



भारत सरकार Government of India  
विद्युत मंत्रालय Ministry of Power  
उत्तर पूर्वी क्षेत्रीय विद्युत समिति  
North Eastern Regional Power Committee  
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय  
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

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## **BID DOCUMENTS**

### **(SINGLE STAGE-TWO ENVELOPE BIDDING)**

#### **Through E-Procurement**

Name of the Package:

### **Request for Proposal for “Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”**

**Last Date of Receipt of Bids: 30th August ,2018, upto15:00hrs**

**Date of pre-bid conference: 16th August 2018 at 11.00 hrs**

**Date of Opening of Technical Bid: 31st August, 2018 at11:00 hrs**

**Date of Opening of Financial Bid: 14th September, 2018 at 11:00 hrs**

**[www.nerpc.nic.in](http://www.nerpc.nic.in)**



भारत सरकार Government of India

विद्युत मंत्रालय Ministry of Power

उत्तर पूर्वी क्षेत्रीय विद्युत समिति

North Eastern Regional Power Committee

एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय

NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

No- NERPC/SE/PDMS/2018/2345

Dated: 31st July, 2018

**Notice Inviting Tender (NIT) for “Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”**

Sealed quotations/ offers are invited on behalf of NERPC Constituents from eligible and reputed agency for providing services for implementation of “**Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region**” under Single Stage-two packet/envelope system.

NERPC Secretariat on behalf of all the constituents of North Eastern Region requires the services of eligible, qualified Firms/agencies for Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region (Creation and maintenance of Web-based Protection Database and Desktop-based Protection Setting Calculation tool for North Eastern Regional Grid).

The work shall broadly include the following deliverables which are detailed subsequently:

- Database building for Protection Setting calculation Tool
- Protection Setting Calculation Tool/engine.
- Web Based Protection Database Management System
- Hardware setup and software package

The validity of the offer should be at least 120 days from the date of opening of this tender. The technical bid and Price bids shall be enclosed in separate sealed envelopes marked with Tender Reference, Tender Id “Technical/Price bid” as applicable and Tender Name. EMD shall be provided in the Technical bid envelope.

Technical bid envelope and price bid envelope should be enclosed in a separate sealed envelope superscripted **Tender Name, Date and Time of opening.**

Sealed tenders must reach North Eastern Regional Power Committee (NERPC) not later than **30th August, 2018 up to 15:00 hrs** at the following address:

**Member Secretary,  
North Eastern Regional Power Committee,  
Dong Parmaw Lapalang,  
Shillong, Meghalaya-793006**

**TENDER SCHEDULE:**

Tender Name	<b>Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region.</b>
Tender Reference Tender Id	<b>NERPC/SE/PDMS/2018/2345 Dated: 31.07.2018 01/2018</b>
Type of Tender	<b>Single Stage-Two Packet/Envelope System with the principles of Quality and Cost Based Selection process will be followed for selection of 'Preferred Bidder'</b>
Last Date and Time for receipt of sealed tender offers	<b>30th August, 2018 (15:00 Hrs.)</b> (In case this date is declared a public holiday then the next working day shall be the last date)
Time and Date of Opening of sealed technical bids	<b>31st August, 2018 (11:00 Hrs)</b> (In case this date is declared a public holiday then the next working day shall be the tender opening date)
Time and Date of Opening of sealed financial bids	<b>14th September, 2018 (11:00 Hrs)</b>
Place of Opening tender offers	<b>NERPC, Shillong</b>
Address of Communication	<b>Member Secretary, North Eastern Regional Power Committee, Lower Nongrah, Dong Parmaw, Lapalang Shillong-793006 Email: <a href="mailto:ms-nerpc@gov.in">ms-nerpc@gov.in</a> Email: <a href="mailto:brieflee.lyngkhoi@gov.in">brieflee.lyngkhoi@gov.in</a></b>
Contact/ Telephone Numbers Website	<b>Phone: 0364-2534101, 2534039 <a href="http://www.nerpc.nic.in">http://www.nerpc.nic.in</a></b>
Earnest Money Deposit (EMD)	<b>Rs. 50,00,000/- (Rupees 50 Lakhs) payable as A/c payee Demand draft/Bank Guarantee on any scheduled commercial Indian bank "In favour of Member Secretary, NERPC".</b>
Tender Submission mode	<b>Manual/post or by courier at NERPC, Dong Parmaw, Lapalang Shillong-793006</b>

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## SECTION A: DEFINITIONS AND ABBREVIATIONS

The following words and expressions shall have the meanings hereby assigned to them:

- (a) "Act" shall mean the Electricity Act 2003 unless otherwise specified.
- (b) "Agency" shall mean the bidder
- (c) "Applicable Law" means the laws and any other instruments having the force of law in India, as they may be issued and in force from time to time;
- (d) "Bank" or "Banks", refers to all scheduled Indian Banks as per the RBI
- (e) "Buyer" means the Purchaser calling for BID.
- (f) QCBS:- principles of **Quality and Cost Based Selection** process will be followed for selection of 'Preferred Bidder'
- (g) "Contract" means the Agreement entered into between the Purchaser and the Agency, together with the Contract Documents referred to therein, including all attachments, appendices, annexure and all documents incorporated by reference therein.
- (h) "Contract Documents" shall mean the following documents listed, including any amendments thereto be read and construed as part of this Agreement, viz.:
  1. All provisions of Tender vide Reference No: **NERPC/SE/PDMS/2018/2345 dated 31st July 2018**, Tender ID-**01/2018** Tender Name: **Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region** including all Annexure(s)/Appendices;
  2. Vendor's response (proposal) to the NIT, including the Bid Submission Sheet and the Price Schedules submitted by the Supplier;
  3. The Purchaser's Notification to the Supplier for Letter of Intent;
  4. Acceptance of purchaser's notification
  5. The Purchaser's Notification to the Supplier for Letter of Award;
- (i) "Contract Price" means the price payable to the Supplier as specified in the Agreement, subject to such adjustments thereto, as may be made pursuant to the Contract.
- (j) "Day" means calendar day.
- (k) "Delivery" means the transfer of the Goods and/or Services from the Supplier to the Purchaser in accordance with the terms and conditions set forth in the Contract.
- (l) "Completion" shall mean the completion of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.
- (m) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause 8 of GCC;
- (n) "NERPC" Shall mean North Eastern Regional Power Committee with responsibilities and functions as provided in the Act.
- (o) "GCC" mean the General Conditions of Contract.

- (p) "Goods" means all hardware, software, networking equipment and/or other equipment accessories and materials that the Supplier is required to supply to the Purchaser under the Contract.
- (q) "Go Live" means the date from which the project is implemented with all functionality as envisaged in the scope of work. Thereafter, support period shall begin.
- (r) "Government" means the Government of India or any state government of India unless the context implies otherwise.
- (s) "Intellectual Property Rights" means any patent, copyright, trademark, trade name, service marks, brands, propriety information, whether arising before or after the execution of this Contract and the right to ownership and registration of these rights
- (t) "Party" means the Purchaser or the Agency, as the case may be;
- (u) "PDMS" means Protection Database Management System
- (v) "Personnel" means persons hired by the Agency as employees and assigned to the performance of the Services or any part thereof; "Foreign Personnel" means such persons who at the time of being so hired had their domicile outside the Government's country; and "Local Personnel" means such persons who at the time of being so hired had their domicile inside the Government's country;
- (w) "Project" means all Activities covered under present contract
- (x) "PSCT" means Protection Setting Calculation Tools
- (y) "Purchaser's Country" shall mean India.
- (z) "Purchaser" means the NERPC. It has been used to mean Owner or Purchaser in this document.
- (aa) "Related Services" means the services to be provided as per the requirements / conditions specified in the Contract. In addition to this, the definition would also include other related/ancillary services that may be required to execute this Contract.
- (bb) "RPC" shall mean Regional Power Committee
- (cc) "Starting Date" means the date referred to in Clause 8 of GCC;
- (dd) "Services" means the work to be performed by the Agency pursuant to this Contract for the purposes of the Project, as described in the Scope of Work hereto;
- (ee) "Subcontractor" means any natural person, private or government entity, or a combination of the above, including its legal successors or permitted assigns, to whom any part of the Goods to be supplied or execution of any part of the Services is subcontracted by the Supplier.
- (ff) "Supplier" means the natural 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 Agreement, and includes the legal successors or permitted assigns of the Supplier. Supplier has been used to mean Agency in this document.
- (gg) "Task Force" shall mean 'Task Force on Power System Analysis under Contingencies' constituted by MoP in December, 2012.
- (hh) "The MoP" is the Ministry of Power, Government of India.
- (ii) "The Site," shall mean all identified locations within the NERPC jurisdiction, where the Supplier carries out any installation of Goods or is required to provide any Services.

- (jj) "Third Party" means any person or entity other than the Government, the Purchaser, the Agency or any other party as implied by the usage and context
- (kk) "OEM" means the Original Equipment Manufacturer of any equipment / system / software / product.
- (ll) "Owner" means the "Purchaser" calling for BID
- (mm) "Reliability Standards" means the Reliability Standards for Protection System devised by NRCE as and when they come into force.
- (nn) "in writing" means communicated in written form with proof of receipt

## **SECTION B: INTRODUCTION**

### **B.1 Synopsis**

NERPC Secretariat on behalf of all the constituents of North Eastern Region requires the services of eligible, qualified Firms/agencies for Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region (Creation and maintenance of Web-based Protection Database and Desktop-based Protection Setting Calculation tool for North Eastern Regional Grid). The detailed scope of the project is at Section-E.

The work shall broadly include the following deliverables which are detailed subsequently:

- Database building for Protection Setting calculation Tool
- Protection Setting Calculation Tool/engine.
- Web Based Protection Database Management System
- Hardware setup and software package capable of meeting the following objectives; but not limited to:
  - Classified database structure and data of all bay equipment and the protection system details of all bays 132kV and above for North Eastern Regional power system.
  - Classified database structure for bays and data of all bay equipment and the protection system details of all bays at 33kV (excluding Assam) where data can be updated by Users through Web Based application.
  - Deployment of simulation engines power flow, fault calculation, transient stability studies, electromagnetic transient analysis; protection relay operation post-mortem analysis tools.
  - A user friendly interface for browsing and editing the contents of the database
  - Tool for simulating the performance/ behaviour of the protection system under all possible normal and abnormal operating conditions of the power system, including effect of changing one or more parameter setting of the relays for all the Bay equipment data in the database.



- Diagnostics Tool for verifying proper coordination among various protective relay
- Generation of useful reports

➤ Five-Year Support Period.

## **B.2 Need for Implementation**

North Eastern Regional Grid comprises the electrical system of the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.

System security is a critical element of power system operations and management. Having an updated information system including an up to date web based protection database and the ability to run various relevant studies on it, is necessary to ensure that the protective relays will function correctly with proper discrimination to provide the requisite reliable, sensitive and selective isolation of faulty power system equipment.

The ‘Task Force on Power System Analysis under Contingencies’ constituted in December 2012 on the backdrop of the 30-31.07.2012 blackouts strongly recommended creation & maintenance of protection data base under RPCs.

In various Protection Co-ordination Sub- Committee (PCC) meetings of NERPC, it was also felt that a protection data base for transmission system of North Eastern Region is urgently needed. This tender is being called to implement the protection database system in NERPC.

## **B.3 Objectives**

1. To collect the protection data from field from all 132 kV & above Substations (except for Assam) 66kV/33kV to be provided by utilities and build the centralized web-based Protection database of the North Eastern Region Power system and continuously update the same.
2. To provide provision in the database to update details for all Substations by Users through Web Based application.
3. To create facility to store all types of relay settings in one system irrespective of the manufacturer, the data archiving should comply relevant cyber security norms and privacy standard.
4. To capture the life cycle of protection settings(modification of settings etc) and template for each relay used in the system along with chronological records of changes/revision in settings during the scope period of the contract
5. To model the Network for 33 kV and above (in case of Assam 132kV and above) system based on the data collected from the field with generation(complete generating station) and load at 132kV & above (33kV data to be provided by utilities)to be used in Protection Setting Calculation Tool with the exception where the generator is connected to the lower voltage network, it will also be considered so that coordination between power plant and transmission system protections may be tested / verified.

6. To create an interface with Protection Setting Calculation Tool and protection database thus compute the various relay settings for each relay modelled.
7. Perform analysis of the faults/disturbances simulated in the network of Protection Setting Calculation Tool based on the protection database relay settings. Analysis report in prescribed format will be forwarded within specific time to owner of the system & employer
8. Establishing the web based system for protection relay setting database which can be imported to the Network in the Protection Setting Calculation Tool.
9. Provision for Web based sharing of Network case among the users.
10. To create a system where there is a provision of hierarchical Role based access control and has reporting procedures for relay settings.
11. All works will be done, recorded during period of contract, in an approved format. The format will be proposed by executing agency incorporating all technical requirements/specification for approval of purchaser within one month of award of contract. It would be sole responsibility of executing agency to full-fill the requirements of technical specification for full-fledged completion and meeting the intended purpose as indicated in this bidding document

### **SECTION C: INSTRUCTIONS TO BIDDERS**

1. The Address for all communication with the purchaser shall be Member Secretary, NERPC, Shillong.

2. Important Dates:

1	Pre-Bid Conference	16th August, 2018 at 11:00 hrs.
2	Answers to Pre Bid queries	17th August, 2018 till 17:30 hrs.
3	Last date and time for receipt of proposal	30th August, 2018 till 15:00 hrs
4	Date and Time of opening of Technical proposal	31st August, 2018 at 11:00 hrs
5	Earnest Money Deposit	Rs. 50,00,000 /- (Rupees Fifty Lakhs only) as A/c payee Demand draft/Bank Guarantee on any scheduled commercial Indian bank In favour of "Member Secretary NERPC".

3. Single Stage – Two Envelope Procedure: Bidders should submit two sealed envelopes simultaneously, one containing the Technical Proposal and the other the Price Proposal, enclosed together in an outer single envelope. The envelopes should be superscripted with Tender Name, Tender Id, Tender Reference, Technical bid/Price bid as applicable and date and time of opening of tender.

4. Bidder has to demonstrate the web based system for protection relay setting database and

Protection Setting Calculation Tool to the Technical evaluation committee on a date informed by NERPC. The demo will be done before opening of price bid. Bidders who have successfully demonstrated demo to technical committee will be entitled for price bid opening. All pre-requisite for demo will be arranged by bidder.

Constituents: Constituents for this tender shall mean the electricity utilities of the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland & Tripura and PGCIL, NTPC Ltd, OTPC, NHPC, NEEPCO and Independent Power Producers (IPP's) of North Eastern Regional Power System and NERLDC and NERPC.

5. Project completion time: scheduled implementation of all functionality as per the scope of works shall be 18 months from date of award. Thereafter there shall be a support period of 5 years from the date of Go Live. In case services are required beyond support period the same shall be with mutual agreement between buyer and agency.
6. Exchange Rate: For any financial figure in other than Indian rupees the exchange rate as on the date of transaction shall be considered for conversion to Indian rupee value.
7. Milestones for the project shall be as under (all from date of award):
  - a. Delivery of 31 No base license of protection calculation engine along with Laptop computers: 1 month

Note: All necessary support softwares/report generation software/windows/office, for office use(no home version) ,antivirus as required will also be supplied along with carry case as applicable.

- b. Delivery of web based database management system: last 2 months
  - c. Delivery of required hardware-servers: 3 months
  - d. Building the existing North Eastern Region network data for conducting as on date load flow and fault calculation: 4 months
  - e. Completion of Training program on the protection setting calculation software: 4 Months
  - f. Site Acceptance Test(SAT) with one pilot system: 6 months
  - g. Building the entire North Eastern Region network data identified substations Protection database and substation-wise SLD preparation: 16 months
  - h. Go live with all NERPC constituents data: 18 months
  - i. Continuation of technical support services up to 5 years from Go Live.
8. Cancellation of contract: The period of contract is subject to cancellation of appointment due to any of the reasons mentioned hereunder.
  - If the Agency is found to have submitted false particulars / fake documents for securing empanelment as Agency or for the award of assignment.
  - The Agency's performance on the job will be constantly monitored for quality, commitment to delivery period mentioned in contract with the Purchaser, adherence to the guidelines, Statutory regulations, Conduct / Discipline etc., while executing jobs. Any deviations from stated conditions can lead to appropriate deterrent action as deemed fit by Purchaser.
  - If the Agency refuses to execute the job at his agreed scope/quoted rates, after the

purchaser issues the letter of intent (LoI)

- Manipulation of rates by cartelization shall be viewed very seriously by the Purchaser. If such a situation comes to the notice of the Purchaser and/or there are reasons / circumstances for the Purchaser to believe so, the concerned Agency will be called in to give justification of proposal/rates quoted by them. If they are not able to give a proper or satisfactory justification of their quoted proposal/rates, their bids is liable to be cancelled.
- Any other reason deemed fit by the competent authority/purchaser for cancellation
- Such Agency's, whose appointment is cancelled due to any of the above reasons, will not be considered for subsequent assignments for a period of Five years.
- Sharing of data/network information with other utilities/region without permission.
- Any security issues observed.

