

Addendum No. 2

Preamble

This addendum No. 2 to the above tender is being issued pursuant to the clarifications sought by some of the Bidders, for the interested bidders, after the issue of Addendum No. 1 dated 17th February 2023 as well as to address other inconsistencies based on BPSO's own assessment of the same and other changes to the tender document.

*All the amendments to the tender documents are listed in this Main Text of this Addendum and other than those listed in this Main Text, there are no changes to the tender documents. The **Appendix - I** covering the replies to Bidder's queries shall not be construed as any modifications to the tender documents, unless such modification or change is listed in this Main Text. In case of any discrepancies between the Appendix to this Addendum and the Main Text herein, the provisions of the Main Text will govern. Bidders are also advised to note that only those changes / modifications as indicated in this Main Text represent all changes to the Bidding documents, notwithstanding any modifications / additional provisions that the Appendix may inadvertently suggest.*

Some of the main points of the original tender stipulations are reiterated in this Addendum to particularly draw the attention of the Bidders. Bidders are advised to note the same and ensure compliance to the tender requirements.

A Summary and General Clarification

1. The deadline for submission and opening of the Bid is extended till **6th April 2023**.
2. For general information, Tax deducted at Source (TDS) shall be applicable for both goods and services which shall be deducted from every running bills whereas the Customs Duty (CD), Sales Tax (ST), Green Tax (GT) as per Department of Revenue and Customs, Ministry of Finance, shall be applicable only for goods at the entry to Bhutan.
3. In the Addendum No. 1, Sl. No. 4 of A) Summary of Clarification/Amendments clause is modified as "*In order to have seriousness during the entire AMC period by the contractor, the total AMC charges quoted by the bidder should not be less than **20% of the Total Contract price**. If the Contractor has quoted less than this threshold, the employer will have the right to deduct the remaining amount, which will be discussed and decided during the project kick-off meeting. This deducted amount will be evenly adjusted for entire duration of AMC and released along with the AMC clauses.*"
4. All loading and unloading works, local transportation at site for panels and other equipment must be done by the Contractor. The Contractor shall also make necessary arrangements for transportation/shifting of the material from stores to respective sites for installations. Statutory clearances including clearance of customs, entry tax as required for all the supplied items will be in Contractor's scope. All substations and control centres are connected by motorable roads.



5. As per the government regulations, the truck transporting materials from India will be required to unload materials at the border and a truck with a Bhutanese license plate, needs to be arranged for transporting material within Bhutan.
6. Some of the clauses in technical specifications are modified to ensure easy implementation and price segregation without any ambiguity. While there is no change to the overall intent of the original tender stipulations due to this, these changes are considered appropriate to be incorporated.
7. The Price Schedule have also been revised to take into account some items, which have been inadvertently missed out or decided after the issue of Addendum No. 1. Bidders shall use only the revised price schedule provided along with this Addendum and also in the excel format.

Bidders shall note that no changes to the description or the quantities shall be made by the Bidder and the Bidders shall fill in only the relevant prices or rates. **Any changes made to the description and / or quantities / units, made by the Bidders, may result in rejection of the Bid.** Further, even if such changes made by the Bidder are inadvertently overlooked by the Employer during the Bid Evaluation resulting in award of the Contract to the Bidder, the provisions of the price schedule as furnished by BPSO would be considered binding on the Bidder and non-acceptance of the same by the Bidder would result in forfeiture of the Bid Security.

Specific to Lot 1: Revamp of SCADA/EMS Systems:

1. For rough estimates of system sizing, the typical substation I/O counts is attached as **Attachment 1**, for information.
2. Civil works

The scope of civil works mentioned in the tender document remains deleted. These civil works include room partitioning, false flooring/ceiling, and cable trenches. The employer will carry out these works based on the contractor's requirements, which will be discussed and finalized during detailed engineering.

3. Cabling related works

The employer reiterates that the employer has not conducted any site survey while preparing the tender specifications. Therefore, bidders are requested to carry out their own site survey or have judgment in coming up with the competitive bids.

4. The layout of Main NLDC is attached as **Attachment 2**.
5. UPS Battery backup time

The bidders are required to supply Battery capacity of 200 AH. The employer shall calculate the backup time based on the load connected to it.

6. Related to Cyber security:



In addition to the details given in the tender document, the bidders are required to comply the following:

- i. The bidder should submit the documentation covering the details of philosophy regarding provisions of the Firewalls and how the system security is ensured through these devices and the applicable standards governing these aspects.
 - ii. The bidder should elaborate in details the complete philosophy about managing the logs, i.e. about its archival philosophy and the minimum time period etc. for which the logs shall be stored and shall be finally agreed upon in consultation with BPSO.
 - iii. It is important that the Intrusion Detection & Prevention System should understand the OT (Operational Technology) protocols and should not generate active traffic on the OT system.
7. The location of the main Control Centre in Thimphu will be in new building instead of using the existing location. Therefore, the Video Projection System (VPS) needs to be incorporated under this project. The detail specification is given in **Part B** of this document.

Specific to Lot 2: Revamp of Telecommunication System:

1. Telecommunication panels shall be transported to installation sites. BPSO shall not provide a central storage for Telecommunication panels.
2. FAT test on Battery, DCPS and SMPS is not required.
3. The Network Management System should support at least 80 substation nodes and should be possible to extend to 200 nodes as required at a later date.
4. GPS clock shall be provided as per what works best in the supplied network equipment. If more than one GPS is required for optimal operation of the proposed network, then it should be included in the supplied system.
5. For general information, **Darjay** and **Tsirang** substation refers to same substation.

