these foundations should be cured with water at least 3 times a day for four days.

**h) Local Earthing**

1. Material required: Salt: 20 Kg; Charcoal: 20 Kg; Sand 100 Kg
2. The lightning arrestor rod is made of copper which is mounted on the top most part of the RTDAS Mast / Tripod /Tower.
3. It should be of thickness 12 mm and of one-meter length with a connected copper wire of 6mm thickness (gauge). At the other end of copper wire is the Earthing rod of dimensions 15mm thickness and 1.8-meter length, which is buried into the ground.
4. On the bottom of earthing rod, one copper plate of dimensions 300mm x 300mm should be connected. RTDAS data logger enclosure should also be grounded with local earthing.
5. A pit of 1200-1500 mm depth, 600 x 600 mm wide at bottom (like a cone shaped pit) has to be dug.
6. After leveling the bottom of the pit, uniform layer in the sequence of 150 mm of Salt + 150 mm Charcoal + 150 mm Sand is filled. Such sequence is repeated 3 times till the earth pit is filled to the top. The copper earthing rod is placed in the center of the pit. The pit is closed and leveled.

**i) Painting**

1. The tower, fencing angles, chain-link fencing and gate should be properly painted every year to avoid rusting.
2. All concrete foundations shall be painted using white cement paint every year.

**j) Foundation work for Automatic Weather Station (AWS)**

AWS stations will be placed in open fields and away from any obstructions which may disturb the measurements. WMO guidelines will be followed during the installation and precise site selection. The AWS stations will require 3-meter tower intended to measure meteorological parameters closer to the ground than typical met stations. The hardened enclosure will be attached to the tower at 1.5 m about the ground. Then Air Temperature/Relative humidity and Solar Radiation sensor will be mounted at ~1.5 m above the ground and sufficiently away from any objects that may produce long wave radiation. The wind speed/direction sensor will be placed at the top of the 3m tower. The rain gauge and the evaporimeter will be placed away from the tower, at least 3 m from the tower, and no closer than the 2 times the difference in height (top of the rain gauge to the top of the nearby objects) to other objects.

## **k) Specifications for Civil Works**

### **1. Common Enclosure for Site**

Area of the AWS Station should be ideally 5m x 5m x 1.5m height.

The approach to the site should be made free of obstacles like bushes; trees etc. and a suitable cement path must be laid to approach the platform.

Following are the common specification for civil works for all the Telemetry sites.

### **2. Fencing for the site**

The height of the fencing for the site enclosure must be 1.5 meters from the ground level.

- The fencing must be made over a cement enclosure which is 230mm above ground level.
- Fencing angle should be of size 40mm x 40mm x 6mm and pre coated with red- oxide.
- The total length of the fencing angle should be 2.8 meters i.e. (2.0m above ground level + 0.8 m below groundlevel)
- Two MS angles must be used diagonally at each of the four corner angles of the site.  
The angles can be attached (with welding or the other appropriate means) from the middle of the existing corner angle to the ground. The depth of the support will remain the same as of main angle.
- The dimensions of the fencing angle foundation should be 450mm x 450mm (length X width) and at a depth of 800mm. The foundation should be square shaped. Distance between each fencing angle should be 1.5 to 2 meter.

### **3. Wire fencing**

Wire fencing must be stretched and welded/fixed properly on the fencing angles.

- A pipe or angle must be fixed on the upper part of the fencing to have a neat finishing and at the same time to avoid loosening of the fencing over a period of time.
- The chain-link fencing should be fastened with the help of screws fitted on the fencing angles. Alternately it may be welded neatly at four equidistant positions of 0.5 m each.

### **4. Gate**

- Dimensions: 1 m X 1.5 m (Width x Height) with locking facility
- The gate must be fabricated by MS Angle whose dimensions

should be minimum 40mm x 40mm x 6mm.

- Suitable locking facility with 3 keys for safety purposes is mandatory. Standard locks should be used.
- Gate and MS Angle must be well painted with white / silver colour.
- Gate should have proper support of MS angles with additional support of crossed MS angles. Alternately gate should be fixed with the support of RCC pillars.

#### **5. Rain Gauge foundation**

- Rain gauge foundation must be of dimensions 450mm x 450mm (length x width) and 800mm deep.
- The rain gauge may be located so that it is at a minimum distance of twice the distance of the difference in height to all obstructions.
- The raised platform should be 230mm above the ground level.
- In the case of flood prone areas the base plate on which the rain gauge is mounted should be placed 1.0 m above ground level. The location must be decided after discussion with Field Officer.

#### **6. Mast Foundation**

- Foundation Dimensions: 750mm X 750mm (length x width) and 1.2m deep. The raised platform of the foundation must be 300mm above the ground level. The height of the mast should be minimum 3 meters above raised platform.

#### **7. 03mts Tower Foundation**

- The 03m triangular tower foundation must be of dimensions 900mm X 900mm (length x width) and 1.5m deep. The raised platform of the foundation must be 300mm above the ground level.
- Proper guy rope support (three Nos) with foundation (for 03mts Tower). The foundation for the Anchor Rod which holds the guy rope must be of dimensions 450mm X 600mm (length x width) at the ground level and min 1.2m deep
- The DCP, sensors and Antenna will be mounted on a 3-meter triangular tower, which should cater for fitments of assemblies for sensors, DCP, antenna and other accessories. The tower will have 3 sections of 3 meter height and one top section of 1-meter height. The tower should be made of MS Pipe and should be light as well as robust enough to withstand weight of at least two persons (200 Kgs). This tower with complete accessories will be part of the supplies and will be galvanized to avoid rusting and long life in outdoor conditions.



**8. Proportions for concrete foundations**

- Concrete pillar foundations for the ARG tower, fencing angle should be made in the volumetric mixing proportions as follows:
- Concrete foundation : 1 (Cement) : 2 (Sand) : 4 (Metal)
- Fine plastering : 1 (Cement) : 4 (Sand)
- Concrete Pillar must be cemented to achieve smooth finish above the ground level.
- After 8 hours, these foundations should be cured with water at least 3 times a day for four days.

**9. Local Earthing**

- Material required: Salt: 20 Kg; Charcoal: 20 Kg; Sand 100Kg
- The lightning arrestor rod is made of copper which is mounted on the top most part of the ARG tower.
- It should be of thickness 12 mm and of one-meter length with a connected copper wire of 6mm thickness (gauge). At the other end of copper wire is the Earthing rod of dimensions 15mm thickness and 1.8-meter length, which is buried into the ground.
- On the bottom of earthing rod, one copper plate of dimensions 300mm x 300mm should be connected. ARG data logger enclosure should also be grounded with local earthing.
- A pit of 4-5 feet depth, 2' x 2' wide at bottom (like a cone shaped pit) has to be dug.
- After leveling the bottom of the pit, uniform layer in the sequence of 6 inches of Salt + 6 inches Charcoal + 6 inches Sand is filled. Such sequence is repeated 3 times till the earth pit is filled to the top. The copper Earthing rod is placed in the center of the pit. The pit is closed and leveled.

**10. Painting**

- The tower, fencing angles, chain-link fencing and gate should be properly painted to avoid rusting.
- All concrete foundations shall be painted using white cement.

## 6.0 TECHNICAL SPECIFICATIONS OF EQUIPMENT

### 6.1. PERMANENT FIXING BRIDGE MOUNTED RADAR TYPE AWLG SENSOR (30M)(Item no. 1a, List of Goods and Delivery Schedule under Section VII):

Feature	Value
<b>Site Conditions</b>	
Ambient Temperature	From 0 to +50 °C
Humidity	0 to 95
Altitude	0 to 2000 meter
<b>Sensor</b>	
Sensor Type	Microwave non-contact sensor
Range	30meter
Resolution	3 mm or better
Accuracy	0.02 % FSO
Output Interface	SDI-12 / RS-485 / 4-20mA and compatible to RTU/Data logger Unit
Power Supply	To be powered by Solar Panel provided by bidder.
Beam angle	Less than 12 degree
<b>General Features</b>	
Housing Material	Housing Material – “Corrosion Resistance (Stainless steel / die cast Aluminium or PVC/UV stabilized ABS with metal casing”
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	Sensor Mounting support, cables and other accessories as required
Protection	NEMA4X or IP65 or better
Horizontal Mounting/Installation Arrangements	Above FRL, below a bridge girder wherever available otherwise horizontal cantilever arrangement from a mast/wall/pedestal to be provided By using a Separate horizontal ladder one should be able to reach the enclosure for maintenance/repair. Separate ladder should also be supplied with the equipments for each station.
Radar Sensor should have inbuilt diagnostic feature & averaging function	

## 6.2 POLE MOUNTED RADAR TYPE AWLG SENSOR (30M)(Item no. 2a, List of Goods and Delivery Schedule under Section VII):

Feature	Value	
Site Conditions		
Service	Measurement of level of water level along the banks of major river reaches in select locations in Bangladesh	
Ambient Temperature	From 0°C to + 50°C	
Humidity	5 to 95 % (non-condensing)	
Sensor Type	Battery operated Ultrasonic /RADAR non-contact sensor	
Battery Type	External or internal replaceable batteries Should be lithium or alkaline battery pack, with at least 1-year operation (with one transmission per six hour). Battery must be easily replaceable in the field or in local offices of the implementing Agency or supplier. Replacement batteries must be easily available in Bangladesh	
Range	30 m	
Accuracy	0.5 % of FSO	
Beam angle	Less than 12 degrees.	
Dead Band	Less than 0.5m	
Resolution	5 mm or better	
	Manual Staff Gauge	<p>Required. The staff gauge is to be used for manual water level observation and for reference purposes in combination with the planned AWLG in rivers.</p> <p>The material of the staff gauge should also unattractive for theft and vandalism. It should not also have any resale value.</p> <p>The staff gauge/pole shall be of such a design that it can be effectively used under the prevailing environmental conditions. It needs to be readable for all possible water levels at site.</p> <p>The staff gauge shall generally comply with IS 4080-1994. The staff gauge shall be of a sturdy construction • The staff gauge pole shall be easy to operate and maintain. • All materials on the staff gauge shall be non-corrosive. Specifications material enamelled</p>

	<p>steel or stable FRP plate colour white background, smallest graduation 0.01 m accuracy of graduations 0.5 mm distinction cm, dm and m, index at 5 cm mark temperature 0 to 60°C, the accuracy shall be maintained over the full temperature range.</p> <p>The staff gauge pole shall have provisions to rigidly attach the AWLG sensor unit and a provision to adjust the staff gauges to the required elevation, tuning it to Datum. The pole shall have such solidity that it can permanently sustain partial and/or full immersion in water. The pole should have approximately 15 – 20 cm in diameter. The pole shall be epoxy paint coated or equivalent. In saline water, the compatibility of the applied materials should be taken into account, to avoid excessive damages. The staff gauge support shall be founded in cast concrete, alternatively, it may be supported by a concrete or steel pole firmly driven in the river bed/ banks. In case of wave-action, a stilling well shall be provided.</p>
Sampling interval	01 Hour
Computer Interface	Capable of connection to a computer via USB / RS-232 / Bluetooth /IR /Wi-Fi interface, and supply the necessary interface cables and should be transmitted through <b>GPRS/GSM modem.</b>
Output interface	GPRS/GSM (SMS on at least 5 mobile no.)
Ingress Protection	NEMA4X/IP65 or better
Sensor Material	PVDF/PP/SS/Aluminum
Enclosure Material	Stainless steel /Aluminum or (/PVC/PBT/UV stabilized ABS with metal casing to be provided).
Process Connection	Threaded/ Flanged, non-corrosive as per site condition
Display	Digital Read LCD / LED Display, inbuilt or External type with Keys for parameterization & configuration.
Display Parameters	Level, Flow
Zero & Span Adjustment	Required
Manufacturer	Required

Calibration Certificate	
<b>General Features</b>	
Mounting	The Sensor shall be easy to dismount from the staff gauge and relocate with the change of water level
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	Sensor Mounting support with proper HDPE/ GI Pipe conducting, cables and other accessories (as required)
Certification	UL/IEC/ANSI/Equivalent certifications shall be followed. References for guidelines are provided in the specification section.

### 6.3 AUTOMATIC RAIN GAUGE (ARG) (Item no. 3a, List of Goods and Delivery Schedule under Section VII):

Feature	Value
<b>Site Conditions</b>	
Ambient Temperature	From 0 to +50 Degree C
Humidity	0 to 100 %
Altitude	0 to 2000 meter
<b>Sensor</b>	
Sensor Type	Tipping Bucket type with reed switch
Range	250 mm/h or better
Resolution	0.5 mm or better
Accuracy	3% or better, $\pm 2$ mm/h
<b>General Features</b>	
Output Interface	Switching closure output

Mounting	ARG's are proposed to mount on top of buildings. It is to be mounted in a corner of the building terrace. If it is planned to mount on the parapet, a platform of 30 cm above the parapet level to be constructed and to mount. If the mounting is planned in the terrace, a platform of 30 cm to be constructed above the terrace level and the ARG to be mounted.
Power Supply	To be powered by Solar Panel provided by bidder with DCP
Material	Corrosion Resistance Metal (Stainless steel/ Aluminum)
Enclosure	NEMA4X or IP65 or better
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	Sensor Mounting support, cables and other accessories as required
Certification	UL/IEC/ANSI/Equivalent certifications shall be followed. References for guidelines are provided in the specification section.
<b>Note:</b> Bidder shall provide spout filter and bird cage to prevent ingress of insects and debris, <b>And with Bubble Spirit Level and adjustable legs for horizontal alignment of tipping bucket mechanism.</b>	

#### 6.4 AUTOMATIC WEATHER STATIONS (Item no. 4, List of Goods and Delivery Schedule under Section VII):

Feature	Value
<b>Site Conditions</b>	
Ambient Temperature	From 0 to +50
Humidity	0 to 100 %
Altitude	0 to 2000 meter

<b>Air Temperature Sensor</b>	
Sensor Type	Platinum resistance or better or equivalent
Range	0 to 50 Degree Celsius
Resolution	$\pm 0.2^{\circ}\text{C}$
Accuracy (Intensity)	Within $\pm 0.5^{\circ}\text{C}$ in the entire working range
Response time	10 secs or lesser
<b>Relative Humidity Sensor</b>	
Sensor Type	Capacitive/ Solid State Humidity Sensor
Range	0 to 100 %
Resolution	0.1%
Accuracy	$\pm 3\%$ or better
Power Supply	To be powered by solar panel provided by bidder
Response Time	10 secs or lesser
<b>General</b>	
Self-aspirated	To ensure continuous supply of air. Free from turbulence, water droplets and radiation
Power Supply	To be powered by solar panel provided by bidder.
Accessories	All accessories for mounting the instrument at ~1.5mts height above the ground level. special cross arm clamps or flag, if any shall be provided
Output Interface	SDI 12/ RS 485/ 4-20mA/Compatible to datalogger/RTU
Radiation Shield	<ul style="list-style-type: none"> <li>Naturally ventilated radiation shields to protect both temperature and relative humidity sensor</li> <li>Composed of UV stabilized fiber-glass filled polyester with outer surface painted white to</li> </ul>

	reflect the sun radiation and minimum absorption. Shields made of metal are not permitted.
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<b>Wind Speed and Direction Sensor</b>	
Sensor Type	Ultrasonic sensor (No moving Parts)
Range	0-60 m/s for speed and 0–359 degrees for direction
Resolution	0.1m/s for Speed; $\pm 1$ degree for Direction
Accuracy	$\pm 0.5$ m/s or better for wind speed; $\pm 5^\circ$ or better for wind direction
Response time	Less than 10 second lag in operating range
Mounting	All accessories for mounting the instrument 03mts height above the ground level, e.g. special cross arm clamps or flag if any shall be provided.
Output Interface	SDI 12 / RS 232/ RS 485/ Compatible to datalogger/RTU

<b>Air Pressure Sensor</b>	
Sensor Type	Temperature Compensated
Range	800 to 1100 hPa
Resolution	$\pm 0.1$ hPa
Accuracy	$\pm 0.2$ hPa
Power Supply	To be powered by solar panel provided by bidder
Output Interface	SDI 12 / RS 232/ RS 485/ Compatible to datalogger/RTU

<b>Evaporimeter sensor</b>	
Operating temperature	-5 to 60 degrees Celsius
Operating Humidity	5 to 100 %
Altitude	0 to 2000 meter
<b>General Features</b>	
Measurement	Evaporation Pan with water level sensor
Sensor Type	Shaft Encoder / ultrasound radar / Float & pulley type As Specified by IS:5973 which is known as the modified Class APan evaporimeter



Diameter of the pan	1.2 m or more
Accuracy	± 1% FSO
Resolution	1mm
Power Supply	To be powered by solar power provided by bidder
Accessories	As required for complete installation of the sensors and equipment
Material	The pan is made of Copper or anti corrosive stainless-steel, tinned inside and painted white outside.
Covering	The top of the pan is covered with a hexagonal wire net of GI to protect water in the pan from birds and cattles
Platform	Rot resistance, timber treated with creosote or other effective Wood preservative
Measurement range	150mm
Output Interface	SDI-12 / RS-485 / 4-20 mA / Analog

<b>Solar Radiation Sensor</b>	
Sensor Type	Silicon Pyranometer
Threshold	120 W/m <sup>2</sup> of direct solar irradiance
Methodology	Alternate shading of sensor to account for sky radiation or Sunshine duration shall be computed in datalogger
Spectral Range	400nm to 1100 nm
Range	0-2000 W/Square meter
Resolution	1 W/Square meter
Accuracy (Including Temperature Compensation)	3% or better
<b>General Features</b>	
Material	Corrosion Resistance Metal (Stainless steel / Aluminum)
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	All accessories for mounting the instrument at ~1.5mts height above the ground level e.g. special cross arm clamps or flag, if any, shall be provided.
Certification	UL/IEC/ANSI/Equivalent certifications shall be provided.

## 6.5 DATA LOGGER/RTU

### 1. Data Logger with Analog Input (AI) 2 channels for ARG &AWLG (Item no. 1b, 2b, 3b, List of Goods and Delivery Schedule under Section VII):

Feature	Value
<b>Site Conditions</b>	
Ambient Temperature	From 0 to +50 <sup>0</sup> C
Humidity	0 to 95%
Altitude	0 to 2000meter
<b>Sensor Interface</b>	
Analogue Inputs	Analogue Input 2 Channels 4 to 20 mA input shall have 100% over-range withstand) (Analog input channels are required in datalogger, if any sensor offered by the bidder requires Analog interface to integrate with datalogger)
Serial Port for sensor interface	RS-232/ RS-485 for sensor Interface
Pulse Input	1 Input for Rain Gauge impulse
<b>Input - Output Interfaces</b>	
Data Transfer	USB stick option for Data transfer
Port for Configuration	One Serial Port (RS-232 / RS-485) for communication with Laptop for programming
Port for Telemetry	2 Ports for Communication with Telemetry (GSM & GPRS) device Both telemetry systems should work simultaneously for redundancy
Display Port	Port for connecting external display screen for displaying measured data as running text
<b>Analog to Digital Converter</b>	
Resolution	16 bit or better
Sample intervals	1 Sec to 24 hours (user scalable)
<b>General Features</b>	
Flash memory	Non-volatile Flash memory that can one store one year of data and expandable upto a minimum of 1GB. Via USB/SD Card

Feature	Value
Resolution	A/D resolution $\geq 16$ bit
Recording Interval	Individual recording intervals for each sensor/parameter
Firmware Operating System	Multi-tasking operating system - must log data and transmit at same time
Display	Inbuilt Digital Display for viewing current data and setting values
Power Supply	Shall be powered by Solar panel, to be provided by bidder with DCP, low current drain(quiescent $\leq 10.0\text{mA}$ )
Power Consumption	1) non operation mode: $< 30\text{ mA}$ 2) In operation mode : $< 250\text{ mA}$ .
Battery Voltage	Monitoring of battery voltage level
Internal battery	Internal battery backup for clock, lithium battery, storage 2 years
Charge Controller	Internal or External
Internal clock	Internal clock with drift less than 1 second per Week
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors
Real time clock	GPS synchronized& timing in BST (GMT+6 hours) format required
System integrity	System integrity check procedures
Enclosure	for wall-mounting in a shelter / enclosure with IP65/NEMA4X or better) protection or better
PCB Standard	1)Material: Minimum FR-4 Standard Tg 150°C 2) Surface Finish : HASL - Hot Air Solder Leveling Or Lead Free HASL - RoHS Or ENIG - Electroless Nickel/Immersion Gold - RoHS
Accessories	Serial cable + adaptor (if required) for notebook connection. All accessories (fixing units, etc.) as required
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)
Manuals	full documentation and maintenance instructions in English (1 copy per station).

Feature	Value
<b>GSM / GPRS MODEM</b>	
Operating Temperature	From -20 to +60 Degree C
Performance	Data Reception availability of 95% or better. Yagi Antenna may be used in places with weak signal strength.
Form factor	The GSM /GPRS modem should either be integral part of data logger specified above, or it should be supplied as independent unit compatible with supplied data logger
Specific Features	Data logger should be universal and support any other RLS/Pressure sensor. It should be easily configurable either physical or remote.
Communication direction	Utilize GPRS network for two-way connection with FTP, TCP/IP (INTERNET) connection and SMS  GSM/GPRS antenna to be provided for better signal capture.
Transmission trigger	Data collection to be triggered by interrogation from Data Centre, or by event based transmission triggered by the on-site data loggerFor sending data from data logger to server to BWDB, provided Sub-domain (www.xxx.bwdb.gov.bd) has to be used.
Flood Alarm for typical threshold	Data logger should have alarm set parameters for each sensor value. ( Min Level and Max Level Alarm intervals) When the sensor values crosses critical levels, data loggers should send alarm to Customer by mail and by SMS.
Remote Firmware updation	Data Loggers should have online update option. When there is a new version of the data logger software available it should update itself by online.
Power Saving	Ability to disable interrogation system in order to save power at remote site
Communication Protocol	Data transmission to execute HTTP Post or FTP, SMS to transmit and receiving data to the Data Centre
Accessories	All associated equipment, including Antenna all cables and mounting hardware
Certification	BMD/UL/IEC/ANSI/Equivalent certifications.

### 6.6 Data Logger with Analog Input (AI) 8 channels (For AWS) (Item no. 4f, List of Goods and Delivery Schedule under Section VII):

Feature	Value
<b>Site Conditions</b>	
Ambient Temperature	From 0 to +50 Degree C
Humidity	0 to 100 %
Altitude	0 to 2000meter
<b>Sensor Interface</b>	
Analogue Inputs	8-Analogue Input Channels
Analogue Input	4 to 20 mA, 100% over range withstand
SDI Port	One SDI-12 Interface port
Serial Port for sensor interface	One RS 232 for sensor Interface One RS-485 for sensor Interface port
Digital Inputs	6 Digital Channel (bidirectional)
Pulse Input	2 Input for Rain Gauge impulse
<b>Input - Output Interfaces</b>	
Data Transfer	USB stick option for Data transfer
Port for Configuration	One Serial Port (RS232) for communication with Laptop for programming
Port for Telemetry	2 Ports for Communication with Telemetry (GSM/GPRS) device. Both telemetry systems should work simultaneously for redundancy.
Display Port	Port for connecting external display screen for Data in running text
<b>Computer Software</b>	
Operating System	Windows software for system configuration / communication
Version	English language version
Licenses	All required licenses shall be included
<b>Analog to Digital Converter</b>	
Resolution	16 bit or better or as necessary to make measurements at the necessary accuracy (required under sensor section).
Sample intervals	1 Sec to 24 hours (user scalable)
<b>General Features</b>	
Flash memory	Minimum 8MB Non-volatile Flash memory that can store one year of data. & expandable upto 4 GB Via USB/SD Card.

Resolution	A/D resolution $\geq 16$ bit
Recording Interval	Individual recording intervals for each sensor/parameter
Firmware Operating System	Multi-tasking operating system - must measure log data and transmit at same time
Display	Inbuilt Digital Display for viewing current data and setting values
Power Supply	Shall be powered by solar Power supply to be provided by bidder
Battery Voltage	Monitoring of battery voltage level
Power Consumption	1) non operation mode: < 30 mA 2) In operation mode : <250 mA.
Internal battery	Internal battery backup for clock, lithium battery, storage 2 years
Charge Controller	Internal or External
Internal clock	Internal clock with drift less than 1 seconds per Week or using GPS
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors
Real time clock	GPS synchronized & timing in BST (GMT+6 hrs) format required
System integrity	System integrity check procedures
Enclosure	for wall-mounting in a shelter / enclosure with IP65 /NEMA 4X protection or better
PCB Standard	1)Material: Minimum FR-4 Standard Tg 150°C 2) Surface Finish : HASL - Hot Air Solder Leveling Or Lead Free HASL - RoHS Or ENIG - Electroless Nickle/Immersion Gold - RoHS
Accessories	Serial cable + adaptor (if required). All accessories (fixing units, etc.) as required
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)
Manuals	full documentation and maintenance instructions in English (1hard copy per station along with soft copy).
<b>GSM/GPRS MODEM</b>	
Operating Temperature	From -20 to +60 Degree C
Performance	Data Reception availability of 95% or better. Yagi Antenna may be used in places with weak signal strength.

Form factor	The GSM /GPRS modem should either be integral part of data logger specified above, or it should be supplied as independent unit compatible with supplied data logger
<b>Specific Features</b>	
Communication Direction	Utilize GPRS network for two-way connection with FTP,TCP/IP (INTERNET) connection and SMS.  GSM/GPRS antenna to be provided for better signal transmission.
Transmission trigger	Data collection to be triggered by interrogation from Data Center, or by event based transmission triggered by attached data logger. For sending data from data logger to server at BWDB, provided Sub-domain (www.xxx.bwdb.gov.bd) has to be used.
Flood Alarm for typical threshold	Data logger should have alarm set parameters for each sensor value. (Min Level and Max Level Alarm intervals) When the sensor values crosses critical levels, data loggers should send alarm to Customer by mail and by SMS.
Remote Firmware updation	Data Loggers should have online update option. When there is a new version of the data logger software available it should update itself by online.
Power Saving	Ability to disable interrogation system in order to save power at remote site
Communication Protocol	Data transmission to execute HTTP Post or FTP, SMS to transmit and receiving data to the Data Centre
Accessories	All associated equipment, including Antenna all cables and mounting hardware
Certification	BMD/UL/IEC/ANSI/Equivalent certifications.

## 7.0 DATA COLLECTION PLATFORM

### 7.1. FUNCTIONAL REQUIREMENT

1. The system shall automatically collect the observations from attached sensors, process and store them into its memory and transmit through GSM /GPRS communication link to central station as per the preprogrammed measurement interval, The DCP shall also continuously monitor the status of the instruments, power supply and communication. In the event of failure of an instrument or disruption of any of the power sources, an alarm shall be sent back to the modelingcentre.

2. The number of analog/ digital/ SDI-12 / RS-232 / RS-485 channels in the data logger must be compatible to the sensors being supplied and also for other battery monitoring systems.
3. The sensor's signal conditioning unit should be an integral part of the system.
4. The System shall have provision to easily include and change the following information in field as mandatory requirements:
  - (a) Unique station identification code.
  - (b) Time of observation and Transmission.
  - (c) Sensor identification
  - (d) Data transmission time for GSM/ GPRS communication
  - (e) Programmable Sensor data measurement interval
  - (f) Configuration of Measurement, logging & GPRS/GSM data transmission interval
  - (g) Gain, offset, Datum parameterization for all sensors
  - (h) Configuration of FTP server & mobile number of data centre.
5. Parameterization & configuration of RTDAS stations remotely through GPRS/ GSM communication shall be available
6. The system shall have an integrated microprocessor based data acquisition and storage system having adequate hardware configuration and software support to serve as an interface between sensors and the communication link to perform tasks as stated below.
7. Providing necessary electrical power to the sensors and conversion of electrical output signals from the sensors into engineering value based on calibration information stored in the memory. Full compatibility with all types of sensors provided in the package shall be mandatory.
8. Storage of observed data along with time for all the parameters in the memory. Memory capacity to retain at least 365 days' data is required. Data shall be available even if the power supply to the system has failed (RAM Backup battery) for one year.
9. The stored data shall be retrievable via serial port to a PC/ laptop or USB device. The downloaded data shall be provided in the prescribed format provided for GSM/GPRS in technical specifications
10. Full compatibility with all types of sensors provided in the packages shall be mandatory.
11. The system should be stand alone and all programming functions / setups to be carried out through system keypad and display independent of a PC / Laptop.



12. The system should be capable of continuous updating of the values of sensed parameters and post processing the instantaneous values into average values over a specified period of time for transmission to the DCP with earth receiving station.
  - (i) Management of DCP transmitter to optimize the battery consumption.
13. The system shall provide a complete health status of the battery, transmitter and other components.
14. The system shall support the following functions:
  - (a) Easy programming set up.
  - (b) Multi-tasking capability.
  - (c) User friendly software programming.
  - (d) The system shall have self-diagnostic facility and be capable of displaying station ID / sensor ID code and messages of the display panel for general identification of the fault. It should have facility to monitor these code and other health status through an external laptop / PC.
  - (e) Setup shall be organized in a tree of menus and sub menus. Protection of setup parameters and data through password should be supported by the system. In addition, the DCP shall support the manual entry of data through keyboard and its display.
  - (f) Data including the setup and program files shall be transferrable from the system via a serial port to PC and SD card or other suitable memory device and vice versa. The scripts / software for configuration of datalogger should be part of supply.
  - (g) Facility for Pooling of data via GPRS shall available in data logger.
15. The DCP shall be housed in a weather proof and temper proof housing of NEMA 4X/IP65 or better type enclosure of steel or fiber glass.
16. DCP Should be supplied with Software for configuration and troubleshooting
17. The data logger shall be programmable locally in field via laptop / PC.
18. The DCP shall be located in a place specified by the Engineer-in-charge at each site and shall be generally one meter above Highest Flood Level (HFL) attained at that site. The DCP at each site shall be located in such a way it is easily approachable even in floods.
19. The surge suppression in form of fuse or other appropriate device shall be provided for all interfaces to protect the data logger from the surges emanating from the sensor.
20. The DCP shall have a provision to display, store and transmit the water level with respect to MSL or with respect to zero level/bed level (user selectable).

21. The datalogger shall store data in memory, in case of GPRS/GSM communication failure. The data shall be transferred automatically once GPRS/GSM communication is retained. This will ensure no data loss during no communication also.

## 8.0 GSM & GPRS TRANSMISSION FORMAT:

Table below gives the GSM / GPRS data parameters and their identification code format which is required to transmit the data from datalogger to FTP server.

### Format:

&Station ID, Date and Time, Mobile Number, Battery, Water Level, Hourly Rainfall, Daily rainfall, Air temperature, Snow Depth, Evaporation, Wind speed, Wind direction, Atmospheric pressure, Humidity, Sunshine Duration

### **Example Data String:**

&738D1E76,07/01/18 10:00,9849556430,13.5,26.347,1.5,15.5,-11.4,--,187,1.2,256,936.7,56,125

S. No.	Channel no.	Parameter
1	Station ID	Start of String should be ‘&’ and Eight Characters Station ID provider by bidder
2	Date and Time	Measurement date and Time in DD/MM/YY HH:MM
3	Mobile Number	Mobile no of remote station SIM
4	Battery	Battery voltage at end of every full hour in Volts with 1 right digit
5	Water Level	Water level at end of every full hour in Mts. with 3 right digit
6	Hourly Rainfall	Hourly rainfall in mm. with 1 right digit
7	Daily rainfall	Daily rainfall (rounded off to next higher integer).in mm. with 1, right digit reset at 08:00 IST
8	Air Temperature	Instantaneous sampled value of air temperature in °C with 1 right digit at the end of every full hour.
9	Evaporation	Evaporation at end of every full hour in mm. with 0 right digit
10	Wind speed	Wind speed in knots with 1 right digit (3 minute vector averaging prior to full hour).
11	Wind direction	Wind direction in degrees with 0 right digit (3 minute vector averaging prior to full hour).

S. No.	Channel no.	Parameter
12	Atmospheric pressure	Atmospheric pressure at end of every full hour in hpa. with 1 right digit
13	Relative Humidity (RH)	Instantaneous value of RH at the end of every full hour in %. with 0 right digit
14	Solar Radiation / Sunshine Duration	Global Solar Radiation in $W/m^2$ or sunshine Duration since last mid night. Reset to zero at mid night In number of minutes. (Global radiation will be transmitted in this slot instead of duration of sunshine)

**Note:**

1. If any sensor is not connected, then it should transmit '--' characters in place of the sensor value.
2. Attached format is indicative, recommended for standardised data acquisition for development of unified Water Information System. In case bidder deviates from this format then bidder shall be responsible for integration of the data in New Data Center server without any manual intervention.

**9.0 LIGHTNING PROTECTION**

The entire unit has to be adequately protected against lightning and build of static charges. The lightning rod should protrude 1 m above the highest point (Antenna) and should be placed in the centre of the pole. The mast should be electrically grounded by following as per appropriate Bangladesh Government electrical installation standards and specifications earthing procedures. As a part of the maintenance, the earthing equipment shall be inspected on a yearly basis for its conductivity and effectiveness. Such inspection shall be carried out in the pre-monsoon period and any faults noticed shall be rectified.

**10.0 EARTHING FOR EQUIPMENT**

The electrical grounding for all other electronic and electrical equipment should be done by following standard as per appropriate Bangladesh Government electrical installation standards and specifications. The earthing for the equipment should be done separately and should have a minimum distance of 2.5 meter from the earthing done for lightning rod. In no case both the earths should be done in the same earthing rod.

As a part of the maintenance, the earthing equipment shall be inspected on a yearly basis for its conductivity and effectiveness. Such inspection shall be carried out in the pre-monsoon period and any faults noticed shall be rectified.

**10.1 SAFETY EQUIPMENT KIT**

The safety equipment kit is for the purpose of maintenance and repair of the sensor and other related equipments at the site which include but not limited to: Safety belt, Ladder, Tools box

, Tools set, Register/Note book, Duster (to clean solar panel and other devices), Standard Operation Manual (in Bangla).

## **11.0 SOLAR POWER SUPPLY WITH BATTERY BACKUP**

### **11.1 SOLAR POWER SUPPLY**

Solar Panel mounting hardware shall be designed to allow a great variety of attachment methods and accommodate a variety of mounting surfaces. They may be used to mount a module on a horizontal or vertical surface, on surfaces at angles between horizontal and vertical and on metal poles. Attachment methods include bolts, lag bolts, u – bolt brackets and stainless steel hose clamps.

The Solar power supply shall be mounted on the roof of site buildings where existing. The Bidder shall supply a pole – mounted arrangement including a standard pole and necessary foundation and fixing arrangements.

The location of solar power installation shall be indicated by the concerned engineer – in – charge of each DCP.

In order to guard against frequent theft of solar panels the mounting device shall be so designed as to make the solar panel detachable as and when required. It is intended to store the solar panel during the night hours as well for longer durations in the non-monsoon period and the arrangement should be designed in such a way that the arrangement is sturdy and capable of handling frequent disconnecting and re connections.

The power supply shall primarily function through a set of sealed maintenance free rechargeable batteries capable of preventing deep discharge.

Solar panel has to hang in a place suitable for easy access and to clean.

### **11.2 BATTERIES**

The batteries required for the equipment above shall be maintenance free, rechargeable sealed batteries with the following features:

- (a) Overcharge and deep discharge protection
- (b) Leak-proof
- (c) Easy handling – no special shipping container required
- (d) Long service life
- (e) Excellent recharge ability

One battery pack shall be provided for each DCP. The batteries pack provided shall have adequate capacity to sustain the maximum sized DCP configuration of sensors and telemetry equipment for a period of 30 days of continuous operation at the frequency of one observation per hour per sensor and one transmission per hour on a 24-hourly basis. This capacity shall be available If it not, battery pack should be replaced with new one free of cost.

The necessary housing and configuration of the batteries shall be furnished in detail by the Bidder.

The battery pack shall also include arrangements of charging through a standard 220 V AC domestic power supply outlet and also from solar panels established as above. The normal supply to the DCP equipment shall be from battery pack only.

The power supply unit shall have audio and/or visual alarms for overcharging and deep discharging conditions. The charge level shall also be indicated on the front panel of the pack.

The sealed construction shall allow trouble-free, safe operation in any position. The battery case shall be high-impact, with sufficient resistance to shock, vibration, chemicals and heat.

### 11.3. POWER SUPPLY FOR DCP

The equipment offered should conform to the following technical specifications

Feature	Units
<b>Battery</b>	
Voltage	0 to 60 V / as compatible with DCP and all sensors
Type	Sealed maintenance free
Capacity	Based on site conditions and Telemetry method, power supply system to provide 15 days of power back up to all equipment's being powered up by the solar panel
<b>Solar Panels</b>	
Size	Size shall be smaller and portable in nature and panel size shall be such that during the rainy season. The solar panel size should be dictated by the power consumption of the attached equipment, and allow the battery to be charged in a single day of full sunlight from 50% battery capacity.
Mounts	The mounts should be sturdy in design and detachable but the solar panel should not move or rotate with wind. It should have provision to adjust direction and elevation during installation for optimal solar power generation.
Charger	Smart solar charger with protection shall be provided by the bidder
<b>General</b>	
The supplier should determine optimal size of batteries, such that system should be operational for at least 15 days in the absence of charging	

#### 11.4. SPECIFICATION FOR CABLING AND CONDUITS

- i. The term cable shall always include necessary type of connectors at both the ends for connecting between two equipment. The connectors shall be properly anchored with protective sheathing of the cable in such a way that the loads due to pulling and twisting shall be borne by the protective sheathing and the conductors shall not be subjected to any stress.
- ii. The connectors shall be so fixed on the individual components of the system that the metal/ plastic connector shall always transfer the loads due to pulling and twisting directly to the protective body of the component and the internal interface cards/ connections shall not be subjected to any load.
- iii. Laying of necessary data and power supply cables for connecting various components and embedding them or protecting them with necessary conduits shall be carried out as per directions of engineer-in-charge.
- iv. Wherever the cables are to be laid indoors and the length of the individual cable run exceeds 1 meter, the cable shall be housed in a protective conduit made of electrical supply grade conduit of appropriate diameter and the conduit shall be fixed with the wall at a height not less than 1 meter above the floor surface. Whenever the indoor cable is required to cross the floor, it shall be housed in a HDPE pipe of 25mm internal diameter and the pipe shall be fixed to the floor with suitable protective covering to avoid tripping of personnel using the area or disturbance to the pipe due to such movement.
- v. Wherever cables are to run through open ground including the public road and pathways, the cable shall be armored /shielded and shall be water ingress proof up to static water pressure of 5 kg/cm<sup>2</sup>. All joints made in cable shall also meet the water proofing criteria. In addition, the cable shall be protected by housing the same in 25 mm HDPE pipe/flexible metallic conduit embedded at a depth of not less than 1.0 meter below the ground surface with a warning brick on the same. A sketch of the cable layout with respect to the identifiable marks of the area shall be prepared and handed over to the Engineer-in-charge for each such cable run on completion of the work of cable laying operation.
- vi. The joints in the cable connecting between the sensor and data collection unit shall be avoided by measuring the appropriate length of the cable required and attaching the same in one piece. If the cable joints become necessary, prior permission of the Engineer-in-charge shall be obtained before executing the same. The joint fabricated through a splicing and jointing kit shall be stronger than the parent cable.
- vii. The cable carrying data and electrical AC power shall be housed separately in different conduits separated by adequate distance to prevent leakage currents. The

data cables shall also be laid out in such a way that the data integrity is not compromised due to mutual interference.

- viii. Shielded (screened) cables shall be used for external Cabling. The power and control cables shall be generally as per IS 8130/34. For these cables, equivalent IEC/IS specifications are also acceptable

- (a) All cables shall have stranded copper conductor of suitable cross section depending on load.
- (b) The Communication cable/power cable shall be of shielded, twisted pair type.

These are minimum requirements. Bidder is free to propose improved cabling technology

## 12.0 TRAINING AND DOCUMENTATION

The Bidder is required to provide an extensive training programme for the system. The training set forth in the following paragraphs is a minimum requirement and the bidder should propose any additional training that he considers critical for long term success of the system operations.

The Bidder is expected to provide an outline or table indicating the contents of each of the required courses. The table shall describe the specific topics to be covered for each day of the training period.

The Bidder is responsible for the salaries of the training instructors and all training materials. The costs of travel, transportation and per diem for the trainees shall be borne by the Purchaser.

Training shall be provided by the bidder in several phases. The training shall include both classroom and field trainings and will be continued during all five years. The bidder is required to have hydro-meteorological equipment specialists.

The Bidder shall provide trainings as training modules as part of the Tender given as under:

S. No.	Description	Numbers of training/ Duration of each Training	Number of Participants per session
<b>During Installation Period</b>			
1	User Training Course for senior management. (5 day) regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning	1 Training in Dhaka Head Quarter of BWDB  Duration 5 days	20

S. No.	Description	Numbers of training/ Duration of each Training	Number of Participants per session
	including training kit containing course material in soft and hard copies as per technical specification.		
2	Operation and Maintenance course (5 days). regarding startup, operation, maintenance and/or repair manual of the supplied goods. Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies as per technical specification.	4 Training in Four Measuring divisionsMeasuring divisions offices of BWDB  Duration 5 days each training	4X10
<b>IT Related Traing after Installation</b>			
	<p>Provide Training after completion of the implementation. for operation and system support of all the software and hardware</p> <ul style="list-style-type: none"> <li>• <b>Admin Level Training (Hydrology operation):</b> Provide Admin User Training for 10 Admin users for 5 days</li> <li>• <b>Admin Level Training (Other operations):</b> Provide Admin User Training for 10 Admin users for 5 days</li> <li>• <b>Technical Training (software):</b> Provide Technical Training on software development for 10 advanced users for 15 days</li> <li>• <b>Technical Training (Hardware):</b> Provide Technical Training on hardware maintenance for 10 advanced users for 7 days</li> <li>• <b>User Level Training (Other operations):</b> End user training for 10 users for 07 days</li> <li>• <b>On Job Training (Other operations):</b> 3 days training during implementation in each module</li> </ul>	1 traning each as mentioned	as mentioned days and numbers of trainees



S. No.	Description	Numbers of training/ Duration of each Training	Number of Participants per session
<b>During 1 year Warantee Period</b>			
3	User Training Course for senior management. (5 days)	1 Training in Dhaka Head Quarter of BWDB  Duration 5 days each training	20
4	Operation and Maintenance course (5 days). Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing, maintenance requirements, and procedures for equipment configuration, installation, site testing and commissioning .	4 Training in Four Measuring divisionsMeasuring divisions offices of BWDB  Duration 5 days each training	4X10
<b>During Annual Operation &amp; Maintenance Services Period in each Year</b>			
5	User Training Course for senior management (5 days).	1 Training in Dhaka Head Quarter of BWDB  Duration 5 days	20
6	Operation and Maintenance course (5 days). Course topics will include sensor calibration, data logger configuration, data downloading, data retrieval, collection, Trouble shooting, processing, maintenance requirements, and procedures for equipment configuration, installation, site testing and commissioning .	2 Training in Two Measuring divisionsMeasuring divisions offices of BWDB  Duration 5 days each training	2X10

All aspects of the electrical, instrumentation and telemetry equipment being supplied shall be covered in the courses and full documentation shall be provided. The documentation and kits shall be approved from purchaser in advance. The course shall provide detail documentation and shall ensure that the purchaser's personnel shall be able to modify settings/ parameters without reference back to the Supplier. The places / sites where this training will be decided later by the purchaser.