9. Language of BID: The language of the bid shall be English
10. Number of Copies of BID: Two nos. of Hardcopies (one marked as "original" and one marked as "Copy" and 1 Softcopy in CD/Pen drive should be submitted. Each technical proposal should be marked "Original" or "Copy" as appropriate. If there are any discrepancies between the original and the copies of the Proposal, the original governs. In the event of any discrepancy between the hard copy and soft copy, the hard copy shall prevail.
11. Corrigendum: Should the Purchaser deem it necessary to amend the BID Document, it shall do so by uploading the corrigendum in the website(s). At any time prior to the deadline for submission of the BID, the Purchaser may amend the BID Document by issuing corrigenda. In order to provide prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Purchaser may, at its discretion, extend the last date for the receipt of BIDs. Any corrigendum issued shall be part of the BID Document and shall be communicated and shall be uploaded on [www.nerpc.nic.in](http://www.nerpc.nic.in)
12. Cost of preparation of BID: 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 BID process.
13. Submission of BID: The Bidder shall submit the BID using the appropriate Submission Sheets provided in the Annexures. These forms must be completed without any alterations to their format, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.
14. Rights of Use: All rights of use of any process, product, service or facility developed or any other task performed by the Agency during execution of the engagement for the Purchaser would lie exclusively with the Purchaser in perpetuity free from all liens, encumbrances and other third party rights and the Agency shall, wherever required, take all steps that may be necessary to ensure the transfer of such ownership in favour of the Purchaser.
15. Area of Work: The Agency may be required to work anywhere in the state or union territory of India within the concerned area of the Purchaser.
16. Confidentiality: The Agency and the personnel of any of them shall not either during the term or within two (2) years after the expiration of this contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract or the Owner's

business or operations without the prior written consent of the owner. Purchaser will ensure confidentiality of the bids submitted.

17. Bid Security / Earnest Money Deposit (EMD): The Bidder shall furnish as part of its Technical Proposal, a Bid Security in original form and in the amount and currency specified below. The EMD shall be payable in form of Demand Draft/Bank Guarantee (along with format attached at **Annexure -J**) in favour of “Member Secretary, NERPC” payable at Shillong drawn on any scheduled commercial bank.

Earnest Money Deposit for the tender shall be Rs50,00,000 (Rupees Fifty Lakhs only). Earnest Money will not fetch any interest. The EMD made by the bidder will be forfeited if:

- i. The bidder withdraws his tender before processing of the same.
- ii. The bidder withdraws his tender after processing but before acceptance of “Letter of award” issued by NERPC.
- iii. The selected bidder withdraws his tender before furnishing an unconditional and irrevocable Performance Security Deposit.
- iv. The bidder violates any of the provisions of the terms and conditions of this tender specification.

The EMD will be refunded subject to:

- i. To the successful bidder, only after furnishing an unconditional and irrevocable Performance Security Deposit for 10% of the contract price.
- ii. To the successful bidder if for any reasons beyond the control of the purchaser, the purchaser fails to award LOI within one month of the date of acceptance of tender by the agency.
- iii. To the unsuccessful bidders, after acceptance of the “Letter of Award” by the selected bidder.

18. Price Offer: The Bidder shall provide ONLY ONE Price bid. In case of more than one price bid, the submission will be considered non-responsive. Prices will be firm and inclusive of all cost minus taxes and no change alternate/conditional price offers shall be allowed. The price offer shall be firm and no escalation would be allowed.

19. Performance Security: Within twenty-eight (28) days of the issue of Letter of Intent from the Purchaser, the successful Bidder shall furnish the Performance Security in accordance as provided below. The value of Performance Security would be 10% of the bid value/contract price.

The successful bidder will have to furnish a Performance Security Guarantee Deposit @10% of the bid value/contract price in form of an irrevocable bank guarantee as per format at Annexure-H from a scheduled commercial bank within 28 days after the issue of Letter of Intent (LoI).

This guarantee will be for faithful performance of the contract in accordance with the terms and conditions and technical specification specified in the contract bid documents. The purchaser shall be at liberty to deduct appropriately from the Performance Security Deposit such sums as are due and payable to the agency by purchaser as may be determined in terms of the contract.

The performance guarantee shall remain valid for a period of 60 days beyond the supply period from the date of project ‘go live’ and shall be renewed for a further period of 60 days

beyond completion of Technical support period by 1% of the bid value/contract price. Performance Security Guarantee in form of bank guarantee will be discharged and returned to the successful bidder after satisfactory performance of all the terms and conditions of contract.

20. Bid Validity Period: Bid should be valid for a period of 120 days from the date of opening of proposal.
21. Acceptable Banks: All bank related documents should be submitted only from a bank listed in Schedule-2 of Reserve Bank of India (RBI).
22. Currency of Contract: The currency of contract shall be Indian Rupees only.
23. NERPC shall mean the North Eastern Regional Power Committee as defined under the Electricity Act, 2003 and having its secretariat at NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006 and headed by Member Secretary.
24. The website of NERPC is at [www.nerpc.nic.in](http://www.nerpc.nic.in)
25. Purchaser/owner shall mean the NERPC.
26. The competent Authority for this Tender shall be The Member Secretary, NERPC.
27. The competent Authority reserves the right to cancel this tender without assigning any reason whatever.
28. Part bids, incomplete bids will not be accepted.
29. The competent authority reserves the right to postpone and/or extend the date of receipt of tender or to withdraw the tender notice without assigning any reasons thereof. In such an event, bidders shall not be entitled to any compensation, in any form whatsoever.
30. Terms and Conditions described in this NIT shall be binding on all bidders.
31. All entries in the tender forms should be legible and filled clearly. If the space for furnishing information is insufficient, a separate sheet duly signed by the authorized signatory may be attached.
32. Each page of this tender document/NIT should be signed by the bidder or by the authorized signatories with seal of the agency and require to be enclosed with the technical bid. Signing each page of this document will be implied as its acceptance in unequivocal manner with clear understanding and interpretations.
33. All pages in technical and commercial bid/response documents shall be stamped with the official company seal and duly signed by the authorized signatory.
34. The offer shall be of Single stage-two packet/envelope type, containing Technical and Price offers. Two separate sealed envelopes containing the Technical and Price offers separately should be enclosed together in a large envelop, sealed and superscripted with the Tender Reference Number, Tender ID, Tender Name, Name and address of the Bidder. Tender Offer without separate envelops for technical offer and price offer will be rejected outright. The selection of bidder is based on the principles of **Quality and Cost Based Selection** process.
35. Late bids: Any bid received by courier/post/by hand after the deadline for submission of bids prescribed, shall not be accepted.

36. The envelope shall be sealed by signing across all joints & pasting good quality transparent adhesive tape on top of such joints & signatures with company seal. Proposals sent through telex/telegrams/fax/e-mail shall not be accepted. NERPC shall not be responsible for delay on account of delivery by the postal authorities as well as courier companies. Such delivery shall be at the risk and cost of the bidder. If the envelopes are not sealed and marked as required above, NERPC shall assume no responsibility for the proposal's misplacement or premature opening.
37. Bidder is expected to examine all instructions, forms, terms and requirement in the bid document. The invitation to bid together with all its attachment thereto shall be considered to be read, understood and accepted by the bidder in full and binding manner. Failure to furnish all information required by the bid document or a bid not substantially responsive to the bid document in every respect may result in rejection of the bid.
38. The language of the bid shall be English. All documents enclosed should also be in English language. In case the original document is in a different language, a certified true translation in English language must be furnished, in which case, for purposes of interpretation of the bid, the translation shall govern. All such translated documents should bear the signature and stamp of the authorized signatory of the bidder signing the document, as a token of authentication of the same.
39. The bidders will have to accept unconditionally all the Terms and Conditions of NIT along with an undertaking in support of the authenticity of the declarations regarding the facts, figures, information and documents furnished by the Bidder in order to become an eligible bidder. Conditional bids against the terms of the bid may be rejected upon sole discretion of purchaser.
40. Based on undertaking furnished by the bidder, as per format given at Annexure-E, certifying the authenticity and statement made in the bid, If any information or document submitted by the bidder is found to be false/incorrect, the offer shall be considered absolutely null and void and penal action as deemed fit shall be taken against the bidder which may include termination of contract / forfeiture of all dues including EMD/ Security Deposit / banning of the firm along with all partners of the firm as per provisions of law. Further, suitable action shall be taken for claiming damages from the bidder.
41. NERPC reserves the right to accept or reject any or all offers in part or not to make any procurement against this tender, without assigning any reasons. No dispute of any kind can be raised against this right of the NERPC in any court of law or elsewhere.
42. The purchaser shall be entitled and it shall be lawful on his part to forfeit the amount of Performance Security in whole or in part in the event of any default, failure or neglect on part of the agency in fulfilment or performance of the contract under reference in all respects to the satisfaction of the purchaser. The purchaser shall be entitled to deduct from the amount of Performance Security any loss or damage which the purchaser may suffer due to any act or default of the Agency as per stipulations of the contract.
43. In the event of termination of agreement for any reasons, or in the event the successful bidder is discharged of its obligations clauses 36-39 of GCC. shall be applicable.
44. After award and before starting of work the selected agency shall give a presentation detailing the proposed architecture and their work plan, support services required and deliverables.
45. The Bidder will be responsible for sizing the hardware to support the scalability and performance requirements of the protection database application. The Bidder shall ensure

that the servers are sized adequately and redundancy is built into the architecture required to meet the service levels mentioned in the NIT.

46. The IT Infrastructure proposed should be compatible with infrastructure at NERPC and constituents.
47. The Bidder will be responsible for providing all the details of the Bill of Material (BoM) and specifications of the IT Infrastructure proposed, specifications of the system software, all other equipment proposed as part of its Technical Proposal. The price quote submitted by the Bidder should include costs for these.
48. After completion of the 5-year support period the successful agency will provide a proposal for AMC which may be accepted /declined by the purchaser.



## SECTION D: SCHEDULE OF REQUIREMENTS

### D.1 Deliverables

- Web based database management tool for remote access
- Protection calculation & Analysis tool with laptop computers - 31 Licenses
- User Manuals- 50 sets
- Associated servers for installation and Deployment of application and database software along with standard Operating System –With Main and Back up. (communication is excluded in the scope)
- Training for 5 days at NERPC premises in 3 batches including printed reading material/soft files and all activities up to Go Live.
- 5 year comprehensive Support including incorporation of any new network configuration, addition of new substation, change of relays, settings, change in any bay element or bus configuration, support for database software, web access and various analysis engines.

### D.2 Minimum Hardware Bill of Quantities (BOQ) and Specifications

Sl. No.	Server Role/Requirement	Hardware Description (Higher or Equivalent)	Quantity
1	Web Server	Processor : X 86 processor, 3.06 GHz or latest equivalent RAM : 32 GB RAM, Storage : 600 GB Raid : RAID 1 and 5 (Supported) Power Supply: Redundant power supply Network: 4 × 1GbE (std.) Operating system: Windows / Linux /Unix	2
2	Database Server	Processor : X 86 processor, 3.06 GHz or latest equivalent RAM : 32 GB RAM, Storage : 1 TB Raid : RAID 1 and 5 (Supported) Power Supply: Redundant power supply Network: 4 × 1GbE (std.) Operating system: Windows / Linux /Unix	2
3	Historian/ Storage Server	Processor : X 86 processor, 3.06 GHz RAM : 32 GB RAM, Storage :2 TB Raid : RAID 1 and 5 (Supported) Power Supply: Redundant power supply Network: 4 × 1GbE (std.) Operating system: Windows / Linux /Unix	1
4	Application Server	Processor : X 86 processor, 3.06 GHz RAM : 32 GB RAM, Storage : 600 GB Raid : RAID 1 and 5 (Supported) Power Supply: Redundant power supply Network : 4 × 1GbE (std.) Operating system: Windows / Linux /Unix	2
5	Laptop Systems	Intel Processor, 8GB RAM 1TB HDD, 14' LED, Windows 10 Professional/above	31
6	Database	Oracle / MySQL / Postgresql/ MS Sql	As per design
7	Firewall	Layer 7 Standard firewall	
8	Switches/Routers	Layer 2 / Layer 3 Standard	
9	Backup	Tape/ disk based backup	

The above may be considered as minimum requirement. The party may offer higher version or better version to match suitability to proposed system

## **SECTION E: DETAILED SCOPE OF THE PROJECT**

### **E.1 Synopsis**

Bidder should supply Protection Analysis Software Package with following requirements but not limited to the following modules for the supply of Software and Database building activities:-

Broad scope of supply includes following.

1. Protection system data collection from site and Database building activities
2. Protection Setting Calculation Tool (PSCT)
3. Protection Database Management System
4. The vendor should develop and maintain a hardware setup and software package capable of meeting the following objectives; but not limited to:
  - Classified database of all bay equipment and the protection system details of all bays at 132kV and above for North Eastern Regional power system.
  - Classified database structure of all bay equipment and the protection system details for bays at 33 kV where data can be updated by Users through Web Based application.
  - Importing extracted setting from each relay (proprietary format for numerical relay and excel template for static relays) and bay control unit directly into Protection Database Management System (PDMS).
  - A user friendly interface for browsing and editing the contents of the database.
  - Tool for simulating the performance/ behaviour of the protection system under all possible normal and abnormal operating conditions of the power system, including effect of changing one or more parameter setting of the relays.
  - Diagnostics for verifying proper coordination among various protective relays.
  - Generation of useful reports.
5. Five-Year Support Period (both local & remote support). Updating of revised setting in to the data base(whenever revision) is included in support period scope.

### **E.2 Database Building Activities**

- One time power system network model building for the Load-flow, Short circuit and dynamic simulations of entire North Eastern Region with Indian national grid transmission network model (import facility from available models in NERPC). The protection calculation Tool, apart from having the functionality of Load-Flow, Short circuit and dynamic simulations.
- The protection calculation tool should be capable of interacting with the data in the database.

- Fault simulation at each Node (Bus) and on each transmission line, and generate relay-based integrity report including discrepancies, if any.
- Data collected from respective substations to be validated before populating the same in the database.
- Complete modelling of NER transmission network for 33 kV and above (in case of Assam 132kV and above) including HVDC systems connected with NER, with relevant system parameters collecting from the field like transmission lines, generators, transformers, reactors, substation layouts, and associated protective relays in the substations. The model should include CT, PT, Isolator, Breaker and other bay equipment's ratings along with rating of the BUS (easily accessible PU model) and the type of conductor used for the BUS. The modelling should be done as per bus-breaker philosophy instead of node oriented model. Modelling for 33kV stations would be done based on data provided by utilities.
- GUI based interface for users to develop and maintain network of 33kV and above (except for Assam 132kV and above) in PDMS
- Building of network Database, creating templates for all relay models, provision of designing new templates for new relay models and populations of relay data for all existing substations of 33kV and above voltage level (except for Assam 132kV and above), of North Eastern Region including Generating station switchyards as well as the Generators. Substation DC system and interlocks should also be modelled in the database.
- Modification & recommendation of protection settings, as required for SPS, Islanding etc (if any/as applicable) subject to practical feasibility of system as available in region
- Prepared network should be ready for base case load flow analysis and the same has to be verified with field engineers of NER constituents. Both MW and MVAR flow should be computed and Voltage Level at different Buses should be ascertained.
- Short circuit, transient stability/ dynamic studies, voltage stability and contingency analysis have to be simulated and the results have to be demonstrated to the NER constituents for approval. There should be features to study low frequency oscillations, 3<sup>rd</sup> zone tripping, AVR&PSS tuning support and Voltage collapse prediction feature. Measures to mitigate contingencies based on above studies have to be presented to NER utilities.
- Transient stability and grid disturbance simulation studies for the North Eastern Region database and performing the com-trade file analysis to find out the root cause.
- Over current and distance relay coordination settings have to be calculated and coordination curves should match the existing protection schemes of the substations. Some critical contingencies have to be discussed with NER constituents and the same has to be simulated and results to be demonstrated.
- Computation of critical clearing time for the most of the voltage level and critical stations.

- Review of the unit protection for the elements like Generators, GT's, Unit transformers, Station transformers, ICT's, Main power transformers, Reactors, Dynamic and Static Compensators, bus-bars, transmission lines and other differential protection relays.
- Following are estimated details of the existing sub-station in the NERPC region and same should be modelled in the software with all details. However, actual number may vary within close limits and taking into consideration new capacity addition. This has to be considered by the bidder in his proposal.

<b>No. of HVDC Substation 800kV</b>	<b>No. of 400kV Substations</b>	<b>No. of 220 kV Substations</b>	<b>No. of 132 kV Substations</b>	<b>No. of 66kV Substations</b>	<b>No. of 33kV Substations</b>
<b>1</b>	<b>10</b>	<b>17</b>	<b>137</b>	<b>23</b>	<b>662</b>

- Capacity building and training at NERPC Office and central location of all utilities.

### **E.3 Protection Setting Calculation Tool**

This module gives new relay settings for improved performance and computes panel settings for type of distance/over current/EF/differential/line/transformer/Reactor/ Generator/UFR protection relays. Relay co-ordination will be conducted for relays of all make and with user defined characteristics for over current, earth fault and distance relays in line with the protection philosophy followed by NERPC.

Protection Engineering involves the practice of carrying out various fault studies followed by relay setting, checking and co-ordination studies. These studies are necessary in order to ensure that the wide variety of protective relays function correctly with proper discrimination to provide the required reliable, sensitive and selective isolation of faulty power system equipment.