B Details of Amendments

The Tender documents stand amended to reflect changes in the relevant clauses, irrespective of whether or not the same are specifically covered in the details indicated below:

I. Volume – I: Commercial Bid

1) Notice Inviting Tenders (NIT), Clause 3.0

In the **Addendum No. 1**, the following were the changes in the clause:

"Bidding Documents shall be available from: From 19th December 2022 to 5th April 2023 on all working days from 09:00hrs to 17:00hrs"

"Bid receipt date & time: Up to 6th April 2023 by 14:00hr"

"Bid opening date & time: 6th April 2023 at 15:00hrs at BPSO conference Hall"

2) NIT, Clause 7.0

In the **Addendum No. 1**, the following were the changes in the clause:

"... valid till 6th August 2023."

3) Section II – BDS, ITB Clause 22.1 and 22.4

The validity of Bid Security is extended as below:

"... valid up to 6th August 2023."

4) Section III – Bidding Forms

In the "FORM 1: BID SECURITY (BANK GUARANTEE)", the following text:

"To

[Employer's Name and Address]' is replaced with:

"To

Mr. Sherub,

Interim Head,

Office of the BPSO,

Yarden Lam, Thimphu Bhutan."

5) Section IV – General Condition of Contract (GCC) 13.2 and 13.3

In the **Addendum No. 1**, the Advance Payment and Terms of Payment clause shall be understand as follows.

"Supply of products as per BoQ:

i. 10% advance against the bank guarantee as per Clause 13.2.1

ii. 85% after delivery of product at site.

iii. 5% shall be paid after successful testing, installation and commissioning of the product.

Services as per BoQ:

i. 10% advance against the bank guarantee as per Clause 13.2.1

- ii. 90% after successful testing and commissioning as integrated system.*



II. Volume – II: Technical Specifications

Lot 1: Revamp of SCADA/EMS Systems

1. Part B, Section 2, Clause 2.3.8

This clause on Interchange Scheduling application stands **DELETED**.

2. Part B, Section 2, Clause 2.3.10

This clause on Hydro Scheduling application stands **DELETED**.

3. Part B, Section 5

Insert "Sub-section 1.18" at the end of Section 5, Part B, Volume – II as follows:

"1.18 Video Projection System (VPS)

The contractor must provide a Video Projection System (VPS) based on modular Laser technology. All the screen modules of the system must be suitable to form combined high-resolution projection images. The VPS will be used to project displays of Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS) independently of workstation monitors. All the operations envisaged from workstation monitors must also be possible from VPS.

The Contractor must supply all necessary hardware and software, including modules, multi-screen drivers, adapters, memory, supporting structure, cabling, and as required to seamlessly integrate and run the system. The necessary engineering, design, supply, testing and commissioning are part of the scope of work.

Design & installation of the systems must be coordinated with the Employer during project implementation. Only upon successful testing and commissioning, the employer will take over the site.

1.18.1 Technical specifications

The video wall and its controller must be capable of running 24 hours 7 days a week and maintenance free.

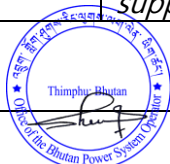
All the screen modules must be suitable to form combined high-resolution single image or multiple images depending on the System Operator's need.

The Guaranteed Technical Particulars (GTP) for Video Projection System.

Sl. No.	Description of the Features	Minimum Quantity of the features required
1	Manufacturer	



2	Model No.	
3	Display technology (DLP)	LED/Laser based rear projection
4	Video screen configuration	4x2
5	Each screen module size	Minimum 70 inches diagonal
6	Aspect ratio	16:9
7	Colors	16.7 million
8	Screen resolution	Minimum 1920x1080
9	Inter modular gap	< 0.5 mm
10	Screen border	0 mm (No border)
11	Horizontal & Vertical viewing angle	$\pm 160^\circ$ (approx.)
12	Horizontal & Vertical Half gain angle	$\pm 30^\circ$ with tolerance of $+5^\circ$
13	Overall brightness of each module	Minimum 2000 Lumens
14	Median Laser life	Minimum 80,000 Hours
15	Centre to corner uniform brightness	> 90%
16	Brightness adjustable through software	Yes
17	Contrast ratio	1800:1
18	Ambient temperature range	-10 to 40° C
19	Ambient Relative Humidity	10 to 80% non-condensing
20	Power Supply	Dual redundant hot swappable
VPS Controller Features:		
21	RAM	16 GB expandable to 64 GB
22	Internal Auxiliary Memory (SSD)	500 GB
23	Optical Drive	DVD±R
24	User Interface	Wireless keyboard and optical mouse capable of 15 meters range
25	Power supply	Dual redundant hot swappable
26	Interface ports	All necessary ports and connections with video wall and additional standard port USB 3.0, HDMI, Dual Giga LAN port.
27	Types of video signal to be supported by Video Wall Controller	PAL, SECAM, NTSC HDTV 720p, 1080i, 1080p (Component) RGB Analog up to 1920x1200 (up to 165 MHz pixel clock) DVI up to 1920x1200 (up to 165 MHz pixel clock), MPEG-x H26x
28	Time synchronization	SNTP, NTP
29	Streaming video from video camera	Video client application software
30	Capability to display videos directly from video camera	Yes
31	Operating system	It should be compatible with the supplied system



1.18.2 Inspection and Testing

A factory testing must be conducted on all the offered equipment and the necessary documents must be submitted to the employer for providing the dispatch clearance to the contractor.

After the equipment has been installed in all respect, the contractor alongside employer will carry out the detail testing which will form the Site Acceptance Test (SAT). The contractor must submit the SAT format for employer's approval prior to conducting the test.

In addition, the contractor must provide two days hands on training – including both hardware and software – for operation and maintenance on the supplied system.”

4. Part B, Section 4, Clause 4.11

Add the following paragraph at the end of this clause:

“In order to achieve the desired level of the security of the SCADA/EMS, provision(s) about network partition and segmentation using firewalls shall be made in line with the applicable standards. Further, in line with the best cyber security practices, the zones and conduits for the network shall also be well defined and it shall be ensured that no user is allowed direct access from one network zone to another.”