The training course will take place as decided by the Purchaser. In case of formal training, the Purchaser will provide classroom and other logistics. The Bidder will facilitate the professional and the training materiel. On-the-job training will be provided

by the Bidder in conjunction with the installation of hydro-meteorological stations and during the course of maintenance as required.

- (a) TA/ DA of the trainees shall be borne by the purchaser.
- (b) Training kit containing course material in soft as well as hard copy shall be provided by the Bidder.
- (c) All logistical arrangement such as projector, training space etc for training is to be made by purchaser.

### **13.0 PREVENTIVE MAINTENANCE**

The bidder shall be responsible for operation and maintenance of all stations /components of installations, commissioning, site acceptance and operation tests. All equipment maintenance cost, repairs, replacements and repairs to civil work shall be borne by the bidder during the warranty Period. The scope of O&M support would include all materials and services including replacement of components and consumables (including batteries etc.), mandatory spare parts required to ensure smooth and sustainable operations of the entire system. The bidder shall provide monthly maintenance reports during the course of maintenance. The bidder shall supply a Manual specifying all the faults experienced by the system together with an account of how such faults have been rectified.

The bidders shall ensure the following visits at remote site for preventive maintenance. The bidder should take time stamped geo tagged photographs of the equipment during each maintenance visit (either scheduled or unscheduled visit). The photographs should show the condition of equipment before maintenance, during maintenance and after maintenance.

#### **Schedule Showing Frequency of Scheduled Visits for Routine and Preventive Maintenance**

<b>Sl. No.</b>	<b>Station Category</b>	<b>Minimum Preventive Visits yearly</b>	<b>Remarks</b>
1	Maintenance of AWLG stations (Bridge mounted)	4	One pre-monsoon, two in monsoon period and one in post monsoon and also on need basis
2	Maintenance of AWLG Stations (Pole mounted Radar type)	4	One pre-monsoon, two in monsoon period and one in post monsoon and also on need basis

3	Maintenance of Automated Rain gauges(ARG)	4	One pre-monsoon, two in monsoon period and one in post monsoon and also on need basis
4	Maintenance of AWS	4	One pre-monsoon, two in monsoon period and one in post monsoon and also on need basis

1

### 13.2 Operation & Maintenance

Bidder shall provide at least one dedicated Service Engineer cum operator at the National Data Centre for Operation of RTDAS system and ensure seamless data transfer from remote station to National data Centre via GPRS /GSM data transmission as per technical specifications.

The Service Engineer shall have experience of working on Hydro met stations /Instrumentation / SCADA system for period of at least 3 years and shall be well versed with Operation and Maintenance aspects of RTDAS systems.

Operation and Maintenance shall include free of cost repairs/ replacement of hardware and Software necessary to keep the system functional for the period of five years (Warranty) from Date of Installation.

## 14.0 INFORMATION TECHNOLOGY SECTION

Apart from getting the specific responsibilities in the Information technology area, the bidder should get:

- An overview of the entire Software Solution for BWDB, and,
- An overview of the entire ICT Solution for implementing the software solution.

At the end of the section, Specific Responsibilities of the bidder, vis-à-vis the entire software solution and the entire ICT solution, have been described.

For details of the Software Solution, refer to “*Proposed IT Solution: Appendix 1: Services & Products Report*”.

### **Overview of the Software Solution**

The New BWDB Information System will be developed for meeting the following non-negotiable key business objectives of BWDB:

- To retain the functions implemented in the current information system. Currently implemented functions must not be removed, rather they should be technically upgraded, as found required;
- To overcome the issues and deficiencies of the current information system as revealed through the assessment of the existing system;

- To introduce more functions and features for strengthening Hydrological Information Services;
- To capture, collate, process, integrate, and disseminate hydro-meteorological data of all river basins in Bangladesh;
- To process the data for providing information required for a range of hydrological, environmental and engineering studies;
- To manage and maintain the historical data and disseminate data to the stakeholders, to meet their demands;
- To enable the Flood Forecasting and Early Warning System, by providing hydro-met data online.

The direct benefits of the New BWDB Information System are:

- Maximization of real-time capture of hydro-met data;
- Maintain data entry facility, for the hydro-met parameters, which are not captured through RTDAS;
- Maintain data entry facility, as a fall back of RTDAS;
- More efficient data storage for integrating surface water data, ground water data, meteorological data, and river channel morphology data;
- More stringent data validation and data cleaning;
- Flexible, fulfilling and access controlled data dissemination;
- Enabling flood forecasting and early warning;
- More user friendly and easy to use system;
- More secure and scalable database design for storing and retrieving hydro-met data;
- More secured data dissemination;
- Enabling users with advanced search options and obtaining required data from anywhere;
- Modularized design of the software application enabling the BWDB developers to maintain the software system, efficiently.

The New BWDB Information System will capture real-time hydro-met data files for Surface Water, Coastal Monitoring and Ground Water data from the respective Real Time Data Acquisition Systems. The data files will be collected in the “Data Collection Server”. The system will provide facility for capturing manually measured hydro-met parameters data and River Morphology data also. Both the real-time data files and non-real-time data files (say, “Other Data Files”) will be stored in the “Data Collection Server”.

A Data Collection / Acquisition software will be installed in the “Data Collection Server”. The software will parse the data files, decrypt the data, and store them in a “Time Series Database”. A relevant portion of the parsed data will be stored in another Database too (say, “General Database”).

A Data Management Software will be installed in a “Data Management & Processing Server”. The software will do data validations and store the validated data in a “Time Series Database”. The “Data Management & Processing Server” will house the “General Database” also.

There will be another Server, “Dissemination Server”, where permissible data sets, extracted from the Time Series Database and the General Database will be stored and regularly refreshed. All the three Servers (“Data Collection Server”, “Data Management & Processing Server” and “Dissemination Server”) will be installed in the New BWDB Data Centre.

The New BWDB Information System will be a web-based software application system, consisting of three major components:

- A. Portal:** For data entry, data validation and cleaning, controlling parameters and options set up for data dissemination
- B. Mobile Application:** For limited data entry and queries
- C. Website:** For controlled and rule-based information dissemination

The “Dissemination Database” will be accessed for disseminating data to the external users, in the form of restricted and stipulated reports, queries, data buying, and data visualization. Data will be disseminated mainly through the Website. Part of the Portal and the Mobile Application may be designed for data dissemination to the external users. The Portal and the Mobile Applications will be implemented with user access control and authorization. BWDB Internal Users will mainly use the Portal and Mobile Application for their internal operations, queries, reports, and data visualization. For that purpose, the “General Database” and the “Time Series Database” will mainly be accessed. Everywhere, GIS system will be accessed for displaying data of Maps.

### **Sourcing Observation Wells Ground Water Data**

Refer to the Bidding document, "Procurement of Upgrade existing and new ground water stations and nests from Manual to Automatic, including monitoring and maintenance" under the Project BWCSR: Component-B SHEWS.

Through a separate initiative, a ground water observation wells network (RTDAS) will be installed, consisting of 905 sties. The automation of the Groundwater monitoring network will streamline the data into the system. Ground Water data transmission will be automatic

and real-time from the field to the server. The Ground Water data will be transmitted using GSM/GPRS communication protocol. Ground Water “real-time data files” containing hydro-met data will be collected in the “Data Collection Server”.

### **Sourcing Observation Network Surface Water Data**

A real time hydro-met data acquisition network (RTDAS) will be implemented, as per the Task 1.2 “Assessment and design of water resources information observation network”. The Real Time Data Acquisition System (RTDAS) for Surface Water Observation Network will consist of a telemetry network of Automatic Rainfall Gauges (ARG), Automatic Weather Station (AWS) and Automatic Water Level Gauge (AWLG) stations, along the rivers and reservoirs. The sensors of the telemetry network will automatically measure and transmit “real-time data files” containing hydro-met data to the same “Data Collection Server”, using GSM/GPRS communication protocol.

### **Sourcing Coastal Monitoring Surface Water Data**

Another Real-Time Data Acquisition System (RTDAS) for Coastal Monitoring Network will be implemented, consisting of a Telemetry Network of Automatic Rainfall Gauges (ARG), Automatic Weather Stations (AWS) and Automatic Water Level Gauges (AWLG). The sensors of the telemetry network will automatically measure and transmit “real-time data files” containing Coastal Storm and Inundation data, to the same “Data Collection Server”, using GSM/GPRS communication protocol.

Every day 1500 X 400 data files will be transmitted by the Real Time Data Acquisition Systems from 1500 stations. This huge load will hit the Data Collection Server every day (24X7). Hence, the Data Collection Server has to be load balanced.

### **Sourcing Manually Measured Data**

There are certain hydro-met parameters, which will not be captured through the Real-time Data Acquisition Systems. Those hydro-met parameters will be manually measured at the field. The New BWDB Information System will provide User Interfaces (in Portal and Mobile Application) for the users to enter the manually measured data. The manually measured data will be stored as “Other Data files” in the same “Data Collection Server”.

### **Sourcing River Morphology Data**

River Morphology data will be captured from the IWM (Institute of Water Modelling) files. The New BWDB Information System will provide Import Utility for the IWM users to upload the River Morphology data files. IWM users should also be able to enter River Morphology data using the User Interfaces provided by the New BWDB Information System. The uploaded data files will be stored as “Other Data files” in the same “Data Collection Server”. Entered morphology data will be stored as “Other Data files” in the same “Data Collection Server” too.

### **Sourcing BMD and DAE Data**

Bangladesh Meteorological Department (BMD) and Department of Agriculture Extension (DAE) send data to BWDB. The New BWDB Information System will provide Import Utility

for the BMD and DAE users to upload the data files. The uploaded data files will be stored as “Other Data files” in the same “Data Collection Server”.

### **Data Files Parsing and Decrypting**

A Data Collection / Acquisition software will be installed in the “Data Collection Server” and will run in a stipulated time interval. The software will pick up the newly arrived data files in the “Data Collection Server”, parse the data from the data files, and decrypt the data. After parsing and decrypting, the software will store the data in a “Time Series Database”. A relevant portion of the parsed and decrypted data will be stored in another Database too. (say, “General Database”).

### **Data Processing and Validation**

A Data Management Software housed in the “Data Management & Processing Server” will perform time series processing and data validation, as per the Quality Management System (QMS) of BWDB. As part of the data validation process, the software will facilitate in doing Data in-filling (completion) and correction, Data compilation, Data analysis, and Data reporting. The software will support performing Data Validation in two levels; Primary Data Validation and Secondary Data Validation. The processed, validated and corrected data will be stored in the Time Series Database.

### **Other Supporting Functions**

Apart from data collection, processing and validation, the New BWDB Information System will have many supporting and ancillary functions. In order for executing those functions properly, corresponding data have to be maintained in the system. These data will be stored in the “General Database”.

### **Catering to User Data Requests**

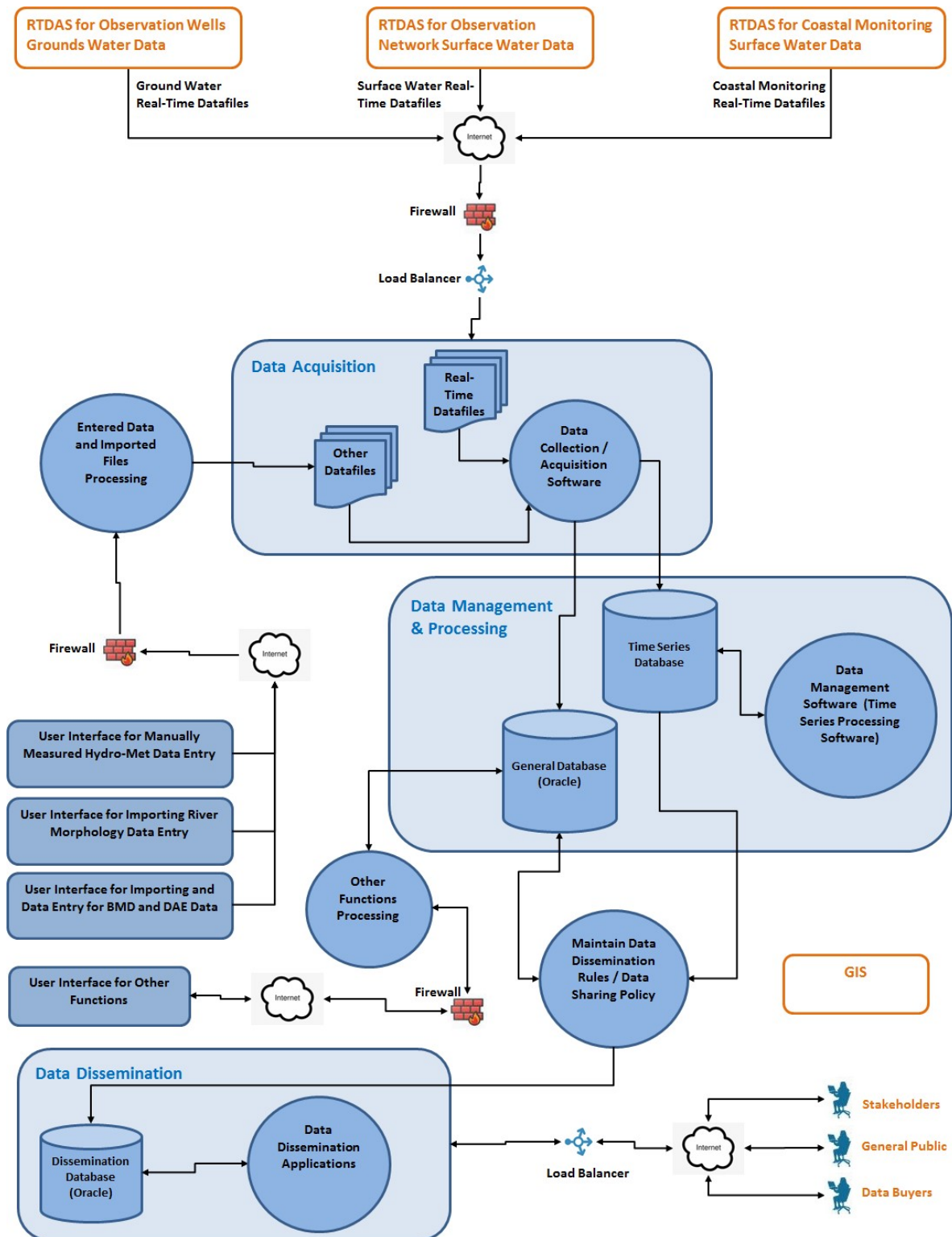
There are Data Dissemination Rules and Data Sharing Policy of BWDB/the Bangladesh Government, which have to be maintained in the system. According to the Data Dissemination Rules and Data Sharing Policy, data will be extracted from the “General Database” and the “Time Series Database”, and the extracted data will be updated and refreshed in the “Dissemination Database”. The “Dissemination Database” will be accessed to cater to the users, who are external to the core system. The “General Database” and the “Time Series Database” will be secluded from the external world.

“Data Dissemination Applications” will primarily access the “Dissemination Database” to cater to the external users’ data requests like reports, queries, data buying, and data visualization. Data Dissemination Applications mainly relate to the Website. However, a part of Data Dissemination may be implemented in the Portal and Mobile Application, also. Data Dissemination Server will be “Load Balanced” to sustain potentially fluctuating data request load from the external users. “Data Dissemination Applications” will access the GIS system for displaying disseminated data on the Maps.

### **An Integrated Information System**

As described above, data from various sources will get into the system, go through several processes, get transformed, stored and get ready for dissemination. The New BWDB Information System will be an integrated information system ensuring end-to-end seamless data flow and processes. The Figure below schematically depicts the end-to-end dataflow, the processes, the Servers, and the Databases housed in the Servers, for the New BWDB Information System.





**Schematic diagram of end-to-end dataflow, the processes, the Servers, and the Databases of the Information System**

## **Overview of the ICT Solution**

The New Software Application will be installed in the New BWDB Data Centre facility and run from there. In order for implementing the New Software Application and running the same efficiently, appropriate ICT Items (Computer Servers, Communication items, Security items, Monitoring Software items, etc.) have been judiciously identified. The ICT Solution for BWDB identifies the ICT items according to specific requirements, purposes and benefits of BWDB.

Following are the primary drivers for the ICT solution and design:

- Overcoming the issues, deficiencies and problems at hand in the Computer Facility of the Hydrology Wing.
- Provisioning the ICT items, which will implement the Value Adding features in the ICT System.
- Provisioning the ICT items, which are directly or indirectly required for installing and running the software for the New BWDB Information System
- Provisioning the ICT items, which are not related to running the software for the New BWDB Information System, but required for the Data Centre rendering more efficient services to the New BWDB Information System.

For details of the ICT Solution, refer to the “ICT Systems Design Report”.

The value adding features and their benefits are described below.

### **Implementing Redundancy at Server Level**

Computer Server Level redundancy will be achieved at two levels; by having redundant Computing Resources and by having redundant Computer Servers. Explained below:

#### **Computing Resources Redundancy**

High-performance Servers with sufficient computing power in terms of CPU, storage, RAM, network ports will be installed in the Data Centre, which will have computing resource redundancy for hosting and running multiple applications and databases efficiently. Computer Servers’ specifications have been judiciously decided to ensure sufficient computing resources redundancy. The HDDs will have sufficient storage space for installing and running the requisite application software/tools and database management software.

#### **Computer Servers Redundancy**

A critical requirement for BWDB is that the New Information System will provide uninterrupted (24X7) services to the stakeholders and the users. To ensure that the system

has to be set on High Availability (HA) mode or Fault Tolerant (FT) mode. In the New BWDB Information System, HA/FT will be obtained by deploying Computer Servers in Failover clusters and/or Data Synchronization clusters. Almost for every function of the BWDB system, a pair of Computer Servers will be deployed in Failover clusters and/or Data Synchronization clusters. As for example, for Data Acquisition, instead of having one Computer Server, two Computers Servers will be deployed, which will run in Failover cluster?

Failover is a backup operational mode in which the functions of a system component is taken over by a Secondary system, when the Primary system becomes unavailable either due to failure or due to scheduled down time. Thus, if the Primary Computer Server deployed for “Data Acquisition” fails due to any reason, the Secondary Computer Server will take over the data acquisition operation. This will ensure an uninterrupted data acquisition in the BWDB system.

### **Implementing Load Balancing**

Every day 1500 X 400 data files will be transmitted by the Real Time Data Acquisition Systems from 1500 stations. Data files will generally contain the following data points; SWL/GWL/RF, Device code, Station Id, Server/Device Time/Log interval, Parameter/value, Battery voltage, Solar voltage, CSQ of Modem/Radar status, Ptr (Read/Write), Source IP, RecError. This huge load will hit the Data Collection/Acquisition Servers every day (24X7). Hence, the Data Collection/Acquisition Servers have to be load balanced.

The Data Dissemination Servers will also face fluctuating load from the external users. Data requests from the users can substantially go high in the event of natural disasters or similar events. In order for coping up with the spikes of load, the Dissemination Servers have to be load balanced.

Load Balancers hardware will be implemented with DDoS protection (Anti-DDoS). Anti-DDoS will protect from DDoS attacks at the network, session and application layers. Depending upon the incoming load the Load Balancers will distribute the load dynamically among the Servers.

### **Enhancing Security**

Another critical requirement for the new Information System is the Security at all levels (internet security, application security, etc.). Security will be ensured through Firewalls and Anti-DDoS at every entry point of the system from the internet. At the crucial entry points like real time data acquisition, most modern and advanced Firewall, i.e., Next-Generation Firewall (NGFW), will be installed for taking care of all possible security measures and control. NGFW will be installed for WAN perimeter. Midrange Firewalls will be installed for

the four branch offices for IPSEC connectivity to HO. Redundancy will be followed in Firewall item also, including Data Centre Internal requirement.

### **Implementing Redundancy at Network Level**

All the Networking equipment like Firewall, Core Switches, and Load Balancers will have redundancy for avoiding single point of failure, and ensuring High Availability (HA) of the ICT system. Sufficient redundancy is applied to ensure HA in the RTDAS sensors connectivity.

### **Implementing Data Centre Storage Network**

Storage-Area Networking (SAN) is used to attach servers to remote computer storage devices in such a way that they appear to be locally attached devices. SAN offers the following benefits:

- Application high availability: Storage is independent of applications and can be accessed through multiple paths.
- Better application performance: Processing for data storage is offloaded from servers.
- Consolidated storage and scalability: Simpler management, flexibility, and scalability of storage systems.
- Disaster recovery: Data can be copied remotely using Fibre Channel over IP (FCIP) features for disaster recovery.

### **Monitoring Services**

The Data Centre needs to monitor certain critical aspects like security incident event monitoring, server monitoring, field maintenance tracking and monitoring, for much enhanced services to the Information System by taking pro-active actions and by taking informed decisions.

Following monitoring Tools will be implemented in the Data Centre. The functional requirements of the Monitoring Tools are described in the following sections.

- **NMS/Server Monitoring Tool:** This tool is for Infrastructure and Network Management, which will help to monitor all the Servers and the Network components for taking immediate action, in case of any failure or mal-functioning.
- **Security Incident Event Management (SIEM) Tool:** This tool will help to monitor the security in the system, which will help in taking immediate action if any incident has taken place already and taking pro-active action for any perceived threat to the system.

- **Field Maintenance Tracking Tool:** This tool will help in tracking onsite services, managing personnel, and maintaining online visibility into operations.

Following functions and features will be implemented in the New BWDB Data Centre for overcoming the issues, deficiencies and problems at the current computer facility.

### **Backup & Restore**

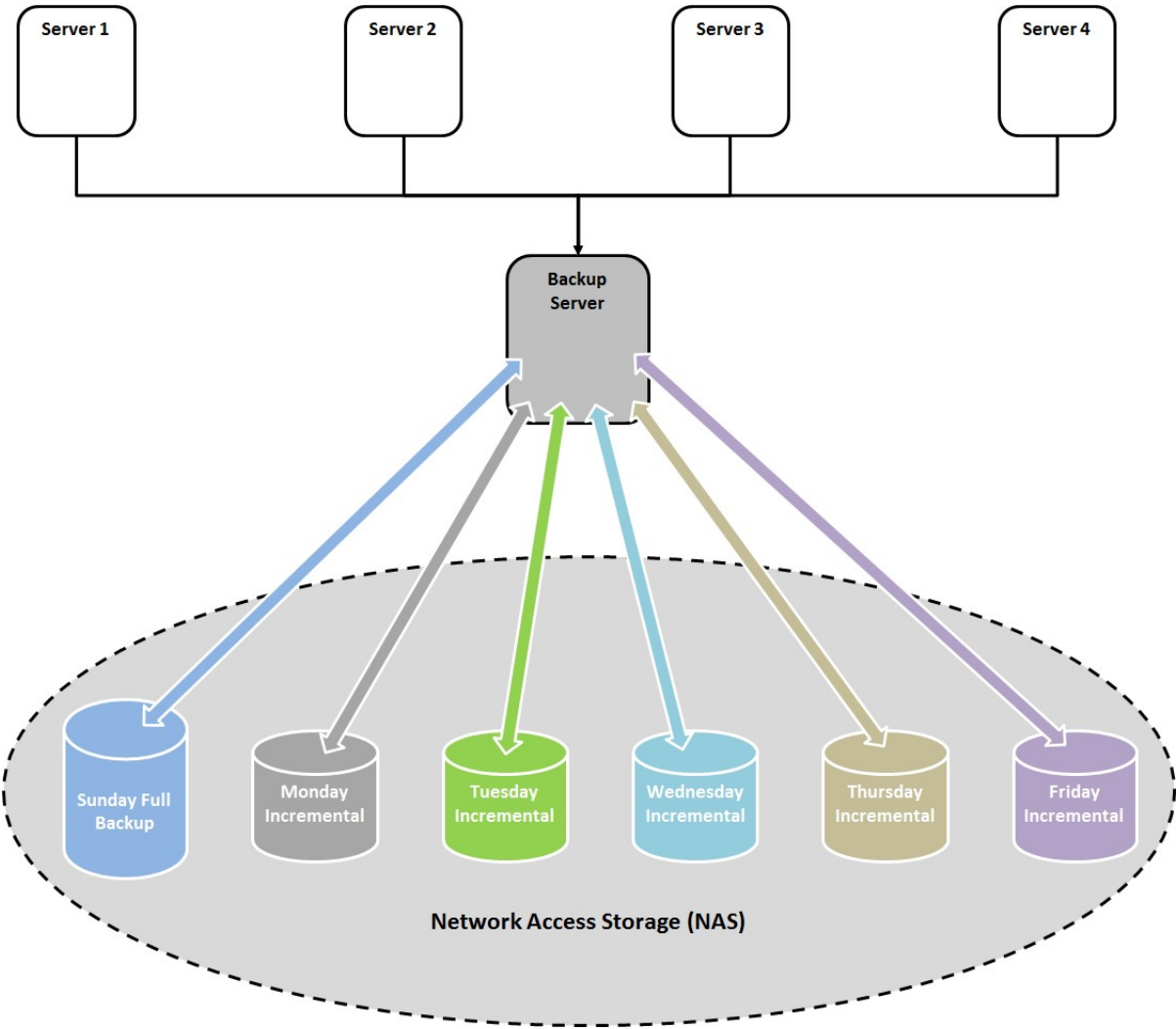
Enterprise data deem to be vulnerable in the event of buggy software, data corruption, hardware failure, malicious hacking, user error or other unforeseen events. BWDB cannot afford to lose its sensitive and valuable data. The Data Centre needs to implement a rugged and fool-proof backup and restore process and mechanism for the New BWDB Information System. BWDB's goal is to minimize the risk of losing data and ensure rapid and reliable data restore, should the need arise.

A COTS software for Backup and Restore will be implemented in the Data Centre to make sure all the servers data and applications of the New BWDB Information System are backed up systematically. The Backup System should conform to an industry standard backup methodology.

The Backup System should follow the classic GFS scheme, which implies daily backups as 'sons', weekly as 'fathers', and monthly as 'grandfathers'. This scheme is very suitable for the organization want to have an incremental backup system. For BWDB incremental backup is very suitable.

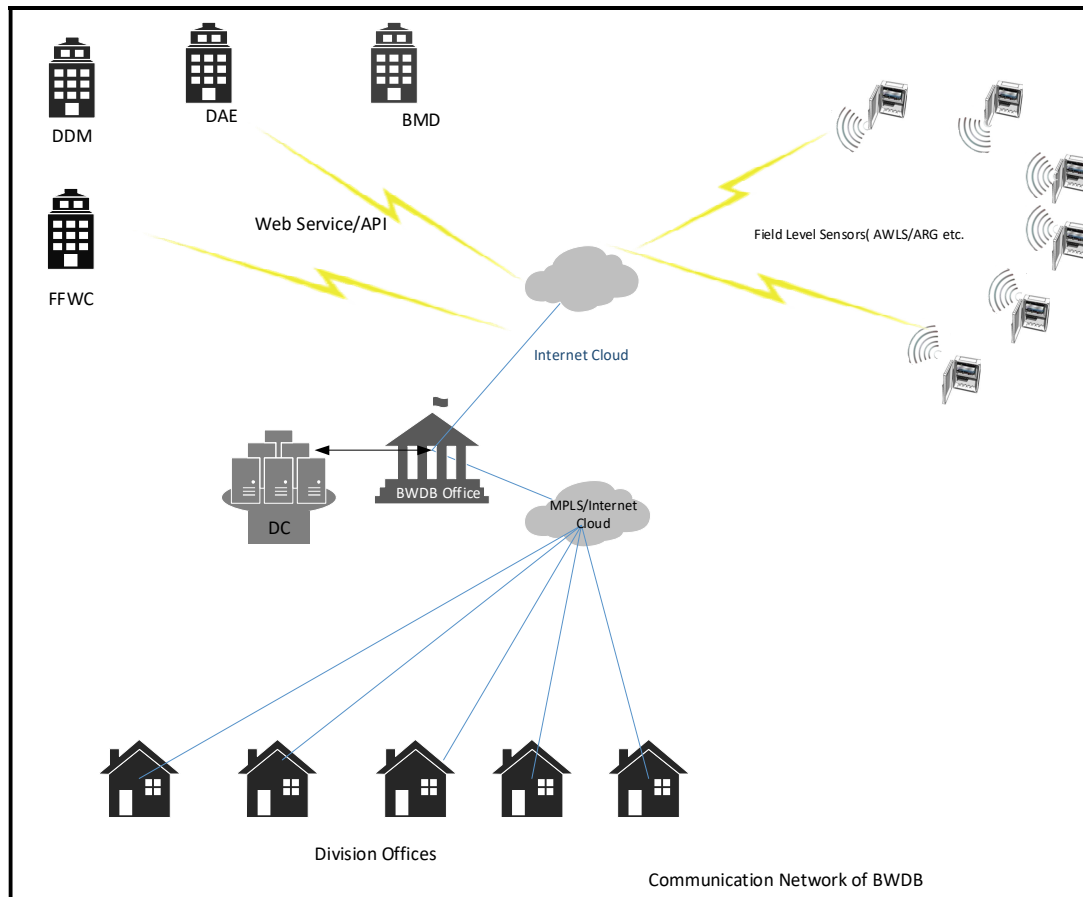
The initial full backup made on Monday becomes the first 'father', and the following incremental daily backups are 'sons'. The last backup of the week becomes the next 'father'. The 'sons' are rotated on the FIFO rotation scheme, so the oldest 'son' is replaced with the new incremental backup, and the cycle repeats. The last backup of the month becomes a 'grandfather'. After that, 'fathers' begin to rotate by the FIFO scheme.

Figure below schematically depicts how data will be pulled from the target servers and the data will be backed up in NAS (Network Attached Storage), installed in the new Data Centre.



### The Communication Network

The Proposed Communication Network for the New BWDB Information System is schematically presented in the Figure below.



In the new system, all field stations like AWLS, AWS, ARG etc., will be having GSM/GPRS based communication system, which will send real time data over GPRS network to the BWDB Data Collection Server, installed at the New BWDB Data Centre. The Data Collection Server will have high speed Internet connectivity to receive those data. Data exchange with the department like BMD, DAE will be done through API / Web services, apart from Data Import/Export facility. All Divisional offices of BWDB will also have Internet connectivity for exchanging data among themselves and with HO at Dhaka. IPSEC VPN configuration will be done. This connection configuration may be used for Video Conferencing system also. IPSEC over internet connection is cost effective. Each branch office will have branch Firewall for the same. Users can access data over the internet. The Backup system will be set up in the BWDB old computer facility. The BWDB old computer facility be connected to the new Data Centre through a dedicated OFC Link. Entire communication between sensors/remote offices and the BWDB Data Collection Server is expected to be through secured encrypted channel.

## Infrastructure and Network Management

Getting the real-time data from the RTDAS sensors, and data entered over the internet from anywhere is a smart and effective solution, but that brings in some obvious tasks for the Data Centre. The Data Centre shall set thresholds for server utilization, network bandwidth and program responses and monitor them. Should a server go down, it should be able to restart automatically and remotely.

Infrastructure monitoring covers adding and removing devices to be monitored, performance and health monitoring, network and data movement monitoring, reporting/logs, and an issue alert system. This monitoring and issue alert will be real-time, as an alert is of no use, if an issue is discovered after six hours.

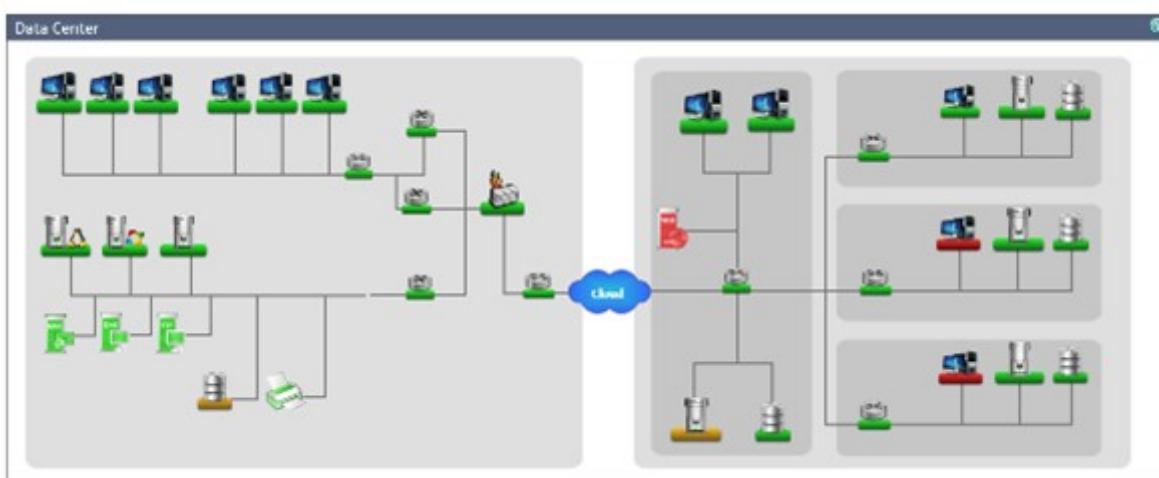
The Data Centre will have a COTS software system for Infrastructure and Network Management. The software should conform to the following features.

### Infrastructure and Network Management Solution Dashboard

Infrastructure monitoring will be typically done through a dashboard, which will present all relevant information in one place through visual layout, like meters. The dashboard will present a real-time update of everything on one screen, and can generate reports over a time period as well.

A Dashboard for IMS/NMS should typically have the features like Maps, Network diagram as a service, Alarm Dashboard, Events / Traps / Syslogs, Node view and Resources.

A typical IMS/NMS dashboard of Network Topology is depicted in the Figure below:

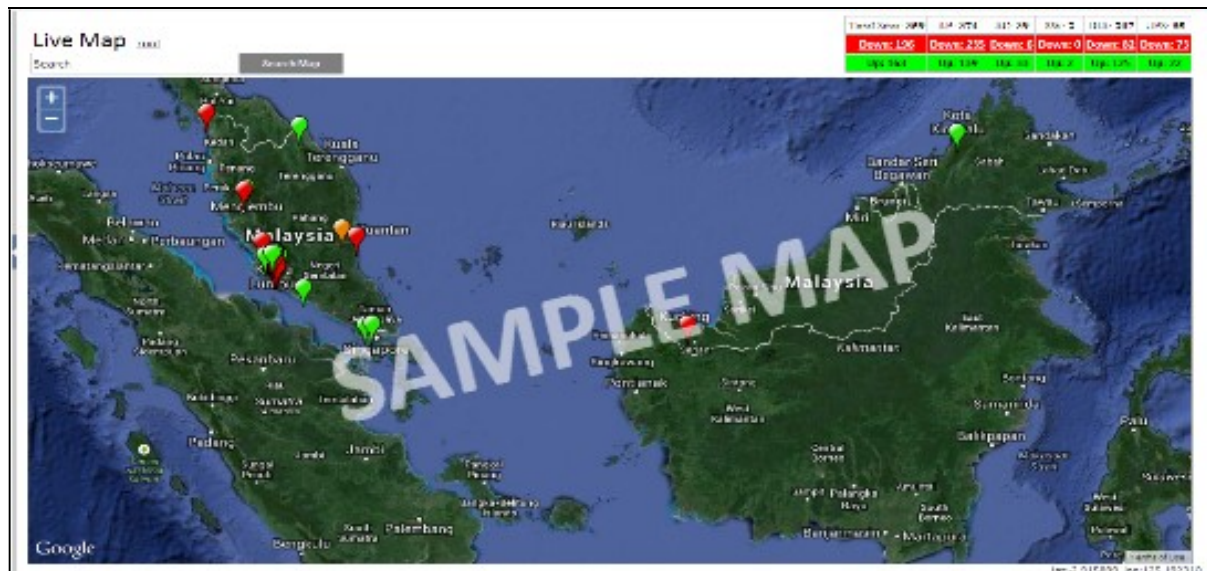


### Mapview



Mapview provides a topological representation of the monitored resources. It offers a quick visual status indicator of the managed elements in a network, from routers to response paths. With features like status propagation, it provides a snapshot view for the NOC users about the general health of the entire system. Components can be grouped to reflect business alignment. Drilling down to reports for additional detail can be accomplished directly from the Mapview. This feature also displays the total number of alarms for each folder and their colour-coded severity level. Mapview shall offer the users the option to create their own connection or topology, by selecting the icons on the Mapview and then creating interconnections and/or relations between folders and resources.

Geographical Map also allows administrator to view the network devices on geographical map as per the location of the devices. This will help the administrators to view the complete network with geographical location and its status across country. A sample Geographical Mapview is presented in the Figure below:



### Robust Discovery of Resources

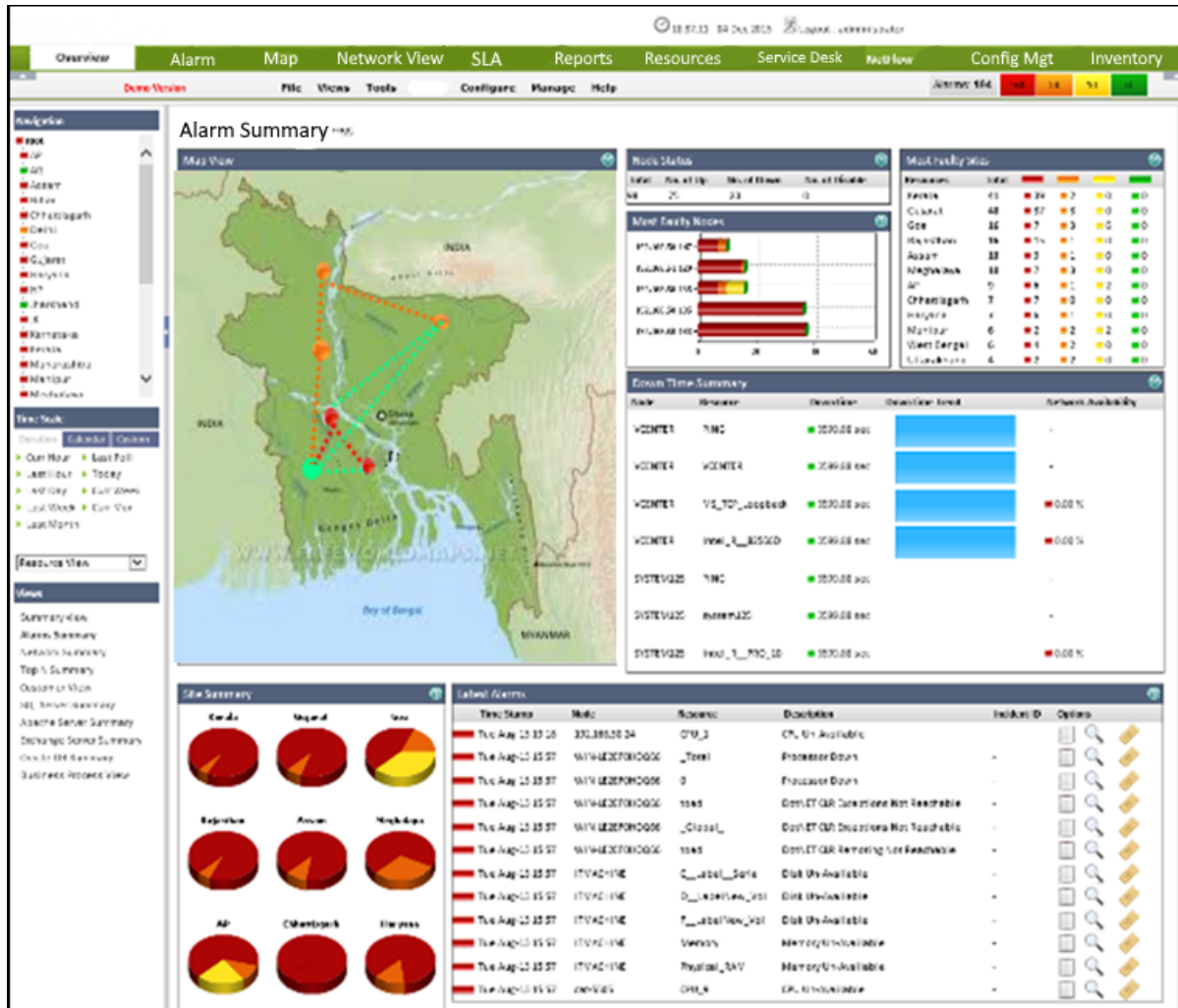
IMS/NMS should be able to discover different resources in network like switches, routers. It should be able to perform the following types of discovery; Topology Discovery, Scheduled Automatic Discovery, CSV based Discovery (bulk discovery), VM Discovery and it should support wide range of Protocols.

### Key Monitored Performance Statistics Dashboard

The key performance statistics that should be monitored on the Dashboard are; Network Availability, Application Availability, Resource Availability, Database Availability, Network Utilization, Network Throughput, Error Traffic, Overflow traffic, CPU Utilization, Disk

Utilization, Memory Utilization, Buffer Overflow, Latency, Packet Loss, Jitter, Ping Response Time, Web Response Time, DNS Response Time, and FTP Response Time.

A sample Key Monitored Performance Statistics Dashboard for Bangladesh is presented in the Figure below with IMS/NMS alert:



## Security Information and Event Management

Security Information and Event Management (SIEM) is a software solution that will aggregate and analyse activities from many different resources across the entire ICT Infrastructure of BWDB. SIEM will collect security data from the network devices, servers, domain controllers, and more. SIEM will store, normalize, aggregate, and apply analytics to that data to discover trends, detect threats, and enable organizations to investigate any alerts.

