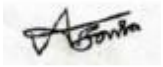
Addendum-01

TENDER NO. Tender Ref: MANPBT0035 DT.27.04.2026: PRE BID TIE UP FOR BOS PACKAGE OF 200MW SOLAR PROJECT IN BIKANER

Addendum: 01 Date: 11.05.2026

Addendum: 01 Date: 11.05.2026
Technical amendments is attached. Bidder to comply all the civil , Electrical , mechanical , Design inline with end customer & BHEL Specifications , amendments.

Any Queries shall be contacted to
For Commercial Clarifications: k.manoj@bhel.in
For Technical Clarifications: punam@bhel.in;krishnaj@bhel.in

Prepared by: SAR (Mgr)	Reviewed by : VJ (SM)	Approved by: PM (AGM)
		Digitally signed by PUNAM MISHRA DN: cn=PUNAM MISHRA, o=BHEL, ou=SBD, email=punammishra@bhel.in, c=US Date: 2026.05.11 16:28:19 +05'30'

Amendments shall be along with Technical specification for Balance of System (BOS) package for 200 MW Grid Connected Solar PV Projects in Bikaner, Rajasthan

Sl. No.		Existing Clause	Amended Clause
1.		……. DC & AC source of supply required for the above equipment at Switchyard Control Room. …….	……. 220V DC & 230V Raw AC source of supply required for the above equipment at Switchyard Control Room. However, Bidder shall install redundant UPS and battery for reliable AC supply for above equipment. …….
2.		……. **Drawing No. 5800-004(BOS2)-POE-A-001 Block Single Line Diagram** …….	…….. **Revision 1 of Drawing No. 5800-004(BOS2)-POE-A-001 Block Single Line Diagram issued as Annexure-1 to Technical Amendment No.1.** ……..
3.		……. Bidder shall install only Static Var Generators (SVG) for additional dynamic reactive power compensation beyond the dynamic reactive power compensation capability of inverters (as per the minimum inverter rating mentioned at Chapter 2A of this document) for the 200MW project to ensure compliance of dynamic reactive power compensation at rated capacity at POI (ISTS end) under CEA technical standard of connectivity to Grid and "Report of the Working Group in respect of Data Submission Procedure And Verification of Compliance to CEA Regulations on Technical Standards for Connectivity to the Grid by RE Generators July 2022". Phasor Measurement Units (PMUs) shall be provided at the output of SVGs in accordance with CEA	…….. Bidder shall install only Static Var Generators (SVG) for additional dynamic reactive power compensation beyond the dynamic reactive power compensation capability of inverters (as per the minimum inverter rating mentioned at Chapter 2A of this document) for the 200MW project to ensure compliance of dynamic reactive power compensation at rated capacity at POI (ISTS end) under CEA technical standard of connectivity to Grid and "Report of the Working Group in respect of Data Submission Procedure And Verification of Compliance to CEA Regulations on Technical Standards for Connectivity to the Grid by RE Generators July 2022". ~~**Phasor Measurement Units (PMUs) shall be provided at the output of SVGs in accordance with CEA guidelines for placement of Phasor Measurement Units**~~

<table>
<tr><th>Sl. No.</th><th></th><th>Existing Clause</th><th>Amended Clause</th></tr>
<tr><td></td><td></td><td>guidelines for placement of Phasor Measurement Units in Indian Grid dated 19.03.2025 (and subsequent amendments if any).
…….</td><td><s>in Indian Grid dated 19.03.2025 (and subsequent amendments if any).</s>
……..</td></tr>
<tr><td>4.</td><td></td><td>…….
PV Analyzer (complete KIT with software)
Bidder shall provide minimum 2 Numbers of PV Analyzer Kits of reputed make to measure the PV Module performance. Analyzer kit shall have all necessary hardware connectors and required software for data analysis. The Offered make and model must not be obsolete and shall have valid calibration certificate. It must have required software for data analysis.
<table>
<tr><td>SL No</td><td>Details</td><td>Values</td></tr>
<tr><td>1.</td><td>PV Voltage</td><td>0-1500 V DC</td></tr>
<tr><td>2.</td><td>PV Current</td><td>0-30 A DC</td></tr>
<tr><td>3.</td><td>Voltage Accuracy</td><td>+/- 0.25 V</td></tr>
<tr><td>4.</td><td>Current Accuracy</td><td>+/- 40 mA</td></tr>
<tr><td>5.</td><td>Operating Temperature</td><td>0-45 Deg C</td></tr>
</table>
……..</td><td>…….
PV Analyzer (complete KIT with software)
Bidder shall provide minimum 2 Numbers of PV Analyzer Kits of reputed make to measure the PV Module performance. Analyzer kit shall have all necessary hardware connectors. The Offered make and model must not be obsolete and shall have valid calibration certificate and to have required servicing facility indigenously
and must have required software for data analysis.
The bidders may be asked to provide satisfactory performance certificate from the users for the offered model.
<table>
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<tr><td>4.</td><td>Current Accuracy</td><td>±(0.5%+0.04A)</td></tr>
<tr><td>5.</td><td>Operating Temperature</td><td>0-45 Deg C</td></tr>
</table>
……..</td></tr>
<tr><td>5.</td><td></td><td>…….
DCP Type (ABC type) (10 Kg. Capacity).</td><td>…….
DCP Type (ABC type) (9 Kg. Capacity).</td></tr>
</table>

Sl. No.		Existing Clause	Amended Clause
		…….	…….
6.		…….. Additionally, 01 (one) number second class pyranometer as per ISO 9060 for measurement of Diffuse Horizontal Irradiance (DHI) shall also be supplied. **Shadow ring/ball for measuring DHI shall require no regular adjustment for of tracker and shadow ring/ball. Pyranometer shall be shaded throughout the day and shall be exposed to diffuse solar radiation only to provide DHI value without any calculation.** **All the Pyranometer have to be mounted at single location at shadow free area. The GII Pyranometer has to be at the same inclination as the angular tilt of module mounting structure. The above quantity of pyranometers shall be installed at central weather monitoring system.** **Bidder shall provide 1 (One) no. Battery powered portable handheld data logger supplied by the OEM of the offered Pyranometer.** In addition to the above, bidder shall provide **one pyranometer each with same specification & SCADA integration for every 100MW capacity and part thereof** to be installed at various	…….. Additionally, 01 (one) number second class pyranometer as per ISO 9060 for measurement of Diffuse Horizontal Irradiance (DHI) shall also be supplied. **Shadow ring/ball for measuring DHI shall require no regular adjustment of tracker and shadow ring/ball at any point. The offered tracker shall be compliant to the relevant IEC. Pyranometer shall be shaded throughout the day and shall be exposed to diffuse solar radiation only to provide DHI value without any calculation. The DNI shall track sun and not require any adjustment.** **These Pyranometers have to be mounted at location which is shadow free. The GII Pyranometer has to be at the same inclination as the angular tilt of module mounting structure. The above pyranometers shall be installed at central weather monitoring system also called primary WMS system.**

Sl. No.		Existing Clause	Amended Clause
		locations inside Project which shall be finalized during detailed engineering stage. The mounting structure shall have provision to fix the pyranometer in horizontal and tilted position. Bidder also needs to provide additional pyranometer with same specification & SCADA integration for the purpose of PG test as specified in the PG test procedure chapter. ……..	**Bidder shall also provide an albedometer each with Class A type pyranometers at the primary weather stations.** **Bidder shall provide 1 (One) no. Battery powered portable handheld data logger supplied by the OEM of the offered Pyranometer.** In addition to the above, bidder shall provide **one pyranometer measuring GHI, GII and an albedometer each with same specification as above & SCADA integration through data logger for every 100MW capacity and part thereof** to be installed at various locations inside. These shall also be located at shadow free area. The location of these pyranometers shall be distributed evenly across the entire layout however the exact location of these shall be finalized during detailed engineering stage. The mounting structure shall have provision to fix the pyranometer in horizontal and tilted position. **These pyranometers along with soiling station shall be called as secondary weather stations.** Bidder also needs to provide additional pyranometer with same specification & SCADA integration for the purpose of PG test/OTGT as specified in the respective chapter. ……..
7.		……. **METEOROLOGICAL STATION**	……. **METEOROLOGICAL STATION**

Sl. No.		Existing Clause	Amended Clause
		Sensors shall be installed at suitable height for which Mast/Structure for the sensor shall be provided by the bidder. Proper fencing shall be provided around meteorological station where the Pyranometer, Wind, Ambient Temp. Sensor, Data logger etc. are installed. …….	Sensors shall be installed at suitable height for which Mast/Structure for the sensor shall be provided by the bidder. Proper fencing shall be provided around meteorological station where the Pyranometer, Wind, Ambient Temp. Sensor, Data logger etc. are installed. **Bidder to ensure that the height at which pyranometers are installed shall be such that it is accessible for the cleaning purpose.** …….
8.		……. In case bidder proposes outdoor inverter with shed arrangement, the bidder must ensure that the inverter has provision of fire sensing system. Else, the fire detection system must be provided in the Inverter shed. ……	……. In case bidder proposes outdoor inverter with shed arrangement, the bidder must ensure that the inverter has provision of fire sensing system. Else, the fire detection system must be provided in **the ICR area. Bidder must submit certificate from the inverter manufacturer ascertaining the above during detailed engineering.** ……
9.		…….. **COMMUNICATION CABLE (Optic Fibre Cable)** Optic Fiber cable shall be 8/12 core, galvanized corrugated steel taped armoured, fully water blocked with dielectric central member for outdoor /indoor application so as to prevent any physical damage. ……	……. **COMMUNICATION CABLE (Optic Fibre Cable)** Optic Fiber cable shall be 8/12 core, galvanized corrugated steel taped armoured **or corrugated ECCS**, fully water blocked with dielectric central member for outdoor /indoor application so as to prevent any physical damage. ……

<table>
<tr><th>Sl. No.</th><th></th><th>Existing Clause</th><th>Amended Clause</th></tr>
<tr><td>10.</td><td></td><td>…….<table><tr><th>Sl No</th><th>Description</th><th>Quantity</th></tr><tr><td>1</td><td>Engineering cum Operator work station (EWS+OWS) (Desktop & Monitor)</td><td>01 Set</td></tr><tr><td>2</td><td>Operator work station (OWS) (Desktop & Monitor)</td><td>01 Set</td></tr><tr><td>3</td><td>Portable (laptop based) EWS</td><td>01 No</td></tr><tr><td>4</td><td>Historian (Desktop)</td><td>01 No</td></tr><tr><td>5</td><td>55 Inch LED display</td><td>01 No</td></tr><tr><td><s>6</s></td><td>Time Synchronization equipment*</td><td>01 No</td></tr><tr><td>7</td><td>Control Desk</td><td>01 Set</td></tr><tr><td>8</td><td>Chairs for Control Desk</td><td>02 No</td></tr><tr><td>9</td><td>Laser Printer</td><td>01 No</td></tr></table>…….</td><td>…….<table><tr><th>Sl No</th><th>Description</th><th>Quantity</th></tr><tr><td>1</td><td>Engineering cum Operator work station (EWS+OWS) (Server with Monitor)</td><td>01 Set</td></tr><tr><td>2</td><td>Operator work station (OWS) (Server with Monitor)</td><td>01 Set</td></tr><tr><td>3</td><td>Portable (laptop based) EWS</td><td>01 No</td></tr><tr><td>4</td><td>Operator work station (OWS) (Server with Monitor) for Robotic Cleaning</td><td>01 No</td></tr><tr><td>5</td><td>Operator work station (OWS) (Server with Monitor) for Tracker system</td><td>01 No</td></tr><tr><td>6</td><td>Historian (Server with monitor)</td><td>01 No</td></tr><tr><td>7</td><td>55 Inch LED display</td><td>01 No</td></tr><tr><td>8</td><td>Time Synchronization equipment*</td><td>01 No</td></tr></table></td></tr>
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<tr><td></td><td></td><td></td><td>
<table>
<tr><td>9</td><td>Control Desk</td><td>01 Set as per the systems offered</td></tr>
<tr><td>10</td><td>Chairs for Control Desk</td><td>As per the systems offered</td></tr>
<tr><td>11</td><td>Laser Printer</td><td>01 No</td></tr>
<tr><td>12</td><td>CCTV Display screen 55’’ Minimum</td><td>01 No (Minimum).</td></tr>
</table>
…….
</td></tr>
<tr><td>11.</td><td></td><td>…..
CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM
…...</td><td>…….
CCTV Chapter Replaced with New chapter placed at Annexure-2 to Technical Amendment No.1.
…….</td></tr>
<tr><td>12.</td><td></td><td>……
Solar Inverters shall be provided with Dual or Multi Master facility, whereas WMS shall be provided with Single or Dual Master facility. Bidder shall install and place its SCADA system along</td><td>……
Solar Inverters shall be provided with Dual or Multi Master facility, whereas WMS shall be provided with Single or Dual Master facility. Bidder shall install and place its SCADA system along with</td></tr>
</table>

Sl. No.		Existing Clause	Amended Clause
		with its terminals at Room provided by NTPC REL at its Pooling substation Switchyard control Room. **NTPC REL shall use the bidder's plant SCADA Network/Communication infrastructure for integration with redundant Power Plant Controller (PPC), installed by NTPC REL at Switchyard Control Room**. Suitable spare dedicated media in communication infrastructure and spare port at SCADA Switch/Controller to be kept by bidder in this regard. ……	its terminals at Room provided by NTPC REL at its Pooling substation Switchyard control Room. **Bidder shall install redundant Slave Power Plant Controller (PPC) under the subject package. NTPC REL shall use the bidder's plant SCADA Network/Communication infrastructure for integration of redundant Slave Power Plant Controller (PPC) with the redundant Master Power Plant Controller (PPC) installed by NTPC REL at Switchyard Control Room. Thus, centralized control of Solar inverters and data communication with WMS from Master PPC shall be facilitated**. Suitable spare dedicated media in communication infrastructure and spare port at SCADA Switch/Controller to be kept by bidder in this regard. **Reliable UPS with Battery for Bidder's SCADA and Slave PPC to be installed at Owner's PSS control room shall be in bidder's scope. Raw AC supply shall be provided by NTPC REL** ……
13.		…… PPC & Substation SCADA at owner's switchyard control Room. …...	…… **Master** PPC & Substation SCADA at owner's switchyard control Room. ……
14.		…… 3. PQ meters & metering system for **PG Test**.	…… 3. PQ meters & metering system for **OTGT**.

Sl. No.		Existing Clause	Amended Clause
		4. Grid Compliance Study, PPC & Substation SCADA at Switchyard Control Room. 5. Space for accommodating Solar SCADA and other associated equipment at Substation Switchyard Control Room. ……	4. GRID compliance study, **Master** PPC and substation Scada at Switchyard control room. 5. Space for accommodating **Solar SCADA**, **Slave PPC** and other associated equipment at Substation Switchyard Control Room. ……
15.		**---- New clause added--------**	…… **Bidder shall supply install redundant Slave Power Plant Controller (PPC) for the 200MW Solar Block in Owner's PSS control room. The same shall be integrated with Owner's redundant Master Power Plant Controller (PPC).** ……
16.		…… SCADA & Time Synchronization Equipment ……	…… SCADA, Slave PPC & Time Synchronization Equipment ……
17.		…… **Bidder shall provide fully automated solution to clean the rows daily at least one cycle (in back-and-forth direction). A minimum of 75% of trackers shall conform to the above condition. Further, the bidder shall also provide an alternate automated solution to use one robot for multiple rows for the remaining areas with**	…… **Semi-automatic robots (One robot for multiple rows) shall only be applicable wherein the length of the continuous tables is less than 300 Mtrs. However, on all other stretches fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. This will be finalized during detailed engineering w.r.t. overall layout and site conditions.**

Sl. No.		Existing Clause	Amended Clause
		smaller row length. However, this will be decided during detailed engineering w.r.t. overall layout and site conditions. ……	……
18		…… **---New chapters B-17 and B-18 added-----** …...	**……** **New Chapter B-17 for "DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT" and B-18 for "HARMONIC FILTERS" enclosed as Annexure-3 to Technical Amendment No.1.** **……**
19		…… Value of LD **in INR** = Shortfall in Generation (MU) x Tariff **= INR ΔG x R** Maximum Value of LD towards shortfall in generation during O&M period = Energy charges for 5% of Evaluated generation **= 0.05 × GY × R INR** Where R is the applicable tariff for LD i.e. INR 3.52/kWh. GY is the evaluated 1st Year Generation by the bidder. ……	…… Value of LD **in million INR** = Shortfall in Generation (MU) x Tariff **= Million INR ΔG x R** Maximum Value of LD towards shortfall in generation during O&M period = Energy charges for 5% of Evaluated generation **= 0.05 × GY × R Million INR** Where R is the applicable tariff for LD i.e. INR 3.52/kWh. GY is the evaluated 1st Year Generation by the bidder. ……

Annexures to Technical Amendment No. 1:

Annexure-1: Drawing No. 5800-004(BOS2)-POE-A-001 Revision 1: Block Single Line Diagram

Annexure-2: Replaced Chapter D-8 (CLOSED CIRCUIT TELEVISION SYSTEM (CCTV))

Annexure-3: New Chapter B-17 for "DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT" and B-18 for "HARMONIC FILTERS"

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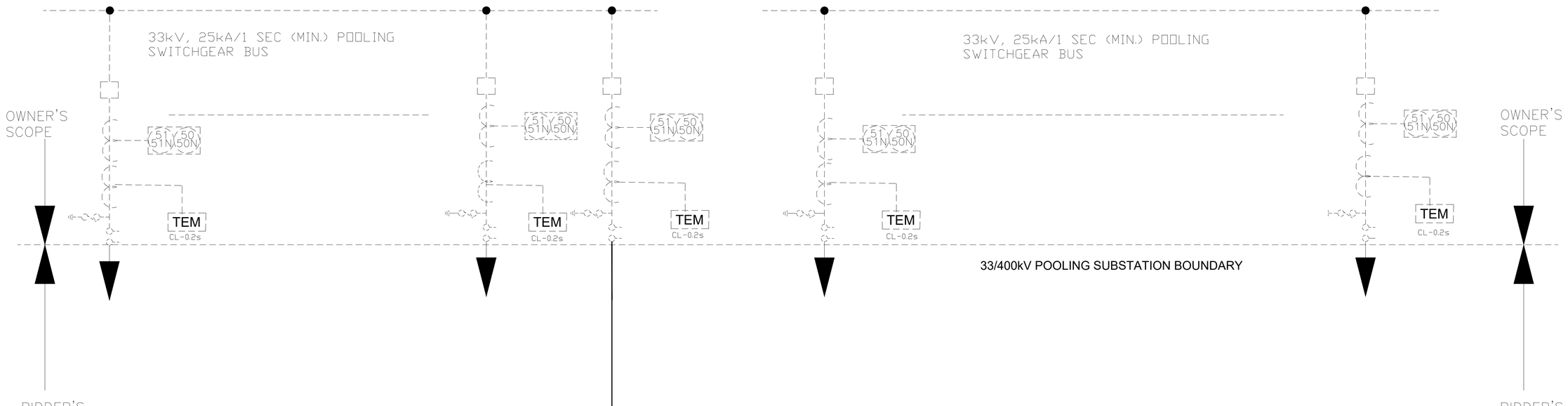
33 kV MAIN POOLING INDOOR SWITCHGEAR AT OWNER'S 33/400kV POOLING SUBSTATION SWITCHYARD

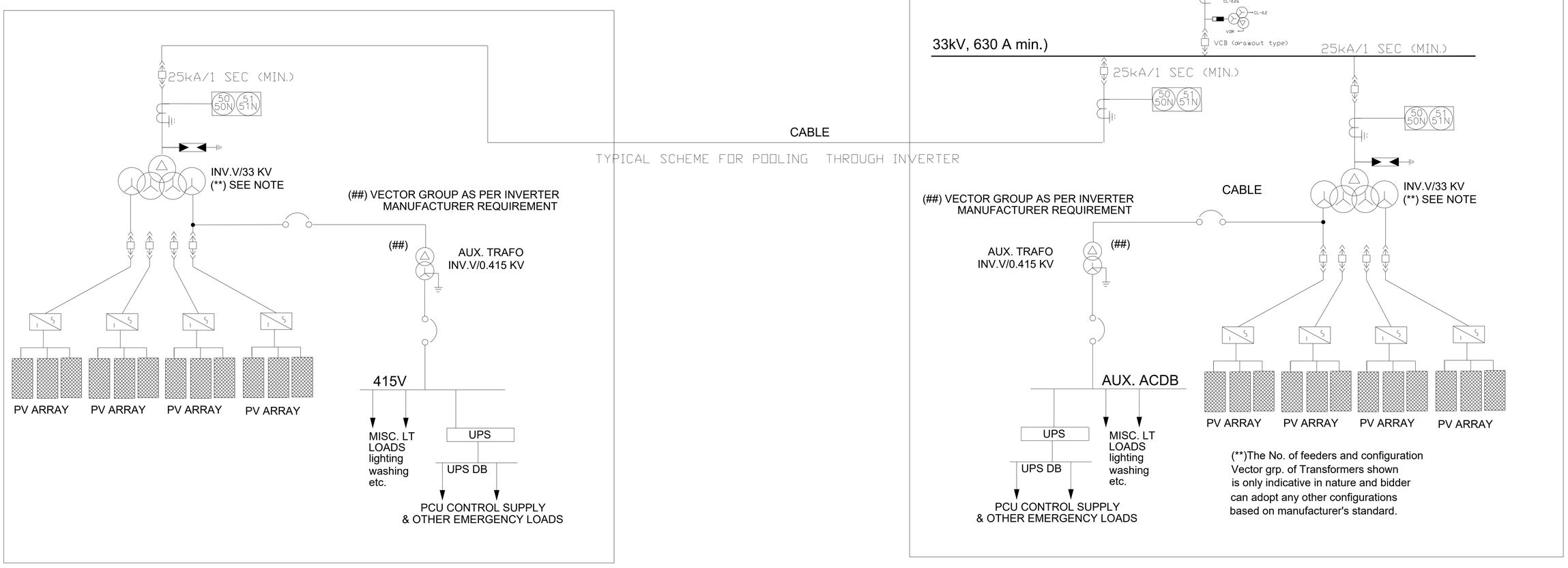


THE MAXIMUM NUMBER OF 33kV INCOMER FEEDERS AVAILABLE AT 33KV MAIN POOLING SWITCHGEAR OF OWNER'S POOLING SUBSTATION, FOR INTERCONNECTION OF SOLAR PLANT CABLES, DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT AND HARMONIC FILTERS OF THE 200MW SOLAR BLOCK IS SEVEN (7). THE POWER FROM THE 200MW SHALL BE EQUALLY DIVIDED (TO THE EXTENT POSSIBLE) AMONG THE ABOVE 33KV FEEDERS DESIGNATED FOR THE RESPECTIVE BLOCK. 33KV CABLES SHALL BE SUITABLY SIZED TO CARRY THE POWER FROM SOLAR PLANT. NO ADDITIONAL FEEDERS WILL BE PROVIDED BEYOND THE SPECIFIED NUMBER OF FEEDERS FOR INTERCONNECTION OF SOLAR BLOCKS, HARMONIC FILTERS, REACTIVE POWER COMPENSATION EQUIPMENT ETC.

(Max. 55 MW)
33kV CABLES

ALTERNATE CONFIGURATION TO LOCAL POOLING SWITCHGEAR :-

BIDDER CAN DIRECTLY TERMINATE CABLE (UPTO 3 SETS) FROM UPTO THREE SEPARATE SAME CAPACITY SOLAR INVERTER BLOCKS (WITH ICOG) AT ONE MAIN POOLING STATION 33kV FEEDER. IF ANY OF THE SEPARATE FEEDERS (UPTO THREE) PROPOSED BY THE BIDDER FOR TERMINATION AT ONE NTPC REL'S 33kV POOLING SWITCHGEAR FEEDER IS OF DIFFERENT CAPACITY FROM THE OTHER(S), THEN THE SAME MAY ALSO BE ALLOWED FOR INTERCONNECTION TO THE SAME FEEDER, AFTER REVIEWING THE INVERTER BLOCK CAPACITIES TAKING INTO ACCOUNT THE ELECTRICAL PROTECTION REQUIREMENTS.



TYPICAL SCHEME FOR POOLING THROUGH INVERTER

NOTES:

1. THERE IS NO CMCS BUILDING ENVISAGED FOR THE 200MW SOLAR PROJECT UNDER BIDDER'S SCOPE. BIDDER SHALL PLACE THE SCADA/OWS/EWS PANEL, AT OWNER'S POOLING SUBSTATION SWITCHYARD CONTROL BUILDING. NTPC REL SHALL PROVIDE REDUNDANT 220V DC AND 230V AC SUPPLY SOURCE TO THE BIDDER FOR SCADA/OWS/EWS PANEL AT OWNER' SWITCHYARD CONTROL ROOM. NECESSARY WIRING IS IN BIDDER'S SCOPE. BIDDER SHALL PROVIDE SUITABLE UPS WITH BACK UP TIME AS MENTIONED IN THE TECHNICAL SPECIFICATIONS FOR THE AFORESAID EQUIPMENT IN OWNER'S SWITCHYARD CONTROL BUILDING (AS REQUIRED).
2. IN CASE OF OUTDOOR INVERTER, THE INBUILT LT TRANSFORMER FOR AUX SUPPLY SHOULD BE DESIGNED AND SIZED IN ORDER TO TAKE CARE OF ALL EMERGENCY LOADS AND MISCELLANEOUS LOADS RELATED TO MAINTENANCE ACTIVITY WITH REDUNDANCY.
3. SUITABLE UPS AND/OR DC SYSTEM WITH BACK UP AS PER TS IS TO BE PROVIDED FOR AUXILIARY POWER SUPPLY FOR PCS (IF REQUIRED) AND OTHER PROTECTION,CONTROL AND ANY EMERGENCY LOADS.
4. THE INVERTER TRANSFORMER ARRANGEMENT SHOWN IS TYPICAL,THE TRANSFORMER CONFIGURATION,VECTOR GROUP, IMPEDANCE ,INSULATION CLASS ETC. AS PER INVERTER MANUFACTURER RECOMMENDED DESIGN PARAMETER /ARRANGEMENT.
5. BIDDER SHALL USE 33kV CABLES FOR CONNECTING FROM LOCAL POOLING SWITCHGEAR/ICOG (AS APPLICABLE) TO OWNER'S 33kV MAIN POOLING SWITCHGEAR DIRECTLY. SUPPLY OF CABLES AND ACCESSORIES INCLUDING JOINTING AND TERMINATION KITS INCLUDING LAYING AND TERMINATION SHALL BE IN THE SCOPE OF THE BIDDER.
6. OTGT TEST SHALL BE PERFORMED AT THE METERING POINT SPECIFIED IN TECHNICAL SPECIFICATION.
7. BIDDER MAY USE LOCAL POOLING SWITCHGEAR FOR LOCAL POOLING OR CONNECT INVERTER TRANSFORMER OUTPUT TO THE 33KV POOLING SWITCHGEAR THROUGH ICOG TYPE BREAKER PANEL AT INVERTER TRANSFORMER END.
8. BIDDER TO PROVIDE ALL TECHNICAL DETAILS INCLUDING INVERTER PSSE MODEL, PSCAD MODEL & INVERTER BENCHMARKING REPORT TO NTPC REL AND FACILITATE NTPC REL FOR CONDUCTING GRID CONNECTIVITY COMPLIANCE AS PER LATEST CEA TECHNICAL STANDARD FOR CONNECTIVITY TO GRID AND ACTUAL REQUIREMENT OF INVERTER DETAILS SHALL BE INTIMATED BY NTPC REL DURING DETAILED ENGINEERING
9. INVERTER SHALL BE PROVIDED WITH DUAL OR MULTIMASTER FACILITY & WMS SHALL BE PROVIDED WITH DUAL OR SINGLE MASTER FACILITY.
10. BIDDER TO PROVIDE NECESSARY ARRANGEMENT TO TRANSMIT SOLAR PLANT DATA TO STATE LDC/RLDC/REMC AS PER TELEMETRY REQUIREMENT OF RELEVANT REGULATION, GUIDELINES. NECESSARY COMMUNICATION INFRASTRUCTURE/SOFTWARE IN THIS REGARD UPTO LDC SHALL BE UNDER BIDDER'S SCOPE. BIDDER SHALL USE PROPOSED FOTE PANEL TO BE INSTALLED AT NTPC REL SWITCHYARD CONTROL ROOM FOR SOLAR SCADA DATA AVAILABILITY TO RLDC/REMC. IF ANY MODIFICATIONS /UPGRADATION IS REQUIRED AT FOTE, IT SHALL BE DONE BY THE BIDDER.
11. THE METALLIC SCREEN/ARMOUR OF CORE AND CONDUCTOR OF HT CABLES SHALL BE CAPABLE OF CARRYING SYSTEM EARTH FAULT CURRENT.
12. HARMONIC FILTERS SHALL BE INSTALLED AT NECESSARY LOCATIONS KEEPING IN VIEW OF POWER TRANSFORMER CONFIGURATION OF INDIVIDUAL BLOCKS SUCH THAT THE STATUTORY REQUIREMENTS AT POI ARE MET WITH.
13. SUPPLY OF SOLAR PV MODULES IS NOT IN THE SCOPE OF THE BIDDER

FOR TENDER PURPOSE ONLY

एन टी पी सी नवीकरणीय NTPC RENEWABLES

NTPC Renewable Energy Ltd
(A GROUP COMPANY OF NTPC LTD)
(ENGINEERING DIVISION)

PROJECT
BALANCE OF SYSTEM (BOS) PACKAGE FOR DEVELOPMENT OF 200MW GRID CONNECTED SOLAR PV PROJECT AT BIKANER, RAJASTHAN

TITLE **BLOCK SINGLE LINE DIAGRAM**

PREPARED BY	CHECKED BY		APPROVED BY	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
	CIVIL	ELE.						
RR		JPP	AD	05.05.2026		NTS	5800-004(BOS2)-POE-A-001/1	R1

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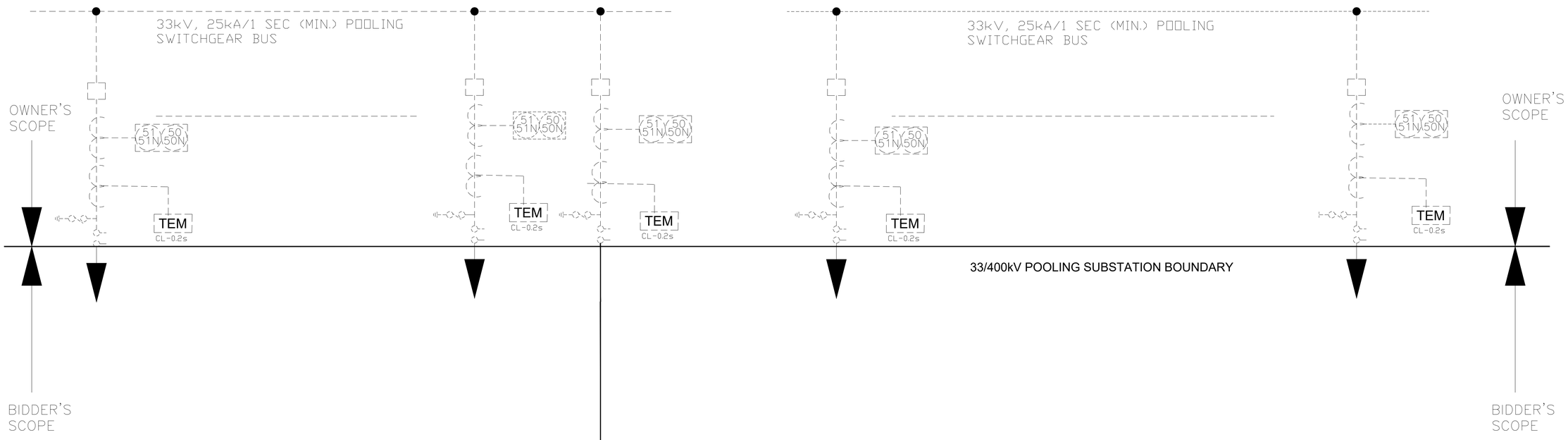
33 kV MAIN POOLING INDOOR SWITCHGEAR AT OWNER'S 33/400kV POOLING SUBSTATION SWITCHYARD



THE MAXIMUM NUMBER OF 33kV INCOMER FEEDERS AVAILABLE AT 33KV MAIN POOLING SWITCHGEAR OF OWNER'S POOLING SUBSTATION, FOR INTERCONNECTION OF SOLAR PLANT CABLES, DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT AND HARMONIC FILTERS OF THE 200MW SOLAR BLOCK IS SEVEN (7). THE POWER FROM THE 200MW SHALL BE EQUALLY DIVIDED (TO THE EXTENT POSSIBLE) AMONG THE ABOVE 33KV FEEDERS DESIGNATED FOR THE RESPECTIVE BLOCK. 33KV CABLES SHALL BE SUITABLY SIZED TO CARRY THE POWER FROM SOLAR PLANT. NO ADDITIONAL FEEDERS WILL BE PROVIDED BEYOND THE SPECIFIED NUMBER OF FEEDERS FOR INTERCONNECTION OF SOLAR BLOCKS, HARMONIC FILTERS, REACTIVE POWER COMPENSATION EQUIPMENT ETC.

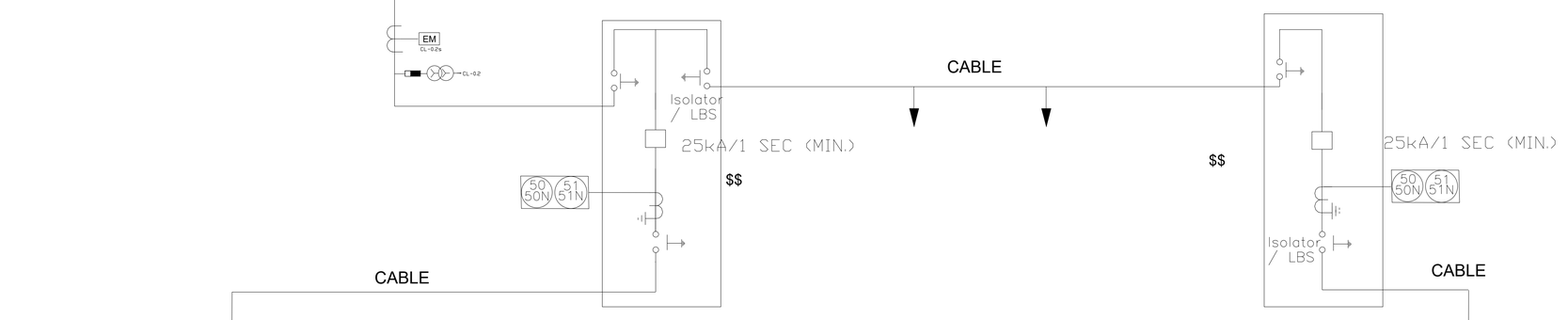
(Max. 55 MW)
33kV CABLES

ALTERNATE CONFIGURATION TO LOCAL POOLING SWITCHGEAR :-

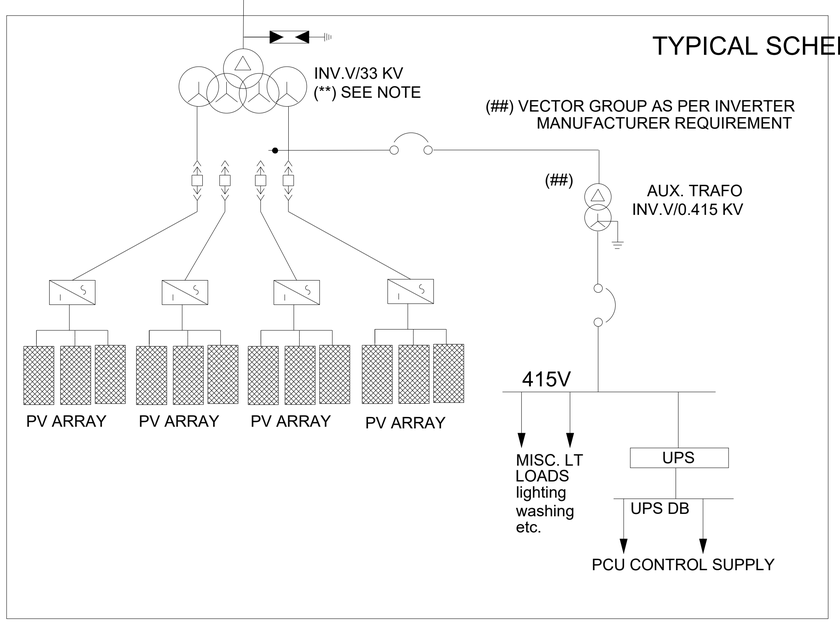
BIDDER CAN DIRECTLY TERMINATE CABLE (UPTO 3 SETS) FROM UPTO THREE SEPARATE SAME CAPACITY SOLAR INVERTER BLOCKS (WITH ICOG) AT ONE MAIN POOLING STATION 33kV FEEDER. IF ANY OF THE SEPARATE FEEDERS (UPTO THREE) PROPOSED BY THE BIDDER FOR TERMINATION AT ONE NTPC REL'S 33kV POOLING SWITCHGEAR FEEDER IS OF DIFFERENT CAPACITY FROM THE OTHER(S), THEN THE SAME MAY ALSO BE ALLOWED FOR INTERCONNECTION TO THE SAME FEEDER, AFTER REVIEWING THE INVERTER BLOCK CAPACITIES TAKING INTO ACCOUNT THE ELECTRICAL PROTECTION REQUIREMENTS.