5. Part B, Section 8, Clause 8.3

Add the following paragraph at the end of this clause:

“Under the Web System Functions, it shall be possible to supply/transfer any desired data from the BPSO SCADA/EMS system to any outside system/application available on web, without physically interconnecting, by using features/protocols like API (Application Programming Interface). Some examples of such outside portals/applications can be like systems of neighbouring LDCs, South Asia Energy Database (SAED) and/or Data Centres/MIS of other entities. Hence as a part of the Web System Functions, the Contractor shall also provide the details of the communication interface and API addresses/ documentation etc. for transfer of the desired data from BPSO system to outside portals/applications, safely and securely and with ease.

Similarly, for strengthening the RTDAS (Real Time Data Acquisition System)/MIS (Management Information System) of BPSO with the data of other control centres/regional data from SAED, it shall be possible for BPSO system to pick up the outside/regional data supplied in the standard protocols/through APIs from the outside systems and any tools/interface required to pick the same from the web shall be provided by the Contractor in the BPSO system.”

6. Part B, Appendix G



The Bill of Quantity for SCADA/EMS system is replaced with the following:

Sl. No.	Item Description	Unit	Quantity		Total Quantity
			Main NLDC	Backup NLDC	
A	MAIN EQUIPMENT				
1	Application Software				
1.1	SCADA applications	Lot	1	1	2
1.2	ICCP Communication	Lot	1	1	2
1.3	Network Management System	Lot	1	1	2
1.4	Historian System (ISR)	Lot	1	1	2
1.5	EMS applications				
a)	- Network Topology	Lot	1	1	2
b)	- State Estimation	Lot	1	1	2
c)	- Optimal Power flow Analysis	Lot	1	1	2
d)	- Bus Load Forecast (BLF)	Lot	1	1	2
e)	- Contingency analysis	Lot	1	1	2
f)	- Load Forecasting	Lot	1	1	2
1.6	Web Server Application	Lot	1	1	2
1.7	Dispatcher Training Simulator (DTS)	Lot	1	-	1
1.8	Centralized Management Console applications	Lot	1	1	2
1.9	Patch Management software	Lot	1	1	2
1.10	Image Backup software	Lot	1	1	2
1.11	Antivirus server software	Lot	1	1	2
2	Computer System Hardware				
2.1	Servers				
a)	SCADA/EMS Server	Nos.	2	2	4
b)	Historian System (ISR) Server	Nos.	2	2	4
c)	ICCP Server	Nos.	2	2	4
d)	Communication Front End (CFE) Sever	Nos.	2	2	4
e)	NMS Server	Nos.	2	2	4
f)	Web/Replica Data/ Antivirus/ Patch Management Server	Nos.	2	2	4
g)	Centralized Management Console / Image Backup	Nos.	1	1	2
h)	Dispatcher Training Simulator Server	Nos.	1	-	1
2.2	Dual TFT Monitor				
a)	Operator Workstation console	Nos.	5	2	7
b)	Workstation for DTS	Nos.	2	-	2
c)	Workstation for DDS	Nos.	1	-	1
2.3	Engineering Laptop	Nos.	3	1	4
2.4	Next Generation Firewall (NGFW)				
a)	External NGFW	Nos.	1	1	2
b)	Internal NGFW	Nos.	2	2	4

2.5	LAN switches				
a)	Dual SCADA/EMS LAN	Lot	1	1	2
b)	Dual CFE LAN	Lot	1	1	2
c)	Dual DMZ LAN	Lot	1	1	2
d)	DTS LAN	Nos.	1	-	1
2.6	Auxiliary Storage for Historian	Nos.	1	1	2
2.7	NAS Box	Nos.	1	1	2
2.8	Server Rack With IP based KVM Switch	Nos.	3	3	6
2.9	Multifunction Laser Printer	Nos.	1	-	1
3	Time and Frequency System displays				
3.1	Time & Frequency System (GPS based)	Lot	1	1	2
3.2	Digital display for Day	Nos.	1	1	2
3.3	Digital display for Time	Nos.	1	1	2
3.4	Digital display for Frequency	Nos.	2	2	4
4	ICCP Integration				
4.1	Integration with Indian NLDC	Lot	1	1	2
4.2	Integration with DMS	Lot	1	1	2
5	Furniture	Lot	1	1	2
6	Video Projection System	Lot	1	-	1
B	MISCELLANEOUS				
1	Heavy duty Air Conditioner	Lot	-	1	1
2	Uninterruptible Power Supply (UPS)	Lot	1	1	2
3	VRLA maintenance-free Battery	Lot	1	1	2
4	Input ACDB	Lot	1	1	2
5	Output ACDB	Lot	1	1	2
6	Civil works	Lot	1		1
C	TRAINING FOR SCADA/EMS				
1	Training requirements	Lot	1		1
D	MANDATORY SPARES				
1	Servers including all main memory, auxiliary memory, interface cards complete one of each type	Nos.	2		2
2	LAN switch one of each type	Nos.	2		2
3	Router	Nos.	1		1
E	MAINTENANCE SUPPORT				
1	Annual Maintenance Contract	Lot	1		1
2	Annual Cyber Security auditing	Lot	1		1
3	Annual Refresher Course	Lot	1		1



Lot 2: Revamp of Telecommunication System

1. Section 2: 2.4.1 (dd)

Replace this bullet point "It shall also be able to drop and insert commands ..." with the following:

"It shall be able to transfer teleprotection commands across multiple transit stations."