Thus, the Protection Setting Calculation Tool should be capable of performing the following:

- All relay settings calculation to be modelled based on recommendations of Task force report. There should also be flexibility to accommodate philosophies followed in NER but not covered in Task force report.
- Relay co-ordination for radial and interconnected power system networks for distance, over current and earth fault relays.
- Primary/back-up relay pairs generation.
- Fault calculation will be a part of relay co-ordination program.
- Transparent Fault calculation results.
- Built with standard relays library data for different manufacturers, including but not restricted to the following protection features:
  - a. Line protection: Distance, over current, earth fault, over voltage
  - b. Line Differential protection
  - c. Transformer Differential Protection
  - d. Transformer Over fluxing Protection
  - e. Transformer Thermal Overload Protection

- f. Transformer Low Impedance Restricted Earth Fault Protection and High Impedance Restricted Earth Fault Protection
  - g. Transformer back-up over current and earth fault protection
  - h. Generator, Generator Transformer, Generator Overall and Unit Differential Protection
  - i. Generator Inter – Turn Differential Protection
  - j. Generator Transformer Low Impedance and High Impedance Restricted Earth Fault Protection
  - k. Generator Stator Earth Fault Protection ( Both 95% and 100% protection)
  - l. Generator Rotor Earth Fault Protection
  
  - m. Generator Loss of Excitation Protection(Field Failure) ( with and without Under voltage)
  - n. Generator Forward Power and Reverse Power Protection
  - o. Generator Back-Up Impedance protection
  - p. Generator Inadvertent energization
  - q. Generator Negative Sequence Protection,
  - r. Generator Pole Slip Protection
  - s. Generator Thermal Overload Protection
  - t. Feeders Directional and Non-Directional Over current and Earth Fault Protection with standard and nonstandard curves (User defined curves).
  - u. LBB protection.
- Plotting Log-Log grid and graphs.
  - Option to check existing relay settings as per the field or vice versa.
  - Unit protection settings computation for Generators/ line/transformer / breaker /reactor/ busbar etc.
  - Computation of Out of Step Tripping Protection Settings.
  - Display of sequence operation of relays with respect to tripping time. Simulation of relay response for different types of faults at various locations. Simulation of Faults due to lightning as entire NER is lightning prone.
  - Switching status for all relays elements from the screen.
  - Association of relays to power system elements.
  - Co-ordination check can be conducted for relays of all make and with user defined characteristics for over current and earth fault and distance relays.
  - Disturbance analysis can be done with single click on mapping of disturbances files with corresponding relay.
  - Simultaneous tripping analysis of the same event must be possible.
  - It has standard power system components and relay symbols.
  - Phase and Earth relay co-ordination.
  - Instantaneous setting for relays.
  - Automatic computation of zone setting for distance protection.
  - Feature for viewing existing and newly computed relay settings simultaneously.
  - Pre-loaded standard relay curves.
  - Directional and non-directional feature for relays.
  - Overload factor, unbalance factor and discrimination time (user defined/selectable) for each relay.
  - Inbuilt discrimination time calculator for grading of relays.
  - Facility to model the back-up protection settings of generating units / GTs connected to the grid at 132 kV and above level, with the exception where the generator is connected

to the lower voltage network, it will also be considered so that coordination between power plant and transmission system protections may be tested / verified.

- For any new element to be integrated in NER Grid, the relay settings to be adopted will be computed by PSCT and discussed in proper forum of NERPC/State before its implementation.
- During root cause analysis, the software will be able to distinguish between fault and Power Swing.
- SPS and Islanding Logic to be integrated in PDMS software . SPS, Islanding Schemes to be mapped up to PSL level. Also, as per requirement of SPS scheme in NER, the same will be studied by the vendor and feedback will be given to NERPC.
- Recommendations given by consultant based on Task force report to be incorporated accordingly by the vendor.
- The number of licenses for PSCT will be as follows:

<b>Sl. No.</b>	<b>Utility</b>	<b>Quantity of licenses</b>
1.	Arunachal Pradesh	2
2.	Assam	4
3.	Manipur	3
4.	Meghalaya	4
5.	Mizoram	2
6.	Nagaland	2
7.	Tripura	3
8.	NERTS	2
9	NEEPCO	2
10.	NTPC	1
11.	OTPC	1
12.	NHPC	1
12.	NERLDC	2
10.	NERPC	2
<b>TOTAL</b>		<b>31</b>

- All recommendations should conform to Reliability Standards.

#### **E.4 Protection Database Management System**

Web-based Enterprise license of Database tool and populating of all the relay templates and also relay field data into the software and customizing the approval procedures.

Protection data management system is an asset management tool for maintaining information on relay attributes and settings. The software should be capable of maintaining the entire data belonging to all relays. Once data fits in the software it should be capable of porting the data to any third party application for analysis and also various reports generated. The data would be accessed over web or remotely for use in protection calculation tool.

The Protection database management system has following capabilities

1. Web based System.

2. Role based access control
3. Flexible customization of user roles, grants, actions from Master control panel
4. User Access Monitor
5. Relay Template Management
6. Create\Edit\Delete relay templates
7. Viewing relay template
8. Locking and Unlocking templates
9. Copy & Edit templates from the existing template
10. Import and Export templates
11. Relay Data management
12. Create\Edit\Delete relay data
13. Viewing relay data
14. Locking and Unlocking relay data
15. Copy & Edit relay data from the existing data
16. Import and Export relay data
17. Configuration management : Should have option to configure user defined levels for generating relay indexing
18. Work flow Management
19. Relay template life cycle management
20. Relay data life cycle management
21. Availability of historical fault data for predicting nature of fault.
  - (a) The User should have option to enter actual reason for the nature of fault.
  - (b) Based on the User-fed actual reason for the nature of the fault, PMS should update its Expert-database for future analysis.
22. Database sizing: The PMS should be capable of analyzing, storing, and handling all fault records (Disturbance record, Event Logger, COMTRADE files, etc.) for a minimum period of 5 years; And the updated Expert-database to be used for fault analysis should be permanently available.
23. Reports:
  - a. Possible to generate reports as per user requirement
  - b. User can generate report in standard format like .xls, .pdf.
  - c. History logger: All user activities including user operations, data management, template management, configuration management and workflow can be logged to track the user activities over a period of time
  - d. Import and Export: There shall be an option to import template and data from any third party application in standard formats like .xml and .xls
  - e. Option to integrate any third party application to share data in common data exchange format between protection database management software and calculation engine/tool and vice versa.
  - f. Drawing of Relay characteristics curve can be drawn from the setting data.
  - g. Provision to attach documents to relay template and relay data can be made available Option to accept setting data as per the audit and verify/compare the field setting with protection database setting and generate error report.
  - h. Provision to store and retrieve audit reports.
  - i. Provision to store and retrieve relay tripping incidence report.
  - j. Facility to store and retrieve setting guidelines as per various committees.

- k. Automatic Reconciliation Tool should be available which will generate automatic reconciliation requests for relay settings in the database.
- l. Up-to-date application guides and user manuals of all relays is a part of the relay library.
- m. Web-based Checklist for protection audit should be made available for Constituents to self-auditing

PDMS is an offline based system. With proper communication system in NER, PDMS shall be upgraded to online system at a later stage where auto-downloading of Relays shall be possible. In case the communication system fails, the DR outputs will be uploaded manually.

## **E.5 Technical Specification of the Software**

As per **Annexure-A (II)**.

## **E.6 Five-Year Support Period**

The following are the broad activities envisaged during the five year support period for this project.

- Support period shall be for a period of 5 years beyond the date of Go Live.
- Technical support for the protection setting computational tool and training programs on every quarterly basis.
- Updating and entering the protection and network database of the NER region during the support period on regular/daily basis which shall include changes in system configuration, addition of new substations, generators, etc.
- Bug fixing and free updating of the software release during the support period.
- Performing the grid disturbance simulation for the events occurring in the system on daily basis. Deployment of two qualified protection engineers for the support period. The engineers shall be available for the technical support during official working hours.
- Providing the expert technical advice from the protection expert on the grid disturbance and simulation studies in the events of faults.

## **SECTION F: BID EVALUATION AND SELECTION OF AGENCY AND AWARD OF WORK**

The following is the Bid process/ evaluation methodology that will be adapted by purchaser for appointment of Agency.

1. **Single Stage – Two packet/Envelope Procedure:** Bidders should submit two sealed envelopes simultaneously, one containing the Technical Proposal (Tender Name and “Technical Bid”) and the other the Price Proposal (Tender Name and “Price Bid”), enclosed together in an outer single envelope (Tender Name and date of opening). Initially, only the Technical Proposals will be opened at the date and time advised in the Bidding Document. The Price Proposals remain sealed and are held in custody by the purchaser. The Technical Proposals are evaluated by the purchaser.
  2. Following the approval of the technical evaluation, and at an address, date and time advised by the purchaser, the Price Proposals will be opened for technically approved
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bidders. The Price Proposals are evaluated and, following approval of the price evaluation, the Contract is awarded to the Bidder who's Bid has been determined to be successful based lowest quote.

3. **Preliminary Evaluation:** The technical proposals will be reviewed for deviations, acceptance of terms and conditions, adherence to scope of work, formats required, purchase of bid document etc. along with the demonstration during bid evaluation. In case of non compliance on any of the above, bids will be considered as technically non-responsive.
4. This tender will be evaluated for minimum eligibility criteria and offers of only those agencies that fulfil the mandatory Qualifying requirements criteria will be considered for further technical evaluation under marking system as detailed in further section. Quality and Cost based evaluation will be done for the proposed bidders. Firms scoring **at-least 70 out of 100 marks** shall be considered for selection.

**5. Mandatory Qualifying Requirements for Technical Evaluation:**

- i. The Bidder must have completed 2 projects of similar nature using the same software proposed along with protection system data base modelling and analysis for a big transmission utility in the last seven years ending 31.03.2018. The documentary evidence for the same shall be submitted in the form of documents like PO/WO/Completion Letter/Reference letter should be submitted along with the bid.
- ii. The bidder should have completed one project of same requirement as that of this NIT by supplying protection setting calculation tool, data base management software, performing data collection & modelling, conducting tripping analysis and power system stability studies involving more-than **300EHV** sub-stations to a utility and project should be in operation as on date. The documentary evidence for the same shall be submitted in the form of documents like PO/WO/Completion Letter/Reference letter/ should be submitted along with the bid.
- iii. Protection setting calculation software proposed to be supplied under this NIT should be single software with all features/key functionalities existing and fully operational as on NIT date. Documentary evidence and demo of the same shall be provided.
- iv. Bidder must have full-fledged software development, protection expert team and support team for supporting this tender in India. Details such as address, e-mail and name of relevant personnel along with their designation should be provided.
- v. The following minimum human resource requirements are to be deployed by the Bidder for execution of the Project/ Tender:
- vi.

Key Personnel	Qualifications/Experience	No
<b>Power System Advisors and Team Leader</b>	He/ She should be Ph.D/ Master's Degree holder in power systems domain with 10 years of power system and protection field. He/ She should have advised several projects in protection studies and one project for complete modelling of network with protection elements and database modelling	2

<b>Senior Power System Consultants</b>	He/ She should be Bachelor/ Master's Degree with more than 10 years of experience in transmission system protection analysis and studies.	2
<b>Software Consultants/Experts</b>	He/ She should be Bachelor/Master's Degree with more than 7 years' of experience in designing database concepts for power system products. He/she should have experience in handling data base structures for any reputed power system domain applications. He/ She should have successfully completed the implementation of database structure design for any power system application under reputed projects of India /International to support this project in the past 3 years.	2
<b>Power System Engineers</b>	He/She should be Bachelor /Master's Degree holder in Electrical Engineering and should have minimum 3 years' experience in power system consulting services and protection system	20

- vii. Bidder should have very good understanding of power system network model of Indian grid and have completed at least 1- assignments in providing power system planning studies, operational studies, and protection audit to an electrical utility in India. Bidders should also have a good understanding of NER Power System.
- viii. Bidder must have at least Rs. 20 Crores (Rupees TWENTY Crores in words) each year average turnover for the past three financial years that is from 01.04.2015 to 31.03.2017. Certificate from CA is to be submitted. Audited Balance Sheets to be submitted
- ix. Bidder should have positive net worth in the last three audited financial years ended 31.03.2017. Certificate from CA is to be submitted. Audited Balance Sheets to be submitted.
- x. The proposed protection setting calculation engine/software must be in use for at least 10 years ending 31.03.2018 in any utility in India/Abroad. The documentary evidence for the same shall be submitted in the form of documents like PO/WO/Completion Letter/Reference letter should be submitted along with the bid.
- xi. Key protection simulation functionality as at Annexure-B (Technical bid) shall be complied and confirmation documents shall be submitted along-with the bid. The same shall be demonstrated for the technical evaluation committee of NERPC as part of the technical evaluation.
- xii. The company should practice ISO industry standard Quality process and systems for the software development and activities. The company should have a relevant ISO 9001 certificate for the software development and power system consultancy and the same should be submitted along with the bid.
- xiii. Bidder should not be in blacklist of any department of Government in India and Abroad. A declaration/affidavit should be furnished in this regard.

6. **Documents Comprising the Technical bid:** Technical bid shall contain no prices or price schedules. Technical bids containing such price information will be rejected.

Each Bidder shall submit with its First Stage bid the following attachments:

- EMD
- Covering Letter and Technical Bid Form at Annexure-B

7. **Technical Bid Form:** The Bidder shall complete the Technical Bid Form Annexure-B in the manner and details indicated therein and submit the same, along with Covering Letter and all necessary enclosures, with its first stage bid.

8. **Technically Qualified Bidder:** The technical bids shall be opened by a Tender Evaluation Committee (TEC) formed for this purpose. The Qualifying Criteria & Technical bid shall be analyzed first. TEC will scrutinize the offer to determine whether the offer is complete, whether required technical documentation have been furnished, whether the documents have been properly signed, whether the bidder has made successful demonstration and whether the offer is in order. The decision of the Evaluation Committee in the evaluation of the Qualification criteria and Price bids shall be final and binding.

9. Evaluation of bids:-

The tender evaluation committee constituted by NERPC for the purpose will carry out the evaluation of Technical and price bids of the technically responsiveness firms.

The Technical bids will be evaluated on the basis of the technical parameters furnished by the bidder and score provisioned against each parameter is as here under:

S.No	Evaluation Criteria	Maximum Sub Points	Maximum Points
<b>1</b>	<b>Completed 2 or more projects of similar nature using the same software proposed along with protection system data base modelling and analysis for a big transmission utility in the last Ten years ending 31.03.2018</b>		<b>30</b>
1.1	Projects within India.	20	
1.2	Projects outside India	10	
<b>2</b>	<b>Experience in carrying out Advanced Power System Studies for bigger Transmission network/system with morethan300 buses.</b>		<b>15</b>
2.1	Power system Protection Studies including Unit Protection, Transient Stability Studies :- 5 marks for each project.	10	
2.2	EMTP Studies, Disturbance/Tripping analysis_ 2.5 marks for each project.	5	
<b>3</b>	<b>Software with all features/key functionalities existing and fully operational as on date</b>		<b>20</b>
3.1	Protection Setting Calculation Tool-Key functionalities	10	
3.2	Protection System Database Management Software Functionalities	10	
<b>4</b>	<b>Qualifications &amp; competence of the key professional staff</b>  <b>1. Power System Advisors ;-3 marks for each CV.</b> <b>2. Senior Power System Consultants:-2.5 marks for each CV.</b> <b>3. Software Consultants/Experts :- 2.0 marks for each CV.</b>	15	<b>15</b>
<b>5</b>	<b>Presentation and demo on Work Plan, Approach &amp; Methodology for the Scope of work</b>	20	<b>20</b>
<b>Total Marks</b>			<b>100</b>

**Minimum qualifying technical score from the above is 70.**

<b>Weights given to the technical and financial proposals:</b>	
Technical Proposal	<b>T = 80</b>
Financial Proposal	<b>F = 20</b>

The evaluation is on QCBS system and the weight age of **technical score will be 80 and Financial score will be 20.**

The proposal with the lowest cost shall be given financial score of 100 points and other proposal shall be given financial score that are inversely proportional to their prices. The technical score will be considered as per evaluation of offer submitted with reference to this invitation.

The total score for any firm shall be arrived at by weighing the technical score and financial scores and adding them.

Financial score (Sf) of 20 points will be given for the lowest Financial Proposal. The financial scores (Sf) of the other Financial Proposals will be computed in the inverse proportion to the lowest bid. Proposals will be ranked according to their combined technical score (St) and financial (Sf) score using the weights:

$$\text{Total Score(S)} = \text{St} + \text{Sf}$$

10. **Price Bid:** The Price bids may be opened on the same day or at a later date to be intimated on the same day based on the number of bids received.

The Price bid of only those bidders would be opened who have qualified the mandatory qualifying requirements. All figures in financial bids shall be in Indian currency only. The Price bid must be submitted in format at Annexure-C only. Validity of the Price bids shall be 90 days from the date of opening of financial bid.