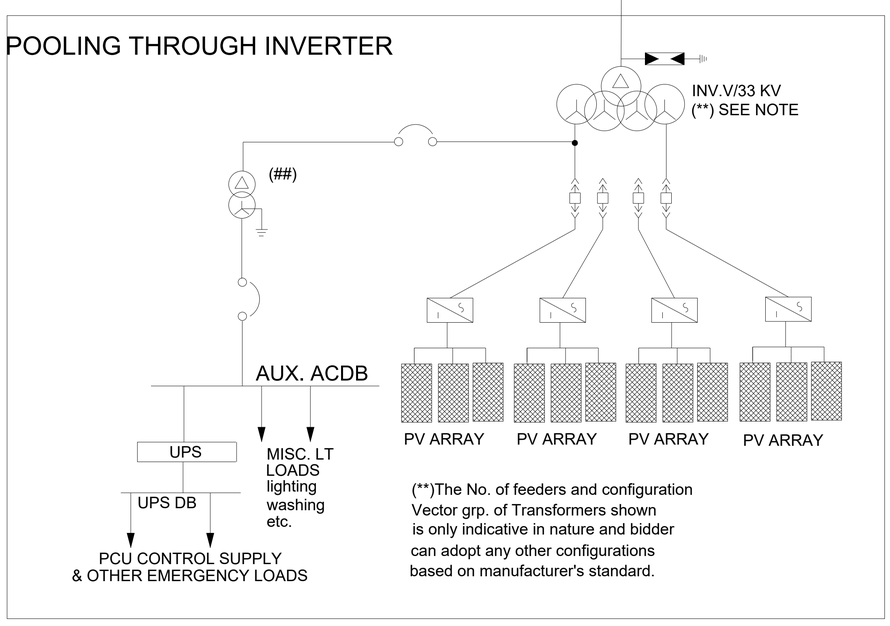
$$ BIDDER CAN FOLLOW ANY OF THE FOLLOWING ARRANGEMENT TO ACHIEVE

1. BIDDER MAY OFFER OUTDOOR ARRANGEMENT WITH VCB,CT AND ISOLATOR. ASSOCIATED RELAY PANEL SHALL BE KEPT WITHIN SUITABLE KIOSK .
2. BIDDER MAY OFFER THE PROPOSED ARRANGEMENT USING 33KV
3. BIDDER MAY OFFER STANDALONE SWITCHGEAR PANEL FOR INVERTER TRANSFORMER FEEDER INSIDE THE INVERTER ROOM AND CONNECT THROUGH SUITABLE OUTDOOR ISOLATOR.
4. ISOLATOR SHALL BE LOCATED IN RING SO THAT EACH SECTION OF RING CAN BE ISOLATED, SUBJECTED TO APPROVAL DURING DETAIL ENGINEERING.
5. PROTECTION SCHEME IN RMU AS PER RELATED SPECIFICATION.



TYPICAL SCHEME FOR POOLING THROUGH INVERTER





NOTES:

1. THERE IS NO CMCS BUILDING ENVISAGED FOR THE 200MW SOLAR PROJECT UNDER BIDDER'S SCOPE. BIDDER SHALL PLACE THE SCADA/OWS/EWS PANEL, AT OWNER'S POOLING SUBSTATION SWITCHYARD CONTROL BUILDING. NTPC REL SHALL PROVIDE REDUNDANT 220V DC AND 230V AC SUPPLY SOURCE TO THE BIDDER FOR SCADA/OWS/EWS PANEL AT OWNER' SWITCHYARD CONTROL ROOM. NECESSARY WIRING IS IN BIDDER'S SCOPE. BIDDER SHALL PROVIDE SUITABLE UPS WITH BACK UP TIME AS MENTIONED IN THE TECHNICAL SPECIFICATIONS FOR THE AFORESAID EQUIPMENT IN OWNER'S SWITCHYARD CONTROL BUILDING (AS REQUIRED).
2. IN CASE OF OUTDOOR INVERTER, THE INBUILT LT TRANSFORMER FOR AUX SUPPLY SHOULD BE DESIGNED AND SIZED IN ORDER TO TAKE CARE OF ALL EMERGENCY LOADS AND MISCELLANEOUS LOADS RELATED TO MAINTENANCE ACTIVITY WITH REDUNDANCY.
3. SUITABLE UPS AND/OR DC SYSTEM WITH BACK UP AS PER TS IS TO BE PROVIDED FOR AUXILIARY POWER SUPPLY FOR PCS (IF REQUIRED) AND OTHER PROTECTION,CONTROL AND ANY EMERGENCY LOADS.
4. THE INVERTER TRANSFORMER ARRANGEMENT SHOWN IS TYPICAL,THE TRANSFORMER CONFIGURATION,VECTOR GROUP, IMPEDANCE ,INSULATION CLASS ETC. AS PER INVERTER MANUFACTURER RECOMMENDED DESIGN PARAMETER /ARRANGEMENT.
5. BIDDER SHALL USE 33kV CABLES FOR CONNECTING FROM LOCAL POOLING SWITCHGEAR/ICOG (AS APPLICABLE) TO OWNER'S 33kV MAIN POOLING SWITCHGEAR DIRECTLY. SUPPLY OF CABLES AND ACCESSORIES INCLUDING JOINTING AND TERMINATION KITS INCLUDING LAYING AND TERMINATION SHALL BE IN THE SCOPE OF THE BIDDER.
6. OTGT TEST SHALL BE PERFORMED AT THE METERING POINT SPECIFIED IN TECHNICAL SPECIFICATION.
7. BIDDER MAY USE LOCAL POOLING SWITCHGEAR FOR LOCAL POOLING OR CONNECT INVERTER TRANSFORMER OUTPUT TO THE 33KV POOLING SWITCHGEAR THROUGH ICOG TYPE BREAKER PANEL AT INVERTER TRANSFORMER END.
8. BIDDER TO PROVIDE ALL TECHNICAL DETAILS INCLUDING INVERTER PSSE MODEL, PSCAD MODEL & INVERTER BENCHMARKING REPORT TO NTPC REL AND FACILITATE NTPC REL FOR CONDUCTING GRID CONNECTIVITY COMPLIANCE AS PER LATEST CEA TECHNICAL STANDARD FOR CONNECTIVITY TO GRID AND ACTUAL REQUIREMENT OF INVERTER DETAILS SHALL BE INTIMATED BY NTPC REL DURING DETAILED ENGINEERING
9. INVERTER SHALL BE PROVIDED WITH DUAL OR MULTIMASTER FACILITY & WMS SHALL BE PROVIDED WITH DUAL OR SINGLE MASTER FACILITY.
10. BIDDER TO PROVIDE NECESSARY ARRANGEMENT TO TRANSMIT SOLAR PLANT DATA TO STATE LDC/RLDC/REMC AS PER TELEMETRY REQUIREMENT OF RELEVANT REGULATION, GUIDELINES. NECESSARY COMMUNICATION INFRASTRUCTURE/SOFTWARE IN THIS REGARD UPTO LDC SHALL BE UNDER BIDDER'S SCOPE. BIDDER SHALL USE PROPOSED FOTE PANEL TO BE INSTALLED AT NTPC REL SWITCHYARD CONTROL ROOM FOR SOLAR SCADA DATA AVAILABILITY TO RLDC/REMC. IF ANY MODIFICATIONS /UPGRADATION IS REQUIRED AT FOTE, IT SHALL BE DONE BY THE BIDDER.
11. THE METALLIC SCREEN/ARMOUR OF CORE AND CONDUCTOR OF HT CABLES SHALL BE CAPABLE OF CARRYING SYSTEM EARTH FAULT CURRENT.
12. HARMONIC FILTERS SHALL BE INSTALLED AT NECESSARY LOCATIONS KEEPING IN VIEW OF POWER TRANSFORMER CONFIGURATION OF INDIVIDUAL BLOCKS SUCH THAT THE STATUTORY REQUIREMENTS AT POI ARE MET WITH.
13. SUPPLY OF SOLAR PV MODULES IS NOT IN THE SCOPE OF THE BIDDER

FOR TENDER PURPOSE ONLY

NTPC Renewable Energy Ltd
(A GROUP COMPANY OF NTPC LTD)
(ENGINEERING DIVISION)

PROJECT
BALANCE OF SYSTEM (BOS) PACKAGE FOR DEVELOPMENT OF 200MW GRID CONNECTED SOLAR PV PROJECT AT BIKANER, RAJASTHAN

TITLE
BLOCK SINGLE LINE DIAGRAM

PREPARED BY	CHECKED BY		APPROVED BY	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
	CIVIL	ELE.						
RR		JPP	AD	05.05.2026		NTS	5800-004(BOS2)-P0E-A-001/2	R1

CLAUSE NO.	TECHNICAL SPECIFICATIONS
	D-8
	CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)
1.0	**General Requirements**
1.01	The intent of the specification is to define the functional & design requirements for the CCTV System meant for gathering video information from the various areas of the power plant with display and recording facilities with night vision and motion sensors as per requirement.
1.02	The Contractor shall be responsible for selection, design, engineering, manufacture, testing at manufacturer's works/site, installation of all the equipment supplied as covered in this specification and commissioning of the system meeting the intent & functional requirements of the specification. All the power supply (UPS), cables, cable trays, power packs, erection hardware (viz. junction boxes, brackets glands, nut-bolts, conduits etc.) and mounting are also included in Contractor's scope.
1.03	The Contractor's scope shall also include successful demonstration of functional requirements specified herein complete in all respects and shall guarantee satisfactory performance of the equipment under stipulated variations of voltage and frequency.
1.04	The bidder should offer new (Not refurbished cameras), Obsolete cameras and not an end-of-life product which shall be verified by the owner during detailed engineering.
1.05	The number of camera units, servers, network switches, wireless equipment etc. and their locations shall be finalized during detailed engineer for effective functional requirements.
1.06	Any other equipment, module, software required for the safe and satisfactory operation, control, protection, monitoring, testing and maintenance of the system shall also be included by the Bidder within the lump sum quoted price.
1.07	The equipment furnished under this section shall meet the requirements of all the applicable international codes and standards or their latest amendment Codes and Standards. Camera certification has to be CE/FCC/UL or equivalent.
1.08	Comprehensive warranty for **10 years** for the entire CCTV system being offered.
1.09	Bidder/Integrator shall provide project specific Authorization from the OEM incorporating the fact that the OEM shall provide technical support / troubleshooting during commissioning and operation of the system and ensure that the maintenance is being done by the authorized agencies/personals till the completion of the Warranty.
1.10	Bidder Shall offer CCTV complying to the regulatory requirement like STQC or others as mandated by nodal agencies with latest amendments.
2.00	**POWER SUPPLY ARRANGEMENT**

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2.01	Arranging for power supply for cameras and CCTV accessories shall be bidders' responsibility. The CCTV System along with all its components i.e., network switches, storage devices, servers, LAN switches, cameras etc. shall be powered from UPS system. Power Supply requirement if any from the bidder from existing facilities shall be seen based on availability The contractor shall also provide local power distribution boxes as required for sub-distribution of UPS supply.
2.02	For cameras to be located in remote areas where the UPS power supply cannot be extended due to voltage drop etc., then such cameras can be grouped and fed from mini-UPS. Individual mini-UPS shall be provided for the cameras which cannot be grouped. The contractor shall also provide local power distribution boxes as required for sub-distribution of supply from these mini-UPS to cameras. The location of mini-UPS & power distribution scheme shall be finalized during detail engineering. Powering of the Cameras through POE shall also be acceptable subject to reliability and the same shall be verified during detailed engineering.
2.03	If the offered equipment is operating at voltage level other than what is available as auxiliary supply, the Contractor shall provide all required hardware, to make the offered system compatible with specified power supply arrangement.
3.00	**DESIGN, TECHNICAL REQUIREMENTS AND CYBER SECURITY**
3.01	The CCTV system shall be able to provide surveillance of different locations in the plant like all **entry/exit gates, ICR's in entire layout ,Office building (Indoor and Outdoor) and all across the periphery**. **. Bidder to consider adequate number of cameras to ensure that no area across the periphery is left uncovered at a time. The same shall be reviewed during the design engineering.** It is to be ensured that location of camera shall be such that it **should cover all the WMS locations** inside the plant or else camera for the WMS also needs to be provided. Other strategic locations if any shall be decided during detailed engineering design. The exact locations shall be finalized during detailed engineering stage depending on the CCTV offered. Any kind of terminal equipments and items required for successful commissioning of the CCTV system shall be in the bidder's scope. The CCTV system shall be designed as a standalone IP based network architecture. The system shall use video signals from different cameras at different locations, process the video signals for viewing on monitors at different locations and simultaneously record all the video streams using H.264 or better compression technique. Joystick and mouse-keyboard controllers shall be used for Pan, Tilt, Zoom and other functions of desired cameras.
3.02	Camera and database servers shall offer both video stream management, video stream storage management. These servers shall also manage and store configuration information/database for the whole system. Recording frame rate & resolution in respect of individual camera shall be programmable. It shall be

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	possible to view and record at different resolutions and frame rates and this shall be individually programmable on every camera. It shall be possible to take back-up of system configuration and database on portable media device and restoring the same if required.
3.03	System shall ensure that once recorded, video cannot be altered.
3.04	Camera server shall be provided with a minimum of 32 TB/higher storage space or as calculated per requirement to store recordings of all cameras for the specified days. All recordings shall have camera ID, Location, Date, and time of recording. **The minimum storage days shall be 30 days @25 FPS at 1080p. Accordingly, the calculation of storage shall be verified during detailed engineering.**
3.05	It shall be possible to view, record, search and replay simultaneously without affecting the performance of the system.
3.06	The system supplied shall be complete in all respects for reliable performance. The Contractor shall submit the detailed block schematic, video, signal & power wiring diagram, describing the connections between the network switch/camera server Systems and various cameras, monitors, keyboard, and joystick.
3.07	The camera & Video Management Software shall conform to ONVIF profile S, G, T and M or latest available applicable ONVIF profile at the time of detail engineering.
3.08	The camera OEM is desired to have valid H.265 HEVC Certificate and should be listed on following official website of HEVC.
3.09	The network cameras supplied must be manufactured in accordance with the ISO 9001 and 14001 standards.
3.10	The Camera to be provided along with all the components / parts / assembly / software used in the offered hardware and software all the latest cybersecurity regulation and other certifications as applicable with latest amendments thereof. It shall also be checked/verified to ensure that the camera should not be complying to GB28181, GB/T 28181-2011; GB/T28181-2011; GBT 28181-2011; GBT28181-2011 standards. There should be no option to activate or deactivate these standards in the camera web page/Settings.
4.0	**DETAILED DESCRIPTION OF THE SYSTEM COMPONENTS:**
4.01	**Application Software for Video Monitoring, Recording & Management.**
	a) The application software shall be used to display, store, control & manage the entire surveillance system.
	b) It shall be possible to control all cameras i.e., PTZ, auto/manual focus, selection of presets, video tour selection etc. The software shall support flexible 1/2/4 windows split screen display mode or scroll mode on the display monitors for live video.
	c) The system shall support video analytics in respect of the following server/edge based.

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1. Video motion detection,
2. Auto tracking
3. Object classification and tracking.
4. Line crossing.

The feature can be an integral part of camera or a part of camera server. The features shall be user configurable for each camera. It shall be possible to activate recordings automatically based on events generated by video analytics. These events shall also be able to be logged and suitably alarmed on the monitors.

4.02 **Cameras:**

All the cameras shall be color, suitable for day and night surveillance and network compatible. There will be two types of cameras viz. PTZ & Fixed PTZ cameras shall be high speed integrated dome type.

The camera shall be directly connected to network and use of external encoder for connecting to network is not acceptable. The cameras shall be rugged, high performance color cameras. These cameras shall provide high resolution and high sensitivity suitable for operation in a power plant, both in natural and artificial lighted areas.

Minimum detailed technical specification is given below.

a) **PTZ Dome Cameras**

High Definition (HD) PTZ cameras

Image Device	1/2.8-1/3” Progressive scan CMOS or better.
Lens	4.45-4.7 /- 130-137 mm focal length
Optical Zoom	30x or better
Digital Zoom	12x or better
Number of Pixels/Effective resolution	1920X1080 (Full HD)/2 MP at 25/30 IPS
Video compression	H.264, H.265 Main Profile/High profile
Sensitivity	Color mode 0.6 lux, B/W mode 0.04lux @30IRE, F1.6
Horizontal Angle of view	55.4 deg(wide)- 3.5 deg (Tele) minimum
Focus	Auto with Manual Override
Iris Range	F1.6-F2.9
Iris Control	Auto with Manual Override
IR Range	250 mtrs minimum.

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Back Light Compensation	Required
White Balance	Automatic with mode selection options
Electronic Shutter	1/50 to 1/10000 Auto
S/N Ratio	>50dB
Audio	Full Duplex or 2-way
Automatic Gain Compensation	Up to 18 dB
Power Supply	The camera power supply should preferably be of the same make as that of camera and suitable for the model no. offered. If the Power supply from the Camera OEM is not available, approval for the power supply shall be accorded during detailed engineering.
Gain Control	Auto/Off
Day/Night selection	Auto On-Off
IR cut filter	Yes
Protocols	IPV4/IPV6, RTP, UDP, TCP/ IP, HTTP, HTTPS, FTP,DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP, SNMP, MQTT or equivalent.
Security	Password protection, Digest authentication, camera to boot with authorized firmware.
Auto Resume after Power Failure	Yes
Multiple Streams Operating resolution	H.264 /H.264 & H.264/Motion JPEG, H.265 with HEVC Certificate. 4 streams at 25 FPS in H.265/H.264
Analytics	Motion detection, Temper detection and etc. .
PoE supply IEEE 802.3af compliant or better	Yes
Rate Control	VBR/CBR
Cybersecurity requirement.	To comply to all latest cybersecurity regulations in India with all latest amendments thereof.
Other Features	
	On screen Menu display and WDR 120 dB, ONVIF Profile G, S, T and M compliant.
WDR	Automatic Picture Enhancement to give a balanced picture where there is too much/too little light
	Minimum 2 Alarm I/Ps & 1 alarm output
PTZ Specifications	
Pan	360 Deg Continuous .

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Tilt	± 90 deg.
Manual Tilt Speed	0.1 deg/sec to 280 deg/sec.
Manual Pan Speed	0.1 deg/sec to 250 deg/sec.
Preset Positions	Minimum 256.
Preset Pan Speed	280 deg/sec min.
Preset Tilt Speed	250 deg/sec min.
Maximum Operating conditions	-10 °C to 55 °C.

b) Fixed Cameras

High Definition (HD) Fixed Camera

Image Device	1/2.8-1/3" Progressive scan CMOS
Number of Pixels	1920X1080 (Full HD)/2 MP at 25/30 FPS
Sensitivity (at f1.2,6dB)	0.21 Lux color & 0.05 Lux B/W (at 30IRE)
Lens	Varifocal Lens f=8-50/11-29 mm, Board/CS-Mount or Motorized 3.00-9.00 mm
Lens Mount	Board/CS-Mount/Motorized.
Focus	Auto with Manual Override
Multiple Streams	4 streams at 2MP, 25 FPS in H.264/H.265
Iris Range	1.7
IR Range	50 mtr.(Minimum)
Audio	Full Duplex or 2-way
IR cut filter	Yes
Protocols	IPV4/IPV6, RTP, UDP, TCP, IP, HTTP, HTTPS, FTP,DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP, SNMP, MQTT or equivalent
Security	Password protection, Digest authentication, camera to boot with authorized firmware.
Iris Control	Auto with Manual Override
Analytics	Motion detection, Temper detection, and additional analytics as available.
PoE supply IEEE 802.3af compliant	Yes
SD/SDHC/SDXC in Camera (For Local alarm recording & scheduled local recording)	Yes, minimum 256 GB capability
Rate Control	VBR/CBR
Back Light Compensation	Required
White Balance	Automatic with mode selection options
Electronic Shutter	1/50 to 1/10000 Auto
S/N Ratio	>50dB
Automatic Gain Compensation	Up to 18 dB

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Power Supply	The camera power supply should be of the same make as that of camera and suitable for the model no. offered. If the Power supply from the Camera OEM is not available, power supply shall be endorsed by the OEM.
Gain Control	Auto/Off
Day/Night selection	Auto On-Off
Other Features	
	WDR 120 dB, ONVIF Profile G, S, T and M compliant.
WDR	Automatic Picture Enhancement to give a balanced picture where there is too much/too little light
	Minimum One Alarm I/P Minimum One Alarm O/P
Maximum Operating conditions	-10 °C to 55 °C

4.03 Camera Housing & Mount

a) All the cameras and accessories are to be housed in Weatherproof IP 66 environmental housing made of aluminum and Sun shroud. The housing, with heater and blower installed, shall provide protection for camera/lens assemblies in the ambient temperature range of - 10 deg. C to 55 deg. C.

b) The camera mount, camera housing and camera power supply should be of the same make as that of camera and suitable for the model no. offered as specified by the manufacturer.

4.04 Keyboard & Joystick-

The keyboard shall have full function used for system control and programming for selection of various Network switches, camera/database servers, camera functions including pan, tilt and zoom lens controls and shall be ergonomically designed.

Joystick shall be provided for achieving all control functions.

4.05 Workstation

Operators' workstation & network switch station shall be in the control room or as finalized during detailed engineering. The size of the display screen shall be

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	minimum 55 inches or inline to the requirement for the complete camera coverage in the screen. Bidder must ensure that the LED screen pixel density shall match with the offered camera pixel density or higher. Bidder to provide as many LED screens as required to technically satisfy the requirements to suitably accommodate the videos from the entire CCTV installed in the field.
4.06	**WIRELESS CONNECTION EQUIPMENT (FOR CAMERA SPECIFIED ON WIRELESS CONNECTIVITY):** If contractor offer any camera with wireless connectivity, Access points for these cameras shall be mounted on lighting mast/pole. Wireless equipment and type of wireless connectivity shall be decided during detailed Engineering. Wireless communication for the above should be subscribing to the latest Cyber security standards including encryption. The wireless modem should support dynamic encryption techniques.
4.07	**NETWORK SWITCH:** All the network switches shall be of high quality and shall be sized to meet the functional requirements as specified. The common switch to which all networks are connected shall be Layer-III switch/router. All the interconnecting cables between network switches shall be fiber optic only. All fiber optic cables shall be terminated directly to network switches through optical fiber port without using media converters. Bidder to ensure that minimum 100% cores are kept as spares in all type of optical fiber cables. The network switches shall be able to work in the temperature range of -10 C to +55 deg C.
4.08	**SERVER SPECIFICATION** Minimum specification of the server to be provided shall be as per the following criteria. Processor - Xeon min Octa core CPU / Clock speed 3.4 Ghz. RAM: DDR4 or better, 16 GB expandable upto 32 GB. Hard disk - **8 TB x 4 SSD.** Minimal Internal storage: 32 TB for storing minimum 30 days recording **The minimum storage days shall be 30 days @25 FPS at 1080p. Accordingly, the calculation of storage shall be verified during detailed engineering.** Storage Drive - 16x or higher for server - DVD R/W drive Storage Controller - RAID 5 Controller Operating System: Microsoft Windows latest Power Supply: Redundant.

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	Software: Anti- Virus, Network security etc. as per the requirement during detailed engineering etc.
5.0	**CABLES:**
	Cables shall be of FRLS PVC sheathed cables for use in CCTV and shall conform to latest edition of Indian/International standards. Fiber optic cables are to be provided (as applicable). Optic Fiber cable shall be 8 cores, galvanized corrugated steel taped armored, fully water blocked with dielectric central member for outdoor /indoor application so as to prevent any physical damage . All the cables and the hardware required for powering the system are also in the scope of Contractor. All cables required for interfacing alarm contact inputs (to be provided by employer) to CCTV system are also in scope of contractor.
5.01	For estimation of cable quantities, erection hardware, hardware for wireless communication etc., the Bidder shall refer to General Layout Plant, Equipment Location Plans drawings & other relevant drawings to be finalized during detailed engineering. All the cables are to be provided by the Contractor on as required basis.
6.0	**Location of CCTV:**
	Bidder to note: I. Final/Exact location of the CCTV cameras shall be reviewed during detailed engineering. **II. The relevant drawings pertaining to location and the location of the console shall be finalized during the detailed engineering.**

B-17 DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT

1.0 SCOPE

This specification covers design & engineering, manufacture, testing, transporting, unloading, site testing and integration with PPC of Static Var Generator (SVG) of 33 KV, 3-ph based on solid state switching device (IGCT/IGBT) with all accessories, allied equipment including structures, 33 kV outdoor yard/equipment, support insulator, clamp connectors at site for outdoor installation along with accessory equipment complete in all respect.

2.0 CODES AND STANDARDS

It shall conform to all applicable IEC standards. Where an applicable IEC standard is not available, IS/ any applicable international standard shall be referred to as best practice.

IEC 61000	Emission/ Immunity requirement
IEEE 519	Recommended practices and requirements for harmonic control in electrical power systems.
IEC 60068	Environmental testing
IEC 62109-1 & 2	Safety of power converters for use in power systems.
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
IEC 60529	Ingress protection test
Grid Connectivity (LVRT & HVRT etc)	CEA Technical Standard for connectivity to Grid regulations and Indian grid code as amended and revised from time to time. A. High resolution /clear type test data as per IEC 61400-21 formats B. Valid Benchmarking report of PSSE/PSCAD.

3.0 FUNCTIONAL REQUIREMENT: -

The SVG shall meet the basic requirement of providing the reactive Power compensation to meet the reactive power injection centrally controlled from centralized Power Plant controller of each project. However, this voltage source converter device is expected to provide the reactive power/current in both lead

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	and lag direction independent of network voltage and also damping/eliminating the Power oscillations and mitigation of transient/dynamic voltage oscillations and Power Quality values /parameters of solar plants including harmonics within limits at POI. The Dynamic reactive power compensating equipment shall have the following features a) It shall be of 3 phase, shunt configuration, modular in design to compensate Reactive Power in all phases for power quality improvement by supplying smooth and continuous/step-less reactive power at instantaneously. b) It should be able to do step-less reactive power compensation and aim to compensate for a target displacement power factor ensuring correct operation in the presence of reactive power. c) It shall be able to provide/inject the capacitive reactive rated current even in case of low grid voltage upto 0.8 pu of Normal voltage in addition to support of reactive power during LVRT. d) The active power inverter used in dynamic reactive power compensator is based on minimum 3 Level topology with IGBT /IGCT based technology. e) The response time shall be less than one power cycle. f) It should have target setting for Power factor/Reactive Power/Harmonic suppression (active power filter mode) g) It should be able to work at its rated capacity under ambient temperature of 51 deg C. h) The active losses of Active Compensator shall be within 1% of the unit panel MVAR rating. i) Controller should use closed loop control technique and the compensation shall be completed within 1 power cycles. j) The temperature of the IGBT power converter should be continuously monitored. k) It should have operator interface (HMI) for setting up hardware configuration parameters, programming the reactive power requirements and monitoring of network and its parameters. l) HMI should record and display an event log with time and date stamp. A minimum of 100 events shall be stored. m) HMI should display a flashing warning screen in the event of fault. n) HMI should allow for the setting up of programmable warning that may be associated with a selection of network parameters. It can also allow for the setting up of digital inputs and the digital outputs of the system. o) HMI should display operating and setup parameters and event / fault messages in English p) It should incorporate its own protection devices that ensure protection against the following as minimum: i) Over current ii) DC over voltage iii) IGBT short circuit iv) Over temperature v) Cooling system failure

vi) IGBT stack failure
vii) Supply over voltage/ under voltage
viii) Switchgear acknowledgement feedback errors
ix) Unstable grid detection
x) Door open detection

q) It should have an automatic restart function upon power loss return and fault resets.
r) Communication of the system on Modbus TCP/IP (mandatory) with IEC 61850/IEC 104 protocol along with suitable I/O Ethernet switch at SVG end.
s) An energy saving feature shall be provided to permit switching OFF of IGBT converter and blowers when load goes below a desired set point and turn on at some higher set point.
t) The active Inverter should have an input L-C-L filter configuration to minimize ripple injection in the power system.
u) The DC capacitor used in the active power inverter must be Film type DC capacitors for longer life and reliability.
v) The SVG should support reliable, secure, and standardized communication with the Power Plant Controller (PPC)/SCADA and meet following requirements for connectivity to PPC:

Parameter	Specification
Communication interface	Modbus TCP/IP must be provided. Additional IEC 61850 protocol is preferred.
Communication protocols	The SVG bidder should ensure that the SVG is equipped with the necessary communication protocols like Modbus (mandatory). Additionally, IEC 61850, OPC etc. are preferred.) which supports all required data points and control functions, and guarantees secure, reliable communication for real-time monitoring and control.
Software's (if applicable)	Bidder to supply software tools to configure, monitor, and control the SVG through the communication protocol(s) used. This includes **GUI-based** software or an **API** for integration with the PPC or SCADA. All softwares supplied should have licenses with lifetime validity.
Cybersecurity Compliance	Bidder must ensure that the system adheres to industry standards for cybersecurity, providing encrypted communication channels and proper authentication/authorization mechanisms.

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Data logging	The SVG should have the capability to log events and provide historical data for performance analysis, diagnostics, and compliance with grid codes. SVG should be capable of capturing high resolution data (less than or equal to 10ms accuracy) for at least 10 seconds period during disturbances with pre fault data of 1 sec and post fault data of 9 seconds at least. SVG should have provisions to record events when operating in both remote and local mode with/without connection with plant PPC/SCADA. In the events of SVG operating in local mode with disconnection from plant PPC/SCADA, SVG should have internal storage facility to store operational data for at least two days for performance analysis. The list of data points to be stored is attached at **Annexure-I.**
Data integration	The SVG should integrate with plant SCADA/PPC system for remote operation and monitoring. The list of data points is attached at **Annexure-I.**
Communication cables & accessories	All type of communication cables & accessories (media converter/switch/LIU/JB/tray/conduit etc.) for connectivity between PPC/SCADA and SVG is in the scope of the bidder.
Control Mechanism	The SVG should operate in an automatic mode, adjusting reactive power dynamically based on PPC inputs. Complete control of Reactive power for the entire system is to be taken care by the bidder.

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Annexure-I (List of datapoints)

Sl. No.	Data	Description	Unit	Access to PPC/SCADA	Additional information
1	Reactive Power instantaneous	SVG Measurement, instantaneous reactive Power	kvar / Mvar	Read	Generator sign Convention: positve = capacitive / Q-Export / Overexicted; negative = inductive / Q-Import / Underexcited
2	Reactive Power _200ms	SVG Measurement, 200ms average reactive Power (20ms average reactive Power)	kvar / Mvar	Read	Generator sign Convention: positve = capacitive / Q-Export / Overexicted; negative = inductive / Q-Import / Underexcited
3	Reactive Power _1s	SVG Measurement, 1s average reactive Power	kvar / Mvar	Read	Generator sign Convention: positve = capacitive / Q-Export / Overexicted; negative = inductive / Q-Import / Underexcited
4	Reactive Power _1min	SVG Measurement, 1min average reactive Power	kvar / Mvar	Read	Generator sign Convention: positve = capacitive / Q-Export / Overexicted; negative = inductive / Q-Import / Underexcited
5	Voltage_ph12	SVG Measurement, 1 cycle rms line voltage	V	Read	SVG terminals

6	Voltage_ph23	SVG Measurement, 1 cycle rms line voltage	V	Read	SVG terminals
7	Voltage_ph31	SVG Measurement, 1 cycle rms line voltage	V	Read	SVG terminals
8	positive sequence voltage_20ms	20ms average positive sequence line voltage	V	Read	SVG terminals
9	positive sequence voltage_200ms	200ms average positive sequence line voltage	V	Read	SVG terminals
10	positive sequence voltage_1s	1s average positive sequence line voltage	V	Read	SVG terminals
11	Capable reactive power_capacitive	SVG actual positive reactive power capability	kvar / Mvar	Read	Reactive power capability shall consider all set or operational limitations in SVG
12	Capable reactive power_inductive	SVG actual negative reactive power capability	kvar / Mvar	Read	Reactive power capability shall consider all set or operational limitations in SVG
13	Grid Frequency	SVG Measurement, 1 cycle frequency in Hertz	Hz	Read	SVG terminals
14	Time	Time of the statcom controller		Read	
15	Heartbeat	Heartbeat signal		Read	Any periodically changing signal (periods 100 … 1000 ms) can be used, e.g. any counter or seconds of time
16	Current_ph1	1 cycle rms phase current	A	READ	

17	Current_ph2	1 cycle rms phase current	A	READ	
18	Current_ph3	1 cycle rms phase current	A	READ	
19	System ready	Indication (0/1), Statcom ready to take setpoint commands		Read	
20	SVG ramp mode	Indication (0/1), Indication of SVG ramp mode		Read	SVG shall be able to control the reactive power injection either as per set ramp rate or as fast as technically possible
21	System OK	Indication (0/1), SVG OK and operating / ready to operate		Read	
22	System Error	Indication (0/1), SVG Not OK		Read	
23	SVG control mode Automatic	Indication (0/1), SVG operating mode manual / automatic		Read	
24	SVG control mode by PPC / external	Indication (0/1), Local / under PPC		Read	
25	SVG control mode	Indication of control mode: 0 = OFF, 1 = Constant Q, 2 = constant pF, 3 = constant volt		Read	
26	LVRT enabled	Indication (0/1), enabled/disabled		Read	
27	HVRT enabled	Indication (0/1), enabled/disabled		Read	

28	LVRT active	Indication (0/1), LVRT Triggered (with time stamp)		Read	
29	HVRT active	Indication (0/1), HVRT Triggered (with time stamp)		Read	
30	Reactive Power Setpoint	Applied reactive power set point of the SVG, feedback of command	kvar / Mvar	Read	
31	Reactive Power ramprate_kVar/min	Applied reactive power ramp rate of the SVG, feedback of command	kvar/min / Mvar/min	Read	
32	SVG ramp mode command	SVG ramp mode command, set from PPC or external		Read & Write	SVG shall be able to control the reactive power injection either as per set ramp rate (command) or as fast as technically possible, selection to made by command
33	Reactive Power Setpoint command	SVG Reactive Power setpoint command from PPC or external	kvar / Mvar	Read & Write	SVG terminals
34	Reactive Power ramprate_kVar/min Command	SVG Reactive power ramp rate command from PPC or external	kvar/min / Mvar/min	Read & Write	ramp rate range to be provided
35	Alarm: Low Voltage	SVG alarm indication of low voltage condition at SVG terminals		Read	
36	Alarm: High Voltage	SVG alarm indication of		Read	

		high voltage condition at SVG terminals			
37	Alarm: Over load condition	SVG alarm indication of over load condition of SVG		Read	
38	Alarm: Ambient temperature	SVG alarm indication of abnormal ambient temperature conditions		Read	

w) The bidder shall consider breakers suitable for capacitive switching duty for SVG feeders. The relays incorporated for protection of the SVG shall have inbuilt additional features for capacitor bank protection, detection of unbalanced faults, LC resonance faults, current harmonic protection, etc., as applicable.

In case the bidder proposes direct connection of the SVG at the Owner's 33 kV switchgear, the bidder shall ensure the capacitive switching suitability of the breaker installed in the existing panel. Any modification/replacement works wrt breaker and relay required in the Owner's 33 kV switchgear panel as applicable shall be in the bidder's scope

CLAUSE NO.	TECHNICAL SPECIFICATIONS
4.0	**GENERAL DESCRIPTION** 4.1 It shall have protection against any sustained fault in the feeder line and against lightning discharge in the feeder line. 4.2 It must be self-managing and stable in operation. 4.3 In case of grid failure, it shall be re-synchronized with grid after revival of power supply. Bidder to furnish the time taken by it to be re-synchronized after restoration of grid supply during detailed engineering. 4.4 It shall include appropriate self-protective and self-diagnostic feature to protect itself from damage in the event of component failure or from parameters beyond the safe operating range due to internal or external causes. The self-protective features shall not allow signals from the front panel to cause it to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the device, including commutation failure, shall be cleared by the protective devices. 4.5 It shall have necessary limiters in build in the controller so as to ensure safe operation within the designed operational parameters. 4.6 It shall have thermal overloading protection to prevent failure of switching devices (i.e. IGBT/IGCT) and other components of SVG. It's controller shall automatically regulate/limit the power output to reduce the cabinet and switching devices temperature. Bidder to submit the power vs ambient temperature curve during details engineering stage. It shall be able to provide SVG inside cabinet (in soft analog value) to SCADA/PPC system for remote monitoring, storing and report generation purpose. 4.7 It shall have AC and DC side monitoring capability and reporting to SCADA/PPC system (measured analog and digital value measured within it). Any special software if required for this purpose shall be provided for local and remote monitoring and report generation. 4.8 All-important alarm and trip signals shall be configured in the device and their corresponding modbus address shall be provided for SCADA/PPC configuration. Signal shall necessarily be included such as LVRT in action and trip operated, HVRT trip, islanding protection operated, over current operated, Inverter cabinet temperature high alarm and all other important signals. Details shall be finalized during details engineering stage. 4.9 EARTHING OF EQUIPMENT: - The Device shall be earthed as per manufacturer recommendation. During detail engineering the Bidder needs to submit the details earthing arrangement of compensating equipment and system earth pit requirement during detail engineering stage. The detail

specification for panel earthing for safety has been mentioned elsewhere in this specification.

5.0 TECHNICAL PARAMETERS: -

Connection method	3-Ph,3-Wire System
Converter operating Voltage	OEM standard.
Permissible Voltage Variation	+/-10%
Rating	30/40/50/60MVAR as applicable
Overload Capacity	110% continuous
IGBT Connection Topology	3 Level Topology
System Frequency	50 Hz (± 5%)
Losses	1% of Rated MVAR Capacity
Compensation Modes	Closed Loop/PPC command
Response time	<10 ms
Modularity	Yes
Protection	Main breaker/Isolator/Arrestor with suitable protection at Pooling switchgear end and equipment end
Communications	Mod bus TCP/IP/IEC 61850/IEC 104
Programming Interface	Colour Touch Screen - GUI
Reactive Power range	-100% inductive to +100% capacitive of the rated MVAr
Ambient Temperature	0 to +51° C
Humidity	Maximum 95% RH, Non-condensing
Cooling Arrangements	Forced-air cooling/liquid cooling
DC Capacitors Used in DC Link	FILM TYPE DC CAPACITORS
PWM Reactors	Foil Type reactors specially designed with Multiple Airgaps
INPUT FILTER	with Mandatory LCL Filter
Controller Design	Rugged Design with Multiple I/Os

6.0 CONTROLLER FEATURES: -

a) The controller shall be Digital Signal Processor (DSP) based and shall be able to sense the reactive current requirement/voltage variation/Harmonic of the outgoing feeder and shall automatic command for necessary compensation.
b) The DSP controller should be able to detect and correct abnormalities in wirings such as reversed CT connection, PT on a wrong phase etc.
c) The DSP controller should be able to detect any stage size by automatic recognition and the switching sequences should be user defined.
d) The controller should be suitable for 1A or 5A current input and shall have LCD display.

e) The controller shall be able to recognize the connection of CT and Voltage and be able to automatically adjust itself to the phase angle difference.

f) The controller shall initiate alarms and warnings in the following events

I. Temperature limit is exceeded
II. Insufficient capacitor output
III. Overload current ratio limit is exceeded
IV. Under voltage, over voltage
V. THD limit is exceeded.

g) The Equipment controller shall have facility to integrate with power Plant controller of Solar Plant in seamless manner. Bidder to integrate the same to PPC of the Wind plant (Suzlon make).

h) This control system to be designed to take proper command from existing SCADA, SAS & PPC for successful dynamic operation of the plant. Operation logic for the softswitch in the SVG unit shall also be incorporated in the control system. The control shall be programmable and shall have sufficient scope and flexibility to permit re-programming according to future changes/addition in the power system.

i) The Controller shall have at least 10% excess I/O capacity to allow future program upgrades to satisfy the changing requirements of the power systems The control equipment shall satisfy the availability requirements specified in this specification.

j) All necessary measures shall be taken to ensure satisfactory operation in presence of harmonic current and voltage, noise and radio interference signals. The equipment shall be designed to operate in the environmental conditions specified in the specification.

