एनएचपीसी लिमिटेड
(भारत सरकार का एक नवरत्न उद्यम)
NHPC Limited
(A Government of India Navratna Enterprise)

CIN: L40101HR1975GOI032564
Regd. Office: NHPC Office Complex, Sector-33, Faridabad-121003(Haryana)

Dated: 08.04.2025

Corrigendum No.-3

Tender ID.: 2025_NHPC_849236_1

Name of the Work:- Selection of Battery Energy Storage System (BESS) Developers for setting up of 500MW/1000MWh InSTS connected standalone Battery Energy Storage Systems (BESS) in the state of Andhra Pradesh under Tariff Based Competitive Bidding (TBCB) with Viability Gap Funding (VGF) support (NHPC-Tranche-II-BESS) (2024-25)

Sl. No.	Clause No./ Ref.	Bid Conditions/ Description	Amendment in Clause
1	Section 1, 1.11, page 11 of RfS	NHPC Limited (hereinafter referred to as the BESS Implementing Agency, or the BIA or NHPC) seeks to utilize energy storage systems, on an "On-Demand" basis, during the peak hours of buying entity i.e. Andhra Pradesh Power Distribution Companies (hereinafter referred to as APDISCOMs / Buying Entity). In view of the above, the BIA hereby invites proposals for setting up of InSTS-connected Projects of Standalone Battery Energy Storage Systems (BESS), for an aggregate storage capacity of 1000 MWh (500 MW x 2 hrs) to meet morning and evening peak requirements with 2 cycle charging/discharging operation (2	NHPC Limited (hereinafter referred to as the BESS Implementing Agency, or the BIA or NHPC) seeks to utilize energy storage systems, on an "On-Demand" basis, **at discretion** ~~during the peak hours~~ of buying entity i.e. Andhra Pradesh Power Distribution Companies (hereinafter referred to as APDISCOMs / Buying Entity). In view of the above, the BIA hereby invites proposals for setting up of InSTS-connected Projects of Standalone Battery Energy Storage Systems (BESS), for an aggregate storage capacity of 1000 MWh (500 MW x 2 hrs) to meet ~~morning and evening peak~~ **grid** requirements with 2 cycle charging/discharging operation (2 hours per cycle) each day **as specified in the RfS** ~~**of BESS**~~ with project to be located in the State of Andhra Pradesh connected with the State Transmission Utility.

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<tr><td>2</td><td>Section 1, 1.15, page 12 of RfS</td><td>A Single Stage Two Envelope Bidding Procedure will be adopted and will proceed as detailed in the RfS Documents. Bidding will be conducted through the global competitive bidding procedures as per the provisions of ITB and the contract shall be executed as per the provisions of this RfS. It shall be noted that the respective rights of the NHPC and the Bidder/ BESSD shall be governed by the RfS Documents/BESSA signed between the NHPC and the BESSD for the project.</td><td>A Single Stage Two Envelope Bidding Procedure will be adopted and will proceed as detailed in the RfS Documents. Bidding will be conducted through the global competitive bidding procedures as per the provisions of ITB and the contract shall be executed as per the provisions of this RfS. It shall be noted that the respective rights of the NHPC and the Bidder/ BESSD shall be governed by the RfS Documents/~~BESSA~~BESPA signed between the NHPC and the BESSD for the project.</td></tr>
<tr><td>3</td><td>Section 2, 2.0 Definitions of RfS</td><td>New Definition added</td><td>“lix. PROJECT CAPACITY” shall mean the maximum AC capacity at the delivery point that can be scheduled on which BESPA shall be signed.</td></tr>
<tr><td>4</td><td>Section 2, 2.0 Definitions of RfS (xi)</td><td>“BID CAPACITY” shall mean contracted capacity of the Battery Energy Storage System(s) as proposed by the Bidder.</td><td>“BID CAPACITY / QUOTED CAPACITY” shall mean aggregate contracted capacity of the Battery Energy Storage System(s) as proposed by the Bidder.</td></tr>
<tr><td>5</td><td>Section 3A, 3.1 Page 23 of RfS</td><td>TOTAL CAPACITY OFFERED:
Bids are invited under this RfS for selection of BESS Projects for a total capacity of 500 MW / 1000 MWh through e-bidding followed by e-Reverse Auction process. The total capacity of 1000 MWh will be awarded for injection at InSTS substations in the 3 (three) locations across the state of Andhra Pradesh. The break-up of maximum capacities that will be awarded in these 3 locations along with connectivity voltage level, bay & land availability are as follows:
<table><tr><th>Sl. No.</th><th>Location</th><th>Capacity in MW/MWh</th><th>Connectivity Voltage Level (in kV)</th><th>Bay Availability</th><th>Land available (in Acre)</th></tr></table></td><td>TOTAL CAPACITY OFFERED:
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1	400kV Substation Jammala madugu	225/450	220/132	2Nos. 220KV bays available	Area1 3.67 Area2 5.46
2	400kV Substation Ghani	225/450	400/220	Space Available for 4 Nos bays. New bay to be constructed	11.25
3	220kV Substation Kuppam	50/100	220/132	Space Available for 2 Nos bays (132kV). New Bay to be Constructed	4
Total Capacity		500/1000			

.....

1	400kV Substation Jammalamadugu	225/450 **(75MW x3)***	~~220/132~~ **33**	~~2Nos. 220KV bays available~~ **Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO**	~~Area1 3.67 Area2 5.46~~ **Plot-1 about 15 acres (beside 400kV Switchyard) and Plot-2 about 5 acres (beside 132kV Switchyard)**
2	400kV Substation Ghani	225/450 **(75MW x3)***	~~400/220~~ **33**	~~Space Available for 4 Nos bays. New bay to be constructed~~ **Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO**	~~11.25~~ **Plot of about 12 acres beside 400kV Switchyard**
3	220kV Substation Kuppam	50/100	~~220/132~~ **33**	~~Space Available for 2 Nos bays (132kV). New Bay to be Constructed~~ **Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO**	4 **Plot-1 about 2.2 acres (beside 220kV Switchyard) and Plot-2 about 0.7 acres (beside Control room)**
Total Capacity		500/1000			

***The BESS systems capacity of 225MW/450MWh shall divide into three BESS blocks i.e., 3 x 75 MW at the project location 400kV Jammalamadugu substations (mentioned at Sl.no.1) and 400 kV SS Ghani (mentioned at Sl.no 2) each. Block-wise operation can be on manual mode on instructions from SLDC. Each BESS block must be operated/responded independently to comply APDISCOMs/SLDC instructions. For operational purposes, each BESS block will be treated as a separate project and schedules and operating instructions will be issued accordingly.**

The selection of Project Developers will be carried out based on the **Tariff / Annualized capacity Charges** ~~Contracted Capacity~~ offered by the Bidders. In this context, the term "Project" used anywhere in the RfS, BESPA, will solely