SIEM will provide two primary capabilities to the Data Centre for taking pro-active response; Reporting and forensics about security incidents, and Alerts based on analytics that match a certain rule set, indicating a security issue. SIEM will gather immense amounts of data from the entire BWDB networked environment, consolidate and make that data human accessible. With the data categorized and handy, Data Centre can research data security breaches.

### **Field Maintenance Management**

Field Maintenance Management software will primary help the Administrators of the BWDB Hydrology Wing in tracking onsite services, managing personnel, and maintaining online visibility into operations. A COTS software system for Field maintenance Tracking will be installed in the Data Centre. The software must ensure the following features.

- Record all station visits including the following activities
  - Date of visit
  - Time of arrival
  - Station name
  - Technician(s) name
  - Purpose of visit
  - Operational status upon arrival
  - Operation status upon departure
  - Activities performed during visit
  - Recommendation of activities on future visit
  - Geo-tag timestamp picture taken during maintenance visit (3 pictures each visit)
  - Time of Departure
- The records must be sortable by any of the fields. For instance, the software must produce a record of all activities at a given station, or all activities performed by a given technician, or any combination of fields.
- The field maintenance management software will be used to produce monthly reports.

The New BWDB Data Centre will provide the following support for installing and running the New BWDB Information System, provided all the Data Centre requirements are fulfilled.

### **Data Centre Infrastructural Support**

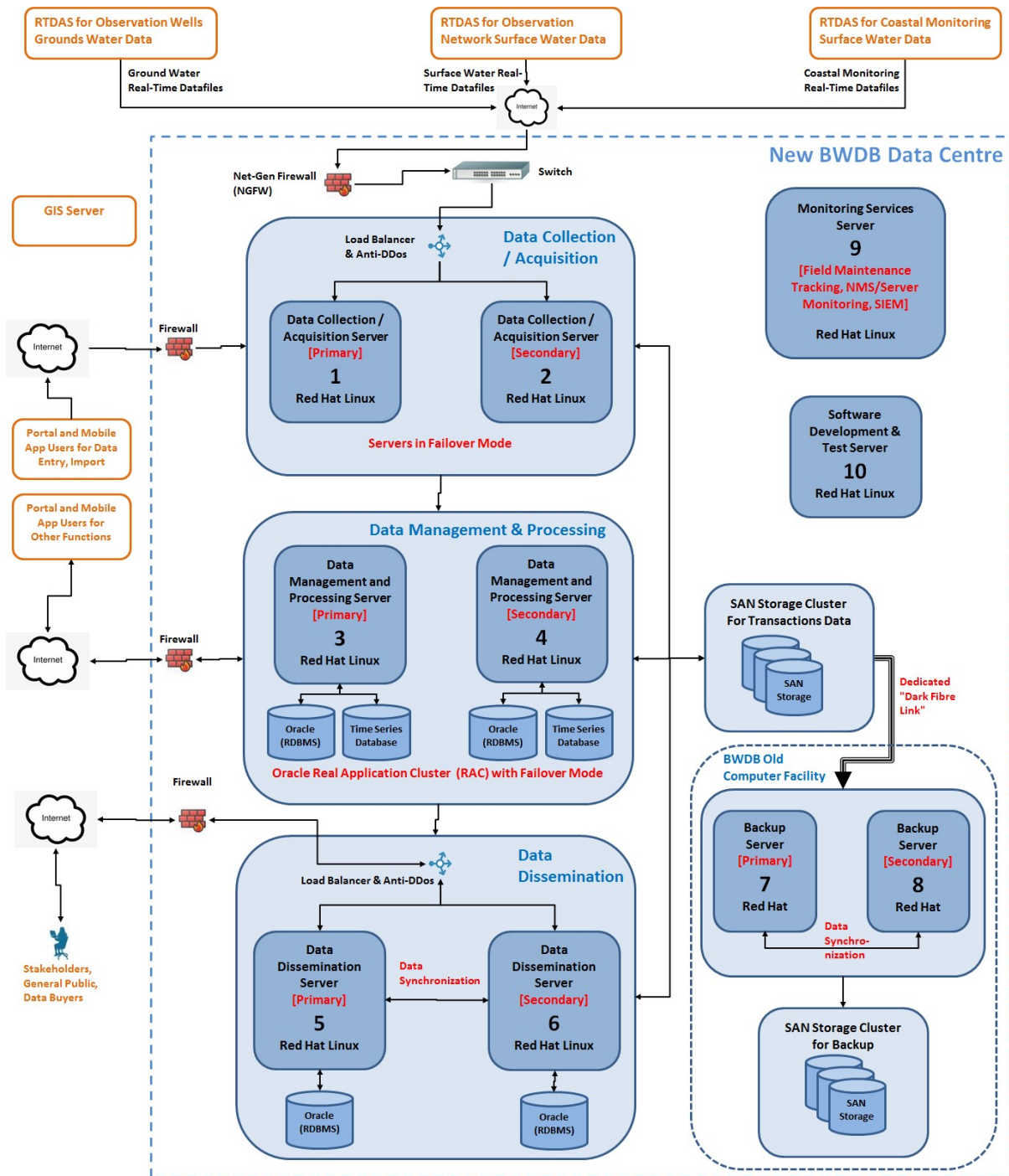
- Rack Space for installing the networking equipment and the necessary Servers.
- As the new Data Centre is a 4-Tier standard data centre, all the requisite power and HVAC system will be available.
- Required internet connectivity.
- Required SAN storage space.
- Load Balancer with Anti DDos
- WAF
- Backup and Restore
- Network Monitoring, Application Monitoring and System Monitoring for performance and cyber-attack prevention
- In case of an ICT item failure (including Server), facilitate in getting the failed item repaired.
- The new Data Centre, BWDB shall follow and implement the Industry standard security frame work like ISO 27001:2013/ ISO (refer to [ISO.org/standard/42103.html](http://ISO.org/standard/42103.html)), which will take care of
  - Aligning of security strategy to the BWDB's business objectives
  - Defining security policies that meet security strategy
  - Implementation of effective security metrics and monitoring activities
  - Conducting regular security awareness programs and trainings for all employees
  - Implementation of well-defined guidelines, standards, and procedures for all security operations, such as incident and risk management plans

### **Identification of the Computer Servers and the Major ICT Items**

Computer Servers and the major ICT items are identified on the basis of the following:

- Identification of Computer Servers for the Data Centre is done primarily on the basis of the Software Requirements.
- Following the Failover Clusters value addition, the redundant Computer Servers have been identified.
- Computer Server has been identified for Monitoring Services value addition.
- Computer Servers have been identified for the Backup requirement of the Data Centre with redundancy.
- Major hardware appliances like Firewall, Load Balancer, Switches, and SAN have been identified, on the basis of the value additions for enhanced security, network redundancy and storage arrangement.
- Computer Sever has been identified for maintaining the Software Development Environment (the Development Environment and the Test Environment). Apart from the Software Development Server, all other servers are for the Production Environment.

The Figure below shows the “Computer Servers and other major ICT Items identified”, which will be installed in the Data Centre. In the diagram, the New BWDB Data Centre is demarcated by the dotted box. The orange coloured objects are external to the Data Centre, but they have interactions with the Data Centre resources/servers. The identified Computer Servers are given unique identification numbers for ease of referencing. The diagram covers the major ICT items like Firewall, Load Balancer, Switches, and SAN. Though Back & Restore function will be under the operational purview of the Data Centre, the backup setup will be physically located at a place, away from the Data Centre premises. The Backup setup will be located in the BWDB Old Computer Facility, which will be connected to the Data Centre through a “Dedicated Black Fibre Link”.



### **Specific Responsibilities of the Bidder in Information Technology**

The bidder shall be responsible for supplying, installing and testing all the ICT Items and Software Items to make the following areas to work:

Refer to the Figure above, “Computer Servers and other major ICT Items identified”, for understanding the specific areas that fall in bidder’s scope of work. The overall responsibilities of the bidder, pertaining to each of the areas, are given below. The granular responsibilities are provided in Section VII: Schedule of Requirements.

#### **1. Data Collection / Acquisition**

- Set up the “Data Collection / Acquisition Servers” with OS and the “Data Collection / Acquisition Software”.
- Set up the ICT items, viz., Next-Generation Firewalls, Switches, Load Balancer with Anti-DDos, and other necessary ICT items for this area.
- Set up the “Data Collection / Acquisition Servers” in Failover mode and Load Balancing mode.
- Ensure that the real-time data files are being received from all the ARG, AWLS and AWS sensors of the “RTDAS for the Observation Network Surface Water Data”.
- Set up the SAN Storage Cluster, connect the “Data Collection / Acquisition Servers” to the SAN storage, and ensure that the files are getting stored in the SAN storage.
- Configure the “Data Collection / Acquisition Software” to ensure that the software is correctly parsing and decrypting data from the collected real-time Surface Water data files, and data is getting stored in the “Time Series Database” and “General Database”, as well. Setting up of “Time Series Database” and “General Database” are mentioned in the following area.

#### **2. Data Management & Processing**

- Set up the “Data Management & Processing Servers” with OS, the Time Series Database, the Oracle Database, and the “Data Management & Processing Software”.
- Set up required the ICT items for this area.
- Set up the “Data Management & Processing Servers” in Oracle Real Time Clusters and Failover mode.

- Connect the “Data Management & Processing Servers” to the SAN storage, and ensure that the data/files are getting stored in the SAN storage.
- Configure the “Data Management & Processing Software” to ensure that the software is correctly picking up the records from the “Time Series Database” and “General Database”, and performing Time Series processing, including Primary Data Validation. As part of Data Validation, ensure that the software is enabling the users in doing Data in-filling (completion) and correction, Data compilation, Data analysis, and Data reporting.
- Ensure that in the validated data are properly getting stored in the “Time Series Database” and “General Database”.

### **3. Monitoring Services**

- Set up the “Monitoring Services Server” with OS, and the three monitoring software; “NMS/Server Monitoring Software”, “Security Incident Event Management (SIEM) Software” and “Field Maintenance Tracking Software”.
- Set up required the ICT items for this area.
- Connect the “Monitoring Services Server” to the SAN storage, and ensure that the data/files are getting stored in the SAN storage.
- Ensure that the monitoring software/tools are working as per the requirement specifications.

### **4. Backup**

- Set up the “Backup Servers” with OS, and the “Backup Software”.
- The “Backup Servers” have to be installed in the Old BWDB Computer Facility, connected to the New BWDB Data Centre through the Dedicated Dark Fibre cable.
- Set up the “Backup Servers” in Failover and Data Synchronization mode.
- Configure the “Backup Software” to automatically perform backup operation, following the GFS Scheme.
- Ensure that the “Backup Software” is doing backup of all the data and applications of the Information System.



The work will be carried out in coordination with the suppliers of Ground Water Monitoring Network System and Coastal Monitoring Network System. Intervention of BWDB will be required as and when necessary.

## 14.1 Technical Specification of Information System Requirement

### Hardware

#### 1. Data Collection / Acquisition Server (Primary), Backup Server (Primary), Backup Server (Secondary) (item no. 5a, 5c & 5d of List of Goods and Delivery Schedule under Section VII)

No.	Item	Technical Specification
1.	Form Factor	2U, Rack Mount
2.	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar
3.	Operating System	<b>Red Hat Enterprise Linux Server 8 with Red Hat Cluster Suite (RHCS)</b> with proper support and subscription
4.	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar
5.	Drive Bays	8 x 2.5" Hot-Plug Disk Drive Bays
6.	Hard Drive	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache. RAID Level 10 is required for high Read performance, optimum Write Performance, Fault tolerance and optimum disk capacity utilization
7.	Network Card	(4x1Gbit) Quad Port Network Card or similar
8.	HBA	Dual port 16Gbps FC card with SFP+ module and cables
9.	Power Supply	Dual, hot-plug, Redundant Power Supply (1+1) or similar
10.	Cooling Fans	Hot plugs fans
11.	DVD ROM	DVD ROM, SATA, Internal
12.	Ports	1 Serial, 4 USB 3.0 ports, backward compatible to USB 2.0
13.	Keyboard/Mouse	To be included and wired
14.	KVM Switch Compatibility	Server shall require the necessary ports to be fully compatible with required KVM Switch
15.	Rack Mounting Rails	Compatible with rack that is being supplied separately
16.	Power	120/240V AC (must accommodate either power source)
17.	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support

**2. Data Management and Processing Server (Primary)(item no.5b of List of Goods and Delivery Schedule under Section VII):**

No.	Item	Technical Specification
1.	Form Factor	2U, Rack Mount
2.	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar
3.	Operating System	<b>Red Hat Enterprise Linux Server 8 with Red Hat Cluster Suite (RHCS)</b> with proper support and subscription
4.	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar
5.	Drive Bays	8 x 2.5" Hot-Plug Disk Drive Bays
6.	Hard Drive	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache. RAID Level 10 is required for high Read performance, optimum Write Performance, Fault tolerance and optimum disk capacity utilization
7.	Network Card	(4x1Gbit) Quad Port Network Card or similar
8.	HBA	Dual port 16Gbps FC card with SFP+ module and cables
9.	Power Supply	Dual, hot-plug, Redundant Power Supply (1+1) or similar
10.	Cooling Fans	Hot plugs fans
11.	DVD ROM	DVD ROM, SATA, Internal
12.	Ports	1 Serial, 4 USB 3.0 ports, backward compatible to USB 2.0
13.	Keyboard/Mouse	To be included and wired
14.	KVM Switch Compatibility	Server shall require the necessary ports to be fully compatible with required KVM Switch
15.	Rack Mounting Rails	Compatible with rack that is being supplied separately
16.	Power	120/240V AC (must accommodate either power source)
17.	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support

**3. Monitoring Services Server (item no.5e of List of Goods and Delivery Schedule under Section VII):**

No.	Item	Technical Specification
1.	Form Factor	2U, Rack Mount
2.	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar
3.	Operating System	Red Hat Linux with proper support and subscription

No.	Item	Technical Specification
4.	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar
5.	Drive Bays	8 x 2.5" Hot-Plug Disk Drive Bays
6.	Hard Drive	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache. RAID Level 10 I required for high Read performance, optimum Write Performance, Fault tolerance and optimum disk capacity utilization
7.	Network Card	(4x1Gbit) Quad Port Network Card or similar
8.	HBA	Dual port 16Gbps FC card with SFP+ module and cables
9.	Power Supply	Dual, hot-plug, Redundant Power Supply (1+1) or similar
10.	Cooling Fans	Hot plugs fans
11.	DVD ROM	DVD ROM, SATA, Internal
12.	Ports	1 Serial, 4 USB 3.0 ports, backward compatible to USB 2.0
13.	Keyboard/Mouse	To be included and wired
14.	KVM Switch Compatibility	Server shall require the necessary ports to be fully compatible with required KVM Switch
15.	Rack Mounting Rails	Compatible with rack that is being supplied separately
16.	Power	120/240V AC (must accommodate either power source)
17.	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support

**4. Enterprise Next-Generation Firewall (NGFW) (item no.5f of List of Goods and Delivery Schedule under Section VII):**

<b>Description:</b> This is a Full Featured Enterprise Firewall, which will render critical services in receiving the huge stream of data (24 X 7) from the Real Time Data Acquisition Systems (RTDAS) into the Data Acquisition/Collection Server (installed at the Data Centre).
<b>General Requirements:</b>
The Firewall should support "Stateful" policy inspection technology.
Appliance should be rack mountable
The communication between all the components of Firewall System (firewall module, logging & policy management server, and the GUI/WebUI Console) should be encrypted with SSL or PKI.
Firewall Architecture should be on multiple tiers (firewall module, logging & policy management server, and the GUI/WebUI Console)
The firewall system should have a provision to handle the bandwidth management, if the same is required in future
The firewall should support IPv6 and IPV4 functionality

Firewall should work on software blade architecture
Firewall should be processor based
The firewall should support ISP link load sharing
<b>Technical, Interface and Connectivity Requirements:</b>
The firewall interfaces have to support the unnumbered IP address
The platform must be supplied with at least 6nos. of 10/100/1000Mbps
Support a minimum of 1000 VLAN's
Integrated Multi site management
Built in storage capacity of 250 GB minimum for storing logs.
Should support star & mesh topology for VPN usage
<b>Firewall Filtering Requirements:</b>
The Firewall should also support the standard Layer 3 mode of configuration with Interface IP's.
The Firewall must provide state engine support for all common protocols
The Firewall must provide NAT functionality, including dynamic and static NAT translations
The Firewall must provide filtering capability that includes parameters like source addresses, destination addresses, source and destination port numbers, protocol type.
The Firewall should be able to filter traffic even if the packets are fragmented.
All internet based applications should be supported for filtering like Telnet, FTP, SMTP, http, DNS, ICMP, DHCP, ARP, RPC, SNMP, mime, s/mime, Lotus Notes, MS-Exchange etc
Support for Filtering TCP based applications
Support basic inspection by working as a proxy for HTTP, FTP & SMTP traffic
Should support CLI & GUI based access to the firewall modules
Local access to firewall modules should support role based access
Integrated IPS should support hybrid attack detection/prevention with multiple attack protections methods, like Protocol Anomaly, Signature-Based, Day-Zero Protection, etc
Integrated IPS should protect setup against vulnerabilities in the applications of the protected systems by carrying out deep packet inspection
<b>Firewall Logging and Monitoring Requirements:</b>
The Firewall must send log information to an external log server via an encrypted connection
The Firewall administration software must provide a means of viewing, filtering and managing the log data
The Firewall logs must contain information about the firewall policy rule that triggered the log
The Firewall must provide at a minimum basic statistics about the health of the firewall and the amount of traffic traversing the firewall
Support to log in detail all connections which are blocked
Support to log in detail all connections which go through the Firewall
Firewall should have an option to save filters
Log solution should have an option to search for using search strings
Provision to report all successful connections inbound
Provision to report all successful connections outbound

Provision to report traffic levels for inbound & outbound destinations
Support to generate performance statistics on real-time basis
Capability to produce reports which measure usage
<b>Administration/ Management Requirements:</b>
Dedicated management system and real-time logs system should be provided and the management should a software and not a hardware
The Firewall administration station must provide a means for exporting the firewall rules set and configuration to a text file
Any changes or commands issued by an authenticated user should be logged to a database
The Firewall must send SNMP traps to Network Management Servers (NMS) in response to System failures
Automatic synchronization ability of rules on multiple firewalls and the management servers at DC & DR sites
Provision to generate automatic mail alerts
Provision to send alerts to multiple recipients
The Firewall must not support any non-secure means of access to the Firewall
Support for role based administration of firewall
Management module should support Role-based approval, Self-approval & Emergency bypass with password
Only approved policies can be installed & email notification on installation of policies
Should be capable of comparing different policies installed verses new policy intended to apply
Management server should give a full view on all changes to objects and rules to generate an audit log for any forensic/ compliance needs.
<b>User Authentication Requirements:</b>
Support for user authentication at the firewall system for the different TCP/IP applications, like HTTP, SMTP, Telnet & RSH
Support for integration with the RSA Secure ID as the strong user authentication mode
Should support machine based authentication for user access across the firewall
Should support clientless authentication for user access across the firewall
<b>URL Filtering Requirements:</b>
Should support category based filtering.
Should support minimum of at least 90 predefined categories.
White listing based on IP's & URL's.
Black listing based on IP's & URL's.
Exceptions based on network objects defined.
Notification of Custom messages or URL redirection.
Should provide Centralized, daily updates.
Should support at least 25 million-plus URLs
<b>Web Server Security Requirements:</b>
Should offer protection for web servers using separate web security modules

Should support Malicious code protection.
Should monitor Web communication for potential executable code
Blocks malicious executable code from reaching a target host.
Should be capable of doing real-time security decisions based on session and application information, and protects Web communication even when it spans multiple TCP segments
Should Identify buffer overflow, heap overflows, and other malicious executable code attacks on Web servers and other applications without the need of signatures
Should detect malicious executable code within Web communications by identifying existence potential for malicious behavior
<b>Intrusion Prevention System Requirements:</b>
Blocks attacks such as DoS, port scanning, IP/ICMP/TCP-related DNS cache poisoning, FTP bounce, improper commands
Signature-based, behavioural, and protocol anomaly, IPS should be an integrated system with firewall
Encryption support of AES 128-256 bit, 3DES 56-168 bit, Triple data DES, Integrated certificate authority (X.509)
Should support 200 or more with globally support protocols, Should support star & mesh topology for VPN usage and Should support an integrated IPS (Intrusion Prevention System)
<b>Performance Requirements:</b>
The box should be capable of upgrading to new versions/products, in case a new feature is released by the OEM.
The Firewall may support at least 1.2 Million
The Firewall may support at least 30,000 connections per second processing.
The Firewall should support throughputs of minimum 5 Gbps
The appliance should support integrated IPS throughputs of minimum 250 Mbps

#### **5. Load Balancer with Anti-DDos(item no.5m of List of Goods and Delivery Schedule under Section VII):**

For receiving and re-distributing incoming requests to any available server capable of fulfilling them Application Throughput (L4/L7): 10 Gbps / 10 Gbps DDoS Protection (SYN Flood) SYN/sec: 4 Million 1/10 GE Fibre (SFP+): 2 ports

#### **6. Storage Area Network (SAN) Switch (item no.5n of List of Goods and Delivery Schedule under Section VII):**

SAN will solve the purpose of connecting servers and shared pools of storage devices and is dedicated for moving storage traffic: Connectrix- DS-6620B, 24 active ports with 16 Gbps Short Wave SFP transceiver modules.

**7. Storage Enclosure (item no.5p of List of Goods and Delivery Schedule under Section VII):**

Dell SC420F with 24 x 1.92TB SAS 12GB, RI SSD, 2.5in Hot-plug HDD - for purpose of high-speed network and provides block-level network access to storage. It is typically composed of server, switches, storage elements, and storage devices.

**Software:**

**8. Data Collection/Acquisition software: (item no. 5q of List of Goods and Delivery Schedule under Section VII)**

Description	This software will be used to automatically receive and poll the mobile network radios at each ground water station.
Operating System Compatibility	Red Hat Enterprise Linux Server8
Licensing and Support	Licensing/support/upgrade costs for a minimum of 8 years to be included in price, and all the Software shall be purchased and registered in the name of Purchaser (PD SHISEWS project, BWDB).
Software operation	Software will continue to operate on a given computer/operating system without requirement for additional fees. This is intended to allow the software to operate beyond the 8-year time period indicated in the licensing and support agreement.
Data polling	Data polling will be compatible and configured to operate with the supplied ground water data loggers. User can request data loggers be polled at user determined intervals.
Data reception	The software will receive data through data files ( over GPRS ) and through SMS( over GSM) that are automatically sent by the data stations, The Formats are indicated in para 8.0 GSM & GPRS TRANSMISSION FORMAT: .
Data Storage	Real-time data from the data stations will be transmitted and stored in the Data Acquisition Server in two ways: (1) Data files containing real-time data will be transmitted over GPRS to a stipulated FTP directory (HTTP post) of the Data Acquisition Server. The Data Acquisition software will pick up the data files from the stipulated directory and parse the data from the data files, as per the data file record format indicated in section “8.0 GSM & GPRS TRANSMISSION FORMAT.” (2) SMSs containing real-time data will be transmitted over GSM to a stipulated mobile number in a modem, which will be connected to the Data Acquisition Server. The modem will transfer the SMSs to a stipulated directory of the Data Acquisition Server. The Data Acquisition software will pick up the SMSs from the stipulated directory and parse the data

	from the SMSs, as per the SMS format indicated in section “8.0 GSM & GPRS TRANSMISSION FORMAT”
Pre-programmed polling	The polling cycle will allow for a pre-programmed group of stations that will recover a pre-programmed period of data from the data logger.
Ad-hoc data polling	The software will allow for ad-hoc polling, whereby a single station or group of stations can be polled by an operator.
Software service	Software will be run as a service that will be automatically started upon computer restart.
Licensing and Support	Licensing/support/upgrade costs for a minimum of 8 years to be included in price. The purchaser will be permitted and licensed to use two instances of this software. One for the primary system and the other for a backup system.
Software operation	Software will continue to operate on a given computer/operating system without requirement for additional fees. This is intended to allow the software to operate beyond the 8-year time period indicated in the licensing and support agreement.
System Integration	This software will be integrated with the data loggers and the water resource data management software to operate automatically and unattended.
Compatibility	Data collection will be fed into time series software. Bidder to provide the necessary routines to automatically store data in time series data base.
Support	Support must be provided from an office in the general region or provide 24-hour support if support centre is located outside the South Asia region.
Features	<ul style="list-style-type: none"> <li>• The software must be Compatible with Red Hat Linux operating system.</li> <li>• Web based application for data acquisition, processing, storage, and statistical analysis of time series data.</li> <li>• Configure a central server which is then accessible to anyone with a valid username/password on any computer connected over internet through standard Web Browsers (Internet Explorer, Google Chrome or Mozilla Firefox, opera etc. all browsers will support).</li> <li>• The data collection/acquisition software will acquire real-time data from Data Loggers, processes data, plots and display data in a graph and tabulated forms, as well.</li> <li>• The real-time data in the data files will be received in a stipulated directory of the FTP server.</li> <li>• The software provides a set of visual components that allows user to read the data on their web browser through a variety of</li> </ul>



	display choices. <ul style="list-style-type: none"> <li>It should be compatible with ArcGIS and map will be produce by ArcGIS.</li> </ul>
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**9. Data Management and Processing Software (Time Series Processing Software) (item no. 5r of List of Goods and Delivery Schedule under Section VII):**

Description:	This software will be used to store, perform quality control, and allow for the distribution of water resource data, such as ground water, conductivity, water temperature, surface water, rainfall, air temperature, humidity, wind speed, wind direction, and evaporation.
Operating System Compatibility	Red Hat Enterprise Linux Server8
Data Import:	Automatic import from hot directory (or similar). Import CSV, flat file format.
Database:	Software to be built around Oracle data base management system.
Licensing and Support:	Minimum of 10 seats (unlimited seats preferable). Licensing/support/upgrade costs for a minimum of 8 years to be included in price, and all the Software shall be purchased and registered in the name of Purchaser ( PD SHISEWS project, BWDB).
Software operation:	Software will continue to operate on a given computer/operating system without requirement for additional fees. This is intended to allow the software to operate beyond the 8-year time period indicated in the licensing and support agreement.
Data Export:	CSV, text for user defined stations for user defined period.
Program functionality:	Software will support at least two versions of data, one being the original (raw) data and the other being the edited data.
Transaction tracking:	Edited data will be tagged with the date/time/operator involved in creating the edited data. Automatic audit log.
Data manipulation:	Allow for offset of data for a user defined period. Allow for interpolation of data between two data points for a user prescribed time gap. Allow for the correction of sensor drift.
Data flagging:	Data that is interpolated or corrected must be flagged as such in the edited data set.
Statistics:	Allow for the calculation of min/max/average/standard deviation or other ad-hoc statistics over a user definable period.
Graphics:	Allow for time series graphics of multiple stations/parameters on a single plot.
Map interface:	Allow for station/date to be plotted on map interface. This interface must come configured with the product.
Report generation:	Allow for daily, monthly, annual, reports for a single station, group of stations, and/or all stations. Allow for publication quality reports.

Rating Table Development:	Develop rating curves using gauge height discharge measurements. Ability to store an unlimited number of rating curves for each station spanning an applicable period.
Experience:	The author (company) providing the software must provide a mature product, being sold for not less than 15 years by the author/company.
Support:	Support must be provided from an office in the general region or provide 24-hour support if support center is located outside the South Asia region.
Licensing:	Minimum 8 simultaneous users (including processes), including software support/upgrades pre-paid for a minimum of a 8-year period. Examples of time series database software include, Hydstra, Aquatic Informatics, Kister's, Data Sight, etc.
Features	<ul style="list-style-type: none"> <li>• The software must be Compatible Red Hat Linux operating system.</li> <li>• Web based application for time series processing, validation, storage, and statistical analysis of time series data.</li> <li>• Configure a central server which is then accessible to anyone with a valid username/password on any computer connected over internet through standard Web Browsers (Internet Explorer, Google Chrome or Mozilla Firefox, opera etc. all browsers will support).</li> <li>• The software provides a set of visual components that allows user to read the data on their web browser through a variety of display choices.</li> <li>• Export capability of the processed data to Flood forecasting and warning center (FFWC), BWDB, for the MIKE-11 model according to the model data format.</li> <li>• It should be compatible with ArcGIS and map will produce by ArcGIS</li> <li>• <b>Graph:</b> Software will compare the data by plotting online hydro-graph/charts or check the data on grid format or download the data on PC to work on excel, with selectable time intervals (Hour, days, months, years) for display of data in any form (More than one station or river wise or district wise sequentially).</li> <li>• Database will be designed keeping the existing database schema (Hydrology) into consideration. Any additional data attributes to be factored in vis-à-vis the new system.</li> </ul>

	<ul style="list-style-type: none"> <li>• Available as single and multi-workstation version</li> <li>• Automatic calculations based on mathematical formulas or table pictures</li> <li>• User Access Management to protect against unauthorized access (access will be role base)</li> <li>• Export of time series in different file formats (e.g. ASCII, csv, txt, etc.)</li> <li>• The software will incorporate automatic quality control activities to raw data acquired from field devices and manual input data from BWDB users to ensure high quality published data.</li> <li>• The software will perform quality checks based on various rules defined by user. The Quality Control module will have following features: <ul style="list-style-type: none"> <li>• No data will be visible on public domain until and unless it successfully passes through QC.</li> <li>• Data validation will be based on rules. Rules itself will have the validity period.</li> <li>• Rules can be simple mathematical operation and/or user defined function based on time and data.</li> <li>• Invalid data will raise flags and create alerts for manual intervention.</li> <li>• Both raw data and corrected data will be stored into the database.</li> <li>• QC rules will be executed either when an observation is received or triggered on a specific time based on a predefined schedule.</li> <li>• Value should be flagged with insert/update/delete. No value should be physically deleted from the system.</li> <li>• Data upload / download system will available by .csv/excel page</li> <li>• Different checks for data quality: <ul style="list-style-type: none"> <li>○ <b>Step Check (Spike):</b> Difference of two consecutive values of a parameter will be checked against the maximum deviation allowed between those two values. The recent value is checked with valid (QC passed) data.</li> <li>○ <b>Limit Check (Threshold):</b> Parameter will be checked whether it lies within the defined range of value. The software will provide fields for entering two extremes, against which data will be checked.</li> </ul> </li> </ul> </li> </ul>
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	<b>Constant Check:</b> Parameter will be checked within a period of time for amount of change. The check fails if the change in the value of the parameter within the period lies within a tolerance provided defined by the user.
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**10. Oracle Database Management Software (item no. 5s of List of Goods and Delivery Schedule under Section VII):**

Database Management Software	Oracle Database 12C Enterprise Edition Processor Perpetual with 1st year ATS Support.
Support requirements	Oracle Real Application Cluster (RAC) Processor Perpetual with 1st year ATS Support
	Diagnostic Pack Processor Perpetual with 1st year ATS Support
	Tuning Pack Processor Perpetual with 1st year ATS Support
OS compatibility	The Database Management Software must be Compatible with Red Hat Enterprise Linux Server 8
Data retaining capability	The Database Management Software must be capable of holding large amount of historical hydro-met data online
Supply, installation, testing and commissioning	Supply, installation, testing and commissioning in the three servers, by the vendor

**11. NMS/Server Monitoring Software (item no. 5tof List of Goods and Delivery Schedule under Section VII):**

For the purpose of monitoring the entire server related devices and network, the software will have the following features:

1. **Mapview:** A topological representation of the monitored resources. It offers a quick visual status indicator of the managed elements in a network, from routers to response paths. With features like status propagation, it provides a snapshot view for the NOC user about the general health of the entire system. Components can be grouped to reflect business alignment. Drilling down to reports for additional detail can be accomplished directly from the Mapview. This feature also displays the total number of alarms for each folder and their colour-coded severity level. It shall offer the user the option to create his own connection or topology using the Mapview by selecting the icons on the Mapview and then creating interconnections and/or relations between folders and resources. Geographical Mapview with colour-coded severity levels may be as follows:
  - i. Green marker indicates 'Normal level' for more than 50 cm below danger level

- ii. Yellow marker indicates ‘Warning level’ for within 50 cm below danger level
- iii. Magenta marker indicate ‘Flood’ at and above (within 1m) danger level
- iv. Red marker indicates ‘Severe flood’ for more than 1 m above danger level;

The software will display a map using the ArcGis software. The map will display the station detail (as in [www.ffwc.gov.bd](http://www.ffwc.gov.bd)).

Geographical Map also allows administrator to view the network devices in geographical map as per the location of the devices using Open Street Map with google map representation, which helps the administrators to view the complete network, as per the geographical location and its status spread across country.

2. **Inventory Module:** The software should have an inbuilt inventory management module for keeping track of all the physical items that have been procured by the Department and installed at various stations. The module will keep track of the different equipment and sensors installed at the station with all the relevant information (manufacturer, supplier, warranty, calibration etc.) along with their representative picture and file attachments. The module will also keep track of the movement of the items from one station to another or store or warehouse for maintenance.

All this information will be grouped together in the station for easier management of sensors and other related equipment. The module will also provide a feature to provide necessary alerts required for sensor calibration or raise a maintenance log when a sensor needs to be calibrated. The module will also store information regarding the vendors - manufacturers and suppliers for each item, making it easier to find out the contact person for specific items.

3. **Monitored Performance Statistics Dashboard:** The key performance statistics that should be monitored on the Dashboard are; Network Availability, Application Availability, Resource Availability, Database Availability, Network Utilization, Network Throughput, Error Traffic, Overflow traffic, CPU Utilization, Disk Utilization, Memory Utilization, Buffer Overflow, Latency, Packet Loss, Jitter, Ping Response Time, Web Response Time, DNS Response Time, FTP Response Time

Apart from collecting regular parameter observation from the remote stations, the Software will have features to collect and analyse other diagnostic parameters being sent by the remote stations as well. The software will keep track of parameters like the system supply voltage, GSM signal strength, Data Logger Reset Logs, Sensor status logs, etc. These logs will be analysed properly and presented to the user in a graphical/tabular form for continuous monitoring of the stations. The software will also feature an online ticketing system to streamline the support operations and simplify the process of resolving issues on the stations, manage resources effectively, and increase productivity of the system. The software will keep event logs either automatically generated by the system through different modules or user generated. For example, a QC module could generate an event log whenever a QC rule fails, the Data Acquisition module could generate an event log whenever a data is not available for any parameter.

The user will have the ability to convert these logs into tickets for necessary action from the support personnel.

**12. Security Information and Event Management (SIEM) Software (item no. 5 of List of Goods and Delivery Schedule under Section VII):**

Description	Security information and event management (SIEM) is a solution for security management, which combines the security information management and security event management functions into one security management system. The SIEM Software should have the following features.
Data aggregation	Collects and aggregates data from security systems and network devices
Threat intelligence feeds	Combines internal data with third-party data on threats and vulnerabilities
Correlation and security monitoring	Links events and related data into security incidents, threats or forensic findings
Analytics	uses statistical models and machine learning to identify deeper relationships between data elements
Alerting	Analyses events and sends alerts to notify security staff of immediate issues
Dashboards	Creates visualizations to let staff review event data, identify patterns and anomalies
Retention	Stores long-term historical data, useful for compliance and forensic investigations
Forensic analysis	Enables exploration of log and event data to discover details of a security incident
Threat hunting	Enables security staff to run queries on log and event data to proactively uncover threats
Incident response	Helps security teams identify and respond to security incidents, bringing in all relevant data rapidly
SOC automation	Advanced SIEMs can automatically respond to incidents by orchestrating security systems in an approach known as security orchestration and response (SOAR)

**13. Field Maintenance and Tracking Software (item no. 5 of List of Goods and Delivery Schedule under Section VII):**

There is a requirement for field maintenance & tracking software. This software will be used to produce monthly maintenance reports. This software will allow the field crews to log daily activities, especially activities that have to do with the AWLS, ARG and AWS Stations and Data Centre operations. The purchaser will have unlimited use rights of the software. Field Maintenance Tracking Software should cover the following features:

- Record all station visits including the following activities
  - Date of visit

- Time of arrival
  - Station name
  - Technician(s) name
  - Purpose of visit
  - Operational status upon arrival
  - Operation status upon departure
  - Activities performed during visit
  - Recommendation of activities on future visit
  - Geo-tag timestamp picture taken during maintenance visit (3 pictures each visit)
  - Time of Departure
2. The records must be sortable by any of the fields. For instance, the software must produce a record of all activities at a given station, or all activities performed by a given technician, or any combination of fields.
  3. The field maintenance management software will be used to produce monthly reports that will be prepared by the **Bidder** and delivered to the **Purchaser** no later than the 5<sup>th</sup> day after the end of the month the report is valid for.
  4. Time maintenance management software will include licensing and maintenance fees are required to be pre-paid for a period of 10 years so that no further expenses will be required by the Purchaser over the 10-year time frame starting from the date of commissioning and the start of the Warranty Period.

**14. Backup Software (item no. 5wof List of Goods and Delivery Schedule under Section VII):**

Description	The Backup Software will be used for taking backup for all the servers' data and applications. The Backup software should have the following features.
Streamlined Management Console	The backup software will simplify day-to-day maintenance by allowing performing all important tasks from a user-friendly control panel. From managing backup jobs to viewing reports of completed jobs, everything needed should be available in a single console.
Scheduled Backups	The backup software should be able to schedule backups to run automatically, at the stipulated intervals. Admins should be able to customize the backup schedules. The Backup System should follow the classic GFS scheme.
Data Security	The backup software should have the ability to encrypt backup copies, enforce password-based file protection, and restrict system access to the administrators. Data is vulnerable to a wide range of threats, so the backup software should have a suite of security features.
Backup Verification	The worst time to learn that the backup copies are corrupted is when trying to restore them in a crisis situation. The backup software should automatically verify and ensure that backups are not corrupted. This process is usually enabled by a checksum, which verifies integrity by checking file data for corruption before and after the backup job. Though it is not a substitute for testing,

	verification is a good step on the road to restore.
Data Compression	Keeping a huge load of files and important digital items takes huge spaces. The backup software should be able to compress backed up data.
Volumes	The backup software should make data management a lot easier. Using the “volumes” feature, users should be able to split large files into smaller volumes so that it will be easier to organize and manage the data that is being stored and backed up.

## 15. Data Center Accessories

### **KVM Switch with Console Monitor (item no. 5 i of List of Goods and Delivery Schedule under Section VII)**

The Bidder will provide a KVM Switch which will allow connection of all the servers through a single Console (computer screen minimum 22”, keyboard and mouse). The KVM switch will be rack mounted (with rails)

### **16 Port Switch (item no 5j. of List of Goods and Delivery Schedule under Section VII)**

The Bidder will provide a 16-port switch, which will allow the new computer systems to be connected to the BWDB network

### **Computer Rack (item no 5k. of List of Goods and Delivery Schedule under Section VII)**

The Bidder will provide a full height computer rack which will hold all four servers, computer switch, and KVM system, Maximum Height 42U (1991 mm) Maximum Width 31.50inches (800 mm) Maximum depth 31.5 inches (800 mm) Weight Capacity (static load) 3000.00 lbs. (1363.64kg) Color Black

### **Other Accessories**

The bidder will provide surge protectors and power strips to accommodate twice the number of equipment being procured in this tender (in the computer rack). All necessary cables for interconnecting equipment will also be provided.

### **Installation**

*The **Bidder** will be responsible for installing and commissioning systems as proposed below.* The commissioning process will result in final acceptance of the solutions and the start of the prescribed warranty period. The warranty period will only begin when all systems have been successfully commissioned systems have been accepted which means all systems must be operational and working error free.

### **Data Server(s) and Software**

The **Bidder** will be required to install all hardware, software and ancillary devices that are supplied as part of this tender.



Supply and installation of material needed for establishing stations will be the responsibility of the **Bidder**. The **Bidder** shall assume the cost of installation; including personnel and proper vehicles to transport the fragile equipment. The **Bidder** shall be responsible for all equipment up to and through the warranty period. This is considered a turn-key system with installation, configuration and all other services/costs necessary to make the network operational will be incurred by the **Bidder**.

The **Purchaser** will be in charge of gaining permission for land use where the remote groundwater instrumentation will be placed.

The **Bidder** shall also assume the cost of telecommunication charges for all AWLS, ATG & AWS instrumentation installed under this contract.

### **Operation, Trouble-shooting and Maintenance Requirements During Warranty Period and Annual Operation & Maintenance Services period**

#### **Staffing**

The project requires the **Bidder** to provide staff positions to fill the tasks involved in maintenance during the warranty period.

These staff positions will include a minimum of 8 (eight) Hydro-meteorological Technician technicians (four teams, two technicians per team) and 2 (two) computer systems & software support engineers. The personnel will be required to be **dedicated** to the project and will remain onsite for the period of the schedule. The Purchaser will arrange office space, furnishing (desk, chair, and cabinets) and other related facilities. The hydrologic technicians will have their own arrangements for reliable transportation and required laptops and mobile telephone facilities required for the work. It is required that the Bidder acquire a minimum of 4 (four) 4x4 vehicle capable of holding and securing all of the equipment used for field maintenance. The hydrologic technicians will form 4 (four) teams and be strategically located at field offices/ head office to minimize travel time to the AWLs, ARGs and AWS stations while participating in preventative and emergency maintenance.

#### **Staff Schedule Requirements**

The Bidder supplied staff will be required to work in the field during the entire warranty and Annual Operation & Maintenance Services period (if any). It is most important that the staff be entirely committed to the project and will not be allowed to be shared between projects without the written consent of the Purchaser.

Staff Requirements to be supplied by the Bidder are as follows:

No of Personnel Required	Designation and Location	Period of Commitment
<b>BWDB Data Center in Dhaka</b>		
1	Senior Computer System & Software Specialist	Full Time
2	Junior Computer System & Software Specialist	Full Time
<b>North Eastern Measurement Division , Dhaka (NEMD)</b>		
1	Senior Hydro-meteorological Technician	Full Time
1	Junior Hydro-meteorological Technician	Full Time
<b>South Eastern Measurement Division , Comilla (SEMD)</b>		
1	Senior Hydro-meteorological Technician	Full Time
1	Junior Hydro-meteorological Technician	Full Time
<b>Northern Measurement Division , Pabna (NMD)</b>		
1	Senior Hydro-meteorological Technician	Full Time
1	Junior Hydro-meteorological Technician	Full Time
<b>South West Measurement Division , Faridpur (SWMD)</b>		
1	Senior Hydro-meteorological Technician	Full Time
1	Junior Hydro-meteorological Technician	Full Time

### **Hydro-meteorological Technicians – Responsibilities, Qualifications and Supervision**

There are two levels of hydro-meteorological technicians required. There will be a senior hydro-meteorological technician and a junior hydro-meteorological technician at each maintenance center.