2. Appendix B, Table B.1

Table B.1: Bill of Quantity for Communication Systems is replaced as below:

Sl. No.	Item Description	MPLS-TP		Teleprotection Interface	
		Unit	Quantity	Unit	Quantity
A	Supply of Main Equipment				
1	National Load Dispatch Centre (NLDC)	Set	1	Set	-
2	Chubachhu Substation	Set	1	Set	-
3	Olakha Substation	Set	1	Set	1
4	Gidagom Mini-hydel	Set	1	Set	-
5	Jamji Station	Set	1	Set	2
6	Chhukha Hydropower Plant	Set	1	Set	5
7	Gedu 66 kV Substation	Set	1	Set	-
8	Gedu 220 kV Substation	Set	1	Set	2
9	Phuentsholing Substation	Set	1	Set	0
10	Singhigaon Substation	Set	1	Set	2
11	Malbase Substation	Set	1	Set	6
12	Dhamdum	Set	1	Set	2
13	Gomtu	Set	1	Set	0
14	Tala Hydropower Plant	Set	1	Set	4
15	Semtokha Substation	Set	1	Set	2
16	Lobeysa Substation	Set	1	Set	0
17	Basochhu Hydropower Plant	Set	1	Set	2
18	Dharjey	Set	1	Set	2
19	Dagapela	Set	1	Set	1
20	Jigmeling Substation	Set	1	Set	10

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21	Backup NLDC, Jigmeling	Set	1	Set	-
22	Mangdechhu (MHP)	Set	1	Set	5
23	Gelephu Substation	Set	1	Set	2
24	Yurmoo Substation	Set	1	Set	2
25	Tintibi Substation	Set	1	Set	3
26	Nganglam Substation	Set	1	Set	3
27	Nangkor Substation	Set	1	Set	3
28	Kurichhu Hydropower Plant	Set	1	Set	2
29	Kilikhar Substation	Set	1	Set	2
30	Corlung Substation	Set	1	Set	2
31	Kanglung Substation	Set	1	Set	2
32	Phuntshothang Substation	Set	1	Set	2
33	Motanga Substation	Set	1	Set	3
34	Deothang Substation	Set	1	Set	2

Sl. No.	Item Description	Unit	Quantity	Remarks
B	Supply of Other Equipment			
I	NMS at NLDC			
1	Software	LOT	1	
2	Workstation / Server	LOT	2	
3	Craft Terminal	Nos.	2	
II	Supplementary Modules for Main Equipment			
1	E1 Interface	Nos.	1	
2	Optical Amplifier	Nos.	1	
III	Spares			
1	MPLS-TP	Set	5	
2	Teleprotection Interface	Set	5	
3	Ethernet Cards	Nos.	5	
IV	Miscellaneous			
1	48VDC Power Supply System	Nos.	3	
2	GPS	Set	1	
V	Annual Maintenance Contract			
1	Year 1	LOT	1	
2	Year 2	LOT	1	

3	Year 3	LOT	1	
VI	Training For Communication System			
1	Design, installation and maintenance of Communication equipment	LOT	1	
2	Communication NMS	LOT	1	
3	Teleprotection	LOT	1	
VII	Installation, Testing and Commissioning			
1	Installation, Testing, and Commissioning of the Communication System	LOT	1	

"Note:

-Each **Set of MPLS-TP** shall include at least main and redundant modules for power supply, optical network cards and controller card to provide access to the configuration of the set and other connected sets in the network. It shall also include SFP (as per optical distance and losses mentioned in Appendix E) and Ethernet module with minimum 8 interfaces. It should incorporate all modules/wiring/cabling and accessories that are mandatory for satisfactory operation at the proposed network node. "

-Each **Set of Teleprotection** Interface shall include at least main and redundant power supply module, cables connecting protection relays (Main I & II, or Main & Backup as per the Appendix H) and all other necessary accessories for proper functioning of the Teleprotection."

3. Appendix D: Technical Requirement Sheet

Replace Appendix D-1 with the following:

D-1. MPLS-TP and Teleprotection

Sl. No	Specified Technical Requirements	To be filled by Bidder
1	List of core (common) cards/modules:	
2	Packet and Ethernet Services	
	A	Minimum of 8 Ethernet interface and expandable to 16 Interface (Yes/No)



	B	Minimum support for 2 optical link directions and expandable to 6 optical link directions with 1+1 redundancy support. (Yes/No)	
	C	Support VLAN Services (Yes/No):	
	D	Ethernet OAM (Yes/No):	
	E	Support Spanning Tree (Yes/No):	
	F	IPv4 support: (Yes/No):	
	G	Adjustable port BW(Auto/Manual) and Transmission (Half/Full Duplex): (Yes/No)	
	H	Channel Segregation capability (Yes/No):	
	I	Channel size allocation capability from minimum 64Kbps (Yes/No):	
	J	Applicable Standards compliance MEF CE 2.0 (Yes/No):	
	K	Please mention applicable standards complied for Ethernet and Packet services:	
3	MPLS-TP		
	A	Make: Model: Country of Origin:	
	B	MPLS-TP OAM with functionalities: - Continuity check (CC) & Continuity verification (CV): (Yes/No) - Active and On-demand status (Yes/No): -Traffic Performance; Forwarding performance at scale, including latency and delay variation: (Yes/No)	
	C	Service Scalability -Number of supported LSPs/PWs:	
	D	Service Quality - Number of supported service levels to meet SLAs:	

E	MPLS FRR support (Yes/No):	
F	L2 VPN Support (Yes/No):	
G	RFC 5654 MPLS-TP or equivalent Requirements (Yes/No)	
H	RFC 5860 MPLS-TP OAM or equivalent Requirements (Yes/No)	
I	RFC 5921 MPLS-TP Architecture Framework or equivalent Requirements (Yes/No)	
J	Please mention applicable standards complied for the MPLS-TP device:	
K	Possible to define CIR/PIR (Yes/No):	
L	Timing and Synchronization. Please mention the supported features: -SyncE with ESMC (Yes/No), - 1588v2 (Yes/No), -External timing 1PPS and TOD (Yes/No), -Internal Stratum 3 clock (holdover state) (Yes/No)	
M	Topologies support (Yes/No): Mesh, dual homing, multi-ring, ring, star, linear.	
N	Supported power supply: (Yes/No): -48VDC	
O	Dual Power Supply (Yes/No):	
P	(If Modular Cards) Hot swappable cards (Yes/ No):	
Q	Rack mountable 19" (Yes/No):	
R	Please mention physical dimensions (W x D x H in inches):	
S	-Environmental Compliances. Please mention standards: -Safety: -EMC/EMI:	
T	Interoperability with different vendors (Yes/No):	