			mean the BESS, set up by the BESSD to make available the Contracted Capacity as agreed to in the BESPA. For a specified Contracted Capacity, any oversizing of the BESS over the minimum rated Energy capacities required under this RfS is left to the discretion of the BESSD. However, it is to be noted that, at the time of commissioning, rated capacity of the BESS (Power and Energy) to be installed as indicated in the BESPA, will be verified.
6	Section 3A, 3.6.1 Page 27 of RfS	The total Project capacity of 500 MW / 1000 MWh shall be located in the vicinity of Substations of the STU network as per information mentioned at Clause 3.1 in the State of Andhra Pradesh. The Project location(s) should be chosen taking cognizance of the provision as per above Clause 3.1 of Section-3A & 2 of Section-3B of the RfS. Land identification and allocation for the Projects will be under scope of the NREDCAP/APTRANSCO. Land will be provided on lease basis/right-of use basis to the BESSD through suitable agreement with NREDCAP/APTRANSCO and the same shall be facilitated by NHPC. The format for Right to use agreement shall be furnished at later stage. The above land area will be given to the BESSD on lease/ Right of Use (ROU) within 60 days from Effective Date of the BESPA. In case of any delay in signing of ROU/lease agreement of land to the BESSD, the Financial Closure and Commissioning milestones will be suitably extended. As Battery Energy Storage System is prone to fire hazard, the BESSD shall provide suitable means such as fire barrier between switchyard and BESS to avoid fire to spread from BESS to Yard equipment. The details in respect of sub-station location, type, voltage level, land availability and Contact details of concerned officers from APDISCOMs / APTRANSCO etc. for the site visit is attached at Annexure -9	The total Project capacity of 500 MW / 1000 MWh shall be located in the vicinity of Substations of the STU network as per information mentioned at Clause 3.1 in the State of Andhra Pradesh. The Project location(s) should be chosen taking cognizance of the provision as per above Clause 3.1 of Section-3A & 2 of Section-3B of the RfS. Land identification and allocation for the Projects will be under scope of the NREDCAP/APTRANSCO. Land will be provided ~~on lease basis/right-of use basis~~ to the BESSD **on "Right to use basis" at an annual rent of Rs.1/- per project** through suitable agreement with NREDCAP/APTRANSCO and the same shall be facilitated by NHPC. The format for Right to use agreement ~~shall be furnished at later stage~~ **is attached at Annexure 11.** The above land area will be given to the BESSD for Right of Use (ROU) within 60 days from Effective Date of the BESPA. In case of any delay in signing of ROU agreement of land to the BESSD, the Financial Closure and Commissioning milestones will be suitably extended. As Battery Energy Storage System is prone to fire hazard, the BESSD shall provide suitable means such as fire barrier between switchyard and BESS to avoid fire to spread from BESS to Yard equipment.**The safety of the equipment / personnel related to BESS operations will be in the scope of the BESSD. Buying Entity / APTRANSCO will in no way be responsible for any loss/ damage due to any fire accidents. Fire Hydrant system with approval from Fire Force Department, Andhra Pradesh shall be installed in the BESS area. The BESS container area shall be fitted with High mast Thermal & Surveillance Camera and streaming of the same shall be provided at Control Room of respective Sub Station in BESSD's scope.** The details in respect of sub-station location, type, voltage level, land availability and Contact details of concerned officers from APDISCOMs / APTRANSCO etc. for the site visit is attached at Annexure -9 .
7	Section 3A,	New Clause	**The prospective bidder shall invariably submit their tentative BESS infrastructure plot plans along with their offer. The bidder can take up joint**

	3.6.2		**inspection with APTRANSCO officials before submission of their bid.**
8	Section 3A, 3.9.1 page 32 of RfS	The detail of Delivery Points for the projects shall be as per table under Clause 3.1 above. The Project should be designed for interconnection with the InSTS network in accordance with the prevailing SERC regulations in this regard. For interconnection with the grid and metering, the BESSD shall abide by all rules and regulations framed under the Electricity Act, 2003 including the applicable Grid Code, Grid Connectivity Standards, Regulations on Communication System for transmission of electricity and other Regulations/Procedures (as amended from time to time) issued by Appropriate Commissions and Central Electricity Authority (CEA). Minimum voltage for interconnection at the InSTS shall be as per table given under Clause 3.1. BESSD shall also comply with the requirements mentioned in the First Time Charing (FTC) regulations/rules issued by the Government, as amended from time to time. All the Substations where BESS is proposed are AIS.	The detail of Delivery Points for the projects shall be as per table under Clause 3.1 above. The Project should be designed for interconnection with the InSTS network in accordance with the prevailing SERC regulations in this regard. For interconnection with the grid and metering, the BESSD shall abide by all rules and regulations framed under the Electricity Act, 2003 including the applicable Grid Code, Grid Connectivity Standards, Regulations on Communication System for transmission of electricity and other Regulations/Procedures (as amended from time to time) issued by Appropriate Commissions and Central Electricity Authority (CEA). Minimum voltage for interconnection at the InSTS shall be as per table given under Clause 3.1**. The power evacuation infrastructure up to the 33 kV level (from grid side) shall be developed by APTRANSCO. Therefore, the interconnection point with BESS developer shall be at the 33 kV level i.e., LV side of PTR. All losses upto the metering point shall be accounted by BESSD and the AC round-trip efficiency shall be guaranteed at the 33 kV metering point. The following infrastructure shall be developed by APTRANSCO.** **At 400KV SS Jammalamadugu & Ghani:** **a. The 220 kV bus will be extended to accommodate three/four power transformer bays and 80 MVA/100 MVA power transformers.** **b. On the LV side, a 33 kV bus (either Indoor Metal-Clad or conventional) should be formed to accommodate 11/13 feeder bays (9 no. feeder bays (25MW/ feeder), 1 No Spare & 1 No for Auxiliary supply) and 3/4 Power Transformer (PTR) LV bays.** **At 220KV SS Kuppam:** **c. The 220 kV bus will be extended to accommodate two numbers power transformer bays and 50/80 MVA power transformers.** **d. On the LV side, a 33 kV bus (conventional) should be formed to accommodate 4/5 feeder bays (two for incoming, one for outgoing, one for station aux supply transformer and one spare) and two numbers PTR LVs.** BESSD shall also comply with the requirements mentioned in the First Time Charing (FTC) regulations/rules issued by the Government, as amended from time to time. All the Substations where BESS is proposed are AIS.

9	Section 3A, 3.9.2 page 33 of RfS	The responsibility of getting the/InSTS connectivity shall entirely be of the BESSD and shall be at the cost of the BESSD, in line with the applicable regulations. The transmission of power up to the point of interconnection where metering is done for energy accounting, shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the interconnection point shall be responsibility of the BESSD, to be undertaken entirely at its own cost	~~**The responsibility of getting the/InSTS connectivity shall entirely be of the BESSD and shall be at the cost of the BESSD, in line with the applicable regulations.**~~ **Bidders need not to take any separate connectivity approvals from APTRANSCO (STU). However, the bidder has to submit formal application in line with the applicable regulations. The fees, charges, etc, if any shall be waived as a special case. However, Developers are required to develop their plot plans for connectivity to the proposed 33 kV bus though 33 kV cables at their own cost. Considering the available vacant plots in the respective substations, the distance from the vacant plot to the 33 kV bus is approximately 500 meters. BESSD need to lay the 33 kV cable from the BESS location to the 33 kV bus.** The transmission of power up to the point of interconnection **(33 kV level i.e. LV side of PTR)** where metering is done for energy accounting, shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the interconnection point shall be responsibility of the BESSD, to be undertaken entirely at its own cost.
10	Section 3A 3.9.3 Page 33 of RfS	The entire cost of construction of infrastructure from the Project upto and including at the Interconnection Point including construction of requisite Bays (as required), including but not limited to the transmission line, maintenance & all cost up to the delivery point shall be borne by the BESSD. The maintenance of the Transmission system up to the interconnection point shall be the responsibility of the BESSD, to be undertaken entirely at its cost and expense. The SLDC/Scheduling charges, connectivity and other charges shall be payable by BESSD. The BESSD shall be required to follow the Connectivity Procedure as per the applicable Regulations issued by Appropriate Regulatory Commission / CEA as amended from time to time. The Bidders have to choose the corresponding InSTS substations for Interconnection of the Project to the Grid. Bids indicating substations outside the above locations suggested will be liable for rejection.	The entire cost of construction of infrastructure from the Project upto and including at the Interconnection Point ~~including construction of requisite Bays (as required)~~, including but not limited to the transmission line, maintenance & all cost up to the delivery point shall be borne by the BESSD. The maintenance of the Transmission system up to the interconnection point shall be the responsibility of the BESSD, to be undertaken entirely at its cost and expense. The SLDC/Scheduling charges, connectivity and other charges shall be payable by BESSD.The BESSD shall be required to follow the Connectivity Procedure as per the applicable Regulations issued by Appropriate Regulatory Commission / CEA as amended from time to time. The Bidders have to **connect to the specified** ~~choose the corresponding~~ InSTS substations for Interconnection of the Project to the Grid. **Connectivity to any other Sub Stations than specified is not permissible as per this RfS**. ~~Bids indicating substations outside the above locations suggested will be liable for rejection.~~
11	Section 3A 3.9.6 Page 33 of RfS	The BESSD shall comply with CERC/SERC regulations on Forecasting, Scheduling and Deviation Settlement, as applicable. The scheduling of power to/from the Project as	The BESSD shall comply with CERC/SERC regulations on Forecasting, Scheduling and Deviation Settlement, as applicable. The scheduling of power to/from the Project as per the applicable regulation shall be decided by