7.0 OPERATING MODES/FUNCTIONS

a) **Voltage Control Mode: -** Automatic/Manual Control of the positive sequence component of the fundamental frequency voltage in steady state and dynamic operation in accordance with CEA /CTU/RLDC requirement with programmable dead band and slope characteristic.

b) **Reactive Power Mode: -** It shall provide the required dynamic reactive power as per command from PPC/Automatic derived from actual injection, to simultaneously provide reactive power to Grid at steady state condition as well as transient condition.

c) **Active filtering Function: -** It shall have facility to eliminate/mitigate the desired harmonic upto 13^{th} order in the system based on actual injection.

d) **Unbalance Load Compensation: -** Provide negative phase sequence voltage control to minimize presence of negative sequence content of the bus voltage.

CLAUSE NO.	TECHNICAL SPECIFICATIONS
	e) **Start up and Initial Switching**: - The operation of reactive compensation system Station during start-up/initial switching on should not create significant energizing transients causing voltage drop, voltage distortion and swinging of transmission voltage angle at the intermediate bus by more than +/-5%. Bidder shall have to ensure this analytically during design phase and also in the field after commissioning of the facility. Contractor shall prepare the design documentation and the same shall be preserved by OEM & to be submitted to CEA/CTU/POSOCO, as per their request. f) **Steady State Condition**: - The SVG shall provide necessary reactive power support to compensate for voltage variation under steady state. g) **Dynamic Over-voltage Control Performance:-** The SVG shall be required to provide necessary reactive power support with fast and smooth variation so that over-voltages under dynamic conditions are controlled. h) **Transient and Dynamic Stability Performances: -** The SVG shall provide necessary reactive power so that transient and dynamic stability of the system enhanced. i) **Harmonic performance: -**The SVG should be designed to eliminate the effects of any harmonic resonance between system along with the overall plant. The distortion levels as per IEEE 519 should be met. Test report for the same to be submitted. The harmonic filter components should be rated to carry continuously the harmonic currents caused by the background harmonic distortion of the system and the harmonic currents produced by the SVG itself. j) **Over Loading Capability: -** SVG shall be designed to withstand overloading caused by Short circuits and ground faults in the system especially those occurring near to the SVG, Transient overvoltage due to switching operations and atmospheric effects, Temporary over voltages, Short circuits in the transformer, Protection system faults etc. **S**VG shall provide adequate over-current protection for any abnormal operation, mal-operation or system event. k) **Additional features: -** (a) In case auxiliary supply of device is met internally, then it should have sufficient power backup to meet the LVRT/HVRT requirement. (b) Bidder to submit third-party verified PSSE/PSCAD and benchmarking reports files of the reactive power device for combined Grid study as per CEA standard for solar/wind plant during detail engineering.

(c) The type test report as per CEA shall be with clear data reporting format as per IEC 61400-21. Graphs are to be with proper legend, scale and data of positive and negative sequence values. SOC, evaluation report and type test report along with Firmware version must be available as per CTUIL/RLDC requirement.

8.0 CONSTRUCTIONAL DETAILS

8.1 Complete SVG must be provided with Isolator, softswitch, Surge Arrestor and MCCB/Fuse/ACB is to be provided between Modules based on standard type tested design and configuration of manufacturer. The ACB and MCCB shall be able to withstand the maximum fault current for minimum one sec duration.

8.2 It shall have suitable communication card (Modbus TCP/IP and IEC 61850/IEC 104) for networking and SCADA/PPC integration. It shall include all important measured & internal calculated analog values and alarm & trip signals for remote monitoring, storing and report generation purpose in SCADA/PPC system. Details list of above such parameters shall be provided along with their Modbus address during detail engineering stage.

8.3 In case of modular design is offered, the Contractor shall ensure that no abnormal interaction shall take place among the various modules during any grid operating condition which may result in outages. The controller offered by the Contactor shall be such as to ensure stability, reliability, and a good dynamic performance. The Bidder shall indicate the control scheme adopted for modular device and its merits and the test which will check its performance.

8.4 Bidder may offer liquid cooling system subject to NTPC REL approval. In case Liquid cooled device are offered, Bidder to ensure that coolant is used in closed cycle. Complete device along with cooling system shall be of proven design.

8.5 Ground current shall be measured continuously, and alarm shall be generated in case ground current reaches to predefined set value. Device shall trip in case ground current more than safe operating limit.

8.6 It shall have emergency stop push button for tripping of device with complete electric isolation.

8.7 3-Phase series reactors to be connected to 33KV system for reactive power compensation and it shall be capable of controlling the dynamic over voltage occurring in the system. The Reactor shall be capable of withstanding

maximum continuous operating voltage (5% higher than the rated voltage) under normal frequency variation of the system without exceeding the hot spot temperature at any part of the Reactor. The Reactor shall be capable of withstanding temporary over voltage and frequency fluctuation. To avoid harmonic current generation, the reactor shall have constant impedance up to about 1.5 times rated voltage. Furthermore, the impedance should be accurately balanced between phases of the 3-phase reactor. Grounding of the reactor to be specified by OEM.

8.8 **OUTDOOR RECTIVE POWER EQUIPMENT(SVG)**

a) Outdoor enclosure must be suitable to withstand the harsh environmental conditions for complete life of plant.

b) The enclosure protection class shall IP 55 or better protection. For outdoor solution (Other than containerized), the electronic card compartment shall have IP 65 or better protection.

c) Bidder to submit temperature endurance test report of complete assembly during detail engineering stage.

d) For Outdoor Equipment, the complete assembly should be placed inside a shed made of structural steel section preferably tubular/hollow section and color coated metal sheets for roof with BMT 0.5 mm and at least 60cm projection in all side. For containerized solution separate shed is not required, however, the container shall have projection of at least 60cm wherever an opening in the inverter door exposes the inverter component to outside environment. Structural steel and paints for shed shall be as per ISO 12944-5.

e) Outdoor SVG (including containerized solution) platform shall be raised Min 1250 mm from NGL. Cable bending radius and other relevant factors to be considered during platform design. This shall be reviewed during detailed engineering.

9.0 **COOLING SYSTEM**

a) A closed-loop recirculating system shall be provided with full heat rejection capacity for heat exchangers, and fans, appropriate to the SVG availability requirements. The cooling system should be able to maintain full capacity at maximum ambient temperature and maximum SVG reactive power output. The cooling system should be able to operate at the lowest ambient temperature and zero output specified.

b) The control system for cooling system shall be redundant type including the provision of redundant control supply and main power supply. However, in place of redundant control system for cooling system, suitable alternate mode is also acceptable meeting the requirement of fulfilling cooling system operation even if failure of cooling control. The status of the cooling system to

be monitored by the control system. Replacement of certain cooling equipment (e.g., fans, cooler unit etc.), if defective, should be possible while the cooling system still operates.

c) Cooling System to be designed based on the ambient temperature defined for the project location. Selection criteria with proper calculation to be provided.

10.0 TYPE TESTING

During detailed engineering, the contractor shall submit all the type test reports including temperature rise test and surge withstand test carried out within last ten years from the date of techno-commercial bid opening for Owner's approval. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of techno-commercial bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

11.0 TESTING REQUIREMENTS

All the below mentioned test reports as per relevant IEC to be submitted & complied but not limited to;

- Power Frequency Voltage Withstand test.
- Lightning Impulse Voltage Withstand test.
- Clearances & Creepage Distance
- Performance test shall cover as follows.
- Rated Capacity Test
- Loss Test
- Response Time
- Power & Voltage control test
- Overload test
- Harmonic test
- Voltage flicker test
- Voltage unbalance test
- No-load test
- Vibration test
- Noise test
- Temperature rise test
- Protection & Alarm function

- Environmental Test
- Damp Heat & Steady state
- Safety protection test
- Grid Connected Test (Indian Grid Code Compliance)

12.0 ANNUAL MAINTENANCE CONTRACT & WARRANTY: -

Bidder has to take Comprehensive Annual Maintenance Contract (AMC) from Original Equipment Manufacturer (OEM) ***or OEM authorized service provider*** for a period of 10 years for the reactive power compensating equipment and its components. Warranty shall be of minimum 5 years from successful commissioning as per details specified elsewhere in the specification.

Comprehensive AMC shall include all preventive maintenance and breakdown maintenance including replacement of any component to ensure that equipment is working satisfactorily as per design/system requirement. During AMC period, the OEM or its representative are required to visit at least once a year or as per OEM recommendation cycle for periodic maintenance. During AMC period, the OEM is required to respond within one working day through telecom or any electronic mean. In case of breakdown of the system, OEM has to send their representative within 72 hours. For the minor faults not hampering the generation e.g. communication, display etc., the OEM has to get the fault rectified within 7 working days.

(a) Replacement of equipment/spare parts/ updating of softwares being phased out or not being supported by OEM's is also included in bidder's scope.

(b) Contractor shall be responsible to carry out all test and work as required by statutory regulation in effect as on date of Techno-commercial bid opening during commissioning of the plant.

13.0 Commissioning Tests and Training:-

Bidder shall employ OEM for its proper commissioning at site and all necessary functional test to be carried out upto satisfaction of Employer/RLDC for its performance.

Training to 02 personnel at Site with proper documentation, testing and checks to be explained for its O&M.

B-18 HARMONIC FILTERS

1. SCOPE

This specification outlines the detailed requirements for the design, engineering, manufacture, shop testing, packing, transport, unloading, storage at the site, installation, commissioning, and maintenance of passive harmonic filters for 33 kV power systems. The scope includes:

- Supply of filter capacitor banks, reactors, and associated components
- Ensuring compliance with IS 13925, IS 5553, and CEA guidelines
- Design considerations for electrical, mechanical, and environmental factors
- Protection and interlocking requirements
- Performance criteria, efficiency, and reliability standards
- Detailed factory and site testing procedures
- Documentation, training, and operational guidelines
- Coordination with existing MV switchgear and grid integration

The filter banks shall be installed outdoors and connected to the 33 kV MV bus bars. via single core power cables to the concerned switchgear bus-bar, connection between Capacitor bank to reactor shall be single core power cables. The cable arrangement for those power cables shall be subject to approval by the Client.

The installation shall be designed for long-term reliability, minimal maintenance, and optimal harmonic mitigation.

2. CLIMATIC CONDITIONS

The equipment shall be suitable for operation under the following environmental conditions:

Parameter	Value
Maximum Ambient Temperature	51°C
Minimum Ambient Temperature	**
Design Ambient Temperature	**
Maximum Wind Speed	**
Relative Humidity	**
Annual Rainfall	**
Seismic Zone	As per IS 1893

Parameter	Value
Corrosion Category	**
Altitude	<1000 m
System Voltage	33 kV ±10%
Frequency	50 Hz ± 3% (as per Grid Code)
Short Circuit Level	As per system study

** As per Site

3. APPLICABLE STANDARDS

All components of the harmonic filter shall conform to the latest versions of the following standards:

- **IS 13925 (Part 1 & 2)** - Shunt Capacitors for AC power systems
- **IS 5553 (Part 3)** - Reactors for Power Capacitors
- **IS 3070 / IEC 60099-4** - Surge Arresters
- **IS 2705 / IEC 61869-1 & 2** - Current Transformers
- **IS 9921 / IEC 62271** - Isolators and Switchgear
- **IEEE 519-2022** - Harmonic Control in Power Systems
- **CEA Regulations on Power Quality & Grid Integration**
- **IEC 60076-6** - Power Transformers
- **IEC 60871** - High Voltage Capacitors
- **PXE Oil** – Biodegradable/ Environment Friendly

4. SCOPE OF SUPPLY

The filter banks shall include, but not be limited to:

- **Filter Capacitor Banks** (with series/parallel connected capacitor units, internally fused configuration)
- **Series Reactors** (air-core, dry-type, with appropriate tuning)
- **Surge Arresters** (ZnO gapless type with insulating base, heavy-duty station class)
- **Unbalance Current Transformers**
- **Damping Resistors** (for High-pass or C-Type Filters)
- **Post Insulators** (Porcelain/Composite, creepage distance as per pollution level)
- **Tinned Copper Busbar/Cables** (with proper rating and short circuit withstand capacity)
- **Numerical Protection and Control Panel** (SCADA compatible with remote monitoring capability)
- **Interlocking Mechanism** (Mechanical and Electrical safety interlocks)
- **MV & LV Cable Termination Compartments**
- **Terminal Connectors** (suitable for indoor/outdoor applications)
- **Remote Control Cubicle** (with necessary interface provisions)

- **Mounting Structure** (Hot Dip Galvanized Steel suitable for seismic and wind load conditions)
- **Earthing and Discharge Devices**
- **Warning and Safety Signage**
- **Fire Protection and Arc Flash Mitigation measures**
- **33kV MV cable and termination from capacitor bank to reactors.**
- **RAL 5012 The paint thickness shall not be less than 50 microns**

5. PROTECTION REQUIREMENTS

Each capacitor bank shall be provided with the following protections:

- **Over-current Protection** (due to capacitor bank faults or individual unit failure)
- **Short Circuit Protection** (for Busbar and capacitor units)
- **Overload Protection** (Thermal and electrical)
- **Capacitor Element Fuse Protection**
- **Over-voltage & Under-voltage Protection** (Numerical Relays)
- **Earth Fault Protection**
- **Unbalance Protection** (Numerical Relay with Alarm & Trip Settings)
- **Harmonic Distortion Monitoring** (for compliance with IEEE 519 limits)
- **Temperature Monitoring & Alarm** (for capacitors, reactors, and resistors)
- **Interlocking Scheme** to prevent unsafe operations

The Bidder/Contractor shall co-ordinate the tripping scheme with main MV switchgear systems. Over-voltage / under-voltage may be combined within a single numerical relay designed specifically for protection of capacitor banks. Relays from the approved Contract Vendor list make only shall be utilized for capacitor bank protection.

The bidder shall consider breakers suitable for capacitive switching duty for Harmonic filter feeders. The relays incorporated for protection of the Harmonic filter shall have inbuilt additional features for capacitor bank protection, detection of unbalanced faults, LC resonance faults, current harmonic protection, etc., as applicable.

In case the bidder proposes direct connection of the Harmonic filter feeder at the Owner's 33 kV switchgear, the bidder shall ensure the capacitive switching suitability of the breaker installed in the existing panel. Any modification/replacement works wrt breaker and relay required in the Owner's 33 kV switchgear panel as applicable shall be in the bidder's scope

Interlocking mechanisms shall ensure safe operation by preventing:

- Closing of capacitor bank circuit breaker when access doors are open
- Closing of grounding switch when capacitor bank is energized
- Opening of capacitor bank enclosure unless proper discharge procedure is followed
- Minimum 10-minute time delay before capacitor bank can be accessed after de-energization

Portable, insulated earthing equipment shall also be provided to earth and ensure discharge of the capacitor units before handling. This portable earth to be of special design equipped with insulated stick to enable the operator for safe earthing, more over there should be leads from the capacitors to facilitate connection of the earth.

6. FILTER BANK DESIGN SPECIFICATIONS

1. The capacitor bank shall be structure-mounted and suitable for outdoor installation with an IP55 protection rating.
2. The filters shall consist of passive components such as resistors, reactors, and capacitors.
3. The filter bank supplier must be the manufacturer of key components, such as capacitors, and should possess design knowledge of reactors, resistors, protection relays, and circuit breakers/switches.
4. The manufacturer must demonstrate expertise in harmonic analysis, grid integration studies, and design simulations (seismic, wind loading, etc.).
5. The filter supplier must have the expertise to conduct power quality measurements in accordance with relevant standards. This includes determining the type and class of meter to be used, as well as the location, duration, and sampling time of the power quality measurement. This is essential to ensure the proper design of the harmonic filter. Incorrect input could result in the selection of the wrong tuning frequency, leading to ineffective filtering.
6. It is essential that the filter supplier has a control panel design that is compatible with both control and SCADA integration for the filter bank in the power plant's PPC.
7. Component Tolerances:

- **Capacitor** (high-pass filters): ±7.5%
- **Capacitor** (band-pass filters): ±5%
- **Reactor**: ±5%
- **Resistor**: ±5%
- **Tolerance on Loss**: The total loss shall not exceed the guaranteed loss by more than 15%.

8. Component Losses: As per the latest IS standards, there isn't a specific standard that defines loss limits for Shunt capacitors and damping resistors used in harmonic filters. Hence we rely on the IEEE Standards for more clarity.

- **Capacitor: IEEE 18-2012 – "IEEE Standard for Shunt Power Capacitors"** standard specifies that the dissipation factor (tan δ) for power capacitors should not exceed 0.2% at the rated frequency and voltage. This corresponds

to a loss of 0.2 Watts/kVAR rating of the capacitor.

- **Reactor: IEEE C57.21-2020 (IEEE Standard for Shunt Reactors)** Defines design, performance, and loss limits for reactors used in harmonic filtering and power quality applications.

Parameter	Limit as per IEEE C57.21-2020
Copper Loss (I^2R loss)	0.2% – 1% of rated power

- The combines losses must be around 0.14 %

9. Filter Types:
- Tuned Filters
- High-pass Filters
- C-type Filters
- Double-tuned Filters

10. Quality Factor:
- Band-pass Filters: ~100
- High-pass & C-type Filters: <10

11. Minimum expected life: 25 years with periodic maintenance.

7. TECHNICAL SPECIFICATIONS OF MAIN COMPONENTS

7.1 Capacitors

The capacitor units shall be manufactured by adopting latest technology in dust free environment (certified for Class 10000) to ensure higher reliability and higher breakdown strength of the capacitor unit for better performance at site. The impregnate used shall be most suitable for high temperature. The impregnation shall be carried out under high vacuum for increasing di- electric strength. The capacitor units shall be hermitically sealed by controlled robotic welding process.

- Dielectric: Polypropylene Film, Non-PCB
- Stainless steel container (Min. 1.5 mm thickness)
- Welded/press fit type Bushings.
- Discharge voltage ≤ 75V in 10 minutes
- Routine & Type tests as per IS 13925
- Insulation Level: As per the Voltage Level

TESTS FOR CAPACITOR UNIT

Routine tests

a. Capacitance measurement.

b. Measurement of the tangent of the loss angle (tan δ) of the capacitor.
c. Voltage test between terminals.
d. AC voltage test between terminals and container.
e. Test of internal discharge device.
f. Sealing test.
g. Discharge test on internal fuses (If applicable)

Type tests

a. Thermal Stability test
b. Measurement of the Tangent of the Loss angle of the capacitor at elevated temperature.
c. AC voltage test between terminals and container
d. Lightning impulse voltage test between terminals and container
e. Short circuit discharge test
f. Disconnecting test on internal fuses

Routine tests shall have been carried out by the manufacturer on every capacitor before delivery. If the purchaser so requests, he shall be supplied with a certificate detailing the results of such tests. The test sequence above is not mandatory.

Routine Test or Type Tests must be done as per latest IEC and IS standards certified by as IEC 17025/ IEC 60871-1 /IS 13925 standards.

7.2 Series Reactors

- Air-core, dry type, aluminium wound
- Rated Voltage: 33 kV, Max System Voltage: 36 kV, Frequency: 50 Hz
- Compliance with IS 5553 (Part 3)
- Class F insulation, Max temperature rise: 90°C (Over Ambient)

TESTS FOR REACTOR UNIT

Type & Routine Tests

a. Measurement of winding resistance
b. Measurement of insulation resistance
c. Measurement of reactance
d. Dielectric tests (including separate-source voltage withstand test, induced overvoltage withstand test, and lightening impulse voltage test)
e. Temperature-rise test
f. Inductance measurement
g. Q-factor measurement
h. Measurement of harmonic current

Routine Test or Type Tests must be done as per latest IS standards certified by IS 5553.

7.3 Damping Resistors

1. Resistors shall be air-insulated, air-cooled through natural convection, and of dry type suitable for outdoor use.
2. Resistors for AC filter arms shall be of effectively low inductance.
3. Resistors shall be constructed with sufficient strength to withstand mechanical forces calculated in accordance with IEC 60865-1.
4. Paint Shade: RAL 5012-Epoxy Powder Paint/ with 33kV Stand Off Insulators/ Copper Bus Bars.

- Rated Voltage: 33 kV
- Stainless steel elements, IP23 enclosure (birds and vermin proof)
- Max temperature rise: 375°C
- Compliance with BS 587

7.4 Surge Arresters

1. The surge arrestors (SAs) shall conform in general to IEC 60099-4 or IS: 3070 except to the extent modified in the specification.
2. Arresters shall be of hermetically sealed units, self-supporting construction, suitable for mounting on lattice type support structures.
3. Bidder shall furnish the technical particulars of Surge arrester. The SAs shall be of heavy-duty station class and gapless Metal Oxide type without any series or shunt gaps.
4. The SAs shall be capable of discharging over voltages occurring during switching of unloaded transformers, and long lines.
5. Arrestors shall be complete with insulating base for mounting on structures. Self- contained discharge counters, suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit with necessary connection. Suitable leakage current meters should also be supplied within the same enclosure
6. The reading of millimetre and counters shall be visible through an inspection glass panel.
7. The surge arrestors shall conform to type tests and shall be subjected to routine and acceptance tests in accordance with IEC-60099-4

- Voltage: 33 kV, ZnO gapless type
- Discharge current: 10 kA
- Insulation Level: 70 kVrms / 170 kV
- Creepage distance: 31 mm/kV

7.5 Neutral Current Transformer

- Voltage: 33 kV, Ratio: 10/1A or 5/1A
- Burden: 15 VA, Class: 5P20
- Insulation Level: 70 kVrms / 170 kV
- Creepage distance: 31 mm/kV

7.6 Isolators

The Isolator should be Manually operated Double Break type off load Isolator with earth switch suitable for outdoor structure mounting Separate Junction Boxes for Isolator Main Switch & Earth Switch.

- Voltage: 33 kV, Double Break Off-Load
- Interlocks: Mechanical
- Creepage distance: 31 mm/kV
- Aux contacts: 4NO + 4 NC for main switch & 4NO + 4 NC for earth switch

7.7 MOUNTING RACKS

1. The mounting racks shall be hot dip galvanized steel sections. Each end of the rack shall have provision to receive incoming line connection.
2. The racks shall be complete with rack insulators, foundation bolts or any other hardware etc. for assembly into complete bank.
3. The height of the racks of capacitor banks shall be such that for making electrical connections with other equipment, proper electrical clearances are maintained.

This technical specification ensures full compliance with IS standards, IEEE 519, and CEA guidelines with enhanced details for technical clarity.

Following Technical clarifications shall be read with technical specification for Balance of System (BOS) package for 200 MW Grid Connected Solar PV Projects in Bikaner, Rajasthan (Section VI means technical specifications)

Sl.No.	Bidding Document Section (As quoted in Bidder's query*)	Chapter No. (As quoted in Bidder's query*)	Clause No. (As quoted in Bidder's query*)	Page No. (As quoted in Bidder's query*)	Description as per Tender Specification (As quoted in Bidder's query*)	Bidder's Query	NTPC REL's Reply
1	Section VI		Vicinity Map . Tender drawing		Vicinity Map and Block Layout: Cable & Road corridor road:	1. Kindly provide the width of road and cable corridor and request to share the typical drawing. This will enable bidder to properly plan cable laying philosophy. 2. Land and ROW for cable corridor will be in the scope of NTPC. 3. Weather Cable corridor shall be with fence and road. Cable shall be laid above Ground or buried? 4. We understand that external lighting is not required over cable corridors. Please confirm	1. Width of roads shall be as defined in Tender drawings. Cable corridor of sufficient width will be available. Bidders to comply. 2. Bidder's understanding is correct. 3. Cable corridor shall have no requirement of fencing. Cable to be laid underground / buried. 4. Bidder's understanding is correct.
2	Section VI				Pooling Sub-Station	1. Substation AutoCAD drg with proposed panel location with SVG, HF area shall be marked 2. We understand that Space and Aux. supply for Harmonic filter, SVG shall be provided by NTPC	1. NTPC REL shall provide space adjacent to the pooling substation for installation of SVGs. The detailed layout will be finalized during detailed engineering. 2. Bidder to make own arrangements for auxiliary supply for SVG and harmonic filters. Bidder to supply and lay communication cables up to PPC/CMCS as well as HT cables up to Main pooling switchgear and integrate the SVG and Harmonic filters in all respect. Provisions of bidding documents are clear and shall prevail.
3	Section VI	2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES	1.0, 2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES		Above Block DC capacity is considering DC:AC ratio 1.30 and nominal module Wp of 600 Wp. Number of modules for the solar PV project calculated based on 600 Wp (at DC:AC ratio of 1.30)	Please specify the Module Cable length	Cable length of 1200mm will be provided with Module.
4	Section VI	Tender drawing			THERE IS NO CMCS BUILDING ENVISAGED FOR THE 200MW SOLAR PROJECT UNDER BIDDER'S SCOPE. BIDDER SHALL PLACE THE SCADA/OWS/EWS PANEL, AT OWNER'S	Bidder required clarification back-up shall be considered in 220V DC Battery rating. EPC Shall convert DC to AC supply through inverter. Hence back- up time is not applicable	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room will be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at

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					POOLING SUBSTATION SWITCHYARD CONTROL BUILDING. NTPC REL SHALL PROVIDE REDUNDANT 220V DC AND 230V AC SUPPLY SOURCE TO THE BIDDER FOR SCADA/OWS/EWS PANEL AT OWNER' SWITCHYARD CONTROL ROOM. NECESSARY WIRING IS IN BIDDER'S SCOPE. BIDDER SHALL PROVIDE SUITABLE UPS WITH BACK UP TIME AS MENTIONED IN THE TECHNICAL SPECIFICATIONS FOR THE AFORESAID EQUIPMENT IN OWNER'S SWITCHYARD CONTROL BUILDING (AS REQUIRED).		Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Provisions of Bidding documents are clear and shall prevail.
5	Section VI	Tender drawing			1N CASE OF OUTDOOR INVERTER, THE INBUILT LT TRANSFORMER FOR AUX SUPPLY SHOULD BE DESIGNED AND SIZED IN ORDER TO TAKE CARE OF ALL EMERGENCY LOADS AND MISCELLANEOUS LOADS RELATED TO MAINTENANCE ACTIVITY WITH REDUNDANCY.	Bidder request to accept the outdoor inverter with external transformer & also redundancy not considered	Provisions of Bidding documents are clear and shall prevail.
6	Section VI	8. STATUTORY COMPLIANCE, GRID CONNECTIVITY AND POWER EVACUATION	1.0 ,K, 8. STATUTORY COMPLIANCE, GRID CONNECTIVITY AND POWER EVACUATION		k) Metering: As per SLD. For interconnection with grid and metering, the SPDs shall abide by the relevant CERC Regulations, Grid Code and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended and revised from time to time.	Bidder understands metering is at 400kV side and same shall be provided by the NTPC and no separate metering if required Stand by meter - 33kV side Please confirm.	Bidder to refer the Tender SLD in addition to the metering requirements/provisions mentioned at Technical Specification Part A, Chapter 2A and Terminal points/Exclusions at Chapter 3A. The metering point for OTGT is mentioned at Clause 2.0 of Technical specification Chapter 1A. Provisions of Bidding documents are clear and shall prevail.
7	Section VI	B-3(A) INVERTER	1.0, B-3(A) INVERTER		Continuous operation at rated MVA on any tap with voltage variation of +/-10%, also transformer shall be capable of being	Bidder request to accept Transformer load to 100% continuous thermal overloading capability at principle tap	Provisions of Bidding documents are clear and shall prevail.

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		TRANSFORMER	TRANSFORMER		loaded in accordance with IS: 6600/ IEC60076-7.		
8	Section VI	B-4 AC CABLES	B-4 AC CABLES		Screen Fault current _ _ _KA for _ _ _ Sec. (Value of current & time shall be indicated) (If applicable)	Bidder request to accept 33kV Cable armour type strip/round wire base on the Fault current. Armour +Screen - 25kA for 0.5 sec Conductor - 25kA /0.5 Sec	Provisions of Bidding documents are clear and shall prevail.
9	Section VI	B-8 EARTHING SYSTEM	1.0, B-8 EARTHING SYSTEM		GS/GI Flat (Strip) conductor shall comply to IS 2026 with Galvanization of 85 Micron as per IS. Material shall be clean and free form mechanical defects.	Bidder request to accept the GI Strip of Hot Dipped Galvanized (Avg of 86 Micron)..	Provisions in Bidding documents are clear and shall prevail.
10	Section VI	B-8 EARTHING SYSTEM	4.10, B-8 EARTHING SYSTEM		Each PV Module frame shall be earthed in accordance with module manufacturer guidelines. In case module frame earthing is to be separately provided, it shall be earthed with minimum 2.5 Sq mm flexible copper cables with lug at suitable location of module frame. Nos. of PV modules in single loop of earthing connection to module frame shall be as per Module manufacturer recommendation. Both ends of the loop of copper cable for earthing shall be connected with nearest earthed structure or earth conductor.	Bidder request to accept the Module Earthing by using of Serrated washer	Provisions in Bidding documents are clear and shall prevail.
11	Section VI	B-9 PLANT ILLUMINATION SYSTEM	9.0 ,B-9 PLANT ILLUMINATION SYSTEM		The inverter room shall be provided with electric light to achieve an average illumination level of 150 Lux. However, room should be designed to utilize maximum natural light during the day.	Bidder maintains avg lux for Indoor & outdoor locations as per standard industry practice	Provisions of bidding documents are clear and shall prevail.
12	Section VI	B-10 AUXILIARY POWER	1.02, B-10 AUXILIARY POWER		ACDB in CMCS room shall have two incomer (100% rated) fed from two different sources. At CMCS, auxiliary transformer directly feed from 33kV switchgear are also acceptable.	Please confirm the scope of bidder at CMCS building since PSS & CMCS building is in client scope as bidder having ambiguity in scope at CMCS building. Since bidder understands that	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for

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		SUPPLY SYSTEM	SUPPLY SYSTEM		Following consideration shall be taken while arriving kVA capacity of auxiliary transformer	supply of ACDB & Aux trafo at CMCS building is in owner scope and only UPS without battery for SCADA will be provided by bidder at CMCS building.	bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Auxiliary power supply for owner's equipment at PSS is not in the scope of the subject package. Provisions of Bidding documents are clear and shall prevail.
13	Section VI	12.1, D-2 FIRE FIGHTING AND ALARM SYSTEM	D-2 FIRE FIGHTING AND ALARM SYSTEM		DCP Type (ABC type) (10 Kg. Capacity)	Bidder request to accept the DCP (AB type) 9kg capacity	Bidder to refer technical amendment no.1 in this regard.
14	Section VI	2.0, A-2 TRACKER SYSTEM	A-2 TRACKER SYSTEM		A-2 TRACKER SYSTEM : f) Redundant communication (wireless) for individual Trackers. f)Suitable redundancy in sensing and auxiliary power supply shall be provided for fail-safe stowing of trackers. Redundancy in control is also desirable for the safe operation of trackers. Detail of the scheme for various redundancy shall be finalized at the time of detailed engineering. c) All local tracking controls shall be mounted on the tracking structure. A suitable arrangement/bellows shall be provisioned to protect actuator assembly from extreme outdoor harsh condition, dust and UV rays.	Bidders want to inform that all prominent of tracker OEM do not provide redundant communication system for tracker, please accept. Bidder want to inform that all prominent of tracker OEM do not provide redundant sensing and auxiliary power supply. Bidders want to inform that slew drive outer section contains these features as per OEM proven and proprietary design, suitable documents will be provided DDE thus in this connection there would not be requirement of separate bellow.	Provisions of the bidding documents are clear However, OEM recommendation shall be reviewed based on the actual redundancy or merit during detailed engineering phase. Provisions of bidding documents shall prevail.
15	Section VI	B-12 METERING SYSTEM	B-12 METERIN G SYSTEM		Suitable PQ meters (0.2 accuracy class) shall be provided at plant output and at necessary locations (as per scope of work) for measurement of required electrical parameters	Bidder required clarification for the location of PQ meter for Each outgoing feeder.	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of PQ meters. Provisions of bidding documents are clear and shall prevail.

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16	Section VI	10.0, PV Analyzer (complete KIT with software	10.0 PV Analyzer (complete KIT with software		Bidder shall provide minimum 2 Numbers of PV Analyzer Kits of reputed make to measure the PV Module performance. Analyzer kit shall have all necessary hardware connectors and required software for data analysis.	Bidder requires a clarification of Number of PV Analyzer needs to be consider during O&M period ? After the O &M period PV Analyzer will not handover to client	Bidder shall supply 2 PV analyzer kit for the project as per the technical specification. The details of the PV analyzer is as per the latest technical specification with all subsequent amendments.
17	Section VI		4.0, 4_AREA AVAILABILITY		Land will be provided by NTPC REL on "as is where is basis" (Approx. 5 acres/MW). Land being provided may or may not be on a contiguous basis. Land will be, in general levelled with an average slope of 10% and local slope of up to 15%. Thus, major cutting / filling is not envisaged in bidder scope, in general, except for the practical / localized issues. Topography survey and levelling (to the slope mentioned above) will be done by Owner through another contract which is going on in parallel. Any additional levelling and grading, if required w.r.t. the MMS system proposed by bidder, beyond the specified slope above, shall be in the scope of the bidder Further, once the land is handed over, further protection of slope would be in bidder's scope.	Based on our previous project experience, the existing soil at the proposed site meets the requirement of an average slope of 10% and a local slope below 15%. Therefore, the bidder requests that the soil be locally levelled to within 5%. It will save price escalation during Post-bid stage. As NTPC has already engaged land development agency for this work.	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mtr along N-S direction, and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.
18	Section VI	PART-1A_Project Information	B, B_MODULE MOUNTING – i) Single Axis E-W Tracker		The minimum design clearance (at the highest tilt angle) between the lower edge of the modules and the developed ground level shall be 400mm for Single Axis Tracker based system.	Bidder Proposes in the absence of hydrology report, the max. Ground clearance b/w Module Lower Edge to NGL to be fixed during pre-bid stage so that all bidders are at same level. Because as per our experience at nearby location the clearance is minimum 600mm. Request NTPC to make this requirement firm and common for all.	Provisions of the bidding documents are clear and shall prevail. Bidder to comply with the same.

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19	Section VI	PART-1A_Project Information	D, D_PROJECT LOCATION CLASSIFICATION (CORROSION PROTECTION		Classification of environments for Corrosive category shall be in accordance with ISO12944-2, the applicable atmospheric corrosivity categories are C3 (medium); C4 (high); C5-I (very high-industrial); C5-M (very high-marine).	The bidder proposes to consider corrosion category C3. The coating thickness for HDG material shall be a minimum of 65 microns and an average of 80 microns, while for Galvalume material, it shall be AZ150. Kindly confirm.	Provisions of the bidding documents are clear and shall prevail. Bidder to comply with the same. Detailed characteristics shall be finalized during the detailed Engineering phase.
20	Section VI	PART-1A_Project Information	E_SEISMIC DATA & DESIGN CRITERIA		Provisions of IS 1893 (Part 1) shall be followed	Bidder proposes seismic zone III as per IS:1893. Kindly, confirm	Provisions of bidding documents are clear and shall prevail.
21	Section VI	PART-1A_Project Information	F_WIND DATA & DESIGN CRITERIA		The minimum design wind pressure (Pd) to be considered for design of MMS, Equipment Fixing, Buildings, Rooms, etc. as below: BASIC WIND SPEED, 47m/s Design Wind Pressure, min,.Pd 890(N/m2), For the solar project, the minimum design wind pressure (Pd) = 890 N/m2	We will consider the basic wind speed as per Indian IS codes and standards however, wind pressure calculations and load combinations shall be considered as per OEM recommendations (ASCE codes)	Provisions of the bidding documents are clear and shall prevail. Bidder to comply with the same.
22	Section VI	PART-1A_Project Information	H_Bidder shall propose Dry Robotic cleaning system only for cleaning of Solar PV modules.		Bidder shall propose Dry Robotic cleaning system only for cleaning of Solar PV modules.	Bidder proposes dry robotic cleaning system. Length of table less than 500m shall be considered as semi automatic robots (manually operated with lift and shifting by intervention of labours) & length greater than 500m shall be automatic robots. Kindly, confirm & share approved robotic vendors.	Semi-automatic robots shall only be applicable where the length of the continuous tables is less than 300 Mtr. However, on all other stretches the fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. The same shall be reviewed during detailed engineering prior to acceptance. Bidder to refer technical amendment no.1 in this regard.

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23	Section VI	PART-1A_Project Information	I_General		Approach Road is the road from the Main approach road to the plant boundary/Main gate.	Kindly confirm whether the construction of the main approach road is within the bidder's scope. If so, please specify the length to be considered for bidding purposes.	As the Plot boundary is attached to the existing main road hence no such approach road is envisaged however in some minor stretch, if road is required, same shall be in the scope of bidder. Kindly refer the KMZ provided for reference. Provisions of bidding documents are clear and shall prevail.
24	Section VI	PART 1-B_INTENT OF SPECIFICATION	2.3_SCOPE OF WORK		Works related to site clearance including removal of bushes, trees, levelling, grading, finishing and other additional works in the scope of bidders. Mandatory permission/ licenses/ statutory clearances from Competent Authorities for undertaking blasting related works, disposal of cutting material, etc. shall be carried out by the Bidder.	We proposes, Mandatory permission/licenses/ statutory clearances from Competent Authorities shall be in clients scope. Minor bush clearance shall be done by EPC. Any permanent structures, TL lines shifting shall be in client scope.	Bidder to refer technical specification part A for scope of clearances for the project. However, if any other requirement is necessitated during the course of project development, then Bidder has to facilitate the same. Any permanent structures, TL lines shifting shall be in employer's scope. However, if any exclusion of portion of the land in the shared land profile is encountered later, project layout may be prepared accordingly as sufficient land to the tune of approx. 5 acre per MW is provided for project development. Provisions of bidding documents are clear and shall prevail.
25	Section VI	PART 2-B_CIVIL SCOPE OF SUPPLY & SERVICES	1_CIVIL SCOPE OF SUPPLY & SERVICES		Site investigation-Topography survey, Geotechnical investigation and other investigations	Bidder requests, to provide preliminary topography, Geotech & hydrological study reports in AUTOCAD format for Prebid works with clear boundary of proposed land. These reports will help us to access the site conditions and propose better solutions and risk management during pre-bid stage.	All site investigations are in bidder's scope. However, Topography survey of land will be carried out by NTPC REL in parallel. The same will be shared as and when available post award of the contract with the successful bidder. Bidder shall verify the propriety of the said topography survey data for use in project design. Provisions of bidding documents are clear and shall prevail.
26	Section VI	PART 2-B_CIVIL SCOPE OF SUPPLY & SERVICES	1_CIVIL SCOPE OF SUPPLY & SERVICES		Central Monitoring and Control Station (CMCS) building with parking shed.	As per the tender document, CMCS and the parking shed are not included in the scope. Kindly confirm the same. Also, Please specify the location of CMCS building.	As clearly mentioned at Technical specification chapter 2B and 3B, CMCS building and parking shed civil works are excluded from the scope of the subject package. CMCS/Control room building is at Owner's PSS shown in Vicinity map cum block layout tender drawing. Provisions of bidding documents are clear and shall prevail.