	U	Please mention Pluggable SFP/CSFP/SFP+ support:	
	V	Please mention Max No. of MSP protected directions:	
	W	Please mention No. of plug-in slots available:	
	X	Please mention No. of interface on E1 card:	
	Y	User Selectable / Automatic Periodical Link Test (Yes/No):	
	Z	Link Performance Alarms (Yes/No):	
	AA	System Performance Alarms (Yes/No):	
	AB	Alarms Logging (Yes/No):	
4	Protection		
	A	Hardware redundancy for Power, Optical link (MSP 1+1), controller cards (Yes/No):	
	B	Ethernet Ring Protection (ERPS) (Yes/No):	
	C	MPLS TP Linear protection (Yes/No):	
	D	Switching time less than 50ms (Yes/No):	
	E	Link Aggregation (Yes/No):	
	F	Please mention applicable standards complied for the link protection:	
5	QoS		
	A	Supports 8 CoS Queuing (Yes/No):	
	B	Scheduling Disciplines (Yes/No):	
	C	Congestion Management (Yes/No):	
	D	Traffic classification based on Port, VLAN, Port + VLAN (Yes/No):	
	E	Bandwidth Control (Yes/No):	
	F	Please mention complied applicable standards for the QoS:	
Security			



6	A	Port security & mirroring (Yes/No):	
	B	Security incorporated for accessing the MPLS-TP device:	
	C	MPLS-based Encryption Layer 2.5 (Yes/No):	
	D	Access Control list (ACL) (Yes/No):	
Network Management System			
7	A	NMS, SNMPv2/v3 (Yes/No):	
	B	System monitoring (Temperature, voltage, power, fans, fiber losses and memory utilization) (Please mention all monitoring parameters):	
	C	Remote access for NMS from any network node and from client NMS (Yes/No):	
	D	Configuration, Fault, Performance and Security Management:	
	E	Firmware upgradability (Yes/No):	
	F	Command line interface (CLI) / Graphical User Interface (GUI): (Yes/No):	
	G	User access management (Yes/No):	
	H	OS used (Windows or Linux)	
	I	Please mention complied applicable standards for the NMS:	
Services			
8	A	Support for CES: (SAToP, or CEP) (Yes/No)	
	B	Encapsulation of TDM & IP over MPLS-TP	
	C	Creation of Pseudowires	
	D	Ethernet services	
	E	E1 Services	
Teleprotection			



9	A	<p>Make:</p> <p>Model:</p> <p>Country of Origin:</p>	
	B	Support for minimum 4 Number of Input Binary Commands (Yes/No)	
	C	Support for minimum 4 Number of Output Binary Commands (Yes/No)	
	D	<p>Support for Protection Schemes:</p> <p>-Direct Transfer Tripping, (Yes/No)</p> <p>-Permissive Tripping, (Yes/No)</p> <p>-Blocking Tripping (Yes/No)</p>	
	E	Command Combination, AND / OR (Yes/No)	
	F	Command Transfer Time from one relay to other relay <10ms (Yes/No)	
	H	Supported Command Voltages, User Selectable 48VDC/110V DC / 220V DC (Yes/No)	
	I	<p>Support power supply -please mention which ever that is applicable.</p> <ul style="list-style-type: none"> - 48VDC - 110VDC - 220VDC 	
	J	Loop test feature: (Yes/No)	
		Compliance to Teleprotection equipment of power systems - Performance and testing IEC 60834-1 or 60834-1 or equivalent standards: (Yes/No)	
	K	Please mention complied applicable standards for Teleprotection:	
L	Please mention physical dimensions (W x D x H in inches):		
M	<p>-Environmental Compliances. Please mention standards:</p> <p>-Safety:</p>		



		-EMC/EMI:	
	N	Interoperability with SDH Technology (Yes/No):	
	O	NMS for equipment: (Yes/No)	
	P	Link Performance Alarms: (Yes/No)	
	Panel		
	A	Make: Model: Country of Origin:	
	B	Functions for mounting or placement of equipment (Yes/No)	
10	C	Floor mounted with front & rear access to hardware and wiring. (Yes/No)	
	D	Cable entry from bottom (Yes/No)	
	E	Internal lighting lamp, with door interlock: (Yes/No)	
	F	Exhaust Fan: (Yes/No)	
	G	All material used in the panel are flame retardant: (Yes/No)	
	H	All Louvers provided with suitable wire mesh: (Yes/No)	
	Other Requirements		
11		Environmental Operating Limits -Operation Temperature without damage: -0°C to +50°C (Yes/No): -Storage Temperature: -Humidity up to 95%, Non-condensing (Yes/No): - Operating Elevation up to 3500m (Yes/No):	

4. Appendix I: Project Implementation Plan

Replace the Project Implementation Plan Table with the following:

				Project Implementation Schedule - 15 months (Months after Letter of Award-LOA)
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Sl/ No.	Task Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Site surveys, Engineering, Documents, Submissions and Approvals	■	■	■	■											
2	Inspection, Type Test and Factory Testing of Equipment			■	■	■	■									
3	Supply, Installation, and Integration of Equipment				■	■	■	■	■	■	■	■	■			
4	Site Acceptance Test												■	■		
5	Network Stability Test, Trial Run and Commissioning												■	■	■	■

5. Appendix K: K-1.34 Factory/Site Testing of DCPS

Replace the factory/site tests Table with the Table below.