11. **Selection of Successful bidder:** The Employer will award the contract to the successful Bidder (also referred to as L1 Bidder) whose bid has been determined to be substantially responsive and to be the lowest evaluated bid, further provided that the Bidder is determined to be qualified as per the Qualification Requirement specified in Annexure-B to perform the project satisfactorily and verification of the documents, submitted by the bidder towards meeting the Qualifying Requirements (QR) and /or any other Documents submitted in the bidding, with their originals as specified.
12. **Notification of Award and Initiation of Contract:** The Bidder, who's Bid, has been accepted, will be notified of the award by NERPC prior to expiry of the Bid validity period by registered letter/speed post. This letter (hereinafter and in the Conditions of Contract called the "Letter of Intent"(LOI)) will state the sum that purchaser will pay the Agency in consideration of the execution, completion and maintenance of the Works by the Agency, as prescribed by the Contract (hereinafter and in the Contract called "the Contract Price").
13. The successful qualified Bidder(s) will confirm acceptance of LOI through 'Letter of Acceptance' within seven days from the date of issue of LOI along with the Performance Security Guarantee.
14. Award of work: Thereafter "Letter of Award" shall be issued after receipt of 'Letter of Acceptance' and submission of Performance Security.

15. Upon the furnishing of Performance Security Guarantee Deposit by the successful Bidder and receipt of “Letter of Acceptance” NERPC will promptly notify the other Bidder(s) that their Bids have been unsuccessful and refund the Bid Security/Earnest Money Deposit as promptly as possible.

**SECTION G: GENERAL CONDITIONS OF CONTRACT**

1. Contract Documents	1.1 All documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory.
2. Corrupt Practices	<p>The bidder shall not have been blacklisted by any State/Central Government or PSU Organization or bilateral/multilateral funding agencies or abroad agency for breach of ethical conduct or fraudulent practices as on date of submission of the proposal. There should be no investigations pending/proceedings contemplated against the bidder by any government agency.</p> <p>1.2 The Purchaser requires bidders, suppliers, and contractors to observe the highest standard of ethics during the execution of such contracts.</p> <p>(a) The following definitions apply:</p> <p>“corrupt practice” means the offering, giving receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any party in the procurement process or the execution of a contract;</p> <p>“fraudulent practice” means a misrepresentation or omission of facts in order to influence a procurement process or the execution of a contract;</p> <p>“collusive practices” means a scheme or arrangement between two or more bidders, with or without the knowledge of the NERPC,- designed to influence the action of any party in a procurement process or the execution of a contract; “coercive practices” means harming or threatening to harm, directly or indirectly, persons, or their property to influence their participation in a procurement process, or affect the execution of a contract;</p> <p>(b) The Purchaser will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.</p>

### 3. Interpretation

1.3 In this Contract unless a contrary intention is evident:

- a. the clause headings are for convenient reference only and do not form part of this Contract. The headings shall not limit, alter or affect the meaning of this Contract;
- b. unless otherwise specified a reference to a clause number is a reference to all of its sub-clauses;
- c. unless otherwise specified a reference to a clause, sub-clause or section is a reference to a clause, sub-clause or section of this Contract including any amendments or modifications to the same from time to time;
- d. a word in the singular includes the plural and a word in the plural includes the singular;
- e. a word imparting a gender includes any other gender;
- f. a reference to a person includes a body corporate;
- g. a reference to legislation includes legislation repealing, replacing or amending that legislation;
- h. where a word or phrase is given a particular meaning it includes the appropriate grammatical forms of that word or phrase which have corresponding meanings;
- i. in the event of an inconsistency between the terms of this Contract and the proposal, the terms of this contract hereof shall prevail.

#### 1.4 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 parties with respect thereto made prior to the date of Contract.

#### 1.5 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.

#### 1.6 Non-waiver

(a) Subject to GCC Clauses 32 and 34 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.

Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized

	<p>representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.</p> <p>1.7 Severability</p> <p>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.</p>
4. Language	<p>1.8</p> <p>The Contract as well as all correspondence and documents relating to the Contract exchanged by the Agency and the Purchaser, shall be written in English. 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 English, in which case, for purposes of interpretation of the Contract, this translation shall govern.</p> <p>1.9</p> <p>The Agency shall bear all costs of translation to English and all risks of the accuracy of such translation.</p>
5. Joint Venture/Consortium/Association	<p>1.10</p> <p>Joint Venture / Consortium / Association of two or more partners is not allowed.</p>
6. Eligibility	<p>1.11</p> <p>Eligibility criteria shall be as per the Technical bid evaluation criteria</p>
7. Location	<p>1.12</p> <p>The Services shall be performed at the area under the jurisdiction of NERPC, or at such location required by NERPC.</p>
8. Effectiveness of Contract	<p>1.13</p> <p>This Contract shall come into force and effect on the date of award (the "Effective Date") of the Purchaser's notice to the Agency confirming that the following conditions have been met:</p> <p>a) This Contract has been approved by Purchaser  b) Requisite Performance Bank Guarantee has been submitted.</p>
9. Warranty/ Licenses and Annual Maintenance Contract (AMC)	<p>1.14</p> <p>Server, storage hardware and Laptops supplied in the contract shall be covered under warranty for at least five year onsite manufacturer's warranty.</p> <p>Warranty period for the all other hardware shall be on site for</p>

	<p>two years or as per manufacturer standard warranty whichever is higher.</p> <p>All warranties and licenses for hardware and software shall be in favor of purchaser.</p>
10. Authorized Representatives	<p>1.15</p> <p>Any action required or permitted to be taken, and any document required or permitted to be executed under this Contract, may be taken or executed:</p> <ul style="list-style-type: none"> <li>a. on behalf of the Purchaser by competent authority or his designated representative;</li> <li>b. on behalf of the Agency by Power of Attorney (PoA) or his designated representative.</li> </ul>
11. Relation between the Parties	<p>1.16</p> <p>Nothing contained herein shall be construed as establishing a relation of master and servant or of agent and principal as between the Purchaser and the Agency. The Agency, subject to this Contract, has complete charge of Personnel performing the Services and shall be fully responsible for the Services performed by them or on their behalf hereunder.</p>
12. Notices	<p>1.17</p> <p>Any Notice given by one party to the other pursuant to the Contract shall be in writing. The term “in writing” means communicated in written form with proof of receipt.</p> <p>1.18</p> <p>Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent by registered post, telex, telegram, email or facsimile to such Party at the following address:</p> <p>1.19</p> <p>For the Owner: Member Secretary, NERPC  Email: ms-nerpc@gov.in  Telephone: 0364-2534101</p> <p>1.20</p> <p>For the Agency: (pl.fill up) _____  Attention: _____ Telegram: _____  Facsimile: _____</p> <p>1.21</p> <p>Notice will be deemed to be effective as follows:</p> <ul style="list-style-type: none"> <li>(a) in the case of personal delivery or registered mail, on delivery;</li> <li>(b) in the case of email twenty four(24) hours following confirmed transmission.</li> </ul>



	<p>(c) in the case of facsimiles, twenty four(24) hours following confirmed transmission</p> <p>1.22</p> <p>A Party may change its address for notice hereunder by giving the other Party notice of such change pursuant to this Clause.</p>
13. Governing Law	<p>1.23</p> <p>The Contract shall be governed by and interpreted in accordance with the laws of the India. The Courts in Shillong shall have exclusive jurisdiction with respect of the tendering process, award of Contract and execution of the Contract.</p>
14. Settlement of Disputes	<p>1.24</p> <p>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.</p> <p>1.25</p> <p>If the parties fail to resolve such a dispute or difference by mutual consultation within twenty-eight (28) days from the commencement of such consultation, either party may require that the dispute be referred for resolution to the formal mechanisms specified below(The date of commencement of the dispute shall be taken from the date when this clause reference is quoted by either party in a formal communication clearly mentioning existence of dispute or as mutually agreed):</p> <p>a. The mechanism for resolution of disputes for bidders shall be in accordance with the Indian Arbitration and Conciliation Act of 1996 as amended from time to time. The Arbitral Tribunal shall consist of a sole arbitrator appointed on agreement of the Parties. If within 30 days of commencement of dispute, the Parties fail to appoint a sole arbitrator, then the panel shall include 3 (Three) Arbitrators. Each Party shall nominate an Arbitrator and the two nominated Arbitrators shall mutually agree and nominate a third Presiding Arbitrator.</p> <p>b. The place for arbitration shall be Shillong</p>
15. Scope of Work	<p>1.26</p> <p>The services to be rendered by Agency shall be as per scope of work (Given in the <a href="#">Section E-Scope of Work</a>). At the time of awarding the contract, the Purchaser shall specify any change in the Scope of Work. Such changes may be due to increase or decrease in the scope of work at the time of award.</p> <p>1.27</p> <p>Unless otherwise stipulated in the Contract, the Scope of Work shall include all such items not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Delivery and Completion of Related Services as if such items were expressly mentioned in the Contract.</p>

16. Commencement of Services	<p>1.28</p> <p>The Agency shall begin carrying out the Services immediately viz. from the date of issue of Letter of Award (the "Starting Date"), or on such date as the Parties may agree in writing.</p>
17. Delivery	<p>1.29</p> <p>The Delivery of services and Completion of the Related Services shall be in accordance with the milestones specified in the Section E, Scope of Work and acceptance of the services rendered by the Purchaser.</p> <p>1.30</p> <p>The Agency, in relation to its deliverables, shall provide any supporting data or information required by the Purchaser.</p>
18. Agency Responsibilities	<p>1.31</p> <p>The Agency shall provide the services mentioned in the Scope of Work and the Delivery and Completion Schedule, as per <a href="#">Section-E-Scope of Work</a>.</p>
19. Purchaser's Responsibilities	<p>1.32</p> <p>For successful completion of the assignment, as and when required by the Agency, the Purchaser shall provide data and support based on availability of the same and without prejudice. In the event that the purchaser is unable to provide the required data or support for a requirement which the Agency cannot be reasonably expected to procure on its own or from alternate sources, the Agency's failure to deliver shall not be held against it.</p> <p>1.33</p> <p>The Agency shall bear all costs involved in the performance of its responsibilities, in accordance with GCC Clause 20.</p> <p>1.34</p> <p>The Competent authority of Purchaser shall act as the nodal point for implementation of the contract and for issuing necessary instructions, approvals, commissioning, acceptance certificates, payments etc. to the Agency.</p> <p>1.35</p> <p>The Competent authority of Purchaser shall approve all such documents within 30 working days.</p> <p>1.36</p> <p>Purchaser may provide on Supplier's request, particulars/information / or documentation that may be required by the Supplier for proper planning and execution of Scope of Work under this contract.</p>

	<p>1.37</p> <p>Purchaser shall provide to the Supplier sitting space and infrastructure and utilities, in the Purchaser's offices at such location as may be mutually decided by the Parties.</p>
20. Contract Price	<p>1.38</p> <p>The Contract Price shall be as specified in the Agreement subject to any additions and adjustments thereto, or deductions there from, as maybe made pursuant to the Contract.</p> <p>1.39</p> <p>Prices charged by the agency for the service provided under the Contract shall not vary from the prices quoted by the Agency in its Bid (bid value).</p> <p>1.40</p> <p>The Contract Price shall be paid in the manner specified in the Payment Schedule GCC 51. No invoice for extra work/change order on account of change order will be submitted by the Supplier unless the said extra work /change order has been authorized/approved by the Purchaser in writing. , as appropriate, Services provided, accompanied by the documents submitted pursuant to GCC Clause 17.</p> <p>1.41</p> <p>The Agency shall submit the bills in triplicate to the concerned purchaser.</p> <p>1.42</p> <p>Payments shall be made promptly by the Purchaser, not later than sixty (60) days after submission of an invoice along with supporting documents or request for payment by the Supplier, and the Purchaser has accepted it. But if the progress is not satisfactory and according to agreed work program/schedule the payment may be withheld.</p> <p>1.43</p> <p>The final payment under this Clause shall be made only after satisfactory completion of the activities mentioned in the Scope of Work.</p> <p>1.44</p> <p>If any excess payment has been made by the Purchaser due to difference in quoted price in proposal and Supplier's invoice, the purchaser may without prejudice to its rights recover such amounts by other means after notifying the Supplier or deduct such excess payment from any payment subsequently falling due to the Agency. The payment would be subject to PSDF disbursement.</p>

<p>22. Taxes and Duties</p>	<p>1.45</p> <p>The Agency and the personnel shall pay the taxes, duties, fees, levies and other impositions levied under the existing, amended or enacted laws during life of this contract.</p> <p>1.46</p> <p>The purchaser shall reimburse all applicable taxes such as GST (Goods and Service Tax) directly related to the execution of the works to the agency and the purchaser shall perform such duties in regard to the deduction of such tax as may be lawfully imposed.</p> <p>Payment of taxes/duties shall not be made separately in any case.</p> <p>1.47</p> <p>For goods/services supplied from outside the Purchaser's country, the Supplier shall be entirely responsible for all taxes, duties, stamp duties, license fees, and other such levies imposed outside the Purchaser's country.</p>
<p>23. Performance Security</p>	<p>1.48</p> <p>The Supplier shall, within twenty eight (28) days of the issue of Letter of Intent, provide a Performance Security for the due performance of the Contract in the amounts and currencies specified below:</p> <p>The successful bidder will have to furnish a Performance Security Guarantee Deposit @ 5% of the bid value/contract price in form of an irrevocable bank guarantee as per format at <b>Annexure-H</b> from a scheduled commercial bank within 28 days after the issue of letter of intent (LoI).</p> <p>The performance guarantee shall remain valid for a period of 60 days beyond the support period of five years from the date of project 'go live' and shall be renewed for a further period, if required so. Performance Security Guarantee in form of bank guarantee will be discharged and returned to the successful bidder after satisfactory performance of all the terms and conditions of contract.</p> <p>This guarantee will be for faithful performance of the contract in accordance with the terms and conditions and technical specification specified in the contract bid documents.</p> <p>1.49</p> <p>The Purchaser shall at its sole discretion invoke the Performance Security and appropriate the amount secured there-under, in the event that the Supplier commits any delay or default in Services rendered or commits any breach of the terms and conditions of the Contract.</p>

	<p>1.50</p> <p>The Performance Security shall be denominated in the currencies of the Contract, and shall be in one of the forms stipulated by the Purchaser in <b><u>Annexure-H</u></b>.</p> <p>1.51</p> <p>The Performance Security shall be discharged by the Purchaser and returned to the Agency not later than sixty (60) days following the date of completion of the Supplier’s performance obligations under the Contract, unless specified.</p>
24. Intellectual Property	<p>1.52</p> <p>Purchaser shall own and have a right in perpetuity to use all newly created Intellectual Property Rights which have been developed solely during execution of this Contract, including all records, reports, designs, application configurations, data and written material, specifications, reports, drawings and other documents which have been newly created and developed by the Supplier solely during the performance of Related Services and for the purposes of inter-alia use or sub-license of such Services under this Contract. The Supplier undertakes to disclose all such Intellectual Property Rights arising in performance of the Related Services to the Purchaser and execute all such agreements/documents and file all relevant applications, effect transfers and obtain all permits and approvals that may be necessary in this regard to effectively transfer and conserve the Intellectual Property Rights of the Purchaser. To the extent that Intellectual Property Rights are unable, by law, to so vest, the Supplier assigns those Intellectual Property Rights to Purchaser on creation.</p> <p>1.53</p> <p>The Supplier shall be obliged to ensure that all approvals, registrations, licenses, permits and rights etc. which are inter-alia necessary for use of the goods supplied / installed by the Supplier (if any),as part of the service obligations under the present contract, shall be acquired in the name of the Purchaser, and the same may be assigned by the Purchaser to the Supplier solely for the purpose of execution of any of its obligations under the terms of this Contract. However, subsequent to the term of this Contract, such approvals, registrations, licenses, permits and rights etc. shall endure to the exclusive benefit of the Purchaser</p> <p>1.54</p> <p>The Supplier shall ensure that while it uses any software, hardware, processes, document or material in the course of performing the Services, it does not infringe the Intellectual Property Rights of any person and the Supplier shall keep the Purchaser indemnified against all costs, expenses and liabilities howsoever, arising out any illegal or unauthorized use(piracy) or in connection with any claim or proceedings relating to any breach or violation of any permission/license terms or infringement of any Intellectual Property Rights by the Supplier or its personnel during the course of performance of the Related</p>

	<p>Services. In case of any infringement by the Supplier, the Supplier shall have sole control of the defense and all related settlement negotiations</p> <p>1.55</p> <p>Subject to sub-clauses 1.52 to 1.54, the Supplier shall retain exclusive ownership of all methods, concepts, algorithms, trade secrets, software documentation, other intellectual property or other information belonging to the Supplier that existed before the effective date of the contract.</p>
<p>25. Confidential Information</p>	<p>1.56</p> <p>The Agency and the personnel of any of them shall not either during the term or within two (2) years after the expiration of this contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract or the Owner's business or operations without the prior written consent of the owner.</p> <p>1.57</p> <p>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 design, procurement, or other work and Services required for the performance of the Contract.</p> <p>1.58</p> <p>The obligation of a party under this clause, however, shall not apply to information that:</p> <ul style="list-style-type: none"> <li>a. the Purchaser or Agency need to share with the institutions participating in the financing of the Contract;</li> <li>b. now or hereafter enters the public domain through no fault of that party;</li> <li>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</li> <li>d. Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.</li> </ul> <p>1.59</p> <p>The above provisions of GCC Clause 25 shall not in any way modify any undertaking of confidentiality given by either of the parties here to prior to the date of the Contract in respect of the Supply or any part thereof.</p> <p>1.60</p> <p>The provisions of GCC Clause 25 shall survive completion or termination, for whatever reason, of the Contract.</p>