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27	Section VI	PART 2-B_CIVIL SCOPE OF SUPPLY & SERVICES	1_CIVIL SCOPE OF SUPPLY & SERVICES		Permanent Store-Room / Ware House (Pre-Engineered Building)	The bidder proposes to consider a maximum area of 250 sqm for the store room/warehouse for a 200 MW block. Kindly confirm	As per TS "Construction of 1 No. of store room for each block with minimum built-up size of 250 sqm (width not less than 7Mtr)." Provisions of bidding documents are clear and shall prevail.
28	Section VI	A-2 TRACKER SYSTEM	2.3_REQUIREMENTS		REQUIREMENTS	1. Single axis single row tracker or single axis multiple row tracker shall be proposed. kindly confirm. 2. Wind pressure coefficient and load combination for the tracker design shall be as per tracker vendor standards. kindly confirm. 3. Self powered or string tapping tracker shall be proposed, kindly confirm. 4. tracker material coating thickness, structural material thickness /properties shall be provided as per tracker vendor recommendation.	Provisions of bidding documents are clear and shall prevail.
29	Section VI	PART-B_CIVIL WORK	1.3_CONTOURING		Bidder shall carry out spot level surveying at an interval of average 50 meters for contouring the area. Levels shall also be taken on all traverse stations and on salient points located at random over the area (ground points). Contours are to be interpolated at 0.5 M intervals after the above points are plotted.	Bidder suggests: The interpolation for 0.5 metres intervals within 50 meters grid may create inaccuracy in contour results. Bidder suggests to go forward with 10 m grid intervals for contouring for better results and further interpolation for 0.5 meters.	Provisions of bidding documents are clear and shall prevail.
30	Section VI	PART-B_CIVIL WORK	2.2 FOUNDATION SYSTEM		Minimum depth of foundation shall be 1.0m below ground level.	Foundation depth shall provided as per the design calculation and approved geotechnical report. kindly confirm.	Provisions of bidding documents are clear and shall prevail.
31	Section VI	PART-B_CIVIL WORK	2.2 FOUNDATION SYSTEM		In desert areas where sand erosion is anticipated, depth of pile shall be increased beyond designed depth by minimum 300mm	The tender specifies that in desert areas, the pile depth shall be increased by a minimum of 300 mm or the anticipated erosion depth, whichever is higher. Kindly confirm the erosion depth to be	Provisions of bidding documents are clear and shall prevail.

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					or envisaged depth of erosion, whichever is higher	considered for this project location and whether any site-specific criteria or study shall govern this requirement.	
32	Section VI	PART-B_CIVIL WORK	2.2.2 Rammed Steel Pile as MMS foundation		Rammed Steel Pile as MMS foundation for Ground Mounted solar PV Projects Considering the substrata condition, advanced and mechanized steel pile foundations may be opted for MMS of a solar PV system:	The bidder proposes to adopt bored cast-in-situ pile foundations of 300 mm diameter for the MMS. The pile depth shall be finalized based on detailed design calculations and the approved geotechnical report.	Provisions of bidding documents are clear and shall prevail.
33	Section VI	PART-B_CIVIL WORK	1.3_SITE LEVELLING AND GRADING		Fill shall normally be made up of Cohesive Non swelling (C-Ø) material capable of being compacted up to 95% Standard Proctor density. If cohesionless soils(Sandy soils) are used as fill material, then the degree of compaction shall be 75% of relative density for site levelling and grading work. In case earth has to be borrowed from outside the plant boundary, the same shall be arranged by the Bidder. The slope at the edge of graded areas shallot be steeper than 1:1.5 (1 vertical to 1.5 horizontal) in cutting and 1:2 in filling.	The bidder proposes to utilize the existing soil available within the plant boundary for filling and grading works	Provisions of bidding documents are clear and shall prevail.
34	Section VI	PART-B_CIVIL WORK	1.5_SITE LEVELLING AND GRADING		The slope protection measure shall be provided in case inter levelled patches level difference is more than 2.0m. Random rubble/boulder/stone pitching/concrete blocks etc. shall be provided for the slope protection for road side slope, storm water ditches/drainage, embankment slopes, inter levelled patches slopes etc. as per design requirements.	During site grading (cutting and filling), slope stability shall be achieved by maintaining cut slopes at 1:1.5 or 1:2. No additional slope protection measures are required, as the slopes will remain stable under natural conditions. kindly confirm.	Provisions of bidding documents are clear and shall prevail.

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35	Section VI	PART-B_CIVIL WORK	1.5_SITE LEVELLING AND GRADING		Suitable sand erosion control measure shall be provided in case any sand dune or very loose soil areas fall inside the plot area. The same may be made with Random rubbles/boulders/stone pitching/concrete blocks/ murrum filling, etc. Bidder shall also provide sufficient grass/buses/trees covers on these dune / loose soil patches, as specified below for desert areas. 1.7 Bidder shall also provide suitable sand erosion protection measure around the foundation as mentioned above. In case murrum filling around foundation is adopted as sand erosion measure, then well compacted murrum filling around foundation/ pile may serve the purpose of control of sand erosion. However, diameter of extent of murrum layer shall be at least 1500mm beyond face of foundation and depth of filling shall extend at least 100mm beyond the maximum depth of erosion observed/ anticipated. In no case, it shall be less than 300mm	The bidder notes that sand erosion control measures are specified; however, no quantitative inputs such as erosion depth, affected areas, or soil parameters have been provided in the tender. In the absence of such data, the bidder proposes to finalize the type and extent of erosion control measures during detailed engineering based on site investigations. Any additional quantities arising from these requirements shall be treated as a variation. Kindly confirm.	Bidder to suggest the measures for review by NTPC REL post award of the contract and deploy the same as per the site-specific requirement. All the works required for achieving the same shall be with the scope of bidder without any extra cost to employer. Provisions of bidding documents are clear and shall prevail.
36	Section VI	PART-B_CIVIL WORK	1.8_For Solar Project in Desert areas		Bidder shall also provide suitable sand erosion protection measure within its allotted plot area by sowing Cassia angustofolia (Sonamukhi or senna) andcenchrus ciliaris. This shall be taken up when the majority of construction, MMS erection and fixing work has completed. A minimum of one bush shall be planted in each 5 sqm area of the plot. Usually, it attains height of 70-80 cm and crown diameter of 50-60 cm within a period of 5-6 months, when sown.	As per clause The height of SONAMUKI is almost 70 to 80cm and crown diameter of 50-60 cm. We feel this casts shadow on tracker and affect the generation numbers so, same to be avoided in the tracker area. We request you to give markup for planting the same due to non availability of topo & survey report	Provisions of bidding documents are clear and shall prevail.

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37	Section VI	PART-B_CIVIL WORK	1_ BOUNDARY WALL, FENCING AND GATE		a) Pre-Stressed Precast Boundary Wall – Bidder's Choice b) Chain Link Fencing (e.g. Any Statutory Requirements) c) RCC Fencing Poles with Barbed Wire	As per tender Plant boundary fencing is not in bidder scope. Bidder proposes, Chain link fencing for IDT. Kindly confirm. Barbed wire and toe wall shall not be provided.	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement as per provisions of tender. Provisions of bidding documents are clear and shall prevail.
38	Section VI	PART-B_CIVIL WORK	3. Design Loads:		The concept of wind tunnel studies may be considered in the design philosophy for fixed seasonal module mounting structure as well as Tracker System.	1.Wind pressure coefficient and load combination for the tracker design shall be as per tracker vendor standards. kindly confirm. 2.STAAD or any other type of software will not be provided only design warranty and product warranty for the tracker shall be provided as per tracker vendor standards. Kindly confirm. 3.wind tunnel study or any other soft copies will not be shared by tracker vendor due to IP issues. 4.fabrication drawing of tracker shall not be shared only GA drawing will be provided due to IP issues.	Provisions of bidding documents are clear and shall prevail.

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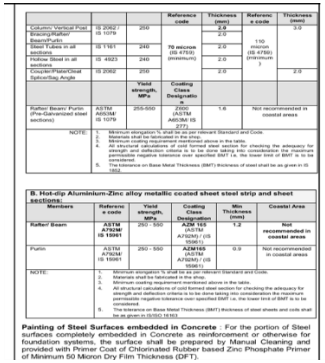
39	Section VI	PART-B_CIVIL WORK	6_ Materials Specification & Coating for Structural Steel Works			1. For C3 corrosion category- Thickness of Coating is Min. 65 Microns Avg. 80 microns Kindly Confirm. 2. Above ground steel post will be embedded in concrete up to 300 mm (pile cap). The other atmospheric exposed steel post shall be HDG for corrosion protection as per ISO 14713. Separate epoxy coating on steel post is not required. 3. For C3 corrosion category Epoxy based Corrosion Protection measures above concrete capping is not required. Please confirm.	Provisions of bidding documents are clear and shall prevail.
40	Section VI	PART-B_CIVIL WORK	8_Foundation System		Top of concrete/ height of collar for MMS foundation shall be minimum 150mm above Finish ground level. The proposed foundation system for MMS shall be based on findings/results of the approved geo technical investigation report. Following kind of foundation may be provided: 1. Short pile foundation (Min. 300mm dia.) 2. Rock anchor with concrete collar (Min. 700 sq.cm.) 3. Isolated, strip or raft foundation 4. Concrete ballast foundation	1. Final depth of foundation will be decided based on results of Pull-out test & lateral test. 2. For Bidding purpose, please confirm the Pile depth. 3. Extension piece of black material is applicable for MMS column post below NGL. depth of main HDG leg will be 750 mm below NGL and remaining depth of pile depth will be covered with black steel. kindly confirm.	Provisions of bidding documents are clear and shall prevail.
41	Section VI	PART-B_CIVIL WORK	2_INVERTER ROOMS & SECURITY ROOM		b) Pre-Engineered Building in line with PEB Tender drawing & technical specification (IR PEB shall be provided only in non-coastal area),	Bidder proposes, Since it is non coastal area inverter rooms shall be Outdoor type. Where top is covered with corrugated sheet and sides are open. Rectangular loading pattern will be followed for load calculation. kindly confirm.	Provisions of bidding documents are clear and shall prevail.

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42	Section VI	PART-B_CIVIL WORK	2.2.1_Structure and material specification:		All hot rolled primary structural members and Rod/Angle/Pipe bracing etc. shall conform to IS: 2062, minimum Grade E250 Quality A. Secondary members for Purlins and Girts shall conform to the specification of IS 811 or ASTM A1003-12 made from steel sheets conforming to ASTM A1011 12b Grade 50 having a minimum yield strength of 345 MPa The minimum thickness of secondary members shall be 3mm. All other miscellaneous secondary members shall have the minimum yield strength of 250 MPa	The bidder proposes to adopt a minimum yield strength of 210 MPa for hot-rolled structural sections and 310 MPa for cold-formed sections. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.
43	Section VI	PART-B_CIVIL WORK	2.2.2_Fasteners & Connections:		Special coated self-drilling screws/fastener shall be used conforming to class 3 as per AS 3566.1 and AS 3566.2. Steel bolts, nuts and washers complying with AS 1112:2000. High Strength Bolts for Primary Connections IS 1367 (Part III) Gr. 8.8 / ASTM A325. Bolts for Secondary Connection IS 1367 (Part III) Gr. 4.6 / ASTM A307. Anchor/foundation Bolts shall conform to IS 5624 and relevant IS code.	the bidder proposes to adopt Grade 5.6 bolts for primary connections for inverter shed/storage shed or any other shed structure . For tracker-related connections, bolts shall be as per the tracker vendor's standard specifications. Kindly confirm	Provisions of bidding documents are clear and shall prevail.
44	Section VI	PART-B_CIVIL WORK	2.2.6_Doors Frames:		Door frames shall be of the iron frame of mild steel sections.	Bidder Proposes Aluminium frame sections for door	Detailed characteristics shall be finalized during the detailed Engineering phase. Adoption of Aluminium frame sections shall be subject to approval of NTPC REL based on application and meeting requirement.
45	Section VI	PART-B_CIVIL WORK	2.2.10_Plinth Protection:		500 mm wide plinth protection minimum with 75 mm thick of cement concrete 1:3:6 (1cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top	Bidder suggests, that ICR below plinth beam shall be open type. Hence plinth protection can be avoided. Kindly, confirm.	Provisions of bidding documents are clear and shall prevail.

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					smooth, shall be provided around the Pre-Engineered Building		
46	Section VI	PART-B_CIVIL WORK	3_GENERAL CIVIL WORKS		a) All RCC works shall be designed mix as per IS 456 (2000). For structural concrete items, Ordinary Portland cement (43 Grade) conforming to IS: 8112 and Fly ash-based Portland pozzolana cement conforming to IS: 1489 (Part-1) shall be used for superstructure. Type of cement for sub-structures shall be decided based on the approved geotechnical Investigation report and special protection measures against chemically aggressive environment, specified at Cl.2.2 of Chapter C-1 of this specification.	Kindly allow to use the Portland slag cement / Portland Pozzolana cement also for the RCC work.	Bidder may propose the same during detailed engineering. Adoption shall be subject to approval of NTPC REL based on application and meeting requirement.
47	Section VI	PART-B_CIVIL WORK	3.1_GENERAL CIVIL WORKS		Reinforcement steel shall be of high strength deformed TMT steel bars of grade minimum Fe-415 and shall conform to IS: 1786. Ductile detailing in accordance with IS: 13920 shall be adopted for superstructure and substructure of all RCC buildings/structures	Bidder considers, only non coastal area parameters because proposed land is located at non coastal area.	Provisions of bidding documents are clear and shall prevail.
48	Section VI	PART-B_CIVIL WORK	6_PLANT DRAINAGE SYSTEM		Bidders can also propose suitable detention pond, recharge dugwells, recharge pits, recharge trenches, and recharge soakways for quick disposal of storm water in the vicinity of the solar block/plot.	The bidder notes that hydrology report and topographical survey data are not available. In the absence of these inputs, storm water management systems or culverts cannot be designed or quantified at this stage. Any such works shall be treated as a variation. Kindly confirm.	All the works related to Storm water management shall be in the scope of Bidder. Provisions of bidding documents are clear and shall prevail. Bidder to comply.
49	Section VI	PART-B_CIVIL WORK	6_PLANT DRAINAGE SYSTEM		The bidder plot drainage scheme shall include to drain out the drainage of the allotted plot and shall include contributing catchment area consisting of adjoining plots and nearby catchment area.	The bidder proposes to consider only the internal (plant boundary) catchment area for drain design. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.

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50	Section VI	PART-B_CIVIL WORK	8.Internal Roads		The Internal roads to the Solar Power Plant shall originate from the approach road and connect to all Inverter rooms, module cleaning station and gates.	Bidder request to clarify the requirement of peripheral road along the boundary. If required kindly confirm the sections and details to be followed.	Roads shall be as the Bidder's proposal and tender drawings, within the purview of Technical Specifications. Provisions of bidding documents are clear and shall prevail.
51	Section VI	B-6 SCADA	1.9		1.9 Supply of hot standby redundant PLC/RTU/DCS based power plant controllers (PPC) and associated independent equipment/ accessories is in the scope of the Bidder. Power plant controller (PPC) shall be provided with two processors (main processing unit and memories), one for normal operation and one as hot standby. In case of failure of working PPC processor, there shall be an appropriate alarm and simultaneously the hot standby PPC processor shall take over the plant control function automatically. The transfer from main processor to standby processor shall be totally bump less and shall not cause any plant disturbance whatsoever. It shall be possible to keep any of the PPC processors as master and other as standby.	Bidder informs 1No. 32" PPC workstation with redundant PPC controller will be considered , for overall 200MW project. Please check and confirm.	Bidder to refer terminal points and exclusions for the subject package. Further, bidder to refer technical amendment no.1 in this regard.
52	Section VI	B-6 SCADA	1.3		vii) Remote monitoring of essential parameters of plant on the web using popular web browser without requirement of additional software. Same shall be authorised with user id and password using standard modem. User ID and password for remote view can only be changed by SCADA Administrator. Internet connection for transferring data to web shall be taken by Contractor in the name of NTPC REL Site for O & M period.	1)Bidder informs that for remote monitoring we will provide 3 number web client license.	Bidder may provide as many licenses as they wish to but not less than the requirement envisaged in the bidding document. Provisions of bidding documents are clear and shall prevail.

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53	Section VI	D-1 WEATHER MONITORIN G STATION	1.1		1.1 Pyranometer Bidder shall provide minimum 02 (Two) numbers of Secondary Standard Pyranometers as per ISO 9060 for measuring incident solar radiation as per following. • Global Horizontal Irradiance (GHI)- 1 Nos. • Global Inclined Irradiance (GII)-1 Nos	1)The Bidder proposes that, as per IEC-61724-1:2021, a total of 4 Primary WMS are considered for the overall 200 MW project. Kindly check and confirm. 2)Bidder informs as per the new CEA Guidelines, 1No. AWS will be considered for overall 200 MW project. 3)Following shall be considered in each set of (CR-1000X) Primary WMS: • Pyranometer (GHI & POA) with SMP10 -2Nos • Module surface temp sensor-4Nos • Albedometer-1Nos • Ambient temp sensor-1No • Wind speed & direction sensor-1No • Rain guage-1No • Barometric pressure sensor-1No Following sensor shall be considered in project (SLDC requirements): 1 Set for over all 200 MW project. •Direct and Diffused Radiation Sensor-1No •Cloud cover sensor (PCCD) -1No Request to confirm the quantity for better optimizations during pre-bid stage.	Bidder to provide minimum as per the TS requirement. Further bidder may refer to the technical amendment no.1 for the WMS for the additional requirements.
54	Section VI	HUMAN MACHINE INTERFACE SYSTEM (HMIS)	4		iv) Graphical Interface Unit (GIU) / Operator workstation (OWS) shall perform control, monitoring and operation (as applicable) for plant equipment's connected with SCADA system. v) Engineering workstation (EWS) shall work as a programming station both for controller and SCADA. It shall be possible to use same EWS as programming station and the Human Machine Interface System.	Bidder proposed to confirm the below-mentioned PC qty for overall 200 MW project . 1) 32" EWS cum OWS Server - 2 No 2) 32" OWS workstation - 1 No 3) 32" HISTORIAN Server - 1 No 4) 55" LED monitor for SCADA with HDMI cable - 1 No 5) 55" LED monitor for CCTV inside SCADA Room - 1 No 6) 32" ROBOT PC - 1 No	Provisions of bidding documents are clear. Further, Bidder to refer to the technical amendment no.1 in this regard.

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					vi) SCADA System shall also be provided with an OWS. Operator shall be able to access all control/information related data under all operating conditions including a single processor and computer failure/hardware failure at CMCS in the HMIS. vii) In addition to a desktop based EWS, vendor shall also provide dedicated portable (laptop) based EWS. xv) In addition to GUI Display, one 55 Inch LED display shall be provided at SCADA Room.	7) EWS LAPTOP - 1 No 8) 50" GUI Display - 1 No 9) 32" TRACKER PC - 1 No 10) One (1) number A4 printer colour laser jet printer,	
55	Section VI	D-3 MODULE CLEANING SYSTEM			Bidder shall propose Dry-Robotic cleaning system only for cleaning of Solar PV modules. The technical specifications/minimum technical requirements of Dry Robotic Cleaning System are furnished below:	Bidder informs 1No. 32" ROBOT Monitoring PC will be considered for overall 200 MW project. Please check and confirm.	Bidder to refer to the technical amendment no.1 in this regard.
56	Section VI	B-7 INSTRUMENTATION AND COMMUNICATION CABLE	1		1.0 COMMUNICATION CABLE (Optic Fibre Cable): Optic Fiber cable shall be 8/12 core, galvanized corrugated steel taped armoured, fully water blocked with dielectric central member for outdoor /indoor application so as to prevent any physical damage. The cable shall have multiple single-mode or multimode fibres on as required basis so as to avoid the usage of any repeaters. The outer sheath shall have Flame Retardant, UV resistant properties and are to be identified with the manufacturer's name, year of manufacturing, progressive automatic sequential on-line marking of length in meters at every meter on outer sheath.	Bidder proposes that OFC Outer sheath will be corrugated ECCS outer sheath cable instead of Galvanized Corrugated Steel Tape cable. Kindly check and confirm.	Bidder to refer to the technical amendment no.1 in this regard.

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57	Section VI	D-8 CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM	3.01		3.01 The CCTV system shall be able to provide surveillance of different locations in the plant like entry/exit gates, ICR's(Indoor and outdoor) in entire layout CMCS(Indoor and Outdoor) and all across the periphery. The periphery shall be covered by the CCTV such that at a time all the periphery is covered irrespective of the direction the PTZ camera is facing. The same shall be verified during detailed engineering. It is to be ensured that location of camera shall be such that it should cover the WMS locations inside the plant. Bidder to ensure that a bullet camera to be installed at the WMS locations inside the plant and to be added in the CCTV screen The Camera at WMS location to have a battery backup/ alternate supply in case main supply gets disrupted. Other strategic locations if any shall be decided during detailed engineering design. The exact locations shall be decided during detailed engineering.	Bidder proposed below camera quantity location-wise for overall 200 MW project . • PV Plant Inside MCR entrance/Inside SCADA ROOM - 2Nos Dome type camera. • 1No. PTZ Camera for each Main gates entry & exit. • Inverter Stations- 1Nos PTZ camera • Each Security room 1Nos Dome type camera. • 1No. PTZ Camera at each WMS • PTZ camera with 500 meter coverage for over all PV plant periphery please check and confirm. • Bullet camera shall have 40 meter range and PTZ camera shall have 100 meter range and Dome camera shall have 30 meter range	The number of cameras shall be as per the IR range of the camera offered. The exact location shall be finalized during detailed engineering. Provisions of bidding documents are clear and shall prevail.
58	Section VI	D-8 CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM	3.06		Camera server shall be provided with a minimum of 32 TB of storage space or as calculated per requirement to store recordings of all cameras for the specified days. All recordings shall have camera ID, Location, Date, and time of recording.	Bidder informs that we will provide NVR with 30days storage backup. Kindly check and confirm.	Bidder to refer to the technical amendment no.1 in this regard.
59	Section VI	Workstation	4.05		Operators' workstation & network switch station shall be in Control Room or as finalized during the detailed engineering. The size of the display screen shall be minimum 55 inches/ inline to the requirement for the complete camera coverage in the screen.	Bidder proposed that 1No. 55" inch LED monitor will be provided for PV plant CCTV for overall 200 MW project and also 1No. separate 55" LED monitor with NVR will be considered for Periphery. kindly check and confirm.	Bidder to refer to the technical amendment no.1 in this regard.

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					Bidder must ensure that the LED screen pixel density shall match with the offered camera pixel density or higher.		
60	Section VI	D-2 FIRE FIGHTING AND ALARM SYSTEM	12.2		Microprocessor based fire alarm panel Bidder to provide intelligent microprocessor based main fire alarm panel of modular construction complete with central processing unit, input and output modules, power supply module, supervision control and isolator modules with 10% spare provisions in each loop. Fire detection alarm system shall include) but not limited to the following items	Bidder proposes that 4-Zones at MCR & 2 Zones at ICR level Microprocessor-Based Addressable type FAS system with RS-485 Protocol for Fire & Fault Alarm will be provided for overall 200 MW project. Kindly check and confirm	Provisions of bidding documents are clear and shall prevail. The final details shall be decided during detailed engineering.
61	Section VI	4.0 HUMAN MACHINE INTERFACE SYSTEM (HMIS)			xvii) SCADA shall have facility to provide real time reporting of alarms and statistical data through SMS and e-mails.	Bidder informs that for real time reporting we will provide FTP feature instead of SMS and e-mails. Please check and confirm.	The same shall be provided during detailed engineering in line with the technical specification.
62	Section VI	B-12 METERING SYSTEM	4		Suitable PQ meters (0.2 accuracy class) shall be provided at plant output and at necessary locations (as per scope of work) for measurement of required electrical parameters such as active power, reactive power, power factor, voltage, current, frequency, power quality paraments, etc. PQ meter shall have TCP/IP port for SCADA and PPC communication. Selected PQ meters shall be able to measure grid frequency with minimum two digit after decimal point. CT and PT/CVT core used for PQ meters shall have accuracy class of 0.2S and 0.2 respectively. These PQ meters should have auto report generation facility of daily reports of Harmonics/Flicker and DC currents as per IEEE519/IEC61000 accessible from	Bidder needs clarity for the scope of PQM meter, if it was in EPC scope, kindly confirm the PQM Quantity.	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of PQ meters. Provisions of bidding documents are clear and shall prevail.

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					OWS of PPC system so that it can be submitted in relevant REMC/RLDC. Necessary software for visualization of online parameters and setting in PQM in OWS(PPC) must be supplied along with PQM.		
63	Section VI	POWER EVACUATION SYSTEM, TELEMETRY & SCADA.	3.3		**Provision of SCADA HMIS/SERVER Operator Work-Station (OWS) at Owners' Control Room at 33/400kV Pooling substation** SCADA, & other associated electrical system shall be placed at the identified location inside Control Room of Owners' 33/400kV Pooling Substation/Switchyard. Sl No / Description / Quantity 1 / Engineering cum Operator work station (EWS+OWS) (Desktop & Monitor) / 01 Set 2 / Operator work station (OWS) (Desktop & Monitor) / 01 Set 3 / Portable (laptop based) EWS / 01 No 4 / Historian (Desktop) / 01 No 5 / 55 Inch LED display / 01 No 6 / Time Synchronization equipment* / 01 No 7 / Control Desk / 01 Set 8 / Chairs for Control Desk / 02 No 9 / Laser Printer / 01 No ***The SCADA/ all other related system shall have facility to synchronize time on Network Time Protocol with Time Synchronization Equipment to be supplied under the package.**	Please clarify the scope of SAS to access the cost and scope during pre-bid stage.	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of Substation automation system for owner's PSS. Provisions of bidding documents are clear and shall prevail.
64	Section VI	PLC System (Ref Note 4)	10		MAKE: 1.Rockwell 2.Emerson automation solution Intelligent platforms Pvt Ltd 3.ABB 4.Honeywell 5.Siemens 6.Phoenix Contact Electronics GmbH 7.Mitsubishi Electric Corporation 8.Schneider Electric System India Pvt Ltd 9.Schneider Electric India Pvt Ltd	1) Bidder informs that PPC and SCADA make will be same as the selected PLC System OEM. 2) Bidder requests that please consider OEM'S and its System integrators for SCADA : i. Mitsubishi OEM and its system integrator Sutek systems ii Mitsubishi OEM and its system integrator EIT. iii. Schneider OEM and its system integrator Adaptive. Please check and confirm.	The make shall be as per the indicative list of makes listed in Technical specifications. However, any new vendor onboarding shall be as per the QA procedure stated in relevant chapter of technical specifications.

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65	Section VI	CCTV	15		MAKE: Axis, Bosch, Pelco, M/s Samriddhi Automations Pvt. Ltd (Sparsh make)	Bidder proposes Honeywell & CP PLUS makes for CCTV As these makes already have STQC Approval. Kindly check and confirm.	The make shall be as per the indicative list of makes listed in Technical specifications. However, any new vendor onboarding shall be as per the QA procedure stated in relevant chapter of technical specifications.
66	Section VI				GENERAL	Pyranometer Model :Kipp & Zonnen Bidder proposes that Kipp & Zonen make with the SMP10 Model will be considered for the pyranometer. Kindly confirm.	The make shall be as per the indicative list of makes listed in Technical specifications. However, any new vendor onboarding shall be as per the QA procedure stated in relevant chapter of technical specifications.
67	Section VI				GENERAL	Bidder proposes we are considering Campbell make for WMS system.	The make shall be as per the indicative list of makes listed in Technical specifications. However any new vendor onboarding shall be as per the QA procedure stated in relevant chapter of technical specifications.
68	Section VI				GENERAL	Bidder informs that plant end LDC RTU PANEL to FOTE and SLDC data will be shared through OPGW cable. Further connectivity from OPGW cable from PV plant end to PSS end will be in client scope. OPGW cable Supply and connectivity will be taken care by client. Kindly check and confirm.	Provisions of bidding documents are clear and shall prevail.
69	Section VI				GENERAL	Bidder informs that data for SLDC/NRLDC will be shared through IEC-104 protocol from PV plant SCADA TO SAS by Bidder, further connectivity will be taken care by client. Please check and confirm.	The protocol shall be as per the requirement envisaged by the RLDC/ Relevant statutory agency and in line with the technical specifications. Provisions of bidding documents are clear and shall prevail.
70	Section VI				GENERAL	The supply and installation of FOTE/PLCC in plant end as well as in GSS end to FOTE/PLCC in GSS end will be in NTPC's scope. Please confirm.	Bidder to refer Clause 3.2 of Technical specification chapter 2A for scope of FOTE and other telemetry requirements. Provisions of bidding documents are clear and shall prevail.

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71	Section VI				GENERAL	Bidder propose RM Young make for wind sensor. Kindly check and confirm.	The make shall be as per the indicative list of makes listed in Technical specifications. However, any new vendor onboarding shall be as per the QA procedure stated in relevant chapter of technical specifications.
72	Section VI				GENERAL	Bidder informs soling station module test and Test & Reference module to be considered in client scope. Kindly check and confirm.	Provisions in Bidding documents are clear and shall prevail.
73			General			We request an extension of the project completion timeline beyond the currently stipulated 10 months.	Provisions of bidding documents are clear and shall prevail.
74	Section VI	2-B Civil Scope of Supply & Services	1		CMCS building with parking shed is NIL mention	Does that mean its not in Bidder scope.?	As clearly mentioned at Technical specification chapter 2B and 3A, CMCS building and parking shed civil works are excluded from the scope of the subject package. Provisions of bidding documents are clear and shall prevail.
75			General		cable trench/Laying	kindly mention type of Cable trench. Or we would assume cable should be laid burried/Above the ground.	Provisions of Bidding documents are clear and shall prevail.
76	Section VI	C-5 Civil & Structural work general design criteria	8		The approach road to the Solar Power Plant shall originate from the main approach road and connect to CMCS building, Metering yard/ Switchyard and Gates (whether or not such buildings are in Bidder's scope). The scope of approach roads shall be as per the vicinity map for respective block contractors. Internal Roads: The Internal roads to the Solar Power Plant shall originate from the approach road and connect to all Inverter rooms, module cleaning station and gates. Width and other details of roads shall be as per tender drawings. Layout of Internal roads	Pls clear the length of Pheripheral road, Access road, Internal road as it is not clear from the vicinity map. If possible pls share the tentative length.	Roads shall be as the Bidder's proposal and tender drawings, within the purview of Technical Specifications. Provisions of bidding documents are clear and shall prevail.

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					within the plot shall be proposed by Bidder as per bidder's detailed array layout, section as per Tender Drawings. Material / Width / tentative length Pheripheral road Access road — WBM — 0.5+3.75+0.5 internal road — WBM — 0.5+3+0.5		
77	Section VI (Tender Drgs)				HARMONIC FILTERS SHALL BE INSTALLED AT NECESSARY LOCATIONS KEEPING IN VIEW OF POWER TRANSFORMER CONFIGURATION OF INDIVIDUAL BLOCKS SUCH THAT THE STATUTORY REQUIREMENTS AT POI ARE MET WITH.	Please confirm the scope of Harmonic filter	As clearly mentioned at Technical specification chapter 1A Clause 8.0, the scope of supply, installation and commissioning of harmonic/power quality mitigation equipment to meet the requirements as per technical standards shall be in the scope of the bidder. Provisions of bidding documents are clear and shall prevail.
78	Section VI	1-A PROJECT INFORMATION	CLAUSE NO.2 PROJECT CAPACITY		Two no.s of 33-33/400KV, 315MVA at Pooling sub station to be executed by Owner (Tentative). Note: One of the 315MVA transformers shall already have a 300MW Owner's Solar project connected at its 33kV side and the other 315MVA transformer shall already have a 200MW Owner's Solar project connected at its 33kV side (Tentative). In addition to the above, a total of 250MW, 1000MWh BESS projects of owner are also connected to the 33kV side of the two power transformers, the distribution of which shall be pro-rata of the solar project capacities connected to the respective transformers (Tentative).	Bidder is not understanding the connectivity at Power transformer. Please clarify	The 200MW Solar project shall be connected to Owners' 33kV Switchgear Panels connected to 33kV side of Two no.s of 33-33/400KV, 315MVA at Pooling substation. The details of existing Solar and BESS projects which are already connected to the same transformers are furnished in the quoted technical specification clause. Provisions of bidding documents are clear and shall prevail.
79	Section VI	1-A PROJECT	CLAUSE NO.2		Termination Point Owner's 33kV Main Pooling switchgear at 400kV/33kV substation switchyard.	BIdder understand the Scope upto 33 kV interconnection.	Provisions of bidding documents are clear and shall prevail.

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		INFORMATION	PROJECT CAPACITY		(Number of 33kV feeders available for interconnection shall be as per Tender SLD)		
80	Section VI	2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES	CLAUSE NO.3.2		oor Switchgear of 33/400kV switchyard of NTPC REL as per Block Single Line Diagram(SLD). All hardware (including but not limited to Cables, Cable jointing kits, endtermination kits etc.) required for 33kV cable laying up to and termination at 33kVSwitchgear of 33/400kV switchyard, including support structure and civil works requiredfor the same, shall be under scope of bidder		Provisions of bidding documents are clear and shall prevail.
81	Section VI	1-A PROJECT INFORMATION	CLAUSE NO.3 LOCATION AND APPROACH		Location of Site Indicative Coordinate 28°21'41.01"N, 73°17'3.44"E	Please share the KMZ file with marking the land boundary and PSS loaction. and Distance of Evacaution point.	KMZ file is already shared for reference purpose only along with bidding documents.
82	Section VI	D-3 MODULE CLEANING SYSTEM	CLAUSE NO.4		The bidder shall guarantee that losses due to soiling upon usage of the cleaning system shall not exceed 0.5% of the module output of the each 12.5MWac PV block on a daily basis. Bidder shall provide Test reports / On-field data of the operational plants to ensure guaranteed soiling loss.	Please confirm that bidder is free to design block size.	Bidder's proposal for inverter block sizing shall be reviewed during detailed engineering. Provisions of bidding documents are clear and shall prevail.
83	Section VI	D-6 O&M TARGET GENERATION TEST (OTGT)	CLAUSE NO. 8		Soiling loss exceeds 1.5% for wet cleaning or 0.5% for dry-robotic cleaning as per applicability	Please confirm the requirement of cleaning	Provisions of Bidding documents are clear and shall prevail.

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84	Section VI		General		Module Cable Length	Please confirm the module cable length and stringing method have to consider leapfrog or daisy chain if any specific requirement	Cable length of 1200mm will be provided with Module. Accordingly, bidder to design the interconnection of the modules.
85	Section VI	A-3 DC CABLES	CLAUSE NO.2.0		DC CABLES (STRING COMBINER BOX TO INVERTER) Cables used between SCBs and Inverters shall be of 3.3kV (E) grade. These Power cables shall have compacted Aluminium/copper conductor, XLPE insulated, PVC inner-sheathed (as applicable), Armoured/ Unarmoured, FRLS PVC outer sheathed conforming to IS: 7098 (Part-II). These cables shall confirm to the requirements of the standards & codes specified in the relevant chapter.	Bidder consider DC main cable from SMB to inverter Aluminium	Provisions of Bidding documents are clear and shall prevail.
86	Section VI	A-5 POWER CONDITIONING UNIT	CLAUSE NO.4.03		String Monitoring facility:- PCU shall be provided with current monitoring transducer at incoming DC cables from each string combiner box (SCB) for PV array zone monitoring purpose. The current transducers used for this purpose shall have accuracy of 1.0 class or better	SCB required with monitoring or Without monitoring please confirm.	Provisions of Bidding documents are clear and shall prevail.
87	Section VI		General		String Inverter and Central Inverter	Is there any specific requirement. Kindly mention	Bidders can choose either String inverter or central Inverter as per their proposal. Provisions of bidding documents are clear and shall prevail.
88	Section VI		General		Metering	Kindly confirm the Location of metering.	Bidder to refer the Tender SLD in addition to the metering requirements/provisions mentioned at Technical Specification Part A, Chapter 2A and Terminal points/Exclusions at Chapter 3A. The metering point for OTGT is mentioned at Clause 2.0 of Technical specification Chapter 1A. Provisions of Bidding documents are clear and shall prevail.

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89	Section VI		General		Main HT panel	Please provide the Main HT panel feeder details where we have interconnect the solar power.	Relevant details of Owner's main pooling switchgear for interconnection of solar projects is already furnished in tender drawings and technical specifications. Provisions of Bidding documents are clear and shall prevail.
90	Section VI	B-2 HT SWITCHGEAR	CLAUSE NO.2 Technical		Minimum system fault level As per System Fault current (Refer Cl. 1.0 of Chapter 2-A, Part A)	Bidder has Consider 25 kA for 1 Sec as per AC SLD fault current rating for the offering. Any change in the fault level during detail engineering shall be at actual.	Refer Tender SLD shared along with Technical Amendment no.1 in this regard.
91	Section VI				Availability of Power & Water during construction & O&M	Arrangement of construction power & water is in the scope of contractor. Kindly confirm whether NTPC will provide single point availability of power and water at site. During the O&M period, will power be available free of cost from solar park free of cost.	Provisions of bidding documents are clear and shall prevail.
92	Section VI	Part - A 1-C	9		Robotic Dry-cleaning system	Bidder requests confirmation on the type of module cleaning system to be considered Robotic Dry-Cleaning System and whether it should be fully robotic or semi-robotic.	Bidder to refer Technical specification part B, Chapter D-3 for detailed specifications of Robotic cleaning system. Provisions of bidding documents are clear and shall prevail.
93	Section VI	Part - B C-3	6		Main Gate Mild Steel frame gate woven with chain linking having minimum span 4 m conform to IS: 2062 shall be provided. The gate shall be complete with the guide track, castor wheel, all fitting and fixture like hinges, aldrops, locking arrangement, posts, etc. The width of approach road shall cover the gate width at the main entrance with a suitable transition. All members used in gates shall be finished by cleaning of steel surfaces as per IS: 1477 (Part-II) and applying zinc chrome or	Bidder requests confirmation on the requirement of Main gate and the number of secondary gates to be considered.	Apart from the quoted clause, bidder shall refer Technical specification Part A, Chapter 2B as well for requirement of gates/gate complex. Detailed layout shall be finalized during detailed engineering phase post award. Provisions of bidding documents are clear and shall prevail.