		per the applicable regulation shall be decided by NHPC/Buying Entity. However, any DSM penalties due to violation of the schedule of charging or discharging of the BESS shall be to the account of the BESSD. DSM penalties, if any, shall be levied separately on the respective entities as applicable, at their respective ends for the charging and discharging activities	**APSLDC/APPCC** ~~NHPC~~/Buying Entity. However, any DSM penalties due to violation of the schedule of charging or discharging of the BESS shall be to the account of the BESSD. DSM penalties, if any, shall be levied separately on the respective entities as applicable, at their respective ends for the charging and discharging activities.
12	Section 3A 3.9.7 Page 34 of RfS	In order to remove potential discrepancies and ambiguities, the BESSDs are hereby instructed that, as part of scheduling of power to/from the Project, they will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of the SLDC for the corridor of power flow, as per the Regulations in force, under intimation to the BIA. The BIA may facilitate in identification of any discrepancy and assist the BESSD for its early rectification without any liability on the BIA. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices.	In order to remove potential discrepancies and ambiguities, the BESSDs are hereby instructed that, as part of scheduling of power to/from the Project, they will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of the SLDC for the corridor of power flow, as per the Regulations in force, under intimation to the BIA. **APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail**. The BIA may facilitate in identification of any discrepancy and assist the BESSD for its early rectification without any liability on the BIA. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices.
13	Section 3A, 3.12.4.1 Page 34 of RfS	Second Envelope (containing first round tariff bid) of only those bidders shall be opened who are found to be technically qualified. After evaluation of technical bid, if a bidder is found to be qualified for lower capacity of Projects than that applied, the Price quoted by the bidder (i.e. first round tariff) in the Second envelope will be considered valid for lower capacity of Projects and the bidder will have to accept the lower capacity of projects than applied for, if found successful after closing of Reverse Auction. However, if a bidder is found to be qualified for less than the capacity at each location as per qualifying requirement then they shall be considered disqualified for this tender.	Second Envelope (containing first round tariff bid) of only those bidders shall be opened who are found to be technically qualified. ~~After evaluation of technical bid, if a bidder is found to be qualified for lower capacity of Projects than that applied, the Price quoted by the bidder (i.e. first round tariff) in the Second envelope will be considered valid for lower capacity of Projects and the bidder will have to accept the lower capacity of projects than applied for, if found successful after closing of Reverse Auction. However,~~ If a bidder is found to be qualified for less than the capacity at each location as per qualifying requirement then they shall be considered disqualified for this tender.
14	Section 3A 3.12.4.3	Location wise E-RA shall be implemented at Application Service Provider's Portal……. If the first round tariff bid is same for two or more bidders,	Location wise E-RA shall be implemented at Application Service Provider's Portal…….

	Page 36 of RfS	then the bidder ……..	If the first round tariff bid is same for two or more bidders, then the bidder…… ~~Out of all qualified bidders, short-listing will be done for Reverse Auction as under:~~ ~~A. When cumulative capacity of technically qualified bidders of particular location is >1.25 x total offered capacity for particular location as per Clause 3.1 above.~~ All the qualified bidders at each location shall be invited for Reverse Auction other than one lowest ranked bidder based on First Round Tariff bid i.e. the bidder quoting the highest first round tariff (i.e. H1) subject to the condition that **the H1 bidder of each location (whose derived Tariff as detailed above is highest) will not be allowed to participate in further Reverse Auction process provided minimum three bidders are left in that location** after removal of H1 bidder.~~ the cumulative capacity remains greater than 1.25x total offered capacity for particular location as per Clause 3.1. In case, after removal of H1 bidder, the cumulative capacity of technically qualified bidders becomes less than 1.25 times total offered capacity for particular location as per Clause 3.1, then all the technically qualified bidders will participate in reverse auction.~~ ~~B. When cumulative capacity of technically qualified bidders of particular location is <= 1.25 x total offered capacity for particular location as per Clause 3.1 above.~~ ~~All the technically qualified bidders will be shortlisted for Reverse Auction for a particular location.~~ ~~For the purpose of determination of the lowest Ranked bidder, if there is a tie among two or more bidders based on First Round Tariff Bid, the bidder with the lowest net worth among these bidders will be considered having lowest rank than the other bidder(s).~~ ~~At the start of the reverse auction process, the first round tariff bid along with the qualified capacity of location (s) (lower of the applied capacity of projects or technically qualified for as per Financial criteria) of short-listed bidders shall be fed as their first quoted tariff and Project(s).~~ At the start of the reverse auction process **location wise**, the first round tariff bid ~~along with the qualified capacity of location (s) (lower of the applied capacity of projects or technically qualified for as per Financial criteria)~~ of short-listed bidders shall be fed as their first quoted tariff ~~and~~

			~~Project(s)~~. ……
15	Section 3A 3.12.4.4 Page 38 of RfS	…… …… Note: 1 NHPC reserves the right to verify the documents furnished by the bidders at the time of submission of RfS including availability of the Net Worth and other Financial Criteria to the extent claimed in the RfS with the original documents and bank statements and the shareholding of the Project Company along with a copy of complete documentary evidence supported with originals at any stage from evaluation upto the expiry of BESPA. Before signing the BESPA, NHPC will ask the successful Bidder to furnish the Memorandum & Articles of Association of Project Company/Project Developer/Solar Power Generator (highlighting the relevant provision of Power / Energy / Renewable Energy / Solar Power Plant development /Battery Energy Storage System Developer) in case the same was not available in the Memorandum & Articles of Association of the Bidder at the time of submission of Bid. If at any stage it is found that the documents furnished by the bidders during RfS are misleading or misrepresented in any way then the EMD shall be forfeited and the agency shall be blacklisted for an appropriate period decided by NHPC.	…… …… Note: 1 NHPC reserves the right to verify the documents furnished by the bidders at the time of submission of RfS including availability of the Net Worth and other Financial Criteria to the extent claimed in the RfS with the original documents and bank statements and the shareholding of the Project Company along with a copy of complete documentary evidence supported with originals at any stage from evaluation upto the expiry of BESPA. Before signing the BESPA, NHPC will ask the successful Bidder to furnish the Memorandum & Articles of Association of Project Company / Project Developer/~~Solar Power Generator~~ (highlighting the relevant provision of Power / Energy / Renewable Energy /~~ Solar Power Plant development~~ Battery Energy Storage System Developer) in case the same was not available in the Memorandum & Articles of Association of the Bidder at the time of submission of Bid. If at any stage it is found that the documents furnished by the bidders during RfS are misleading or misrepresented in any way then the EMD shall be forfeited and the agency shall be blacklisted for an appropriate period decided by NHPC.
16	Section 3A 3.14.2 Page 40 of RfS	The BESSD shall submit a detailed completion Schedule for the Project prior to the signing of BESPA. Broad details to be captured in the Schedule are the land procurement, grid connectivity order, supply and erection status of various Project components; financial arrangement/ tie up etc. The BESSD shall also submit the progress report to NHPC in a form acceptable to NHPC and shall contain percentage completion achieved compared with the planned percentage completion for each activity, and any such other information as required by NHPC.	The BESSD shall submit a detailed completion Schedule for the Project prior to the signing of BESPA. Broad details to be captured in the Schedule are the land **taken over** ~~procurement,~~ grid connectivity order, supply and erection status of various Project components; financial arrangement/ tie up etc. The BESSD shall also submit the progress report to **Buying Entity / APTRANSCO &** NHPC in a form acceptable to NHPC **/ Buying Entity / APTRANSCO** and shall contain percentage completion achieved compared with the planned percentage completion for each activity, and any such other information as required by NHPC.
17	Section 3A	…… First round tariff bid (in Rs/MW/month) shall be quoted in	…… First round tariff bid (in Rs/MW/month) shall be quoted in Indian Rupees per