#### **Senior Hydro-meteorological Technician**

The senior hydro-meteorological technician will be highly trained and certified to have expertise in operation and maintenance of the equipment used in the project. The senior hydro-meteorological technician will also be certified to have expertise in complete knowledge and understanding in making sensor calibration checks and field adjustments. The senior hydro-meteorological technician is required to have a firm grasp and understanding of the installed technology and be able to train junior hydro-meteorological technicians from both Purchaser and Bidder candidate pool.

It is paramount that the senior hydro-meteorological technician be able to maintain, repair, and replace all AWLGS/AWS/ARG equipment and civil works.

#### **Junior Hydro-meteorological Technician**

The junior hydro-meteorological technician will work under the senior hydro-meteorological technician and assist in performing preventative and emergency maintenance visits. The junior hydro-meteorological technician will be certified by the Bidder to maintain data stations.

## Responsibilities

The hydro-meteorological technicians will be responsible for maintaining all AWLGS, AWS and ARGS stations installed by the Bidder. The hydro-meteorological technicians will be required to record activities at the stations using the maintenance management & tracking software purchased as part of this tender. The hydro-meteorological technicians will perform **preventative maintenance visits four per year or more** frequent, to each and every station in their area of responsibility. The hydro-meteorological technicians will also perform emergency maintenance visits on an “as-needed” basis, and within 24 hours of a station going down. Area of responsibility is outlined in Appendix A and Appendix B.

During each such maintenance visit (either scheduled or unscheduled), the bidder’s representative must take geo-tagged time stamped pictures and submit to purchaser. Three pictures must be taken for each visit for each site, covering status before maintenance, during maintenance and after maintenance.

The maintenance activities will include clearing weeds, cleaning equipment and enclosures ridding the equipment of insects. The technicians will perform spot checks of instrument performance, which means the technicians must have, as provided by the Bidder, accurate temperature sensors and rain gauge test equipment to assure the temperature and relative humidity sensors are in proper working order.

The bidder will also be responsible for producing monthly reports, due no later than **7<sup>th</sup> day of each month**, which is valid for the previous month.

The monthly reports will include the summary of the entire meteorological network. The report will include:

1. Station summary of the following:
  1. Number of hours reporting for the previous month.
  2. The number of hours missing for the previous month.
  3. The number of penalty days for the previous month.
  4. Notes on exceptional activities, such as equipment theft/damage.
  5. Surface water level maximum.
  6. Surface level minimum.
  7. Minimum and Maximum value weater parameters
2. Summary of field maintenance activities. Including:
  1. The number of station visits for preventative maintenance for the previous month.
  2. The number of station visits for emergency maintenance for the previous months including problem and action taken.
  3. Other technician activity, such as the number of days worked, vacation, sick, etc.
3. Data Center Summary of the following:
  1. Server downtime and reason for downtime
  2. Software/hardware upgrades
  3. Daily maintenance activity log

The purchaser will modify the reports as directed by the purchaser to include more or less information.

The contractor provided technicians/IT personnel will be responsible for using the time series database to perform quality control and establish a “data for record” database. Data will be processed and stored no later than two months after the data is received at the server.

### **Supervision**

The hydro-meteorological technicians (both senior and junior) will take supervision from the appointed executive officer of BWDB though the purchaser must be cognizant of the contractual commitments of the technicians in assuring that no stations are down beyond a period where penalties may commence. This means that hydro-meteorological technician activities must be carefully coordinated with the Purchaser. Regular dialogue is required between the Bidder and the Purchaser. The Purchaser can also request station maintenance activities, again provided that the activities don’t interfere with the technician’s contractual obligations.

### **Computer System & Software Specialist – Responsibilities, Qualifications and Supervision**

There are two levels of computer system & software staff required. There will be a Senior Computer Systems & Software Specialist and two Junior Computer Systems & Software Specialists.

#### **Senior Computer System and Software Specialist**

The Senior Computer System and Software Specialist will be highly trained and certified to use the AWLGS, AWS and ARGSCommunication& Data Collections Server(s) and all associated software. The senior position must have a broad and in-depth experience with operating systems, system programming, database programming, web programming and a clear understanding of the applications installed as part of this tender. The senior specialist will have a firm grasp of the software and be capable of training the Purchaser’s officials as requested by the Purchaser and also training the junior specialist. The senior specialist will assure that the data transmitted to the center is being properly stored on the AWLGS, AWSand ARGSCommunication and Data Collection Data Base, as well as the time series data base software.

The Senior Specialist will also be capable configuring web pages that are used to disseminate and visualize the collected data.

#### **Junior Computer System and Software Specialist experience**

The Junior Computer System and Software Specialist will serve the Senior Specialist in providing assistance in maintaining the computer server and all software packages and all other activities of the Senior Specialist. The junior specialist should have experience in system programming, database programming and web programming, and should be able to fill-in for the senior position when the senior staff is absent.

## **Responsibilities**

The computer system and software specialists will have the responsibility of maintaining the computer systems and network that were acquired as part of this project. The specialists will also be responsible for operating the AWLGS, AWS and ARGS Communication & Data Collection Server(s) and software any other software that is procured as part of this tender.

The computer systems and software support engineers will be responsible for maintaining the servers, monitoring data collection, assuring that the real-time data is stored in the database, perform QC on the data collected, and assuring the data is continuously available over the web site. The information technology specialists will also work at the behest of the purchaser. All activities will be tracked using the maintenance software tool, which can be identical to the tool used by the field technicians. The computer system and software support engineers will provide monthly reports providing detail of maintenance activities during the previous mon

The bidder's IT staff will also be responsible for producing monthly reports, due no later than 7<sup>th</sup> day of each month, which is valid for the previous month.

The monthly reports will include the summary of the IT systems supported by the IT staff. The report will include:

1. Data Center performance, including:
  - a. Downtime caused by servers;
  - b. Downtime caused by software;
  - c. Number of hours/days of outages on each subsystem;
  - d. Amount of data collected and stored;
  - e. Number of hits on website;
  - f. Most popular products

## **Supervision**

The computer system and software specialists (both senior and junior) will take supervision from the appointed executive officer of BWDB, though the purchaser must be cognizant of the contractual commitments of the IT staff in assuring that the IT system is operating properly, whose failure to perform timely maintenance may incur penalties. This means that meteorological technician's activities must be carefully coordinated with the Purchaser. Regular dialogue is required between the Bidder and Purchaser.

## **Warranty Period**

The warranty period shall begin upon "system" acceptance. System acceptance is defined as all stations installed, collecting data, transmitting data, data reception at data centre, data being stored, and all processing and visualization components in place. Additionally, all technicians must be assigned, trained, and placed at their respective locations with support infrastructure (tools and vehicles necessary to perform maintenance tasks).

**Scheduled Maintenance visits**

The supplier shall make sure that preventive maintenance is carried out at all stations at least twice a year, during maintenance visit, the bidder's personnel should follow standard maintenance procedures, the procedures to be developed and submitted by the bidder. During these maintenance visits, the representative should make sure that:

- Desiccant is replaced
- The battery is in proper operating condition, and free from leads/corrosion
- All the sensors and devices are working
- Confirmation of surfacewater level (note changes in field maintenance software and monthly report)
- All wires are tight with no loose connection
- Any damage to equipment by environment, animal or human factors
- The site is clean free from any kind of grass and debris.

The bidder's representative shall take time stamped geo-tagged photographs during each such maintenance visits for each site. The pictures should clearly show 1) Status before maintenance, 2) status during maintenance and 3) status after maintenance. All these three photographs should be part of the maintenance report that is submitted to purchaser.

## **TECHNICAL RESPONSIVENESS FORM**

**BIDDER SHALL FURNISH CLAUSE BY CLAUSE COMMENTARY AGAINST THE LAID DOWN TECHNICAL SPECIFICATION AND STANDARDS AS PER THE FORMAT GIVEN BELOW:**

### **(A) Summary of Instructions**

- (a) Particulars of Manufacturer and local agent cum representative are to be given under rows Model and Address.
- (b) **All** entry boxes in column “**Specification and Standards as offered in by Bidder**” shall be filled-in accurately and comprehensively. Quantitative fields shall be filled in accurately. It is not acceptable to use ‘Yes’, No, Compliant or similar evading words. Following format is designed to help the Bidder to understand the requirements of the equipment being procured. The Bidder must describe in the format how his bid responds to the technical requirements of the equipment. Bidder to note that one or two word responses (e.g. “Yes”, “No” “will comply” or similar evading words) are normally not sufficient to confirm the responsiveness with the technical requirements, hence elaborate responses are sought from the bidders. **In case deviation on the following technical requirements of equipment is not as per the minimum criteria mentioned, the bids may be declared “non-responsive”.**
- (c) Requested materials and information shall be enclosed with the bid and be unambiguously associated with instruments as offered in the bid
- (d) Negligence to comply with the instructions and requirements as stated above makes the bid liable to be rejected.
- (e) Abbreviations: OD-Outer Diameter; ID-Inner Diameter; FS-Full Scale; Pa-Pascal (unit of pressure), RTDAS-Real time data acquisition system; DRS-Data Retrieval System; DCP- Data Collection Platform, AWS- Automatic Weather Station, ARG- Automatic Rain Gauge, AWLG- Automatic Water Level Gauge.
- (f) Sample interval is the interval at which samples or sensor readings are taken. The recording / measurement interval defines the interval at which the data records are stored in memory. A data record can represent a single sample or the average of a number of samples. In particular, the result of the wave suppression filter is a single record representing the average value of a number of samples.

The proposed maintenance interval and the recommended spares as offered in the bid shall be based on instrument deployment history. The training proposal shall be based on experience in similar cases. Moreover, it shall consider the educational level and specialization of the trainees.

**(A) Entries requiring special attention**

<b>Bidder</b>	<b>AWLG (bridge mounted) make/ model</b>	<b>AWLG (Pole mounted) Make/model</b>	<b>ARG make/model</b>	<b>AWS make/model (each sensor of the AWS)</b>	<b>Data Logger make/ model</b>
Name / Complete Address/ Website/ Email	<b>Model:</b> <b>Manufacturer:</b> Name: Place: Tel: Fax: E-mail: Web:	<b>Model:</b> <b>Manufacturer:</b> Name: Place: Tel: Fax: E-mail: Web:	<b>Model:</b> <b>Manufacturer:</b> Name: Place: Tel: Fax: E-mail: Web:	<b>Model:</b> <b>Manufacturer:</b> Name: Place: Tel: Fax: E-mail: Web:	<b>Model:</b> <b>Manufacturer:</b> Name: Place: Tel: Fax: E-mail: Web:

**(A) Bidder shall provide information in the formats given below:**

- (a) Make/ Model/ Local Agent:
- (b) Clause by Clause Commentary against laid down technical specifications:

**Specifications of the RADAR (Bridge mounted) Water Level Gauge**

<b>Name of Goods-Its Features</b>	<b>Required Specifications and standards as per bidding document</b>	<b>Specification and standard as offered in by Bidder</b>	<b>Remarks</b>
<b>RADAR Automatic Water Level Gauge Sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
<b>Site Conditions</b>			
Ambient Temperature	From 0 to +50 °C		
Humidity	0 to 100 %		



Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
Altitude	0 to 2000 meter		
<b>Sensor</b>			
Sensor Type	Microwave non-contact sensor		
Range	30 meters		
Resolution	3 mm or better		
Accuracy	0.02 % FSO		
Output Interface	SDI-12 / RS-485 / 4-20mA		
Power Supply	To be powered by Solar Panel provided by bidder with DCP		
Beam angle	Less than 16 degrees.		
<b>General Features</b>			
Material	Corrosion Resistance (Stainless steel / Aluminum / PVC/UV stabilized ABS with metal casing)		
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.		
Tools	Complete tool kit for operation and routine maintenance		
Protection	NEMA 4X or IP65 or better		
Certification	UL/IEC/ANSI/Equivalent certifications		
Horizontal Mounting/Installation Arrangements	Above FRL, below a bridge girder wherever available otherwise horizontal cantilever arrangement from a mast/wall/pedestal to be provided		
Radar Sensor should have inbuilt diagnostics feature & averaging feature			

**Specifications of the RADAR (Pole mounted Radar) Water Level Gauge**

Name of Goods-Its Features		Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
<b>RADAR Automatic Water Level Sensor (Pole mounted)</b>			<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
<b>Site Conditions</b>				
Ambient Temperature		From 0 to +50 °C		
Humidity		0 to 100 %		
Altitude		0 to 2000 meter		
<b>Sensor</b>				
Sensor Type		Microwave non-contact sensor		
Range		30 meters		
Resolution		3 mm or better		
Accuracy		0.02 % FSO		
Output Interface		SDI-12 / RS-485 / 4-20mA		
Power Supply		To be powered by Battery provided by bidder with DCP		
Beam angle		Less than 16 degrees.		
<b>General Features</b>				
Material		Corrosion Resistance (Stainless steel / Aluminum / PVC/UV stabilized ABS with metal casing)		
Enclosure		The Sensor shall be easy to dismount and replace in the event of malfunction.		
Tools		Complete tool kit for		

Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
	operation and routine maintenance		
Manuals	Full Documentation and maintenance manual in English		
Accessories	Sensor Mounting support, cables and other accessories as required		
Protection	NEMA 4X or IP65 or better		
Certification	UL/IEC/ANSI/Equivalent certifications		
Horizontal Mounting/Installation Arrangements	Above FRL, at the river bank or wherever suitable. Also should be able to relocate		
Radar Sensor should have inbuilt diagnostics feature & averaging feature			

### Specifications of Automatic Rain Gauge (ARG)

Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
<b>Automated Rain Gauge</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
<b>Site Conditions</b>			
Ambient Temperature	From 0 to +50 Degree C		
Humidity	0 to 100 %		
Altitude	0 to 2000 meter		
<b>Sensor</b>			

Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
Sensor Type	Tipping Bucket type with reed switch		
Range	250 mm/h or better		
Resolution	0.5 mm or better		
Accuracy	2% or better, $\pm 2$ mm		
<b>General Features</b>			
Output Interface	SDI-12/ RS-485 / 4-20 mA / Switching closure output		
Power Supply	To be powered by solar power provided by bidder with DCP		
Enclosure	NEMA 4X or IP65 or better		
Tools	Complete tool kit for operation and routine maintenance		
Certification	UL/IEC/ANSI/Equivalent certifications		

### Specifications of the Automatic Weather Station (AWS)

Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
<b>Site Conditions</b>			
Ambient Temperature	From 0 to +50 °C		
Humidity	0 to 100 %		
Altitude	0 to 2000 meter		
<b>Air Temperature and Relative Humidity Sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
<b>Air Temperature Sensor</b>			
Sensor Type	Platinum resistance or better or equivalent		
Range	-5 to +60 Degree Celsius		
Resolution	$\pm 0.1^{\circ}\text{C}$		

Accuracy	Within $\pm 0.2$ °C in the entire working range		
Response Time	10 secs or lesser		
<b>Relative Humidity Sensor</b>			
Sensor Type	Capacitive/ Solid State Humidity Sensor		
Range	0 to 100 %		
Resolution	0.1%		
Accuracy	$\pm 3\%$ or better		
Power Supply	To be powered by solar power provided by bidder		
Response time	10 secs or lesser		
General Features			
Self-aspirated	To ensure continuous supply of air. Free from turbulence, water droplets and radiation		
Power Supply	To be powered by solar power provided by bidder.		
Accessories	All accessories for mounting the instrument at ~1.5mts height above the ground level e.g. special cross arm clamps or flag, if any shall be provided		
Output Interface	SDI-12/ RS-485/Analog		
<b>Wind Speed and Direction Sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Sensor Type	Ultrasonic sensor (No moving Parts)		
Range	0-60 m/s for speed and 0–360 degrees for direction		
Resolution	0.1m/s for Speed; $\pm 1$ degree for Direction		
Accuracy	Wind Speed		

	$\pm 2\% \pm 0.1$ m/s ( up to 20 m/s ) and $\pm 3 \%$ ( for 20 to 60 m/s) Wind direction $\pm 5$ degrees or better		
Response time	Less than 1 second lag in operating range		
Output Interface	SDI-12 / RS-232/ RS-485		
<b>Air Pressure Sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Sensor Type	Temperature Compensated		
Range	600 to 1100 hPa		
Resolution	$\pm 0.1$ hPa		
Accuracy	$\pm 0.2$ hPa		
Power Supply	To be powered by solar power provided by bidder		
Output Interface	SDI-12 / RS-232/ RS-485		
<b>Evaporimeter sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Sensor Type	Shaft Encoder / ultrasound radar / Float & pulley type As Specified by IS:5973 which known as the modified Class A Pan potentiometer		
Diameter of the pan	1.2 m or more		
Accuracy	$\pm 1\%$ FSO		
Resolution	1mm		
Power Supply	To be powered by solar power provided by bidder		
Accessories	As required for complete installation of the sensors and		

	equipment		
Material	The pan is made of Copper or stainless steel sheet, tinned inside and painted white outside		
<b>Solar Radiation Sensor</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Sensor Type	Silicon Pyranometer		
Threshold	120 W/m <sup>2</sup> of direct solar irradiance		
Methodology	Alternate shading of sensor to account for sky radiation or Sunshine duration shall be computed in datalogger		
Spectral Range	400nm to 1100 nm		
Range	0-2000 W/Square meter		
Resolution	1 W/Square meter		
Accuracy (Including Temperature Compensation)	3% or better		
<b>General Features</b>			
Tools	Complete tool kit for operation and routine maintenance		
Accessories	All accessories for mounting the instrument at ~1.5mts height above the ground level, e.g. special cross arm clamps or flag, if any, shall be provided		
Certification	UL/IEC/ANSI/Equivalent certifications needed		
<b>Automated Rain Gauge</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name,	

		address, email, phone, website, fax	
<b>Site Conditions</b>			
Ambient Temperature	From -5 to +60 Degree C		
Humidity	5 to 100 %		
Altitude	0 to 2500 meter		
Sensor			
Sensor Type	Tipping Bucket type with reed switch		
Range	250 mm/h or better		
Resolution	0.5 mm or better		
Accuracy	2% or better, $\pm 2$ mm		
<b>General Features</b>			
Output Interface	SDI-12/ RS-485 / 4-20 mA/ Switching closure output		
Power Supply	To be powered by solar power provided by bidder		
Enclosure for sensor part	NEMA 4 or IP65 equivalent		
Tools	Complete tool kit for operation and routine maintenance		
Accessories	Sensor Mounting support, cables and other accessories as required		
Certification	UL/IEC/ANSI/Equivalent certifications needed		
Note: Bidder shall provide spout filter and bird cage to prevent ingress of insects and debris, And with Bubble Spirit Level and adjustable legs for horizontal alignment of tipping bucket mechanism			



**Specifications of Data Logger with Analog Input 2 channels (For ARG / AWLG)**

<b>Name of Goods-Its Features</b>	<b>Required Specifications and standards as per bidding document</b>	<b>Specification and standard as offered in by Bidder</b>	<b>Remarks</b>
<b>Data Logger with 2 AI channels</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
<b>Site Conditions</b>			
Ambient Temperature	From 0 to +50 Degree C		
Humidity	0 to 100 %		
Altitude	0 to 2000meter		
<b>Sensor Interface</b>			
Analogue Inputs	2-Analogue Input Channels 4 to 20 mA, 100% over range withstand (Analog input channels are required in datalogger, if any sensor offered by bidder requires analog interface to integration with datalogger)		
SDI Port	One SDI-12 Interface port		
Serial Port for sensor interface	RS-232/ RS-485 for sensor Interface		
Pulse Input	1 Input for Rain Gauge impulse		
<b>Input - Output Interfaces</b>			
Data Transfer	USB stick option for Data transfer		
Port for Configuration	One Serial Port (RS-232 / RS-485) for communication with Laptop for programming		
Port for Telemetry	2 Ports for Communication with Telemetry (GSM/GPRS) device		

Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
	Both telemetry systems should work simultaneously for redundancy		
Display Port	Port for connecting external display screen for data in running text		
<b>Analog to Digital Converter</b>			
Resolution	16 bit or better		
Conversion Accuracy	$\pm 1$ LSB		
Sample intervals	1 Sec to 24 hours (user scalable)		
<b>General Features</b>			
Flash memory	Non-volatile Flash memory that can store one year of data and expandable upto 1 GB Via USB/ SD Card		
Recording Interval	Individual recording intervals for each sensor/parameter		
Firmware Operating System	Multi-tasking operating system - must log data and transmit at same time		
Display	Inbuilt Digital Display for viewing current data and setting values		
Power Supply	Shall be powered by solar Power supply to be provided by bidder with DCP low current drain (quiescent $\leq 10.0\text{mA}$ )		
Battery Voltage	Monitoring of battery voltage level		
Internal battery	Internal battery backup for clock, lithium battery, storage 2 years		
Charge	Internal or External		

<b>Name of Goods-Its Features</b>	<b>Required Specifications and standards as per bidding document</b>	<b>Specification and standard as offered in by Bidder</b>	<b>Remarks</b>
Controller			
User Permissions	Different user levels, system of user rights / passwords, access restricted to unauthorized personnel		
Internal clock	Internal clock with drift less than 1 second per Week		
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors		
Real time clock	GPS synchronized & timing in IST format required		
System integrity	System integrity check procedures		
Enclosure	for wall-mounting in a shelter / enclosure with IP65/NEM4Xor better) protection or better		
Accessories	Serial cable + adaptor (if required for Notebook connection). All accessories (fixing units, etc.) as required		
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)		
Manuals	full documentation and maintenance instructions in English (1 copy per station).		
<b>GSM / GPRS MODEM</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Operating	From 0 to +50 Degree C		

<b>Name of Goods-Its Features</b>	<b>Required Specifications and standards as per bidding document</b>	<b>Specification and standard as offered in by Bidder</b>	<b>Remarks</b>
Temperature			
Transmission System	GPRS/edge-based data transmission system		
Performance	Data Reception availability of 95% or better. Yagi Antenna may be used in places with weak signal reception.		
Form factor	The GSM /GPRS modem should either be integral part of data logger specified above, or it should be supplied as independent unit compatible with supplied data logger		
<b>Specific Features</b>			
Communication Direction	Utilize GPRS network for two-way connection with FTP, TCP/IP (INTERNET) connection and SMS		
Transmission trigger	Data collection to be triggered by interrogation from Data Centre, or by event based transmission triggered by remote site		
Power Saving	Ability to disable interrogation system in order to save power at remote site		
Communication Protocol	Data transmission SMS to transmit and receiving data to the Data Centre		
Accessories	All associated equipment, including Antenna all cables and mounting hardware		
Certification	UL/IEC/ANSI/Equivalent certifications needed		

### Specifications of Data Logger with AI 8 channels for AWS

Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
<b>Data Logger with 8 AI channels</b>		<b>Make: Model:</b>	
<b>Site Conditions</b>			
Ambient Temperature	From 0 to +50 Degree C		
Humidity	0 to 100 %		
Altitude	0 to 2000meter		
<b>Sensor Interface</b>			
Analogue Inputs	8Analogue Input Channels		
Analogue Input	4 to 20 mA, 100% over range withstand		
SDI Port	One SDI-12 Interface port		
Serial Port for sensor interface	One RS 232 for sensor Interface One RS-485 for sensor Interface port		
Digital Inputs	6 Digital Channel (bidirectional)		
Pulse Input	2 Input for Rain Gauge impulse		
<b>Input - Output Interfaces</b>			
Data Transfer	USB stick option for Data transfer		
Port for Configuration	One Serial Port (RS232) for communication with Laptop for programming		
Port for Telemetry	2 Ports for Communication with Telemetry (GSM/GPRS) device.		
Display Port	Port for connecting external display screen for Data in running text		
<b>Computer Software</b>			
Operating System	Windows software for system configuration /		

	communication		
Version	English language version		
Licenses	All required licenses shall be included		
<b>Analog to Digital Converter</b>			
Resolution	A/D resolution 16 bit or better		
Conversion Accuracy	$\pm 1$ LSB		
Sample intervals	1 Sec to 24 hours (user scalable)		
<b>General Features</b>			
Flash memory	Minimum 8MB Non-volatile Flash memory that can store one year of data and shall be expandable upto 4GB via. USB/SD card		
Recording Interval	Individual recording intervals for each sensor/parameter		
Firmware	Multi-tasking operating system – must		

Operating System	log data and transmit at same time		
Display	Inbuilt Digital Display for viewing current data and setting values		
Power Supply	Shall be powered by solar Power supply to be provided by bidder		
Battery Voltage	Monitoring of battery voltage level		
Internal battery	Internal battery backup for clock, lithium battery, storage 2 years		
Charge Controller	Internal or External		
User Permissions	Different user levels, system of user rights / passwords, access restricted to authorized personnel		
Internal clock	Internal clock with drift less than 1 second per Week or using GPS		
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors		
Real time clock	GPS synchronized & timing is required in BST format		
System integrity	System integrity check procedures		
Enclosure	for wall-mounting in a shelter / enclosure with IP65/NEMA 4X protection or better		
Accessories	Serial cable + adaptor (if required). All accessories (fixing units, etc.) as required		
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)		
<b><u>GSM/GPRS MODEM</u></b>		<b>Make:</b> <b>Model:</b>	
Operating Temperature	From 0 to +50 °C		
Performance	Data Reception availability of 95% or better. Yagi Antenna may be used in places with weak signal strength.		
Form factor	The GSM /GPRS modem should either be integral part of data logger specified		

	above, or it should be supplied as independent unit compatible with supplied data logger		
<b>Specific Features</b>			
Communication Direction	Utilize GPRS network for SMS connection		
Transmission trigger	Data collection to be triggered by interrogation from Data Center, or by event based transmission triggered by remote site		
Power Saving	Ability to disable interrogation system in order to save power at remote site		
Communication Protocol	Data transmission to execute SMS to transmit and receiving data to the Data Center		
Accessories	All associated equipment, including Antenna all cables and mounting hardware		
Certification	UL/IEC/ANSI/Equivalent certifications needed		

### Specifications of Solar Power Supply System

Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
<b>Battery</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Voltage	From 0 to +60 V / as compatible with DCP and all sensors		



Name of Goods-Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
Type	Sealed maintenance free		
Capacity	Based on site conditions and telemetry method, power supply system shall provide 15 days of backup to all equipment's being powered up by the solar panel		
<b>Solar Panel</b>		<b>Make:</b> <b>Model:</b> Manufacturer Name, address, email, phone, website, fax	
Size	Based on site conditions and telemetry method, power supply system shall provide 15 days of backup to all equipment's being powered up by the solar panel		
Mounts	The mounts should be sturdy in design and detachable but should not move or rotate with wind. It should have a provision to adjust direction and elevation during installation for optimal solar power generation		
Charger	Smart solar charger with protection shall be provided by the bidder		
Certifications	UL/IEC/ANSI/Equivalent certifications needed		

**Specification of Data Collection / Acquisition Server (Primary), Backup Server (Primary), Backup Server (Secondary)**

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar		
2	Operating System	Red Hat Linux with proper support and subscription		
3	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar		
4	Hard Drive	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache		
5	Network Card	(4x1Gbit) Quad Port Network Card or similar		
6	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support		

**Specification of Data Management & Processing Server (Primary)**

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar		
2	Operating System	Red Hat Linux with proper support and subscription		
3	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar		
4	Hard Drive	8 x 2.5" Hot-Plug Disk Drive Bays		

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
5	Network Card	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache		
6	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support		

**Specification of Monitoring Services Server**

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	Processor	Processor (2x 16C Gold, 2.8GHz, 10.4GT/s, 22MB, 150W) or similar		
2	Operating System	Red Hat Linux with proper support and subscription		
3	Memory	128GB, 2933MT/s, Dual Rank DDR4 RDIMM ECC or similar		
4	Hard Drive	6 x 480GB SSD 2.5in Hot-plug HDD, RAID controller should be provided with minimum 2GB cache		
5	Network Card	(4x1Gbit) Quad Port Network Card or similar		
6	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support		

**Specification of Next Generation Firewall (NGFW)**

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
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No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	Next Generation Firewall (NGFW)	The services that the firewall will render are General Requirements, Technical, Interface & Connectivity , Firewall Filtering, Firewall Logging and Monitoring, Administration/ Management, User Authentication, URL Filtering, Web Server Security, Intrusion Prevention and Performanceas mentioned in the Technical Specifications section		
2	Warranty	Five (5) years' hardware repair/replacement and software support on OS, 24x7 phone support		
3	Operating System	Compatible to Red Hat Enterprise Linux Server 8		

#### Specification of Load Balancer with Anti-DDos

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	<b>Load Balancer with Anti-DDos</b>	For receiving and re-distributing incoming requests to any available server capable of fulfilling them Application Throughput (L4/L7): 10 Gbps / 10 Gbps DDoS Protection (SYN Flood) SYN/sec: 4 Million 1/10 GE Fibre (SFP+): 2 ports		

#### Software

No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
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No	Name of Goods- Its Features	Required Specifications and standards as per bidding document	Specification and standard as offered in by Bidder	Remarks
1	Data Collection/Acquisition software	Operating System, Licensing and Support, Software operation, Data polling, Data reception, Data Storage, Pre-programmed polling, Ad-hoc data polling, Software service, Licensing and Support, Software operation, System Integration. Compatibility and Features as mentioned in Technica Specifications		
2	Data Management software (Time Series Processing Software)	Operating System, Licensing and Support, Software operation,Data Import, Database, Licensing and Support, Software operation, Data Export, Program functionality, Transaction tracking, Data manipulation, Data flagging, Statistics, Graphics, Map interface, Reports generation, Rating Table Development and Features as mentioned in Technica Specifications		
3	Field Maintenance Tracking Software	Features as mentioned in Technical Specifications		
4	NMS/Server Monitoring Software	The software will have the following features of Mapview,Inventory Module, Monitored Performance Statistics Dashboard as mentioned in Technica Specifications		
5	Oracle Database Management Software (12c) ,(as per technical specifications.)	Features as mentioned in Technical Specifications		
6	Supply of Security Information and Event Management (SIEM) Software ( as per specifications)	Features as mentioned in Technical Specifications		
7	Back upSoftware( as per specifications)	Features as mentioned in Technical Specifications		

**Specification of IT System Accessories**

<b>Name of Goods- Its Features</b>	<b>Required Specifications and standards as per bidding document</b>	<b>Specification and standard as offered in by Bidder</b>	<b>Remarks</b>
<b>KVM Switch with Console Monitor</b>	KVM Switch which will allow connection of all the servers through a single Console (computer screen minimum 22", keyboard and mouse). The KVM switch will be rack mounted (with rails).		
<b>Computer Rack</b>	Computer rack which will hold all servers, computer switch, and KVM system, Maximum Height 42U (1991 mm) Maximum Width 31.50inches (800 mm) Maximum depth 31.5 inches (800 mm) Weight Capacity (static load) 3000.00 lbs. (1363.64kg) Color Black .		
<b>16 Port Switch</b>	16-port switch,will allow the new computer systems to be connected to the BWDB network		
<b>Storage Area Network (SAN) Switch</b>	Connectrix- DS-6620B, 24 active ports with 16 Gbps Short Wave SFP transceiver modules.		
<b>Storage Enclosure</b>	Dell SC420F with 24 x 1.92TB SAS 12GB, RI SSD, 2.5in Hot-plug HDD - for purpose of high-speed network and provides block-level network access to storage. It is typically composed of server, switches, storage elements, and storage devices.		

## Performance Specifications

**For 280AWLG (Bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 3 weather stations Operation, Trouble-shooting & Maintenance for 03 (three) years beyond Warranty Period.**

### Scope of Work

The scope of work includes the following activities as guided by the specifications.

1. Undertake services of Operations, Maintenance & keep automated 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations 100 % functional.
2. Provide hydro-meteorological technicians for operation, maintenance and keep 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations 100 % functional.
3. Replace spare parts as and when required.
4. Develop reports and products as directed by the **Purchaser**
5. Provide staff at data center to operate newly acquired data center computer systems.
6. Provide documentation.

### **3.1 Requirements during the period of Operations, Trouble-shooting and Maintenance to keep 280AWLG (Bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 3 weather stations 100% functional for 03 years beyond mandatory warranty Period.**

The monthly reports will include the summary of the entire Hydromet network. The report will include:

- 1. Station summary of the following:**
  - a. Number of hours reporting for the previous month.
  - b. The number of hours missing for the previous month.
  - c. The number of penalty days for the previous month.
  - d. Notes on exceptional activities, such as equipment theft/damage.
  - e. Hydromet level maximum.
  - f. Hydromet level minimum.
- 2. Summary of field maintenance activities. Including:**
  - a. The number of station visits for preventative maintenance for the previous month.

- b. The number of station visits for emergency maintenance for the previous months including problem and action taken.
- c. Other technician activity, such as the number of days worked, vacation, sick, etc.

**3. Data Center Summary of the following:**

- a. Server downtime and reason for downtime
- b. Software/hardware upgrades
- c. Daily maintenance activity log

This report will be provided to the purchaser no later than the 7<sup>th</sup> day of the month for the previous month.

The supplier provided technicians/IT personnel will be responsible for using the time series database to perform quality control and establish a “data for record” database. Data will be processed and stored no later than two months after the data is received at the server.

**3.1.1 Scheduled Maintenance visits**

The supplier shall make sure that preventive maintenance is carried out at all stations for at least twice a year. During maintenance visit, the bidder’s personnel should follow standard maintenance procedures, the procedures to be developed and submitted by the bidder. During these maintenance visits, the representative should make sure that:

- The battery is in proper operating condition, and free from leads/corrosion
- All the sensors and devices are working
- Confirmation of accurate hydro-met observations (note changes in field maintenance software and monthly report)
- All wires are tight with no loose connection
- Any damage to equipment by environment, animal or human factors
- The site is clean free from any kind of grass and debris.

The bidder’s representative shall take time stamped geo-tagged photographs during each such maintenance visits for each site. The pictures should clearly show 1) Status before maintenance, 2) status during maintenance and 3) status after maintenance. All these three photographs along with maintenance report should be submitted to purchaser.

**3.1.2 Documentation**

The **Bidder** will provide complete written documentation, including data sheets and operating manuals of the data logger, sensor and ancillary equipment, such as solar panels, batteries and solar regulators. This will be bound in binder(s) with 5 copies of this written material provided to the **Purchaser**.

The documentation will also be provided in electronic form on USB drives supplied by the **Bidder**. The **Bidder** will prepare 5 such USB drives with all required documentation on each of the 5 USB drives.



**3.1.3 Bidder Responsibilities during Service Operations, Maintenance & kept the hydromet network 100 % functional for 03 years beyond mandatory warranty period.**

1. The Bidder will be responsible for obtaining all tools and equipment necessary to complete Maintenance & kept the groundwater network 100 % functional.
2. The Bidder will be responsible in acquiring vehicles for field use and paying all expenses related to these vehicles. It is required that the vehicles be 4x4 trucks.
3. The Bidder will be responsible for arranging the vehicle for transport during maintenance and troubleshooting visits to remote sites, which includes bidder's personnel and accompanying purchaser's representatives.
4. The Bidder is responsible for obtaining office devices and supplies for their use, such as computer printers, paper stock, pens, etc.
5. The Bidder will be responsible for acquiring computers for field use, and prepare reports, etc.
6. The Bidder will be responsible for acquiring internet connectivity at the field offices for their own staff (technicians).
7. The bidder is responsible for paying all the GSM mobile charges for SIM cards and data at remote sites.
8. The bidder is responsible for paying all the data and telemetry charges, subscriptions for satellite telemetry at remote sites and BWDB headquarters.
9. The bidder is responsible for paying all the salaries, per-diem, travel and all incidental charges for their personnel deployed at BWDB headquarters and field offices.
10. The bidder is responsible for paying all transport and shipping, packing / unpacking, installation / un-installation charges for replacement / repair of defective equipment.
11. The bidder is responsible for paying all replacement spare parts, batteries, etc. whenever required.
12. The bidder is responsible for all training related costs.
13. Submit Geo-tagged time stamped photographs during maintenance visits.

**3.1.4 Purchaser Responsibilities**

1. The Purchaser is responsible for taking permissions for land to be used to install the stations. The space required is free from obstacles.
2. The purchaser is responsible for food, per-diem and incidental charges for purchaser's personnel during field visits for installation/maintenance/ troubleshooting.
3. The purchaser will provide list and location details of 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations.
4. The purchaser will provide training venue with related facilities (projector, white board etc.)

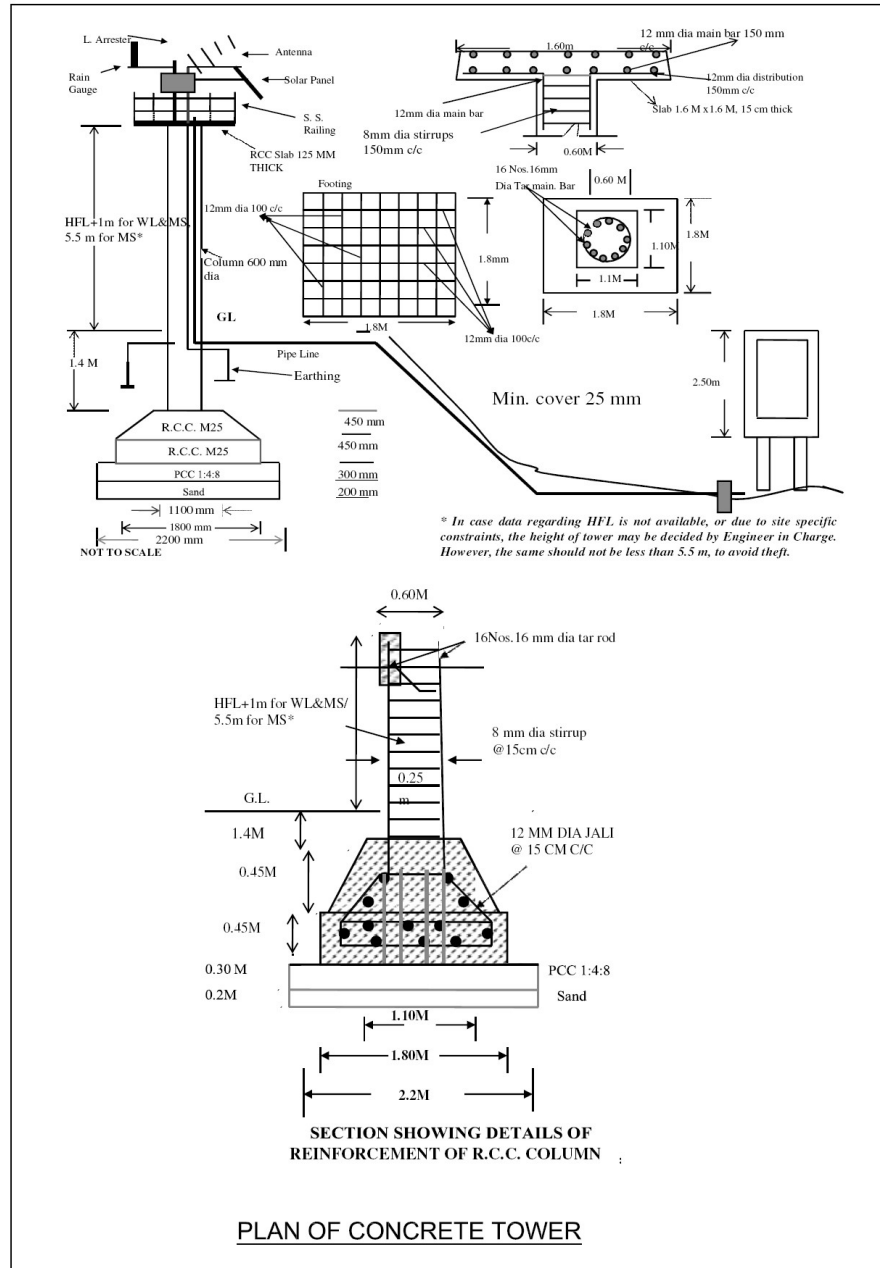
## 4. Drawings

These Bidding Documents includes the following drawing.

<b>List of Drawings</b>		
<b>DRAWING NR.</b>	<b>Drawing Name</b>	<b>Purpose</b>
1	Plan of wire mesh	Related to wire mesh design.
2.	Plan of a telemetric Pillar	Mounting sensors
3	Plan of concrete tower	Details about construction of concrete tower for installation of data logger and solar panel.
4	Typical Instillation of AWLG over a Bridge.	For arrangement showing installation of Radar, solar panel, data logger etc
5	Representative picture of a AWLG mounted on a pole ( Type 1)	For arrangement showing installation of Radar, solar panel, data logger
6	Typical Drawing of AWLG mounted on pole with long arm cantilever boom ( Type 1)	For arrangement showing installation of Radar, solar panel, data logger
7	Representative picture of a AWLG mounted on a pole ( Type 2)	For arrangement showing installation of Radar, solar panel, data logger
8	Typical Drawing of AWLG mounted on pole with long arm cantilever boom ( Type 2)	For arrangement showing installation of Radar, solar panel, data logger
9	Representative picture of ARG to be fixed on top of a building	For showing the convenience of ARG implementation. The sensor should be mounted 1.5 m above the top of the parapet and not exactly as in the figure.