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					zinc phosphate primer, followed by two coats of synthetic enamel paint. For finishing coat suitable colour pigment shall be added. All paints including primer shall be of reputed brand/manufacturer and as approved by the Engineer-In-charge. The method of application shall be as per the recommendations of the manufacturer. One man movement passage gate (minimum 1.2m width) shall also be provided at the main entry gate. 400 mm height concertina with all supporting members shall also be provided on a gate (gates other than main entry gate) for better security. The minimum size & requirements of the Gate's including all items shall be as per the fencing tender drawing title: "Details of Main Gate". The main gate shall be constructed inside the plant/plot boundary line to provide sufficient space for Heavy motor vehicle and light motor vehicle for inspection/check before entering the solar plant and vehicles shall not disturb the traffic in the main approach road.		
94	Section VI	B-5	3		Pipes, Fittings & Accessories Pipes offered shall be complete with fittings and accessories (like tees, elbows, bends, check nuts, bushings, reducers, enlargers, coupling caps, nipples etc.) The size of the pipe shall be selected on the basis of maximum 40% fill criteria GI Pipes shall be of medium duty as per IS:1239 Duct banks shall be High Density PE pipes encased in PCC (10% spare of each size, subject to minimum one) with	Bidder request to kindly confirm the diameter of Hume pipes to be adopted and the total number of Hume pipes to be considered for the entire project plot area,	Provisions of Bidding documents are clear and shall prevail.

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					suitable water-proof manholes. Hume pipes shall be NP3 type as per IS 458		
95	Section VI				Pull Out Lateral Test	Bidder requests to kindly confirm the area coverage (in acres) considered for each test	Provisions of bidding documents are clear and shall prevail.
96	Section VI				Geotech, Topo and Contour & Hydrology surveys	Bidder requests provision of preliminary geotechnical, hydrology, and topographical/contour survey reports.	Testing of piles and interpretation of pile load test results shall be carried out as per the stipulations of IS: 2911 (Part-4). Provisions of bidding documents are clear and shall prevail.
97	Section VI	Part - A 2-B	1		Rainwater Harvesting for RCC Buildings - If RCC Buildings are provided.	Bidder requests details regarding the number of rainwater harvesting systems required along with their respective capacities and dimensions.	Bidder may propose the same during detailed engineering for review by NTPC REL. Adoption subject to approval by NTPC REL.
98	Section VI	Part - B C-4	7		7. **Connections:** Sl No. | Connection | Grade 1 | Solar PV module to purlin/structure connection. | 2 | Bolts required to loose and tighten seasonally for seasonal tilting in the module mounting structure. | SS304, A2-70 3 | Other structural fixed connections. | HDG 5.6 & 8.8 4 | Foundation Anchoring. | HDG 4.6 Note: Fastener shall conform to IS 1367 A. SS304 Fasteners (nuts, bolts, washers and U-bolts) shall be of corrosion-resistant austenitic steel. SS 304 Fasteners shall have a good anti-seize finish with proper wax coating for better durability and firm resistance to all types of failure including seasonal removal and re-fixing of bolts. B. All fasteners shall be provided according to the connection design requirement. All bolts shall be tightened with designed torque mechanically immediately after the erection of MMS to avoid any possible damage due to any incidental storm during the erection stage. C. One set of fasteners shall consist of one hexagonal head nut, one hexagon shape bolt, and two washers. The bots and nuts with inbuilt washers may also be provided. D. In the ground mounting structure system with seasonal tilt arrangement, the column post and rafter/beam at seasonal tilt point of rotation shall be preferably hinged plate and bolt system.	Bidder request to confirm, Module to Purlin bolt connection should be considered as SS304, A2-70 and the other MMS connections & fixing as HDG 5.6 & 8.8	Provisions of bidding documents are clear and shall prevail.
99	Section VI	Part - A 1-A	Appendix - 1		The minimum design clearance (at the highest tilt angle) between the lower edge of the modules and the developed ground level shall be 400mm for Single Axis Tracker based system.	Bidder request to confirm that Module Mounting Structure should be considered as SAT and the Module Ground Clearence as 400mm	Provisions of bidding documents are clear and shall prevail.

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100	Section VI	Part - B C-3	2		The size of the foundation shall be decided based on the site conditions and geotechnical investigation report, however the minimum diameter of the foundation shall not be less than 300 mm and depth 1800 mm. d) Bidder has to ensure that damages such as cracks and chipping off of corners do not happen during handling due to knocking etc. In case, such damages happen, the same has to be brought to the notice of engineer in charge. e) In case the damage is minor, the same has to be made good using approved epoxy resin. Non shrink grout can be used for chipped off corners. No monetary claim shall however be admissible for such repairs. The engineer in charge reserves the right to accept or reject any damaged precast unit and the decision shall be binding on the bidder.	Bidder request to confirm that Peripheral Boundary need to be considered as Pre-Stressed Pre-Cast Boundary wall (or) Chain link fencing and to follow as per the Tender Drawing	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement as per provisions of tender. Provisions of bidding documents are clear and shall prevail.
101	Section VI				Bidders can also propose suitable detention pond, recharge dugwells, recharge pits, recharge trenches, and recharge soakways for quick disposal of storm water in the vicinity of the solar block/plot.	Bidder request to confirm whether we can opt recharge pits for storm water drain	Provisions of bidding documents are clear and shall prevail.
102	Section VI	Part-A 2-B	1		No permanent periphery fencing of 200MW block is envisaged.	Bidder request to confirm if any Peripheral roads need to be considered.If yes, please share the detailed technical specifications	Roads shall be as the Bidder's proposal and tender drawings, within the purview of Technical Specifications. Provisions of bidding documents are clear and shall prevail.
103	Section VI					Please confirm whether civil works related to cable trenching outside the project boundary—such as excavation, sand bedding, protective	All civil and electrical works for laying the cables up to terminal point in owner's PSS is in the scope of the bidder. Only corridor for laying the cable is provided

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					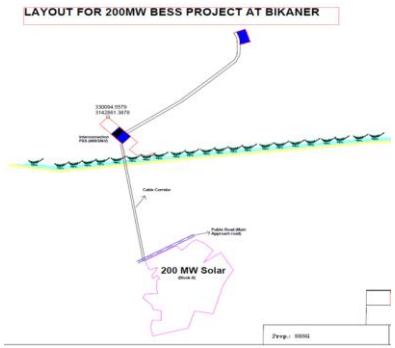	covers, backfilling, compaction, and restoration—are included in the bidder's scope within the provided cable corridor.	by NTPC REL. Provisions of bidding documents are clear and shall prevail.
104						Please confirm that Right-of-Way (ROW) and land availability for cable trenching outside the project boundary shall be provided by NTPC REL, free from encumbrances.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
105						The cable corridor shown in tender drawings is indicative. Please confirm that the final cable trench routing shall be finalized during detailed engineering based on site conditions.	Bidder's understanding is correct. However, any variation is within the scope of the bidder.
106	Section VI	Part-B C-2	1.8		Bidder shall also provide suitable sand erosion protection measure within its allotted plot area by sowing Cassia angustofolia (Sonamukhi or senna) and cenchrus ciliaris. This shall be taken up when the majority of construction, MMS erection and fixing work has completed. A minimum of one bush shall be planted in each 5 sqm area of the plot. Cassia angustifolia (Sonamukhi or Senna) and cenchrus ciliaris to be sown to develop under canopy vegetation for effective control of sand drift. C. angustifolia is a perennial shrub considered as the perfect crop for restoring barren and infertile lands of dry region while the cenchrus ciliaris is an important grass of the Indian dry zone and used as fodder. Seeds of C. angustifolia usually germinate within five days of sowing. However, regeneration from naturally	The specification mentions a minimum of one bush per 5 sqm. Please confirm whether this density is applicable uniformly across the entire plot area or only in identified zones prone to sand drift.	Applicable uniformly across the entire plot area. Provisions of bidding documents are clear and shall prevail.

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					dispersed seeds occurs immediately after rain when sufficient soil water availability is there. Usually, it attains height of 70-80 cm and crown diameter of 50-60 cm within a period of 5-6 months, when sown.		
107						Bidder request to confirm considering soil erosion protection	
108	Section VI	Part - A 2-A	1		For 600 Wp Dimensions: 2384 mm (+/ 10mm) x 1134mm (+/ 5mm) 33.8 kg (Approx. weight) 15.85 A (Isc) 14.97 A (Imp) Bifacial gain of 5% to be considered over and above Isc value mentioned above for component and cable sizing. 29 modules in series (600 Wp)	Bidder request to confirm the Module cable lead length to be considered 300mm or 1400mm	Cable length of 1200mm will be provided with Module. Accordingly, bidder to design the interconnection of the modules.
109	Section VI	Part - A 2-A	1		2.5 % (Individual DC and AC Cabling loss shall be as per system design chosen by bidder)	Bidder propose to consider OH line for HT cable laying from PV plant to PSS to maintain the AC cabling loss.Please confirm cable laying shall be underground or overhead line??	Provisions of bidding documents are clear and shall prevail.
110	Section VI				General	Bidder request to confirm the ROW scope is in NTPC or bidder scope?	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
111	Section VI	Part-B B-11	3		Solar array shall be protected from direct lightning stroke with Early Streamer Emission air terminal in accordance to NF C 17-102 .	Bidder request to confirm to consider ESE LA shadow for the PV plant area.	Consideration of ESE shadow is not insisted in the subject tender. Provisions of bidding documents are clear. Bidder to comply with the same.

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112	Section VI				General	DC Power cable laying can be considered below trackers.Please confirm.	Provisions of Bidding documents are clear and shall prevail.
113	Section VI				General	Bidder request to provide the ERT and TRT value for the soil in the plant area.	ERT and other such investigations are in bidder's scope. Provisions of bidding documents are clear and shall prevail.
114	Section VI	Part - A 2-A	1		Only Single Core 19/33kV HT Cables shall be offered for the project where armour acts as the metallic screen	Please consider 3 core cables also for the project.	Provisions of Bidding documents are clear and shall prevail.
115	Section VI	Part - A 2-A	1		No permanent periphery fencing of 200MW block is envisaged.	Bidder Request to confirm whether construction of boundary wall is excluded from bidder's scope	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement. Provisions of bidding documents are clear and shall prevail.
116	Section VI	C4 - Design of Module Mounting Structure and Civil Works	3.B		B. Wind Load: The wind load (positive and negative) normal to surface on the modules and wind load on the structural members.	Bidder understands that all calculations and structural designs must include uplift scenarios to ensure system stability and integrity under varying environmental conditions and cyclone resistance. Further design wind speeds must follow site-specific conditions as per IS 875 Part 3: 2015. Uplift loads—especially critical in coastal and high-wind regions—must be explicitly considered, and should be equal or exceed downward loads.	Provisions of bidding documents are clear and shall prevail.

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117	Section VI	C4 - Design of Module Mounting Structure and Civil Works	4.E		E. Design analysis and the forces on MMS (Compressive force, uplift force, shear and moment) shall be used for the design of foundation system.	Bidder understand that the design of tracker foundation/ structure should be reinforced to withstand high wind pressures and uplift forces even if bi-directional stow is being followed.	Provisions of bidding documents are clear and shall prevail.
118	Section VI	C4 - Design of Module Mounting Structure and Civil Works	-		General	Bidder assume that provision of advanced tracking options like intelligent algorithms, scattered irradiance detection, and backtracking to ensure accurate, true solar tracking.	Provisions of bidding documents are clear and shall prevail. The entire scope is of bidder.
119	Section VI	C4 - Design of Module Mounting Structure and Civil Works	-		General	Bidder assume that damping ratios and modal frequencies shall be determined through full scale pluck testing	Provisions of bidding documents are clear and shall prevail.
120	Section VI	A2 - TRACKER SYSTEM	2.3.f		f) Suitable redundancy in sensing and auxiliary power supply shall be provided for fail-safe stowing of trackers. Redundancy in control is also desirable for the safe operation of trackers. Detail of the scheme for various redundancy shall be finalized at the time of detailed engineering.	Bidder understands that Power Supply for Tracker Operation shall be equipped with a self-charging power system. The use of external auxiliary power supplies (e.g., grid or AC/DC connections) is not permitted. Power autonomy must be ensured under typical site solar conditions.	Provisions of bidding documents are clear and shall prevail.
121	Section VI	A2 - TRACKER SYSTEM	2.9.a		Aeroelastic instability analysis for the proposed tracker structure to show that the stow angle will not result in aeroelastic instability	1) Trackers shall only be permitted to stow flat if the following conditions are met: 1a) Aeroelastic testing is performed in a boundary layer wind tunnel by an approved 3rd party wind engineering firm (CPP or RWDI). Results of tracker OEM in house wind tunnels shall not be permitted. CFD results shall not be permitted	Provisions of bidding documents are clear and shall prevail.

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						1b) Damping ratios and modal frequencies shall be determined through full scale pluck testing 1c) The critical wind speed for aeroelastic stability used in the design shall be at least 25% less than that measured in the wind tunnel for a 15 degree peak to peak motion. 1d) The aeroelastic design of the tracker shall be reviewed by an accredited 3rd party (DNV or SBP). 2) Sites in hail prone regions shall not be permitted to stow at tilt angles less than 50 degrees	
122	Section VI	C4 - Design of Module Mounting Structure and Civil Works	-	-	General	Bidder assume that Aeroelastic testing is to be performed in a boundary layer wind tunnel by an approved 3rd party wind engineering firm (CPP or RWDI). Results of tracker OEM in house wind tunnels will not be permitted. CFD results will not be permitted	Provisions of bidding documents are clear and shall prevail.
123	Section VI	A2 - TRACKER SYSTEM	-		General	The zero-degree stow position exposes the tracker to higher wind loads and increases the risk of damage, making it less favorable compared to tilted stow positions. Damage due to hail is also potential threat. Bidder proposes to include criteria stating wind stow position shall be at least 15 degree. Any other stow shall be properly justified by OEM	Provisions of bidding documents are clear and shall prevail.
124	Section VI	C4 - Design of Module Mounting Structure and Civil Works	4.C		C. Wind pressure for following loads shall be considered as follows: (1) Dead Load of steel with all members, fittings & panels. (2) Load due to fair wind direction on design tilt angles of solar mounting structural members.	Bidder understands that purlin design to be basis trapezoidal loading. Averaging wind pressure (as UDL) masks critical localized effects. Under-designed purlins may fail under quadrant pressure events even if they pass calculations based on average pressures. Design codes and validation methods must consider quadrant-based	Provisions of bidding documents are clear and shall prevail.

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					(3) Load due to adverse wind direction on design tilt angles of solar mounting structural members. (4) Load on the side face of mounting structural members.	or worst-case dynamic loading scenarios. Wind tunnel testing or CFD analysis should resolve pressure distributions at high spatial fidelity rather than relying on area-averaged simplifications.	
125	General					Bidder is requested to provide the following report for reference during tender stage- 1. Substation SLDs 2. 33kV Main Pooling Switchgear drawing 3. Equipment layout of Owner's Control Room 4. KMZ file 5. Existing ERT report 6. AutoCAD files 7. Topographic Survey Report	1. Relevant details of substation, power transformers are already provided in technical specifications. 2. Number of feeders available at Owner's 33kV Main pooling switchgear for interconnection of 33kV cables pertaining to the 200MW block are provided in the tender SLD. 3. Detailed equipment layout in Owner's control Room will be finalized during detailed engineering phase post award. 4. KMZ file is already shared along with the bidding documents for reference only. 5. ERT and other such investigations are in bidder's scope. 6. AutoCAD file is already shared along with the bidding documents for reference only. 7. Report of Topography survey being done by owner will be shared with the successful bidder post award. However, the bidder to ensure the propriety of the data for design of the project. Provisions of bidding documents are clear and shall prevail.
126	Block Single Line Diagram				THE MAXIMUM NUMBER OF 33kV INCOMER FEEDERS AVAILABLE AT 33KV MAIN POOLING SWITCHGEAR OF OWNER'S POOLING SUBSTATION, FOR INTERCONNECTION OF SOLAR PLANT CABLES, DYNAMIC REACTIVE POWER COMPENSATION EQUIPMENT AND HARMONIC FILTERS OF THE 200MW	"The continuous combined MW rating of all PCUs/inverters at 0.95 power factor and at 0.95 p.u. voltage at Inverter terminal at ambient temperature of 50 deg C shall not be less than Plant MW capacity." Because two (2) nos of feeders dedicatedly required for SVG and Harmonic filter requirement respectively.	Provisions of bidding documents are clear and shall prevail.

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					SOLAR BLOCK IS NINE (9). THE POWER FROM THE 200MW SHALL BE EQUALLY DIVIDED (TO THE EXTENT POSSIBLE) AMONG THE ABOVE 33KV FEEDERS DESIGNATED FOR THE RESPECTIVE BLOCK. 33KV CABLES SHALL BE SUITABLY SIZED TO CARRY THE POWER FROM SOLAR PLANT. NO ADDITIONAL FEEDERS WILL BE PROVIDED BEYOND THE SPECIFIED NUMBER OF FEEDERS FOR INTERCONNECTION OF SOLAR BLOCKS, HARMONIC FILTERS, REACTIVE POWER COMPENSATION EQUIPMENT ETC.		
127	Section VI	1-A Project Information. 1.0			The scope of the Balance of System (BOS) Package shall include all EPC works (excluding supply of Solar PV modules) for development of Solar PV projects (in the land aggregated by NTPC REL through a separate package) and power evacuation system up to Owner's 33kV main pooling switchgear.	Bidder understand that PV Module is not in bidder's scope. So it is requested to share the PV module datasheet, PAN file, cable length along with module.	Provisions of bidding documents are clear and shall prevail. Kindly refer Chapter 2-A Clause 1.0(d) and Clause 6.0. Relevant PV module related details are provided for designing the Solar PV Plant. NTPC REL shall provide PV modules as per the dimensions (including tolerances) as mentioned in the said clause. PV module datasheet/PAN file shall be shared with successful bidder during detailed engineering within timeline mentioned in the technical specification. Bidder is not required to quote any generation and thus data sheet/PAN file of module are not required at this stage.
128	Section VI	1-A Project Information. 2			Metering Point EHV side Power transformer at Owner's 400kV/33kV Pooling substation switchyard	Bidder understand that supply & installation of ABT meters shall be in owner's scope which will be placed in each 33kV incomer feeders of 33kV main pooling switchgear for OTGT. So Metering point shall be at 33kV level till ABT meter only. PG test is not applicable. Please confirm.	Quoted clause does not pertain to the subject tender package. Provisions of bidding documents are clear and shall prevail.

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129	Section VI	1-A Project Information. Appendix-4			PQ meters & metering system for PG Test.		Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of PQ meters. Provisions of bidding documents are clear and shall prevail.
130	Section VI	1-A Project Information. 8.0/e			As a part of Grid compliance study, NTPC REL shall carryout the Harmonic/DCcurrent injection/Flicker study upto ISTS point. In case of non-compliance of above, Bidder shall install necessary harmonic/power quality mitigation equipment to limit these values at POI	Bidder understand that grid study shall be done by owner till POI after award. So, how much the reactive power compensation and harmonic filters requirement till POI shall be considered by bidder at prebid stage? Please confirm.	NTPC REL shall communicate reactive power compensation requirements and harmonic filters requirement till POI only after completion of the grid compliance studies. Bidder to assess the requirements at Prebid stage on their own with the details provided along with bidding documents.
131	Section VI	1-A Project Information. 8.0/h			Bidder shall install only Static Var Generators (SVG) for additional dynamic reactive power compensation beyond the dynamic reactive power compensation capability of inverters (as per the minimum inverter rating mentioned at Chapter 2A of this document) for the 200MW project to ensure compliance of dynamic reactive power compensation at rated capacity at POI (ISTS end) under CEA technical standard of connectivity to Grid and "Report of the Working Group in respect of Data Submission Procedure And Verification of Compliance to CEA Regulations on Technical Standards for Connectivity to the Grid by RE Generators July 2022". Phasor Measurement Units (PMUs) shall be provided at the output of SVGs in accordance with CEA guidelines for placement of Phasor Measurement Units in Indian Grid dated 19.03.2025 (and subsequent amendments if any).	Bidder understand that additional inverter (required to meet the continuous combined MW rating of all PCUs/inverters at 0.95 power factor and at 0.95 p.u. voltage at Inverter terminal at ambient temperature of 50 deg C) shall also compensate reactive power requirement. Beyond that only SVG shall be considered for reactive power compensation for 200MW blocks. Please confirm.	Bidder to refer technical specifications Part-A Sub section-2 clause 1.0 for inverter capacity and SVG requirements. Provisions of bidding documents are clear and shall prevail.

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132	Section VI	1-A Project Information. 9.0			The bidder shall guarantee the decided generation as per PVSyst document and modified as per O&M Target Generation Test (OTGT) at metering point, i.e., at 33kV side Owner's Main pooling switchgear at Owner's 400kV/33kV Pooling substation. Bidder shall adopt module mounting arrangement with Single axis E-W tracker for the subject projects.	As per tender SLD, ABT meters which is in owner's scope, shall be placed in each 33kV incomer feeders of 33kV main pooling switchgear. So Metering point shall be at 33kV level till ABT meter only. Please confirm.	Metering point for OTGT is clearly stated in Chapter 1A of Technical specification Part A. Provisions of bidding documents are clear and shall prevail.
133	Section VI	1-A Project Information. 10.0			ROW clearance - To be facilitated by bidder	Bidder request to clarify the scope of ROW for 200MW block.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
134	Section VI	1-A Project Information. Appendix-1/C			Bidder can also propose suitable cable laying methodology, keeping in view of the site conditions, which shall be reviewed during the detail design engineering.	Bidder understand that 33kV HT cable shall be laid through cable corridor to PSS for for 200MW blocks, bidder can directly terminate 33kV HT cable from PV plant to PSS. Please confirm	Bidder to refer Tender SLD for interconnection requirements of 200MW block with 33kV Owner's main pooling switchgear at PSS. Provisions of bidding documents are clear and shall prevail.
135	Section VI	1-A Project Information. Appendix-1/H			Bidder shall propose Dry Robotic cleaning system only for cleaning of Solar PV modules.	Bidder understand that semi-automatic & fully automatic both shall be considered. Please confirm.	Semi-automatic robots shall only be applicable where the length of the continuous tables is less than 300 Mtr. However, on all other stretches the fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. The same shall be reviewed during detailed engineering prior to acceptance. Bidder to refer technical amendment no.1 in this regard.
136	Section VI	1-A Project Information. Appendix-4			DC & AC source of supply required for the above equipment at Switchyard Control Room.	Bidder understand that only UPS supply through UPSDB required for Solar SCADA and other	UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in

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						associated equipment for 200MW blocks shall be considered by bidder. Please confirm.	bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Provisions of Bidding documents are clear and shall prevail.
137	Section VI	2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES. 1.0/f			Bidder shall install only Static Var Generators (SVG) for additional dynamic reactive power compensation	Please clarify the requirement of PMU. Also clarify its scope of supply, location, interconnection with CRP panel of 33kV Main Pooling switchgear & SCADA etc.	PMUs at EHV level in Owner's PSS are not in the scope of the package. Provisions of Bidding documents are clear and shall prevail.
138	Section VI	2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES. 3.2			The arrangement to transmit data required by the Load Dispatch Centre (LDC) from Solar plant to NLDC/RLDC/SLDC through owner's FOTE at Project Pooling substation as per extant regulations and procedures for grid management up to Bikaner-IV ISTS substation is in contractor's scope.	Bidder understand that Communication of Solar plant SCADA to NLDC/RLDC/SLDC through owner's FOTE shall be in scope of NTPC. Please confirm.	Provisions of bidding documents are clear and shall prevail.
139	Section VI	B-10 AUXILIARY POWER SUPPLY SYSTEM 1.00			ACDB in CMCS room shall have two incomer (100% rated) fed from two different sources. At CMCS, auxiliary transformer directly feed from 33kV switchgear are also acceptable.	Bidder understand that owner shall provide all the auxiliary (AC & DC) supply for CMCS building equipment. Only UPS supply through UPSDB required for Solar SCADA and other associated equipment for 200MW blocks shall be considered by bidder. Please confirm.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
140	Tender Drawing				PEB – Inverter Room	Can bidder consider outdoor type inverter station with shed or only PEB type Inverter room shall be considered? Please confirm.	Bidder to refer technical specifications for various options of Inverter Room design. Bidder may choose among the available options. Provisions of bidding documents are clear and shall prevail.

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						If only PEB type inverter room shall be considered then bidder may propose outdoor type PCU and IDT. Please confirm	
141		B. Site Preparation	2-B CIVIL SCOPE OF SUPPLY & SERVICES		1. Cutting, Clearing, transporting and disposal of plants, bushes, other vegetation, roots, stubs etc.	No major tree cutting is envisaged in bidder's scope other than minor site clearance and removal of shrubs, vegetation required for establishment of a solar park. Please confirm	Tree cutting and relevant permissions are in the land vendor's scope, however minor tree cutting & relevant permissions, removal of shrubs, obstruction and execution will be in BOS bidder's scope. Bidders are advised to make site visit and appraise themselves with site conditions including the extent of local constraints. Further, bidder to refer technical specification chapter 1-A for the slope of land which will be handed over by the owner for project development. Any levelling beyond the specified slope shall be in the scope of the bidder if required. Provisions of Bidding documents are clear. Bidders are requested to follow the same.
142	Section VI	B. Site Preparation	2-B CIVIL SCOPE OF SUPPLY & SERVICES		2. Site grading including slope protection, ground preparation/ filling/ levelling (if required) of the identified area for solar plant.	No Major site Grading and Levelling is in the scope of Bidder except micro levelling please clarify.	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mt. N-S and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.
143	Section VI	1.1 Scope of Work	PART-B C – CIVIL WORKS		Carrying out the Benchmark (GTS) to site(s) under survey by parallel levelling, establishing and constructing benchmark, grid and reference pillars in the field and spot level survey of the entire area at specified intervals and development of the contours	Bidder is requested to identified the location of Permanent bench mark as reference near each site location.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.

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144	Section VI	1.1 To pographical Survey and Mapping	PART-B C – CIVIL WORKS		Positions, both in plan and elevation, of all natural and artificial features of the area like waterways, railway tracks, trees, cultivation, houses, fences, pucca and kutcha roads including culverts and crossings, foot tracks, other permanent objects like telephone posts and transmission towers etc	Please ensure that the project plot shall be free from any unhindered obstacles like electricity poles, transmission towers waterways, railway tracks & trees etc.	The project plot shall be free from any obstacles like electricity poles, transmission towers waterways, railway tracks & trees etc. If removal of some of the facilities is not possible than the project layout shall be modified accordingly. Land is in the scope of Employer.
145	Section VI	1.3 To pographical Survey and Mapping	PART-B C – CIVIL WORKS		Method of the survey, contour intervals etc. shall be decided by the bidder with prior approval of the Owner (NTPC REL).	Method of survey, Topographic survey shall be carried out as per the standard practice. please confirm.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
146	Section VI	2.0 Geo-Technical Investigations Scheme.	PART-B C – CIVIL WORKS		2.0.2 The detailed Geotechnical investigation has to be carried out by the bidder in line with the technical specification.	Bidder is requested to recommend SBC during tender stage. Also, provide the piling details for MMS.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
147	Section VI	1.0 SITE LEVELLING AND GRADING	PART-B C – CIVIL WORKS		1.6. Suitable sand erosion control measure shall be provided in case any sand dune or very loose soil areas fall inside the plot area.	Please specify the type of sand erosion protection measure that is to be deployed for better understanding and due diligence of the bidder.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
148	Section VI	C-5 CIVIL & STRUCTURE WORKS - GENERAL DESIGN CRITERIA	PART-B C – CIVIL WORKS		A. CMCS Buildings	As per 2.02 clause of page 56 out of 477,Civil works are excluded from the scope of Contractor under this contract. Bidder's understanding is that CMCS building is not in our scope. Please clarify.	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of CMCS building. Provisions of bidding documents are clear and shall prevail.
149	Section VI	C-3 BOUNDARY WALL,	PART-B C – CIVIL WORKS		b) Chain Link Fencing (e.g. Any Statutory Requirements)	Bidder is requested to clarify the statutory requirement where chain link fencing will be adopted. Please specify accordingly.	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map.

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		FENCING AND GATE				Bidder's understanding is that fencing is excluded from their scope.	However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement. Provisions of bidding documents are clear and shall prevail.
150	Section VI	6.0 PLANT DRAINAGE SYSTEM	PART-B C – CIVIL WORKS		a) All Drains within a plot are in Bidder's Scope.	Bidder's understanding is that only drainage design inside the proposed plant is in our scope. Capacity check of the Owners drain is not in bidder's scope.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
151	Section VI	6.0 PLANT DRAINAGE SYSTEM	PART-B C – CIVIL WORKS		f) Provision of culverts and their design to be submitted separately.	We understand in our scope only culvert design inside the proposed PV plant is to be considered. Bidder is requested to provide the detail technical specification of culvert.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
152	General					Bidder's understanding is that fencing of plant boundary is not in bidder's scope.	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement. Provisions of bidding documents are clear and shall prevail.
153	General					Bidder is requested to provide the following report for reference during tender stage- 1. Existing Site investigation Report.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.

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						2. Existing Topography survey. 3. Existing Geotechnical investigation. 4. Existing GA details of road and drainage 5. Approx. size/ area of the, store room, Security Room required along with architectural features.	
154	General					While carrying out construction activities below ground level, if we meet any obstruction e.g. presence of any drainage pipe / water or fire pipeline, cable / ash trench, any leftover foundation concrete, live wire etc., the owner shall arrange to remove the same & we shall be freed by the owner from any such obstruction for conducting our works. Please confirm	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
155	General					Bidder presume that all statutory clearances shall be provided by the owner. Site Security shall be in the scope of the Owner.	Bidder to refer Technical specification part A. Provisions of bidding documents are clear and shall prevail.
156	General					Construction Power and Construction Water availability at site to be made to the contractor. Also, Owner to provide well graded and levelled land within the vicinity of the site for Contractor Site Office establishment, labour hutment & Storage Space free of cost to the Bidder. Please confirm	Responsibility of arranging construction power and water in line with tender requirements shall be in the scope of the bidder. The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mt. N-S and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder or for any facilities of Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.

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157	General					Please provide the lead distance for the disposal of excess earth/debris from site location.	To be assessed by the Bidder and considered in their Bid Price. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
158	General					Please provide the approved location for the procurement of building material. Such as Sand, gravel, aggregate, Bricks, Stone etc.	To be assessed by the Bidder and considered in their Bid Price. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
159	Technical Specifications (OTHER DETAILS)	Clause no - 10.0			MOEF Clearance - To be arranged by bidder ROW Clearance - In General, No ROW clearance requirement is anticipated. In case of any minor ROW clearance requirement, Owner shall take up the same and necessary facilitation as required shall be provided by the bidder SPCB Clearance - To be arranged by bidder MNRE Clearance (if applicable) - To be arranged by bidder Tree Cutting Permission - For large trees, the removal and relevant permissions will be taken care by the owner through a separate contract. However, removal of smaller plants, bushes, other vegetation, roots etc. to be taken care by the bidder.	The Bidder requests that the entire Overburden (OW) be included under the Client's scope of work rather than the Bidder's scope. Additionally, the Bidder requests clear specification of the types and sizes of smaller plants, bushes, other vegetation, roots, etc., to be considered within the scope.	Bidder to refer Technical specification part A. Provisions of bidding documents are clear and shall prevail.
160	TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9		2-A		Bidder shall submit PV Syst report	Please clarify whether report to be submitted along with bid?	Bidder is not required to submit any generation details along with their bid. Provisions of bidding documents are clear and shall prevail.

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161	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		10		For large trees, the removal and relevant permissions will be taken care by the owner through a separate contract.	Based on site visit conducted by Bidder's Team we observed many large trees (khejri). Request details on the timelines for Readiness for the Handover of the site for execution shall be detailed	Encumbrance free Land shall be handed over in phases. . The Levelling & Grading as per the employers scope shall be taken up in parallel along with removal of Trees.
162	Site Visit - Land					Based on site visit, The team indicates additional Grading beyond 10% slope might be needed at site. Please provide land contour.	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mt. N-S and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.
163	Site Visit - Revenue Pathway					Request to clarify the scope of ROW corridor for 33kV which is roughly 4 kms from the project Boundary. There are a few 11kV lines within the land parcel. Clear the Scope of line shipting and related approvals. Also found revenue pathway within the land parcel, Request to provide a revenue pathway for the area.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
164	Section VI (TS)		9		The annual generation shall be finalized during detailed engineering through PV Syst document, based on the boundary conditions/design parameters specified by NTPC REL.	Please indicate an acceptable P50 values at the 33kV metering point, What are the key Loss inputs considered like soiling, Availability, etc.	Provisions of Bidding documents are clear and shall prevail.
165	Section VI (TS)		9		Liquidated Damages for shortfall in performance during O&M period are elaborated in APPENDIX – 3.	Details of Liquidity Damages working missing in appendix 3. Kindly provide	Provisions of bidding documents are clear and shall prevail.

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166	Section VI (TS)				BG for O&M, AMC and Extended warranty contract for the 200MW Block = 0.05 x G x R (in million INR) up to 3-year O&M period.	AMC for Bought items are ideally covered under the respective OEM warranty period normally factored in the price. Request no additional BGs for the same. Applicable tariff of 3.52 Rs/kWh also seems on the Higer side for solar.	Provisions of bidding documents are clear and shall prevail.
167	Section VI (Tender Drgs)		General		-	Define the voltage level and number of circuits for the overhead PSS transmission line that is passing nearby main switchgear pooling as shown in vicinity map	Bidder is advised to refer vicinity map tender drawing and carry out on-site assessment of actual site conditions prior to bidding.
168	Section VI (TS)		General	-	-	How much voltage drop is acceptable for 3.6km line from solar plant to main pooling switchgear,to carry 55MW power as per tender SLD.	Provisions of bidding documents are clear and shall prevail.
169	Section VI (TS)		Clause no 1.07 (Section-B-10 AUXILIARY POWER SUPPLY SYSTEM)		Solar Plant Main Pooling Switchgear shall be powered from 2X100% DC supply system. Each DC supply system shall consist of 1x100% charger, 1 x 100% station Battery bank rated 110V/220VDC (+10%,-20%) for providing minimum 30 minutes backup and DC switchgear.	As 33 kV switchgears are under Owner's scope in CMCS building and, as discussed in the pre-bid meeting, AC and DC power supply for CMCS shall be provided by Owner, kindly confirm whether provision of additional battery charger with batteries in CMCS building is in Bidder's scope or it is excluded from bidders scope?	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
170	Section VI (TS)		Clause no 1.03 (Section-B-10 AUXILIARY POWER		For inverter stations and sub-pooling systems, UPS system shall comprise of 1 x 100% UPS with 30 minutes backup. For CMCS, UPS system shall comprise of 2 x 100% UPS with 30 minutes backup for each. Each UPS shall consist of 1x100% charger	As discussed in the pre-bid meeting, bidder understand that the CMCS building is in scope of owner which includes, AC and DC power supply provision. Kindly clarify whether the Owner's scope includes UPS-backed / battery-backed supply for CMCS critical loads, or whether Bidder is required to	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in

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			SUPPLY SYSTEM)		and inverter, 1 x 100% Battery bank for providing required backup as above.	provide additional UPS with batteries for CMCS equipment.	220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
171	Section VI (TS)		Clause no 1.01 (Section-B-10 AUXILIAR Y POWER SUPPLY SYSTEM)		ACDB in CMCS room shall have two incomer (100% rated) fed from two different sources. At CMCS, auxiliary transformer directly feed from 33kV switchgear are also acceptable. Following consideration shall be taken while arriving kVA capacity of auxiliary transformer, 1. 20 % future load margin. 2. The minimum kVA capacity of auxiliary transformer for CMCS requirement shall be 50kVA.	As discussed in the pre-bid meeting, bidder understand that the AC and DC power supply for CMCS shall be provided by Owner. In view of the above, kindly confirm whether provision of auxiliary transformer for CMCS building is excluded from Bidder's scope, or if any transformer / further distribution arrangement is required from Bidder side.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
172	Section VI (TS)		General		-	Since the CMCS building is under Owner's scope, kindly clarify whether the following items inside CMCS building are in Bidder's scope or Owner's scope: i) AC power arrangement and AC distribution panels ii) DC power arrangement and DC distribution panels iii) UPS and its distribution panels iv) Internal lighting, lighting fixtures, distribution boards/ power sockets v) Air conditioning / HVAC system vi) Fire detection and fire protection system vii) Earthing and associated cabling viii) Cable trenches in CMCS building	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Illumination, Air conditioning, Earthing, cabling and fire protection/detection of Owner's PSS equipment/building is not in the scope of the bidder. Cable trenches in CMCS building is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.

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173	Section VI (TS)		General	-	-	Kindly clarify the number of 33 kV feeders / switchgear panels to be provided by Owner in the CMCS building for interfacing of the 200 MW plant. Further, if auxiliary power supply (415 V AC) is under Bidder's scope, kindly confirm whether any dedicated 33 kV feeder(s) in the Owner-provided switchgear shall be allocated for auxiliary transformer connection and how many feeders.	Bidder to refer tender SLD in this regard.
174	Section VI (TS)		Clause no 1.1- Section-D-1 Weather monitoring systrem		Bidder also needs to provide additional pyranometer with same specification & SCADA integration for the purpose of PG test as specified in the PG test procedure chapter.	In section 2-A clause no- 4.0 OPERATION AND MAINTENANCE (O&M) Target Generation test: it is stated that since the supply of PV modules is not in the scope of BOS Vendor, there shall be no Performance Guarantee (PG) Test. However, the tender also specifies requirements for additional instruments such as pyranometer, ambient air temperature sensor, PQ meters, etc., which are generally associated with conduct of PG / performance validation tests. In view of the above, kindly clarify whether these additional instruments are still required under Bidder's scope. If yes, kindly specify their intended purpose, applicable testing requirements, and detailed scope of supply/installation.	Provisions of bidding documents are clear and shall prevail.
175			Clause no 2.1- Section-D-1 Weather monitoring systrem		Bidder to refer to the PG test procedure chapter for additional number of ambient air temperature sensors used for the PG test only		
176			Appendix-4 (Section-1-A Project information)		PQ meters & metering system for PG Test.		