26. Subcontracting	No subcontracting of jobs is allowed.
27. Service Quality	<p>1.62</p> <p>The Purchaser may reject any Service rendered or any part thereof that fail to conform to the specifications. The Supplier shall take measures necessary to meet the specifications at no cost to the Purchaser.</p>
28. Liquidated Damages and Penalty	<p>1.63</p> <p>Except as provided under GCC Clause 32, if the Supplier fails to perform any or all of the 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,</p> <ul style="list-style-type: none"> <li>a. sum equivalent to 0.5% of the value of the Services, supplied beyond stipulated delivery schedule for each week or part thereof of delay until actual performance, subject to a maximum of 10% of value of such services.</li> <li>b. To obtain services from elsewhere, after due notice to the successful bidder on the account and at the risk of the defaulting service provider.</li> <li>c. To cancel the work order or a portion thereof and if so desired to get the services at the risk and cost of the defaulting supplier and also,</li> <li>d. To extend the period of delivery with or without penalty as may be considered fit and proper, the penalty, if imposed shall not be more than the agreed liquidated damages referred to in clause (a) above.</li> <li>e. To forfeit the security deposit fully or partly.</li> <li>f. Whenever, under this contract, a sum of money is recoverable from and payable by the Service Provider, purchaser shall be entitled to recover such sum by appropriation in part or in whole by deducting any sum or which at any time thereafter may become due to the successful bidder in this or any contract should this sum be not sufficient to cover the full amount recoverable, the successful bidder shall pay purchaser on demand the remaining amount. The supplier shall not be entitled to any gain on any such purchase.</li> </ul> <p>Liquidated damages shall be the sole and exclusive remedy and Purchaser shall not have right to terminate before the Liquidated damages cap (10%) is reached</p> <p>The bidder shall not be in any manner liable for any delay arising out of purchaser's inability to make the site ready within the stipulated period.</p>
29. Liability/ Indemnity	<p>1.64</p> <p>The Supplier hereby agrees to indemnify the Purchaser, for all conditions and situations mentioned in this clause, in a form and manner acceptable to the Purchaser. The supplier agrees to</p>

indemnify the Purchaser and its officers, servants, agents (“Purchaser Indemnified Persons”) from and against any costs, loss, damages, expense, claims including those from third parties or liabilities of any kind howsoever suffered, arising or incurred inter alia during and after the Contract period out of:

- a. any negligence or wrongful act or omission by the Supplier or its agents or employees or any third party associated with Supplier in connection with or incidental to this Contract; or
- b. (b) any infringement of patent, trademark/copyright or industrial design rights arising from the use of the supplied Goods and Services or any part thereof.

1.65

The Supplier shall also indemnify the Purchaser against any privilege, claim or assertion made by third party with respect to right or interest in, ownership, mortgage or disposal of any asset, property, movable or immovable as mentioned in any Intellectual Property Rights, licenses and permits.

1.66

Without limiting the generality of the provisions of this article 1.67 and 1.68, the Supplier shall fully indemnify, hold harmless and defend the Purchaser Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the Purchaser Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any Goods, Services, information, design or process supplied or used by the Supplier in performing the Supplier’s obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Supplier shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Goods or Services, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Supplier shall promptly make every reasonable effort to secure for the Purchaser a license, at no cost to the Purchaser, authorizing continued use of the infringing work. If the Supplier is unable to secure such license within a reasonable time, the Supplier shall, at its own expense, and without impairing the specifications and standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing. Survival on Termination The provisions of this Clause 29 shall survive Termination.

1.67

Defense of Claims:

If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-



	<p>Clause 1.67, 1.68, or 1.69the 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.</p> <p>1.68</p> <p>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.</p> <p>1.69</p> <p>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.</p>
30. Limitation of Liability	<p>1.70:</p> <ul style="list-style-type: none"> <li>a. neither party shall be liable to the other party for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs,; and</li> <li>b. the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort, or otherwise, shall not exceed the amount specified in the Contract Price. Provided that this limitation shall not apply to damages arising from gross negligence of wilful misconduct of the Supplier the cost of repairing or replacing defective equipment, or to any obligation of the Supplier to indemnify the Purchaser with respect to patent infringement.</li> </ul>
31. Change in Laws and Regulations	<p>1.71</p> <p>Unless otherwise specified in the Contract, if after the date of the Invitation for Bids, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in the place of the Purchaser’s country where the Site / area of work is located(which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date, then such Delivery Date 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.</p>
32. Force Majeure	<p>1.72</p> <p>If the execution of the contract is delayed beyond the period stipulated in the contract as a result of outbreak of hostilities, declaration of an embargo or blockage or fire, flood, acts of nature or any other contingency beyond the supplier’s control due to act of God, then purchaser may allow such additional time by extending the delivery period as it considers to be justified by the circumstances of the case and the decision of the purchaser in this regard shall be final.</p>

	<p>1.73</p> <p>If and when additional time is granted by the purchaser, the contract shall be read and understood as if it had contained from its inception the delivery date as extended.</p> <p>1.74</p> <p>Power failure will not be considered as a force majeure conditions.</p> <p>1.75 A Party affected by an event of Force Majeure shall take all reasonable measures to remove such Party's inability to fulfill its obligations hereunder with a minimum of delay.</p> <p>1.76</p> <p>A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any event not later than fourteen (14) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give notice of the restoration of normal conditions as soon as possible.</p> <p>1.77</p> <p>The Parties shall take all reasonable measures to minimize the consequences of any event of Force Majeure.</p> <p>1.78</p> <p>The decision of the Purchaser with regard to the occurrence, continuation, period or extent of Force Majeure shall be final and binding on the Supplier.</p> <p>1.79</p> <p>Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.</p> <p>1.80</p> <p>Not later than thirty (30) days after the agency, as the result of an event of Force Majeure, have become unable to perform a material portion of the Services, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.</p>
<p>33. Change Orders and Contract Amendments</p>	<p>1.81</p> <p>The Purchaser may at any time order the Agency through Notice in accordance GCC Clause 12, to make changes within the terms and conditions of this Contract, including any modification of the scope of the Services.</p> <p>1.82</p> <p>If any such Change Order causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of</p>

	<p>any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery and Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Agency 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.</p> <p>1.83</p> <p>No variation or modification of the terms of the contract shall be made except by written amendment signed by the parties.</p>
34. Extensions of Time	<p>1.84</p> <p>If at any time during performance of the Contract, the Supplier should encounter conditions impeding timely completion of Services pursuant to GCC Section-E, 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.</p> <p>1.85</p> <p>Except in case of Force Majeure, as provided under GCC Clause 32 or where the delay in delivery of the Goods or completion of Services is caused due to any delay or default of the Purchaser, any extension granted under clause 34 shall not absolve the Supplier from its liability to the pay of liquidated damages pursuant to GCC Clause 28.</p>
35. Suspension	<p>1.86</p> <p>The Purchaser may, by written notice of suspension to the Agency, suspend all payments to the Agency hereunder if the Agency fail to perform any of their obligations under this Contract, including the carrying out of the Services as per schedule, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Agency to remedy such failure within a period not exceeding Seven (7) days after receipt by the Agency of such notice of suspension and shall invoke contract performance guarantee.</p>
36. Termination	<p>1.87</p> <p>Termination of Contract for Failure to Become Effective</p> <p>(a) If the purchaser fails to issue letter of intent (LoI) within 90 days of the date of opening of bids for whatever reasons, either Party may, by not less than two weeks (2) weeks' written notice to the other Party, declare this Contract to be null and void, and in the event of such a declaration by either Party, neither Party shall have any claim against the other Party with respect hereto.</p> <p>1.88 Termination for Default:</p> <p>(a) The Purchaser may, without prejudice to any other remedy for breach of Contract, by Notice of default sent to the Agency terminate the Contract in whole or in part:</p>

(i) if the Agency fails to provide acceptable quality of Services within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause34; or

(ii) if the Agency, in the judgment of the Purchaser has engaged in corrupt, fraudulent, collusive, or coercive practices, as defined in GCC Clause 2, in competing for or in executing the Contract; or

Any representation made by the bidder in the proposal is found to be false or misleading if the Agency commits any material breach of the Contract and fails to remedy or rectify the same within the period of two weeks (or such longer period as the Purchaser in its absolute discretion decide) provided in a notice in this behalf from the Purchaser.

If the Agency fail to comply with any final decision reached as a result of arbitration proceedings.

If, as the result of Force Majeure, the Agency is unable to perform a material portion of the Services for a period of not less than sixty (60) days.

If the Agency has been blacklisted by the any government agency due to misconduct etc.

In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause36, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Services similar to those undelivered or not performed, and the Agency shall be liable to the Purchaser for any additional costs for such similar Goods or Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

#### 1.89 Termination for Insolvency

The Purchaser may at any time terminate the Contract by giving Notice to the Agency if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Agency, 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

#### 1.90 Termination for Convenience

The Purchaser, by Notice sent to the Agency, 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 Agency under the Contract is terminated, and the date upon which such termination becomes effective.

#### 1.91 Consequences of Termination

Any representation made by the bidder in the proposal is found to be false or misleading if the Agency commits any material

	<p>breach of the Contract and fails to remedy or rectify the same within the period of two weeks (or such longer period as the Purchaser in its absolute discretion decide) provided in a notice in this behalf from the Purchaser.</p> <p>Upon Termination of the Contract, the Agency shall:</p> <p>Prepare and present a detailed exit plan within five calendar days of termination notice receipt to the competent authority of Purchaser (“Exit Plan”).</p> <p>The competent authority and along with designated team will review the Exit plan. If approved, Supplier shall start working on the same immediately. If the plan is rejected, Agency shall prepare alternate plan within two calendar days. If the second plan is also rejected, competent authority will provide a plan for Supplier and it should be adhered by in totality.</p> <p>The Exit Plan should cover at least the following :-</p> <ol style="list-style-type: none"> <li>a. Execute all documents that may be necessary to effectively transfer the ownership and title, including OEM warranties in respect of all leased equipment;</li> <li>b. Handover all developed codes, related documentation and other Configurable Items, if any in his possession;</li> <li>c. Handover the list of all IT Assets, passwords at all locations to the Purchaser.</li> </ol>
37. Cessation of Rights & Obligations	<p>1.92</p> <p>Upon termination of this Contract pursuant to Clause 36 hereof, or upon expiration of this Contract pursuant to Clause 49 hereof, all rights and obligations of the Parties hereunder shall cease, except</p> <ol style="list-style-type: none"> <li>a. Such rights and obligations as may have accrued on the date of termination or expiration,</li> <li>b. The obligation of confidentiality set forth in Clause 25 hereof,</li> <li>c. Any right which a Party may have under the Applicable Law.</li> </ol>
38. Cessation of Services	<p>1.93</p> <p>Upon termination of this Contract by notice to pursuant to Clause 36 hereof, the Agency shall, immediately upon dispatch or receipt of such notice, take all necessary steps as provided in Clause 36 hereof, to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum.</p>
39. Payment upon Termination	<p>1.94</p> <p>Upon termination of this Contract pursuant to Clause 36 hereof, the Purchaser shall make the following payments to the Agency:</p> <ol style="list-style-type: none"> <li>a. Remuneration pursuant “Payment Schedule” GCC 51 for Services satisfactorily performed prior to the effective date of termination;</li> </ol>

	<p>b. Reimbursable expenditures pursuant to “Terms of Payment ”GCC 51 for expenditures actually incurred prior to the effective date of termination; and</p> <p>c. Except in the case of termination pursuant failure to perform, insolvency of the Agency, deliberate false submission by the Agency or for failure to comply with the final decision of an arbitration process, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract.</p>
40. Assignment	<p>1.95</p> <p>The Agency shall not assign to any other party, in whole or impart, their obligations under this Contract except as mentioned in subcontract clause.</p>
41. Disclaimer	<p>1.96</p> <p>Purchaser reserves the right to share, with any agency of it's choosing, any resultant Proposals in order to secure expert opinion.</p> <p>1.97</p> <p>Purchaser reserves the right to accept or reject any proposal deemed to be in the best interest of the NERPC</p>
42. Public Disclosure	<p>1.98</p> <p>All materials provided to the Purchaser by bidder are subject to Country public disclosure laws such as RTI etc.</p> <p>1.99</p> <p>The Vendor shall not make or permit to be made a public announcement or media release about any aspect of this Contract unless the Purchaser first gives the Vendor its written consent.</p>
43. Adherence to safety procedures, rules regulations and restriction	<p>1.100</p> <p>Agency shall comply with the provision of all laws including labour laws, rules, regulations and notifications issued there under from time to time. All safety and labour laws enforced by statutory agencies and by Purchaser shall be applicable in the performance of this Contract and Vendor’s Team shall abide by these laws.</p> <p>1.101</p> <p>The Agency shall take all measures necessary or proper to protect the personnel, work and facilities and shall observe all reasonable safety rules and instructions. Supplier’s Team shall adhere to all security requirement/regulations of the Purchaser during the execution of the work. Purchaser’s employee also shall comply with safety procedures/policy.</p>

	<p>1.102</p> <p>The Supplier shall report as soon as possible any evidence, which may indicate or is likely to lead to an abnormal or dangerous situation and shall take all necessary emergency control steps to avoid such abnormal situations.</p> <p>1.103 The Purchaser will be indemnified for all the situations mentioned.</p>
<p>44. Removal and/or Replacement of Personnel</p>	<p>1.104</p> <p>Except as the appropriate Purchaser may otherwise agree, no changes shall be made in the Personnel. If, for any reason beyond the reasonable control of the Agency, it becomes necessary to replace any of the Personnel, the Agency shall forthwith provide as a replacement a person of equivalent or better qualifications.</p> <p>If the Purchaser:</p> <ul style="list-style-type: none"> <li>a. Finds that any of the Personnel has committed serious misconduct or has been charged with having committed a criminal action, OR</li> <li>b. Has reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Agency shall, at the Purchaser's written request specifying the grounds therefore, forthwith provide as a replacement a person with qualifications and experience acceptable to the Purchaser.</li> </ul> <p>1.105</p> <p>The Agency shall bear all additional travel and other costs arising out of or incidental to any removal and/or replacement, and</p> <p>1.106</p> <p>No extra payment is to be made to the agency due to such replacement of personnel.</p>
<p>45. Fairness &amp; Good Faith</p>	<p>1.107</p> <p>The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.</p> <p>1.108</p> <p>Operation of the Contract: The Parties recognize that it is impractical in this Contract to provide for every contingency which may arise during the life of the Contract, and the Parties hereby agree that it is their intention that this Contract shall operate fairly as between them, and without detriment to the interest of either of them, and that, if during the term of this Contract either Party believes that this Contract is operating unfairly, the Parties will use their best efforts to agree on such action as may be necessary to remove the cause or causes of such unfairness, but no failure to agree on any action pursuant</p>

	to this Clause shall give rise to a dispute subject to arbitration in accordance with Clause 14 thereof.
46. Insurance	<p>1.109</p> <p>The Agency shall take and maintain at their own cost, insurance coverage against the risks to their personnel and properties relating to this assignment.</p>
47. Conflict of Interest	<p>1.110</p> <p>The Process Agency shall not engage, and shall cause their Personnel not to engage, either directly or indirectly, in any business or professional activities which would conflict with the activities assigned to them under this Contract.</p> <p>1.111</p> <p>The Purchaser considers a conflict of interest to be a situation in which a party has interests that could improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations, and that such conflict of interest may contribute to or constitute a prohibited corrupt practice.</p> <p>1.112</p> <p>If the Agency is found to be involved in a conflict of interest situation with regard to the present assignment, the Purchaser may choose to terminate this contract as per Clause 36 of GCC.</p>
48. Standard of Performance	<p>1.113</p> <p>The Agency shall perform the Services and carry out their obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted techniques and practices used with professional engineering and consulting standards recognized by professional bodies, and shall observe sound management, and technical and engineering practices, and employ appropriate advanced technology and safe and effective equipment, machinery, materials and methods. The Agency shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Owner.</p>
49. Expiration of Contract	<p>1.114</p> <p>Unless terminated earlier pursuant to Clause 36 hereof, this Contract shall terminate when, pursuant to the provisions hereof, the Services have been completed and the payments of remuneration and reimbursable expenditures have been made.</p>
50. Risk Purchase Clause	<p>1.115</p> <p>In the event of failure of the agency to provide service under this contract within the stipulated date/period of the order, or in the event of breach of any of the terms and conditions mentioned in the order, purchaser shall have the right to procure such service from elsewhere after due notice to the defaulting agency at the risk and cost of the defaulting agency. In the event of failure of the agency as detailed above, the cost as per risk purchase exercise may be recovered from the bills against any other</p>



	contracts pending in purchaser. Such cost shall however not exceed the Limit of liability cap defined in clause 30 above.
51. Payment Schedule	<p>1.116</p> <p>The bidders may please note that the prices are Firm. All statutory taxes, levies, duties, etc. shall be paid on actual.</p> <p>Payment Terms:</p> <p>The bidder shall quote GST Registration No. and PAN No. in the offer or any other information required.</p> <p>Payment would be released via account payee cheque after deduction of statutory dues such as TDS/eSTDS, etc.</p> <p>Rates quoted shall remain firm till the completion of work. Rates are not subject to revision under any circumstances.</p> <p>Payment will be released on presentation of bills in triplicate via account payee cheques/RTGS/NEFT within 60 days after completion of milestones and the same being certified by the competent authority as per the following schedule.</p> <p>For payment against Part-A price (see <b>Price-Bid</b>)</p> <ul style="list-style-type: none"> <li>➤ 10% on submission of High level design document for implementation of web based protection management system to NERPC.</li> <li>➤ 30 % of the order value on delivery of 31 No of base license of protection calculation engine along with laptops</li> <li>➤ 5 % of the order value after completion of Training program on the desktop based protection setting calculation software.</li> <li>➤ 10 % of the order value after Building the network data for operational load flow and fault calculation</li> <li>➤ 15 % of the order value on completion of Protection database and substation SLD preparation for protection study</li> <li>➤ 10 % of the order value on delivery of required server hardware</li> <li>➤ 10 % of the order value on delivery of web based database management system</li> <li>➤ 5 % of the order value on completion of Site Acceptance Tests with one pilot state system</li> <li>➤ 5% of the order value after uploading all NERPC constituents data along with SLD and Go Live.</li> </ul> <p>For payment against Part-B price (see <b>Price-Bid</b>)</p> <ul style="list-style-type: none"> <li>➤ 20% on commencement of each annual support period.</li> </ul> <p>The Certificate of Completion in respect of the works referred to in 1.116 above shall not absolve the Agency from its liability to make good any defects imperfections, shrinkages or faults which may appear during the period of maintenance specified in the tender arising in the opinion of the Engineer from materials or workmanship not in accordance with the drawings or specifications or instruction of the Engineer, which defects, imperfections, shrinkages or faults shall upon the direction in writing of the Engineer be amended and made good by the Agency at his own cost; and in case of default on the part of</p>