Drawing 2: Typical Layout of a Telemetry Pillar



Drawing 3: Typical Layout of Concrete Pillar

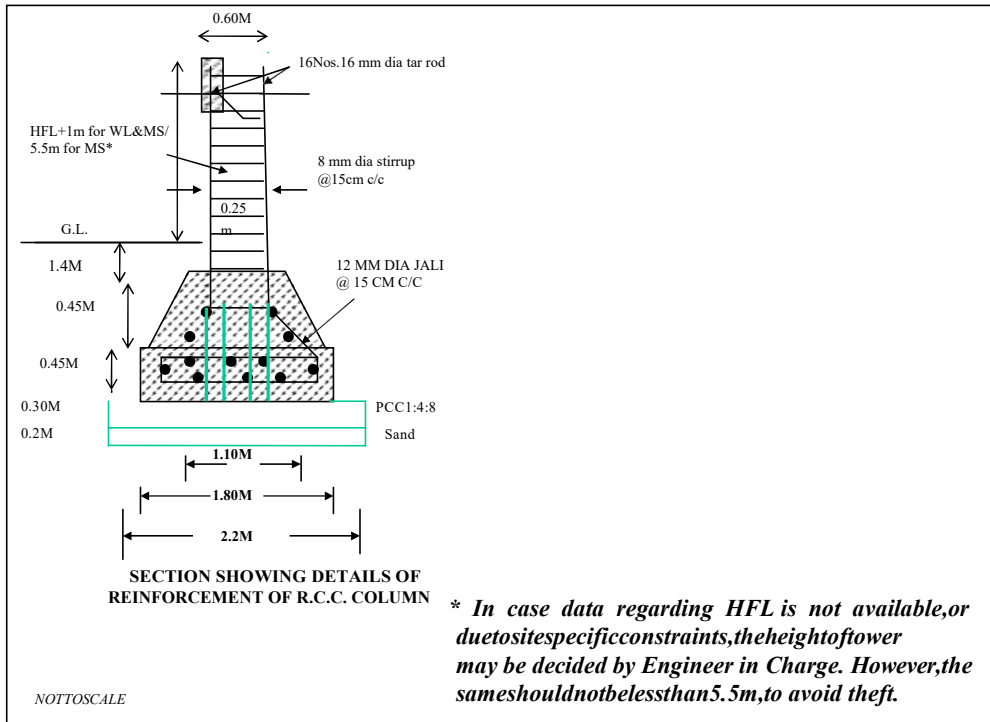


Figure 4: Typical Instillation of AWLG over a Bridge.

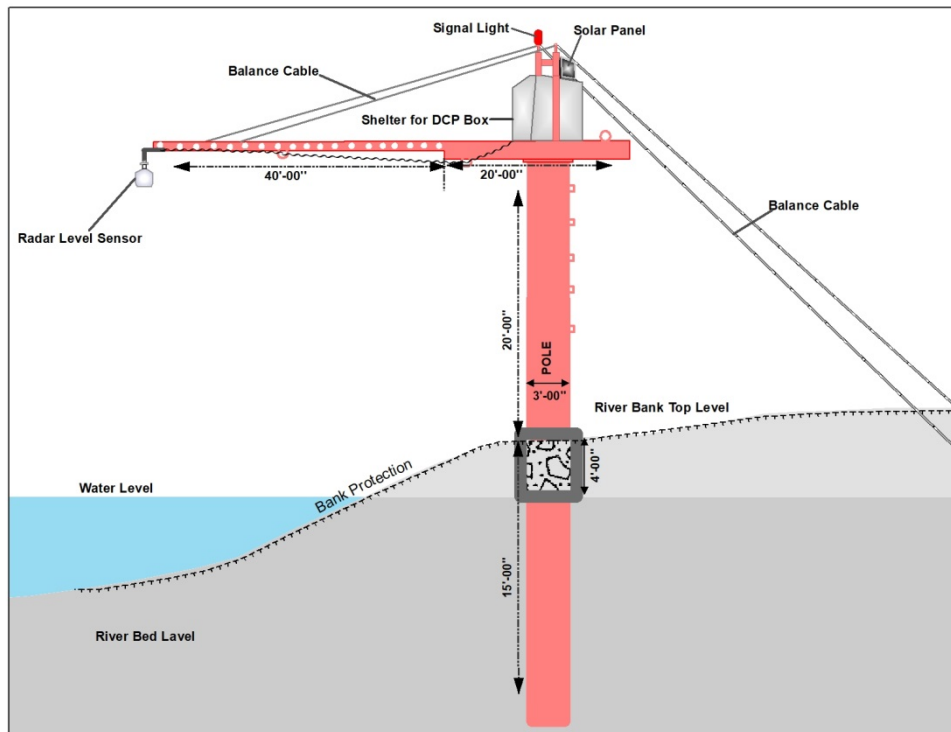


*Fig 5. Representative picture of pole mounted Automatic Water Level Gauge with long arm cantilever boom ( Type I)*

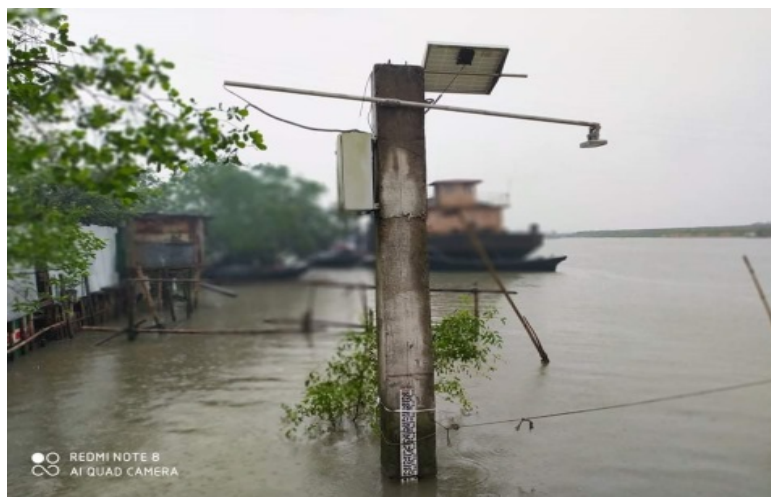
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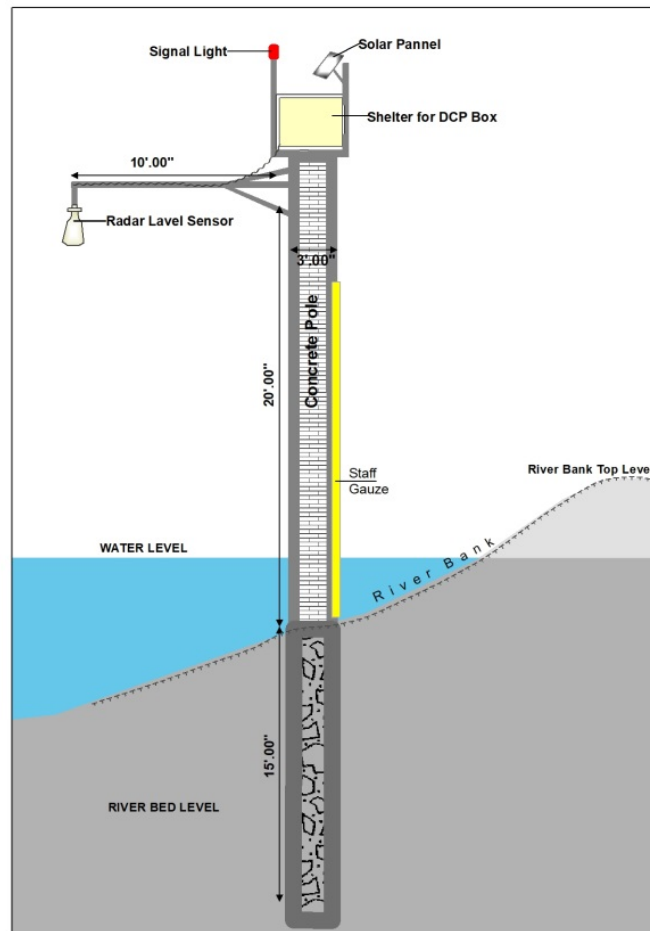
*Fig 6. Typical Drawing of pole mounted Automatic Water Level Gauge with long arm cantilever boom (Type 1)*



*Fig 7. Representative Picture of AWLG mounted on pole (Type 2)*



*Fig 8. Typical Drawing of RCC pole mounted Automatic Water Level Gauge with short arm cantilever ( Type 2)*





*Fig 9. Sample picture of Automatic Rain Gauge (ARG) to be fixed on top of the roof*



## 5. Inspections and Tests

The following inspections and tests shall be performed:

The following inspections and tests shall be performed:

### 5.1 General:

1. After manufacture, the supplier shall get each equipment/item of Goods inspected in manufacturer/s works and forward to the Purchaser along with his letter seeking to inspect an equipment/item of Goods conform to contract specifications.
2. Upon receipt of the test certificate and calibration certificates, the purchaser or its representative may arrange for inspection and/or test of any or part or all the equipment /Goods prior to issuance of dispatch clearance or the purchaser may waive the pre-dispatch inspection.
3. However, the inspection and dispatch clearance by the Purchaser or the waiver thereof shall not prejudice
4. e the right of the Purchaser or its consignee to test the equipment/goods on receipt at destination. Upon receipt of the goods at final destination, the Purchaser shall have the right to inspect and/or test the equipment/Goods to confirm their conformity to contract specifications.
5. If the equipment fails to meet the contract specifications during inspection, whether pre-dispatch or upon receipt at final destination, the supplier shall take immediate steps to remedy the deficiency or replace the defective equipment to ensure that all supplies meet with the specifications specified in the contract

### 5.2 Inspection & tests prior to shipment of Goods and at final acceptance are as follows:

1. The inspection of the Goods shall be carried out to check whether the Goods are in conformity with the approved technical specifications attached to the contract and shall be in line with the inspection/test procedures laid down in the Technical Specifications and the General Conditions of contract. Following broad test procedure will generally be followed for inspection and testing of equipment. The supplier will dispatch the goods to the ultimate consignee after internal inspection testing along with the supplier's inspection report and manufacturer's warranty certificate (where required). The purchaser will test the equipment after completion of the installation and commissioning at the site of the installation.
  - a. Site Preparation and Installation: The Purchaser will designate the installation sites before the scheduled installation date to allow the Supplier to perform a site inspection before the installation of 280AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations, associated telemetry system.
  - b. For site preparation, the supplier should furnish all details to the purchaser sufficiently in advance so as to get the works completed before receipt of the equipment.
2. Complete hardware and software as specified in 'List of Goods and Delivery Schedule' under the Schedule of Requirement should be supplied, installed and commissioned properly by the supplier prior to commencement of performance tests.
3. The acceptance test will be conducted by the purchaser/their consultant or any other person nominated by the purchaser, at its option. The acceptance will involve trouble-free operation

- for fifteen consecutive days. There shall not be any additional charges for carrying out acceptance tests. No malfunction, partial or complete failure of any part of hardware, equipment's, Data Servers attached to printers, drivers etc. or bugs in the software should occur. The supplier shall maintain necessary log in respect of the results of the tests to establish to the entire satisfaction of the purchaser, the successful completion of the test specified. An average uptake efficiency of 98% for the duration of test period shall be considered as satisfactory.
4. In the event of the equipment's & hardware failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing which the purchaser reserves the rights to get the equipment replaced by the supplier at no extra cost to the purchaser.
  5. RTDAS system procured would be subject to the Acceptance Protocol given below-

### **5.3 ACCEPTANCE PROTOCOL**

#### **General**

- a. The delivery of goods/equipment and software should be in accordance with the contract agreement and the process of delivery will adhere to the following 'Acceptance Protocol'. The Acceptance Protocol shall serve as a formal guidance during delivery of the equipment. Its primary goals are twofold.
  - i. Ascertain the delivery and completeness of all ordered products and related documents.
  - ii. Check the functioning of the equipment in a formal way against the specifications by application of Acceptance Tests. The tests also verify the accuracy and stability of the equipment.
- b. The Acceptance Protocol shall be executed in close co-operation between the Supplier and the Purchaser.
- c. Products shall be accepted only if they meet the requirements and are functioning in compliance with the approved technical specifications, related documents are complete and correct. Defective products and any other discrepancies shall have to be replaced/ resolved, within a pre-defined time frame.
- d. The Acceptance Report lays down the findings and observations during the execution of the Acceptance Protocol and is a formal document to record the acceptance or rejection of any item as covered in the Bid document. Any flaws or findings are to be reported. The forms and checklists filled out during the execution of the Acceptance Protocol are to be enclosed with the Acceptance Report. The Supplier receives a signed copy of the Acceptance Report, which the Supplier can use as proof that the items listed in the report were accepted.

The content of the various documents shall be as follows:

#### **Documents**

The following documents shall accompany the delivery of the equipment:

- i. Administrative and Quality Assurance (QA) documents
- ii. Test documents
- iii. Manuals and Guidelines

All documents shall have identification and references to subject or instrument, date, time, location and officer in charge.

**Administrative and QA documents:**

These QA documents shall include:

- i) Production documents associated with the instruments.
- ii) Type codes, serial numbers and other identification data on, possibly externally procured, sensors and major assemblies, to clearly demarcate the sensors/major assemblies associated with hydromet monitoring system.
- iii) Shipping documents indicating instrument/product type, serial number, measuring range, cable length and other similar data.
  - Spray test on enclosure(s), connectors and cables

**Test and calibration documents:**

- i) A comprehensive Method Statement on the applied calibration and in-factory test procedures shall accompany the bid. The Method Statement should define the test and calibration methods applied on the instruments and the components thereof. The Method Statement shall also include, for each calibrated product, an audit trail to national standards on all instruments and facilities used for testing and calibration. The Audit Trail Report shall associate the calibration of the reference instruments and test equipment to the national calibration standards.
- ii) If the Supplier or Manufacturer is not in a position to deliver an Audit Trail Report to the national standards, the Manufacturer shall explain what the quality standards are and how they are maintained and monitored.
- iii) Conditions during calibration, such as room and/or instrument temperature, equipment and facilities used, shall be included in the calibration and test documents.
- iv) The test and calibration documents (QAP) shall contain the data generated during calibration and testing, including:
  - Calibration data provided by the Manufacturer for all instruments
  - Calibration and test data of the data-logger electronics
  - Data on hysteresis test, temperature tests, zero stability test, scale stability test
  - Humidity test
  - Spray test on enclosure(s), connectors and cables

**Manuals and Guidelines**

- i) The manuals shall meet the requirements on style and clarity, completeness, preciseness, detail and accessibility. This includes:
  - System manual,
  - Operation, Maintenance and Service manuals,
  - Observation guideline, and
  - Training handouts.

**5.4 Acceptance Tests**

## 1. General

- i) Qualified engineers under responsibility of a test manager shall execute the Acceptance Tests. The progress of the Acceptance Tests would be monitored and supervised by the Purchaser and/or his authorized representative. The Purchase may have any tests redone or additional tests executed as deemed required based on the results of previous tests conducted. The Purchase's and/or his authorized representative shall have the right of access to any instrument and may request any data or information at any time. The Supplier has the obligation to deliver requested information without delay; i.e. collected test data and documents must be available at the test site.
- ii) It is important that all activities (what, when, where, who, which instrument, etc.) are annotated and uniquely linked to the individual instruments.
- iii) The Acceptance Tests mainly comprise three levels viz.:
  - Functional Tests: The Functional Tests shall verify the proper functioning of the instruments and the associated software. Primary goal is to verify that the instrument performs its functions according to the bid specifications.
  - Accuracy Tests: The Accuracy Tests shall verify that each individual instrument is functional and operates according to the bid specifications. A number of relatively simple accuracy tests are routinely exercised on the instruments.
  - Overall Test: The main purpose of the Overall Test is to verify the common features that are identical to all the instruments in a series. Typical components of the Overall Test are: - in-built software functions of instruments, materials of the instrument, cables, connectors, etc. Further tests include battery and memory autonomy, details of sensor specifications like temperature effects, hysteresis, long term stability etc.
  - The above tests can be executed at any one of the following locations: - Premises of the Manufacturer/Supplier; Premises of the Client; Independent organization; at Site of installation
- iv) The charges for testing shall be borne by the Supplier. The Purchase and/or his authorized representative may at his cost opt to be present during the performances of the tests.

### 5.5 Supply and Installation checklist

In order to facilitate the site acceptance of the system by the site – in – charges, the Bidder should give a list of deliverables for each site to the respective sites as well as to the headquarters. The list shall be verified by the site – in – charge and accordingly will give a verification report whether all deliverables have been delivered properly at the site. The Bidder should preferably, complete the required civil works at the site for proper installation of the equipment before supplying the equipment at the site

For site acceptance test, the supplier should give a check – list of all components and their functions. This check list shall be decided in consultation with the purchaser. This checklist shall indicate the tests to be conducted at the site and the results that are expected for each and every component that are to be installed at the site. This check list will have to be provided to each and every site one month before the installation begins.

For the first payment against supply and installation, following conditions must be met:

- Bidder should provide a complete table for each equipment installed at every site and data centre mentioning the make model and serial number / ID of the equipment.
- All the civil works related to site should be complete. This include foundations, masts, earthing, lightning protection, and mounting of Radars on respective structures.
- The Solar panel and batteries properly installed, connected with correct polarity and surge protection. The solar panel should be oriented in correct direction, elevation and Azimuth.
- All the sensors should be connected to datalogger with proper cabling and conducting. The wires should be properly tied and covered.
- All the user manuals and other literature as applicable for equipment should be supplied to relevant engineer in charge.
- The sensors should start recording correct data in the datalogger
- All the testing and calibration certificates wherever applicable, should be submitted.
- The Radar should be configured to provide data on water level. The zero setting for radar can be any arbitrary bench mark / bed level / bridge Deck or any other permanent structure. The actual configuration against MSL would be required in next stage during final acceptance.
- The rain gauge should be installed as per guidelines mentioned with complete leveling using fish eye bubble.
- The datalogger should have recorded 3 days of data, which would be transferred by USB driver and verified for continuity and correctness.
- For ARG and AWS stations, all sensors should be installed at desired height on the mast, as mentioned under technical specifications.

The payments for this stage of supply and installation can be made pro-rata in batches as the bidder progress towards installation of 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS sites. However, each batch should not be less than 20 % of total stations.

### **5.6 Testing Commissioning and final acceptance checklist**

The acceptance test will be conducted by the purchaser or any other person nominated by the purchaser, at its option.

The testing commissioning and final acceptance stage must fulfill all the conditions mentioned in technical specification section and this section para 5.1 to 5.4. This stage will start with final commissioning of data centre as no remote station can be accepted unless data centre equipment like server, GSM receiver, software etc are fully functional. The data centre should start receiving data from at least 20 % of remote stations. The following checklist in addition to installation requirements mentioned in technical section would be applied for commissioning of data centre:

- The full time person is appointed for managing data centre and RTDAS system
- The server is properly installed and configured with all usernames, passwords, firewalls and network configurations.
- The LED monitor is installed and configured
- The data from remote sites is being received via GSM to the data centre
- All the software should be complete, and no missing modules/ sections will be allowed.
- The operators are fully conversant with the equipment and calibration procedures, methods of operation and all facilities provided by software

- The trainings as mentioned in Para 10 of technical section for commissioning period are completed.
- Data Centre Level acceptance tests shall involve successful receiving of remote stations data at the State Data Center server. It shall include (hardware and software), data dissemination software indicating their full implementation as specified and trouble free operation of all modules for a period of 15 days operating on 24 X 7 basis. An average data acquisition efficiency of 95% for the duration of test period shall be considered as satisfactory.

#### **Checklist for commissioning and final acceptance of remote sites**

The remote sites can be tested, commissioned and accepted in batches and payments can be made pro-rata, provided each batch is at least 20 % of number of total sites, the data centre is commissioned along with first batch of stations and following conditions are met:

- The Radar stations are calibrated against MSL and providing correct data. The zero setting against bed level or any local benchmark would not be accepted
- The fencing is complete at all the sites where mentioned in BoQ
- The telemetry system using GSM are properly installed and tested
- Days of continuous data is received at data centre using GSM based telemetry for at least 95 % of up time. During the period of Fifteen days, there shall be no occurrence of any malfunction in any component necessitating replacement or repairs. No malfunction, partial or complete failure of any part of hardware or excessive heating of equipment or other electro-mechanical equipment or bugs in the software should occur.
- All relevant documentation pertaining to the site shall be handed over by the supplier to the representative of the purchaser.
- The data should be validated against correctness using defined procedures, and wherever available, against manual observations.
- The painting of masts, fencing etc, and last mile connections completed at all sites
- The insurance arrangement and other site security mechanism is in place
- The commissioning of stations in second batch onwards should be on cumulative basis. That means if 50 sites are accepted in first batch and another 55 sites are submitted in second batch, all 105 sites should continue to function un-interrupted for 15 days. The sites accepted during previous batches are subject to be reduced if they stop functioning properly after acceptance. In case in this example, if 5 sites of first batch has stopped working, the total number of sites accepted during second batch would be counted as 100 instead of 105. This would continue till all sites are accepted. That means, during last batch, all 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS sites would be tested for correct data for 15 days with 95 % data reception.

#### **5.7 Spare parts**

Bidder shall provide the list of mandatory spare parts & ensure the availability of sufficient spare parts in its go down for fulfilling its service obligations during warranty and Annual Operation & Maintenance Services period. The same can be inspected by Engineer-in Charge or its authorized representative.

#### **5.8 Manuals**

Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance manuals of the goods and equipment. These shall be in such detail as will enable the Purchaser to operate, maintain, adjust and repair all parts of the equipment as stated in the specifications.

The manuals shall be in the ruling language (English) and in such form and numbers as stated in the contract.

Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purpose of taking over until such manuals have been supplied to the Purchaser.

**5.9 For the System and Other Software, the following will apply:**

The Supplier shall provide complete and legal documentation of hardware, and licensed operating systems. The supplier shall also indemnify the purchaser against any levies/penalties on account of any default in this regard.

**5.10 Acceptance Certificates:**

On successful completion of acceptability test, receipt of deliverables etc. and after the purchaser is satisfied with the working of the RTDAS system, the acceptance certificate signed by the supplier and the representative of the purchaser will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the systems.

**5.11 Checklist for payments during O&M, Warranty and Annual Operation & Maintenance Services period:**

After successful commissioning of the systems, the payments for O&M, Warranty and Annual Operation & Maintenance Services period would be made after fulfilling following conditions:

- The service Level conditions as mentioned in Annexure 1 SCC 16.1 and adhered to and calculations made for percentage of correct data received
- The preventive maintenance of all stations as per Para 11 of technical section has been carried out. The bidder should supply the required geo-tagged time stamped photographs of all sites as mentioned in preventive maintenance section.
- The required trainings falling in the payment period as per mentioned in Para 10 of technical section has been conducted
- The attendance of the maintenance engineer for the payment has been submitted
- The payments for internet connection and data charges for SIM cards at remote sites has been paid regularly



## **PART 3 - Contract**

## **Section VIII. General Conditions of Contract**

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## Section VIII. General Conditions of Contract

### 1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

- (a) “Bank” means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).
- (b) “Contract” means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.
- (c) “Contract Documents” means the documents listed in the Contract Agreement, including any amendments thereto.
- (d) “Contract Price” means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.
- (e) “Day” means calendar day.
- (f) “Completion” means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.
- (g) “GCC” means the General Conditions of Contract.
- (h) “Goods” means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.
- (i) “Purchaser’s Country” is the country specified in the Special Conditions of Contract (SCC).
- (j) “Purchaser” means the entity purchasing the Goods and Related Services, as specified in the SCC.
- (k) “Related Services” means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.

- (l) “SCC” means the Special Conditions of Contract.
- (m) “Subcontractor” means any person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.
- (n) “Supplier” means the person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.
- (o) “The Project Site,” where applicable, means the place named in the SCC.

## **2. Contract Documents**

- 2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

## **3. Corrupt and Fraudulent Practices**

- 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.
- 3.2 The Purchaser requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

## **4. Interpretation**

- 4.1 If the context so requires it, singular means plural and vice versa.
- 4.2 Incoterms
  - (a) Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms.
  - (b) The terms EXW, CIP, FCA, CFR and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms specified in the SCC and published by the International Chamber of Commerce in Paris, France.

### **4.3 Entire Agreement**

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications,

negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

#### 4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

#### 4.5 Nonwaiver

- (a) Subject to GCC Sub-Clause 4.5(b) below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.
- (b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

#### 4.6 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

### 5. Language

- 5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be written in the language specified in the **SCC**. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified, in which case, for purposes of interpretation of the Contract, this translation shall govern.
- 5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.

- 6. Joint Venture, Consortium or Association**
- 6.1 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.
- 7. Eligibility**
- 7.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.
- 7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.
- 8. Notices**
- 8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the SCC. The term “in writing” means communicated in written form with proof of receipt.
- 8.2 A notice shall be effective when delivered or on the notice’s effective date, whichever is later.
- 9. Governing Law**
- 9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Purchaser’s Country, unless otherwise specified in the SCC.
- 9.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Purchaser’s country when
- (a) as a matter of law or official regulations, the Borrower’s country prohibits commercial relations with that country; or
- 9.2 (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower’s Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.
- 10 Settlement of**
- 10.1 The Purchaser and the Supplier shall make every effort to resolve

- Disputes** amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.
- 10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC**.
- 10.3 Notwithstanding any reference to arbitration herein,
- (a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and
  - (b) the Purchaser shall pay the Supplier any monies due the Supplier.
- 11. Inspections and Audit by the Bank**
- 11.1 The Supplier shall keep, and shall make all reasonable efforts to cause its Subcontractors to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs.
- 11.2 The Supplier shall permit, and shall cause its Subcontractors to permit, the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and all accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Supplier's and its Subcontractors and consultants' attention is drawn to Clause 3 [Fraud and Corruption], which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Sub-Clause 11.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)
- 12. Scope of Supply** 12.1 The Goods and Related Services to be supplied shall be as specified in the Schedule of Requirements.
- 13. Delivery and** 13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and



<b>Documents</b>		Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. The details of shipping and other documents to be furnished by the Supplier are specified in the <b>SCC</b> .
<b>14. Supplier's Responsibilities</b>	14.1	The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.
<b>15 Contract Price</b>	15.1	Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in the <b>SCC</b> .
<b>16. Terms of Payment</b>	16.1	The Contract Price, including any Advance Payments, if applicable, shall be paid as specified in the <b>SCC</b> .
	16.2	The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.
	16.3	Payments shall be made promptly by the Purchaser, but in no case later than sixty (60) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.
	16.4	The currencies in which payments shall be made to the Supplier under this Contract shall be those in which the bid price is expressed.
	16.5	In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period set forth in the <b>SCC</b> , the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the <b>SCC</b> , for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award.
<b>17. Taxes and Duties</b>	17.1	For goods manufactured outside the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's Country.
	17.2	For goods Manufactured within the Purchaser's country, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.

- 17.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.
- 18. Performance Security**
- 18.1 If required as specified in the SCC, the Supplier shall, within twenty-eight (28) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount specified in the SCC.
- 18.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.
- 18.3 As specified in the SCC, the Performance Security, if required, shall be denominated in the currency(ies) of the Contract, or in a freely convertible currency acceptable to the Purchaser; and shall be in one of the format stipulated by the Purchaser in the SCC, or in another format acceptable to the Purchaser.
- 18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in the SCC.
- 19. Copyright**
- 19.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party
- 20. Confidential Information**
- 20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.
- 20.2 The Purchaser shall not use such documents, data, and other

information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

- (a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;
- (b) now or hereafter enters the public domain through no fault of that party;
- (c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or
- (d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

## **21. Subcontracting**

21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the bid. Such notification, in the original bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

## **22. Specifications and Standards**

22.1 Technical Specifications and Drawings

- (a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section VI, Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.

- (b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.
- (c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

### **23. Packing and Documents**

- 23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.
- 23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the SCC, and in any other instructions ordered by the Purchaser.

### **24. Insurance**

- 24.1 Unless otherwise specified in the SCC, the Goods supplied under the Contract shall be fully insured—in a freely convertible currency from an eligible country—against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the SCC.

### **25. Transportation and Incidental Services**

- 25.1 Unless otherwise specified in the SCC, responsibility for arranging transportation of the Goods shall be in accordance with the specified Incoterms.
- 25.2 The Supplier may be required to provide any or all of the following services, including additional services, if any, **specified in SCC**:
  - (a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;

- (b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;
- (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;
- (d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and
- (e) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.

25.3 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services

## **26. Inspections and Tests**

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the SCC.

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place in the Purchaser's Country as specified in the SCC. Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

26.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications codes and

standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.

- 26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.
- 26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.
- 26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

## **27. Liquidated Damages**

- 27.1 Except as provided under GCC Clause 32, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the SCC of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those SCC. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

## **28. Warranty**

- 28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.
- 28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

- 28.3 Unless otherwise specified in the **SCC**, the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the **SCC**, or for eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.
- 28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.
- 28.5 Upon receipt of such notice, the Supplier shall, within the period specified in the **SCC**, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.
- 28.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the **SCC**, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

## **29. Patent Indemnity**

- 29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:
- (a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and
  - (b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

- 29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.
- 29.3 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.
- 29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.
- 29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

### **30 Limitation of Liability**

- 30.1 Except in cases of criminal negligence or willful misconduct,
- (a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and
  - (b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or any obligation of the supplier to indemnify the purchaser with respect to patent infringement

### **31. Change in Laws and Regulations**

- 31.1 Unless otherwise specified in the Contract, if after the date of 2 days prior to date of Bid submission, any law, regulation, ordinance or bylaw having the force of law is enacted, promulgated



abrogated, or changed in the place of the Purchaser's country where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

**32. Force Majeure**

32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

**33. Change Orders and Contract Amendments**

33.1 The Purchaser may at any time order the Supplier through notice in accordance with GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:

- (a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;
- (b) the method of shipment or packing;
- (c) the place of delivery; and
- (d) the Related Services to be provided by the Supplier.

33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provision

under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, as the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

#### **34. Extensions of Time**

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to GCC Clause 13, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

#### **35. Termination**

35.1 Termination for Default

(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;

(ii) if the Supplier fails to perform any other obligation under the Contract; or

- (iii) if the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in GCC Clause 3, in competing for or in executing the Contract.
- (b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

### 35.2 Termination for Insolvency.

- (a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser

### 35.3 Termination for Convenience.

- (a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
- (b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:
  - (i) to have any portion completed and delivered at the Contract terms and prices; and/or
  - (ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

- 36. Assignment**            36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.
- 37. Export  
Restriction**            37.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, which arise from trade regulations from a country supplying those products/goods, systems or services, and which substantially impede the Supplier from meeting its obligations under the Contract, shall release the Supplier from the obligation to provide deliveries or services, always provided, however, that the Supplier can demonstrate to the satisfaction of the Purchaser and of the Bank that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract. Termination of the Contract on this basis shall be for the Purchaser's convenience pursuant to Sub-Clause 35.3.

## APPENDIX TO GENERAL CONDITIONS

### Bank's Policy- Corrupt and Fraudulent Practices

*(text in this Appendix shall not be modified)*

#### **Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:**

##### **“Fraud and Corruption:**

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>10</sup> In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
  - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>11</sup>
  - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>12</sup>
  - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>13</sup>

<sup>10</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>11</sup> For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>12</sup> For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

<sup>13</sup> For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

- (iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>14</sup>
- (v) "obstructive practice" is:
  - (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
  - (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,<sup>15</sup> including by publicly declaring such firm or

<sup>14</sup> For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.

<sup>15</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>16</sup>;

- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

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<sup>16</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

## Section IX. Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

<b>GCC 1.1(i)</b>	The Purchaser's country is: <b>People's Republic of Bangladesh</b>
<b>GCC 1.1(j)</b>	<p>The Purchaser is: Bangladesh Water Development Board represented by Project Director, Bangladesh Weather and Climate Services Regional Project (BWCSRP); Component-B: Strengthening Hydrological Services and Early Warning Systems (SHEWS)</p> <p>Address: Floor/ Room number: <b>2<sup>nd</sup> Floor, Firoz Tower, 152/3/B, Panthapath</b>  City: <b>Dhaka</b>  ZIP Code: <b>1205</b>  Country: <b>Bangladesh</b></p>
<b>GCC 1.1 (o)</b>	The Project Site/Final Destination is :280 AWLG (Bridge mounted), 35(Pole mounted Radar), 272 ARG and 03 AWS places through all over the country and /or BWDB Data Center as mentioned in the Annexure-A.
<b>GCC 4.2 (a)</b>	<b>The meaning of the trade terms shall be as prescribed by Incoterms.</b>
<b>GCC 4.2 (b)</b>	The version edition of Incoterms shall be <b>2020</b> .
<b>GCC 5.1</b>	The language shall be: <b>English.</b>
<b>GCC 8.1</b>	<p>For <b><u>notices</u></b>, the Purchaser's address shall be:</p> <p>Attention: <b>Mashiur Rahman</b>  Street Address: <b>Firoz Tower, 152/3/B, Panthapath.</b>  Floor number: <b>2<sup>nd</sup> Floor.</b>  City: <b>Dhaka.</b>  ZIP Code: <b>1215.</b>  Country: <b>People's Republic of Bangladesh</b>  Telephone: +880 2 58153785-86  Facsimile number: <b>Not Available</b>  Electronic mail address: <b>pd.bwcsrp.shews@gmail.com</b></p>
<b>GCC 9.1</b>	The governing law shall be the law of: <b>People's Republic of Bangladesh</b>



<b>GCC 9.2</b>	<p>The texts “Throughout the execution of the contract, the Contractor shall comply with the import of goods and services prohibitions in the Purchaser’s country when” will be replaced with “Throughout the execution of the contract, the Supplier shall comply with the import of goods and services prohibitions in the Purchaser’s country when”</p> <p>The remaining portion (sub-clause (a) and (b) will remain unchanged).</p>
<b>GCC 10.2</b>	<p>The rules of procedure for arbitration proceedings pursuant to GCC Clause 10.2 shall be as follows:</p> <p><b>(a) Contract with foreign Supplier:</b></p> <p><b>GCC 10.2 (a)—Any dispute, controversy or claim arising out of or relating to this Contract, or breach, termination or invalidity thereof, shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules as at present in force.</b></p> <p><b>(b) Contracts with Supplier national of the Purchaser’s country:</b></p> <p><b>In the case of a dispute between the Purchaser and a Supplier who is a national of the Purchaser’s country, the dispute shall be referred to adjudication or arbitration in accordance with the laws of the Purchaser’s country.</b></p>
<b>GCC 13.1</b>	<p>Details of Shipping and other Documents to be furnished by the Supplier are:</p> <ul style="list-style-type: none"> <li><b>i) 06(Six) copies of the Supplier’s invoice showing the description of the Goods, quantity, unit price, and total amount;</b></li> <li><b>ii) Airway bill;</b></li> <li><b>iii) Insurance certificate;</b></li> <li><b>iv) Manufacturer’s or Supplier’s warranty certificate,</b></li> <li><b>v) Inspection certificate issued by nominated inspection agency(if any);</b></li> <li><b>vi) Supplier’s factory shipping details;</b></li> <li><b>vii) Country of Origin issued by the Chamber of Commerce.</b></li> </ul> <p>The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.</p> <p>Along with these documents, the bidder shall meet all delivery requirements and contract obligations mentioned in BDS clause 17.2 (b)</p>

GCC 15.1	<p><b>Contract Price:</b> It is a total price for goods and services (but excludes cost of Comprehensive Annual Operation &amp; Maintenance Services of 03 (three) years after completion of 01 (one) year mandatory warranty period, for which an Annual Operation &amp; Maintenance Effectiveness Agreement is to be signed after written notification issued by the Purchaser to the Supplier.</p> <p>The prices charged for the Goods supplied and the related Services performed <b>shall not</b> be adjustable.</p>
GCC 16.1	<p>GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows:</p> <p><b><u>Payment for Goods supplied from abroad:</u></b></p> <p>Payment of foreign currency portion shall be made in the following manner:</p> <ul style="list-style-type: none"> <li>(i) <b>On Shipment:</b> Fifty(50) percent of the Contract Price shall be paid through irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 13.</li> <li>(ii) <b>On Acceptance:</b> Thirty(30) percent of the Contract Price shall be paid within thirty (30) days of receipt of the Goods upon submission of claim supported by the acceptance and commissioning certificate issued by the Purchaser.</li> <li>(iii) <b>On Operation, Trouble-shooting &amp; Maintenance:</b> Twenty (20) percent of the Contract price shall be paid as following manner;</li> </ul> <p><b>Ten (10) percent to be paid Half-yearly basis. The Condition (applicable for payment) shall be governed by Annexure-B: Service Level Conditions and Chick-list mentioned in Chapter 5 (Inspection and Tests) of Section VII (Schedule of Requirements)</b></p> <p><b><u>Payment for Goods and Services supplied from within the Purchaser's country:</u></b></p> <p>Payment for Goods and Services supplied from within the Purchaser's country shall be made in Bangladesh Taka as follows:</p> <ul style="list-style-type: none"> <li>(i) <b>On Delivery:</b> Fifty (50) percent of the Contract Price shall be paid through irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 13.</li> <li>(ii) <b>On Acceptance:</b> Thirty (30) percent of the Contract Price shall be paid within thirty (30) days upon submission of claim supported by the acceptance certificate issued by the Purchaser.</li> </ul>

	<p><b>(iii) On Operation, Trouble-shooting &amp; Maintenance: Twenty (20) percent of the Contract price shall be paid as following manner;</b></p> <p><b>Ten (10) percent to be paid Half-yearly basis. The Condition (applicable for payment) shall be governed by Annexure-B Service Level Conditions and Chick-list mentioned in Para-5.10 of Chapter 5 (Inspection and Tests) of Section VII (Schedule of Requirements).</b></p> <p><b><u>Payment for Annual Operation &amp; Maintenance Services within the Purchaser's country:</u></b></p> <p><b>Annual Operation &amp; Maintenance services cost inclusive of AIT &amp; VAT payable on it shall be paid on half yearly basis after 01 (one) year of mandatory warranty period. The Condition (applicable for payment) shall be governed by the Annual Operation &amp; Maintenance Effectiveness Agreement of 280 AWLG (bridge mounted), 35 AWLG (Pole mounted Radar), 272 ARG and 03 AWS Stations, Telemetry Systems" (Annexure-C) to be signed after written notification by the Purchaser to the Supplier.</b></p>
<b>GCC 16.5</b>	<p>The payment-delay period after which the Purchaser shall pay interest to the supplier shall be <b>sixty (60) days</b>.</p> <p>The interest rate that shall be applied is <b>LIBOR +1%</b>.</p>
<b>GCC 18.1</b>	<p>A Performance Security shall be required.</p> <p><b>The amount of the Performance Security shall be: 10% of the total Contract price, including Annual Operation &amp; Maintenance Services, and the Performance Security will remain valid up to 28 days after the date of completion of performance obligations including warranty period and Annual Operation &amp; Maintenance Services period.</b></p>
<b>GCC 18.3</b>	<p>The Performance Security shall be in the form of: <b>Bank Guarantee</b>.</p> <p><b>The Performance security shall be denominated in the currencies of payment of the Contract, in accordance with their portions of the Contract Price. If the bank guarantee issued by a commercial bank located outside the Purchaser's country, the bank guarantee shall be endorsed by a commercial bank located in the Purchaser's country.</b></p>

<b>GCC 18.4</b>	<p>The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the contract, subject to the following condition:</p> <p><b>If the Annual Operation &amp; Maintenance Services effectiveness agreement have become effective</b>, the amount of the Performance Security will be reduced to 10%(ten percent) of the total price of the Annual Maintenance Services. Otherwise the Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the contract, including warranty obligations.</p>
<b>GCC 23.2</b>	<p>The packing, marking and documentation within and outside the packages shall be: A packing list, showing the contents of each package, shall be enclosed in a water proof envelope and shall be secured to the outside to the packing case.</p> <p>In addition, each package shall be painted all around each package which shall be distinctly marked. Each package shall have the following information printed on it in bold letter (i) Port of Loading, (ii) Name of Consignee, (iii) Contract No., (iv) Brief Description of Goods, (v) IFB Number, (vi) Gross &amp; Net Weights and Measurements. Further, the following Monogram measuring about 1/4<sup>th</sup> of package, must also be painted in red on at least two sides of each package.</p> <div> <p style="text-align: center;">W</p> <p style="text-align: center;">SHEWS DHAKA</p> <p style="text-align: center;">D                      B</p> </div>
<b>GCC 24.1</b>	The insurance coverage shall be as specified in the Incoterms.
<b>GCC 25.1</b>	The Supplier is required under the Contract to transport the Goods duly insured to the specified final destination, and until the commissioning & final acceptance of each equipment, and all related costs shall be included in the Contract Price.
<b>GCC 25.2</b>	<p>Incidental services to be provided are:</p> <ul style="list-style-type: none"> <li>(a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;</li> <li>(b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;</li> <li>(c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;</li> </ul>

	(d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract.
<b>GCC 26.1</b>	<p>The inspections and tests shall be as detailed in Para 5 of Section VII-Schedule of Requirement:</p> <p>The supplier shall get each item indicated in the Schedule of requirement inspected in manufacturer's works or at the premises of supplier and submit a test certificate and also manufacturer's guarantee /warranty certificate that the items conforms to the laid down specification.</p> <p>The Purchaser or its representative may inspect and /or test any or all the items to confirm their conformity to the contract specification, prior to dispatch from the manufacturer's premises/supplier's premises. Such inspection and clearance will not prejudice the right of the consignee to inspect and test the items on receipt at destination to verify conformity to technical specification.</p> <p>If the items fail to meet the laid down specifications the supplier shall take immediate steps to remedy the deficiency or replace the defective parts of the each to the satisfaction of the purchaser/ consignee.</p>
<b>GCC 26.2</b>	The Inspections and tests shall be conducted at: <i>at remote locations and data center as specified in the technical specification and schedule of requirements.</i>
<b>GCC 27.1</b>	The liquidated damage shall be 0.5% of contract price of delayed Goods or Services per week or part thereof.
<b>GCC 27.1</b>	The maximum amount of liquidated damages shall be: <b>10% of contract price.</b>
<b>GCC 28.3</b>	<p>The period of validity of the Warranty shall be twelve (12) months from the date of commissioning of the Goods by the Purchaser.</p> <p>For purposes of the Warranty, the place(s) of final destination(s) shall be as per Annexure-A</p>
<b>GCC 28.5</b>	The Supplier should pro-actively detect any such fault and act through service engineer provided under this contract to correct the problem. The failure of the supplier to make the equipment fully functional within 72 hours of such fault would attract a penalty of BDT 2000 per station per day. The amount of penalty would be recovered from the bank guarantee or from pending payments.
<b>GCC 28.6</b>	The period shall be 14(fourteen) days.