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<tr><td>18</td><td>Section 3B 1.1 Page 59 of RfS</td><td>Under this RfS, the BESSD shall be required to set up a Battery Energy Storage System (BESS), with the primary objective of making the energy storage facility available to the NHPC for charging/discharging of the BESS, on an “on demand” basis. Detailed criteria for performance are elaborated in Clause 6 of the RfS.</td><td>Under this RfS, the BESSD shall be required to set up a Battery Energy Storage System (BESS), with the primary objective of making the energy storage facility available to the ~~NHPC~~ Buying Entity / APTRANSCO, for charging/discharging of the BESS, on an “on demand” basis. Detailed criteria for performance are elaborated in Clause 6 of the RfS.</td></tr>
<tr><td>19</td><td>Section 3B 1.2 Page 59 of RfS</td><td>Setting up of the BESS and interconnection of the BESS with the InSTS network will be under the scope of the BESSD. This RfS is technology agnostic on the nature of battery storage system being opted by the BESSD, as long as it meets the definition of BESS under this RfS and the required performance criteria under the RfS and BESPA.</td><td>Setting up of the BESS and interconnection of the BESS with the InSTS network and entire Operation & maintenance including safety of the equipment / personnel will be under the scope of the BESSD. This RfS is technology agnostic on the nature of battery storage system being opted by the BESSD, as long as it meets the definition of BESS under this RfS and the required performance criteria under the RfS and BESPA.</td></tr>
<tr><td>20</td><td>Section 3B 2.1 Page 59 of RfS</td><td>Selection of BESS Projects for a total capacity of 500MW/1000 MWh will be carried out through e-bidding followed by e-Reverse Auction process. The total capacity of 1000 MWh will be awarded for injection at InSTS substations in the 3 (three) locations across Andhra Pradesh. The breakup of maximum capacities that will be awarded in these 3 locations along with connectivity voltage level, bay & land availability are as follows:
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<tr><th>Sl. No.</th><th>Location</th><th>Capacity in MW/MWh</th><th>Connectivity Voltage Level (in kV)</th><th>Bay Availability</th><th>Land available (in Acre)</th></tr>
<tr><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td><td>(5)</td><td>(6)</td></tr>
<tr><td>1</td><td>400kV Substation Jammalamadugu</td><td>225/450 (75MWx3)*</td><td>~~220/132~~ 33</td><td>~~2Nos. 220KV bays available~~ Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO</td><td>~~Area1 3.67 Area2 5.46~~ Plot-1 about 15 acres (beside 400kV Switchyard) and Plot-2 about 5 acres (beside 132kV Switchyard)</td></tr>
<tr><td>2</td><td>400kV Substation Ghani</td><td>225/450 (75M</td><td>~~400/220~~ 33</td><td>~~Space Available for 4 Nos bays. New bay to be constructed~~</td><td>~~11.25~~ Plot of about 12</td></tr>
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					d	
	3	220kV Substation Kuppam	50/100	220/132	Space Available for 2 Nos bays (132kV). New Bay to be Constructed	4
	Total Capacity		500/1000			

		Wx3)*		**Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO**	**acres beside 400kV Switchyard**
3	220kV Substation Kuppam	50/100	~~220/132~~ **33**	~~Space Available for 2 Nos bays (132kV). New Bay to be Constructed~~ **Power evacuation infrastructure upto the 33kV level (including Bays) shall be developed by APTRANSCO**	~~4~~ **Plot-1 about 2.2 acres (beside 220kV Switchyard) and Plot-2 about 0.7 acres (beside Control room)**
Total Capacity		500/1000			

***The BESS systems capacity of 225MW/450MWh shall divide into three BESS blocks i.e., 3 x 75 MW at the project location 400kV Jammalamadugu substations (mentioned at Sl.no.1) and 400 kV SS Ghani (mentioned at Sl.no 2) each. Block-wise operation can be on manual mode on instructions from SLDC. Each BESS block must be operated/responded independently to comply APDISCOMs/SLDC instructions. For operational purposes, each BESS block will be treated as a separate project and schedules and operating instructions will be issued accordingly.**

21	Section 3B 2.2 Page 60 of RfS	The selection of Project Developers will be carried out based on the Contracted Capacity offered by the Bidders. In this context, the term "Project" used anywhere in the RfS, BESPA, will solely mean the BESS, set up by the BESSD to make available the Contracted Capacity as agreed to in the BESPA.	The selection of Project Developers will be carried out based on the **Tariff / Annualized capacity Charges** ~~Contracted Capacity~~ offered by the Bidders. In this context, the term "Project" used anywhere in the RfS, BESPA, will solely mean the BESS, set up by the BESSD to make available the Contracted Capacity as agreed to in the BESPA. **Each Project shall be allocated to the lowest Qualified Bidder at a particular Sub-station as per the respective capacity as indicated above. The Project shall be connected to the Interconnection Points, as in table 2.1 above. The BESSDs shall demonstrate the Contracted Capacity at the Interconnection Point**.
22	Section 3B 4.1 Page 61 of RfS	The total Project capacity of 500 MW / 1000 MWh shall be located in the vicinity of Substations of the STU network as per information mentioned at Clause 3.1 above in the State of Andhra Pradesh. The Project location(s) should be chosen	The total Project capacity of 500 MW / 1000 MWh shall be located in the vicinity of Substations of the STU network as per information mentioned at Clause 3.1 above in the State of Andhra Pradesh. The Project location(s) should be chosen taking cognizance of the provision as per Clause 3.1 &

		taking cognizance of the provision as per Clause 3.1 & 3.6.1 Section -3A of the RfS. Land identification and allocation for the Projects will be under scope of the NREDCAP/APTRANSCO. Land will be provided on lease basis/right-of use basis to the BESSD through suitable agreement with NREDCAP/APTRANSCO, and the same shall be facilitated by NHPC. The format for Right to use agreement shall be furnished at later stage. ..... As Battery Energy Storage System is prone to fire hazard, the BESSD shall provide suitable means such as fire barrier between switchyard and BESS to avoid fire to spread from BESS to Yard equipment.	3.6.1 Section -3A of the RfS. Land identification and allocation for the Projects will be under scope of the NREDCAP/APTRANSCO. Land will be provided ~~on lease basis/right-of use basis~~ to the BESSD **on "Right to use basis" at an annual rent of Rs.1/- per project** through suitable agreement with NREDCAP/APTRANSCO, and the same shall be facilitated by NHPC. The format for Right to use agreement ~~shall be furnished at later stage~~ **is attached at Annexure-11**. ..... As Battery Energy Storage System is prone to fire hazard, the BESSD shall provide suitable means such as fire barrier between switchyard and BESS to avoid fire to spread from BESS to Yard equipment. **The safety of the equipment / personnel related to BESS operations will be in the scope of the BESSD. Buying Entity / APTRANSCO will in no way be responsible for any loss/ damage due to any fire accidents. Fire Hydrant system with approval from Fire Force Department, Andhra Pradesh shall be installed in the BESS area. The BESS container area shall be fitted with High mast Thermal & Surveillance Camera and streaming of the same shall be provided at Control Room of respective Sub Station in BESSD's scope.** .....
23	Section 3B 5.1 Page 61 of RfS	The detail of Delivery Points for the projects shall be as per table under Clause 2.1 above. The Project should be designed for interconnection with the InSTS network in accordance with the prevailing SERC regulations in this regard. For interconnection with the grid and metering, the BESSD shall abide by all rules and regulations framed under the Electricity Act, 2003 including the applicable Grid Code, Grid Connectivity Standards, Regulations on Communication System for transmission of electricity and other Regulations/Procedures (as amended from time to time) issued by Appropriate Commissions and Central Electricity Authority (CEA). Minimum voltage for interconnection at the InSTS shall be as per table given under Clause 2.1. BESSD shall also comply with the requirements mentioned in the First Time Charging (FTC) regulations/rules issued by the Government, as amended from time to time. All the Substations where BESS is proposed are AIS.	The detail of Delivery Points for the projects shall be as per table under Clause 2.1 above. The Project should be designed for interconnection with the InSTS network in accordance with the prevailing SERC regulations in this regard. For interconnection with the grid and metering, the BESSD shall abide by all rules and regulations framed under the Electricity Act, 2003 including the applicable Grid Code, Grid Connectivity Standards, Regulations on Communication System for transmission of electricity and other Regulations/Procedures (as amended from time to time) issued by Appropriate Commissions and Central Electricity Authority (CEA). Minimum voltage for interconnection at the InSTS shall be as per table given under Clause 2.1. **The power evacuation infrastructure up to the 33 kV level (from grid side) shall be developed by APTRANSCO. Therefore, the interconnection point with BESS developer shall be at the 33 kV level i.e., LV side of PTR. All losses upto the metering point (from BESS side) shall be accounted by BESSD and the AC round-trip efficiency shall be guaranteed at the 33 kV metering point. The following infrastructure shall be developed by APTRANSCO.**