Sl. No.	Test	FAT	SAT
Tests on DCPS System			
1.	Mechanical & Visual Check Tests		✓
2.	Insulation Test.		
3.	High Voltage Withstand Test		
4.	Switch On Test		✓
5.	DCPS Low voltage & High voltage limits check Test		✓
6.	Pre-alarm test for Battery Voltage Low		✓
7.	Battery Low Voltage Disconnect Level Test		✓
8.	AC Input Low and High voltage limits check Test		
9.	Rectifier Fail Alarm Test		✓
10.	Voltage Regulation Test		
11.	Current Sharing Test		
12.	Total Output Power Test		✓



13.	Hot Plug In Test (if applicable)		✓
14.	Calibration & Parameter settings		✓
15.	Automatic Float cum Boost Charge Mode Change		✓
	Over Test		
16.	Battery Path Current Limiting Test		✓
17.	Battery Charging and full load Current Test		✓
18.	Total Harmonic distortion Test		
19.	Burn in Test at 50 ° C (for 8 hrs duration)		
Tests on SMPS module			
20	Mechanical & Visual Check Test		
21	Module-On Test		
22	Input low/high voltage cut-off test		
23	Voltage Droop Test		
24	Voltage Regulation Test		
25	Power Output & Current Limit Test		
26	DC High Voltage Test		
27	O/P Voltage Ripple Test		
28	Psophometric Noise Test		
29	Efficiency Test		
30	Power Factor		
31.	Input Current Limit		
32.	Rectifier Dynamic Response		
33.	Output Short Circuit Test		
34.	Hold up Time Test		

6. K-2.13 Testing requirements

Replace the factory/site tests Table with the Table below.

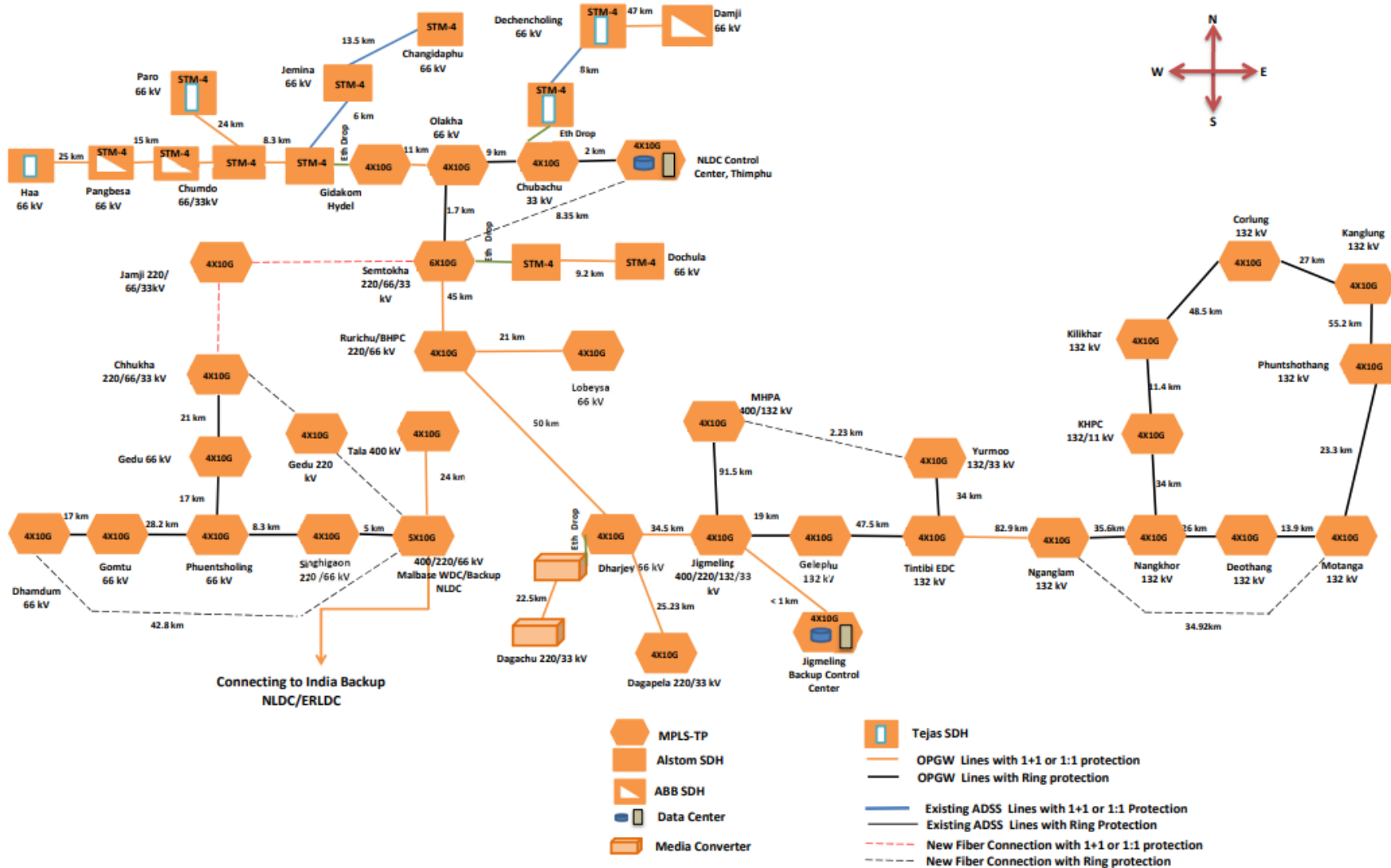
LIST OF TESTS FOR VRLA BATTERY

Sl. No.	Test	Type Test*	FAT	SAT
1	Verification of marking - Visual observation - Dimensional inspection - Polarity checking	X		X
2	Capacity test	X		X



3	<i>Suitability for floating battery operation (to be conducted for 3 months instead of six months)</i>	X		
4	<i>Endurance in discharge/charge cycles (instead of 50, 25 discharge / charge cycles shall be followed)</i>	X		
5	<i>Charge Retention</i>			
6	<i>Short-circuit current and internal resistance</i>	X		
7	<i>Mechanical Tests</i>			
	<i>-Vibration Test (procedure as per IEC 60068-2-6)</i>	X		
	<i>- Free fall Test (procedure as per IEC 60068-2-32)</i>	X		
<p>NOTE: <i>1 The batteries shall meet the general requirements as per IEC 60896/EN 60896.</i> <i>2 *Only the type test reports to be submitted.</i></p>				