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177	Section VI (TS)		Clause no 3- Section-B-8 Earthing System		1 33kV/11kV/6.6kV/3.3 kV/ switchgear equipment and 415V switchgear -- 65 x 8mm GS flat 2 415 V MCC/ Distribution boards / Transformers -- 50 x 6mm GS flat	Please clarify: Whether 415V distribution panel should be considered under: 415V switchgear (65 × 8 mm), or 415V MCC / DB / Transformers (50 × 6 mm)	Provisions of bidding documents are clear and shall prevail.
178	Section VI (TS)		Clause no 3.2- Section-B-8 Earthing System		Bidder shall also interconnect the earthing system of Solar PV plant with Owner's existing earthing system wherever available (applicable for Solar Projects being setup inside existing Owner's Projects).	Earthing system of different locations such as Inverter room/Inverter shelter/ PV array etc. will be interconnected inside the solar PV plant, Kindly clarify whether this interconnection is also required to be extended up to the CMCS / PSS locations?	Earthing adequacy calculation for Solar PV plant, in line with technical specifications, is in bidder's scope which shall be reviewed by owner during detailed engg stage. Interconnection of Solar PV earthing system with Owner's existing earthing system shall be reviewed during detailed engineering stage in line with the provisions of technical specifications.
179	Section VI (TS)		Clause no 1 point 12- Section-2-B CIVIL SCOPE OF SUPPLY & SERVICES		Boundary wall shall be provided by bidder on the periphery of allotted plot/plots.	As discussed in the pre-bid meeting, bidder understand that Boundary wall is under Owner's scope. Kindly clarify it?	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement. Provisions of bidding documents are clear and shall prevail.
180	Section VI (TS)		Clause no B point 7- Section-2-B CIVIL SCOPE OF SUPPLY & SERVICES		The construction power shall be in the scope of contractor and the same shall be mandatorily through green power by means of Green Micro-grid which shall comprise of Solar PV System along with AC/DC coupled Battery Energy Storage System.	Please clarify whether the power supply required for civil works is included under the owner's scope?	Provisions of bidding documents are clear and shall prevail.

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181	Section VI (TS)	1-A	8.0(h)		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	Kindly clarify the scope of SVG PMU and its integration with existing PMU's (No other PMU is required from bidder at 33kV end)	Bidder to refer technical amendment no.1 in this regard.
182	Section VI (TS)					Kindly share the protocol for data sharing of 200MW plant with switchyard SAS	The same shall be finalized during detailed engineering in line with the tender requirement.
183	Section VI (TS)	B-2	6.26		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	In ICR HT panel, No Ethernet switches is required as same will be present in near by ICR PLC panel	The same shall be finalized during detailed engineering in line with the tender requirement.
184	Section VI (TS)					Please clarify the scope of Internet required for FTP, OPC	Provisions of bidding documents are clear and shall prevail.
185	Section VI (TS)	D-1	1.1		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	For measurement of DHI and DNI parameters a single sensor will be offered	Provisions of bidding documents are clear and shall prevail.
186	Section VI (TS)	D-1	8		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	Any recommended height for Meteorological station, General consideration is 3Mtrs	Provisions of bidding documents are clear and shall prevail.
187	Section VI (TS)	D-1	2.1		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	Ambient Air Temperature Sensor (Qty.- 1 temperature sensor each with every pyranometer being offered for the project.), Kindly clarify (For single WMS station we have 2 Nos pyranometers so 2Nos of Ambient temperature sensors required)	Provisions of bidding documents are clear. Further, bidder may refer to the technical amendment no.1 in this regard.
188	Section VI (TS)	D-1	1.1		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	Bidder also needs to provide additional pyranometer and DATA logger with same specification & SCADA integration for the purpose of PG test as specified in the PG test procedure chapter, Kindly Clarify.	Provisions of bidding documents are clear. Further, bidder may refer to the technical amendment no.1 in this regard.
189	Section VI (TS)	D-1	1.1		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	PG Test Procedure chapter for WMS sensors,Not Available.	Provisions of bidding documents are clear and shall prevail.

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190	Section VI (TS)					Since E-W Tracker is been considered, Any specific/dedicated SCADA, Work station requiremts related to trackers required, Please clarify	Provisions of bidding documents are clear and shall prevail.
191	Section VI (TS)	B-2	6.8		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	As per TS - Latest version of hardware and Software for interfacing the numerical relays with laptop shall be provided. At least two sets of communication cable for Laptop to relay communication shall be provided. Kindly confirm whether additional laptop is required for relay configuration or Laptop considered for EWS will be sufficicent.	Provisions of bidding documents are clear and shall prevail.
192	Section VI (TS)	B-6	3.0 (VII)		TECHNICAL SPECIFICATION BID DOC. NO: NRE-CS-5800-004(BOS2)-9	Cat 6 UTP (or) fibre optic cables shall be employed. We are considering CAT6 STP/SFTP cable	Provisions of bidding documents are clear and shall prevail.
193	Section VI (TS)					Distance between Plant SCADA panel and exixting Switchyard SAS panel for Plant data Sharing	Provisions of bidding documents are clear and shall prevail.
194	Section VI (TS)					PQM Scope and its quantity for 33kV incomer Bays	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of PQ meters. Provisions of bidding documents are clear and shall prevail.
195	Section VI (TS)					PPC consideration (Slave or stand alone), If it is slave kindly share the make, model and inputs required from MPPC.Also, confirm any specific protocol requirements.	Detailed technical data will be finalized during detailed engineering. Provisions of bidding documents are clear and shall prevail.
196	Section VI (TS)					Please clarify whether bidder is required to install fire protection panels in all ICRs incl. Smoke detectors, Hooters and Manual call pointers	Fire protection of ICRs is in the scope of the bidder. Bidder to refer relevant chapter of technical specification for detailed requirements. Provisions of bidding documents are clear and shall prevail.

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197	Section VI (TS)	B-1 LT Switchgear	2		Paint Shade:- RAL9002 (Main body) RAL 5012 (Extreme end covers) The paint thickness shall not be less than 50 microns	Bidder proposes usage of RAL-7032(Pebble grey) 60-70 micron. Same is validated in numerous project sin Rajasthan	Provisions in Bidding documents are clear and shall prevail.
198	Section VI (TS)						No query raised. Provisions of bidding documents are clear and shall prevail.
199	Section VI (TS)	Tender,PART-B,C-5	2.2.2		Rammed Steel Pile as MMS foundation for Ground Mounted	Bidder proposes the cast in stiu pile method	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
200	Section VI (TS)	Tender,PART-B,C-1	2.1.1)		Geotechnical investigation is specified as 1 borehole per 12.5 acres, resulting in about 360 boreholes	Bidder proposes 1 borehole per 20 acres, reducing the total to about 225 boreholes	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
201	Section VI (TS)	(Tender drawing)			It is mentioned GR-2 WBM thickness is 100mm	Bidder proposes general practice GR-2 WBM thickness of 75mm	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
202	Section VI (TS)	Tender,PART-B,C-3	2		The depth of foundation of Pre-Stressed Precast Boundary Wall is 1800 mm	Bidder proposes to reduce the depth of foundation of Pre-Stressed Precast Boundary Wall as per site condition	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
203	Section VI (TS)	Tender,PART-A,2-B	1		For ICR shed a Pre Engineered Building (PEB) is given	Bidder proposes a four side open roof shed (canopy structure)	Bidder to refer technical specifications for various options of Inverter Room design. Bidder may choose among the available options. Provisions of bidding documents are clear and shall prevail.
204	Section VI (TS)	(Tender drawing)			For ICR structure, Grouting between base plate and column ia mentioned 50 mm M40 concrete	Bidder proposes a 25mm GP2 for grouting	Bidder may propose the same during detailed Engineering and the same will be reviewed by NTPC REL as per technical requirements. However, the adoption of the same shall be subject to approval.
205	Section VI (TS)	(Tender drawing)			It is mentioned that grade of concrete shall be M30 with 20mm down graded aggregates	Bidder proposes M25 grade concrete mix as it has been proven sufficeint in Bikaner region	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.

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206	Section VI (TS)	(Tender drawing)			Minimum thickness of galvanization is mentioned as 110 micron for all structural steel members of inverter room	Standard practice is - all structural steel are painted with 2 coats of synthetic enamel paint over a base coat of preimer and total DFT of paint is 125 micron pls clarify	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
207	Section VI (TS)	(Tender drawing)			Peripheral garland drain made around PEB inverter room and connected to nearby drain	This may vary as per site conditions, Bidder proposes to keep this optional	Bidder may propose the same during detailed Engineering and the same will be reviewed by NTPC REL as per technical requirements. However, the adoption of the same shall be subject to approval.
208	Section VI (TS)	Tender,PART-A,3-A	2.01		It is mentionned that drains are in Bidder Scope and shall be constructed and connected suitably with External/Natural drainage (If any), by the Bidder	Bidder proposes that we will provide natural slope and avoid drains	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
209	Section VI (TS)	2-A	6		NTPC REL will try to provide the exact PV Module characteristics including datasheet and other documents by 7 to 9 months after the award of LOA to BOS Bidder	Bidder Request NREL to share Module dtasheet inputs within 4-5 months from NOA in order to successfully meet the 11 month timeline	Provisions of Bidding documents are clear and shall prevail.
210	Section VI (TS)	B-12				For 33kV metering arrangement - whether NREL will provide space for ABT metering installation inside MCR Panels at PSS or Bidder to consider Metering yard arrangement on plant side of the 33kv feeder.	Bidder to refer Tender SLD for scope of energy meters in 33kV Owner's Main Pooling Switchgear. Provisions of bidding documents are clear and shall prevail.
211	Section VI (TS)					Please clarify whether the WMS equipments installed for the project will suffice the requirement during OTGT test also	Provisions of bidding documents are clear and shall prevail.
212	Section VI (TS)	A2 - Tracker System	2.2-F		Redundant communication (wireless) for individual Trackers	Please clarify the exact requirement. Will be as per Tracker manufacturer specification	Provisions of bidding documents are clear and shall prevail.
213	Section VI (TS)	A3- DC Cables	1		A maximum of 8 Cables (4 Circuits) shall be laid in one HDPE Pipe for DC Cable	Is it HDPE pipe or DWC conduit ?	Provisions of Bidding documents are clear and shall prevail.

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214	Section VI (TS)	A4- String Combiner box	3		Fuse in each SCB input (both positive and negative) shall be provided to prevent the reverse short circuit current flow.	Fuse on negative to be provided essentially or it should be as per Inverter manufacturer recommendation ?	Provisions of Bidding documents are clear and shall prevail.
215	Section VI (TS)		6-Vii		Offered enclosure shall have adequate space to fix one String Monitoring card, One Modbus SPD and One DC-DC converter for internal power supply with suitable terminal block for retrofitting of enclosure to convert the offered combiner box as String Monitoring Box in future by NTPC REL.	Only space is required or Monitoring card , SPD and converter also needs to be supplied ?	Provisions of Bidding documents are clear and shall prevail.
216	Section VI (TS)	A4- String Combiner box	9.1		bidder to provide suitably sized fuse in positive side of Y-connector.	Do the bidder need to provide fuse at PV module end and at SMB both ?	Provisions of Bidding documents are clear and shall prevail.
217	Section VI (TS)	1-A	2		BESS installation in future	Is there any specific vector group to be considered for solar which needs to be inline with BESS vector Group or BESS IDT transformer	Kindly refer to Technical specification Chapter B-3 (A), wherein it is mentioned that the design and configuration of IDT shall be finalized as per system requirements, Single Line Diagram (SLD), and inverter manufacturer's recommendations. However, the same shall be reviewed during detailed engineering.
218	Section VI (TS)	General	General		General	Please share Fault level at interconnection point at PSS	Bidder to refer Tender SLD in this regard. Provisions of bidding documents are clear and shall prevail.
219	Section VI (TS)	Tender drawings				Do we need to consider a separate LV Breaker after central Inverter as shown in drawings	LV breaker can be part of the central inverter. In such case additional standalone LV breaker shall not be required. Provisions of Bidding documents are clear and shall prevail. Provisions of Bidding documents are clear and shall prevail.
220	Section VI (TS)	B-10 Aux system	1.01		Auxiliary power supply arrangement shall be in line with tender SLD. Each Inverter Room/local pooling/sub-pooling/CMCS room shall have its own auxiliary power supply	1. Is CMCS aux trafo in bidder scope ? 2. Aux trafo - 3 ph , oil filled , KNAN - Can bidder consider air cooled Transformer at ICR level ?	Please refer technical specification Chapter B-3(B) in this regard. Oil filled Auxiliary transformers shall be of KNAN type. Dry type transformers are also permitted for Auxiliary transformers in line with the technical

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					system comprising of AC distribution board (ACDB) which shall be fed from LV side of Inverter transformer through suitably rated auxiliary transformers.		specifications. Provisions of Bidding documents are clear and shall prevail.
221	Section VI (TS)	B-10 Aux system	1.07		Solar Plant Main Pooling Switchgear shall be powered from 2X100% DC supply system.	Please define - Solar Plant main pooling switchgear	Bidder to refer Scope of work and Exclusions in Technical specification Part A for Scope of Owner's Pooling Switchgear. Provisions of bidding documents are clear and shall prevail.
222	Section VI (TS)	2-A PV Module Details	1			Please share PV module back side cable length to be considered	Cable length of 1200mm will be provided with Module.
223	Section VI (TS)	D2 - Fire fighting	12.2		Multi sensor type smoke detectors and heat detectors shall be provided for below false ceiling areas of control room and ACDB and/or inverter rooms. One (01) sensor shall be provided for each 20 sqm of area.	In case of outdoor inverter rooms - do the bidder need to consider fire panel ?	Provisions of bidding documents are clear and shall prevail. Provision for fire detection for equipment at ICR shall be as per the TS.
224	Section VI (TS)	B-9 Plant illumination System	2		AC lighting system 415V, 3Phase, 4wire, will be fed from lighting panels Control Board (LPs) which in turn will be fed from the lighting distribution boards (LDBs) of AC Switch board MCC.	Can bidder consider LED light with solar panel.	Provisions of bidding documents are clear and shall prevail.
225	Section VI (TS)	B-2 HT Switchgear	13.1		Each switchboard shall be provided at least two (02) Nos of DC feeders for the control supply.	As per Indutrial practice for Outdoor ICOG panel DC supply from source not possible, we propose 1 nos of powerpack with 30mins backup time. Please clarify requirement.	Provision of Power pack for ICOG is allowed as per provisions of technical specifications. Kindly refer Chapter 2-A clause 1.0 (g)
226	Section VI (TS)					As CMCS is not in scope, pls clarify scope of Auxiliary equipment such as aux trafo, LT panels, UPS, Battery etc	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical

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							specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
227	Section VI (TS)					Please share the minimum ground clearance from center point of SAT.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
228	Section VI (TS)					Module degradation factor assumptions should be linked to the module datasheet or from MCF provided in the tender	Provisions of Bidding documents are clear and shall prevail.
229	Section VI (TS)					In case module shows abnormal degradation behavior during O&M stage, can it be tested at reputed testing facility for actual degradation present. If so, whose scope it would be included to conduct test and would this degradation would be acceptable	Provisions of Bidding documents are clear and shall prevail.
230	Section VI (TS)					Would LID assumption of 2% include first year degradation. If not, can we consider the value as specified in the module datasheet	LID Loss of 2% includes first year degradation. Provisions of Bidding documents are clear and shall prevail.
231	Section VI (TS)					Kindly clarify the grid limitation should be at 33 kV level as 200 MW. As BESS provision is mentioned in future	Provisions of Bidding documents are clear and shall prevail.
232	Section VI (TS)					Is shading scene compulsory for PVSYST report	Provisions of Bidding documents are clear and shall prevail.
233	Section VI	SLD	SLD		As per SLD	Please confirm exact number of 33 kV feeders available for 200 MW evacuation of 55MW, as Cable termination at 33 kV switchgear is in EPC Scope.	Bidder to refer Block single line diagram under Tender drawings and subsequent amendments if any in this regard. Provisions of bidding documents are clear and shall prevail.

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234	Section VI	2-A	Clause-D		Design Philosophy	Kindly confirm the cable length along with module shall be provided as module is in NTPC scope.	Cable length of 1200mm will be provided with Module.
235	Section VI	2-A	Clause-D		Design Philosophy	Kindly cofirm bidder can consider Leap forg configuration for stringing.	Cable length of 1200mm will be provided with Module. Accordingly, bidder to design the interconnection of the modules.
236	Section VI	--	CL-9		Dry-Robotic cleaning system only for cleaning	Fully & semi automatic both robots can be consider, kindly confirm	Semi-automatic robots shall only be applicable where the length of the continuous tables is less than 300 Mtr. However, on all other stretches the fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. The same shall be reviewed during detailed engineering prior to acceptance. Bidder to refer technical amendment no.1 in this regard.
237	Section VI	--	CL-9		Dry-Robotic cleaning system only for cleaning	Kindly confirm the cleaning cycle if considering semi automatic robots for samll row cleaning	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
238	Section VI	--	Clause-D		2.5 % (Individual DC and AC Cabling loss shall be as per system design chosen by bidder)	Bidder understands that 2.5% losses are explicitly mentioned upto 33kv switchgear, kindly confirm.	Losses mentioned are up to metering point specified in technical specification. Provisions of Bidding documents are clear and shall prevail.
239	Section VI	2-B	1.A		No permanent periphery fencing of 200MW block is envisaged. Further, bidder to refer tender drawing for vicinity map.	Bidder requests confirmation that periphery boundary fencing is in NTPC scope and not part of the bidder's scope of work.	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such

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							requirement. Provisions of bidding documents are clear and shall prevail.
240	Section VI	2-B	1.A		Aesthetically pleasing, High Quality Large Size Highway Sign Boards / Internal Road Signages	High quality large size highway sign boards cannot be in bidderes scope as it is under national highways.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
241	Section VI	2-B	1.A		Permanent Store-Room / Ware House (Pre-Engineered Building)	Bidder request to confirm the Height of the PEB and provide a reference drawing for the same	Bidder may propose the same during detailed Engineering and the same will be reviewed against technical requirement. However, the adoption shall be subject to approval based on the approval by NTPC REL and actual site requirement.
242	Section VI	2-B	1.A		Any internal Fencing and Gates, e.g. for Yards (Transformer, inverter, etc.)	Bidder request to please provide tender drawings.	Relevant tender drawings are already shared along with bidding documents. Other details will be finalized during detailed engineering.
243	Section VI	2-B	1.A		Water treatment Plant, disposal of reject water, storage tanks, piping etc.	Is there needed to have Water treatment Plant, disposal of reject water? Bidder request to please provide tender drawings. Confirm the size of required storage tank?	Bidder may submit the detailed proposal to meet the technical requirement and site requirements during detailed Engineering for review by NTPC REL. However, the adoption shall be subject to approval of NTPC REL.
244	Section VI				Drainage system	Bidder request to please provide tender drawings.	Bidder to propose the same during detailed Engineering however the adoption shall be subject to approval by NTPC REL based on the actual site requirement.
245	Section VI	2-B	1.A		CMCS Building	Bidder requests confirmation that CMCS building is in NTPC scope and not part of the bidder's scope of work.	Bidder to refer Terminal points/Exclusions at Chapter 3A of Technical specification Part A for scope of CMCS building. Provisions of bidding documents are clear and shall prevail.
246	Section VI	2-B	1.A		Peripheral Road	Bidder request to please confirm whether peripheral road is at EPC scope or not?	Internal roads as per bidder's proposal, technical specifications and tender drawings within the block are in the scope of the bidder.

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247	Section VI	2-B	1.B		Cutting, Clearing, transporting and disposal of plants, bushes, other vegetation, roots, stubs etc.	It is kindly requested to note that the cutting of trees shall be under the Client's scope. Further, approvals required for cutting of any special, protected, or restricted trees, if applicable, shall also be obtained by the Client / NTPC.	Tree cutting and relevant permissions are in the land vendor's scope, however minor tree cutting & relevant permissions, removal of shrubs, obstruction and execution will be in BOS bidder's scope. Bidders are advised to make site visit and appraise themselves with site conditions including the extent of local constraints. Provisions of Bidding documents are clear. Bidders are requested to follow the same.
248	Section VI	2-B	1.C		Rainwater Harvesting for RCC Buildings - If RCC Buildings are provided.	The bidder kindly requests confirmation on whether rainwater harvesting provisions are required to be provided at the HT switchgear room and the ICR station.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
249	Section VI	2	2.1		All Internal Roads and Drains (Tender Drawing) are in Bidder Scope and shall be constructed and connected suitably with Approach Road and External/Natural drainage, by the Bidder.	Bidderrequest to please provide tender drawings of following. 1) Drainage Layout and cross-section drawings.	Bidder to propose the same during detailed Engineering however the adoption shall be subject to approval based on NTPC REL the actual site requirement.
250	Section VI	C1	2.2.1		In desert areas where sand erosion is anticipated, depth of pile shall be increased beyond designed depth by minimum 300mm or envisaged depth of erosion, whichever is higher.	A cost-benefit analysis should be carried out to determine the most economical and technically sound approach. Allow us to consider foundation Depth as per design calculation.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
251	Section VI	C-1	2.2.2		Rammed Steel Pile as MMS foundation for Ground Mounted solar PV Projects	Bidder request to provide pile foundation for MMS at tender stage. Variable cost analysis shall be caried out to confirm. Allow bidder to consider pile foundation only as per geotech report.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
252	Section VI	C-2	1		SITE LEVELLING AND GRADING	Bidder request to please confirm that site grading is completely in EPC scope. Client will provide virgin land with no grading?	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mtr in N-S direction

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							and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
253	Section VI	1.A	4		Land will be provided by NTPC REL on "as is where is basis" (Approx. 5 acres/MW). Land being provided may or may not be on a contiguous basis. Land will be, in general levelled with an average slope of 10% and local slope of up to 15%. Thus, major cutting / filling is not envisaged in bidder scope, in general, except for the practical / localized issues.	*We understand that general level with an average slope of 10% and local slope of up to 15% will be given within a grid size of 5 m x 5 m. *The localised / practical grading to be done by NTPC and it will be done considering that the land will be handed over to the EPC with an average slope of 10% and local slope of up to 15% within every 5 m x 5 m grid within the entire land parcel. *Also, it is mentioned - Major cutting / filling is not required in bidder scope in general except for the practical / localized issues. With this we understand that only minor cutting filling of upto +/- 300 mm grading will be in scope of EPC.	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mtr in N-S direction and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
254	Section VI	C-3	5		Chain Link Fencing for Yard (Transformer Yard, Metering Yard, etc.) As per Tender Drawing Title: CHAIN LINK FENCING FOR YARD AND COMMON FENCING (5779-004(B)-POC-A-003C)	Bidder request to please provide tender drawings.	Tender Drawings are already shared as a part of bidding documents.
255	Section VI	C-3	3		Chain Link Fencing for Yard (Transformer Yard, Metering Yard, etc.) As per Tender Drawing Title: CHAIN LINK FENCING FOR YARD AND	Bidder request to please provide tender drawings.	Tender Drawings are already shared as a part of bidding documents.

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					COMMON FENCING (5779-004(B)-POC-A-003C)		
256	Section VI	C-3	6		The minimum size & requirements of the Gate's including all items shall be as per the fencing tender drawing title: "Details of Main Gate".	Bidder request to please provide tender drawings.	Tender Drawings are already shared as a part of bidding documents.
257	Section VI	C-3	7		HT cable support	Bidder request to please provide tender drawings. This will be as per electrical requirements.	Provisions of Bidding documents are clear and shall prevail.
258	Section VI	C-5	B		The inverter rooms shall be made through any of the options as mentioned below	Bidder request to placing the inverter On elevated RCC Platform kindly confirm.	Bidder to refer technical specifications for various options of Inverter Room design. Bidder may choose among the available options. Provisions of bidding documents are clear and shall prevail.
259	Section VI	C-5	B		Inverter station steel canopy	Can we consider painting instead of HDG for Inverter station steel structural canopy. If yes please specify the paint, no. of coat and DFT required?	Bidder to propose the same during detailed Engineering however the adoption shall be subject to approval of NTPC REL based on the actual site requirement.
260	Section VI	C-4	6		Materials Specification & Coating for Structural Steel Works	For non-coastal regions for Hot-dip Aluminium-Zinc alloy metallic coated sheet material AZ150 coating is enough. Also please confirm the coating and material for bracings and child parts. Confirm the coating thickness for connection hardware's HDG 5.6 & 8.8 grade in micron.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
261	Section VI	C-4	6		Painting of Steel Surfaces embedded in Concrete : For the portion of Steel surfaces completely embedded in Concrete as reinforcement or otherwise for foundation systems, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc	This is recommended for coastal region so kindly allow us to use black material for For the portion of Steel surfaces completely embedded in Concrete as reinforcement or otherwise for foundation systems,	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.

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					Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT).		
262	Section VI	C-5	6		PLANT DRAINAGE SYSTEM	Surface run-off coefficient shall be as per Hydrology report. Provide reference drainage cross-section drawing. Provide recharge pit and rain water harvesting drawing.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
263	Section VI	C-5	6		PLANT DRAINAGE SYSTEM	Provide Drainage Layout or can we consider the total drainage length as 40% of the internal road length?	Bidder to propose the same during detailed Engineering based on the actual site requirement however the adoption shall be subject to approval of NTPC REL.
264	Section VI	---	---		MCR	Kindly confirm the 33kV HT Switchgear loaction,as it will be placed in the solar PV Plant or it will be in the PSS Area.	33kV Owner's main pooling switchgear is located near Pooling substation as already specified in technical specification. Provisions of bidding documents are clear and shall prevail.
265	Section VI	---	---		Harmonic filter & SVG	Kindly confirm the SVG & Harmonic filter location shall be in the PSS Area or needs to consider in the Solar PV Plant area.	SVGs and Harmonic filters shall be installed by the bidder near Owner's PSS as already specified in technical specification. Provisions of bidding documents are clear and shall prevail.
266	Section VI	2-A	Clause-D		DC Cabling loss at STC + AC Cabling loss at STC 2 .5 % (Individual DC and AC Cabling loss shall be as per system design chosen by bidder	Kindly confirm this losses remains same, if MCR shall be placed in the PSS Area and 33KV HT Cable Will connect to 33KV MV Switchgear through corridor.	Losses mentioned are up to metering point specified in technical specification. Provisions of Bidding documents are clear and shall prevail.
267	Section VI	1-A	4		Land will be provided by NTPC REL on "as is where is basis" (Approx. 5 acres/MW). Land being provided may or may not be on a contiguous basis.	As per the clause, land shall be provided by NTPC REL. Kindly clarify the phasing plan for land handover and the timeline for handing over 100% of the land area required for the project.	Land shall be handed over in phases and bidder shall plan the project development works accordingly. The Levelling & Grading as per the employer's scope will be taken up in parallel.

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268	Section VI	Appendix I	Clause G		No permanent periphery fencing of the solar Block(s) is envisaged	Kindly clarify, how the security of material at the time of erection will be ensured?	No permanent boundary wall or periphery fencing of individual blocks is envisaged. Further, bidder to refer tender drawing for vicinity map. However, any temporary fencing required for the safety, security of the project and manpower as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement. Provisions of bidding documents are clear and shall prevail.
269	Section VI	2-A	1 (b)		NTPC REL shall provide Modules only as free issue items	As modules will be provided by NTPC REL as Free Issue Items, kindly clarify the module supply schedule and the timeline for delivery of 100% of the modules at site to align project execution	Provisions of Bidding documents are clear and shall prevail.
270	Section VI	2-A	6.0 and 1(d)		NTPC REL will try to provide the exact PV Module characteristics including datasheet and other documents by 7 to 9 months after the award of LOA to BOS Bidder. There might be slight changes in the dimensions, weight and Isc as per the actual PV Module compared to the inputs provided by NTPC REL at clause 1.0(d) of chapter 2-A. BOS bidder shall suitably design the BOS system to consider such minor changes	As per the clause, NTPC REL may take 7–9 months from LOA to provide exact module characteristics, and the bidder is required to accommodate minor design changes. Kindly clarify what parameters are considered as minor changes. Specifically, changes in Wp rating, module dimensions, or mounting hole spacing may impact the structure design and associated material procurement.	Tolerance/Range for Module dimension and mounting hole already provided in TS. Same to be considered for design purpose. Provisions of Bidding documents are clear and shall prevail.

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271	Section VI	1-A	8 (b)		NTPC REL shall conduct detailed Grid compliance study with Power Plant Controller for solar project as per CEA technical standard for grid connectivity and latest guideline of RLDC first charging clearance.	As inverter quantity, SVG capacity/quantity, and harmonic filter design will be finalized based on the Grid Compliance Study, which is under NTPC REL scope, kindly clarify the expected timeline for submission of the detailed grid study report after the bidder provides inverter, PPC, and other relevant details.	NTPC REL shall communicate reactive power compensation requirements and harmonic filters requirements till POI after completion of the grid compliance studies. Bidder to provide all the required inputs as per timelines specified in bidding documents. Provisions of bidding documents are clear and shall prevail.
272	Section VI	1-A	2		Solar Project shall be terminated at 33kV Switchgear which is in-turn stepped up through Power Transformer (s) and 400kV side finally connected to ISTS substation by 400kV Transmission Line(s))	As the bidder's termination point is the Owner's 33 kV Main Pooling Switchgear at the 400 kV / 33 kV substation switchyard, kindly confirm the tentative timeline for readiness and commissioning of the HT switchgear to facilitate integration of the 33 kV blocks.	Pooling substation and Owner's main pooling HT Switchgear are being developed by the owner in parallel and the same is expected to be ready along with the solar plant readiness for commissioning. Provisions of bidding documents are clear and shall prevail.
273	Section VI	1-A	10		The following clearances shall be arranged by bidder. However, necessary documentation/ applications shall be in the name of NTPC REL …. All the statutory fees for approvals till the completion of O&M period shall be in the scope of bidder (unless otherwise specifically mentioned in document).	Employer to kindly confirm the amount for processing applications/permits etc (in name of the Employer) for setup of Facilities as per norms of these authorities, to be catered by the Contractor in its bid. Employer to also kindly confirm that no fee/cost/GST for any asset transfer from NTPCREL to authorities is to be considered by the Contractor under its bid. If such cost/fee too is to be borne by the Contractor, the Employer to kindly confirm the amount, for consideration in bid.	Provisions of bidding documents are clear and shall prevail.
274	Section VI	1-A	4		Land will be provided by NTPC REL on "as is where is basis" (Approx. 5acres/MW).	Kindly clarify/confirm the following points	1. The land parcels shall be contiguous. And if any Land parcel is falling within the boundary which has not been acquired than the Fencing & Road for the same shall be in Employer's scope.

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						1) Land required for PV array needs to be contiguous as our cost will depend on the layout optimization. 2) Kindly provide the topography survey report, contour detail (in pdf and software files), land detail (in kmz and.dwg) for the land, to enable the Contractor to understand the suitability of land for installation of MMS. 3) Kindly provide the latest dates of encumbrance free land handover. 4) Kindly provide the details of existing encumbrances like trees, bushes, rocky areas (if any), existing encroachments, huts etc., pipelines, powerlines/cables, existing structures, roads or other utilities duly marked in the land layout, as in prebid stage, it is not possible for Bidders to carryout detailed survey of complete land, without access available. 5) Since no reference topography report is available in tender documents and the Employer confirms that the levelling shall be carried out by them in parallel to the BOS contract, the bidder understands that the land shall be provided levelled and fit for installation of MMS, and no levelling/grading work has been taken in bidder's scope. Please confirm.	2. Topography survey of land will be carried out by NTPC REL in parallel. The same will be shared as and when available post award of the contract with the successful bidder. Bidder shall verify the propriety of the said topography survey data for use in project design. Provisions of bidding documents are clear and shall prevail. 3. Land shall be handed over in phases and bidder shall plan the project development works accordingly. The Levelling & Grading as per the employer's scope will be taken up in parallel. 4. Bidders to assess the actual site conditions prior to bidding by site visit. For other relevant details, refer technical specifications and tender drawings. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
275	Section VI	1-A	4		Land will be, in general levelled with an average slope of 10% and local slope of up to 15%. Thus, major cutting / filling is not envisaged in bidder scope, in general, except for the practical / localized issues	Please clarify who will be responsible if the levelling requirement is more that the specified value of 10%	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mtr along N-S direction and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any

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							further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
276	Section VI	1-A	8		The scope of power evacuation system in the scope of the bidder is upto the terminal point as indicated in the tender SLD. The Bidder shall be responsible for terminating their 33kV evacuation feeder at 33kV Main Pooling Switchgear built by NTPC REL.	The scope of bidder is only upto 33 kV pooling switchgear. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.
277	Section VI	1-A	8 e)		Bidder shall install necessary harmonic/power quality mitigation equipment to limit these values at POI	Please specify the excact location for installing the harmonic filter / power quality mitigation equipment. Should it be at the PV plant end of Pooling switchyard?	Location of the harmonic filter/power quality mitigation equipment shall be near to Owner's PSS. However, exact location shall be finalized during detailed engineering. Provisions of bidding documents are clear and shall prevail.
278	Section VI	1-A	10		3. MOEF Clearance 4. SPCB Clearance 5. MNRE Clearance 6. ROW Clearance	Please eloborate in whoose scope shall be the ROW of 33 kV cable corridor? Also clarify what degree of support is envisaged as part of facilitation for various Clearances.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
279	Section VI	1-A	Appendix 4		Grid Compliance Study. PPC & Substation SCADA & Switchyard Control room	Who will confirm the sizing of Harmonic filter & SVG since Grid compliance study will be done by NTPC.	NTPC REL shall communicate reactive power compensation requirements and harmonic filters requirements till POI only after completion of the grid compliance studies. Bidder to provide all the required inputs as per timelines specified in bidding documents. Provisions of bidding documents are clear and shall prevail.

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280	Section VI	1-B	1		17. Forecasting and scheduling during the 3-year O&M period as per guidelines/procedures of CERC/RLDC/Other nodal agencies.	Please clarify in whose scope is this activity	Provisions of bidding documents are clear and shall prevail.
281	Section VI	A-5	5		String Inverter	Bidder does not envisage use of String Inverters. Please confirm.	Bidder's proposal is allowed as per provisions of technical specifications. Provisions of Bidding documents are clear and shall prevail.
282	Section VI	2-A	1 d)		Table 10. DC Cabling loss at STC + AC Cabling loss at STC - 2.5%	Please clarify if these losses are including 33 kV cables from PV plant to PSS.	DC Cabling loss at STC + AC Cabling loss at STC referred in this clause are up to metering point. Provisions of Bidding documents are clear and shall prevail.
283	Section VI	2-A	1 d)		Bidder shall submit PV Syst report complying with the design parameters specified above and the actual Module PAN file supplied by NTPC REL to arrive at the Target Generation for first year O&M at Metering point.	The bidder understands that the project scope is up to the respective pooling substation. Accordingly, the bidder requests confirmation of the line length from PSS to the pooling substation.	Provisions of Bidding documents are clear and shall prevail.
284	Section VI	2-A	3.2		Telemetry System: The arrangement to transmit data required by the Load Dispatch Centre (LDC) from Solar plant to NLDC/RLDC/SLDC through owner's FOTE at Project Pooling substation as per extant regulations and procedures for grid management up to Bikaner-IV ISTS substation is in contractor's scope.	Bidder scope is limited to 33kV HT switchboard termination only. Hence telemetry is not in bidder scope. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.
285	Section VI	2-A	6		NTPC REL will try to provide the exact PV Module characteristics including datasheet and other documents by 7 to 9 months after the award of LOA to BOS Bidder	Bidder will require the PAN file of the modules at the bid stage to run the PVsyst reports. Please clarify.	Provisions of bidding documents are clear and shall prevail. Kindly refer Chapter 2-A Clause 1.0(d) and Clause 6.0. Relevant PV module related details are provided for designing the Solar PV Plant. NTPC REL shall provide PV modules as per the dimensions (including

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							tolerances) as mentioned in the said clause. PV module datasheet/PAN file shall be shared with successful bidder during detailed engineering within timeline mentioned in the technical specification. Bidder is not required to quote any generation and thus data sheet/PAN file of module are not required at this stage.
286	Section VI	2-B	1		A. Design & Construction of Permanent Facilities 15. Minimum two nos. of airconditioned porta Cabins having cumulative area not less than 900 sq. ft. for the 200MW solar block– one for Conference Room with all necessary facilities and minimum one for Office with necessary facilities shall be provided by the bidder for Owner's use.	Bidder understanding is that no separate MCR shall be provided. Only two prefab building shall be provided. Please confirm.	Provisions of bidding documents are clear and shall prevail.
287	Section VI	A-4	9.1		General Requirement Bidder can propose Y-connector type DC Field Connector for paralleling two DC strings from PV Module to SCB. However, bidder to provide suitably sized fuse in positive side of Y-connector.	Bidder proposes to use MC4 connectors for string connections. If Y-connectors are required, the same will be taken care during the detailed engineering stage.	Provisions of Bidding documents are clear and shall prevail.
288	Section VI	B-10	1.03		For inverter stations and sub-pooling systems, UPS system shall comprise of 1 x 100% UPS with 30 minutes backup. For CMCS, UPS system shall comprise of 2 x 100% UPS with 30 minutes backup for each. Each UPS shall consist of 1x100% charger and inverter, 1 x 100% Battery bank for providing required backup as above. Bypass Line static switch, manual bypass switch, 1 x 100% UPSDB, and other necessary Protective devices and accessories. In place	Since CMCS building is not part of Bidder Scope, so there UPS supply is not applicable. Kindly confirm.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of

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					of UPS, bidder can provide DC supply system (1 x 100% Battery with Charger system for inverter stations/sub-pooling systems and 2x 100% system for CMCS) with backup as indicated as above, if the auxiliary power supply requirement of the loads is in DC.		bidder. Provisions of Bidding documents are clear and shall prevail.
289	Section VI	B-10	1.07		Solar Plant Main Pooling Switchgear shall be powered from 2X100% DC supply system. Each DC supply system shall consist of 1x100% charger, 1 x 100% station Battery bank rated 110V/220VDC (+10%,-20%) for providing minimum 30 minutes backup and DC switchgear. In case UPS fed from above DC supply system, in that case separate DC system for UPS is not required.	Since CMCS building is not part of Bidder Scope, so there UPS supply is not applicable. Kindly confirm.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Auxiliary supply for Owner's equipment at PSS is not in the scope of bidder. Provisions of Bidding documents are clear and shall prevail.
290	Section VI	D-3	2.1		SUPPLY The bidder shall supply the Robotic Module Cleaning system units, mounting structures, antennas (including Aluminum poles for its fixing), communication tools, charging system, spares, remote operation management & analytics tools, SCADA communication tools and any other system related requirement for successful installation & operation of Robotic Module Cleaning System. The structural material of docking and reversing station and connecting bridge between two adjacent tables supplied and fabricated as per requirement shall be in the scope of bidder.	Bidder can propose 100% semi-automatic robotic cleaning system or 100% fully automatic robotic system or combination of both fully and semi-automatic robotic cleaning system. Kindly confirm	Semi-automatic robots shall only be applicable where the length of the continuous tables is less than 300 Mtr. However, on all other stretches the fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. The same shall be reviewed during detailed engineering prior to acceptance. Bidder to refer technical amendment no.1 in this regard.