			At 400KV SS Jammalamadugu & Ghani: **a. The 220 kV bus will be extended to accommodate three/four power transformer bays and 80 MVA/100 MVA power transformers.** **b. On the LV side, a 33 kV bus (either Indoor Metal-Clad or conventional) should be formed to accommodate 11/13 feeder bays (9 no. feeder bays (25MW/ feeder), 1 No Spare & 1 No for Auxiliary supply) and 3/4 Power Transformer (PTR) LV bays.** **At 220KV SS Kuppam:** **c. The 220 kV bus will be extended to accommodate two numbers power transformer bays and 50/80 MVA power transformers.** **d. On the LV side, a 33 kV bus (conventional) should be formed to accommodate 4/5 feeder bays (two for incoming, one for outgoing, one for station aux supply transformer and one spare) and two numbers PTR LVs.** BESSD shall also comply with the requirements mentioned in the First Time Charging (FTC) regulations/rules issued by the Government, as amended from time to time. All the Substations where BESS is proposed are AIS.
24	Section 3B 5.2 Page 62 of RfS	The responsibility of getting the/InSTS connectivity shall entirely be of the BESSD and shall be at the cost of the BESSD, in line with the applicable regulations. The transmission of power up to the point of interconnection where metering is done for energy accounting, shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the interconnection point shall be responsibility of the BESSD, to be undertaken entirely at its own cost.	~~The responsibility of getting the/InSTS connectivity shall entirely be of the BESSD and shall be at the cost of the BESSD, in line with the applicable regulations.~~ **Bidders need not to take any separate connectivity approvals from APTRANSCO (STU). However, the bidder has to submit formal application in line with the applicable regulations. The fees, charges, etc, if any shall be waived as a special case. However, developers are responsible for establishing connectivity to the proposed 33 kV bus (to be constructed by APTRANSCO), through 33 kV cables, at their own cost. Considering the available vacant plots in the respective substations, the distance from the vacant plot to the 33 kV bus is approximately 500 meters. BESSD need to lay the 33 kV cable from the BESS location to the 33 kV bus.** The transmission of power up to the point of interconnection **(33 kV level i.e., LV side of PTR)** where metering is done for energy accounting, shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the interconnection point shall be responsibility of the BESSD, to be undertaken entirely at its own cost.
25	Section 3B 5.3 Page	The entire cost of construction of infrastructure from the Project upto and including at the Interconnection Point	The entire cost of construction of infrastructure from the Project upto and

	62 of RfS	including construction of requisite Bays (as required), including but not limited to the transmission line, maintenance & all cost up to the delivery point shall be borne by the BESSD. The maintenance of the Transmission system up to the interconnection point shall be the responsibility of the BESSD, to be undertaken entirely at its cost and expense. The SLDC/Scheduling charges, connectivity and other charges shall be payable by BESSD. The BESSD shall be required to follow the Connectivity Procedure as per the applicable Regulations issued by Appropriate Regulatory Commission / CEA as amended from time to time. The Bidders have to choose the corresponding InSTS substations for Interconnection of the Project to the Grid. Bids indicating substations outside the above locations suggested will be liable for rejection.	including at the Interconnection Point ~~including construction of requisite Bays (as required)~~, including but not limited to the transmission line, maintenance & all cost up to the delivery point shall be borne by the BESSD. The maintenance of the Transmission system up to the interconnection point shall be the responsibility of the BESSD, to be undertaken entirely at its cost and expense. The SLDC/Scheduling charges, connectivity and other charges shall be payable by BESSD. The BESSD shall be required to follow the Connectivity Procedure as per the applicable Regulations issued by Appropriate Regulatory Commission / CEA as amended from time to time. The Bidders have to **connect to the specified** ~~choose the corresponding~~ InSTS substations for Interconnection of the Project to the Grid. **Connectivity to any other Sub Stations than specified is not permissible as per this RfS.** ~~Bids indicating substations outside the above locations suggested will be liable for rejection.~~
26	Section 3B 5.6 Page 62 of RfS	The BESSD shall comply with CERC/SERC regulations on Forecasting, Scheduling and Deviation Settlement, as applicable. The scheduling of power to/from the Project as per the applicable regulation shall be decided by NHPC/Buying Entity. However, any DSM penalties due to violation of the schedule of charging or discharging of the BESS shall be to the account of the BESSD. DSM penalties, if any, shall be levied separately on the respective entities as applicable, at their respective ends for the charging and discharging activities.	The BESSD shall comply with CERC/SERC regulations on Forecasting, Scheduling and Deviation Settlement, as applicable. The scheduling of power to/from the Project as per the applicable regulation shall be decided by **APSLDC/APPCC** ~~NHPC~~/Buying Entity. However, any DSM penalties due to violation of the schedule of charging or discharging of the BESS shall be to the account of the BESSD. DSM penalties, if any, shall be levied separately on the respective entities as applicable, at their respective ends for the charging and discharging activities.
27	Section 3B 5.7 Page 63 of RfS	In order to remove potential discrepancies and ambiguities, the BESSDs are hereby instructed that, as part of scheduling of power to/from the Project, they will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of the SLDC for the corridor of power flow, as per the Regulations in force, under intimation to the BIA. The BIA may facilitate in identification of any discrepancy and assist the BESSD for its early rectification without any liability on the BIA. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices.	In order to remove potential discrepancies and ambiguities, the BESSDs are hereby instructed that, as part of scheduling of power to/from the Project, they will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of the SLDC for the corridor of power flow, as per the Regulations in force, under intimation to the BIA. **APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail.** The BIA may facilitate in identification of any discrepancy and assist the

			BESSD for its early rectification without any liability on the BIA. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices.
28	Section 3B 6.1 (e) Page 64 of RfS	The BESSD shall make the BESS available for 2 operational cycle per day, i.e. two complete charge-discharge cycles per day. Following provisions shall be applicable on the entire Capacity guaranteed to be off taken by APDISCOMs:	The BESSD shall make the BESS available for 2 operational cycle per day, i.e. two complete charge-discharge cycles per day. **Charging and Discharging from the BESS shall be solely as per the schedule by APDISCOMs/SLDC. APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail. However, BESSD should allow the BESS to be charged to its full depth in two separate discontinuous spells and discharged in three separate discontinuous spells per cycle, in a staggered manner, without transitioning between charging and discharging states, to meet grid exigencies whenever required.** **However, due to grid exigencies if any, whenever the mode of BESS transitions from charging to discharging or from discharging to charging during an intermediary cycle (before reaching full depth charging/discharging), it will be considered as one cycle, subject to maximum cooling time of 1 hour or as stated by the bidder in their offer, whichever is lesser.** Following provisions shall be applicable on the entire Capacity guaranteed to be off taken by APDISCOMs: .....
29	Section 3B 6.1 e. i Page 64 of RfS	The procurement shall be in power (MW) terms. The BESSD shall install, operate and maintain the BESS to offer facility to Buying Entity to charge and to discharge the BESS on an "on demand" basis. The BESSD shall guarantee a minimum system availability of 95% on monthly basis. The BESSD shall pay the liquidated damages for such shortfall and shall duly pay such damages to the BIA to enable NHPC to remit the amount to Buying Entity under BESSA. Amount of such liquidated damages shall be twice the Capacity Charges for the capacity not made available	The procurement shall be in power (MW) terms. The BESSD shall install, operate and maintain the BESS to offer facility to Buying Entity to charge and to discharge the BESS on an "on demand" basis. The BESSD shall guarantee a minimum system availability of 95% on ~~monthly~~ **annual** basis. The BESSD shall pay the liquidated damages for such shortfall and shall duly pay such damages to the BIA to enable NHPC to remit the amount to Buying Entity under BESSA. Amount of such liquidated damages shall be twice the Capacity Charges for the capacity not made available. **The BESSD shall declare system availability on Day Ahead Basis.**