	<p>Agency, the Engineer may employ labour and materials or appoint another Agency to amend and make good such defects, imperfections, shrinkages and faults and all expenses consequent thereon and incidental thereto shall be borne by the Agency and shall be recoverable from any moneys due to him under the contract.</p> <p>The scheme is funded through PSDF. The payment would be subject to disbursement from PSDF.</p>
<p>52. Monitoring Mechanism</p>	<p>1.117</p> <p>Competent Authority shall nominate a monitoring committee for certification of completion of milestones. No payment shall be released unless the competent authority is satisfied with the completion of works envisaged as per the milestones.</p> <p>The competent authority may design acceptance tests for some or all of the milestones envisaged in the project within the overall scope of works and the agency shall satisfy the competent authority with regard to the correctness of response /performance of the system. The competent authority may choose to be advised by technical experts from relevant field with respect to the design of acceptance tests.</p>
<p>53. Acceptance Tests:</p>	<p>1.118</p> <p>A list of the various planned tests and a brief explanation follows below:</p> <ul style="list-style-type: none"> <li>➤ Functionality Testing-Execute each function, using valid &amp; invalid data to verify the following: <ul style="list-style-type: none"> <li>• The expected result occurs when valid data used.</li> <li>• The appropriate error / warning messages are displayed when invalid data is used.</li> </ul> </li> <li>➤ Integration Testing-Integration testing ensure that interface of coupling between the module is working fine. The goal here is to see if the modules can be integrated properly. Hence the emphasis is on testing interface between modules.</li> <li>➤ System Testing- The System tests will focus on the behavior of the application. Conditions specified in Software Requirement Specification will be executed against the system and error message testing. Overall, the system tests will test the system testing and verify that it meets the requirements defined in the requirements document.</li> <li>➤ User Acceptance Testing-The purpose of these tests is to confirm that the system is developed according to the specified user requirements and is ready for operational use. Acceptance Testing checks the system against the "Requirements". It is similar to systems testing in that the whole system is checked but the important difference is the change in focus.</li> </ul>

54. Guaranteed Availability and Penalty

1.119

The supplier shall ensure that the Guaranteed Availability of the application system shall not be less than 99% (Ninety nine percent) during the period of 5 years from the date of 'go live' on quarterly basis.

The following calculation shall determine the availability of the total system:

$$\% \text{ Availability} = \frac{\text{Scheduled Available Time} - \text{Downtime}}{\text{Scheduled Available Time}} \times 100$$

Scheduled Available time shall equate to 24 hours x 7 days per week.

In the event that the application system fails to achieve the guaranteed availability as mentioned above, aggregated over the quarter, during 5 years period from the date of 'go live, NERPC shall be at liberty of deducting 1% contract value for every percent reduction in availability from the agency's bills/performance security as penalty.

<b>Technical Details of the Project</b>	
<b>I</b>	<b>Technical Evaluation Criteria Check-List (shall include the following, but not limited to)</b>
1	Protection database software demonstration – It should be able to produce SLDs showing key protection elements along with the CT, PT, and different type of Relays modelled, run a sample base case LF on data provided, add/update various relay settings in the database and show their operation by simulating a fault.
2	Key protection simulation functionality as at Annexure-B (Technical Bid) shall be complied and confirmation documents shall be submitted along-with the bid. The same shall be demonstrated for the technical evaluation committee of NERPC.
3	Web-based Protection Database Management System with User Role management and tracking the details
4	Enhanced database creation including detailed modelling of all relay elements with standard libraries
5	Possible to create user defined Relay template and life cycle management of the relay
6	Possible to reduce Regional/ Bigger Transmission Network to equivalent network and to perform EMTP Simulation
7	Distance Relay simulation and showing the zone of Operation in the graph of R/X plot
8	Relay co-ordination can be conducted for relays of all make and with user defined characteristics for distance, over-current and earth fault relays.
9	Automatic / Interactive / Manual Primary-Backup relay pairs generation
10	Simulation of relay responses for the program Computed & Existing Field settings of the relays
11	Highlighting of Relay Operational Sequence after the analysis.
12	Fault simulation and relay trip currents plotted on the SLD for different type of fault currents including user defined fault current.
13	Fault Simulation and Relay trip sequence on the SLD and showing the sequence of relay pick-up.
14	Unit protection of Transformers/lines
15	Attaching the COMTRADE file to the Relay for analysis.
16	Performing the analysis of the single COMTRADE file for the associated relay through the network element modelled.
17	Viewing of Analog and Digital plots of disturbance files stored in the relay using the COMTRADE Viewer.
18	Merging of two existing COMTRADE files received from disturbance recorder and removing unwanted channels and storing as a new COMTRADE file for further processing.
19	EMTP analysis for the given network and generating COMTRADE files to match with the disturbance records as part of the Post-mortem analysis.
20	Under frequency and df/dt relay modelling and simulation of load shedding schemes.
21	Modelling user defined control block for simulation of AVR, Governor and special protection schemes.

<b>II</b>	<b>Technical Specification of the Software</b>
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<b>General/ Graphical User Interface</b>	
1	Graphical User Interface(GUI)
2	Compatible with latest Microsoft Operating systems
3	Support for both RDBMS &ASCII data
4	Graphic editor for generation single line diagrams.
5	Provision for exporting the Single Line diagram to AutoCAD/EMF,BMP, GIF, JPEG, PNG, TIF,XLS
6	Software based on standards (IEEE/ANSI...) that are widely acceptable by national and international community.
7	Single line diagram (SLD) / Network Creation with detailed modeling of all the network elements/equipment and interfaced with relational database.
8	Module for creating SLD has advanced features as in a professional drafting / drawing package like AutoCAD. For e.g. layering, panning, zooming, real-time zoom, scaling to fit any paper size (A5toA0), printing / plotting of full diagram, selected window, current window, copy and paste options etc.
9	Different views of the same network. Meaning, there shall be a provision to display /print /plot SLD or part of SLD showing only system topology / with load flow results / with fault study results/ others.
10	SLD to .PDF conversion, scaling to fit any paper size (A5toA0)
11	Flexibility in modeling the system. Meaning there is provision for SLD-Database integrated mode for network creation Independently draft the SLD using IEC or ANSI symbols Data entry using interactive forms without SLD Multiple SLD shall be supported for the same data base Create input data in ASCII files
12	Automatically generates SLD from given system connectivity data for equivalent networks
13	Different ways of executing analysis Run any analysis directly from graphic editor Run while interactively entering data through forms Run studies using ASCII input or other batchfile
14	User defined reports including information of the system under study.
15	Reports in Standard and IEEE Formats
16	Generate reports in .csv, html, pdf, xps, prn, emf, png, xls, xml, csv format as well
17	Should have inbuilt library of all major power system equipment like Generators, lines, cables, transformers, Reactors both Line and Bus, Dynamic and Static Compensators, relays etc. The libraries have all the equipment that is widely in use by Indian or abroad Utilities and industries and should have the capability to build and manage a new library.
18	User friendly GUI for entering new equipment into library.
19	Software supports modeling of unlimited buses and unlimited number of other power system equipment's like transformers, lines, Generators etc...
20	Provision for importing of Geographic coordinates and generating the network.
21	Performing the analysis of the single file com-trade file for the associated relay through the network element modelled.
<b>Software Licensing/Commercials</b>	
22	Software should not have any time limitation for the expiry of license.
23	Solution methods – Gauss-Seidel, Newton-Raphson/Fast-DeCoupled, current Injection

<b>Power Flow Analysis</b>	
24	Zone / Area wise modeling & control, islanding.
25	Simulating the study mode in dynamic changes in the network
26	Modeling loads as constant power, constant current, constant impedance or any combination of these.
27	Determine MVAR Compensation.
28	Contingency analysis ranking.
29	Slack Bus Concept uses Gauss – Seidel, Newton – Raphson/Fast-DeCoupled techniques.
30	Frequency dependent Load flow uses Fast-DeCoupled technique. The options available are Flat Tie-Line Control Flat Frequency Control
31	Optimal load flow uses Fast-DeCoupled technique. The different optimizations available are P – Optimization Q – Optimization P & Q Optimization.
32	AC-DC load flow – this shall be in built feature of load flow program
33	Possible to simulate Looped and radial systems.
34	Possible to simulate Multiple Islanded systems.
35	Transmission line can be opened at one or both sides.
36	Possible to Model HVDC systems.
37	Computation of Total Transfer Capability (TTC) and Available Transfer Capability (ATC) between two Buses/Areas/Zones and estimation of Loop flows.
38	Sub Station wise load flow for utilities.
39	Simple and Detailed Wind Turbine Model considering all the four IEEE/WECC generic wind turbines models (WT1 to WT4)
40	Modeling suitable for individual Solar plant, Wind Turbine and Wind Farm (Group of Wind Turbines)
41	Provision to enter user specific Wind Power curves in pre-defined formats (such as P,Q).
42	FACTS devices namely – SVC, STATCOM, TCSC, SPS and UPFC are modelled
43	Modeling of two and three winding transformers with auto tap, off nominal fixed tap and phase shift.
44	The real and reactive power load values, scheduled generation, reactor and capacitor values can be changed globally or zone wise using reduction factors.
45	Generator Q – check limit violations after a specified number of iterations.
46	Changing the load model from the given type to impedance type automatically, when the voltage magnitude at load bus goes below specified value to have better and realistic convergence.
47	Load shedding during under frequency to maintain the frequency at desired value.
48	Efficient memory management.
49	Estimation of Inter regional load flow on various corridors by proper modeling of other regions of the country including all scenarios of peak/off peak, seasonal, etc.
50	The module shall Compute fault level for both symmetrical and asymmetrical faults.

<b>Short Circuit Analysis</b>	
51	Report post-fault bus voltages, currents and impedances as seen at relay. Also fault MVA and current, Peak / crest asymmetrical and symmetrical components at fault busses.
52	Open conductor faults, traveling shunt fault simulations.
53	Option of running fault studies taking initial conditions from load flow results or flat-start.
54	Shall comply with IEC 363 & IEC 909 Fault analysis.
55	Simulation of number of faults one at a time at various buses in a single execution.
56	Computation of fault contributions from adjacent/next adjacent/all buses in the neighborhood of fault and from the user defined nodes.
57	While computing the program shall take Transformer vector groups, earthing of transformer and generator neutrals.
58	HVDC system contribution to faults.
59	Zero sequence, mutual coupling values will be taken from element modeling However, provision for multiplication factors for the calculation of unknown zero-sequence impedance/admittance of lines/transformers, negative/zero sequence resistance/reactance of generators, negative/zero sequence impedance of loads and zero sequence impedance of series reactors/shunt reactors are there.
60	Fault MVA and current, Peak/Crest asymmetrical current and symmetrical components at the fault bus are reported.
61	Wind Turbines contribution to Faults for all the four IEEE/WECC generic wind turbines models (WT1 to WT4) and Solar Inverter contribution to Faults.
<b>Transient Stability (Dynamic) Studies</b>	
63	Study of system stability for various faults and disturbances.
64	Study the effects of sudden load / generation variations.
65	Modeling of cyclic loads and different types of synchronous machine.
66	User defined modeling of loads such as constant power / current / impedance or as any combination of the three
67	Motor starting analysis is inbuilt.
68	Built in standard IEEE type voltages regulators, AVR, governors, static VAR compensators, power system stabilizers
69	Support for user defined control system
70	Reports critical fault clearing time to aid in deciding rating of various equipment's.
71	Study of machine swing curves at various machines and its states
72	Simulation of user-specified number of disturbances.
73	Disturbances that can be simulated are listed below: <ol style="list-style-type: none"> <li>1. Change in transformer parameters (for changing number of transformers in parallel, tripping and reconnecting transformer)</li> <li>2. Change in transmission line parameters (for changing the number of circuits, tripping and reconnecting transmission line)</li> <li>3. Change in real and reactive power of the load.</li> <li>4. Change in shunt impedance</li> <li>5. Change in load model</li> <li>6. Change in number of generator sets.</li> <li>7. Total generation outage.</li> <li>8. Single line to ground fault with pole reclosure.</li> <li>9. Three phase to ground fault with auto-reclosure.</li> <li>10. Loss of excitation</li> <li>11. Motor starting studies</li> </ol>



74	Possible to simulate Load shedding schemes.
75	Simulation of operation of voltage/current/frequency relays and distance relays.
76	Load modeling according to user-defined load characteristics as a constant power / current / impedance or as a combination of all the three.
77	Simulation of over/under frequency and df/dt relays for different levels of load shedding at three setting levels of load frequencies.
78	Simulation of over/under voltage relays.
79	Possible to plot Linear graph of absolute/relative swing curves for various machines.
80	Power swing curves of transmission lines and distance relay performance verification.
81	Wind Turbine behavior considering all the four IEEE/WECC generic wind turbines models (WT1 to WT4) and Solar Inverter contribution to Faults.
82	Capability to simulate ramp up/down of the generation.
<b>Protection Calculation Tool/Engine</b>	
83	Software shall support Standard Power System components and Relay symbols.
84	Software should have Inbuilt library of all widely used relays / fuses used in Indian scenario or can be added in the inbuilt library if needed.
85	Software shall Co-ordinate the over current, earth fault relays, distance relays
86	Fault calculation will be inbuilt in the relay co-ordination program
87	Primary and backup relay pairs can be modelled.
88	There shall be a provision for manual selection of primary and backup relays.
89	Shall Consider thermal curve of all equipments
90	Simulation of relay responses for Existing settings of the relays
91	Relay co-ordination for radial and interconnected power system networks for distance, over current and earth fault relays.
92	Motor hot and cold curves.
93	Plotting Characteristic Curves on Log-Log grid.
94	Option to check existing relay settings as per the site.
95	Switching status for all Relay elements from the screen. Highlighting of Relay Operational Sequence after the analysis.
96	Display of Sequence Operation of Relays with respect to tripping time.
97	Display of Fault on the SLD with standard notation after fault creation.
98	Disturbance Analysis with single click on mapping of disturbance files with corresponding relay.
99	Possible to model Transformer Differential Protection
100	Possible to model Restricted Earth Fault Protection
101	Possible to model Line Pilot Protection
102	Possible to model Bus Bar Differential Protection
103	Possible to model Line/Cable Differential Protection
104	Transformer over fluxing computations

105	<p>Specific Features of Over Current Relay Coordination:</p> <ol style="list-style-type: none"> <li>1. Phase Relay Coordination</li> <li>2. Earth Relay Coordination (Co-ordination between Normal Non – Directional Earth Fault and Common Earth Fault should be provided.)</li> <li>3. Standby Earth Fault</li> <li>4. Partial Bus-bar Protection Simulation</li> <li>5. Fuse Coordination</li> <li>6. Instantaneous Setting for Relays</li> <li>7. Directional and Non-directional Feature for Relays</li> <li>8. Pre-loaded Standard Relay Curves</li> <li>9. Normalized Curve and Fault Line Feature</li> <li>10. View existing and newly computed relay settings simultaneously</li> <li>11. Partial Analysis for selected relays</li> <li>12. Solve</li> </ol>
106	<p>Specific Features of Distance Relay Coordination:</p> <ol style="list-style-type: none"> <li>1. Automatic computation of zone setting in terms of Primary and Secondary for the standard/approved relay formats. It will be the approved database (along with facility to update) for all types of conductors (for example from Dog to Quad Moose, Cables etc.) data i.e. R1/X1/Z1R0/X0/Z0, Zero Sequence Impedance angle etc. for computing the Line impedances. For Zone 2 and Zone 3, Zone 4 setting it has the facility to check whether the setting is not covering the next voltage level (considering the Transformer impedances from the Percentage impedances data).</li> <li>2. Recommended Arc Resistance, Tower footing Resistance for different voltage level</li> <li>3. Standard Relay Characteristics (example: mho, circular, quadrilateral, user defined etc.).</li> <li>4. View existing and newly computed relay settings simultaneously</li> <li>5. Impedance seen by the relay for faults</li> <li>6. Solve for the existing and proposed setting calculation as per the user choice.</li> </ol>
107	<p>Specific Features of Transformer Differential Protection:</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer/generic types.</li> <li>2. User defined bias slope setting</li> <li>3. Provision to enter CT details for 2 winding and 3 winding Transformers &amp; Single Phase Transformer.</li> <li>4. Provision to enter existing relay settings.</li> <li>5. Program Computed Transformer differential settings.</li> <li>6. Program Computed Operating Time</li> </ol>