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291	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POC-A-001			VICINITY MAP CUM BLOCK LAYOUT	Request to provide details of the structures/buildings in the vicinity of the plant and within the plant boundary	Land shall be handed over to Bidder for the project development free from encumbrances and Levelled & Graded to the extent mentioned in TS & Replies to Pre-Bid Queries. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
292	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/1&2			Vector Group	As per general practice, we typically consider the delta connection on the LV side and the star connection on the HV side. However, the bidder has requested confirmation on whether the configuration should be followed as per the Single Line Diagram (SLD), or if it can be adopted based on our usual practice.	Kindly refer to Technical specification chapter B-3 (A), wherein it is mentioned that the design and configuration shall be finalized as per system requirements, Single Line Diagram (SLD), and inverter manufacturer's recommendations. However, the same shall be reviewed during detailed engineering. Provisions of Bidding documents are clear and shall prevail.
293	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			1. BIDDER MAY OFFER OUTDOOR ARRANGEMENT WITH VCB,CT AND ISOLATOR. ASSOCIATED RELAY PANEL SHALL BE KEPT WITHIN SUITABLE KIOSK	As per the SLD, the bidder has requested confirmation regarding the placement of the LA, CT, PT, and breaker after the IDT. Specifically, they would like to know whether these components are to be installed outdoors or accommodated within the ICOG panel	Outdoor 33KV bay as well as indoor/outdoor 33 KV ICOG panels with all components installed in the panel are allowed as per provisions of technical specifications.
294	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			3. BIDDER MAY OFFER STANDALONE SWITCHGEAR PANEL FOR INVERTER TRANSFORMER FEEDER INSIDE THE INVERTER ROOM AND CONNECT THROUGH SUITABLE OUTDOOR ISOLATOR.		Outdoor 33KV bay as well as indoor/outdoor 33 KV ICOG panels with all components installed in the panel are allowed as per provisions of technical specifications.
295	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			ALTERNATE CONFIGURATION TO LOCAL POOLING SWITCHGEAR :- BIDDER CAN DIRECTLY TERMINATE CABLE (UPTO 3 SETS) FROM UPTO THREE SEPARATE SAME CAPACITY SOLAR INVERTER BLOCKS (WITH ICOG) AT ONE MAIN POOLING STATION 33kV	Bidder Wants clarity on that point, How much capacity we can combine.	Relevant details are already provided in Block single line diagram share under Tender Drawings. Provisions of Bidding documents are clear and shall prevail.

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					FEEDER. IF ANY OF THE SEPARATE FEEDERS (UPTO THREE) PROPOSED BY THE BIDDER FOR TERMINATION AT ONE NTPC REL'S 33kV POOLING SWITCHGEAR FEEDER IS OF DIFFERENT CAPACITY FROM THE OTHER(S), THEN THE SAME MAY ALSO BE ALLOWED FOR INTERCONNECTION TO THE SAME FEEDER, AFTER REVIEWING THE INVERTER BLOCK CAPACITIES TAKING INTO ACCOUNT THE ELECTRICAL PROTECTION REQUIREMENTS.		
296	Section VI	-	General	-	WatchTower	Bidder Request to Confirm Whether Watch Tower is required for the project	Watch towers are not insisted by the technical specifications. However, the bidder may propose the same during detailed engineering. Adoption subject to approval of NTPC REL. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
297	Section VI	-	General	-	Cable	HT & LT Cables Crossing can allow different trenches.	Provisions of Bidding documents are clear and shall prevail.
298	Section VI	-	General	-	Inverters	Inverter Redundancy N+1, should add one more inverter under spare or need more clarity about N+1 configuration	Provisions of bidding documents are clear and shall prevail.
299	Section VI	-	General	-	Conduit	Cable conduit can go with DWG or HDPE or MDPE Road crossing also	Provisions of Bidding documents are clear and shall prevail.
300	Section VI	-	General	-	Busduct	LV Need Busduct	Provisions in Bidding documents are clear and shall prevail.
301	Section VI	PART-B B – AC SYSTEMS	3.3	231	LIGHTNING PROTECTION SYSTEM FOR SOLAR ARRAY WITH E.S.E AIR TERMINAL	Bidder to Confirm that can we use ESE LA Level IV with 107m radius protection	Calculation of ESE LA protection radius in line with technical specifications is in bidder's scope which shall be reviewed by owner during detailed engg. stage.

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302	Section VI	PART-A SUBSECTION – 1	APPENDIX – 3B		2.7142 MU/MW	Bidder Request to confirm weather we need to achieve 2.7142 MU/MW with DC:AC Ratio of 1.30	The referred clause is for BG calculation only. Provisions of Bidding documents are clear and shall prevail.
303	Section VI	PART-A SUBSECTION – 3	2.01		All Project Roads and all Drains (Refer Vicinity Map / Layout Tender Drawing) within the plot are in Bidder Scope and shall be constructed and connected suitably with Main Approach Road and External drainage (if any) by the Bidder.	Bidder understanding is that access road is in the client scope. Kindly confirm	As the Plot boundary is attached to the existing main road hence no such approach road is envisaged. However, in some minor stretch, if road is required, same shall be in the scope of bidder. Kindly refer the KMZ provided for reference only.
304	Section VI	PART-B D – GENERAL SYSTEMS	4.02		There will be two types of cameras viz. PTZ & Fixed. PTZ cameras shall be high speed integrated dome type.	Bidder request to kindly clarify PTZ Camera to be installed all over the Peripheral area of the solar Plant, if so request to provide the IR Range	Provisions of bidding documents are clear and shall prevail.
305	Section VI	PART-B D – GENERAL SYSTEMS	4.02		Cameras shall be high speed integrated PTZ dome type.	Bidder request to Propose Bullet type cameras to all Entries, ICR and IDT and Dome Type Cameras to MCR, SCADA Room	Provisions of bidding documents are clear and shall prevail.
306	Section VI	1-A	4		Land handed over in phases	Bidder requests block-wise land handover schedule to plan construction sequencing.	Land shall be handed over in phases. Bidder shall plan the project development work accordingly. The Levelling & Grading as per the employer's scope shall be taken up in parallel. Provisions of bidding documents are clear and shall prevail.
307	Section VI	1-A	4		Non-contiguous land parcels	Bidder requests confirmation on contiguity or allowance for additional internal roads.	The land parcels shall be contiguous. And if any Land parcel is falling within the boundary which has not been acquired, then the Fencing & Road for the same shall be in Employer's scope. Refer Technical specification and tender drawings for other details. Provisions of bidding documents are clear and shall prevail.

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308	Section VI	1-A	1		Topography & grading	Bidder requests BOQ-based payment for additional grading beyond specified slope.	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mt. N-S and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.
309	Section VI	2-B	1. B		5. Flood level calculation with 25 Years Return Period – For maintaining Plinth level of the building and equipment foundation level.	Bidder requests acceptance of 10-year flood level as per solar industry norm.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
310	Section VI	2-B	1. D		Full geotechnical investigation	Bidder proposes to utilize the geotechnical report provided by the Owner as the basis for design, supplemented by limited validation boreholes, subject to site accessibility and availability. In case validation investigations are not feasible within the bid stage, civil and foundation designs shall be based on reasonable geotechnical assumptions derived from the available data. Any variation in actual soil parameters encountered during execution resulting in increased civil quantities, revised foundation requirements, or additional ground improvement measures shall be treated as a change in scope, with corresponding cost and time implications to be mutually agreed	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
311	Section VI	2-B	1. A		Internal roads as per bidder proposal	Bidder requests limiting road width to 4.5 m except crane paths.	Width of roads shall be as defined in Tender drawings. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
312	Section VI	2-B	1. A		Complete Drainage system	Bidder requests confirmation whether temporary drainage acceptable during construction.	Bidder can deploy the necessary measures as required for construction during the construction phase, however permanent structures shall be as

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							defined in Technical Specifications. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
313	Section VI	1-A	Appendix 1 F		Design wind speed 47 m/s	Bidder proposes IS 875 zone-based wind speed assessment.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
314	Section VI	A-2	2.3 & 2.4		Mandatory wind tunnel test	Bidder requests acceptance of existing wind tunnel reports for proven tracker.	Subject to the Tracker model being any one being used in NTPC REL projects, the same can be approved on endorsement basis. However, for any new model the Wind Tunnel studies are mandatory. (The Tracker should be same in dimensions & characteristics. Merely having the same model number shall not suffice.). The above will be reviewed by the owner during post award detailed engineering phase.
315	Section VI	1-A	Appendix 1 D		Minimum C3 corrosion category	Bidder proposes C3 coating with inspection-based maintenance.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
316	Section VI	A-2	2.2		Tracker Range of Movement (ROM): +/- 45 degrees or better	Bidder requests tolerance of ±50 mm considering site undulations.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
317	Section VI	2-A	1 d)		DC+AC losses limited to 2.5%	Bidder requests optimized losses as per PVsyst simulation.	Provisions of Bidding documents are clear and shall prevail.
318	Section VI	A-3	1		No joints implied	Bidder requests permission for approved straight joints.	Provisions of Bidding documents are clear and shall prevail.
319	Section VI	2-A	1 (e.)		Inverter Capacity/rating: The continuous combined MW rating of all PCUs/inverters at Unity power factor and at 0.95 p.u. voltage at Inverter terminal at ambient temperature of 51 deg C shall not be less than Plant MW capacity.	Bidder requests site-specific temperature derating study.	Provisions of the bidding document are clear and shall prevail. Bidder to comply with the same.

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320	Section VI	1-A	8. h)		Only SVG allowed for dynamic reactive power compensation	Bidder proposes optimization between inverter & SVG.	Provisions of the bidding document are clear and shall prevail. Bidder to comply with the same.
321	Section VI	B-8	3.4		Copper winding preferred	Bidder proposes aluminium winding with efficiency compliance.	As per the referenced clause and page number, no relevant specification has been identified. For the Interconnecting Transformer (IDT), both aluminium and copper windings are permitted in line with technical specification. For further details, please refer to Chapter B-3 (A) of the technical specification. However, for the Auxiliary Transformer, the winding material shall be strictly copper, as specified under Chapter B-3 (B) of the technical specification.
322	Section VI	B-1			LT Switch gear Arc-proof switchgear	Bidder requests limiting arc-proof to critical panels only.	Provisions of bidding documents are clear and shall prevail.
323	Section VI	B-2			HT Switch gear Internal arc classification	Bidder requests confirmation of fault level basis.	Bidder to refer revised Tender SLD shred along with technical amendment no.1 in this regard.
324	Section VI	B-5			CABLE INSTALLATION METHODOLOGY Cable trench with bricks	Bidder requests waiver of brick lining in sandy soil.	Provisions of bidding documents are clear and shall prevail.
325	Section VI	B-11			Conventional LA	Bidder proposes ESE lightning protection system.	Provisions of bidding documents are clear and shall prevail.
326	Section VI	2-A	1. n)		Dual master SCADA	Bidder proposes single master + hot standby.	Provisions of bidding documents are clear and shall prevail.
327	Section VI	2-A	3.3		Historian storage undefined	Bidder requests confirmation of 5-year rolling data.	Provisions of bidding documents are clear and shall prevail.
328	Section VI	2-A	3.2		Redundant communication	Bidder requests acceptance of ring topology instead of dual FO.	Provisions of bidding documents are clear and shall prevail.

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329	Section VI	D-1			AWS as per CEA 2025	Bidder requests acceptance of MNRE-compliant AWS.	Provisions of bidding documents are clear and shall prevail.
330	Section VI	D-2			Fire system for inverter stations	Fire alarm system will not be required for a open type ICR pad.	Provisions of bidding documents are clear and shall prevail. Necessary arrangements for the fire detection of equipment at ICR to be arranged by the bidder.
331	Section VI	D-8			100% coverage	Bidder requests rationalization based on risk assessment.	Provisions of bidding documents are clear and shall prevail.
332	Section VI	2-C	2		Makes of all Bought Out Items shall be subject to approval of NTPC/NGEL/NTPC REL QA Dept..	Bidder requests acceptance of equivalent vendors with approval timeline.	Please refer the indicative list of vendors shared along with Technical specification Part B, Chapter E and the disclaimer mentioned. On boarding of new vendors shall be as per provisions of bidding documents considering the project timeline and the stage of submission of proposal post award.
333	Section VI	1-A			All RLDC changes in bidder scope	Bidder requests freeze of compliance as on cut-off date.	Provisions of bidding documents are clear and shall prevail.
334	Section VI	1-A	8 e)		Harmonic mitigation in bidder scope	Bidder requests provisional sum subject to study.	Provisions of bidding documents are clear and shall prevail.
335	Section VI	2-A	3.2		LDC telemetry scope	Bidder requests confirmation on channel availability.	Provisions of bidding documents are clear and shall prevail.
336	Section VI	1-A	9		OTGT without normalization	Bidder requests GHI & soiling normalization.	Provisions of bidding documents are clear and shall prevail.
337	Section VI	1-A	Appendix - 3A		LD @ Rs 3.52/kWh	Bidder requests LD cap limited to annual O&M value.	Provisions of bidding documents are clear and shall prevail.
338	Section VI	D-5			3-year O&M fixed	Bidder requests escalation clause for manpower & spares.	Provisions of bidding documents are clear and shall prevail.

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339	Section VI		Appendix 3B		10-year AMC mandatory	Bidder requests 5+5 year optional AMC.	Provisions of bidding documents are clear and shall prevail.
340	Section VI		Appendix 3B		High BG quantum	Bidder requests reduction post O&M period.	Provisions of bidding documents are clear and shall prevail.
341	Section VI	2-B	1. B. 7.		Only green microgrid allowed	Bidder requests limited DG use during emergencies.	Provisions of bidding documents are clear and shall prevail.
342	Section VI	1-A	10		All approvals in bidder scope	Bidder requests timeline responsibility clarity.	Provisions of bidding documents are clear and shall prevail.
343	Section VI	1-A	10		No ROW anticipated	Bidder requests cost/time compensation if ROW arises.	Provisions of bidding documents are clear and shall prevail.
344	Section VI	3-A	1.01		Terminal point at 33 kV	Bidder requests confirmation on space & routing.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
345	Section VI	2-C			Extensive documentation	Bidder requests acceptance of soft copies.	Provisions of bidding documents are clear and shall prevail.

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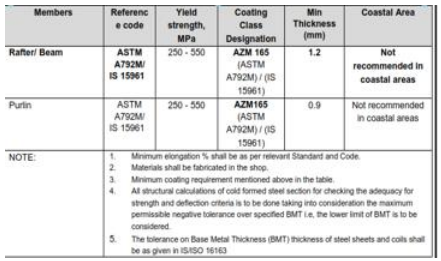
346	Section VI	C-4	6			Bidder Proposse , For FT- UDL loading. Column: min 2.0mm Cold Form Hot-Dip Avg 80 Micron. E350 Mpa; Rafter: Min 1.2 mm thick.Galvalume AZ 150- E550 Mpa; Bracings: Min 1.2 mm Galvalume AZ 150- E550 Mpa; Purlins (Hat profile): Min 0.9 mm thick. Galvalume AZ 150- E550 Mpa. For Tracker , Bidder will follow OEM specification suitable for site location.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
347	Section VI	A-4			String Combiner Box (SCB)	Bidder proposse, SCB stand under the MMS table without canopy.	Provisions of bidding documents are clear and shall prevail.
348	Section VI	C-5	6		Nalla crossing/ Culverts	Bidder reasonable assumptions based on available data. However, the cost of the nalla crossing shall be considered on an actual basis, based on the approved design and finalized vendor quotations	Bidder to carry out proper assessment before finalizing their bid and the cost of the said components if applicable shall be considered in the bid price. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
349	Section VI				General-	Bidder Proposed, MMS pile depth shall be as per soil test and pile load test results , no additional steel reinforcement for the pile and pile cap and MMS piles.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
350	Section VI				General-	The CBR value required for road design has not been provided in the tender documents. Accordingly, the Bidder has considered reasonable assumptions based on the available tender drawings and standard engineering practices for pricing purposes. However, the final pavement crust composition and thickness shall be reviewed and optimized based on the actual CBR values established through detailed	The values provided in the Tender drawings are minimum and any requirement over and above these shall be incorporated by Bidder as per the actual Geotechnical data without any extra cost to employer. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.

Members	Reference code	Yield strength, MPa	Coating Class Designation	Min Thickness (mm)	Coastal Area
Rafter/ Beam	ASTM A792M/ IS 15961	250 - 550	AZM 165 (ASTM A792M) / (IS 15961)	1.2	Not recommended in coastal areas
Purlin	ASTM A792M/ IS 15961	250 - 550	AZM165 (ASTM A792M) / (IS 15961)	0.9	Not recommended in coastal areas

NOTE:
1. Minimum elongation % shall be as per relevant Standard and Code.
2. Materials shall be fabricated in the shop.
3. Minimum coating requirement mentioned above in the table.
4. All structural calculations of cold formed steel section for checking the adequacy for strength and deflection criteria is to be done taking into consideration the maximum permissible negative tolerance over specified BMT i.e, the lower limit of BMT is to be considered.
5. The tolerance on Base Metal Thickness (BMT) thickness of steel sheets and coils shall be as given in IS/ISO 16163

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						geotechnical/site investigations during execution. Any variation resulting in additional quantities, revised specifications, or increased cost/time impact shall be treated as a change in scope and addressed mutually.	
351	Section VI	C-5	6 a)		Lining of drains shall be as per provisions of Bidding Documents and applicable IS/IRC Code provisions.	Bidder proposed, Earthen drain and PCC drain at sharp corners.	Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same. Detailed characteristics shall be finalized during the detailed Engineering phase.
352	Section VI	1-A	4		Land will be, in general levelled with an average slope of 10% and local slope of up to 15%. Thus, major cutting / filling is not envisaged in bidder scope, in general, except for the practical / localized issues	Please clarify who will be responsible if the levelling requirement is more that the specified value of 10%	The land shall be provided at 10% slope with local variations allowable till 15 %. The Slope shall be considered on a length of 100 mtr in N-S direction, and the topography to ascertain slope shall be taken on a grid size of not less than 50 m x 50 m. Any further levelling & grading required for the MMS type proposed by Bidder, beyond these specified limits, shall be taken up by the EPC bidder at no extra cost to employer.
353	Section VI	1-A	8		The scope of power evacuation system in the scope of the bidder is upto the terminal point as indicated in the tender SLD. The Bidder shall be responsible for terminating their 33kV evacuation feeder at 33kV Main Pooling Switchgear built by NTPC REL.	The scope of bidder is only upto 33 kV pooling switchgear. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.
354	Section VI	1-A	8 e)		Bidder shall install necessary harmonic/power quality mitigation equipment to limit these values at POI	Please specify the excact location for installing the harmonic filter / power quality mitigation equipment. Should it be at the PV plant end of Pooling switchyard?	Harmonic filters shall be installed near Owner's PSS. Exact location shall be decided during detailed engineering. Provisions of bidding documents are clear and shall prevail.
355	Section VI	1-A	10		3. MOEF Clearance 4. SPCB Clearance 5. MNRE Clearance	Please eloborate in whoose scope shall be the ROW of 33 kV cable corridor? Also clarify what degree of support is envisaged as part of facilitation for various Clearances.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system up to PSS are to be developed in the land under the possession of

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					6. ROW Clearance		NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding. Provisions of bidding documents are clear and shall prevail.
356	Section VI	1-A	Appendix 4		Grid Compliance Study. PPC & Substation SCADA & Switchyard Control room	Who will confirm the sizing of Harmonic filter & SVG since Grid compliance study will be done by NTPC.	NTPC REL shall communicate reactive power compensation requirements and harmonic filters requirement till POI only after completion of the grid compliance studies. Bidder to assess the requirements at Prebid stage on their own with the details provided along with bidding documents.
357	Section VI	1-B	1		17. Forecasting and scheduling during the 3-year O&M period as per guidelines/procedures of CERC/RLDC/Other nodal agencies.	Please clarify in whose scope is this activity	Forecasting and scheduling during the 3-year O&M period as per guidelines/procedures of CERC/RLDC/Other nodal agencies is in the scope of the bidder. Provisions of bidding documents are clear and shall prevail.
358	Section VI	A-5	5		String Inverter	Bidder does not envisage use of String Inverters. Please confirm.	Bidder's proposal is allowed as per provisions of Technical Specifications. Provisions of bidding documents are clear and shall prevail.
359	Section VI	2-A	1 d)		Table 10. DC Cabling loss at STC + AC Cabling loss at STC - 2.5%	Please clarify if these losses are including 33 kV cables from PV plant to PSS.	DC Cabling loss at STC + AC Cabling loss at STC referred in this clause are up to metering point
360	Section VI	2-A	1 d)		Bidder shall submit PV Syst report complying with the design parameters specified above and the actual Module PAN file supplied by NTPC REL to arrive at the Target Generation for first year O&M at Metering point.	The bidder understands that the project scope is up to the respective pooling substation. Accordingly, the bidder requests confirmation of the line length from PSS to the pooling substation.	Provisions of bidding documents are clear and shall prevail.
361	Section VI	2-A	3.2		Telemetry System: The arrangement to transmit data required by the Load Dispatch Centre (LDC) from Solar plant to NLDC/RLDC/SLDC through owner's FOTE at Project Pooling substation as per extant	Bidder scope is limited to 33kV HT switchboard termination only. Hence telemetry is not in bidder scope. Kindly confirm.	Provisions of bidding documents are clear and shall prevail.

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					regulations and procedures for grid management up to Bikaner-IV ISTS substation is in contractor's scope.		
362	Section VI	2-A	6		NTPC REL will try to provide the exact PV Module characteristics including datasheet and other documents by 7 to 9 months after the award of LOA to BOS Bidder	Bidder will require the PAN file of the modules at the bid stage to run the PVsyst reports. Please clarify.	Provisions of bidding documents are clear and shall prevail. Kindly refer Chapter 2-A Clause 1.0(d) and Clause 6.0. Relevant PV module related details are provided for designing the Solar PV Plant. NTPC REL shall provide PV modules as per the dimensions (including tolerances) as mentioned in the said clause. PV module datasheet/PAN file shall be shared with successful bidder during detailed engineering within timeline mentioned in the technical specification. Bidder is not required to quote any generation and thus data sheet/PAN file of module are not required at this stage.
363	Section VI	2-B	1		A. Design & Construction of Permanent Facilities 15. Minimum two nos. of airconditioned porta Cabins having cumulative area not less than 900 sq. ft. for the 200MW solar block– one for Conference Room with all necessary facilities and minimum one for Office with necessary facilities shall be provided by the bidder for Owner's use.	Bidder understanding is that no separate MCR shall be provided. Only two prefab building shall be provided. Please confirm.	For scope of CMCS, bidder to refer exclusions at Chapter 3A of technical specifications. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
364	Section VI	A-4	9.1		General Requirement Bidder can propose Y-connector type DC Field Connector for paralleling two DC strings from PV Module to SCB. However, bidder to provide suitably sized fuse in positive side of Y-connector.	Bidder proposes to use MC4 connectors for string connections. If Y-connectors are required, the same will be taken care during the detailed engineering stage.	Provisions of Bidding documents are clear and shall prevail.

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365	Section VI	B-10	1.03		For inverter stations and sub-pooling systems, UPS system shall comprise of 1 x 100% UPS with 30 minutes backup. For CMCS, UPS system shall comprise of 2 x 100% UPS with 30 minutes backup for each. Each UPS shall consist of 1x100% charger and inverter, 1 x 100% Battery bank for providing required backup as above. Bypass Line static switch, manual bypass switch, 1 x 100% UPSDB, and other necessary Protective devices and accessories. In place of UPS, bidder can provide DC supply system (1 x 100% Battery with Charger system for inverter stations/sub-pooling systems and 2x 100% system for CMCS) with backup as indicated as above, if the auxiliary power supply requirement of the loads is in DC.	Since CMCS building is not part of Bidder Scope, so there UPS supply is not applicable. Kindly confirm.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Provisions of Bidding documents are clear and shall prevail.
366	Section VI	B-10	1.07		Solar Plant Main Pooling Switchgear shall be powered from 2X100% DC supply system. Each DC supply system shall consist of 1x100% charger, 1 x 100% station Battery bank rated 110V/220VDC (+10%,-20%) for providing minimum 30 minutes backup and DC switchgear. In case UPS fed from above DC supply system, in that case separate DC system for UPS is not required.	Since CMCS building is not part of Bidder Scope, so there UPS supply is not applicable. Kindly confirm.	At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Backup requirement of SCADA UPS is not considered in 220V PSS Battery sizing. Provisions of Bidding documents are clear and shall prevail.
367	Section VI	D-3	2.1		SUPPLY The bidder shall supply the Robotic Module Cleaning system units, mounting structures, antennas (including Aluminum poles for its fixing), communication tools, charging system, spares, remote operation	Bidder can propose 100% semi-automatic robotic cleaning system or 100% fully automatic robotic system or combination of both fully and semi-automatic robotic cleaning system. Kindly confirm	Semi-automatic robots shall only be applicable where the length of the continuous tables is less than 300 Mtr. However, on all other stretches the fully automatic robots are to be mandatorily provided. All efforts should be made to make the Tracker rows contiguous to the maximum extent possible. The same shall be reviewed during detailed engineering

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					management & analytics tools, SCADA communication tools and any other system related requirement for successful installation & operation of Robotic Module Cleaning System. The structural material of docking and reversing station and connecting bridge between two adjacent tables supplied and fabricated as per requirement shall be in the scope of bidder.		prior to acceptance. Bidder to refer technical amendment no.1 in this regard.
368	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POC-A-001			VICINITY MAP CUM BLOCK LAYOUT	Request to provide details of the structures/buildings in the vicinity of the plant and within the plant boundary	In general, no such structure is envisaged to be retained inside the Plot boundary however if any such structure is present the same shall be removed by Employer and the Land shall be provided encumbrance free to the extent of Land Levelling and grading as defined in Technical Specifications & Other replies of Pre-Bid Queries. If any structure is not removed, the same shall be removed from the layout during detailed engineering. However, land quantum to the tune of approx. 5 acre per MW will be provided. Provisions of bidding documents are clear and shall prevail. Bidder to comply with the same.
369	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/1&2			Vector Group	As per general practice, we typically consider the delta connection on the LV side and the star connection on the HV side. However, the bidder has requested confirmation on whether the configuration should be followed as per the Single Line Diagram (SLD), or if it can be adopted based on our usual practice.	Kindly refer to Technical specification Chapter B-3 (A), wherein it is mentioned that the design and configuration shall be finalized as per system requirements, Single Line Diagram (SLD), and inverter manufacturer's recommendations. However, the same shall be reviewed during detailed engineering.
370	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			1. BIDDER MAY OFFER OUTDOOR ARRANGEMENT WITH VCB,CT AND ISOLATOR. ASSOCIATED RELAY PANEL SHALL BE KEPT WITHIN SUITABLE KIOSK	As per the SLD, the bidder has requested confirmation regarding the placement of the LA, CT, PT, and breaker after the IDT. Specifically, they would like to know whether these	Provisions of bidding documents are clear and shall prevail.

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371	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			3. BIDDER MAY OFFER STANDALONE SWITCHGEAR PANEL FOR INVERTER TRANSFORMER FEEDER INSIDE THE INVERTER ROOM AND CONNECT THROUGH SUITABLE OUTDOOR ISOLATOR.	components are to be installed outdoors or accommodated within the ICOG panel	
372	Section VI (Tender drawings)	DRG No. 5800-004(BOS2)-POE-A-001/2			ALTERNATE CONFIGURATION TO LOCAL POOLING SWITCHGEAR :- BIDDER CAN DIRECTLY TERMINATE CABLE (UPTO 3 SETS) FROM UPTO THREE SEPARATE SAME CAPACITY SOLAR INVERTER BLOCKS (WITH ICOG) AT ONE MAIN POOLING STATION 33kV FEEDER. IF ANY OF THE SEPARATE FEEDERS (UPTO THREE) PROPOSED BY THE BIDDER FOR TERMINATION AT ONE NTPC REL'S 33kV POOLING SWITCHGEAR FEEDER IS OF DIFFERENT CAPACITY FROM THE OTHER(S), THEN THE SAME MAY ALSO BE ALLOWED FOR INTERCONNECTION TO THE SAME FEEDER, AFTER REVIEWING THE INVERTER BLOCK CAPACITIES TAKING INTO ACCOUNT THE ELECTRICAL PROTECTION REQUIREMENTS.	Bidder Wants clarity on that point, How much capacity we can combine.	Bidder to refer Tender SLD for the maximum power which can be connected to one 33kV feeder at Owner's Main Pooling Switchgear.
373					Tender SLD	Tender SLD is not received	Tender SLD is already shared as a part of the bidding documents.
374					Hume Pipe (Bridges, Culverts at road & cable crossing)	We are considering half cut hume pipe	Provisions of Bidding documents are clear and shall prevail.
375					Fault current level	Kindly confirm on the fault current level at various levels	Bidder to refer the tender SLD and technical amendment no.1

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376			General		Module Datasheet	Please share the Module datasheet	Provisions of bidding documents are clear and shall prevail. Kindly refer Chapter 2-A Clause 1.0(d) and Clause 6.0. Relevant PV module related details are provided for designing the Solar PV Plant. NTPC REL shall provide PV modules as per the dimensions (including tolerances) as mentioned in the said clause. PV module datasheet/PAN file shall be shared with successful bidder during detailed engineering within timeline mentioned in the technical specification. Bidder is not required to quote any generation and thus data sheet/PAN file of module are not required at this stage.
377			General			During the site visit, the following observations were noted. Kindly review and confirm: 1. An 11 kV transmission line is passing through the plant area. We understand that the shifting/removal of this line is under the Owner's scope—please confirm. 2.Wells are located within the plant area—kindly confirm the same and advise on the proposed action. 3. A landowner's house is located within the plant boundary—please confirm and clarify the resolution plan. 4.Khejri trees are present within the plant boundary—we are considering necessary clearances/removal in client's scope, kindly confirm.	1., 2. and 3. Although NTPC REL shall be pursuing the shifting/dismantling of the 11kV OH lines, and houses, but the same shall not be considered the Hindrance/pre-requisite by BOS bidder towards development of project as the land to the extent of approximate 5 acres/MW, is being provided for the Solar project. There may be certain areas which may be excluded from the layout shown, while maintaining the overall land quantum of approx. 5 acres/MW. Hence the said areas may be left out if the layout permits during the detailed Engineering Phase post award. Further, bidder to refer the extent of levelling which will be done by NTPC REL mentioned in the technical specifications. 4. In General, Major Tree cutting and relevant permissions are in the land vendor's scope, however minor tree cutting & relevant permissions, removal of shrubs, obstruction and execution will be in BOS bidder's scope. Bidders are advised to make site visit and appraise themselves with site conditions including the extent

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							of local constraints. Further, Land to the tune of approximately 5 Acres/ MW is being allocated for the Solar Projects. Provisions of Bidding documents are clear. Bidders are requested to comply with the same.
378	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		1-A PROJECT INFORMATION		Owner's 33kV Main Pooling switchgear at 400kV/33kV substation switchyard. (Number of 33kV feeders available for interconnection shall be as per Tender SLD)	Kindly clarify the scope of the 33 kV feeder Panel at the Owner's MCR located in the 400 kV/33 kV substation switchyard. Also please share the switchyard SLD	Bidder to refer the terminal points and exclusions of the package mentioned in Chapter 3A of technical specification in this regard. Provisions of bidding documents are clear and shall prevail.
379	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		1-A PROJECT INFORMATION		400 KV single circuit twin MOOSE AL-59 conductor from Project Pooling substation to Bikaner-IV ISTS substation of CTU is approximately 25 KM (Tentative)	Kindly clarify the scope of Transmission line	Bidder to refer the terminal points and exclusions of the package mentioned in Chapter 3A of technical specification in this regard. Provisions of bidding documents are clear and shall prevail.
380	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		8.0 - STATUTORY COMPLIANCE, GRID CONNECTIVITY AND POWER EVACUATION		Solar Inverters shall be provided with Dual or Multi Master facility, whereas WMS shall be provided with Single or Dual Master facility. Bidder shall install and place its SCADA system along with its terminals at Room provided by NTPC REL at its Pooling substation Switchyard control Room. NTPC REL shall use the bidder's plant SCADA Network/Communication infrastructure for integration with redundant Power Plant Controller (PPC), installed by NTPC REL at Switchyard Control Room. Suitable spare dedicated media in communication infrastructure and spare port at SCADA Switch/Controller to be kept by bidder in this regard.	We understand PPC will be in Client scope. Kindly confirm.	Bidder to refer the terminal points and exclusions of the package mentioned in Chapter 3A of technical specification in this regard. Provisions of bidding documents are clear and shall prevail.

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381	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		8.0 - STATUTORY COMPLIANCE, GRID CONNECTIVITY AND POWER EVACUATION		NTPC REL shall conduct detailed Grid compliance study with Power Plant Controller for solar project as per CEA technical standard for grid connectivity and latest guideline of RLDC first charging clearance. In this regard, bidder shall provide all technical details including Inverter bench marking report, Generic model data of Inverters, suitable for use in PSS/E and PSCAD software available at RLDC and Encrypted user-defined model (UDM)/generic model of Inverter in PSS/E software (*.dll files) as applicable. Provision of PSCAD model of inverter shall also be in bidder's scope. In case any site testing required for grid compliance as per RLDC, it shall also be conducted.	We understand Grid compliance study, Harmonic/DC current injection/Flicker study upto ISTS point will be in client scope. Kindly confirm.	Bidder to refer technical specification chapter 1A, clause 8.0 b) in this regard. Provisions of bidding documents are clear and shall prevail.
382	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		8.0 - STATUTORY COMPLIANCE, GRID CONNECTIVITY AND POWER EVACUATION		Bidder shall install only Static Var Generators (SVG) for additional dynamic reactive power compensation beyond the dynamic reactive power compensation capability of inverters (as per the minimum inverter rating mentioned at Chapter 2A of this document) for 200MW blocks to ensure compliance of dynamic reactive power compensation at rated capacity at POI (ISTS end) under CEA technical standard of connectivity to Grid and "Report of the Working Group in respect of Data Submission Procedure And Verification of Compliance to CEA Regulations on Technical Standards for Connectivity to the Grid by RE Generators July 2022"	Bidder proposes additional dynamic reactive power compensation using combination of additional Inverter & SVG. Kindly confirm on the SVG ratings.	Provisions of Bidding documents are clear and shall prevail.

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383	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		9.0 GENERATION GUARANTEE				No query raised by the bidder against the quoted clause. Provisions of Bidding documents are clear and shall prevail.
384	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		APPENDIX – 1 SITE SPECIFIC TECHNICAL DATA		Bidder shall propose Dry Robotic cleaning system only for cleaning of Solar PV modules.	We are considering fully automatic robots for module cleaning.	Bidder to refer Technical specification part B, Chapter D-3 for detailed specifications of Robotic cleaning system. Provisions of bidding documents are clear and shall prevail.
385	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		APPENDIX – 3A LIQUIDATED DAMAGES FOR SHORTFALL IN GENERATION DURING O&M		Liquidated damages per unit (kWh) for shortfall in generation during O&M period on yearly basis would be considered as INR 3.52 / kWh.	Module is not in bidder's scope so any underperfromance of the module shall be taken care by client.	In case, the shortfall during OTGT is due to the Non-performance of the PV Modules, bidder shall be responsible for bringing the issue to the notice of the Employer at the earliest with necessary evidence showing clearly that the shortfall in generation during OTGT is due to PV Modules and not attributable to the Systems supplied by the bidder, erection issues and/or O&M practices followed by bidder during OTGT. OTF is needed to calculate the generation target for 1st year of O&M after successful completion of OTGT. In case the target generation is not met due to PV Module non-performance, the first year O&M generation target shall be corresponding to the actual generation value met during OTGT test. Provisions of bidding documents are clear and shall prevail.

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386	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES		For 600 Wp Dimensions: 2384 mm (+/- 10mm) x 1134mm (+/- 5mm) 33.8 kg (Approx. weight) 15.85 A (Isc) 14.97 A (Imp) Bifacial gain of 5% to be considered over and above Isc value mentioned above for component and cable sizing. 29 modules in series (600 Wp)	Bidder is considering 5% bifacial gain for cable sizing only. Not for cable loss.	Bidder to comply with provisions of bidding document. 5% bifacial gain to be considered for all sizing, design and all related losses.
387	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES		10. DC Cabling loss at STC + AC Cabling loss at STC: 2.5 % (Individual DC and AC Cabling loss shall be as per system design chosen by bidder)	Considering overall losses 2.5% (AC + DC)	Provisions of Bidding documents are clear and shall prevail.
388	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES		Metering: As per SLD. For interconnection with grid and metering, the SPDs shall abide by the relevant CERC Regulations, Grid Code and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended and revised from time to time	Tender SLD is not received, kindly clarify on the metering	Tender SLD is already shared as a part of the bidding documents.
389	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		2-A ELECTRICAL SCOPE OF		Only Single Core 19/33kV HT Cables shall be offered for the project where armour acts as the metallic screen. For these cables the conductor and armour shall withstand system fault current.	Instead of using armour as metallic screen and fault current return path, we propose to provide single core 19/33 kV XLPE insulated cables with extruded copper wire/tape metallic screen (as per	Provisions of Bidding documents are clear and shall prevail.