7. Appendix B, Figure B-2 shall be replaced as below:

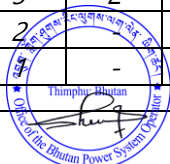


III. Volume – III: Price Schedules

Lot 1: Revamp of SCADA/EMS Systems

LOT 1: REVAMP OF SCADA/EMS SYSTEMS is replaced with the following:

Sl. No.	Item Description	Unit	Quantity		Total Qty.	Ex-works (Nu)	Unit Price (Nu)	Total Price (Nu)	Remarks
			Main NLDC	B/up NLDC					
					1	2	3	4 = 1 x 3	
A	MAIN EQUIPMENT								
1	Application Software								
1.1	SCADA applications	Lot	1	1	2				
1.2	ICCP Communication	Lot	1	1	2				
1.3	Network Management System	Lot	1	1	2				
1.4	Historian System (ISR)	Lot	1	1	2				
1.5	EMS applications								
a)	- Network Topology	Lot	1	1	2				
b)	- State Estimation	Lot	1	1	2				
c)	- Optimal Power flow Analysis	Lot	1	1	2				
d)	- Bus Load Forecast (BLF)	Lot	1	1	2				
e)	- Contingency analysis	Lot	1	1	2				
f)	- Load Forecasting	Lot	1	1	2				
1.6	Web Server Application	Lot	1	1	2				
1.7	Dispatcher Training Simulator (DTS)	Lot	1	-	1				
1.8	Centralized Management Console applications	Lot	1	1	2				
1.9	Patch Management software	Lot	1	1	2				
1.10	Image Backup software	Lot	1	1	2				
1.11	Antivirus server software	Lot	1	1	2				
2	Computer System Hardware								
2.1	Servers								
a)	SCADA/EMS Server	Nos.	2	2	4				
b)	Historian System (ISR) Server	Nos.	2	2	4				
c)	ICCP Server	Nos.	2	2	4				
d)	Communication Front End (CFE) Server	Nos.	2	2	4				
e)	NMS Server	Nos.	2	2	4				
f)	Web/Replica Data/ Antivirus/ Patch Management Server	Nos.	2	2	4				
g)	Centralized Management Console / Image Backup	Nos.	1	1	2				
h)	Dispatcher Training Simulator Server	Nos.	1	-	1				
2.2	Dual TFT Monitor								
a)	Operator Workstation console	Nos.	5	2	7				
b)	Workstation for DTS	Nos.	2	-	2				
c)	Workstation for DDS	Nos.	-	-	1				



2.3	Engineering Laptop	Nos.	3	1	4				
2.4	Next Generation Firewall (NGFW)								
a)	External NGFW	Nos.	1	1	2				
b)	Internal NGFW	Nos.	2	2	4				
2.5	LAN switches								
a)	Dual SCADA/EMS LAN	Lot	1	1	2				
b)	Dual CFE LAN	Lot	1	1	2				
c)	Dual DMZ LAN	Lot	1	1	2				
d)	DTS LAN	Nos.	1	-	1				
2.6	Auxiliary Storage for Historian	Nos.	1	1	2				
2.7	NAS Box	Nos.	1	1	2				
2.8	Server Rack With IP based KVM Switch	Nos.	3	3	6				
2.9	Multifunction Laser Printer	Nos.	1	-	1				
3	Time and Frequency System displays								
3.1	Time & Frequency System (GPS based)	Lot	1	1	2				
3.2	Digital display for Day	Nos.	1	1	2				
3.3	Digital display for Time	Nos.	1	1	2				
3.4	Digital display for Frequency	Nos.	2	2	4				
4	ICCP Integration								
4.1	Integration with Indian NLDC	Lot	1	1	2				
4.2	Integration with DMS	Lot	1	1	2				
5	Furniture	Lot	1	1	2				
6	Video Projection System	Lot	1	-	1				
B	MISCELLANEOUS								
1	Heavy duty Air Conditioner	Lot	-	1	1				
2	Uninterruptible Power Supply (UPS)	Lot	1	1	2				
3	VRLA maintenance-free Battery	Lot	1	1	2				
4	Input ACDB	Lot	1	1	2				
5	Output ACDB	Lot	1	1	2				
6	Civil works	Lot		1	1				
C	TRAINING FOR SCADA/EMS								
1	Overview of SCADA/EMS systems, design process, and implementation	Lot		1	1				
2	Computer System Software and Hardware	Lot		1	1				
3	Database & Display, Applications Software, and Historian	Lot		1	1				
4	NMS and Cyber Security	Lot		1	1				
5	Operator Applications Trainings	Lot			1				

6	Auxiliary Power Supply systems	Lot	1	1				
D	MANDATORY SPARES							
1	Servers including all main memory, auxiliary memory, interface cards complete one of each type	Nos.	2	2				
2	LAN switch one of each type	Nos.	2	2				
3	Router	Nos.	1	1				
E	MAINTENANCE SUPPORT							
1	Annual Maintenance Contract							
1.1	Year 1	Year 1	1	1				
1.2	Year 2	Year 2	1	1				
1.3	Year 3	Year 3	1	1				
1.4	Year 4	Year 4	1	1				
1.5	Year 5	Year 5	1	1				
2	Annual Cyber Security Auditing							
2.1	1 st Year	Year 1	1	1				
2.2	2 nd Year	Year 2	1	1				
2.3	3 rd Year	Year 3	1	1				
2.4	4 th Year	Year 4	1	1				
2.5	5 th Year	Year 5	1	1				
3	Annual Refresher Course							
3.1	1 st Year	Year 1	1	1				
3.2	2 nd Year	Year 2	1	1				
3.3	3 rd Year	Year 3	1	1				
F	INSTALLATION, TESTING, AND COMMISSIONING							
1	Installation, Testing, and commissioning of Video Projection System	Lot	1	1				
2	Installation, Testing, and Commissioning of all the SCADA/EMS systems as required for operation of all the systems as per the technical specifications.	Lot	1	1	2			
3	Installation, Testing, and commissioning of Auxiliary Power Supply such as ACDB, UPS, and VRLA battery banks	Lot	1	1	2			
4	Installation, Testing, and commissioning of Air Conditioners (AC)	Lot		1	1			
Total Amount in Figure (Nu)								



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Project: Revamp of SCADA and Telecommunication Systems

Total Amount quoted in Ngultrum (Nu) in Figure _____ only.