108	<p>Specific Features of Restricted Earth Fault Relay:</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Current or voltage setting</li> <li>3. Provision to enter current setting range details like minimum, Maximum and step Sensitive or Normal selection will be from the REF data.</li> <li>4. User choice of voltage setting details in % or volts.</li> <li>5. Choice of continuous, uniform or discrete voltage setting variation.</li> <li>6. Provision to add and delete voltage setting records.</li> <li>7. User defined bias slope setting for Low Impedance RE/F application</li> <li>8. Provision to enter CT details for 2 winding and 3 winding Transformers along with Neutral CT details.</li> <li>9. Provision to enter existing relay settings.</li> <li>10. Program Computed Restricted Earth Fault settings.</li> <li>11. Program Computed Operating Time</li> </ol>
109	<p>Specific Features of Line Pilot Relay</p> <ol style="list-style-type: none"> <li>1. User defined Line Pilot relay characteristics</li> <li>2. Choice of pilot wire voltage (either 5 or 15 kV)</li> <li>3. Choice of Loop Resistance between measured and computed data</li> <li>4. Provision to input isolation transformer data</li> <li>5. Provision to input CT data</li> <li>6. Padding resistance as a computed output.</li> </ol>
110	<p>Specific Features of Bus Bar Differential:</p> <ol style="list-style-type: none"> <li>1. Provision to enter relay details like max, min and step values of current in %.</li> <li>2. Provision to enter relay details like max, min and step values of alarm in %.</li> <li>3. Provision to enter relay details like max, min and step values of time in seconds.</li> <li>4. Variable resistor Values: Enter Minimum, Maximum and step values</li> <li>5. Provision to input Pick up Characteristics data for minimum, maximum and step details for over current setting in %, Stabilizing factor (selective), stabilizing factor (check zone) and Time in ms.</li> <li>6. Provision to view computed and existing stabilizing resistance simultaneously</li> </ol> <p>Specific Features of Line/Cable Differential:</p> <ol style="list-style-type: none"> <li>1. User defined values for minimum, maximum and step values in % for differential set, switch on, high set and 2<sup>nd</sup> harmonic restraint.</li> <li>2. Provision to view computed and existing settings simultaneously.</li> </ol>

111	<p>Specific Features of Generator Overall, Generator Transformer and Unit Differential Protection</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User defined bias slope setting</li> <li>3. Provision to enter CT details for 2 and 3 and Multiple winding (for Overall differential)Transformers</li> <li>4. Provision to enter existing relay settings.</li> <li>5. Program Computed Transformer differential settings.</li> <li>6. Program Computed Operating Time.</li> </ol>
112	<p>Specific Features of Generator Inter-turn Differential Protection.</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Current or voltage setting</li> <li>3. Provision to enter current setting range details</li> <li>4. User choice of voltage setting details in % or volts.</li> <li>5. Provision to enter CT details</li> <li>6. Provision to enter existing relay settings.</li> <li>7. Program Computed Generator Inter-turn Differential Protection settings.</li> <li>8. Program Computed Operating Time</li> </ol>
113	<p>Specific Features of Generator Stator Earth Fault Protection (Both 95% and 100% protection).</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Selection of 100% Generator Stator Earth Fault Protection ( 20Hz or Third Harmonic Principle)</li> <li>3. Provision to enter Voltage setting range details</li> <li>4. User choice of voltage setting details in % or volts.</li> <li>5. Provision to enter CT details ( for 20Hz Principle)</li> <li>6. Provision to enter existing relay settings.</li> <li>7. Program Computed 95% and 100% Stator Earth Fault Protection settings.</li> <li>8. Program Computed Operating Time.</li> </ol>
114	<p>Specific Features of Generator Rotor Earth Fault Protection</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Selection of Rotor Earth Fault Protection</li> <li>3. Provision to enter Voltage &amp; Ohms setting range details</li> <li>4. User choice of voltage setting details in % or volts.</li> <li>5. Provision to enter existing relay settings.</li> <li>6. Program Computed Rotor Fault Protection settings.</li> <li>7. Program Computed Operating Time.</li> </ol>

115	<p>Specific Features of Generator Loss of Excitation Protection(Field Failure) ( with and without Under voltage)</p> <ol style="list-style-type: none"> <li>1. Automatic computation of Different Stages of Loss of Excitation</li> <li>2. Standard Relay Characteristics</li> <li>3. View existing and newly computed relay settings simultaneously</li> <li>4. Impedance seen by the relay.</li> <li>5. Provision to enter existing relay settings.</li> <li>6. Program Computed Rotor Fault Protection settings.</li> <li>7. Program Computed Operating Time</li> </ol>
116	<p>Specific Features of Forward Power and Reverse Power Protection</p> <ol style="list-style-type: none"> <li>1. Automatic computation of Different Stages of Power Protection.</li> <li>2. View existing and newly computed relay settings simultaneously</li> <li>3. Provision to enter existing relay settings.</li> <li>4. Program Computed Power Relay settings.</li> <li>5. Program Computed Operating Time</li> </ol>
117	<p>Specific Features of Back-Up Impedance protection</p> <ol style="list-style-type: none"> <li>1. computation of zone setting</li> <li>2. Standard Relay Characteristics (example: mho, circular etc.</li> <li>3. View existing and newly computed relay settings simultaneously</li> <li>4. Impedance seen by the relay for faults</li> <li>5. Quick Solve</li> </ol>
118	<p>Specific Features of Generator Inadvertent energization</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Selection of Generator Inadvertent energization.</li> <li>3. Provision to enter Voltage &amp; current setting range details</li> <li>4. User choice of voltage setting details in % or volts.</li> <li>5. Provision to enter existing relay settings.</li> <li>6. Program Computed Generator Inadvertent energization settings.</li> <li>7. Program Computed Operating Time.</li> </ol>
119	<p>Specific Features of Generator Negative Sequence Protection</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of Selection of Generator Negative Sequence.</li> <li>3. Provision to enter Voltage &amp; current setting range details</li> <li>4. Provision to enter existing relay settings.</li> <li>5. Program Computed Generator Negative sequence settings.</li> <li>6. Program Computed Operating Time.</li> </ol>

120	<p>Specific Features of Generator Thermal Overload Protection</p> <ol style="list-style-type: none"> <li>1. Choice of relay library based on the manufacturer.</li> <li>2. User choice of voltage setting details in % or volts and necessary curves.</li> <li>3. Choice of continuous, uniform or discrete voltage setting variation.</li> <li>4. Provision to enter existing relay settings.</li> <li>5. Program Computed Generator Thermal Overload Relay settings.</li> <li>6. Program Computed Operating Time</li> </ol>
<b>COMTRADE Viewer &amp; Fault Analyzer</b>	
121	Viewing of Analog and Digital plots of disturbance files of COMTRADE format (both as instantaneous and RMS values) stored in the relay including trajectory of impedance locus
122	Computation of harmonics in the wave forms of analog channels
123	Harmonics up to the order of N/2 Hz (N-> Sampling Frequency)
124	Harmonics view in Tabular form /bar graphs
125	Saving of the analyzed file in Image format
126	<p>Automatic Fault Analysis based on multiple COMTRADE Files provided to the system by User.</p> <p>The COMTRADE files shall be attached to the PDMS once it is made available in NERPC server. The same shall be downloaded by the constituent members.</p> <p>Based on the incident operating database up-dation and available COMTRADE files in PDMS, Constituent members shall be able to simulate and conduct the analysis of the incidents in the local designated PC.</p>
127	<p>Generation of Report based on the analysis of COMTRADE Files with the following outputs:</p> <ol style="list-style-type: none"> <li>1. Fault Summary&amp; Fault location based on Single-ended/ Double-ended fault data.</li> <li>2. Correctness &amp; validation of operation of each relay.</li> <li>3. Actual impedance seen by the distance relay can be viewed in the R-X plane.</li> <li>4. Identification of nature of Fault (Like fire, tree, de-capping, lightning etc.) based on Historical / Expert database available in the PMS.</li> <li>5. Suggestive remedial action/ measures to be taken including suggestions for relay settings.</li> </ol>

128	<p>Summary of the report shall include:</p> <ul style="list-style-type: none"> <li>(i) File Information</li> <li>(ii) Summary of Analog Channels</li> <li>(iii) Digital channel data</li> <li>(iv) Digital channel sequence events</li> <li>(v) Images of analog, digital and phasor section</li> </ul> <p>Report types: Multiple</p> <ul style="list-style-type: none"> <li>(i) Report-1: Automatic Fault Analysis based on multiple COMTRADE Files provided to the system by User</li> <li>(ii) Report-2: Storing and displaying fault parameters for each line/ equipment based on different search-categories specified by the User such as Duration, Date, Time, Nature of fault, Fault current.</li> </ul>
129	Merging of two existing COMTRADE files received from disturbance recorder can be edited or modified by removing unwanted channels and create a new COMTRADE file for further processing.
130	Comparison of two or more channels on the same screen
131	Computational View
132	Customized Printing: Printing of only required area on the viewer
<b>Network Modification Module</b>	
133	Used defined number of cases should be possible to be imported into PMS
134	Static and dynamic equivalents (equivalent inertia constant) for the power system
135	Initial system condition will be taken from load flow
136	It is possible to select the busses to be retained, individually or zone/area wise.
137	Output of network reduction will give output for both Y-Bus and Z-Bus matrices for the reduced system.
138	Network reduction module will give impedance values of additional series and shunt connections arising out of network reduction.
139	Output of network reduction includes equivalent generator's inertia, power, voltage and impedance.
140	The reduced network database will be created automatically.

<b>Electro-Magnetic Transient Analysis</b>	
141	<ul style="list-style-type: none"> <li>➤ Program shall be capable of modeling of transmission line (both short and long), series reactor, series capacitor, synchronous machines, induction motors, transformer with magnetizing component, shunt reactor (including saturation), shunt capacitor, instantaneous voltage and current sources, RMS voltage and current sources, lightning arrestors, Instrument Transformers such as VT, CT&amp;CVT.</li> <li>➤ It shall be possible to obtain the statistical analysis of breaker closing and opening.</li> <li>➤ Facility to create both symmetrical and asymmetrical faults with varying fault impedance.</li> <li>➤ It shall be possible to model the time varying resistor.</li> <li>➤ Impulse voltage/current can be injected at a bus as disturbance.</li> <li>➤ It shall have facility to incorporate user defined filters.</li> </ul> <p>The module will generate the following results</p> <ul style="list-style-type: none"> <li>➤ Instantaneous voltage/current waveforms for three phases.</li> <li>➤ COMTRADE file generation.</li> <li>➤ Average power &amp; energy output.</li> <li>➤ Electrical machines speed, angle, torque, etc. waveforms</li> </ul>
<b>Protection Database Management System</b>	
142	Protection data management system is an asset management tool for maintaining information on relay attributes and settings. The software is capable of maintaining the entire data belonging to all relays. Once data fits in the software it will be capable of porting the data to any third party application in common data exchange formats for analysis and also various reports generated.
143	Web based software and Remotely accessible
144	Role based access control and user control
145	Customization of user roles, grants, actions
146	User Access Monitor
147	Relay Template management <ol style="list-style-type: none"> <li>1. Create\Edit\Delete relay templates</li> <li>2. Viewing relay template</li> <li>3. Locking and Unlocking templates</li> <li>4. Copy &amp; Edit templates from the existing template</li> <li>5. Important Export templates</li> </ol>
148	Relay Data management <ol style="list-style-type: none"> <li>1. Create\Edit\Delete relay data</li> <li>2. Viewing relay data</li> <li>3. Locking and Unlocking relay data</li> <li>4. Copy &amp; Edit relay data from the existing data</li> <li>5. Import and Export relay data</li> </ol>
149	Configuration management: It has option to configure user defined levels for generating relay indexing



150	<p>Work flow Management</p> <ol style="list-style-type: none"> <li>1. Relay template life cycle management</li> <li>2. Relay data life cycle management.</li> </ol>
151	History Logger: All user activities including user operations, data management, template management, configuration management and workflow should be logged to track the user activities over a period of time
152	Import and Export: It has an option to import template and data from any third party application in standard formats like <b>.xml</b> and <b>.xls</b> format
153	There is an option to integrate any third party application to share data between protection database management software and calculation engine/ tool and vice versa.
154	Able to draw the over current relay characteristic curve from the setting data.
155	Provision to attach documents to relay template and relay data will be available.
156	There is option to accept setting data as per the audit and verify\compare the field setting with protection database setting and generate error report
157	Provision to store and retrieve relay tripping incidence report
158	There is facility to store and retrieve setting guidelines as per various committees.
159	Capturing the History of Protection audit of the sub-stations and reports are available each Utility-wise and State-wise.
160	<p>Reports:</p> <ul style="list-style-type: none"> <li>• Shall be possible to generate reports as per user requirement. Some of these are: <ul style="list-style-type: none"> <li>➤ Tripping Event Analysis Report</li> <li>➤ Sequence of Events Operation as viewed from SLDC Operation</li> <li>➤ Sequence of Breakers Tripped as viewed from Substation</li> <li>➤ Relays operated on each element-wise</li> </ul> </li> <li>• User shall be able to export generated reports to the standard formats like .xls, pdf,</li> </ul>
<b>Security and Data back-up</b>	
161	<p>Latest software and hardware firewalls to be installed for security of the database from hacking or other malicious manipulation.</p> <p>Use should be made of 128 bit SSL protocol to encrypt the channel between a client and server to protect data during transit</p>
162	All settings data, SLD, configuration data, hierarchy controls, etc. will be backed up by Network Data Management Protocol (NDMP) for faster disaster recovery. All hardware, software for such backup creation shall be deemed to be considered part of the project.

<b>Reconciliation Facility</b>	
163	<p>The package will contain reconciliation of substation wise data present on-site, which is obtained by audit and present in the database on user request. No direct communication with Relay has been envisaged here. All constituents will be able to see a red colored buzzer on the dashboard informing them of the pending reconciliation. On clicking the buzzer, the constituent will be able to see the list of its substation where reconciliation is pending.</p> <p>The administrator/NERPC Secretariat and NERLDC should be able to see the pending reconciliation status on constituent wise/substation wise report format.</p>
<b>Disaster Recovery/Backup</b>	
164	<p>The database has automatic backup/failsafe mechanisms to prevent loss of data with at least two separate storages.</p>

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**Format for Covering Letter**

**(on the Letterhead of the Bidding Company)**

Date: \_\_\_\_\_  
From : \_\_\_\_\_

Tel.#:  
Fax#:  
E-mail address#

To,  
Member Secretary,  
North Eastern Regional Power Committee,  
Lapalang, Shillong-793006

**Sub: Response to NIT for selection of bidder for appointment as the Agency for implementation of“ Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”**

Sir,  
I/we \_\_\_\_\_ Consultant/ Developer Firm herewith enclose our bid for appointment of my/our firm as the agency for implementation of“ Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”. I/We hereby accept and abide by the scope & terms and conditions of NIT document unconditionally.

The details of contact person are furnished as under:

Name:  
Designation:  
Name of the Company:  
Address of the Bidder:  
Phone Nos.  
Fax Nos.  
E-mail address

Thanking you,  
Yours sincerely,  
(Signature and Seal)\*

Name:  
Designation:  
Address:  
Date -----  
Place -----

\*To be signed by Managing Director / Chief Executive Officer, being a full time director on the Board/Manager of the Bidding company.

- Provided that in case of Manager, the Company should confirm through a copy of Board Resolution attested by Company Secretary that the concerned person is appointed as Manager as defined under the Companies Act, 1956 for the purpose in question and the Company Secretary **also certifies that the Company does not have a Managing director or CEO.**

**Format for submission of TECHNICAL-BID for “Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”**

1	Name of the Agency
2	Profile of the Agency(in brief)
3	Name of the Proprietor/Owner/ Managing Director of the Agency
4	Full Address of Registered Office
	a. Telephone No. b. Fax No.
5	Full Address of Local Office (ER)
	a. Telephone No. b. Fax No.