30	Section 3B 6.1 e. ii Page 65 of RfS	…… For a given BESPA, the Monthly availability guarantee shall commence from the date of commissioning of the system and shall be calculated as below: Monthly System Availability = Mean of the System availabilities of all time-blocks during the month in which the off-taker has scheduled power for charging/ discharging the BESS. Where, System Availability in a time-block= Actual Injection/Drawl MUi (A) / Scheduled Injection /Drawl MUi (B), where a) i refers to the ith time-block in the year where Scheduled Injection/Drawl MUi ≠ 0. b) Actual Injection/Drawl MUi is the Actual Energy for Charging/Discharging in the ith time-block, in MUs c) Scheduled Injection/Drawl MUi is the Energy Scheduled for Charging/ Discharging in the ith time-block, in MUs d)…… System Monthly availability shall be calculated as per above. The liquidated damages for system availability below 95% shall be settled on monthly basis and if it is not able to settle in the same/ current month, it will be carried forward for settlement in subsequent month(s).	…….. For a given BESPA, the Monthly availability guarantee shall commence from the date of commissioning of the system and shall be calculated as below: Monthly System Availability = Mean of the System availabilities of all time-blocks during the month in which the off-taker has scheduled power for charging/discharging the BESS. Where, System Availability in a time-block= Actual Injection/Drawl MUi (A) / Scheduled Injection /Drawl MUi (B), where a) i refers to the ith time-block in the year where Scheduled Injection/Drawl MUi ≠ 0. b) Actual Injection/Drawl MUi is the Actual Energy for Charging/Discharging in the ith time-block, in MUs c) Scheduled Injection/Drawl MUi is the Energy Scheduled for Charging/ Discharging in the ith time-block, in MUs d)…… System Monthly availability shall be calculated as per above **for each month. On the basis of monthly Availability, average of actual monthly availability for each month shall be taken for calculation of Annual System Availability**. ~~The liquidated damages for system availability below 95% shall be settled on monthly basis and if it is not able to settle in the same/ current month, it will be carried forward for settlement in subsequent month(s).~~ **If the Annual un-availability of 5% is already reached during part of a year, the Monthly Capacity Charges will be paid only after deducting the Penalty towards shortfall in Availability.**
31	Section 3B 6.1 e. iii Page 65 of RfS	The BESSD shall guarantee a minimum AC to AC roundtrip efficiency (RtE) of 85% for the system on monthly basis. The BESSD shall be liable for Liquidated Damages to the off-taker, if any, on account of excess conversion losses, based on the following conditions: (a) For RtE <70%, there shall be a liquidated damage @ 1.5 times of APPC charge of previous financial year of the Discom/ APDISCOMs of excess conversion losses considering system RtE = 85%;	The BESSD shall guarantee a minimum AC to AC roundtrip efficiency (RtE) of 85% for the system on monthly basis. The BESSD shall be liable for Liquidated Damages to the off-taker, if any, on account of excess conversion losses, based on the following conditions: (a) For RtE <70%, there shall be a liquidated damage @ ~~1.5 times of~~ APPC charge of previous financial year of the Discom/ APDISCOMs of excess conversion losses considering system RtE = 85% **and tariff payment for the corresponding month shall not be made to the BESSD.** For 70% ≤ RtE < 85%, there shall be a liquidated damage levied @ APPC tariff

		For 70% ≤ RtE < 85%, there shall be a liquidated damage levied @ APPC tariff of last year of buying entity, per unit of excess conversion losses considering system RtE = 85%. (b) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85% …… The BESSD shall take separate, metered connection for the Auxiliary Power load of BESS OR The BESSD can draw auxiliary power from Interconnection point. Separate meter would be arranged by Developer to measure Auxiliary consumption and that would be billed by APDISCOMs.	of last year of buying entity, per unit of excess conversion losses considering system RtE = 85%. (b) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85%. …… The BESSD shall take separate, metered connection **from APDISCOMs** for the Auxiliary Power load of BESS ~~OR The BESSD~~ and can draw auxiliary power ~~from~~ **at 33kV level after the Metering Point**~~/ Interconnection point~~. Separate meter would be arranged by Developer to measure Auxiliary consumption and that would be billed by APDISCOMs **as per prevailing tariff**. **However, During construction phase, the BESSD shall make their own arrangements or APTRANSCO/Discom will extend power supply on chargeable basis.** **The BESSD shall make his own arrangements to meet the water requirements during construction and O&M period.**
32	Section 3B 6.1 e. vii (c) Page 68 of RfS	Planned Maintenance Outage duly informed by the BESSD to the off-taker with at least one month's prior notice, subject to total no. of planned outage period being not more than 34 hours in a two-month period. BESSD will have to comply with the Charging and Discharging Schedule as intimated by Buying Entity.	Planned Maintenance Outage duly informed by the BESSD to the off-taker with at least one month's prior notice, subject to total no. of planned outage period being not more than 34 hours in a two-month period. **The BESSD shall take up all planned maintenance outages between 9: 00 Hrs to 14:00 Hrs only.** BESSD will have to comply with the Charging and Discharging Schedule as intimated by Buying Entity. **APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS.**
33	Section 3B New clause 6.1 e vii (d) Page 68 of RfS	New Clause added	The Scheduled maintenance must be carried out during monsoon season, subject to prior approval from APTRANSCO.
34	Section 3B New clause 6.1	New Clause added	Licensed copies of IEC 62933-2-1 shall be supplied by BESS Developer to APTRANSCO.

	g Page 68 of RfS		
35	Section 3B 6.2 i Page 68 of RfS	Shortfall in demonstrating minimum Availability: Subsequent to SCD of full Contracted Capacity, in case the Monthly Availability demonstrated by the BESSD is less than the minimum as specified above, such shortfall in performance shall make the BESSD liable to pay the liquidated damages provided in the BESPA to NHPC to enable NHPC to remit the amount to Buying Entity. Liquidated damages on account of shortfall in meeting the minimum system Availability criteria as per Clause 6.1.e.i., will be computed as follows: Liquidated damages in Rs.= (A – B) x C x D x 2 where, A is Guaranteed Monthly Availability as per Clause 6.1.e.i. above; B is Actual Monthly System Availability, as calculated as per Clause 6.1.e.ii. above; C is BESS Power Capacity; D is Capacity Charges Rs/MW/month as discovered through bidding process; ……	Shortfall in demonstrating minimum Availability: Subsequent to SCD of full Contracted Capacity, in case the ~~Monthly~~ **Annual** Availability demonstrated by the BESSD is less than the minimum as specified above, such shortfall in performance shall make the BESSD liable to pay the liquidated damages provided in the BESPA to NHPC to enable NHPC to remit the amount to Buying Entity. Liquidated damages on account of shortfall in meeting the minimum system Availability criteria as per Clause 6.1.e.i., will be computed as follows: Liquidated damages in Rs.= (A – B) x C x D x 2 **x n** where, A is Guaranteed ~~Monthly~~ **Annual** Availability as per Clause 6.1.e.i. above; B is Actual ~~Monthly~~ **Annual** System Availability, as calculated as per Clause 6.1.e.ii. above; C is BESS Power Capacity; D is Capacity Charges Rs/MW/month as discovered through bidding process; **n = 12;** **In case of first & last year of operations are part years, then 'n' shall be regulated accordingly.** ……
36	Section 3B 7 Page 69 of RfS	The Commissioning of the Project shall be carried out by the BESSD in line with the procedure as per the BESPA. The BIA may authorize any individual or committee or organization to witness and validate the commissioning procedure on site. Commissioning certificates shall be issued by the BIA after successful commissioning. The BESSD shall obtain necessary safety clearances from the Central Electricity Authority/CEIG/STU prior to commissioning of the Project.	The Commissioning of the Project shall be carried out by the BESSD in line with the procedure as per the BESPA. **The BESSD shall commission the Project in line with provisions of the SERC/CERC (Indian Electricity Grid Code) Regulations, 2023, as amended from time to time. In line with this regulation, the BESSD proposing the Project, or its part, for commissioning, shall give to the BIA and the Buying Entity, a preliminary notice not later than 60 days prior and advance notice not later than 30 days prior to the proposed commissioning date.** The BIA may authorize any individual or committee or organization to witness and validate the commissioning procedure on site. Commissioning certificates shall be issued by the BIA after successful commissioning. The BESSD shall obtain necessary safety clearances from the Central Electricity Authority/CEIG/STU prior to commissioning of the Project
37	Section 3B 10.8 Page 74 of RfS	The BIA will have the right to recover the VGF disbursed through encashment of BG, if the BESPA gets terminated within the first 5 years after COD of the Project, on account of reasons solely attributable to the BESSD. Irrespective of	The BIA will have the right to recover the VGF disbursed through encashment of BG, if the BESPA gets terminated within the first 5 years after COD of the Project, on account of reasons solely attributable to the BESSD. Irrespective of the year of termination within the first 5 years after COD, the