<b>GCC 33</b>	<p>Additional clause GCC 33.5</p> <p>The Annual Operation and Maintenance services (after completion of 01 (one) year Warranty period), will not become Effective until after the 03 (three) years' Annual Operation &amp; Maintenance Services Effectiveness Agreement has been signed by the Purchaser and the Supplier(Annex-C). Written notification shall be issued by the Purchaser to the Supplier at least one month before the end of the Warranty period regarding the effectiveness and commencement of the Annual Operation &amp; Maintenance Services and signing of the Effectiveness Agreement. The Effectiveness Agreement between the Purchaser and the Supplier shall be based on and use the quoted prices for the annual operation &amp; maintenance services in the Supplier's bid.</p> <p>The comprehensive Annual Operation &amp; Maintenance Services shall become effective only after signing of the Effectiveness Agreement following written notification by the Purchaser to the Employer upon completion of 01 (one) years' warranty period subject to the availability of funds, Purchaser's assessment of the performance of services from the Supplier as well as need of the services. The Purchaser has discretionary right to decide on whether or not to require implementation of the Annual Operation and Maintenance Services or enter into the Annual Operation and Maintenance services Effectiveness Agreement based on conditions mentioned above.</p> <p>Draft of Annual Operation &amp; Maintenance Services Effectiveness Agreement (Supplementary Contract) is enclosed as <b>Annexure-C</b>.</p>
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# Section X. Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

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## Letter of Acceptance

*[letterhead paper of the Purchaser]*

*[date]*

To: *[name and address of the Supplier]*

Subject: **Notification of Award Contract No.** . . . . .

This is to notify you that your Bid dated . . . . *[insert date]* . . . . for execution of the . . .  
. . . . . *[insert name of the contract and identification number, as given in the SCC]* .  
. . . . . for the Accepted Contract Amount of . . . . . *[insert amount in numbers  
and words and name of currency]*, as corrected and modified in accordance with the  
Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance  
with the Conditions of Contract, using for that purpose the of the Performance Security  
Form included in Section X, Contract Forms, of the Bidding Document.

Authorized Signature: \_\_\_\_\_

Name and Title of Signatory: \_\_\_\_\_

Name of Agency: \_\_\_\_\_

**Attachment: Contract Agreement**



## Contract Agreement

*[The successful Bidder shall fill in this form in accordance with the instructions indicated]*

THIS AGREEMENT made

the *[ insert: **number** ]* day of *[ insert: **month** ]*, *[ insert: **year** ]*.

BETWEEN

- (1) *[ insert complete name of Purchaser ]*, a *[ insert description of type of legal entity, for example, an agency of the Ministry of .... of the Government of {insert name of Country of Purchaser }, or corporation incorporated under the laws of { insert name of Country of Purchaser } ]* and having its principal place of business at *[ insert address of Purchaser ]* (hereinafter called “the Purchaser”), of the one part, and
- (2) *[ insert name of Supplier ]*, a corporation incorporated under the laws of *[ insert: country of Supplier ]* and having its principal place of business at *[ insert: address of Supplier ]* (hereinafter called “the Supplier”), of the other part:

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz., *[insert brief description of Goods and Services]* and has accepted a Bid by the Supplier for the supply of those Goods and Services

The Purchaser and the Supplier agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other contract documents.
  - (a) the Letter of Acceptance
  - (b) the Letter of Bid
  - (c) the Addenda Nos. \_\_\_\_\_ (if any)
  - (d) Special Conditions of Contract
  - (e) General Conditions of Contract
  - (f) the Specification (including Schedule of Requirements and Technical Specifications)

- (g) the completed Schedules (including Price Schedules)
  - (h) any other document listed in GCC as forming part of the Contract
3. In consideration of the payments to be made by the Purchaser to the Supplier as specified in this Agreement, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of *[insert the name of the Contract governing law country]* on the day, month and year indicated above.

For and on behalf of the Purchaser

Signed: *[insert signature]*  
in the capacity of *[insert title or other appropriate designation]*  
in the presence of *[insert identification of official witness]*

For and on behalf of the Supplier

Signed: *[insert signature of authorized representative(s) of the Supplier]*  
in the capacity of *[insert title or other appropriate designation]*  
in the presence of *[insert identification of official witness]*

## Performance Security

### Option 1: (Bank Guarantee)

*[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated]*

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[insert name and Address of Purchaser]*

**Date:** *\_ [Insert date of issue]*

**PERFORMANCE GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *\_ [insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the supply of *\_ [insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*),<sup>1</sup> such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the .... Day of ....., 2...<sup>2</sup>, and any demand for payment under it must be received by us at this office indicated above on or before that date.

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<sup>1</sup> The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, and denominated either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Beneficiary.

<sup>2</sup> Insert the date twenty-eight days after the expected completion date as described in GC Clause 18.4. The Purchaser should note that in the event of an extension of this date for completion of the Contract, the Purchaser would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this

This guarantee is subject to the

Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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*[signature(s)]*

***Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.***

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*guarantee, the Purchaser might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*

## Option 2: Performance Bond- Not Applicable

By this Bond *[insert name of Principal]* as Principal (hereinafter called “the Supplier”) and *[insert name of Surety]* as Surety (hereinafter called “the Surety”), are held and firmly bound unto *[insert name of Purchaser]* as Obligee (hereinafter called “the Supplier”) in the amount of *[insert amount in words and figures]*, for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Supplier and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Contractor has entered into a written Agreement with the Purchaser dated the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_, for *[name of contract and brief description of Goods and related Services]* in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, the Condition of this Obligation is such that, if the Supplier shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Supplier shall be, and declared by the Purchaser to be, in default under the Contract, the Purchaser having performed the Purchaser’s obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

- (1) complete the Contract in accordance with its terms and conditions; or
- (2) obtain a Bid or bids from qualified Bidders for submission to the Purchaser for completing the Contract in accordance with its terms and conditions, and upon determination by the Purchaser and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Purchaser and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term “Balance of the Contract Price,” as used in this paragraph, shall mean the total amount payable by Purchaser to Supplier under the Contract, less the amount properly paid by Purchaser to Contractor; or
- (3) pay the Purchaser the amount required by Purchaser to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of one year from the date of the issuing of the Taking-Over Certificate.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Purchaser named herein or the heirs, executors, administrators, successors, and assigns of the Purchaser.

In testimony whereof, the Supplier has hereunto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly attested by the signature of his legal representative, this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_.

SIGNED ON \_\_\_\_\_ on behalf of \_\_\_\_\_

By \_\_\_\_\_ in the capacity of \_\_\_\_\_

In the presence of \_\_\_\_\_

SIGNED ON \_\_\_\_\_ on behalf of \_\_\_\_\_

By \_\_\_\_\_ in the capacity of \_\_\_\_\_

In the presence of \_\_\_\_\_

## Advance Payment Security- Not Applicable

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[Insert name and Address of Purchaser]*

**Date:** *[Insert date of issue]*

**ADVANCE PAYMENT GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* () *[insert amount in words]*<sup>1</sup> upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has used the advance payment for purposes other than toward delivery of Goods;  
or
- (b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

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<sup>1</sup> *The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Purchaser.*

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, has been certified for payment, or on the *[insert day]* day of *[insert month]*, 2 *[insert year]*, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No.758, except that the supporting statement under Article 15(a) is hereby excluded.

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*[signature(s)]*

***Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.***



## Annexure-A

### List of Final (Project Site) Destination of Goods to be Supplied & Installed by the Supplier

#### AWLG Stations

Sl No	Div	Station Name & ID	River Name & ID	Converted Latitude (N) in G2	Converted Longitude (E) in G2	Location/availability of permanent structure	Sensor Type
1	NMD	151 Baghabari	57, Karotoa-Atrai	24.130871	89.581329	Bridge	Radar
2	NMD	16.1 Malonchi	9, Boral	24.293084	88.962941	Bridge	Radar
3	NMD	148 Chanchkoir	57, Gurnandakuja	24.373775	89.252099	Bridge	Radar
4	NMD	149 Astamonisha	57, Karotoa-Atrai	24.263456	89.332388	Bridge	Radar
5	NMD	99 Gorai Rly, Bridge	42, Gorai	23.884347	89.180390	Bridge	Radar
6	NMD	11.5 Nalka-Sengatii	28-Dcj Koratoa	24.423387	89.591747	Bridge	Radar
7	NMD	66 Ullapara	28, Karotoa	24.297350	89.593757	Bridge	Radar
8	NMD	17.1 Baral Bridge	9, Boral	24.219700	89.379448	Bridge	Radar
9	NMD	150 Dohokuladanga	57-Gur-Gumani	24.175506	89.470704	Bridge	Radar
10	NMD	149.1 Gumani Rly. Bridge	57-Gumani	24.227702	89.419817	Bridge	Radar
11	NMD	313 Nangura Rly. Bridge	117-Nangura	24.257292	89.489669	Bridge	Radar
12	NMD	211.5 ChapaiNawabgoanj	80- Mohananda	24.603507	88.281620	Bridge	Radar
13	NMD	261 Naohata	98-Sib-Baranai	24.459524	88.613163	Bridge	Radar
14	NMD	147.5 Singra	57, Gur	24.497763	89.138623	Bridge	Radar
15	NMD	238 Raharpur	89, Punarbhuba	24.823431	88.319018	Bridge	Radar
16	NMD	338 Cansart	148, Pagla	24.734556	88.168219	Bridge	Radar
17	NMD	133 Naogoan	51-L, Jamuna	24.807982	88.945950	Bridge	Radar
18	NMD	144 Chalkhariharpur	57, Atrai	25.170080	88.751193	Bridge	Radar
19	NMD	145 Mahadevpur	57, Atrai	25.972390	89.565964	Bridge	Radar
20	NMD	147 Atrai Railway Bridge	57, Atrai	24.612071	88.974566	Bridge	Radar
21	NMD	83.1 Naldangarhat	37, Fakir barnai	24.503282	88.960806	Bridge	Radar
22	NMD	82 Jote Bazar	57, Atrai	24.719447	88.755361	Bridge	Radar
23	NMD	83 Bagmara	37, Fakir Barrai	24.558307	88.809412	Bridge	Radar
24	NMD	65 Bogura	28, Koratoa	24.845711	89.379216	Bridge	Radar
25	NMD	11 Khanpur	7, Bangali	24.628834	89.465592	Bridge	Radar
26	NMD	324 Dhunot	134, Old Bangali	24.686544	89.546260	Bridge	Radar

27	NMD	11A Sariakandi	7, Bangali	24.874521	89.565079	Bridge	Radar
28	NMD	15-J Mathurapara	22, Brahmaputra	24.837649	89.587254	No Structure	Pole Mounted Radar (Type 1)
29	NMD	155 Mohimaganj	59, Khatakhali	25.111099	89.503891	Bridge	Radar
30	NMD	10 Shimulbari	7, Bangali	25.049505	89.522829	Bridge	Radar
31	NMD	64 Shibganj	28, Koratoa	25.008858	89.315719	Bridge	Radar
32	NMD	312 Talora	120, Nagar	24.825656	89.189008	Bridge	Radar
33	NMD	325 Sanamukhi	135, Tulshiganga	24.965179	89.022838	Bridge	Radar
34	NMD	132.5 Joypurhat	51-L, Jamuna	25.111218	88.990423	Bridge	Radar
35	NMD	62.5 Siraj	28-DCJ Koratoa	25.431543	89.147934	Bridge	Radar
36	NMD	78 Kantanagar	33, Dhepa	25.814003	88.674161	Bridge	Radar
37	NMD	132 Monmothpur	51-L, Jamuna	25.657370	88.841387	Bridge	Radar
38	NMD	132.2 Phulbari	51-L, Jamuna	25.500612	88.906839	Bridge	Radar
39	NMD	142 Khansama	57, Koratoa-Atrai	25.931029	88.725610	Bridge	Radar
40	NMD	142.1 Bushirbandar	57, Koratoa-Atrai	25.770508	88.730460	Bridge	Radar
41	NMD	143 Shamijhiaghat	57, Koratoa-Atrai	25.539062	88.759453	Bridge	Radar
42	NMD	156/A Kundal	60, Kharkharia	25.774356	88.877254	Bridge	Radar
43	NMD	236 Pulhat	89, Punarbhaba	25.499663	88.952165	Bridge	Radar
44	NMD	287 Kodalkatigaon	105, Tangaon	25.703636	88.436611	Bridge	Radar
45	NMD	340 Kazipara	150, Tentulia	25.620907	88.499623	Bridge	Radar
46	NMD	139 Baradeshwari	57-Koratoa-Atrai	26.468820	88.486058	Bridge	Radar
47	NMD	140 Panchagar	57-Koratoa-Atrai	26.330048	88.552826	Bridge	Radar
48	NMD	141 Debiganj	57-Koratoa-Atrai	26.120059	88.750447	Bridge	Radar
49	NMD	235A Pran Nagar	89, Punarbhaba	25.911314	88.564889	Bridge	Radar
50	NMD	282 Bhitorgar	104-Talma	26.414565	88.585466	Bridge	Radar
51	NMD	283 Molani	104-Talma	26.334951	88.589780	Bridge	Radar
52	NMD	284 Raniganj	105, Tangon	26.191766	88.467574	Barrage	Radar
53	NMD	285 Thakurgaon	105, Tangon	26.035936	88.456785	Bridge	Radar
54	NMD	305.5 Ghoramaraghat	114-Ghoramaraghat	26.260819	88.694635	Bridge	Radar
55	NMD	335 Bhutdangi	145, Kulik	25.827338	88.239991	Bridge	Radar
56	NMD	336 Bujruk	146, Nagar	25.855463	88.115396	Bridge	Radar
57	NMD	44/1 Nizbari	21-Chikli	25.796247	88.955400	Bridge	Radar
58	NMD	61 Boragari	28-Deonai	26.104007	88.858786	Bridge	Radar
59	NMD	62.1 Barati	28-Jamuneswari	25.811160	89.047103	Bridge	Radar
60	NMD	62 Bodarganj	28-Jamuneswari	25.682266	89.076094	Bridge	Radar
61	NMD	63 Chalk Rahimpur	28-Jamuneswari	25.147428	89.359928	Bridge	Radar
62	NMD	96/A Jafarganj	40-Ghagot	25.799761	89.188238	Bridge	Radar
63	NMD	96 Islampur	40-Ghagot	25.679032	89.273590	Bridge	Radar
64	NMD	96.5 Mirzapur	40-Ghagot	25.547923	89.402369	No Structure	Pole Mounted

							Radar (Type 1)
65	NMD	97 Gaibandha	40-Ghagot	25.339397	89.551048	Bridge	Radar
66	NMD	291.5 R. Dalia	107-Teesta	26.175619	89.050629	Barrage	Radar
67	NMD	291.5 L. Doani	107-Teesta	26.177072	89.060088	Barrage	Radar
68	NMD	294 Kaunia	107-Teesta	25.788111	89.437680	Bridge	Radar
69	NMD	328 Kumarpara	Naotara	26.130000	88.981025	Bridge	Radar
70	NMD	346 Pocharhat	141-Buri Teesta	26.105719	88.953142	Barrage	Radar
71	NMD	45.5 Chilmari	22-Brahmaputra	25.568348	89.678749	No Structure	Pole Mounted Radar (Type 2)
72	NMD	75 Patgram	32-Dharla	26.342642	89.024795	Bridge	Radar
73	NMD	76 Taluksimulbari	32-Dharla	25.970829	89.473371	Bridge	Radar
74	NMD	77 Kurigram	32-Dharla	25.821068	89.661839	Bridge	Radar
75	NMD	81 Pateswari	36-Dudhkumar	26.096341	89.720471	Bridge	Radar
76	NMD	294.5 Haripur	107-Teesta	25.533844	89.654286	Bridge	Radar
77	SEMD	58 Hajiganj	27 Dakatia	23.248900	90.861188	Bridge	Radar
78	SEMD	58/A Laksam	27 Dakatia	23.234581	91.118863	Bridge	Pole Mounted Radar (Type 1)
79	SEMD	79 Matlab	34 Dhanaghoda	23.350189	90.706139	Bridge	Radar
80	SEMD	109 Bibir Bazar	43 Gumti	23.470823	91.201633	Bridge	Radar
81	SEMD	113 Kangasanagar	43 Gumti	23.555300	91.064765	Bridge	Radar
82	SEMD	114 Jibonpur	43 Gumti	23.605589	90.994049	Bridge	Radar
83	SEMD	115 Daudkandi	43 Gumti	23.542249	90.715452	Bridge	Radar
84	SEMD	275 Badyar Bazar	102 Surma-Meghna	23.649547	90.625165	No Structure	Pole Mounted Radar (Type 1)
85	SEMD	275.5 Meghna Ferry ghat	102 Surma-Meghna	23.602947	90.624007	Bridge	Radar
86	SEMD	276 Satnal	102 Surma-Meghna	23.479874	90.593384	No Structure	Pole Mounted Radar (Type 1)
87	SEMD	277.3 Nilkamal	102 Surma-Meghna	23.089760	90.648781	No Structure	Pole Mounted Radar (Type 2)
88	SEMD	330 Bijni	149 Salda	23.674552	91.147736	Bridge	Radar
89	SEMD	334 Mia Bazar	114 Kakri	23.335065	91.269198	Bridge	Radar
90	SEMD	339 Salda	149 Salda	23.671585	91.156346	Bridge	Radar
91	SEMD	84/1 Kalia Chor	38 Feni	22.939005	91.615695	No Structure	Pole Mounted Radar (Type 1)

							Type 2)
92	SEMD	86 Shuvopur	38 Feni	22.954760	91.542616	Bridge	Radar
93	SEMD	87 Char Sunapur	38 Feni	22.836939	91.453003	Sluice Gate	Radar
94	SEMD	181 Gunoboti	69 Little Feni	23.101206	91.278272	Bridge	Radar
95	SEMD	181/A Selonia	69 Little Feni	22.982337	91.337475	Bridge	Radar
96	SEMD	212 Parshuram	81 Muhuri	23.226527	91.446057	Bridge	Radar
97	SEMD	213 Horipur	81 Muhuri	23.035672	91.485852	Bridge	Radar
98	SEMD	257 Malipur	96 Selonia	23.037663	91.438893	Bridge	Radar
99	SEMD	257.5 Subar Bazar	96 Selonia	23.236975	91.414371	Bridge	Radar
100	SEMD	221.5 Begumganj	85 Noakhali Khal	22.944269	91.109777	Bridge	Radar
101	SEMD	222 Noakhali	85 Noakhali Khal	22.845148	91.101680	Bridge	Radar
102	SEMD	239 Lakshmipur	90 Rahmat Khali Khal	22.937429	90.829996	Bridge	Radar
103	SEMD	321 Hatiya	129 Hatiya	22.229772	91.071239	Bridge	Radar
104	SEMD	239.5 Piarpur	90 Rahmat Khali Khal	22.903054	90.845133	Bridge	Radar
105	SEMD	3A, kaotaliBrahmanbaria	3A, Anterson Khal	23.957087	91.119453	Bridge	Radar
106	SEMD	123, Gongasagor	46, Haura	23.833420	91.198452	Bridge	Radar
107	SEMD	295, Azobpur	108, Titash	24.120945	91.055248	No Structure	Pole Mounted Radar ( Type 1)
108	SEMD	297, Gokornoghat	108, Titash	23.955088	91.084791	Bridge	Radar
109	SEMD	298, Nabinagar	108, Titash	23.902194	90.966120	Bridge	Radar
110	SEMD	296, Akhaura	108, Titash	23.879810	91.200481	Bridge	Radar
111	SEMD	298/1, Salimganj	108, Titash	23.849028	90.846555	Bridge	Radar
112	SEMD	230/1, Ramnagar	86 Old Brahamaputra	24.036873	90.960451	Bridge	Radar
113	SEMD	272/1, AustogramKishorganj	102 Upper Meghna	24.274947	91.098964	Bridge	Radar
114	SEMD	270, Markuli	102 Upper Meghna	24.695094	91.379013	No Structure	Pole Mounted Radar ( Type 2)
115	SEMD	74, DilalpurKishorganj	31 Dhanu-Ghorausra	24.195704	90.788342	Bridge	Radar
116	SEMD	73, ItnaKishorganj	31 Dhanu-Ghorausra	24.530651	91.088805	No Structure	Pole Mounted Radar ( Type 1)
117	SEMD	72, Khaliajuri	31 Dhanu-Ghorausra	24.687773	91.134983	Bridge	Radar
118	SEMD	271, Azmiriganj	102, Upper Meghna	24.552888	91.228147	No Structure	Pole Mounted Radar ( Type 1)

119	SEMD	272, Madna	102, Upper Meghna	24.338373	91.238751	No Structure	Pole Mounted Radar ( Type 1)
120	SEMD	138, Sofiabab	56-Korangi	24.293052	91.546430	Bridge	Radar
121	SEMD	280, Sutang Rly. Br.	103, Sutang	24.283210	91.402666	Bridge	Radar
122	SEMD	158, Chunarghat	61, Khowai	24.202567	91.527256	Bridge	Radar
123	SEMD	158.1, Shaistaganj	61, Khowai	24.273176	91.473585	Bridge	Radar
124	SEMD	117 Narayan hat	44 Halda	22.811874	91.720984	Bridge	Radar
125	SEMD	121 Enayethat	44 Halda	22.666341	91.872724	Bridge	Radar
126	SEMD	120 Telepari	44 Halda	22.560335	91.845208	Bridge	Radar
127	SEMD	119/1 panchpukuria	44 Halda	22.666341	91.782331	Bridge	Radar
128	SEMD	124 ThandaChari	47 Ichamoti	22.570190	92.040859	Bridge	Radar
129	SEMD	248 Dohajari	92 Sangu	22.159009	92.067964	Bridge	Radar
130	SEMD	250 Banigram	92 Sangu	22.121445	91.895230	Bridge	Radar
131	SEMD	84 Ramghor	38 Feni	22.997119	91.723725	Bridge	Radar
132	SEMD	247 Bandarban	92 Sangu	22.196379	92.216854	Bridge	Radar
133	SEMD	125 Rangunia	47 Ichamoti	22.459413	92.064933	Bridge	Radar
134	SEMD	203 Lama	78 Matamuhuri	21.783488	92.190186	Bridge	Radar
135	SEMD	200 Shaflapur	76 Moheskhal Channel	21.672136	91.959082	Bridge	Radar
136	SEMD	204 Chiringa	78 Matamuhuri	21.770958	92.081382	Bridge	Radar
137	SEMD	176 Lemshikhali	67 Kutubdia Channel	21.813235	91.875139	Bridge	Radar
138	SWMD	51, Ramdia	23, Chandana Arkandi Khal	23.703081	89.526293	Bridge	Radar
139	SWMD	52, Ghoshpur	23, Chandana Arkandi Khal	23.447897	89.650664	Sluice Gate	Radar
140	SWMD	101 B, Kamarkhali	42, GoraiMadhumati	23.539291	89.516799	Bridge	Radar
141	SWMD	102, Bhatiapara	42, Gorai-Madhumati	23.214960	89.696585	Bridge	Radar
142	SWMD	168, Faridpur	64, Kumar	23.603555	89.829475	Bridge	Radar
143	SWMD	169, Mujurdia	64, Kumar	23.482893	89.686657	Bridge	Radar
144	SWMD	170, Bhanga	64, Kumar	23.387386	89.975413	Bridge	Radar
145	SWMD	5, Madaripur	3, Arial Khan	23.181607	90.200591	Bridge	Radar
146	SWMD	95, Suressor	39, Ganges	23.279106	90.494130	Bridge	Radar
147	SWMD	4A, Offtake	3, Arial Khan	23.378972	90.117181	Bridge	Radar
148	SWMD	190, Mostafapur	72, Lower Kumar	23.161626	90.137575	Bridge	Radar
149	SWMD	193, Kabirajpur	74, MadariputBeel-Route.	23.270944	90.080967	Bridge	Radar
150	SWMD	350, Rajgonj	61.5, Kirtinasha	23.220507	90.339354	Bridge	Radar
151	SWMD	27, Keshabpur	13, Bhadra	22.909363	89.221836	Bridge	Radar
152	SWMD	30, Afraghat	14, Bhairab (Lower)	23.117369	89.384798	Bridge	Radar
153	SWMD	55, KhatorMagura	25, Chitra	23.259596	89.441588	Bridge	Radar

154	SWMD	55A, Ratandanga	25, Chitra	23.197442	89.514326	Bridge	Radar
155	SWMD	56.1, Narail	25, Chitra	23.169170	89.512017	Bridge	Radar
156	SWMD	162, Jhikargacha	62, Kobadak	23.105149	89.094556	Bridge	Radar
157	SWMD	217, Kala Chandpur	83, Nabaganga	23.346297	89.027366	Bridge	Radar
158	SWMD	217A, Lohagara	83, Nabaganga	23.184407	89.648507	Bridge	Radar
159	SWMD	219, Gazirhat	83, Nabaganga	23.009294	89.447255	No Structure	Pole Mounted Radar (Type 1)
160	SWMD	206, Hatboalia	79, MathaBhanga	23.826529	88.862453	Bridge	Radar
161	SWMD	207, Chuadanga	79, MathaBhanga	23.647553	88.845601	Bridge	Radar
162	SWMD	205, Kajipur	79, MathaBhanga	23.963065	88.742809	Bridge	Radar
163	SWMD	205A, Insafnagar	79, MathaBhanga	24.063992	88.739449	Bridge	Radar
164	SWMD	208, Darsana	79, MathaBhanga	23.524768	88.788389	Bridge	Radar
165	SWMD	21, Arpara	11, Begbati	23.377354	89.372675	Bridge	Radar
166	SWMD	161, Tahirpur	62, Kobadak	23.346203	89.027573	Bridge	Radar
167	SWMD	171, Garagonj	65, Kumar	23.668254	89.199825	Bridge	Radar
168	SWMD	215, Jhenaidaha	83, Nabaganga	23.548314	89.176122	Bridge	Radar
169	SWMD	216A, Magura	83, Nabaganga	23.487374	89.431809	Bridge	Radar
170	SWMD	216, Magura	83, Nabaganga	23.494490	89.423502	Bridge	Radar
171	SWMD	1, Bagerhat	1, Doratana	22.647209	89.802706	Bridge	Radar
172	SWMD	26, Protapnagar	12, BetnaKhulpetua	22.353380	89.203622	Sluice Gate	Radar
173	SWMD	28, Baroaria (Dumuria)	13, Bhadra	22.646823	89.428810	No Structure	Pole Mounted Radar (Type 1)
174	SWMD	105, Atharobaki	42, Gorai-Madhumati-Baleswar	22.968157	89.781201	Bridge	Radar
175	SWMD	164, Chandkhali	62, Kobadak	22.541860	89.237942	Bridge	Radar
176	SWMD	241, Khulna	91, Rupsha-Pashur	22.777719	89.584269	Rupsha Bridge	Radar
177	SWMD	243, Chalna	91, Rupsha-Pashur	22.600344	89.522035	No Structure	Pole Mounted Radar (Type 1)
178	SWMD	258, Paikgacha	97, Shibsha	22.752820	89.102588	Bridge	Radar
179	SWMD	23, Kalaroa	12, BetnaKhulpetua	22.859956	89.043493	Bridge	Radar
180	SWMD	25, Chapra	12, BetnaKhulpetua	22.550764	89.187758	Bridge	Radar
181	SWMD	129, Basantapur	49, Ichamati	22.470498	89.003506	Bridge	Radar
182	SWMD	130, Khoikhali	49, Ichamati	22.216183	89.078472	BWDB Sluice Gate	Radar
183	SWMD	163, Tala Magura	62, Kobadak	22.740382	89.258011	Bridge	Radar
184	SWMD	18.1, Bakergonj	10, Barisal Buriswar	22.541722	90.339847	Bridge	Radar
185	SWMD	37.5, Betagi	18, Biskhali	22.417142	90.165462	Bridge	Radar

186	SWMD	183, Kaitpara	70, Lohalia	22.515353	90.432542	Bridge	Radar
187	SWMD	253A, Uzirpur	94, Swarupkati	22.807467	90.239112	Bridge	Radar
188	SWMD	278, Daulatkhan	102, Surma-Meghna	22.603567	90.748321	Sluice Gate	Radar
189	SWMD	288.3, Tongibari	106, Tentulia	22.694525	90.495868	No Structure	Pole Mounted Radar ( Type 1)
190	SWMD	288.4, Bhola Kheyaghat	106, Tentulia	22.676560	90.606390	Bridge	Radar
191	SWMD	300, Gouranadi	110, Torki	22.976186	90.230381	Bridge	Radar
192	SWMD	318, Babugonj	126, Babugonj	22.818426	90.321111	Bridge	Radar
193	SWMD	320, Hijla	128, Dharmagonj	22.890822	90.504721	Bridge	Radar
194	SWMD	323, Abupur	131, Noyabhangania	22.974087	90.464070	No Structure	Pole Mounted Radar ( Type 1)
195	SWMD	19, Mirjaganj	10, Barisal Buriswar	22.358532	90.230485	Bridge	Radar
196	SWMD	20, Amtoli	10, Barisal Buriswar	22.143288	90.226636	Sluice Gate	Radar
197	SWMD	38, Bamna	18, Biskhali	22.324102	90.090812	Bridge	Radar
198	SWMD	39, Pathorghata	18, Biskhali	22.013371	89.964187	Bridge	Radar
199	SWMD	136.1, Umedpur	54, Kacha	22.492047	89.965391	Bridge	Radar
200	SWMD	107, Pirojpur	42, Gorai-Madhumati-Baleswar	22.580201	89.966809	Bridge	Radar
201	SWMD	107 A, Nazirpur	42, Gorai-MadhumatiBaleswar	22.296499	89.746012	Bridge	Radar
202	NEMD	7, Pubail	5 Balu	23.934390	90.489364	Bridge	Radar
203	NEMD	7.5, Demra	5 Balu	23.732950	90.496487	Bridge	Radar
204	NEMD	8, Basuri	6, Banar	24.699904	90.150776	Bridge	Radar
205	NEMD	9, Kaoraid	6, Banar	24.311480	90.513834	Bridge	Radar
206	NEMD	9.5, Trimohini	6, Banar	24.273446	90.547344	Bridge	Radar
207	NEMD	12, Madhupur	8, Bangshi	24.605663	90.029061	Bridge	Radar
208	NEMD	13 Kawaljani	8, Bangshi	24.298597	90.058353	No Structure	Pole Mounted Radar ( Type 2)
209	NEMD	14 Mirzapur	8, Bangshi	24.110317	90.096948	Bridge	Radar
210	NEMD	14.5, Noarhat	8 Bangshi	23.914717	90.229198	Bridge	Radar
211	NEMD	35, Nalitabari	17, Bhogai-Kangsa	25.084597	90.196382	Bridge	Radar
212	NEMD	35.5, Sarchapur	17, Bhogai-Kangsa	24.996884	90.358691	Bridge	Radar
213	NEMD	36, Jaria-Jhanjail	17, Bhogai-Kangsa	25.010553	90.653007	Bridge	Radar
214	NEMD	36.1 Mohonganj	17, Bhogai-Kangsa	24.873011	90.973879	Bridge	Radar
215	NEMD	42, Mill Baraccuk	20, Buriganga	23.698050	90.418861	Bridge	Radar

216	NEMD	43, Hariarpara	20-Buriganga	23.633394	90.469217	No Structure	Pole Mounted Radar ( Type 1)
217	NEMD	46.7L, Khulbarirchar	22, Brahmaputra-Jamuna	25.204498	89.770515	Bridge	Radar
218	NEMD	46.9L, Bahdurabad	22, Brahmaputra-Jamuna	25.130221	89.734714	No Structure	Pole Mounted Radar ( Type 2)
219	NEMD	46.9R Fulchori_ Transit	22-Brahmaputra	25.187394	89.594280	No Structure	Pole Mounted Radar ( Type 2)
220	NEMD	48, Jogonnathganj	22, Brahmaputra-Jamuna	24.712303	89.812067	Bridge	Radar
221	NEMD	50.5, Aricha	22, Brahmaputra-Jamuna	23.720495	89.774298	Bridge	Radar
222	NEMD	53, Batkuchi	24, Cellakhali	25.196847	90.176499	Bridge	Radar
223	NEMD	67, Kamalganj	29, Dhalai	24.355781	91.849055	Bridge	Radar
224	NEMD	68A, Elashin	30, Dhaleswari	24.117289	89.888490	Bridge	Radar
225	NEMD	68 Tilli	30, Dhaleswari	23.938301	89.960268	Bridge	Radar
226	NEMD	68.5, Jagir Dhaleswari	30, Dhaleswari	23.879131	90.024878	Bridge	Radar
227	NEMD	69, Savar	30 Dhawlessary	23.817589	90.257557	Bridge	Radar
228	NEMD	70, Kolatia	30 Dhawlessary	23.602821	90.276803	Bridge	Radar
229	NEMD	71A, Rekabi bazar	30,Dhowlessory	23.570110	90.502837	Bridge	Radar
230	NEMD	71, Kalagachia	30, Dhawlessary	23.569368	90.512079	Bridge	Radar
231	NEMD	93.5L, Mawa	39 Ganges,Padma	23.471208	90.257515	Bridge	Radar
232	NEMD	94, Tarpasha	39 Ganges-padma	23.466143	90.332152	No Structure	Pole Mounted Radar ( Type 2)
233	NEMD	134B, Jhenai Bridge	52, Jhenai	24.949599	89.898688	Bridge	Radar
234	NEMD	134A, Baushi Bridge	52, Jhenai	24.780253	89.852069	Bridge	Radar
235	NEMD	134, Jukerchar	52, Jhenai	24.372292	89.859962	Bridge	Radar
236	NEMD	135A, Juri(Silghat)	53, Juri	24.589626	92.119314	Bridge	Radar
237	NEMD	137A, Taraghat	55, Kaliganga	23.858179	89.955843	Bridge	Radar
238	NEMD	172.5 Amolshid	66, Kushiara	24.872536	92.485578	No Structure	Pole Mounted Radar ( Type 2)
239	NEMD	174, Fenchuganj	66, Kushiara	24.702461	91.940855	Bridge	Radar
240	NEMD	175.5, Sherpur	66, Kushiara	24.628721	91.682115	Bridge	Radar
241	NEMD	179, Demra	68, Lakhya	23.728154	90.504530	Bridge	Radar



242	NEMD	180, Narayanganj	68, Lakyha	23.703188	90.517405	Bridge	Radar
243	NEMD	186, Jugini	71, Lohajang	24.290424	89.874617	Bridge	Radar
244	NEMD	192, Motiganj	73, Lungla	24.305195	91.681813	Bridge	Radar
245	NEMD	201, Monu Rail Br.	77, Monu	24.426239	91.939415	Bridge	Radar
246	NEMD	202, Moulvibazar	77, Monu	24.493971	91.773866	Bridge	Radar
247	NEMD	223, Gualkanda	86, Old Brahmaputra	25.364955	89.810067	Bridge	Radar
248	NEMD	225, Jamalpur	86, Old Brahmaputra	24.922365	89.967555	Bridge	Radar
249	NEMD	228.5, Mymensingh	86, Old Brahmaputra	24.736044	90.430191	Bridge	Radar
250	NEMD	229, Toke	86, Old Brahmaputra	24.262351	90.643133	Bridge	Radar
251	NEMD	233A, Jaflong	88, Peain	25.156930	92.016851	Bridge	Radar
252	NEMD	233, Protappur	88, Peain	25.134109	91.947235	Bridge	Radar
253	NEMD	252.1, Salutarikar	93, Sari-Gowain	24.991143	91.852492	Bridge	Radar
254	NEMD	263.1, Kalmakanda	99, Someshowri	25.076895	90.894825	Bridge	Radar
255	NEMD	265, Jaldhup	101, SonaiBordal	24.773979	92.172923	Bridge	Radar
256	NEMD	268, Chhatak	102, Surma-Meghna	25.036636	91.662516	No Structure	Pole Mounted Radar (Type 2)
257	NEMD	269.5, Dirai	102, Surma-Meghna	24.797798	91.352458	Bridge	Radar
258	NEMD	274, Narsingdi	102, Surma-Meghna	23.919152	90.725900	Bridge	Radar
259	NEMD	299, Tongikhal	109, Tongi Khal	23.881696	90.400986	Bridge	Radar
260	NEMD	301, Kaliakoir	111, Turag	24.082113	90.207688	Bridge	Radar
261	NEMD	302, Mirpur	111, Turag	23.784895	90.336659	Bridge	Radar
262	NEMD	310, Netrokona	119, Mogra	24.883039	90.724681	Bridge	Radar
263	NEMD	311, Atpara	119, Mogra	24.811461	90.870117	Bridge	Radar
264	NEMD	314, Ghosegaon	122 Nitai	25.150252	90.517601	No Structure	Pole Mounted Radar (Type 2)
265	NEMD	327, Bulamari	137, Nil Jiringam	25.613458	89.878053	No Structure	Radar
266	NEMD	332, Islampur	142, Dhola	25.130174	91.755003	Bridge	Radar
267	NEMD	333, Muslimpur	143, Jhalukhali	25.084934	91.377027	Bridge	Radar
268	NEMD	334, Ghok Bazar	164, SaiduliBaruni	24.689015	90.865080	Bridge	Radar
269	NEMD	337, Urargaon	147 Noagaon	25.120804	91.593803	Bridge	Radar
270	NEMD	341, ChellaSonapur	151, Umium	25.128381	91.668603	Bridge	Radar
271	NEMD	342, Nolsafa	156 Futikjani	24.487905	89.900391	Bridge	Radar

272	NEMD	343.5, Bhuiyanpur d/s	156 Futikjani	24.483257	89.881272	Bridge	Radar
273	NEMD	345, Durlavpur	102, Surma-Meghna	24.997228	91.264043	Bridge	Radar
274	NEMD	351, Aktapara	170, Mohasing	24.877074	91.487460	Bridge	Radar
275	NEMD	352, Jagannathpur	Noljora (Mora Surma)	24.763642	91.551661	Bridge	Radar
276	NEMD	363.2 Moddonagar	99, Someshowri	25.004876	90.985311	Bridge	Radar
277	NEMD	355 DokkhinHasonpur	119 Mogra (Dhonu)	24.625451	90.955863	Bridge	Radar
278	SWMD	Rayenda, Bagerhat 8501 WMIP	Balesh war	22.313400	89.860000	Bridge	Radar
279	SWMD	Borguna, Borguna 8513 WMIP	Biskhali	22.158800	90.120000	Bridge	Radar
280	SWMD	Shakra, Satkhira 8522 WMIP	Ichhamoti (WesterBorder)	22.194500	89.080000	Bridge	Radar
281	NMD	Dalia, Dinajpur 8502 WMIP	107-Teesta	26.178827	89.051893	Barrage	Radar
282	SWMD	Borhanuddin, Bhola 8514 WMIP	Tentulia	22.468800	90.850000	Bridge	Radar
283	SWMD	Mongla, Bagerhat 8515 WMIP	Possur	22.464200	89.600000	Pole	Pole Mounted Radar ( Existing Pole)
284	NMD	ShaheberArga, Kurigram 8523 WMIP	Bramaputra	25.706000	89.822000	Pole	Pole Mounted Radar ( Existing Pole)
285	SWMD	Barisal, Barisal 8516 WMIP	Kitonkhola	22.700200	90.340000	Bridge	Radar
286	SEMD	Chandpur, Chandpur 8503 WMIP	Meghna	23.472100	90.590000	Bridge	Radar
287	SEMD	Chittagong Sadarghat/KalurGhat, CTG 8504 WMIP	Karnaphuli	22.457571	92.033844	Bridge	Radar
288	NEMD	Sarighatsylhet 8524 WMIP	Sarigoain	25.087100	92.120000	Bridge	Radar
289	NMD	Kurigram, kurigram 8505 WMIP	Dhorola	23.328800	89.690000	Bridge	Radar
290	NEMD	Habiganj, Habiganj 8525 WMIP	Khowai	24.390000	91.410000	Bridge	Radar
291	NEMD	ShaolaDubag, Sylhet 8506 WMIP	Kushiara	24.880000	92.190000	Bridge	Radar
292	SEMD	Cox's Bazar 8517 WMIP	Bakkhali	21.448000	91.980000	Bridge	Radar
293	SWMD	Patigati, Gopalganj 8507 WMIP	GoraiModhumoti River	22.933307	89.808894	Bridge	Radar
294	SWMD	Haridaspur, Gopalganj 8508	MBR	23.214100	89.700000	Bridge	Radar

		WMIP					
295	SWMD	Bishkhali, Jhalkathi 8518 WMIP	Bishkhali	22.630000	90.180000	Bridge	Radar
296	SWMD	Nolianala, Khulna 8519 WMIP	Shibsha57	22.456800	89.420000	Pole	Pole Mounted Radar ( Existing Pole)
297	SEMD	Ralunatkhal, Laxmipur 8509 WMIP	Meghna	22.867900	90.770000	Pole	Pole Mounted Radar ( Existing Pole)
298	SEMD	Comilla, Comolla 8526 WMIP	Gomoti	23.470400	91.200000	Bridge	Radar
299	SEMD	Bamni, Noakhali 8520 WMIP	Bamna	22.888300	91.350000	Bridge	Radar
300	SEMD	Musapur, Feni 8510 WMIP	Little Feni	23.034800	91.440000	Bridge	Radar
301	NEMD	Durgapur, Netrokona 8527 WMIP	Sumeshwary	24.677900	90.470000	Bridge	Radar
302	SWMD	Swarupkathi, Barisal 8511 WMIP	Swarupkathi	22.581600	89.970000	Bridge	Radar
303	SWMD	Patuakhali, Patuakhali 8512 WMIP	Lohalia	22.351700	90.230000	Bridge	Radar
304	NEMD	Nakuagaon, Sherpur 8528 WMIP	Bhogai	24.736600	90.430000	Bridge	Radar
305	SWMD	Benarpota, Satkhira 8529 WMIP	Betna-Kholpetua	22.256700	89.100000	Bridge	Radar
306	NEMD	Kobadak Forest, Satkhira 8521 WMIP	Kobadak	22.726400	89.270000	Bridge	Radar
307	NEMD	Sirajganj, Sirajganj 8302 Hycos_1	Jamuna	24.392833	89.803333	Bridge	Radar
308	SWMD	Lalonsa Bridge, Kustia 8303 Hycos_2	Ganges	24.063511	89.022789	Bridge	Radar
309	NEMD	Bhairab Bazar, Bhairab 8304 Hycos_3	Uppar Meghna	24.047286	90.993389	Bridge	Radar
310	NEMD	Ballah Station, Hobiganj 8306 Hycos_4	Khowai	24.083814	91.595025	Pole	Pole Mounted Radar ( Existing Pole)
311	NEMD	Chatlaghat Station, Moulubi Bazar 8307 Hycos_5	Monu	24.362778	91.960833	Bridge	Radar
312	NEMD	Zakiganj Station, Zakiganj 8309 Hycos_7	Khushiya	24.873633	92.363347	Pole	Pole Mounted Radar ( Existing