Company Seal

Signature of the Bidder



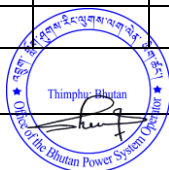
NIT No.: 3/BPSO/Tender/Vol-1/2022/03 dated December 19, 2022

Project: Revamp of SCADA and Telecommunication Systems

Lot 2: Revamp of Telecommunication System

Price Schedule for LOT 2: Revamp of Telecommunication System is replaced with the following:

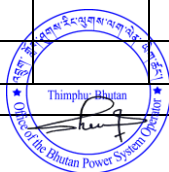
Sl. No.	Item Description	MPLS-TP					Teleprotection Interface					
		Unit	Quantity	Ex-Works (Nu/INR)	Unit Price (Nu/INR)	Sub-Total (Nu/INR)	Unit	Quantity	Ex-Works (Nu/INR)	Unit Price (Nu/INR)	Sub-Total (Nu/INR)	Total Price (Nu/INR)
			1	2	3	4=1x3		5	6	7	8=5x7	9=4+8
A	Supply of Main Equipment											
1	National Load Dispatch Centre (NLDC)	Set	1				Set	0				
2	Chubachhu Substation	Set	1				Set	0				
3	Olakha Substation	Set	1				Set	1				
4	Gidagom Mini-hydel	Set	1				Set	0				
5	Jamji Station	Set	1				Set	2				



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6	Chhukha Hydropower Plant	Set	1				Set	5				
7	Gedu 66 kV Substation	Set	1				Set	0				
8	Gedu 220 kV Substation	Set	1				Set	2				
9	Phuentsholin g Substation	Set	1				Set	0				
10	Singhigaon Substation	Set	1				Set	2				
11	Malbase Substation	Set	1				Set	6				
12	Dhamdum	Set	1				Set	2				
13	Gomtu	Set	1				Set	0				
14	Tala Hydropower Plant	Set	1				Set	4				
15	Semtokha Substation	Set	1				Set	2				
16	Lobeysa Substation	Set	1				Set	0				
17	Basochhu Hydropower Plant	Set	1				Set	2				
18	Dharjey	Set	1				Set	2				
19	Dagapela	Set	1				Set	1				



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Project: Revamp of SCADA and Telecommunication Systems

20	Jigmeling Substation	Set	1				Set	10				
21	Backup NLDC, Jigmeling	Set	1				Set	0				
22	Mangdechhu (MHP)	Set	1				Set	5				
23	Gelephu Substation	Set	1				Set	2				
24	Yurmoo Substation	Set	1				Set	2				
25	Tintibi Substation	Set	1				Set	3				
26	Nganglam Substation	Set	1				Set	3				
27	Nangkor Substation	Set	1				Set	3				
28	Kurichhu Hydropower Plant	Set	1				Set	2				
29	Kilikhar Substation	Set	1				Set	2				
30	Corlung Substation	Set	1				Set	2				
31	Kanglung Substation	Set	1				Set	2				
32	Phuntshothan g Substation	Set	1				Set	2				

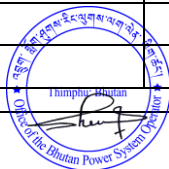


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Project: Revamp of SCADA and Telecommunication Systems

33	Motanga Substation	Set	1			Set	3				
34	Deothang Substation	Set	1			Set	2				
Total Amount quoted in Ngultrum for the Supply of Main Equipment (A)=											

Sl.No	Item Description	Unit	Quantity	Ex-works (Nu)	Unit Price (Nu)	Total Price (Nu)	Remarks
			1	2	3	4= 1x3	
B	Supply of other equipment						
I	NMS at NLDC						
1	Software	LOT	1				
2	Workstation / Server	LOT	2				
3	Craft Terminal	Nos.	2				
II	Supplementary Modules of Main Equipment						
1	E1 Interface	Nos.	1				
2	Optical Amplifier	Nos.	1				
II	Spares						
1	MPLS-TP	Set	5				
2	Teleprotection Interface	Set	5				



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Project: Revamp of SCADA and Telecommunication Systems

3	Ethernet Cards	Nos.	5				
III Miscellaneous							
1	48VDC Power Supply System	Nos.	3				
2	GPS	Set	1				
IV Annual Maintenance Contract							
1	Year 1	LOT	1				
2	Year 2	LOT	1				
3	Year 3	LOT	1				
V Training For Communication System							
1	Design, installation, and maintenance of Communication equipment	LOT	1				
2	Communication NMS	LOT	1				
3	Teleprotection	LOT	1				
VI Installation, Testing and Commissioning							
1	Installation, Testing, and Commissioning of the Communication System	LOT	1				
Total Amount quoted in Ngultrum (Nu) for other equipment(B)=							



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Project: Revamp of SCADA and Telecommunication Systems

<i>Total Amount quoted in Ngultrum (Nu) for the Communication System(C)=A+B</i>



C General

1. The detailed replies to the queries received from the Bidders are enclosed as **Appendix – I** to this Main Text.
2. This Addendum consists of the following:
 - (a) This Main Text of the Addendum, along with
 - (b) Replies to Bidders' Queries
3. All the above form Part of the Tender Documents.