		the year of termination within the first 5 years after COD, the VGF amount to be recovered will be fixed as the amount disbursed until COD plus interest @ SBI-MCLR (1 Year) plus 5 percent, as existing on the date of disbursement, accrued from the date of disbursement on the disbursed amount.	VGF amount to be recovered will be fixed as the amount disbursed ~~until COD~~ **till date of termination of BESPA** plus interest @ SBI-MCLR (1 Year) plus 5 percent , as existing on the date of disbursement, accrued from the date of disbursement on the disbursed amount .
38	Section 6 5.0 Page 159 of RfS	**Fire Protection:** The BESSD shall design and install a fire protection system that conforms to national and local codes. The fire protection system design and associated alarms shall take into account that the BESS will be unattended at most times. For high energy density technologies, the BESSD shall also obtain thermal runaway characterization of the battery storage systems.	**Fire Protection:** The BESSD shall design and install a fire protection system that conforms to national and local codes. The fire protection system design and associated alarms shall take into account that the BESS will be unattended at most times. For high energy density technologies, the BESSD shall also obtain thermal runaway characterization of the battery storage systems. **As Battery Energy Storage System is prone to fire hazard, the BESSD shall provide suitable means such as fire barrier between switchyard and BESS to avoid fire to spread from BESS to Yard equipment.** **The safety of the equipment / personnel related to BESS operations will be in the scope of the BESSD. Buying Entity /APTRANSCO will in no way be responsible for any loss / damage due to any fire accidents. Fire Hydrant system with approval from Fire Force Department, Andhra Pradesh shall be installed in the BESS area. The BESS container area shall be fitted with High mast Thermal & Surveillance Camera and streaming of the same shall be provided at Control Room of respective Sub Station in BESSD's scope.**
39	Section 6 9.0 Page 160 of RfS	**Other necessary criteria** a) BESS shall be capacity of operating in the frequency range of 47.5 Hz to 52 Hz and be able to deliver rated output in the frequency range of 49.5 Hz to 50.5 Hz. b) BESS shall be capable of operating when voltage at the interconnection point on any or all phases dips/rises to the high or low levels. The levels applicable for wind/solar inverter-based generation may be referred as available in Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations. c) The safe and reliable operation of power system is ensured by frequency control as well as voltage control. BESS to be implemented shall have provisions for Primary frequency control with a droop which can be set as per system requirement between 1- 3 percent. The BESS performs regulations in one or several pre-defined ways (e.g.	**Other necessary criteria** **i. Central Electricity Authority, Technical Standards for Connectivity to the Grid, (Amendment) Regulations, 2013 and 2019 mention connectivity standards applicable to the wind generating stations, generating stations using inverters, wind - solar photo voltaic hybrid systems and energy storage systems. BESS, being an inverter based power system element, shall also comply to the requirements specified for other generating stations using inverters.** a) BESS shall be capacity of operating in the frequency range of 47.5 Hz to 52 Hz and be able to deliver rated output in the frequency range of 49.5 Hz to 50.5 Hz. b) **Low/High Voltage Ride Through (LVRT/HVRT): The BESS shall be operated at Unity Power factor.** BESS shall be capable of operating when voltage at the interconnection point on any or all phases dips/rises to the high or low levels. The levels applicable for wind/solar inverter-based generation may be referred as available in Central Electricity Authority

		regulating its own output power according to the orders given by SCADA system) to achieve an active power balance between generation and demand to maintain the power system frequency within a reasonable range.	(Technical Standards for Connectivity to the Grid) Regulations. c) The safe and reliable operation of power system is ensured by frequency control as well as voltage control. BESS to be implemented shall have provisions for Primary frequency control with a droop which can be set as per system requirement between **the range specified for wind/solar generation sources (inverter-based) in the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations** ~~1-3 percent~~. The BESS performs regulations in one or several pre-defined ways (e.g. regulating its own output power according to the orders given by SCADA system) to achieve an active power balance between generation and demand to maintain the power system frequency within a reasonable range. .....
40	Section 6 9.0 (h) Page 160 of RfS	h) BESS shall have capability to operate in AGC. The details regarding AGC signals required by not limited to, are given (the conventional power plant signal link) at the link, https://posoco.in/download/detailed-signal-list-for-connecting-generators-underagc/?wpdml=29546. BESS shall be able to operate in AGC and be able to comply with the requirements desired by system operators. Some of the BESS signal list for implementation of AGC can be like below (list is indicative only): i) Maximum MW permissible (dynamic or user entry) ii) Minimum MW permissible (dynamic or user entry) iii) Ramp rate up permissible (dynamic or user entry) iv) Ramp rate down permissible (dynamic or user entry) v) Actual MW vi) Actual MVAR vii) Auxiliary Consumption MW viii) Scheduled MW (dynamic or user entry) ix) BESS Temperature (for monitoring and correlation) x) Ambient Temperature (for monitoring and correlation) xi) Cycle limits (0-100%) per day (user entry) xii) Circuit breaker status xiii) Local/Remote status xiv) ACC Set Point MW from NLDC to BESS xv) Voltage (KV) at grid level	~~h) BESS shall have capability to operate in AGC. The details regarding AGC signals required by not limited to, are given (the conventional power plant signal link) at the link, https://posoco.in/download/detailed-signal-list-for-connecting-generators-underagc/?wpdml=29546.~~ ~~BESS shall be able to operate in AGC and be able to comply with the requirements desired by system operators. Some of the BESS signal list for implementation of AGC can be like below (list is indicative only):~~ ~~i) Maximum MW permissible (dynamic or user entry)~~ ~~ii) Minimum MW permissible (dynamic or user entry)~~ ~~iii) Ramp rate up permissible (dynamic or user entry)~~ ~~iv) Ramp rate down permissible (dynamic or user entry)~~ ~~v) Actual MW~~ ~~vi) Actual MVAR~~ ~~vii) Auxiliary Consumption MW~~ ~~viii) Scheduled MW (dynamic or user entry)~~ ~~ix) BESS Temperature (for monitoring and correlation)~~ ~~x) Ambient Temperature (for monitoring and correlation)~~ ~~xi) Cycle limits (0-100%) per day (user entry)~~ ~~xii) Circuit breaker status~~ ~~xiii) Local/Remote status~~ ~~xiv) ACC Set Point MW from NLDC to BESS~~ ~~xv) Voltage (KV) at grid level~~ ~~xvi) Voltage (V) at BESS LV side~~