								Pole)
313	NEMD	Sunamganj Station, Sunamganj 8308 Hycos_6	Surma	25.076586	91.411400	Pole	Pole Mounted Radar ( Existing Pole)	
314	NMD	East Chatnai	Dimla, Tista river	26.279444	88.931944	On Groney	Pole Mounted Radar ( Type 2)	
315	NMD	At 18 km downstream of Gorai Rail bridge Janepur in Khoksha upazila, Kushtia	Gorai Moghumoti River,	23.801915	89.278283	On River bank	Pole Mounted Radar ( Type 1)	

**Water level stations shall be placed in a suitable position with existing bridge structure where ever possible and the final point of installation will be fixed upon discussion and approval of Client. The locations of poles for mounting the radars will also be finalized after discussions with BWDB officials.**

#### **ARG Stations**

**Rain gauge stations shall be placed in a suitable position at the roof of existing building structure where ever possible and the final point of installation will be fixed upon discussion and approval of Client. In few cases it may be required to place the stations in ground.**

SI No	Division	Sub-Division	District	Station ID and Name	Existing Latitude	Existing Longitude	Proposed installation Location
1	NEMD	Dhaka	Gazipur	CL-17, Jaydebpur	24°00'07.8874 "N	90°25'11.99 60"E	Roof top of Joydebpur Govt. Primary School is the best place
2	NEMD	Dhaka	Dhaka	CL-31, Savar	23°50'16.2436 "N	90°14'53.27 92"E	Roof top of SavarDak=Ban glow
3	NEMD	Dhaka	Narsingdi	CL-76, Narsindi	23°55'02.5691 "N	90°42'31.07 78"E	Roof top of Narsingdi BWDB office, NarsingdiPoras ava, Narsingdi

4	NEMD	Dhaka	Narsingdi	CL-79, Shibpur	24°02'17.5912 "N	90°44'46.33 54"E	Roof top of Bangladesh Agricultural Research Institute, Narsindi
5	NEMD	Dhaka	Narayanganj	CL-519, E-46, Shimrail	23°46'54.2413 "N	90°30'54.33 27"E	Roof top of Shimrail DND, ME Sub-div. office, Siddirganj
6	NEMD	Dhaka	Dhaka	CL-9, Dhaka PBO	23°46'47.6868 "N	90°22'42.01 43"E	Roof top of Bangladesh Meteorological Department, Agargaon
7	NEMD	Dhaka	Banani	CL-Banani Meteorological Station	23°47'19.2261 "N	90°24'44.44 41"E	Roof top of Bangladesh Meteorological Department, Agargaon
8	NEMD	Dhaka	Munsiganj	CL-365, Munsiganj	23°33'28.2428 "N	90°31'44.43 05"E	Roof top of Near of Private Building
9	NEMD	Dhaka	Munshiganj	CL-402, Bhagyakul	23°30'45.5013 "N	90°13'11.50 23"E	Roof top of Bhagyakul training Institute, sreenagar, Munshiganj
10	NEMD	Dhaka	Manikgonj	CL-20, Manikgonj	23°52'19.0401 "N	90°00'02.32 79"E	Roof top of Private Building, Manikganj
11	NEMD	Dhaka	Manikgonj	CL-10, Daulatpur	23°58'06.4506 "N	89°49'47.41 85"E	Roof top of Dawlotpur union Porishod, Dawlotpur
12	NEMD	Mymensing	Mymensing	CL-5, Bhaluka	24°24'27.1781 "N	90°23'06.04 20"E	Roof top of Bhaluka Model Government Primary School
13	NEMD	Mymensing	Mymensing	CL-27, Phulbaria	24°38'15.7001 "N	90°16'06.97 17"E	Roof top of Govt. Fulbaria Model Pilot High School
14	NEMD	Mymensing	Mymensing	CL-37, Sripur	24°11'43.9422 "N	90°29'05.54 68"E	Roof top of SreepurMuktijo ddhaRahmat Ali Govt College
15	NEMD	Mymensing	Mymensing	CL-43, Maona	24°13'34.1523 "N	90°24'03.26 42"E	Roof top of Pear Ali

							University College
16	NEMD	Dhaka	Mymensing	CL-44, Mohekhola	25°09'39.4811 "N	90°58'47.79 87"E	Roof top of Near of Building, Jamalpur, 1 No. Bongsi Konda
17	NEMD	Dhaka	Mymensing	CL-45, Ghosegaon	25°08'34.0470 "N	90°31'36.92 65"E	Roof top of Ghosegaon Govt. Primary School
18	NEMD	Dhaka	Mymensing	CL-63, Durgapur	25°07'08.9064 "N	90°40'36.20 20"E	Roof top of Durgapur Warless Station
19	NEMD	Mymensing	Mymensing	CL-64, Gafargaon	24°27'00.7555 "N	90°33'28.70 54"E	Roof top of Gafargaon Govt. College
20	NEMD	Dhaka	Mymensing	CL-65, Gauripur	24°45'14.8665 "N	90°34'36.57 04"E	Roof top of Gouripur Government College
21	NEMD	Dhaka	Mymensing	CL-68, JariaJhanjail	25°00'34.3536 "N	90°39'08.96 90"E	Roof top of BWDB Office, JariaJhanjail
22	NEMD	Dhaka	Mymensing	CL-71, Kishoreganj	24°26'43.0662 "N	90°46'11.19 08"E	Roof top of BWDB Office, Kishoreganj
23	NEMD	Mymensing	Mymensing	CL-72, Muktagacha	24°46'07.9023 "N	90°15'15.84 71"E	Roof top of Muktagacha College
24	NEMD	Mymensing	Mymensing	CL-73, Mymensing	24°45'56.6531 "N	90°23'38.84 50"E	Roof top of Near of Building of Staion
25	NEMD	Dhaka	Mymensing	CL-123, Netrokona	24°53'04.6691 "N	90°43'31.59 49"E	Roof top of Near of Building
26	NEMD	Dhaka	Mymensing	CL-75, Nandail	24°33'53.2833 "N	90°44'35.93 16"E	Roof top of Near of Building
27	NEMD	Mymensing	Mymensing	CL-46, Rasulpur	24°41'24.8251 "N	90°08'35.51 83"E	Roof top of Near of Building
28	NEMD	Dhaka	Mymensing	CL-77, Phulpur	24°57'29.7310 "N	90°21'29.11 18"E	Roof top of Near of Phulpur govt Primary School

29	NEMD	Dhaka	Mymensing	CL-115, Kendua	24°39'37.1353 "N	90°50'52.39 23"E	Roof top of Near of Building
30	NEMD	Mymensing	Mymensing	CL-227, Nakuagaon	25°11'26.1384 "N	90°12'55.90 76"E	Roof top of Near of Building
31	NEMD	Dhaka	Mymensing	CL-121, Mohanganj	24°52'21.0450 "N	90°58'26.05 37"E	Roof top of Near of the Private Building
32	NEMD	Dhaka	Mymensing	CL-527, Moddhonagar	25°03'01.9093 "N	90°59'36.78 45"E	Roof top of Near of Govt. Building
33	NEMD	Dhaka	Tangail	CL-2, Tangail_Atiya	24°16'13.5027 "N	89°55'13.70 12"E	Roof top of Near of Tangail Atiya Govt. Primary School
34	NEMD	Dhaka	Tangail	CL-13, Gopalpur	24°32'46.9528 "N	89°55'28.10 97"E	Roof top of SutiDakhilMad rasha, Gopalpur, Tangail
35	NEMD	Dhaka	Tangail	CL-18, Kalihati	24°21'43.3556 "N	89°55'39.88 39"E	Roof top of Near of Building
36	NEMD	Dhaka	Tangail	CL-21, Mirzapur	24°05'52.1971 "N	90°06'08.81 92"E	Roof top of Near of Building
37	NEMD	Dhaka	Tangail	CL-17, Kutubpur	24°25'11.4843 "N	90°11'48.72 83"E	Roof top of Near of Building
38	NEMD	Dhaka	Dewanganj	CL-32, Sarisabari	24°46'24.8193 "N	89°50'44.62 29"E	Roof top of Near of the Private Building
39	NEMD	Dhaka	Dewanganj	CL-62, Dewanganj	25°09'21.6170 "N	89°45'18.24 94"E	Roof top of BWDB Office, Dewanganj, Jamalpur
40	NEMD	Dhaka	Dewanganj	CL-67, Jamalpur	24°54'43.1252 "N	89°57'05.63 16"E	Roof top of BWDB Office, Jamalpur
41	NEMD	Dhaka	Dewanganj	CL-78, Sherpur Town	25°00'39.0690 "N	90°00'59.63 92"E	Roof top of BWDB Office, Sherpur

42	NEMD	Dhaka	Dewanganj	CL-74, Nalitabari	25°05'04.6272 "N	90°11'40.69 67"E	Roof top of Near of Nalitabari College
43	NEMD	Sylhet	Sylhet	CL-48, Jaflong	25°09'42.1246 "N	92°01'02.38 42"E	Roof top of Jaflong Union Porishod
44	NEMD	Sylhet	Sylhet	CL-102, Companyganj	25°05'15.5053 "N	91°45'35.55 14"E	Roof top of Near of Building
45	NEMD	Sylhet	Sylhet	CL-107, Chhatak	25°02'16.3432 "N	91°40'14.01 71"E	Roof top of Chatok Police Station
46	NEMD	Sylhet	Sylhet	CL-116, Lallakhal	25°06'26.3298 "N	92°10'45.56 37"E	Roof top of Near of Building
47	NEMD	Sylhet	Sylhet	CL-129, Tajpur	24°43'27.0669 "N	91°45'10.13 74"E	Roof top of Near of School
48	NEMD	Sylhet	Sunamganj	CL-49, Laurergarh	25°11'31.2452 "N	91°15'02.14 91"E	Roof top of BWDB Office
49	NEMD	Sylhet	Sunamganj	CL-106, Durlavpur	24°59'51.3716 "N	91°15'48.15 35"E	Roof top of Near of Durlavpur Union Porishod
50	NEMD	Sylhet	Sunamganj	CL-526, Tahirpur	25°05'50.4977 "N	91°10'37.59 87"E	Roof top of TahirpurUpzill a Football Field, Sunamganj
51	NEMD	Sylhet	Sunamganj	CL-528, Dirai	24°47'55.4522 "N	91°21'08.62 68"E	Roof top of Baghbari, Derai, BWDB Office, Sunamganj
52	NEMD	Sylhet	Sunamganj	CL-529, Shalla	24°40'17.7184 "N	91°16'13.04 65"E	Roof top of Shalla, Shalla Union Parishad, Sunamganj
53	NEMD	Sylhet	Moulvibazar	CL-118, Latu	24°49'00.7864 "N	92°14'54.60 26"E	Roof top of Near of Building (Karampur, North Sahabazpur, Moulvibazar)
54	NEMD	Sylhet	Sylhet	CL-125, Sheola	24°53'29.7038 "N	92°11'15.27 54"E	Roof top of Sheola BWDB Office Building



55	NEMD	Sylhet	Sylhet	CL-130, Zakiganj	24°52'32.2190 "N	92°21'58.30 79"E	Roof top of Zakiganj BWDB Office Building
56	NEMD	Sylhet	Sylhet	CL-228, Kanaighat	25°00'00.6294 "N	92°15'28.91 61"E	Roof top of Kanaighat, Police Stations
57	NEMD	Sylhet	Moulvibazar	CL-104, Chandbagh	24°36'30.7822 "N	91°55'40.92 75"E	Roof top of Near of Building ( Chandbagh Tea Factory Office) Sahabazpur, Moulvibazar)
58	NEMD	Sylhet	Moulvibazar	CL-108, Dakhinbagh	24°38'10.2063 "N	92°09'41.62 21"E	Roof top of Side Building (Railway)
59	NEMD	Sylhet	Moulvibazar	CL-114, Kamolganj	24°21'00.0051 "N	91°50'52.24 34"E	Roof top of Komolganj Union Porishod Building
60	NEMD	Sylhet	Moulvibazar	CL-117, Langla	24°28'27.3099 "N	91°57'21.11 94"E	Roof top of Tea State Office Building, Langla
61	NEMD	Sylhet	Moulvibazar	CL-119, Monumukh	24°37'45.5372 "N	91°40'43.92 57"E	Roof top of RHD Building
62	NEMD	Sylhet	Moulvibazar	CL-122, Moulvibazar	24°28'27.5084 "N	91°46'19.99 78"E	Roof top of BWDB Colony, Moulvibazar,
63	NEMD	Sylhet	Moulvibazar	CL-126, Srimangal	24°17'39.6877 "N	91°44'56.19 36"E	Roof top of Bangladesh Tea Research Institute(BRTI) , Srimangal, Moulvibazar
64	NEMD	Sylhet	Moulvibazar	CL-229, Monu Rly Br.	24°25'28.7680 "N	91°56'26.02 63"E	Roof top of Near of the Building, Monu Bazar, Hajipur
65	NMD	Pabna	Pabna	CL-25-E-28 Pabna	24°00'22.9963 "N	89°13'02.43 02"E	Roof top of Pabna BWDB Hydrology Office, Hemayetpur, Pabna Sada
66	NMD	Pabna	Pabna	CL-3CL-38, Sujanagar	23°56'09.0155 "N	89°24'40.66 97"E	Roof top of Sujanagar Pilot Model Thana School, Sujanagar, Pabna

67	NMD	Pabna	Pabna	CL-4 Bera	24°04'35.6518 "N	89°36'43.84 78"E	Roof top of Near of side Building
68	NMD	Pabna	Pabna	CL-1 Atghoria	24°04'35.6518 "N	89°36'43.84 78"E	Roof top of UpazilaPorisha d Building
69	NMD	Pabna	Pabna	CL-7 Chatmohar	24°13'57.4398 "N	89°17'18.64 49"E	Roof top of Near of Building, Aboundant location of BADC, Dolong, Chatmohar, Pabna
70	NMD	Pabna	Pabna	CL-15 Ishurdi	24°08'04.8846 "N	89°03'53.05 65"E	Roof top of house, Iswardi Municipality, Pabna
71	NMD	Pabna	Natore	CL-16 Zoari	24°19'54.1029 "N	89°05'53.08 48"E	Roof top of Zoari Govt. Primary School, Joari, Natore
72	NMD	Pabna	Natore	CL-14 Gurudashpur	24°22'10.1797 "N	89°14'02.00 26"E	Roof top of Gurudashpur, Dakbanglow, Nator
73	NMD	Pabna	Kustia	CL-41 Bheramara	24°01'46.7524 "N	89°00'00.97 99"E	Roof top of Near of GK Colony, Bheramara, Kustia
74	NMD	Pabna	Kustia	CL-19 Kustia	23°54'41.2696 "N	89°07'28.04 95"E	Roof top of Building, Thana Para, Kustia Municipality
75	NMD	Pabna	Kustia	CL-214-E-1 Amla	23°55'20.1565 "N	88°54'10.82 38"E	Roof top of Govt. Primary School, Satnapara
76	NMD	Pabna	Pabna	CL-12 Banawarinagar	24°11'09.8807 "N	89°25'42.44 79"E	Roof top of Near of Private Building
77	NMD	Pabna	Sirajgonj	CL-29 Ranigonj	24°30'28.9467 "N	89°31'31.42 47"E	Roof top of Near of Private Building

78	NMD	Pabna	Sirajgonj	CL-34-E-35 Sirajgonj	24°27'52.9931 "N	89°43'01.48 95"E	Roof top of Union Porisod Office, Dhangora, Raigonj Thana
79	NMD	Pabna	Sirajgonj	CL-35 Shahjadpur	24°10'42.5898 "N	89°35'29.98 52"E	Roof top of Near Private Building
80	NMD	Pabna	Sirajgonj	CL-39 Taras	24°25'38.7047 "N	89°22'11.97 11"E	Roof top of House of Gauge reader, Taras Union, Sirajgonj
81	NMD	Pabna	Sirajgonj	CL-40 Ullapara	24°19'07.0291 "N	89°34'02.92 07"E	Roof top of Near of side Building
82	NMD	Rajshahi -Pabna	Rajshahi	CL-205-E-29 Rajshahi	24°22'44.9166 "N	88°36'10.95 26"E	Roof top of BWDB O & M Division Office Building, Sopura, Rajshahi
83	NMD	Rajshahi -Pabna	Natore	CL-23 Natore	24°57'04.7092 "N	88°58'56.10 26"E	Roof top of BWDB Office, Nator
84	NMD	Rajshahi -Pabna	Natore	CL-36 Singra	24°30'24.9791 "N	89°08'35.93 87"E	Roof top of BWDB Office, Singra
85	NMD	Rajshahi -Pabna	Chapai Nawabganj	CL-158 Bholahat	24°57'05.4783 "N	88°11'59.75 52"E	Roof top of Building, Ino Union, Bholahat
86	NMD	Rajshahi -Pabna	Rajshahi	CL-172 Godagari	24°27'39.8882 "N	88°19'40.74 05"E	Roof top of Building, Baroipara, Godagari Municipality
87	NMD	Rajshahi -Pabna	Natore	CL-184 Lalpur	24°10'38.6831 "N	88°57'36.26 78"E	Roof top of Union Porisod Office, Lalpur, Natore
88	NMD	Rajshahi -Pabna	Chapai Nawabganj	CL-190 Nachol	24°44'01.1100 "N	88°24'53.17 97"E	Roof top of NacholeUpozil aPorishod office, Nachole
89	NMD	Rajshahi -Pabna	Chapai Nawabganj	CL-195-E-25 Chapai Nawabganj	24°36'03.3355 "N	88°16'52.81 44"E	Roof top of BWDB Office, Chapai Nawabganj

90	NMD	Rajshahi -Pabna	Rajshahi	CL-204 Puthia	24°55'50.4054 "N	88°12'37.53 03"E	Roof top of PuthibariTowsh il Office, Begumbari
91	NMD	Rajshahi -Pabna	Chapai Nawabganj	CL-208 Rahanpur	24°49'11.0428 "N	88°19'32.11 67"E	Roof top of Gauge reader house, Rohanpur, Rahanpur Municipality
92	NMD	Rajshahi -Pabna	Rajshahi	CL-212 Sardah	24°18'10.5688 "N	88°44'09.43 73"E	Roof top of Gauge reader house, Charghat, Rajshahi
93	NMD	Rajshahi -Pabna	Chapai Nawabganj	CL-215 Shibganj	24°41'03.9901 "N	88°09'34.55 14"E	Roof top of Upozilla Fisheries officer's Compound, Shibganj Municipality
94	NMD	Rajshahi -Pabna	Rajshahi	CL-219 Tanore	24°35'10.4871 "N	88°34'33.76 40"E	Roof top of Jamal Super Market, Gollapara Bazar, Tanore
95	NMD	Rajshahi -Pabna	Naogaon	CL-191 Naogaon	24°48'22.4580 "N	88°57'05.79 55"E	Roof top of BWDB O & M Building, Naogaon,
96	NMD	Rajshahi -Pabna	Naogaon	CL-187 Mohadebpur	24°54'55.1998 "N	88°45'10.98 92"E	Roof top of BWDB Office Building, Mohadebpur, Naogaon
97	NMD	Rajshahi -Pabna	Naogaon	CL-152 Badalgachi	24°58'01.5986 "N	88°54'11.04 39"E	Roof top of Abdul Salam's house, Badalgachi Sardar Para,
98	NMD	Rajshahi -Pabna	Naogaon	CL-192 Nazipur	25°02'50.6929 "N	88°45'01.10 98"E	Roof top of Nazipur Bazar near Police Station, NazipurMunicu ipality, Naogaon
99	NMD	Rajshahi -Pabna	Naogaon	CL-211 Shapahar	25°07'38.3187 "N	88°35'31.85 61"E	Roof, Tuhin Reza' house, Chowdhury Para, Sapahar, Naogaon

100	NMD	Rajshahi -Pabna	Naogaon	CL-194 Nithpur	25°01'35.8333 "N	88°27'07.89 73"E	Roof top of NithpurUpozilla Porisod, Nithpur, Naogaon
101	NMD	Rajshahi -Pabna	Naogaon	CL-3 AtraiAhsangan j	24°36'42.5772 "N	88°58'28.56 74"E	Roof top of Bazar Shop, Atrai Railway Station, Atrai, Naogaon
102	NMD	Rajshahi -Pabna	Bogura	CL-6-E-5 Bogura	24°52'16.1353 "N	89°22'07.93 03"E	Roof top of Bogra BWDB O & M Office, Bogra
103	NMD	Rajshahi -Pabna	Bogura	CL-24 Naokhila	24°48'43.1693 "N	89°35'06.28 61"E	Roof top of Near of Private Building
104	NMD	Rajshahi -Pabna	Bogura	CL-216 Shibganj	25°00'23.2731 "N	89°18'59.17 44"E	Roof top of ShibganjUpozil la Health Complex, Bogra
105	NMD	Rajshahi -Pabna	Bogura	CL-169 Dupchanchia	24°52'27.2674 "N	89°10'48.67 22"E	Mother & Child Wealfare Center, Dhupchanchia, Bogra
106	NMD	Rajshahi -Pabna	Joypurhat	CL-520 Joypurhat	25°06'13.1043 "N	89°01'17.87 15"E	BWDB Office, Joypurhat
107	NMD	Rajshahi -Pabna	Bogura	CL-11 Dhunot	24°40'55.9688 "N	89°32'21.11 27"E	BWDB office, Dhunot, Bogra
108	NMD	Rajshahi -Pabna	Bogura	CL-33 Sherpur	24°40'38.8137 "N	89°24'58.16 91"E	Roof top of Beside the house of Debtos Chakraborty, Ghospara, Sherpur, Bogra
109	NMD	Rajshahi -Pabna	Bogura	CL-22 Nandigram	24°38'44.3217 "N	89°14'45.38 14"E	Roof of Nandigram Model Pilot High School, Nandigram, Bogra
110	NMD	Dinajpur	Dinajpur	CL-164 Ghoraghat	25°14'51.6336 "N	89°16'52.94 47"E	Roof top of Near of Building, Ghoraghat

111	NMD	Dinajpur	Dinajpur	CL-168-E-11 Dinajpur	25°36'46.6284 "N	88°37'46.51 76"E	Roof top of BWDB Office, Mission Road, Dinajpu
112	NMD	Dinajpur	Dinajpur	CL-175 Banglahili	25°16'56.0960 "N	89°01'14.27 18"E	Roof top of BWDB office, Hili
113	NMD	Dinajpur	Dinajpur	CL-179 Khansama	25°55'28.1444 "N	88°44'12.93 13"E	Roof top of House of Md. Raju Islam, Khansama Thana, 1 Number Unio
114	NMD	Dinajpur	Dinajpur	CL-180 Kantanagar	25°48'45.2627 "N	88°40'47.87 55"E	Roof top of House of AfrozaPervin, Vatgaon, undorpur,Kaha nol Thana
115	NMD	Dinajpur	Dinajpur	CL-196 Nawabganj	25°25'11.4246 "N	89°04'36.88 70"E	Roof top of the Mosque, Nowabganj Thana Office.
116	NMD	Dinajpur	Dinajpur	CL-201 Phulbari	25°30'13.6810 "N	88°58'19.89 30"E	Roof top of Near of House of Md. Sumon Hossain, Phulbari, Dinajpur
117	NMD	Dinajpur	Dinajpur	CL-213 Setabganj	25°48'14.5374 "N	88°27'28.03 39"E	Roof top of Bochagonj Police Station, Bazar Road, Dinajpur
118	NMD	Dinajpur	Panchagar	CL-157 Bhitargar	26°25'24.5622 "N	88°35'02.88 48"E	Roof top of Near of side Private Building
119	NMD	Dinajpur	Panchagar	CL-161 Boda	26°11'56.8850 "N	88°33'11.90 51"E	Roof top of Near of the house of Md. Jahurul Haque, Jhinuknagar, Boda Thana
120	NMD	Dinajpur	Panchagar	CL-166 Debiganj	26°06'53.6963 "N	88°45'19.72 79"E	Roof top of Debiganj Women's Degree College, Debiganj, Panchagar

121	NMD	Dinajpur	Thakurgaon	CL-193 Nakmarad	25°58'55.5468 "N	88°15'55.62 48"E	Roof top of Near of Nakmarad Govt. Primary School, Vobanandapur, 2 Nakmarad Union
122	NMD	Dinajpur	Panchagar	CL-197 Panchagar	26°20'21.4311 "N	88°33'17.94 03"E	Roof top of Panchagar O & M Division, BWDB Building
123	NMD	Dinajpur	Thakurgaon	CL-209-E-33 Ruhia	26°10'13.9577 "N	88°24'37.55 27"E	Roof top of ZilaPorisodDak Bungalow Building Ruhia, Thakurgao
124	NMD	Dinajpur	Panchagar	CL-220 Tetulia	26°29'54.8249 "N	88°20'19.79 81"E	Roof top of Tetulia Model Thana Building, Panchagar
125	NMD	Dinajpur	Thakurgaon	CL-221 Thakurgaon	26°01'28.0338 "N	88°27'52.87 38"E	Roof top of BWDB office Building, Thakurgaon
126	NMD	Dinajpur	Rangpur	CL-153 Badargonj	25°40'00.8483 "N	89°02'50.60 70"E	Roof top of BWDB Office, Dangapara, Badargonj Municipality, Rangpur
127	NMD	Dinajpur	Nilphamari	CL-154 Nilphamari	25°55'40.2751 "N	88°50'33.63 36"E	Roof top of Nilphamari O & M Division, BWDB Office. Nilphamari
128	NMD	Dinajpur	Gaibandha	CL-156 Gaibandha	25°19'26.7728 "N	89°32'44.10 12"E	Roof top of Gaibandha O & M Division, BWDB Office.
129	NMD	Dinajpur	Nilphamary	CL-167 Dimla	26°08'02.2614 "N	88°54'44.25 05"E	Roof top of Near of the Building
130	NMD	Dinajpur	Gaibandha	CL-171 Gobindaganj	25°07'51.8677 "N	89°23'22.51 15"E	Roof top of House of gauge reader, Ghospara, BozrupBolia.

131	NMD	Dinajpur	Nilphamary	CL-177-E-18 Kaligonj	26°04'33.5413 "N	88°57'24.14 40"E	Roof top of BWDB Office, Golna Union, Kaligonj, Joldhaka Thana, Nilphamary
132	NMD	Dinajpur	Rangpur	CL-178 Kaunia	25°46'33.5388 "N	89°25'30.78 07"E	Roof top of BWDB Compound, Balapara Union, Nizpara, kaunia Thana, Rangpur
133	NMD	Dinajpur	Rangpur	CL-186 Mithapukur	25°34'21.9623 "N	89°16'31.97 60"E	Roof top of BWDB office, ChitaliUttorpar a, 7 no Ward, Mithapukur, Rangpur
134	NMD	Dinajpur	Rangpur	CL-188-E-22 Mohipur	25°51'48.5972 "N	89°15'16.17 93"E	Roof top of BWDB Agricultural Farm Office, 5 no Lokkhitari, Mohipur, Gongachora, Rangpur
135	NMD	Dinajpur	Rangpur	CL-202 Pirgacha	25°38'57.6592 "N	89°24'28.30 69"E	Roof top of Near of the gauge reader, Anontoram, Pirgacha, Rangpur
136	NMD	Dinajpur	Rangpur	CL-206-E-32 Rangpur	25°43'51.8915 "N	89°16'15.10 60"E	Roof top of Rangpur O & M Division, BWDB Office
137	NMD	Dinajpur	Nilphamari	CL-210 Sayedpur	25°46'48.8218 "N	88°54'51.76 36"E	Roof top of Sayedpur O & M Division Office, Nilphamary
138	NMD	Dinajpur	Gaibandha	CL-218 Sundargonj	25°35'27.3862 "N	89°30'42.32 68"E	Roof top of Near of the Building, Tarap ur Union, Chachia, Mirgonj, Sundorgonj Thana, Gaibandha



139	NMD	Dinajpur	Nilphamari	CL-226 Dalia	26°09'29.3315 "N	89°02'01.82 61"E	Roof top of Dalia O & M Division, BWDB Office.
140	NMD	Dinajpur	Kurigram	CL-159 Bhuruhamari	26°05'48.6973 "N	89°42'22.65 02"E	Roof top of Near of the Building, Gauge Reader Pikersora, Bhurungamari, Kurigram
141	NMD	Dinajpur	Kurigram	CL-163 Chilmari	25°34'59.7271 "N	89°39'44.54 61"E	Roof top of BWDB Office, Chilmari
142	NMD	Dinajpur	Lalmonirhat	CL-174 Hatibandha	26°07'34.4624 "N	89°08'42.98 89"E	Roof top of the House of gauge reader, Tongbhanga Union, Hatibandha Thana, Lalmonirhat
143	NMD	Dinajpur	KurigramSadar	CL-182 Kurigram	25°48'35.6441 "N	89°37'49.81 86"E	Roof top of the Kurigram O & M Division, BWDB Office
144	NMD	Dinajpur	Lalmonirhat	CL-183 Lalmonirhat	25°54'45.5296 "N	89°26'07.91 26"E	Roof top of ZillaPorisodDa k Bungalow, LalmonirhatSa dar, Lalmonirhat
145	NMD	Dinajpur	Lalmonirhat	CL-200 Patgram	26°19'49.6787 "N	89°02'01.31 41"E	Roof of ZillaPorisodDa k Bungalow Building, LalmonirhatSa dar, Lalmonirhat
146	NMD	Dinajpur	Kurigram	CL-222 Ulipur	25°39'11.9867 "N	89°37'21.17 66"E	Roof of BWDB Office, Joniadanga, UlipurMunicip ality, Kurigram
147	SEMD	Cumilla	Brahmanbaria	CL 351 Bancharampur	23°46'33.9396 "N	90°47'51.46 23"E	Roof Top of JagannathpurA dunik Auditorium, Bancharampur

148	SEMD	Cumilla	Cumilla	CL 352 Barura	23°22'28.6596 "N	91°03'12.73 91"E	Roof of Upazilla Parishad Complex, Barura.
149	SEMD	Cumilla	Cumilla	CL 357 Daudkandi	23°31'19.0917 "N	90°44'31.83 14"E	Roof top of Dakargao, Sundorpur, Daudkandi, Cumilla
150	SEMD	Cumilla	Brahmanbaria	CL 362 Kasba	23°44'32.9551 "N	91°08'56.62 10"E	Rofo of Santipara, Kasba, Brahmanbaria
151	SEMD	Cumilla	Cumilla	CL 363 Laksam	23°20'40.1798 "N	91°08'35.91 89"E	Roof top of Baghmara Govt. Primary School, Laksam
152	SEMD	Cumilla	Cumilla	CL 366 Muradnagar	23°38'17.8662 "N	90°55'44.84 50"E	Roof top of Muradnagar Madrasa roof, Muradnagar
153	SEMD	Cumilla	Cumilla	CL 51 Chauddagram	23°12'36.6384 "N	91°18'51.22 54"E	Roof top of South Falkunkora, chauddagra, Cumilla
154	SEMD	Cumilla	Chandpur	CL 52 Monohorpur	23°19'43.3779 "N	90°54'36.52 75"E	Roof top of Monohorpur Govt Primary & High School
155	SEMD	Cumilla	Chandpur	CL 53 Bernaia	23°11'55.8658 "N	91°00'42.42 53"E	Roof top of Bernaia Govt. primary school .
156	SEMD	Cumilla	Chandpur	CL 354 Chandpur	23°13'51.6052 "N	90°39'06.10 48"E	Roof of BWDB Office, Chandpur Sadar, Chandpur
157	SEMD	Cumilla	Cumilla	CL 356 Cumilla	23°27'53.0877 "N	91°11'34.06 38"E	Roof top of WAPDA Office, Hydrology Section, Cumilla.
158	SEMD	Cumilla	Feni	CL 358 Feni	23°00'30.4372 "N	91°23'01.63 39"E	Roof top of BWDB Office, Feni.
159	SEMD	Cumilla	Cumilla	CL 359 Mahinibazar	23°11'45.4642 "N	91°14'09.22 05"E	Roof top of Madrasa Building, Mahini Bazar,

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160	SEMD	Cumilla	Feni	CL 370 Parshuram	23°13'14.4138 "N	91°26'54.17 48"E	Roof top of BGB Building, Parshuram Upozilla, Feni
161	g	Cumilla	Noakhali	CL 361 Hatiya	23°13'14.4138 "N	91°26'54.17 48"E	Roof top of BWDB Sub division office Hatiya, Nohakhali.
162	SEMD	Cumilla	Lakshmipur	CL 364 Lakshmipur	22°56'14.0175 "N	90°49'44.76 81"E	Roof top of Near of Private Building
163	SEMD	Cumilla	Noakhali	CL 369 Noakhali	22°50'09.4512 "N	91°05'58.82 65"E	Roof top of Noakhali BWDB Office, Noakhali.
164	SEMD	Cumilla	Lakshmipur	CL 372 Raipur	23°02'10.5413 "N	90°45'50.50 77"E	Roof top of Near of side Private Building.
165	SEMD	Cumilla	Lakshmipur	CL 375 Ramgati	22°35'22.7617 "N	90°59'23.06 64"E	Roof top of Near of Borokhiri High School, Ramgati.
166	SEMD	Cumilla	Noakhali	CL 377 Sonaimuri	23°00'02.6923 "N	91°05'53.32 09"E	Roof top of Borokhiri High School, Ramgati.
167	SEMD	Cumilla	Lakshmipur	CL 54 Duttapara	23°00'02.6923 "N	91°05'53.32 09"E	Roof top of Dutta Para High School Compound, Dutta para, Lakshmipur.
168	SEMD	Brahmanbaria	Brahmanbaria	CL-103, E6 Brahmanbaria	23°57'32.4482 "N	91°06'10.08 44"E	Roof top of PuneoutNoyen pur BWDB office, B. BariaSadar, Brahmanbaria.
169	SEMD	Brahmanbaria	Brahmanbaria	CL-131, Sharail	24°04'17.0250 "N	91°07'07.75 98"E	Roof top of SarailUpazila Health Complex.
170	SEMD	Brahmanbaria	Brahmanbaria	CI-132, Nasirnagar	24°11'54.6781 "N	91°11'33.39 00"E	Roof top of NasirnagarDak- Banglow Building.

171	SEMD	Brahmanbaria	Brahmanbaria	CL-367, Nabinagar	23°53'09.6831 "N	90°57'59.21 04"E	Roof top of Nobinagar govt. Hospital.
172	SEMD	Brahmanbaria	Kishoreganj	CL-61, Bajitpur	24°12'42.5223 "N	90°57'20.01 14"E	Roof top of Bajitpur BWDB Office.
173	SEMD	Brahmanbaria	Kishoreganj	CL-112, Itna	24°31'37.0372 "N	91°05'21.24 92"E	Roof top of Near of the Private Building.
174	SEMD	Brahmanbaria	Netrokona	CL-113, Khaliajuri	24°41'22.3043 "N	91°08'22.99 07"E	Roof top of Kishoreganj Land Office.
175	SEMD	Brahmanbaria	Habiganj	CL-120, Markuli	24°41'31.8862 "N	91°22'45.68 60"E	Roof top of BWDB Office Markuli.
176	SEMD	Brahmanbaria	Habiganj	CL-105, Chandpur Bagan	24°09'28.1110 "N	91°29'56.12 57"E	Roof top of Near of Beside Private Building.
177	SEMD	Brahmanbaria	Habiganj	CL-110, Habiganj	24°21'27.7025 "N	91°25'20.89 55"E	Roof top of BWDB Colony, Hobiganj.
178	SEMD	Brahmanbaria	Habiganj	CL-111, Itakhola	24°09'16.0773 "N	91°21'54.80 10"E	Roof top of Itakhola BADC Farm Building, 7 No. Jogodishpur, Habiganj
179	SEMD	Chattogram	Chattogram	CL 301 Amtali	22°44'41.1059 "N	91°45'23.58 25"E	Roof top of East vujhpur Govt. Primary School, Vujpur, Fathikchari .
180	SEMD	Chattogram	Chattogram	CL 302 Anwara	22°13'26.6424 "N	91°54'14.72 89"E	Roof top of Anwara Govt. Model High School, AnwaraSadar.
181	SEMD	Chattogram	Bandarban	CL 303 Bandarban	22°11'30.0592 "N	92°12'55.53 10"E	Roof top of WAPDA Building , Bandarban
182	SEMD	Chattogram	Chattogram	CL 306 Chattogram	22°21'44.7196 "N	91°48'18.50 38"E	Roof top of Bangladesh Agriculture Research Institute Building, Chattagram

183	SEMD	Chattogram	Chattogram	CL 311 Fathichari	22°41'16.4896 "N	91°47'40.62 51"E	Roof top of WAPDA office, Fathikchari, Chattgram
184	SEMD	Chattogram	Bandarban	CL 317 Lama	21°46'49.0903 "N	92°11'20.86 92"E	Roof top of West Side of warelessoffice, Champatoli, Lama
185	SEMD	Chattogram	Khagrachari	CL 319 Manikchari	22°51'05.6515 "N	91°50'13.54 02"E	Roof top of Near of Private Building
186	SEMD	Chattogram	Chattogram	CL 320 Mirsarai	22°46'41.1438 "N	91°34'10.87 05"E	Roof top of Upazilla Administration office Building, Mirsarai, chattagram
187	SEMD	Chattogram	Chattogram	CL 323 Narayanhat	22°48'42.7304 "N	91°43'28.20 88"E	Roof top of Near of Private Building
188	SEMD	Chattogram	Chattogram	CL 324 Nazirhat	22°38'06.2323 "N	91°47'14.47 34"E	Roof top of old bhaban of Nazir hat college, Nazirhat, Fathikchari
189	SEMD	Chattogram	Chattogram	CL 325 Patia	22°17'22.9740 "N	91°59'07.11 61"E	Roof top of WAPDA Building, Patia, Chattagram
190	SEMD	Chattogram	Khagrachhari	CL 327 Ramghar	22°59'51.9047 "N	91°44'06.26 86"E	Roof top of Ramghar WAPDA office, Ramghor
191	SEMD	Chattogram	Rangamati	CL 328 Rangamati	22°38'09.4515 "N	92°11'16.74 60"E	Roof top of Wareless office, BWDB, Rangamati
192	r	Chattogram	Chattogram	CL 330 Rangunia	22°28'03.5063 "N	92°03'57.81 06"E	Roof of Saiyedbari BWDB colony, Rangunia, Chattagram.
193	SEMD	Chattogram	Chattogram	CL 331 Sandwip	22°28'42.2071 "N	91°26'54.89 21"E	Roof of BWDB Office, Magdora, Sandwip.
194	SEMD	Chattogram	Chattogram	CL 332 Satkania	22°04'42.9346 "N	92°01'40.12 86"E	Roof top of BWDB Office.

195	SEMD	Chattogram	Chattogram	CL 334 Sitakunda	22°36'42.2010 "N	91°39'51.19 20"E	Roof top of Sitakundo BWDB office, Sitakundo, Chattogram
196	SEMD	Chattogram	Chattogram	CL 310 Dulahazara	21°39'22.3948 "N	92°04'32.00 87"E	Roof top of JagannatpurAd hunikAditoriu m.
197	SEMD	Chattogram	Chattogram	CL 313 Hathajari	24°18'25.7803 "N	91°46'35.17 40"E	Roof top of Bangladesh Agriculture Research Institute Building, Hathajari
198	SEMD	Chattogram	Cox's Bazar	CL 316 Kutubdia	21°48'50.0998 "N	91°52'13.83 29"E	Roof top of Kutubdia BWDB Building, Kutubdia
199	SEMD	Chattogram	Bandarban	CL 322 Nakhyongocha ri	21°25'39.3574 "N	92°10'45.21 03"E	Roof top of Upazilla Parishad Building, Naikkhangchor i
200	SEMD	Chattogram	Cox's Bazar	CL 312 Teknaf	20°53'32.9685 "N	92°17'28.65 83"E	Roof fo WAPDA rest House, Teknaf, Cox's Bazar
201	SWMD	Faridpur	Faridpur	CL+E-406 Faridpur	23°28'56.6689 "N	89°41'12.43 50"E	Roof of Near of the Faridpur Hydrology Subdivision office at Rathkhola
202	SWMD	Faridpur	Faridpur	CL-404 Boalmari	23°23'25.9264 "N	89°40'48.91 95"E	Roof top of BWDB Sub- division office.
203	SWMD	Faridpur	Faridpur	CL-403 Bhanga	23°23'15.8820 "N	89°58'28.45 20"E	Roof top of BWDB Sub- division office, Bhanga
204	SWMD	Faridpur	Faridpur	CL-411 Madhukhali	23°32'36.9409 "N	89°37'20.44 84"E	Roof top of BWDB Sub- division office, Bhanga.
205	SWMD	Faridpur	Gopalganj	CL-407 Fatehpur	23°14'3.47"N	90°0'34.62" E	Roof top of BWDB Office Building.