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			SUPPLY & SERVICES m) Cable sizing criteria:			relevant standards), and armour shall be considered for mechanical protection only	
390	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		2-A ELECTRICAL SCOPE OF SUPPLY & SERVICES		Closed Circuit Television (CCTV) and Monitoring System: CCTV system shall have 100% coverage for periphery and entry/exit gates of the solar block(s). Additionally, CCTV system shall have 100% coverage of all inverter stations, store room, security room, all WMS locations. For detailed specifications of CCTV system, refer to the relevant chapter of Technical Specifications.	Bidder is proposing CCTV camera PTZ type for ICR	Bidder to comply with the provisions of the bidding document. The layout and camera locations shall be reviewed and finalized during detailed engineering based on the IR range being considered for the project..
391	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		POWER EVACUATION SYSTEM, TELEMETRY & SCADA.		The necessary details of connecting substations, availability of systems at ISTS substations/SLDC/ RLDC has to be ascertained by bidder for ensuring the Telemetry/data communication till final control centers. Necessary software and hardware, including laying of Communication cable/ Fibre Optic cable to Owners' FOTE panel at 33/400kV Project Pooling Substation required for communication of Solar plant data is included in the contractor's scope. Communication link and communication controller/Gateway used for data communication to LDC shall be redundant (one for normal operation and other as hot standby). If any upgradation/ modification required at FOTE at Owner's Switchyard, it shall be done by the bidder.	Bidder is not considering SAS integration scope with Solar scada.	Provisions of Bidding documents are clear and shall prevail.

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392	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		A-3 DC CABLES 1.0 DC CABLES (Interconnecting SPV MODULES and from SPV Modules TO SCB)		Each module shall have two 4 sq.mm stranded UV resistant cables and terminated with DC plug-in connector directly. The positive (+) terminal shall have a male connector while the negative (-) terminal a female connector. All the modules in the PV plant shall be arranged in a way so as to minimize the mismatch losses.	Bidder is considering Module cable length 1400mm connecting wire & proposing leap frog module interconnection scheme.	Module with cable length of 1200 mm will be provided. Accordingly, bidder to design the module interconnection.
393	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		A-3 DC CABLES 1.0 DC CABLES (Interconnecting SPV MODULES and from SPV Modules TO SCB)		The distance between two consecutive printing, identification or embossing shall not be more than 550 mm. The Printing shall be progressive, automatic, in line and marking shall be legible and indelible.	As per Cable OEM	Provisions of Bidding documents are clear and shall prevail.
394	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		A-4 STRING COMBINER BOX 3.0 GENERAL REQUIREMENT		iii. Fuse in each SCB input (both positive and negative) shall be provided to prevent the reverse short circuit current flow. However, in case of negative string fuse is not required as per recommendation of inverter manufacturer, string cable shall preferably be terminated with field connector with SCB.	We are considering fuse and fuse holders on positive side only.	Provisions of Bidding documents are clear and shall prevail.
395	NRE-CS-5800-004(BOS2)-		A-5 POWER		For Outdoor PCU (without containerized solution) the complete assembly should be placed inside a shed made of structural steel	We are considering inverter & ICOG on elevated RCC Platform. with canopy arrangement since all the equipment are outdoor type.	The quoted clause of technical specification regarding telemetry is amply clear. Further, bidder shall facilitate any data integration as required

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	9 Section VI (TS)		CONDITIONING UNIT 4.13 OUTDOOR CENTRL INVERTER		section preferably tubular/hollow section and color coated metal sheets for roof with BMT 0.5 mm and at least 60cm projection in all side. For containerized solution separate shed is not required, however, the container shall have projection of at least 60cm wherever an opening in the inverter door exposes the inverter component to outside environment.		between SCADA and SAS. Provisions of bidding documents shall prevail.
396	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-2 HT SWITCHGEAR 9.0 EARTHING AND EARTHING DEVICES		Separate earthing trucks shall be provided by the Contractor for maintenance work. These trucks shall be suitable for earthing the switchgear busbars as well as outgoing / incoming cables or busducts. The trucks shall have a interlock to prevent earthing of any live connection.	Bidder is considering 2 of nos earthing truck (1 Nos cable & 1 Nos. busbar) for complete project. Kindly confirm the same.	Provision of Earthing trucks is allowed as per provisions of technical specifications. Bidder to comply provisions of technical specifications.
397	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-2 HT SWITCHGEAR 11.0 INSTRUMENT TRANSFORMERS		Current transformers may be multi or single core and shall be located in the cable termination compartment. All voltage transformers shall be single phase type. The bus VTs shall be housed in a separate panel on a truck so as to be fully withdrawable.	Bidder is not considering separate panel for VT in 33kV HT Panel	Bus VT is not required in Local/sub pooling stations. Main pooling station is not in scope of bidder. For other instrument transformer requirements bidder to refer Tender SLD and technical specifications. Provisions of bidding documents are clear and shall prevail.
398	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-3(A) INVERTER TRANSFORMER		Continuous operation at rated MVA on any tap with voltage variation of +/-10%, also transformer shall be capable of being loaded in accordance with IS: 6600/ IEC60076-7.	Rating of 110% will be considered for 4 hrs	Provisions of Bidding documents are clear and shall prevail.

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399	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-3(A) INVERTER TRANSFORMER		a) 110% for continuous rating.	Overloading shall be As per IEC 60076-7 / IS 2026-7 and 110% Loading for 4 Hours and rated load	Provisions of Bidding documents are clear and shall prevail.
400	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-3(A) INVERTER TRANSFORMER		If Inverter transformer is provided indoor, it shall be necessarily dry type	We are considering outdoor type IDTs	Provisions of Bidding documents are clear and shall prevail.
401	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-3(A) INVERTER TRANSFORMER		For multi winding transformer, it is recommended to have close coupling and equal impedances on each of LV winding to HV winding and to have high enough impedance (8% min. based on one LV winding rating) between two LV windings in order to decouple these windings.	1. For multi winding transformer, the winding arrrangement of LV coils shall be top and bottom configuration. 2. For multi winding transformer, due to intrinsic property of transformer, impedance will vary slightly due to coil placement. Due to this the approximate difference in impedance shall be ≤ 5% for multiple LVs transformer.	Provisions of Bidding documents are clear and shall prevail.
402	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-3(A) INVERTER TRANSFORMER		Harmonic Factor as per Inverter manufacturer recommendation must be taken into account while designing the transformer. The extra no load loss due to voltage harmonics and load and stray load loss due to current harmonics (as applicable) and must be taken into consideration in transformer design. In addition, the dc bias component of 0.5% of rated Inverter output current is to be accounted for its effect on the transformer design.	The harmonic factor and DC bias component shall be considered in accordance with the inverter manufacturer's recommendations. For transformer loss evaluation, only no-load and load losses have been considered	Provisions of Bidding documents are clear and shall prevail.
403	NRE-CS-5800-004(BOS2)		B-3(A) INVERTER		xxi) Transformer losses: Total Transformer losses (KW) shall be within 1% of the rated MVA capacity of the transformer. Total Transformer losses (KW) = NLL (KW) + LL(KW). LL: Load Loss (at rated current and temperature of 75 Deg. Celsius @ principal tap) NLL: No Load loss (at rated voltage and frequency)	Bidder is considering aluminium wound IDT with 1.1% Total losses. Confirm the same.	Provisions of Bidding documents are clear and shall prevail.

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	-9 Section VI (TS)		TRANSFORMER				
404	NRE-CS-5800-004(BOS2) -9 Section VI (TS)		B-3(B) AUXILIARY TRANSFORMER		TECHNICAL REQUIRMENTS (OIL FILLED TRANSFORMER) Sr. No. / DESCRIPTION / AUXILIARY TRANSFORMER (AT) i) VA Rating & Quantity — As per system requirement and /or SLD* ii) Voltage Ratio (KV) — As per system requirement and / or SLD* iii) Duty, Service & Application — Continuous application (Outdoor) iv) Winding — TWO v) Frequency — 50 Hz vi) Nos. of Phase — THREE vii) Vector Group & Neutral earthing — As per system requirement and /or SLD* viii) Cooling — KNAN	Bidder propose Aux trafo cooling - ONAN instead of KNAN	Provisions of Bidding documents are clear and shall prevail.
405	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		DRY TYPE AUXILIARY TRANSFORMERS			1. We are considering dry type aux trafo enclosed in ACDB 2. Rating of Aux trafo will be as per the aux trafo sizing calculation	Provisions of Bidding documents are clear and shall prevail.
406	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-5 CABLE INSTALLATION METHODOLOGY 2.0 DESIGN AND CONSTRUCTIONAL FEATURE		Inter Plant Cabling Interplant cabling for main routes shall be laid in Cable trenches/cable trays/buried/duct banks. In case of Duct banks, pull-pits shall be filled with sand and provided with a PCC covering. All buried cables shall be of armoured type. Bidder can propose overground cabling methodology (e.g. on RCC/concrete pedestals etc.). In such cases, the cables shall be UV-resistant supported by test reports.	1) We shall provide riddle soil in the buried cable trenches instead of sand bed for cable laid in buried cable trenches. 2) Hume pipe culverts shall be provided for road crossing. 3) Brick cover shall not be required for DC Cables. 4) Same excavated earth is considered for Backfill.	Provisions of Bidding documents are clear and shall prevail.
407	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-5 CABLE INSTALLATION METHODOLOGY 2.0 DESIGN AND CONSTRU		Directly Buried Cables Cable trenches shall be constructed for directly buried cables. Construction of cable trench for cables shall include excavation, preparation of sieved sand bedding, riddled soil cover, supply and installation of brick or concrete protective covers, back filling and compacting, supply and installation of route markers and joint markers. Laying of cables	1) We shall provide riddle soil in the buried cable trenches instead of sand bed for cable laid in buried cable trenches. 2) Hume pipe culverts shall be provided for road crossing. 3) Brick cover shall not be required for DC Cables. 4) Same excavated earth is considered for Backfill.	Provisions of Bidding documents are clear and shall prevail.

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			CTIONAL FEATURE		and providing protective covering shall be as per IS:1255.		
408	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-8 EARTHING SYSTEM		Each PV Module frame shall be earthed in accordance with module manufacturer guidelines. In case module frame earthing is to be separately provided, it shall beearthed with minimum 2.5 SQMM flexible copper cables with lug at suitablelocation of module frame. Nos. of PV modules in single loop of earthing connection to module frame shall be as per Module manufacturer recommendation. Both ends of the loop of copper cable for earthing shall be connected with nearest earthed structure or earth conductor	Bidder proposes serrated washer for module earthing, kindly confirm.	Provisions of Bidding documents are clear and shall prevail.
409	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-9 PLANT ILLUMINATION SYSTEM		**AVERAGE ILLUMINATION LEVEL** Alternately Vendor may offer technically superior and proven product subject to a Control Room 300 LED Luminaries Store Room 200 LED Luminaries Switchgear Room 150 LED Luminaries Inverter Room 150 LED Luminaries Street lighting-Roads Cl 7.0 above 10 LED Luminaries Yard/ Substation/MCS etc 20(general) 50(on strategic equipment) LED Luminaries Location | Average Illumination Level (Lux) | Type of Fixture	Periphery illumination 40 W LED light shall be consider with interval of 35 Mtr. Or an average LUX of 5	Provisions of bidding documents are clear and shall prevail.
410	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-10 AUXILIARY POWER SUPPLY SYSTEM		Auxiliary power supply arrangement shall be in line with tender SLD. Each Inverter Room/local pooling/sub-pooling/CMCS room shall have its own auxiliary power supply system comprising of AC distribution board (ACDB) which shall be fed from LV side of Inverter transformer through suitably rated auxiliary transformers. ACDB in CMCS room shall have two incomer (100% rated) fed from two different sources. At CMCS, auxiliary transformer directly feed from 33kV switchgear are also acceptable. Following consideration shall be taken while arriving kVA capacity of auxiliary transformer,	Bidder is consdiering Auxiliary transformer for ICR only not for MCR since CMCS & switchyard is in client scope.	The auxiliary power supply for ICRs, sub-pooling systems etc. shall be in the scope of the bidder. At CMCS/PSS, 220V DC and Raw 230V AC supply for bidder's SCADA to be placed at Owner's PSS control room shall be provided by NTPC REL. However, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Provisions of Bidding documents are clear and shall prevail.

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					1. 20 % future load margin. 2. The minimum kVA capacity of auxiliary transformer for CMCS requirement shall be 50kVA.		
411	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-10 AUXILIARY POWER SUPPLY SYSTEM		For inverter stations and sub-pooling systems, UPS system shall comprise of 1 x 100% UPS with 30 minutes backup. For CMCS, UPS system shall comprise of 2 x 100% UPS with 30 minutes backup for each. Each UPS shall consist of 1x100% charger and inverter, 1 x 100% Battery bank for providing required backup as above. Bypass Line static switch, manual bypass switch, 1 x 100% UPSDB, and other necessary Protective devices and accessories. In place of UPS, bidder can provide DC supply system (1 x 100% Battery with Charger system for inverter stations/sub-pooling systems and 2x 100% system for CMCS) with backup as indicated as above, if the auxiliary power supply requirement of the loads is in DC.	We are considering 1 Nos. UPS at each Inverter station only For aux load for Solar Plant Main Pooling Switchgear , We are not considering DC Battery charger since CMCS & switchyard is in client scope.	UPS in inverter stations, sub-pooling systems etc. as per technical specifications shall be in the scope of the bidder. Additionally, UPS and battery for reliable AC supply for bidder's equipment to be installed by the bidder at Owner's control room in line with technical specification is in bidder's scope. Provisions of bidding documents are clear and shall prevail. Power supply requirement for Owner's equipment in PSS control room is excluded from the scope of the package. Provisions of Bidding documents are clear and shall prevail.
412	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-10 AUXILIARY POWER SUPPLY SYSTEM		Contractor has the option of supplying either Nickel Cadmium type batteries or Lead Acid Plante type batteries. The detailed specification for the batteries has been mentioned in the battery and charger section below in this specification.	We are proposing VRLA BATTERY for UPS & Battery charger	Provisions of Bidding documents are clear and shall prevail.
413	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		B-12 METERING SYSTEM		Energy meter (0.2s accuracy class) suitable for ABT requirement with metering panel as required shall be conforming to STU/CTU/PGCIL requirement.	Need Clarity on metering scheme - location of ABT Meter/ at what voltage level	Bidder to refer the tender SLD and technical specification chapter 2A of technical specification Part A regarding metering requirements. Further Bidder shall refer the terminal points and exclusions of the package mentioned at Chapter 3A of technical

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							specification Part A . Provisions of bidding documents are clear and shall prevail.
414	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-1 WEATHER MONITORING STATION		Bidder shall provide 1 (One) no. Battery powered portable handheld data logger supplied by the OEM of the offered Pyranometer.	Bidder will provide WMS quantity as per IEC 61724-1.	Bidder is free to provide as per the IEC mentioned, however it must be ensured that the quantity shall not be less than as specified in the tender document.
415	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-3 MODULE CLEANING SYSTEM		Bidder may propose Dry-Robotic cleaning system for cleaning of Solar PV modules.	We are proposing fully automatic robot cleaning, kindly confirm.	Bidder to refer Technical specification part B, Chapter D-3 for detailed specifications of Robotic cleaning system. Provisions of bidding documents are clear and shall prevail.
416	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-1 WEATHER MONITORING STATION		Indoor Air Temperature Sensor (Qty – 1 no. at each Inverter room)	We are considering outdoor ICR Panel so temperature sensor is not required at ICR	Bidder to refer the detailed requirements mentioned in chapter D-1 of technical specification Part B. Provisions of Bidding documents are clear and shall prevail.
417	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-2 FIRE FIGHTING AND ALARM SYSTEM		Portable Fire Extinguishers and Sand Buckets	We have considered the provision of fire extinguishers and sand buckets only at the ICR and IDT yard. The same has been excluded for the switchyard and MCR, as these areas are not within our scope.	Bidder to refer the detailed requirements mentioned in chapter D-2 of technical specification Part B. Bidder to provide the detector as per the tender specification and also protection for the equipment at ICR to be ensured as per the specification. Provisions of Bidding documents are clear and shall prevail.
418	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-2 FIRE FIGHTING AND ALARM SYSTEM		Multi sensor type smoke detectors and heat detectors shall be provided for below false ceiling areas of control room and ACDB and/or inverter rooms. One (01) sensor shall be provided for each 20 sqm of area. All the cable trench inside the control room and inverter room shall be provided with Multi Sensor smoke detector.	MCR is not in our scope so we are not considering the sensors inside cable trench, and also not required for ICR.	400kV PSS control room and its Fire detection and protection system are not in the scope of the subject package. Fire Alarm and firefighting system in other locations shall be as per provisions of bidding documents. Provisions of bidding documents are clear and shall prevail.

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					Fault Isolation module shall be provided in every room and for every 15 sensors at location proposed by Bidder to be approved by employer during detail engineering		
419	NRE-CS-5800-004(BOS2)-9 Section VI (TS)		D-2 FIRE FIGHTING AND ALARM SYSTEM		In case bidder proposes outdoor inverter with shed arrangement, the bidder must ensure that the inverter has provision of fire sensing system. Else, the fire detection system must be provided in the Inverter shed.	portable fire extinguishers shall be provided near inverter locations as per standard safety practices.	Bidder to provide the detector as per the tender specification and also protection for the equipment at ICR to be ensured as per the specification. Provisions of Bidding documents are clear and shall prevail.
420					Module Damage	Kindly confirm the module damage %.	Sufficient number of PV Modules will be supplied as Spares. However, Bidder shall ensure proper checks while unloading the PV modules. Any breakage during transportation not in the scope of the bidder to informed to the Employer at the earliest. Bidder shall be responsible for proper unloading, storage and installation of PV modules at site. Bidder shall be accountable for any damage during storage, erection and commissioning of SPV modules and hence insurance coverage for the same shall be taken care by the bidder. Provisions of bidding documents are clear and shall prevail.
421	General Requirements					As per the Site Survey, Land photos shows details for home owner houses, kindly confirm if the same can be dismatelled from the Land parcel and if same will be done by the client.	Although NTPC REL shall be pursuing the shifting/dismantling of the houses, but the same shall not be considered the Hindrance/pre-requisite by BOS bidder towards development of project as the land to the extent of approximate 5 acres/MW, is being provided for the Solar project. There may be certain areas which may be excluded from the layout shown, while maintaining the overall land quantum of approx. 5 acres/MW. Hence the said areas may be left out if the layout permits during the detailed

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							Engineering Phase post award. Provisions of bidding documents are clear and shall prevail.
422	General Requirements					As per the Site Survey, Land photos shows 11KVA Lines, kindly confirm if the same shall be in client scope to relocate the same from existing land parcel	Although NTPC REL shall be pursuing the shifting/dismantling of the 11kV OH lines, but the same shall not be considered the Hindrance/pre-requisite by BOS bidder towards development of project as the land to the extent of approximate 5 acres/MW, is being provided for the Solar project. There may be certain areas which may be excluded from the layout shown, while maintaining the overall land quantum of approx. 5 acres/MW. Hence the said areas may be left out if the layout permits during the detailed Engineering Phase post award. Provisions of bidding documents are clear and shall prevail.
423	General Requirements					Khejdi Trees and Jall Trees seen in the Land parcel in the Photos, Kindly confirm the location for the same, which cannot be considered in the array layout and the ones which can be removed from the land - shall be provided by client.	In General, Major Tree cutting and relevant permissions are in the land vendor's scope, however minor tree cutting & relevant permissions, removal of shrubs, obstruction and execution will be in BOS bidder's scope.
424	General Requirements					1.Rock Blasting work and its permission not considered in scope, if encountered shall be reimbursed at actual costs separately.	Provisions of bidding documents are clear and shall prevail.
425	General Requirements					For Cable corridor, Underground cable to be considered from Solar plant area to PSS; Kindly confirm the scope for taking approvals from Local Authorities if the same is in Client scope.	In General, no Right of Way issues are anticipated in the subject project as the project and associated internal power evacuation system including cables are to be developed in the land under the possession of NTPC REL. However, bidder to carry out site assessment to understand the site conditions prior to bidding.
426	Inverter Stations, HT		Section I (IFB)		PEB SHED is provided to be considered for Inverter room.	Open canopy type MS Painted structure as per C3 corrosion category to be considered for Inverters, ICOG and Auxillary equipments as per	Provisions of bidding documents are clear and shall prevail.

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	Switchgear rooms, and Control Rooms		Clause 2.0, Page 6			Inverter and Equipment recommendation to be considered by Bidder with 1.2m Plinth height	
427	Site Developme nt		Section VI (TS) Part-B, Ch. C-2		Clearing of bushes/trees; site grading and levelling to 10-15% slope; compaction in 250mm layers to 95% Proctor density; sand erosion control.	As per documents, client shall provide a general grading of 10-15% slope, rest of the grading shall be done to achieve 3% as per Solar MMS requirements for Tracker, Kindly confirm	Provisions of bidding documents are clear and shall prevail.
428	MMS Foundation s		Section VI (TS) Part-B, Ch. C-4		Design and installation of foundations (piles/columns) for trackers; mandatory 25% pull-out and lateral load testing before mass installation.	Kindly provide the quanties for No. of Pullouts, Lateral Test and compressive test to be considered	Provisions of bidding documents are clear and shall prevail.
429	Module Cleaning System		Section VI (TS) Part-B, Ch. D-3		Civil works for water storage (RCC/PE tanks), pumping stations, and underground piping for robotic/manual cleaning.	Bidder Propose to provide Complete Fully Automatic Robot Cleaning and not Manual Cleaning, hence all the MCS system shall not be included.	Bidder to refer Technical specification part B, Chapter D-3 for detailed specifications of Robotic cleaning system. Provisions of bidding documents are clear and shall prevail.
430	MMS Strcuture		Part-B, Ch. C-4, Cl. 2.1		MMS components are to be fabricated using galvanized steel (min. yield strength 250-350 MPa) or high-strength aluminum alloy. Steel must be hot-dip galvanized with a minimum coating thickness of 70 microns.	Materails for MMS Strcuture shall be HDGI for columns and Galvalume/ ZAM Material for Other components	Provisions of bidding documents are clear and shall prevail.
431	MMS Strcuture bolts		Part-B, Ch. C-4, Cl. 2.1		Material for MMS Structure bolts shall be HDGI 5.6 Grade or 8.8 Grade	Material for MMS Structure bolts shall be HDGI 5.6 Grade	Provisions of bidding documents are clear and shall prevail.
432	Sand Erosion Control		Section VI, Part-B, Ch. C-2		Due to the sandy terrain in Bikaner, the bidder must implement erosion control measures. This includes using random rubbles or boulders for stabilization in loose sand areas to prevent wind or water erosion affecting foundations.	The Land shall be graded per the requirement of installation of Solar Plant, Additional Soil Erosion control shall be avoided	Provisions of bidding documents are clear and shall prevail.

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433	Fire Water Pump House		Section VI Part-B, Ch. C-5		Civil structure to house fire-fighting pumps and control panels, integrated with the fire water storage tanks.	Kindly note we shall not consider the same, for Solar Plants, this is not considered	Provisions of bidding documents are clear and shall prevail.
434	Roads and Pathways		Section VI, Part-A, 2-B		Construction of roads to be as per Tender drawings available	the roads shall be designed based on the Hydrology report and CBR values as per SBC report, the material shall be decided based on site requirements	Provisions of bidding documents are clear and shall prevail.
435	ICR Fencing		Section VI, Part-B, Ch. C-3		Chain link fencing with G.I. (Galvanized Iron) mesh.	Fencing to be provided for IDT Yard Only and not complete ICR as per Tender drawing available for Chain Link Fencing	No permanent periphery fencing of individual blocks is envisaged. However, any temporary fencing required for the safety, security of the project as may be required during construction shall be done by the bidder. The permanent chain link fencing requirement within the blocks shall be as per statutory requirement like transformer fencing or any such requirement.
436	Toe Wall		Section VI, Part-B, Ch. C-3		A continuous RCC (Reinforced Cement Concrete) toe wall of approximately 300mm to 450mm height above FGL to prevent soil erosion and unauthorized entry.	Brick Toe wall shall be Provided of 300mm height	Provisions of bidding documents are clear and shall prevail.
437	Gate Detail		Section VI, Part-B, Ch. C-3		Double leaf MS (Mild Steel) swing gates with a width suitable for the movement of heavy inverter equipment (min. 4.0m to 5.0m width).	1.5m Wide and 1.8m height wicked gate shall be provided for IDT Yard	Provisions of bidding documents are clear and shall prevail.
438	Fencing Posts		Section VI, Part-B, Ch. C-3		Made of ISA (Indian Standard Angle) sections (e.g., 65x65x6mm) or G.I. pipes, spaced at approximately 2.5m to 3.0m intervals.	ISA 50X50X3mm shall be used with 3.0 Interval shall be used	Provisions of bidding documents are clear and shall prevail.
439	Barbed Wire		Section VI, Part-B, Ch. C-3		Topped with 3 to 4 rows of galvanized barbed wire (as per IS 278) for enhanced security.	Barbed wire shall not be provided for IDT Fencing	Provisions of bidding documents are clear and shall prevail.

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440	Corrosion resistance for Fencing		Section VI, Part-B, Ch. C-3		Corrosion Resistance: All components (posts, mesh, hardware) must be hot-dip galvanized to withstand the harsh environmental conditions of the Bikaner region.	The Material used shall be Pre GAL Material	Provisions of bidding documents are clear and shall prevail.
441	MCR Plumbing & Sanitation		Part-B, Chapter C-5		Pipe Specifications: All internal water supply piping must be CPVC or G.I. (Class-B), while external piping should be G.I. or HDPE as per the soil conditions.	PVC Pipes shall be Provided completely for Sanitation	CMCS building/PSS Control room civil works is excluded from the scope of the package. Bidder to refer terminal points and exclusions of the package mentioned at Chapter 3A of Technical specification Part A.
442	MCR Septic Tank & Soak Pit		Part-B, Ch. C-5		Construction of an RCC septic tank and a soak pit of adequate capacity to treat and dispose of sewage from the MCR and other facilities where a central sewer line is unavailable.	Brick Type Septic Tank and Soak Pit shall be Provided	CMCS building/PSS Control room civil works is excluded from the scope of the package. Bidder to refer terminal points and exclusions of the package mentioned at Chapter 3A of Technical specification Part A.
443	MCR - Sanitary Fixtures		Part-B, Ch. C-5		Installation of high-quality vitreous china sanitary ware, including European and Indian type water closets (WCs), washbasins with pedestals, urinals, and required CP (Chrome Plated) fittings (taps, mixers, health faucets).	Standard Fittings shall be considered for MCR	CMCS building/PSS Control room civil works is excluded from the scope of the package. Bidder to refer terminal points and exclusions of the package mentioned at Chapter 3A of Technical specification Part A.
444	System Drain Design		Section VI (TS)Section VI, Part-B, Ch. C-2		The drainage network must be designed based on the site's topographical survey and catchment area analysis, ensuring a self-cleansing velocity of min. 0.6 m/s.	The drains shall be designed based on Hydrology report and as per relevant IRC code	Provisions of bidding documents are clear and shall prevail.
445	Drain Culverts & Crossings		Section VI (TS)SectionSection VI, Part-B, Ch. C-2		Provision of RCC hume pipes or box culverts at all road crossings and access points to ensure uninterrupted water flow across the site.	Hume Pipes shall be provided wherever required for Road crossing and access points	Provisions of bidding documents are clear and shall prevail.
446	BOT Capacity Calculation		Part-B, Ch. C-5		Designed for 100% of the oil capacity of the largest transformer plus an additional volume	BOT shall be designed for 110% of the total Tank volume	Provisions of bidding documents are clear and shall prevail.

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					for 10 minutes of water discharge (typically calculated at 2.5 kL/min, adding ~25m³).		
447	Parking Shed		Part-B, Ch. C-5		Generally designed as a Pre-Engineered Building (PEB) or a light-gauge steel structure with a cantilever or portal frame design.	Shall be designed as Open canopy Structure with 150mm thick PCC grade slab	Permanent parking shed at CMCS building is not included in the scope of the package. However, all temporary work i.e. Fencing, Parking Shed, Road, Porta cabin and other infrastructures etc. as applicable/required shall be in the scope of the bidder.
448	Boundary wall		Section VI, Part-B, Ch. C-3		Boundary wall as per Tender Document	Shall be Provided Precast without concertina wire - 2m height	Provisions of bidding documents are clear and shall prevail.
449	Boundary Wall - Toe Wall		Section VI, Part-B, Ch. C-3		A continuous RCC toe wall with a height of 300mm to 450mm above FGL to prevent soil erosion and unauthorized animal/human entry.	Shall be provided without toe wall	Provisions of bidding documents are clear and shall prevail.
450	Main Gates		Section VI, Part-B, Ch. C-3		Main Gates shall be as per Tender documents	Kindly confirm the quantity of Main gates and secondary for the project	Bidder to refer Chapter 3A of technical specification Part A for requirement of main entrance gates. Other fencing gates for transformers etc. shall be as per technical specifications and tender drawings.
451	Main Gates/ Boundary wall		Section VI, Part-B, Ch. C-3		Corrosion Protection: All MS components, including gate frames, barbed wire, and fasteners, must be hot-dip galvanized to prevent rusting in the desert environment.	All MS Components shall be Painted as per corrosion category C3	Provisions of bidding documents are clear and shall prevail.
452	Cable Tray Support Structures		Part-B, Ch. D-1		Galvanization Standards: All cable trays, supports, and accessories must be hot-dip galvanized as per IS: 2629 and IS: 4759 to withstand the arid and potentially corrosive environment of Bikaner.	Cable Support structures shall be MS Painted per C3 Category	Provisions of bidding documents are clear and shall prevail.

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453	Soil Corrosivity		Section VI, Part-B, Ch. C-1		Geotechnical investigations must assess the chemical properties of the soil (pH, chlorides, and sulfates) to determine the protection required for RCC pile foundations (e.g., use of sulfate-resistant cement or increased concrete cover).	No Specific study shall be taken into geotech report, as per Corrosion Map, site location shall be analyzed and falls under C3 category	Provisions of bidding documents are clear and shall prevail.
454	String combiner Box - Clearance & Height		Part-B, Ch. C-4		The bottom of the SCB must be maintained at a minimum height (typically 600mm to 800mm) above the finished ground level (FGL) to prevent water ingress and facilitate cable entry.	SCB height shall be based on equipment requirements and Hydrology study	Provisions of bidding documents are clear and shall prevail.
455	Support Structure Material		Part-B, Ch. C-4		The mounting structure for SCBs must be made of hot-dip galvanized steel or aluminum. The minimum galvanization thickness is typically 70-80 microns to ensure a 25-year life.	MS Painted per C3 requirements and Bolted connection at site	Provisions of bidding documents are clear and shall prevail.
456	String combiner Box - Foundation		Part-B, Ch. C-4		The support post must be fixed to an RCC pedestal or embedded in a concrete foundation (min. M20/M25 grade) designed to withstand high wind loads.	Pile Foundation per geotect report	Provisions of bidding documents are clear and shall prevail.
457	MMS Strcuture - Wind Tunnel Test		Part-B, Ch. C-4, Cl. 1.2.1		Tests must be conducted at institutes of repute such as IITs, CSIR-SERC, CPP Wind Engineering, RWDI, or equivalent international facilities.	Aerolastic Instability report to be submitted already prepared by Tracker vendor	Provisions of bidding documents are clear and shall prevail.

** The details provided in "Bidding Document Section", "Clause No. / Page No." and "Description as per Tender Specification" columns above, are as quoted in the Bidder's pre-bid Query. The same may be different from the actual provisions of Bidding documents. In case of any discrepancy/contradiction, the technical specifications/bidding documents and subsequent amendments shall prevail.*

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
1.	Section I		The bidder should have executed --------- , in a single project or in a single work and same should be in **successful operation for at least one (1) year/six(6) months*** perior to the date of techno-commercial bid opening ***Successful operation** - At least one (1) year for industrial projects other than RE Sector i.e., Solar/Wind At least six(6) months for projects in RE sector (i.e. Solar/Wind)	We understood that project having 1 year successful operation in power/steel/oil and gas/petrochemical/fertilizer/cement/coal mining etc. value of 66Cr. having one year successful operation and 6 months in RE sector(i.e Solar/Wind) for fulfilling the qualifying requirement.	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
2.	Section II		Time for Completion of Facilities from the date of Notification of Award - **11months** & Master Network	Project Completion Time of 11 months is idealist and not workable. Time table mentioned in **Implementation Schedule is idealist and not workable.** Complete design, engineering, drawings and approvals and civil works can not be done as given in the Implementation Schedule. NTPC have to keep in mind workability conditions in project execution. **It is requested to kindly amend the Project Completion time to 24 months.**	Provisions of bidding documents are clear and shall prevail.
3.	Section IV		LAND	Please confirm that land of proposed complete block is under the possession of NTPC REL? Also explain what is the role of contractor regarding proposed land possession from private land owners. We as a contractor will not be invloved in land possession from private land owners.	Land shall be handed over in phases and Bidder shall plan their activities accordingly. The Leveling & Grading as per the employers scope shall be taken up in parallel. Bidder shall not have any part in Land Acquisition. Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
4.	Section V		Anmual Maintenance Contract (AMC) of critical equipment for a period of ten(10) years	What shall be methodology of AMC of critical equipment. Is prices are fixed for full tennure of 10 years or variable. Or whether critical equipment are to be provded by NTPC REL during AMC period.	Bidder to refer Appendrix 3B of Technical specification Chapter 1A for details of Bank guarantee requirements for O&M and AMC of critical equipment. Provisions of Bidding documents are clear and shall prevail.
5	Section V		(GCC-13.3.5.3) - Shortfall in generation in terms of Section-VI (TS)		No query raised against quoted clause. Provisions of Bidding documents are clear and shall prevail.
6	Section V		GCC-13.3.5.4 - Extension of BG for further period of 7 years beyond 10 years of AMC period	Contractor has to further extend BG against AMC after the expiry of 10 years period for 7 more years. After the completion of 10 years mandatory AMC period, further extension of BG to 7 more years is not adviceable. It will increase the project cost.	Provisions of bidding documents are clear and shall prevail.
7	Section III		The Bidder should be a developer of Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher, out of which at	We commissioned Government solar power supply schemes such as feeder-level solarization, multiple solar PV installations as a developer under a single contract awarded to us. This	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
			least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening. OR	project was conceived, awarded, and executed as a unified package, forming part of an integrated grid-connected system with centralized monitoring and coordinated operation.	
				Although the installed capacity is geographically distributed across multiple locations in a same district due to grid topology and technical considerations, the project is implemented under a single contractual framework with common design, engineering, execution, and control philosophy. Accordingly, the project functions as a single aggregated solar PV system rather than independent standalone plants.	Provisions of bidding documents are clear and shall prevail.
				We therefore request confirmation that distributed solar power plants executed under a single contract shall be evaluated as one plant, and the aggregate capacity under such contract may be considered for meeting the	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
				requirement of “at least one plant of 10 MWp or higher capacity.”	
10	Section III		The reference SPV based grid-connected power plant of 10 MWp or above capacity should be at a single location developed by Bidder for itself or any other client.	We assume that this clause can be read as:The reference SPV based grid-connected power plant of 10 MWp or above capacity should be at a single location/Project developed by Bidder for itself or any other client.Kindly confirm.	Provisions of bidding documents are clear and shall prevail.
11	Section III		The Bidder should have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of power/ steel/ oil and gas/ petro-chemical/ fertilizer /cement/ coal mining including coal handling plant and/ or any other process industry, of Rs 66 Crores (Indian Rupees Sixty-Six Crores Only) or more, in a single project or single work and the same should be	We submit that grid-connected Solar PV projects executed under developer / RESCO model involve comprehensive scope including design, engineering, procurement, construction, grid connectivity, and long-term operation & maintenance, forming part of power generation infrastructure. In view of the above, kindly confirm whether such solar PV projects shall be considered as eligible experience under the “power	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
			in successful operation for at least one (1) year/ six (6) months* prior to the date of techno-commercial bid opening.	sector" category for meeting the specified requirement.	
12			The Bidder should have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of power/ steel/ oil and gas/ petro-chemical/ fertilizer/cement/coal mining including coal handling plant and/ or any other process industry, of Rs 66 Crores (Indian Rupees Sixty-Six Crores Only) or more, in a single project or single work and the same should be in successful operation for at least one (1) year/ six (6) months* prior to the date of techno-commercial bid opening.	We understand that the intent of the clause is to establish bidder capability in execution of large-scale, infrastructure-intensive and process-oriented projects involving multidisciplinary engineering, procurement, construction, and system integration. In this regard, projects such as water and waste water treatment plants executed under EPC / PPP mode involve complex process to treat water. This treatment process involves engineering, electromechanical systems, civil infrastructure, automation, and long-term operational performance obligations. In view of the above, kindly clarify whether such water / waste water treatment projects may be considered under the broader category of "process industry" or	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
				equivalent infrastructure projects for the purpose of meeting the specified qualification requirement.	
13	SECTION -III T		**IMPLEMENTATION SCHEDULE (for complete Block)** SN | Activities/Milestone | Period from LOA (months) Start | Finish General Works 1 | Topographical survey & Geo-Technical investigation of the land (If required as per technical specs) | 0 | 1 2 | Site Mobilization, Site office opening & Preparatory works | 0 | 1 3 | Submission & approval of Details Required (DR) category Vendors | 0 | 1 **Engineering, Ordering and award of works**	EPC Bidder kindly requests that the activity “Handing Over of Land” be incorporated as Line-Item No. 1 in the Implementation Schedule, as it is a critical prerequisite for commencement of project activities.	Provisions of bidding documents are clear and shall prevail.
14	SECTION -V		Time schedule for Completion of Facilities will be **Eleven (11) Months** from the date of NOA.	The tender stipulates that the Time Schedule for Completion of Facilities shall be eighteen (11) months from the date of NOA.Considering the project scope and associated execution challenges, the EPC Bidder kindly requests extension of the completion period to 15 months from the date of NOA.	Provisions of bidding documents are clear and shall prevail.
15	SECTIO N-II		The documentary evidence….in the form of literature, drawing and data……(i) a detailed description of the essential technical and performance	Please clarify whether this states that we need submit the vendor drawings, data and technical specifications of the proposed equipment in Bid? Also do we require to submit technical commentary	Provisions of bidding documents are clear and shall prevail.

S. No.	Section		Description as per Tender	Bidder`s Queries	NTPC REL Clarification/Reply
			characteristics of the facilities; (iii) commentary on the Employer's Technical Specifications	on technical specifications?	
16	Section V			Pls clarify how many BGs are to be submitted against O&M. Bidder understands that for y1 to y3 - there are two BGs -1) 10% of O&M CV; 2) 0.05x G x R million INR for y4 to y10 - AMC BG of 1.5l/MW. Please confirm	Provisions of bidding documents are clear and shall prevail.
17	SECTION-III		Time for Completion of Facilities from the date of Notification of award	As land , SVG delievry and Harmonic filter delivery is dependent on inputs from NREL, please include dependency of time for completion w.r.t date of receipt of NREL Inputs	Provisions of bidding documents are clear and shall prevail.