Sl. No.	Technical-Bid Requirements	Documentary Proof attached (Y/N)
1.	The Bidder must have executed protection system data base modelling and analysis for a big transmission utility. They should have completed at least ONE Jobs with the protection modelling, database building, simulations and protection setting calculation to a large transmission utility with more-than <b>300</b> sub-stations with the voltage level of 765/400kV to 110 kV in the last ten years ending 31.03.2018. The documentary evidence for the same shall be submitted in the form of documents like PO/WO/Completion Letter/Reference letter/Payment received should be submitted along with the bid	
2.	Bidder must have protection expert team and support team for support in India. Details such as address, phone no and name of relevant personnel along with their designation should be provided	
3.	Bidder must have at least Rs. 20 Crores (Rupees TWENTY Crores in words) each year average turnover for the past three financial years that is from 01.04.2015 to 31.03.2018. Certificate from CA is to be submitted	
4.	The proposed protection setting calculation engine/software must be in use for at least 10 years ending 31.03.2018 in any utility in India/Abroad. The documentary evidence for the same shall be submitted in the form of documents like PO/WO/Completion Letter/Reference letter/Payment received should be submitted along with the bid.	
5.	Bidder must be able to assign minimum 20 number of power system & protection engineer on his role full time with Electrical Engineering degree for the works involved in the project. Bidder shall attach Resume of all key personnel as per bid document as per Format given at <b>Annexure-D.</b>	
6.	Bidder shall have an office set up for technical support in India. Provide full address, telephone, fax, email address and contact personnel.	
7.	Bidder must not have been blacklisted by any Government organization.	

	Declaration as per <b>Annexure-E</b> in this regard is to be furnished.	
8.	Shall have positive net worth in the last three audited financial years ended 31.03.2018. Submit certificate from CA.	
9.	Additional Information, if any which bidder intends to submit along with the tender like Quality Certifications.	
10.	VAT/CST of the bidder. Please enclose copies.	
11.	EMD draft. Please Enclose.	
12.	Copies of latest service tax and income tax returns. Please submit return for last three years ending 31.03.2018.	
13.	Copy of PAN card, service tax registration certificate, VAT TIN registration certificate (if applicable)	
14.	Copy of Registration Certificate of the Company of bidder	
15.	Turn-over certificate and P&L statement of past three financial years certified by CA.	
16.	Copies of ISO-9001 certification for software development and consultancy	
17.	Listing with NIC documentary evidence copy thereof in respect of bidder	
18.	Copy of the Tender Document signed on all the pages. Enclose copy	
19.	Board Resolution as per format <b>Annexure-F</b>	
20.	Power of Attorney as per format <b>Annexure-G</b>	
21.	Brief note on the work as understood by the bidder including a plan of action along with PERT chart and proposed system architecture including details of hardware and software proposed with their technical specifications. Detailed methodology for executing the complete assignment along with key points.	

**Format for submission of PRICE-BID for “Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”**

1	Name of the Agency
2	Profile of the Agency(in brief)
3	Name of the Proprietor/Owner/ Managing Director of the Agency
4	Full Address of Registered Office
	a. Telephone No. b. Fax No.
5	Full Address of Local Office (ER)
	a. Telephone No. b. Fax No.

Sl. No.	Item	Price Quote (in Indian Rupees)
Part-A	Price for completion of High level design, Web based database management tool-1 License, desktop based Protection setting calculation & Analysis tool with laptop computers - 31 Licenses, User Manuals- 50 sets, Associated servers for installation and Deployment of application and database software along with standard Operating, Training for 5 days at NERPC premises in 3 batches including printed reading material/soft files and all activities up to Go Live.	
Part-B	5 year comprehensive Support after Go Live including incorporation of any new network configuration, addition of new substation, change of relays, settings, CT/PT, support for database software, setting calculation tool and various analysis engines updates.	
Total Contract Price* to be considered for determination of L1 party (Part-A+Part-B)		
Part C	Taxes as applicable (estimated)(with Break up)	
Part D	Grand Total (Part-A+Part-B+Part-C)	

Date:.....

Place:.....

Signature.....

Name.....

Designation.....

(Common Seal)

**Note:**

- The agency shall not be entitled to any other payments other than contract price and statutory taxes as applicable.
- The prices shall remain FIRM till completion of the Assignment.

**Format for submission of Resume**

1. Full Name: \_\_\_\_\_
2. Address: \_\_\_\_\_
3. Nationality: \_\_\_\_\_
4. Profession / Present Designation: \_\_\_\_\_
5. Years with firm: \_\_\_\_\_
6. Area of Specialization: \_\_\_\_\_
7. Proposed Position on Team: \_\_\_\_\_
8. Key Qualifications/Experience: (Under this heading give outline of staff member experience and training most pertinent to assigned work on proposed team. Describe degree of responsibility held by staff member on relevant previous assignments and give dates and locations)
9. Education: (Under this heading, summarize college/ university and other specialized education of staff member, giving names of colleges, dates and degrees obtained)
10. Experience: (Under this heading, list of positions held by staff member since graduation, giving dates, names of employing organization, title of positions held and location of assignments. For experience in last ten years also give types of activities performed)
11. Language: (Indicate proficiency in speaking, reading and writing of each language by "excellent", "good" or "poor").

Date:.....

Place:.....

Signature.....

Name.....

Designation.....

Address.....

(Seal)

**Note:**

1. Kindly ensure that the relevant work experience and its applicability to the present assignment are clearly articulated. The CVs should not be longer than 3 type-written pages.

**Format for Undertaking to be given by the Bidder**

***[on the Letterhead of the Bidding Company]***

1. I,....., Son/Daughter of Shri.....,Proprietor/Owner/Managing Director/Authorized Signatory of.....,is competent to sign this declaration and execute this tender document;
2. I have carefully read and understood all the terms and conditions of the tender and undertake to abide by them.
3. The information/documents furnished along with the above application are true and authentic to the best of my knowledge and belief. I/we, am/are well aware of the fact that furnishing of any false information/ fabricated document would lead to rejection of my tender at any stage besides liabilities towards prosecution under appropriate law.
4. Certified that no investigations is pending/legal action contemplated against .....(name of Agency) by any government authority to the best of my knowledge and belief.
5. Certified that the agency has not been blacklisted/ security deposit has not been forfeited in case of the Agency during the last five years.

Date:.....

Place:.....

Signature.....

Name.....

Designation.....

(Common Seal)



**Format for Board Resolution for appointing/ granting Power of Attorney in favour of an Authorized Personnel of the Bidding Company**

***[on the Letterhead of the Bidding Company]***

The Board, after discussion at the duly convened meeting on ..... (Insert Date), with the consent of all the Directors present and in compliance of the provisions of the Company Act, 1956, passed the following Resolution:

RESOLVED that Mr./ Ms ..... (Name), Managing Director of the Company, be and is hereby authorized to execute on behalf of the Company, a Power of Attorney in favour of Mr.....(Name),.....(Designation) of the Company granting full power and authorities on behalf of the Company to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for and selection as the Awardee for the project, *“Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region”*.

RESOLVED FURTHER that any work carried out by the Attorney in relation to the purposes mentioned above shall be binding on the Company.

Resolved further that Mr./ Ms....., Managing Director and Mr./ Ms....., Company Secretary of the Company be and are hereby severally authorized to do all such acts, deeds, and things as may be necessary to give effect to this resolution.

**Certified True Copy**

**Company Rubberstamp to be affixed**

**Note:**

1. This certified true copy should be submitted on the letterhead of the Company, signed by the Company Secretary/ any whole-time Director of the Bidding Company.
2. The contents of the format may be suitably re-worded indicating the identity of the entity passing the resolution.
3. This format may be modified only to the limited extent required to comply with the local regulations and laws applicable to a foreign entity submitting this resolution.

**Format-1: Power of Attorney to be provided by the Bidding**

**Power of Attorney**

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution. Foreign companies submitting bids are required to follow the applicable law in their country)

Know all men by these presents, we, ..... (name and address of the registered office of the Bidder) do hereby constitute, nominate, appoint and authorize Mr/Ms.....(name and residential address), who is presently employed with us and holding the position of ..... as our true and lawful attorney (hereinafter referred to as the "Authorized Representative") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for and selection as the Awardee for the project "*Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region*", including but not limited to signing and submission of all applications, proposals/bids and other documents and writings, participating in pre-bid and other conferences and providing information/ responses to North Eastern Regional Power Committee (NERPC), representing us in all matters before NERPC, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with NERPC in all matters in connection with or relating to or arising out of our Proposal for the said Assignment and/or upon award thereof to us till the entering into of the Agreement with NERPC.

AND GENERALLY to act as our Attorney or agent in relation to the Proposal for and selection as the Consultant for ["*Procurement of Web-based Protection Database Management Software and Protection Setting Calculation Tool for North Eastern Region*"] and on our behalf to execute and do all instruments, acts, deeds, matters and things in relation to the said Proposal or any incidental or ancillary activity, as fully and effectually in all respects as we could do if personally present.

AND We hereby for ourselves, our heirs, executors and administrators, ratify and confirm and agree to ratify and confirm all acts, deeds and things whatsoever lawfully done or caused to be done by our said Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF We, .....(Insert name of the Bidder on whose behalf PoA is executed), the above named Principal have executed this Power of Attorney on this ..... day of .....

For [Insert name of the Bidder on whose behalf PoA is executed],

.....(signature of the Executant)

Name:

Designation:

**Accepted**

.....(signature of Attorney)

(Name, Designation and Address of the Attorney)

**Attested**

.....(signature of the Executant)

(Name, Designation and Address of the Attorney)

**Signature and Stamp of Notary of the place of execution**

**Witnesses:**

1.

2.

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**Format for Bank Guarantee for Performance Security**

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution. Foreign companies submitting bids are required to follow the applicable law in their country)

To

The Member Secretary,  
North Eastern Regional Power Committee,  
Lapalang, Shillong- 793006

WHEREAS M/s\_\_\_\_\_ having its registered office at \_\_\_\_\_ (hereinafter referred to as the “ Supplier”) which expression shall repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), in pursuance of the Work Order/LOA No. \_\_\_\_\_ dated \_\_\_\_\_ has undertaken for execution of \_\_\_\_\_ (hereinafter referred to as the “ Contract”) on behalf of North Eastern Regional Power Committee, Shillong ( hereinafter referred to as the “ Purchaser”)

AND WHEREAS it has been stipulated by the you in the said contract that the “ Supplier” shall furnish you with a irrevocable bank guarantee by a Scheduled Commercial Bank for the sum specified therein as security for compliance with its obligations in accordance with the contract:

AND WHEREAS we have agreed to give the “Supplier” such a bank guarantee

NOW THEREFORE we hereby affirm that we are guarantors and responsible to you, on behalf of the Supplier and we undertake to pay you, upon your first written demand declaring the “Supplier” to be in default under the contract and without cavil or argument, any amount up to and not exceeding Rupees.....Crores (Rs \_\_\_\_\_) only as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein. We hereby waive the necessity of your demanding the said debt from the Supplier before presenting us with the demand. We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the Supplier shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until ..... (Insert the date of validity of the Guarantee as per Clause 23 of GCC)

**In witness where of**

Signature of the authorized officer of the  
Bank.....

Name and Designation of the  
Officer.....

Power of Attorney  
No:.....

For,

..... (Insert Name of the Bank)

Banker's Seal, Name, and Full Address, including mailing address of the Head Office.

**Note:**

1. The stamp papers of appropriate value shall be purchased in the name of bank who issues the 'Bank Guarantee'.
2. 'Bank Guarantee' should remain valid for a period of sixty days beyond the end of support period.
3. 'Bank Guarantee' should be from a schedule commercial bank operating in India as approved by RBI.
4. 'Bank Guarantee' should be sent directly by the banker of the vendor to Member Secretary, North Eastern Regional Power Committee, Shillong.

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**Format for Contract Agreement**

(On Non-Judicial Stamp Paper of appropriate value to be arranged by the Agency)

THIS AGREEMENT is made this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, between North Eastern Regional Power Committee on behalf of President of India (hereinafter called "NERPC"/"Purchaser"/"Owner"), of the one part, and

\_\_\_\_\_ of \_\_\_\_\_ (hereinafter called "The Agency"/"Supplier"), of the other part:

AND WHEREAS the Purchaser has invited bids for Related Services, viz., \_\_\_\_\_ and has accepted a Bid by the Supplier for the supply of those Related Services in the sum of \_\_\_\_\_ (hereinafter called "the Contract Price"). NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

2. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract referred to.
3. The following documents (collectively referred to as "Contract Documents") shall be deemed to form and be read and construed as part of this Agreement, viz.:
  - i. All provisions of Tender vide Reference No....., Tender ID....., Tender Name....., including all Annexures/Appendices;
  - ii. Vendor's response (proposal) to Tender, including the Bid Submission Sheet and the Price Schedules submitted by the Supplier;
  - iii. The Purchaser's Notification to the Supplier for Letter of Intent;
  - iv. Acceptance of Purchaser's Notification by the Supplier;
  - v. The Purchaser's Notification to the Supplier for Letter of Award;
4. In consideration of the payments to be made by the Purchaser to the Agency as indicated in this Agreement, the Agency hereby covenants with the Purchaser to provide the Related Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
5. The Purchaser hereby covenants to pay the Consultant in consideration of the provision of the Goods and Related 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 \_\_\_\_\_ on the day, month and year indicated above.

Signed by \_\_\_\_\_ (Authorized Official on behalf of Purchaser)

Signed by \_\_\_\_\_ (Authorized Official on behalf of Supplier)

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**Format of Format of Bank Guarantee for EMD**

Tender Reference No. NERPC/SE/PDMS/2018/2345

Dated 31/07/2018

To,  
Member Secretary,  
North Eastern Regional Power Committee,  
Dong Parmaw Lapalang,  
Shillong, Meghalaya- 93006

Sir,

In response to your invitation to respond to your NIT for Creation and maintaining a Web based Protection Database management system and Desktop based Protection setting calculation tool for North Eastern Regional Grid, M/s -----

-----having their registered office at----- (hereinafter called the '**Bidder**') wish to respond to the said NIT and submit their proposal as specified in the tender document. Whereas the '**Bidder**' has submitted the proposal in response to NIT, we, the \_\_\_\_\_ Bank having our head office are bound unto North Eastern Regional Power Committee (NERPC), having its office at NERPC Complex Dong Parmaw Lapalang, Shillong-793006 (hereinafter called "NERPC"), at the request of the aforesaid Bidder and hereby irrevocably guarantee an amount of Rupees 50 Lakhs (Rupees Fifty Lakhs only) as EMD for which payment will and truly to be made to NERPC Establishment Fund, as required to be submitted by the '**Bidder**' as a condition for participation in the said process of tender and the Bank binds itself, its successors and assigns by these presents.

The EMD for which this guarantee is given is liable to be enforced/ invoked:

1. If the **Bidder** withdraws his proposal during the period of the proposal validity; Or
  2. If the Bidder, having been notified of the acceptance of its proposal by ERPC during the period of the validity of the proposal fails or refuses to enter into the contract in accordance with the Terms and Conditions of the NIT in accordance with the Terms and Conditions of the Contract;
  3. We do hereby expressly, irrevocably and unconditionally undertake to pay to **NERPC Establishment Fund** immediately on first written demand the said amount of Rupees fifty Lakhs only to be remitted as per written instruction from Member Secretary, NERPC without NERPC having to substantiate its demand, and without any reservation, protest, demur, or recourse. The said guarantee is liable to be invoked / enforced on the happening of the contingencies as mentioned above and also in the NIT document and we shall pay the amount on any Demand made by NERPC which shall be conclusive and binding on us irrespective of any dispute or difference raised by the **Bidder**.
  4. Any notice by way of demand or otherwise hereunder may be sent by courier, email, fax or registered post to our local address as aforesaid and if sent accordingly it shall be deemed to have been given when the same has been posted.
  5. This Bank Guarantee shall not be affected by any change in the constitution of the bidder
- North Eastern Regional Power Committee 78

or us nor shall it be affected by any change in constitution of NERPC or by any amalgamation or absorption thereof or therewith.

6. This Bank Guarantee shall come into force from the date of its execution and shall not be revoked by us any time during its currency without NERPC's previous consent in writing.

7. We further agree and undertake to pay NERPC the amount demanded in writing irrespective of any dispute or controversy between NERPC and the bidder in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payments so made by us shall be a valid discharge of our liability for payment hereunder.

8. In order to give full effect to the Guarantee herein contained, you shall be entitled to act as if we were your principal debtors in respect of all your claims against .....hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights, if any, which are in any way inconsistent with any of the provisions Guarantee.

9. This guarantee will remain in force up to \_\_, and any demand made as per clause 3 above shall be construed as demand within these presents and the Bank shall make the payment accordingly.

10. Notwithstanding anything contained herein:

- a. Our liability under this Bank guarantee shall not exceed Rupees 34.00 Lakhs (Rupees Thirty Four lakhs only).
- b. This Bank Guarantee will be valid up to (for a period 180 days from the last date of bid submission) and
- c. We are liable to pay the guarantee amount or any part thereof under this Bank guarantee only upon service of a written claim or demand by you on or before \_\_\_\_\_.

11. We have the power to issue this Bank Guarantee in NERPC Establishment Fund's favour under the Memorandum and Articles of Association of our Bank and the undersigned has full power to execute this Bank Guarantee under the Power of Attorney issued by the Bank.

Dated this the \_\_\_\_\_ day of \_\_\_\_\_ 2012

In witness whereof The Bank, through the authorized officer has sets its hand and stamp on this day of at -----.

Place :

SEAL

Code No.

SIGNATURE.

Note:

1. The stamp papers of appropriate value shall be purchased in the name of bank who issues the "Bank Guarantee".
2. EMD BG should remain valid for a period of one hundred eighty days beyond the date of bid opening.
3. EMD BG Should be from a schedule commercial bank Shillong branch.
4. EMD BG should be in favour of "NERPC Establishment Fund"

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