206	SWMD	Faridpur	Madaripur	CL+A-409 Haridashpur	23°01'45.1375 "N	89°48'50.71 77"E	Roof top of HaridashpurB WDBBuilding, Haridashpur
207	SWMD	Faridpur	Madaripur	CL-410 Madaripur	23°09'54.6927 "N	90°12'03.27 67"E	Roof top of Near of the Building of BWDB Office.
208	SWMD	Faridpur	Sariatpur	CL-413 Palong	23°11'54.2633 "N	90°20'07.50 36"E	Roof top of Sariatpur O&M office, Sariatpur
209	SWMD	Faridpur	Madaripur	CL-414 Shibchar	23°21'06.4190 "N	90°09'23.47 08"E	Roof top of Near of the Private Building.
210	SWMD	Faridpur	Rajbari	CL-30 Rajbari	23°45'37.8760 "N	89°38'29.31 21"E	Roof top of BWDB Office
211	SWMD	Jashore	Jashore	CL-451 Rajghat	23°00'05.9517 "N	89°25'29.83 92"E	Roof top of Rajghat Govt. Primary school.
212	SWMD	Jashore	Jashore	CL-453 Benapol	23°02'31.5131 "N	88°53'50.43 17"E	Roof top of building, Benapol, Jashore.
213	SWMD	Jashore	Jashore	CL-454 Chuagacha	23°16'09.6948 "N	89°01'20.39 84"E	Roof top of BWDB colony, Chuagacha
214	SWMD	Jashore	Jashore	CL-456 Jashore	23°10'01.0808 "N	89°12'09.78 76"E	Roof of Jashore BWDB O&M division office
215	SWMD	Jashore	Jashore	CL-459 Keshabpur	22°54'17.8863 "N	89°13'08.77 45"E	Roof top of Keshobpur BWDB Subdivision office
216	SWMD	Jashore	Narail	CL-461 Narail	23°09'58.4868 "N	89°29'27.15 57"E	Roof top Fisheries Training Center Building.
217	SWMD	Jashore	Magura	CL-462 Salikha	23°17'49.6465 "N	89°22'38.98 02"E	Roof top of Nearest to Salikha Govt. Primary School, Salikha
218	SWMD	Jashore	Jhenaidah	CL-457 Jhenaidah	23°32'46.7724 "N	89°09'43.33 21"E	Roof top of Jhenaidah BWDB O&M division office

219	SWMD	Jashore	Jhenaidah	CL-458 Kaligonj	23°19'18.6778 "N	88°54'36.57 86"E	Roof top of Private Building, Moheshpur, Jhenaidah
220	SWMD	Magura	Magura	CL-460 Magura	23°29'18.2168 "N	89°25'42.03 57"E	Roof top of BWDB Office, Moheshpur, Jhenaidah
221	SWMD	Jashore	Jhenaidah	CL-463 Sailkupa	23°41'05.2380 "N	89°15'03.80 82"E	Roof top of Sailkupa BWDB O&M sub-division office
222	SWMD	Jashore	Chuadanga	CL-217 Char pragpur	24°00'17.1283 "N	88°45'55.46 58"E	Roof top of BGB camp, pragpur
223	SWMD	Jashore	Meherpur	CL-223 Hogolbaria	23°54'33.2020 "N	88°51'16.78 16"E	Roof top of Private building, Near of Stations, Hogolbaria, Meherpur
224	SWMD	Jashore	Chuadanga	CL-224 Chuadanga	23°38'31.0787 "N	88°50'54.14 98"E	Roof top of Chuadanga BWDB O&M division office
225	SWMD	Jashore	Meherpur	CL-225 Meherpur	23°46'22.9052 "N	88°37'52.14 16"E	Roof top of building, kashirpara, Meherpur
226	SWMD	Jashore	Chuadanga	CL-452 Alamdanga	23°45'12.4733 "N	88°55'03.93 45"E	Roof top of BWDB colony building, Alamdanga
227	SWMD	Jashore	Jhenaidah	CL-455 Dattanagar	23°22'38.6565 "N	88°49'31.88 26"E	Roof top of Private Building near of Station.
228	SWMD	Khulna	Bagerhat	CL+E-501 Bagerhat	22°38'59.8338 "N	89°48'11.37 88"E	Roof top of BWDB O&M office, Bagerhat
229	SWMD	Khulna	Khulna	CL-503 Chalna	22°36'04.6956 "N	89°31'10.25 19"E	Roof top of Private Building near of Station.
230	SWMD	khulna	khulna	CL-504 Dumuria	22°48'33.0954 "N	89°24'52.20 93"E	Roof top of BWDB dumuria colony, khulna
231	SWMD	khulna	khulna	CL-509 Kapilmoni	22°41'23.2344 "N	89°18'31.43 56"E	Roof top of Kapilmoni hospital



							coloney Building
232	SWMD	Khulna	Khulna	CL+E-510 Khulna	22°49'54.8701 "N	89°33'01.81 77"E	Roof top of BWDB colony, khulna
233	SWMD	Khulna	Bagerhat	CL-511 Mollarhat	22°55'52.0990 "N	89°48'10.42 69"E	Roof top of BWDB office Building, Mollarhat
234	SWMD	Khulna	Bagerhat	CL-512 Morolganj	22°27'06.7126 "N	89°51'36.50 98"E	Roof top of Private Building Near of Lunchghat.
235	SWMD	khulna	Khulna	CL-515 Paikgacha	22°35'06.0323 "N	89°19'05.45 44"E	Roof top of Paikgacha BWDB colony,Batikhal i
236	SWMD	Khulna	Bagerhat	CL-516 Rampal	22°33'21.1058 "N	89°39'11.98 49"E	Roof top of House of gauge reader, Rampal
237	SWMD	khulna	Satkhira	CL-505 Islamkati	22°43'01.7795 "N	89°11'43.37 13"E	Roof top of Hazrapara govt. primary school
238	SWMD	khulna	Satkhira	CL-506 Kaikhali	22°12'08.9285 "N	89°04'16.99 58"E	Roof top of kaikhali BGB camp, Satkhira
239	SWMD	khulna	Satkhira	CL-507 Kolaroa	22°53'10.5241 "N	89°01'28.66 90"E	Roof top of Kholshi govt. primary school, Kolaroa.
240	SWMD	khulna	Satkhira	CL-508 Kaliganj	22°27'34.1990 "N	89°01'41.11 95"E	Roof top of Kaligonj O & M office, Satkhira
241	SWMD	Barishal	Barishal	CL-252 Bakergonj	22°32'28.1132 "N	90°19'55.64 30"E	Roof top of Bakerganj WAPDA colony, Barishal.
242	SWMD	Barishal	Barishal	CL-254 BanariPara	22°47'08.9303 "N	90°09'45.31 71"E	Roof top of Upazila Office, Banari Para, Barishal
243	SWMD	Barishal	Bhola	CL-257 Burhanuddin	22°29'46.2082 "N	90°43'18.68 63"E	Roof top of Wapda Colony, Burhanuddin, Bhola
244	SWMD	Barishal	Barishal	CL-258 Barishal	22°40'54.7086 "N	90°21'35.54 52"E	Roof top of Wapda Colony, Barisal O&M Division, Barisal

245	SWMD	Barishal	Bhola	CL-260 Bhola	22°40'24.4355 "N	90°39'34.35 50"E	Roof top of Bhola 2nd Colony, BWDB, Bhola Sadar, Bhola
246	SWMD	Barishal	Bhola	CL-261 Daulatkhan	22°35'51.2035 "N	90°44'49.06 13"E	Roof top of Sanitary Office, DaulathKhanPo uroshova, Bhola
247	SWMD	Barishal	Barishal	CL-263 Gournadi	22°58'02.7880 "N	90°13'25.58 90"E	Roof top of Gauronodi O&M office colony Building, Gauronodi.
248	SWMD	Barishal	Jhalokati	CL-264 Jhalokati	22°38'41.5451 "N	90°12'22.42 50"E	Roof top of Sadar Hospital, Jhalokati.
249	SWMD	Barishal	Patuakhali	CL-255 Bauphal	22°25'19.6170 "N	90°32'32.09 23"E	Roof top of Private Building Near of Station, Bauphal.
250	SWMD	Barishal	Patuakhali	CL-262 Galachipa	22°10'08.8303 "N	90°24'28.44 05"E	Roof top of Galachipa BWDB colony, Galachipa
251	SWMD	Barishal	Patuakhali	CL-266 Patuakhali	22°21'35.8462 "N	90°19'29.47 99"E	Roof top of Patuakhali O&M divisional office, Patuakhali
252	SWMD	Barishal	Patuakhali	CL-269 Khepupara	21°59'05.1799 "N	90°13'15.83 96"E	Roof top of BWDB divisional office colony , Khepupara, Kolapara, Patuakhali
253	SWMD	Barishal	Borguna	CL-253 Bamna	22°18'53.2988 "N	90°05'48.56 94"E	Roof top of Bamna union porishod Building, Bamna
254	SWMD	Barishal	Pirojpur	CL-265 Mathbaria	22°17'00.8942 "N	89°57'35.16 76"E	Roof top of Mathbaria O&M subdivisional office, Mathbaria
255	SWMD	Barishal	Pirojpur	CL-267 Pirojpur	22°34'55.3097 "N	89°57'48.68 81"E	Roof top of Pirojpur O&M divisional

							office, Pirojpur.
256	SWMD	Barishal	Pirojpur	CL-271 Nazirpur	22°42'29.6193 "N	89°58'26.11 45"E	Roof top of Nazirpur TNO office
257	SWMD	Barishal	Borguna	CL-272 Patharghate	22°02'34.5359 "N	89°58'29.43 16"E	Roof top of Patharghata BWDB subdivisional office
258	SWMD	Satkhira	Shakra	Shakra/Satkhira (SW128)	22.1945	89.08	Roof top of Near of the Private Building (river East side)
259	NMD	Kurigram	Shaheber Alga	Shaheber alga/Kurigram (SW45.5) New	25.706	89.822	Roof top of Near of the Building (south/East side)
260	SWMD	Sylhet	Sarighat	Sarighat/sylhet (SW251)	25.0871	92.12	Roof top of Near of Building of (north/East side)
261	NEM D	Habibganj	Habid Gang	Habiganj/Habi ganj(SW159)	24.39	91.41	Roof top of Near of th Private Building (West side)
262	SEMD	Comilla	Comilla	Comilla/Como lla (SW 110)	23.4704	91.2	Roof top of near of the Private Building (west side)
263	NEM D	Netrokona	Durgapur	Durgapur/Netr okona (SW263)	24.6779	90.47	Roof top of Near of the Private Building north side)
264	NEM D	Sherpur	Nalcuagaon	Nalcuagaon/Sh erpur(SW34)	24.7366	90.43	Roof top of Near of the Private Building (river west side)
265	SWM D	Satkhira	Benarpota	Benarpota/Sat khira (SW24)	22.2567	89.1	Roof top of Khejur Near of Beside Private Building
266	NEM D	Tangail	Tangail	Serajganj/Tang ail (SW49)	24° 23'34.20"N	89° 48'12.00"E	Roof top of the Private Building (East

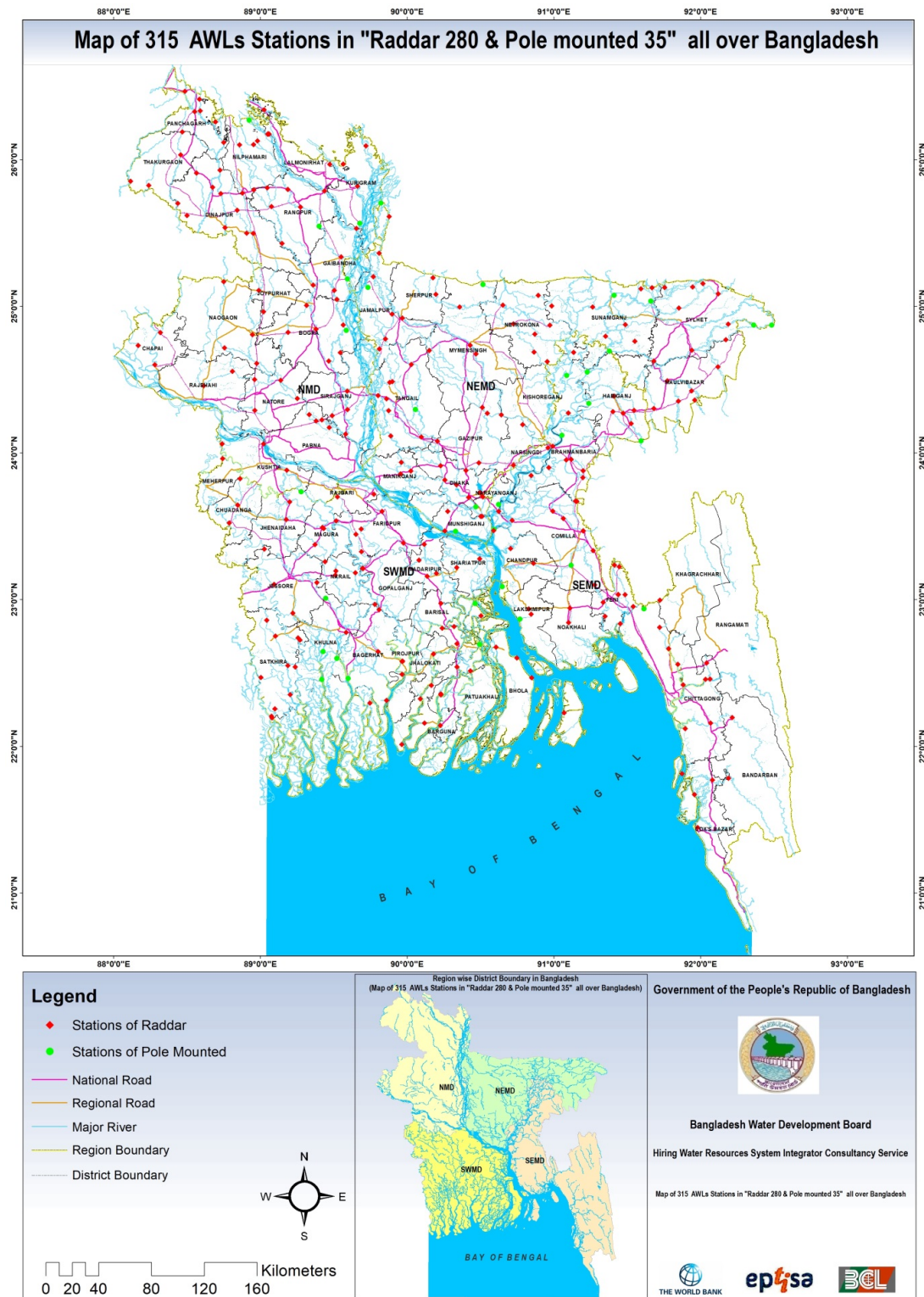
							side)
267	SWM D	Kustia	Kustia	Lalonsa/Kustia (SW90)	24° 3'48.64"N	89° 1'22.04"E	Roof top of the Private Building (erst side)
268	NEM D	Bhairab	Bhairab	Bhairab Bazar/Bhairab (SW230.1)	24° 2'50.23" N	90° 59' 36.20" E	Roof top of the Private Building west side)
269	NEM D	Hobiganj	Hobiganj	Bal lah/Hobiganj (SW157)	24° 5' 1.73" N	91° 35' 42.9" E	Roof top of the Private Building west side)
270	NEM D	Moulobi Bazar	Moulobi Bazar	Chatlaghat'Mo ulobi Bazar (SW201.5) New	91° 57' 39" N	24° 21' 46" E	Roof top of the Private Building south side)
271	NEM D	Sylhet	Sylhet	Zakiganj(SW 172.5) New	92° 21' 48.5" N	24° 52' 25.08" E	Roof top of the Beside Private Building
272	NEM D	Sunamganj	Sunamganj	Sunamganj(26 9)	91° 24' 41.4"N	25° 4' 35.71"E	Roof top of the Beside Private Building

### Proposed Locations AWG Stations

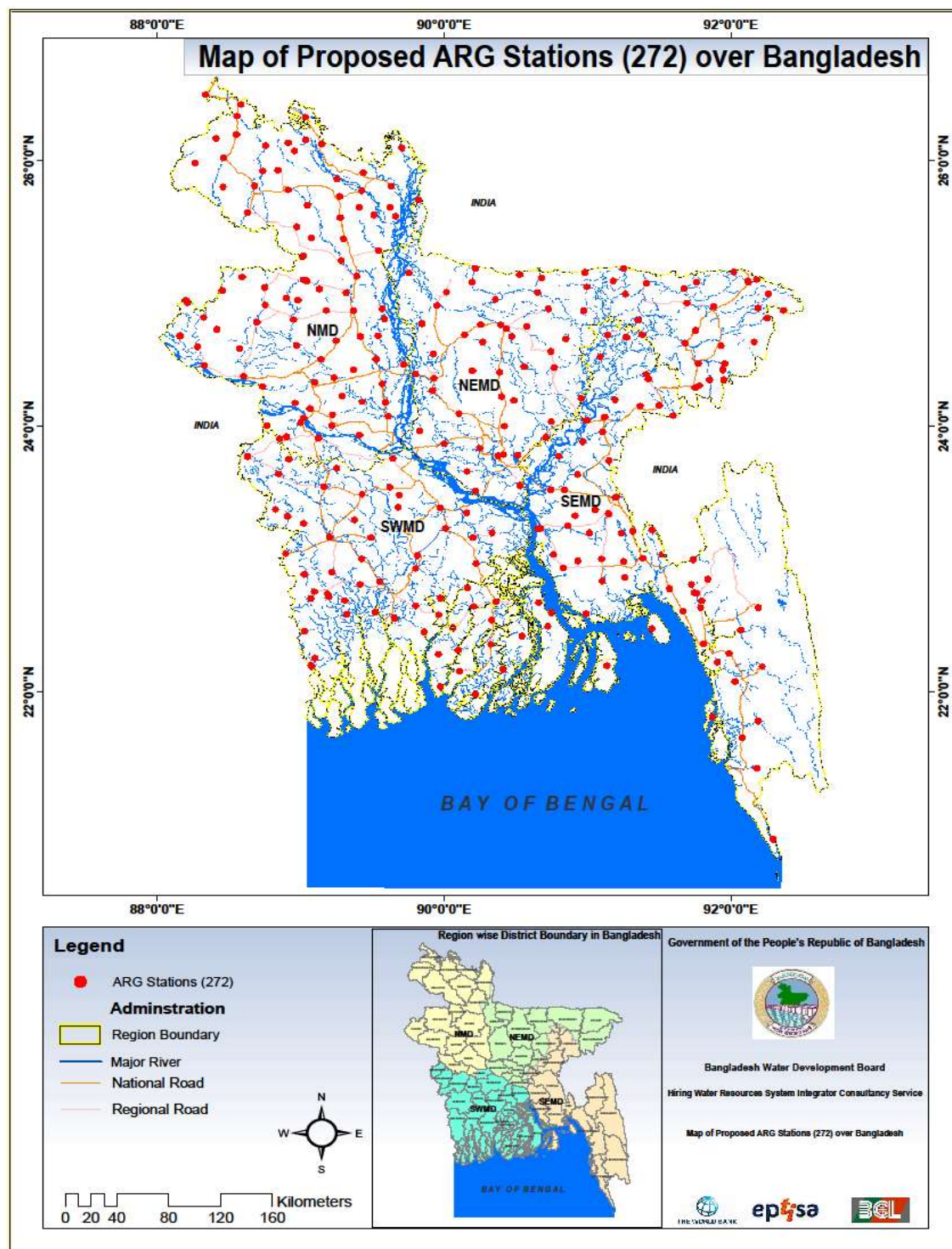
#### AWS

SI No	Measuring Div.	Location	Latitude	Longitude
1	NEMD	Banani	23°47'19.2261"N	90°24'44.4441"E
2	NEMD	Bhagyakul	23°30'45.5013"N	90°13'11.5023"E
3	NMD	Baradi	23°30'45.50"N	90°13'11.50"E

## Proposed locations of AWLG Stations



## Proposed locations of ARG Stations



## Annexure-B of SCC Clause 16.1

### SERVICE LEVEL CONDITIONS

1. The bidder is fully responsible to keep the system functional during installation, commissioning and warranty period. The bidder should take suo-moto action to repair any faulty instrument and should not wait for a complaint from purchaser to initiate action.

## 2. DEFINITIONS

### i. REMOTE SITE

Remote site is the site at remote location where hydro meteorological sensors for monitoring rain and surface water are installed.

### ii. INVALID DATA

A data would be considered **invalid** if

- The value recorded / transmitted is beyond permissible limit for that variable. The examples of invalid data are negative water level, etc. The valid permissible upper limits and lower limits for each monitoring variable for each site would be provided to bidder by the purchaser.
- If the sensor value recorded / transmitted is absurd values or sudden variation in the value (may be within the specified limits) which is not in-line with the actual physical parameter. (e.g. If the Water level sensor recorded / transmitted value is showing absurd sudden variation of 2mts (beyond the limits of rate of change of sensor value) with respective to the previous measurement interval, then this data is the invalid data).
- If the sensor value recorded / transmitted is having frequent / periodic gapes, then the data will be considered as invalid data.
- If the sensor value recorded / transmitted is remain constant, even if there is variation in the physical parameters. (e.g. If the Water level recorded / transmitted value is showing constant / fix value even there is variation in the water level, then this data is the invalid data)
- If the sensor value recorded / transmitted is not in line with the value of co-located automatic / manual observation of the same sensor parameter.

### iii. FAILED DATA TRANSMISSION

For each remote station, each scheduled transmission (for all variables including battery voltage) would consist of one data transmission. A data transmission would be considered failed if any of the following conditions are true

- There is no transmission of data from **remote site**
- Data is transmitted from **remote site** but not received at **data centre**.
- Data is recorded in datalogger but not transmitted.
- Data is not recorded by datalogger.
- Battery voltage and / or GPS status not transmitted.
- Only battery voltage is transmitted without any actual data from sensors.
- Data is transmitted but data values are **invalid**.

### iv. FAULTY STATION

A station would be considered faulty if:

- In case of daily transmission cycle, there are three or more than three failed daily data transmissions.
- In case Datalogger is not recording any of the sensor Data / Battery voltage OR recording the **invalid** data of any of the sensor / Battery voltage for three or more than three days.

### v. FAULTY DATA CENTRE

A Data Centre shall be treated as Faulty if

- Vital Hardware Equipment's installed by bidder at Data Centre Viz. Server, GSM modem, online UPS, GSM modem, Firewall system etc. are not functioning properly.
- Bidder has failed to pay the communication charges (SIM, internet, GSM/GPRS etc.) & system is not in function due to unpaid communication charges.
- Unauthorized absence of Bidders Operator/ Service engineer at Data Centre.

### vi. MAXIMUM RESPONSE TIME FOR REPAIR (MRTR)

- The MRTR for Remote station would be 72 hours.
- The MRTR for Data Centre would be 48 hours.

### vii. MINIMUM TIME BETWEEN REPAIRS PER STATION

- The minimum time between repairs is six months. If a station went faulty for reasons attributed to bidder and availed of MRTR once, it would not be eligible to avail the



free repair period within payment period (six months)

### 3. PAYMENT FOR DATA RECEPTION

- The payment would be released proportion to data received at the Data centre. A table below presents the percentage of data reception and corresponding payment

Percentage of data received	Payment to be made to vendor
95-100%	100% of (10% of contract price to be paid six monthly as per SCC clause no. 16.1 (ii))
90-94.99 %	90% of (10% of contract price to be paid six monthly as per SCC clause no. 16.1 (ii))
80-89.99 %	80 % of (10% of contract price to be paid six monthly as per SCC clause no. 16.1 (ii))
Below 80%	NIL of (10% of contract price to be paid six monthly as per SCC clause no. 16.1 (ii))

### 4. SERVICE LEVEL CONDITIONS FOR SOFTWARE

During the Warranty Period the bidder should comply with the specific service level (as explained below) conditions for the software (Telemetry, primary data validation, data reporting). the Warranty Support implies fixing bugs in the software that are introduced inadvertently or went unnoticed during testing. With the acceptance of the Functional Specifications/SRS (following the Requirement Study and Analysis phase) the scope of the software is formally frozen/baselined, in terms of functions and features. Post GO-LIVE of the software, if any non-conformities/bugs arise out of the frozen software scope, fixing those non-conformities/bugs only come under the purview of Warranty Support. Any enhancements or modifications in the functions and features of the software that fall outside the frozen software scope, do not come under the purview of Warranty Support.

No software can be made 100% bug free. The nature of bugs in software is asymptotic in nature, i.e., bugs can never be zero in software, but it can tend towards zero with quality development and support. Hence, Warranty Support for software is very important for maximizing requirements compliance for the software that has gone live in production.

The Warranty Support for software will go by the following conditions:

- Coverage period: 1 year from the date of GO-LIVE of the software
- Response time and problem-resolution performance standards to be adhered to by the bidder:

- i. Minor bugs and non-conformities which do not prevent the use of the system: within 1 month
- ii. Failure of an element of functionality within a component but which does not significantly impair its use: within 1 week.
- iii. Failure of a major component: within 1 hour
- iv. An error which effectively prevents further use of the system: immediate
- c. Mode of service: on-call/self-monitoring by bidder
- d. Penalty for delay during warranty and post-warranty. Penalty will be imposed for delay in services as detailed below:

#### Critical Level – 1

All the problems reported, diagnosed for the Proposed Information System shall be resolved and rectified as per the satisfaction of the designated authority to maintain 99.6% availability/uptime. If the bidder fails to maintain 99.6% availability/uptime of the Proposed Information System, penalty may be imposed on the bidder, as mentioned below.

#### Critical Level – 2

All the problems reported, as mentioned above as “Response time and problem-resolution performance standards” shall be resolved and rectified as per the satisfaction of designated authority. If the bidder fails to resolve, rectify problem within time, penalty may be imposed on the bidder, as mentioned below.

#### Penalty charges

- a. For critical level–1 items - For each occurrence, BDT 2000 per day subject to maximum of 45% in a year of total contract value
- b. For critical level-2 items - - For each occurrence, BDT 1000 per day subject to maximum of 25% in a year of total contract value
- c. For other items -- For each occurrence, BDT 500 per day subject to maximum of 10% in a year of total contract value

Apart from the above support, the bidder shall provide User Support through hotline, during the warranty period. Given below the details of user support through hotline:

- a. Coverage period: normal working hours
- b. Response time: answer in 3 minutes; if busy return call within 15 minutes

## **Annexure-C Draft of Annual Operational and Maintenance Effectiveness Agreement**

(to be signed upon written confirmation by the Purchaser of the Effectiveness of the Operational & Maintenance Services)

**ANNUAL OPERATION AND MAINTENANCE EFFECTIVENESS AGREEMENT FOR OPERATIONS, TROUBLE-SHOOTING & MAINTENANCE OF 280AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS STATIONS, TELEMETRY SYSTEMS & DATA CENTER**

**between**

**BANGLADESH WATER DEVELOPMENT BOARD**

**and**

**<to be inserted>**

**for**

**OPERATIONS, TROUBLE-SHOOTING & MAINTENANCE OF 280 AWLG (bridge mounted), 35 AWLG (Pole mounted Radar), 272 ARG and 03 AWS STATIONS & TELEMETRY SYSTEMS**

**<DAY><MONTH><YEAR>**

ANNUAL OPERATION & MAINTENANCE EFFECTIVENESS AGREEMENT FOR  
OPERATIONS, TROUBLE-SHOOTING & MAINTENANCE OF AUTOMATED 280  
AWLG (BRIDGE MOUNTED), 34AWLG (POLE MOUNTED RADAR), 272 ARG AND  
03 AWS STATIONS & TELEMETRY SYSTEMS

Agreement No. BWDB/SHEWS/G2/Annual Operation & Maintenance Services/ /2020-21

THIS AGREEMENT made

the [ *insert: number* ] day of [ *insert: month* ], [ *insert: year* ].

BETWEEN

- (1) Bangladesh Water Development Board represented by Project Director, Bangladesh Weather and Climate Services Regional Project (BWCSR); Component-B: Strengthening Hydrological Services and Early Warning Systems (SHEWS) (hereinafter called “the Purchaser”), of the one part, and
- (2) [ *insert name of Supplier* ], a corporation incorporated under the laws of [ *insert: country of Supplier* ] and having its principal place of business at [ *insert: address of Supplier* ] (hereinafter called “the Supplier”), of the other part:

WHEREAS the Purchaser invited bids for certain services, viz., operation, trouble-shooting & maintenance of 280 AWLG (bridge mounted), 34AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations & telemetry systems has accepted a Bid by the Supplier for the supply of those and Services

The Purchaser and the Supplier reach an agreement (hereinafter called “Service Level Agreement”), as follows:

**1. Effectiveness of the Agreement** This agreement shall become effective-

- (i) Once the purchaser has issued a letter of commencement of the services to be rendered by supplier mentioning availability of fund, purchaser’s satisfaction on services rendered & necessity of the supplier’s further services; AND
- (ii) The Supplier has submitted a performance Security as stated in clause no.15 (fifteen) of this agreement.

**2. Purpose of the agreement** The purpose of this annual operation & maintenance effectiveness agreement is to formalize an arrangement between Bangladesh Water Development Board (hereinafter, the *Purchaser*) and <NAME OF SUPPLIER> (hereinafter, the *Supplier*) to deliver operations, trouble-shooting & maintenance of 280 AWLG (bridge mounted), 34 AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations and telemetry systems at specific levels of support, and at an agreed-upon cost.

**3. Core activity** To keep the systems (Operations, Trouble-Shooting and Maintenance

**under the agreement**

280AWLG (bridge mounted), 35AWLG (Pole mounted Radar), 272 ARG and 03 AWS stations & telemetry systems) 100% functional during 03 (three) years after completion of 01 (one) year mandatory warranty period. The Supplier should take sue-moto action to repair any faulty instrument and should not wait for a complaint from purchaser to initiate action.

**4. Definition**

- viii. **REMOTE SITE-** Remote site is the site at remote location where hydrological sensors for monitoring groundwater are installed.
- ix. **DATA CENTRE-**Data center is the respective server where data is expected to be received. In case of GSM & GPRS based telemetry, the data center is the server installed in BWDB data center for receiving GSM & GPRS transmission.
- x. **INVALID DATA-**A data would be considered **invalid** if
  - The value recorded / transmitted is beyond permissible limit for that variable. The examples of invalid data are negative water level, etc. The valid permissible upper limits and lower limits for each monitoring variable for each site would be provided to Supplier by the purchaser.
  - If the sensor value recorded / transmitted is absurd values or sudden variation in the value (may be within the specified limits) which is not in-line with the actual physical parameter. (e.g. If the Water level sensor recorded / transmitted value is showing absurd sudden variation of 2mts (beyond the limits of rate of change of sensor value) with respective to the previous measurement interval, then this data is the invalid data).
  - If the sensor value recorded / transmitted is having frequent / periodic gapes, then the data will be considered as invalid data.
  - If the sensor value recorded / transmitted is remain constant, even if there is variation in the physical parameters. (e.g. If the Water level recorded / transmitted value is showing constant / fix value even there is variation in the water level, then this data is the invalid data)
  - If the sensor value recorded / transmitted is not in line with the value of co-located automatic / manual observation of the same sensor parameter.
- xi. **FAILED DATA TRANSMISSION** -For each remote station, each scheduled transmission (for all variables including battery voltage) would consist of one data transmission. A data transmission would be considered failed if any of the following conditions are true

- There is no transmission of data from **remote site**
  - Data is transmitted from **remote site** but not received at **data centre**.
  - Data is recorded in data logger but not transmitted.
  - Data is not recorded by data logger.
  - Battery voltage and / or GPS status not transmitted.
  - Only battery voltage is transmitted without any actual data from sensors.
  - Data is transmitted but data values are **invalid**.
- xii. **FAULTY STATION** -A station would be considered faulty if:
- In case of daily transmission cycle, there are three or more than three failed daily data transmissions.
  - In case Data logger is not recording any of the sensor Data / Battery voltage OR recording the **invalid** data of any of the sensor / Battery voltage for three or more than three days.
- xiii. **FAULTY DATA CENTRE**- A Data Centre shall be treated as Faulty if
- Vital Hardware Equipment's installed by Supplier at Data Centre Viz. Server, GSM modem, online UPS, GSM modem, Firewall system etc. are not functioning properly.
  - Supplier has failed to pay the communication charges (SIM, internet, GSM/GPRS etc.) & system is not in function due to unpaid communication charges.
  - Unauthorized absence of Suppliers Operator/ Service engineer at Data Centre.
- xiv. **MAXIMUM RESPONSE TIME FOR REPAIR (MRTR)**-
- The MRTR for Remote station would be 72 hours.
  - The MRTR for Data Centre would be 48 hours.
- xv. **MINIMUM TIME BETWEEN REPAIRS PER STATION**--The minimum time between repairs is six months. If a station went faulty for reasons attributed to Supplier and availed of MRTR once, it would not be eligible to avail the free repair period within payment period (six months).

## 5. Corrupt and Fraudulent Practices

The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in **Appendix-1**.

## 6. Services and Requests

The following services shall be provided by the Supplier to the Purchaser in accordance with a Request for Bids for the Bangladesh Weather and Climate

**Covered Under this Agreement** Services Regional Project (BWCSRP): Component-B Strengthening Hydrological Information Services and Early Warning Systems (SHEWS).

1. Operation, Trouble-Shooting And Maintenance of 280 AWLG (Bridge mounted), 34 (Pole mounted Radar), 272 ARG and 03 AWS hydrological monitoring stations, telemetry systems & equipment of data center.

## **7. Scope of Services**

The scope of Services includes the following activities.

1. Undertake services of Operations, Maintenance & keep automated 280 AWLG (Bridge mounted), 34 (Pole mounted Radar), 272 ARG and 03 AWS stations 100 % functional.
2. Provide hydrological technicians for operation, maintenance and keep the automated 280 AWLG (Bridge mounted), 34 (Pole mounted Radar), 272 ARG and 03 AWS stations 100 % functional.
3. Replace spare parts as and when required.
4. Develop reports and products as directed by the **Purchaser**
5. Provide staff at data center to operate newly acquired data center computer systems.
6. Provide documentation.

## **8. Scheduled Maintenance visits**

The supplier shall make sure that preventive maintenance is carried out at all stations for at least twice a year, during maintenance visit, the Supplier's personnel should follow standard maintenance procedures, the procedures to be developed and submitted by the Supplier. During these maintenance visits, the representative should make sure that:

- Desiccant is replaced
- The battery is in proper operating condition, and free from leads/corrosion
- All the sensors and devices are working
- Confirmation of Hydromet level (note changes in field maintenance software and monthly report)
- All wires are tight with no loose connection
- Any damage to equipment by environment, animal or human factors
- The site is clean free from any kind of grass and debris.

The Supplier's representative shall take time stamped geo-tagged photographs during each such maintenance visits for each site. The pictures should clearly show 1) Status before maintenance, 2) status during maintenance and 3) status after maintenance. All these three photographs along with maintenance report should be submitted to purchaser.

## **9. Notice**

The purchaser shall not be obliged to give any notice to the supplier regarding any non-functional station. The Supplier shall pro-actively detect any such fault and act through service engineer provided under this contract to correct the problem. The failure of the supplier to make the equipment

fully functional within 72 hours of such fault would attract a penalty of BDT 2000 per station per day. The amount of penalty would be recovered from the bank guarantee or from pending payments.

#### 10. Penalty

The failure of the supplier to make the equipment fully functional within 72 hours of any fault (as per definition) would attract a penalty of BDT 2000 per station per day. The amount of penalty would be recovered from the bank guarantee or from pending payments.

#### 11. Settlement of Dispute

(i) The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

(ii) If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the services under the Contract. Arbitration proceedings shall be conducted in accordance with the following rules of procedure.

**(a) Contract with foreign Supplier:** Any dispute, controversy or claim arising out of or relating to this Contract, or breach, termination or invalidity thereof, shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules as at present in force.

**(b) Contracts with Supplier national of the Purchaser's country:** In the case of a dispute between the Purchaser and a Supplier who is a national of the Purchaser's country, the dispute shall be referred to adjudication or arbitration in accordance with the laws of the Purchaser's country.

(iii) Notwithstanding any reference to arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) the Purchaser shall pay the Supplier any monies due the Supplier.

#### 12. Nature of Agreement in terms of Price

**It is a total price contract for Operation, Trouble-shooting and Maintenance (Annual Operation & Maintenance Effectiveness Agreement) for a period of 03 (three) years.** The prices charged for the Goods supplied and the related Services performed **shall not** be adjustable.

#### 13. Agreement

**Total Agreement price is –**



**Price** **Bangladesh Taka-**  
**Foreign currency-**

**14. Payment Mode** **Annual Operation & Maintenance Effectiveness Agreement price inclusive of AIT & VAT payable on it shall be paid in 06 (six) installments on half yearly basis within 30 (thirty) days upon submission of claim supported by agreed documents.**

**15. Payment Condition** The payment would be released proportion to data received at the Data centre. A table below presents the percentage of data reception and corresponding payment

<b>Percentage of data received</b>	<b>Payment to be made to vendor</b>
95-100%	100% of (16.66% of contract price to be paid six monthly.
90-94.99 %	90% of (16.66% of contract price to be paid six monthly.
80-89.99 %	80 % of (16.66% of contract price to be paid six monthly.
70-79.99 %	70 % of (16.66% of contract price to be paid six monthly.
Below 70%	NIL of (16.66% of contract price to be paid six monthly.

**16. Performance Security**

- (i) A Performance Security shall be required ( within 21 days of receiving the letter of Commencement for rendering services issued by the Purchaser).
- (ii) The amount of the Performance Security shall be: 10% of the price for Annual Operation & Maintenance Effectiveness Agreement valid up to 28 days after the date of completion of performance obligations.
- (iii) The Performance Security shall be in the form of: Bank Guaranty.
- (iv) The Performance security shall be denominated in the currencies of payment of the Contract, in accordance with their portions of the Contract Price. If the bank guarantee issued by a commercial bank located outside the Purchaser's country, the bank guarantee shall be endorsed by a local commercial bank of the Purchaser's country.
- (v) The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the contract.

**17 Supplier's** The following limitation of the Supplier's Liability towards the Purchaser:

**Liability****“Limitation of the Supplier’s Liability towards the Purchase:**

**(a)** Except in the case of gross negligence or willful misconduct on the part of the Supplier or on the part of any person or a firm acting on behalf of the Supplier in carrying out the Services, the Supplier, with respect to damage caused by the Supplier to the Purchaser’s property, shall not be liable to the Client:

(i) for any indirect or consequential loss or damage;

**(b)** This limitation of liability shall not

(i) affect the Supplier’s liability, if any, for damage to Third Parties caused by the Supplier or any person or firm acting on behalf of the Suppliers in carrying out the Services;

(ii) be construed as providing the Suppliers with any limitation or exclusion from liability which is prohibited by the **Applicable Law**.

**18. Insurance****The insurance coverage against the risks shall be as follows:**

**(a)** Professional liability insurance, with a minimum coverage of 110% of the total annual operation & maintenance effectiveness agreement ceiling.

**19. Reporting obligation of the Supplier**

The monthly reports will include the summary of the entire Hydromet network. The report will include:

**1. Station summary of the following:**

- a. Number of days reporting for the previous month.
- b. The number of days missing for the previous month.
- c. The number of penalty days for the previous month.
- d. Notes on exceptional activities, such as equipment theft/damage.
- e. Hydromet level maximum.
- f. Hydromet level minimum.

**2. Summary of field maintenance activities including:**

- a. The number of station visits for preventative maintenance for the previous month.
- b. The number of station visits for emergency maintenance for the previous months including problem and action taken.
- c. Other technician activity, such as the number of days worked, vacation, sick, etc.

**3. Data Center Summary of the following:**

- a. Server downtime and reason for downtime
- b. Software/hardware upgrades
- c. Daily maintenance activity log

This report will be provided to the purchaser no later than the 7<sup>th</sup> day of the

month for the previous month.

The supplier provided technicians/IT personnel will be responsible for using the time series database to perform quality control and establish a “data for record” database. Data will be processed and stored no later than two months after the data is received at the server.

**20.  
Documentation**

The **Supplier** will provide complete written documentation, including data sheets and operating manuals of the data logger, sensor and ancillary equipment, such as solar panels, batteries and solar regulators. This will be bound in binder(s) with 5 copies of this written material provided to the **Purchaser**.

The documentation will also be provided in electronic form on USB drives supplied by the **Supplier**. The **Supplier** will prepare 5 such USB drives with all required documentation on each of the 5 USB drives.

**21.  
Responsibility  
of Purchaser  
under the  
Agreement**

1. The Purchaser is responsible for taking permissions for land to be used to install the stations. The space required is free from obstacles.
2. The purchaser is responsible for food, per-diem and incidental charges for purchaser’s personnel during field visits for installation / maintenance / troubleshooting.
3. The purchaser will provide list and location details of 280 AWLG (Bridge mounted), 34 (Pole mounted Radar), 272 ARG and 03 AWS stations.
4. The purchaser will provide training venue with related facilities (projector, white board etc.)

**22.  
Responsibility  
of Supplier  
under the  
Agreement**

1. The Supplier will be responsible for obtaining all tools and equipment necessary to complete Maintenance & kept the hydrometnetwork 100 % functional.
2. The Supplier will be responsible in acquiring vehicles for field use and paying all expenses related to these vehicles. It is recommended that the vehicles be 4x4 trucks.
3. The Supplier will be responsible for arranging the vehicle for transport during maintenance and troubleshooting visits to remote sites, which includes Supplier’s personnel and accompanying purchaser’s representatives.
4. The Supplier is responsible for obtaining office devices and supplies for their use, such as computer printers, paper stock, pens, etc.
5. The Supplier will be responsible for acquiring computers for field use,

and prepare reports, etc.

6. The Supplier will be responsible for acquiring internet connectivity at the field offices for their own staff (technicians).
7. The Supplier is responsible for paying all the GSM mobile charges for SIM cards and data at remote sites.
8. The Supplier is responsible for paying all the data and telemetry charges, subscriptions for satellite telemetry at remote sites and BDWD headquarters.
9. The Supplier is responsible for paying all the salaries, per-diem, travel and all incidental charges for their personnel deployed at BDWD headquarters and field offices.
10. The Supplier is responsible for paying all transport and shipping, packing / unpacking, installation / un-installation charges for replacement / repair of defective equipment.
11. The Supplier is responsible for paying all replacement spare parts, batteries, etc. whenever required.
12. The Supplier is responsible for all training related costs.
13. Submit Geo-tagged time stamped photographs during maintenance visits

### **23. Inspection and Audit by the Bank**

- 23.1 The Supplier shall keep, and shall make all reasonable efforts to cause its Subcontractors to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs.
- 23.2 The Supplier shall permit, and shall cause its Sub-contractors to permit, the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and all accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Supplier's and its Subcontractors and consultants' attention is drawn to Clause 3 [Fraud and Corruption], which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Sub-Clause 11.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)

### **24. General Terms**

- i. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them.

- ii. In consideration of the payments to be made by the Purchaser to the Supplier as specified in this Agreement, the Supplier hereby covenants with the Purchaser to provide the Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
- iii. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Bangladesh on the day, month and year indicated above.

**For the Purchaser:**

**For the Supplier:**

In the presence of

1.

3.

2.

4.

## Appendix -1

### Bank's Policy- Corrupt and Fraudulent Practices

*(text in this Appendix shall not be modified)*

**Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:**

**“Fraud and Corruption:**

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>17</sup> In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
  - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>18</sup>;
  - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>19</sup>
  - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>20</sup>

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<sup>17</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>18</sup> For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>19</sup> For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

<sup>20</sup> For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not

- (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>21</sup>
- (v) "obstructive practice" is:
  - (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
  - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank’s sanctions procedures,<sup>22</sup> including by publicly declaring such firm or

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participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

<sup>21</sup> For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

<sup>22</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank’s sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of

- individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>23</sup>;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

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temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

<sup>23</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.