		xvi) Voltage (V) at BESS LV side	
41	Article 3, 3.2.1 Page 183 of BESPA	In case of a failure to submit the documents as above, NHPC shall encash the Performance Bank Guarantee/Payment on Order Instrument / Insurance surety bond submitted by the BESSD, terminate this Agreement and remove the Project from the list of the selected Projects by giving a notice to the BESSD in writing of at least seven (7) days, unless the delay (subject to the condition that BESSD has made/ is making all possible efforts) is on account of delay in allotment of Land by the Government not owing to any action or inaction on the part of the BESSD or caused due to a Force Majeure. Unless extended as per provisions of Article 3.2.1 (i) of this Agreement in writing, the termination of the Agreement shall take effect upon the expiry of the 7th day of the above notice.	In case of a failure to submit the documents as above, NHPC shall encash the Performance Bank Guarantee/Payment on Order Instrument / Insurance surety bond submitted by the BESSD, terminate this Agreement and remove the Project from the list of the selected Projects by giving a notice to the BESSD in writing of at least seven (7) days, unless the delay (subject to the condition that BESSD has made/ is making all possible efforts) is on account of delay in allotment of Land by **APTRANSCO** ~~the Government~~ not owing to any action or inaction on the part of the BESSD or caused due to a Force Majeure. Unless extended as per provisions of Article 3.2.1 (i) of this Agreement in writing, the termination of the Agreement shall take effect upon the expiry of the 7th day of the above notice.
42	Article 4, 4.1.1 (a) Page 186 of BESPA	The BESSD shall be solely responsible and demonstrate possession of 100% (Hundred Percent) of the land identified for the Project in its name for a period not less than the complete Term of this Agreement on or before Schedule Commissioning Date. In this regard, the BESSD shall submit documents/ Lease Agreement to establish possession/ right to use 100% of the required land in the name of the BESSD. The BESSD shall submit a sworn affidavit from the authorized signatory of the BESSD listing the details of the land and certifying that total land required for the Project is under clear possession of the BESSD	The BESSD shall be **offered land on Right to Use arrangement not later than 60 days from the effective date of BESPA, the** ~~solely responsible and demonstrate possession of~~ 100% (Hundred Percent) of the land identified for the Project in its name for a period not less than the complete Term of this Agreement ~~on or before Schedule Commissioning Date~~. **BESSD shall promptly comply with all the statutory / non-statutory, legal requirements including but not limited to signing of any agreement, payment of considerations etc. as per the offer made for the land**. In this regard, the BESSD shall submit documents/Lease Agreement to establish possession/ right to use 100% of the required land in the name of the BESSD. The BESSD shall submit a sworn affidavit from the authorized signatory of the BESSD listing the details of the land and certifying that total land required for the Project is under clear possession of the BESSD;
43	Article 4, 4.1.1 (b) Page 186 of BESPA	The BESSD shall be solely responsible and make arrangements for associated infrastructure for development of the Project and for Connectivity with the STU till Delivery Point for confirming the evacuation of power by the Scheduled Commissioning date and all clearances related thereto. Connectivity has been assured to be provided to the BESSD, and necessary applications in this regard, will be	The BESSD shall be solely responsible and make arrangements for associated infrastructure for development of the Project and for Connectivity with the STU till Delivery Point for confirming the evacuation of power by the Scheduled Commissioning date and all clearances related thereto. Connectivity has been assured to be provided to the BESSD, and necessary applications in this regard, will be required to be made by the BESSD. ~~All the requisite costs associated including fees with obtaining connectivity shall be~~

		required to be made by the BESSD. All the requisite costs associated including fees with obtaining connectivity shall be borne by the BESSD.	~~borne by the BESSD.~~
44	Article 4, 4.1.1 (f) Page 187 of BESPA	Connecting the Project switchyard with the Interconnection Facilities at the Delivery Point; The BESSD shall make adequate arrangements (including construction of requisite bays) to connect the Project switchyard with the Interconnection Facilities at Interconnection / Metering / Delivery Point.	Connecting the Project switchyard with the Interconnection Facilities at the Delivery Point; The BESSD shall make adequate arrangements ~~(including construction of requisite bays)~~ to connect the Project switchyard with the Interconnection Facilities at Interconnection / Metering / Delivery Point.
45	Article 4, 4.1.1 (m) Page 187 of BESPA	As part of scheduling of power / energy from / to the Project for discharging / charging, the BESSD will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of SLDC concerned for the corridor of power flow, as per the Regulations in force, under intimation to NHPC and in consultation with APDISCOMs /Buying Entity. NHPC may facilitate in identification of any discrepancy and assist the BESSD for its early rectification without any liability on NHPC. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices / penalty.	As part of scheduling of power / energy from / to the Project for discharging / charging, the BESSD will be required to punch-in their respective schedules and subsequent revisions, by themselves, at the interfaces of SLDC concerned for the corridor of power flow, as per the Regulations in force, under intimation to NHPC and in consultation with APDISCOMs /Buying Entity. **APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail.** NHPC may facilitate in identification of any discrepancy and assist the BESSD for its early rectification without any liability on NHPC. The BESSD shall be solely responsible for discrepancy identification and its rectification to avoid any rejection/less payment of invoices / penalty.
46	Article 4, 4.2.3 Page 189 of BESPA	The responsibility of getting connectivity with the transmission system up to the Interconnection Point, will lie with the BESSD. The transmission of power up to the point of interconnection where the metering is done for energy accounting shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the designated point as per the applicable terms and conditions shall be the responsibility of the BESSD. All costs, charges and losses up to and including at the Interconnection Point associated with this arrangement will also be borne by the BESSD.	~~The responsibility of getting connectivity with the transmission system up to the Interconnection Point, will lie with the BESSD~~. **Bidders need not to take any separate connectivity approvals from APTRANSCO (STU). However, the bidder has to submit formal application in line with the applicable regulations. The fees, charges, etc, if any shall be waived as a special case. However, developers are responsible for establishing connectivity to the proposed 33 kV bus (to be constructed by APTRANSCO), through 33 kV cables, at their own cost. Considering the available vacant plots in the respective substations, the distance from the vacant plot to the 33 kV bus is approximately 500 meters. BESSD need to lay the 33 kV cable from the BESS location to the 33 kV bus.** The transmission of power up to the point of

			interconnection **(33 kV level i.e., LV side of PTR)** where the metering is done for energy accounting shall be the responsibility of the BESSD at its own cost. The maintenance of Transmission system up to the designated point as per the applicable terms and conditions shall be the responsibility of the BESSD. All costs, charges and losses up to and including at the Interconnection Point associated with this arrangement will also be borne by the BESSD.
47	Article 4, 4.4.1 Page 190 of BESPA	NHPC, in any Contract Year, shall not be obliged to off-take any capacity beyond / over and above Contracted Capacity. Moreover, during a day in any Contract year, BESSD shall not be asked as well as BESSD shall not be allowed to schedule for more than 2 Cycles / day. For the purpose of this Agreement, Cycle shall mean charging of the BESS upto the Contracted capacity followed by discharge of such stored energy. Discharging from the BESS is not allowed between 10:00 AM and 5:00 PM of each day. The BESSD shall not use the Contracted Capacity for any purpose other than that specified in this Agreement. ..... (ii) Energy scheduled for discharge in a given cycle during a year shall be more than or equal to the Min. Dispatchable Energy Capacity at the End of Year as specified under Article 4.4.2 (c). Discharging from the BESS is not allowed between 10:00 AM and 5:00 PM of each day. For example, during the 3rd Year after COD, the energy scheduled for discharge from 125 MW/ 250 MWh capacity shall be more than or equal to 125x0.925x2 = 231.25MWh.	NHPC, in any Contract Year, shall not be obliged to off-take any capacity beyond / over and above Contracted Capacity. Moreover, during a day in any Contract year, BESSD shall not be asked as well as BESSD shall not be allowed to schedule for more than 2 Cycles / day. **Charging and Discharging from the BESS shall be solely as per the schedule by APDISCOMs/SLDC. APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail. However, BESSD should allow the BESS to be charged to its full depth in two separate discontinuous spells and discharged in three separate discontinuous spells per cycle, in a staggered manner, without transitioning between charging and discharging states, to meet grid exigencies whenever required.** **However, due to grid exigencies if any, whenever the mode of BESS transitions from charging to discharging or from discharging to charging during an intermediary cycle (before reaching full depth charging/discharging), it will be considered as one cycle, subject to maximum cooling time of 1 hour or as stated by the bidder in their offer, whichever is lesser.** For the purpose of this Agreement, Cycle shall mean charging of the BESS upto the Contracted capacity followed by discharge of such stored energy. ~~Discharging from the BESS is not allowed between 10:00 AM and 5:00 PM of each day.~~ The BESSD shall not use the Contracted Capacity for any purpose other than that specified in this Agreement. ..... (ii) Energy scheduled for discharge in a given cycle during a year shall be more than or equal to the Min. Dispatchable Energy Capacity at the End of Year as specified under Article 4.4.2(c). ~~Discharging from the BESS is not~~

			~~allowed between 10:00 AM and 5:00 PM of each day.~~ For example, during the 3rd Year after COD, the energy scheduled for discharge from 125 MW/ 250 MWh capacity shall be more than or equal to 125x0.925x2 = 231.25MWh. ……
48	Article 4, 4.4.2 (a) Page 191 of BESPA	**Minimum Monthly Average Availability of 95%:** During any Month for the Contracted Capacity, BESSD shall be required to maintain minimum Monthly average availability of 95%. Monthly Average Availability shall be calculated as per methodology given in the RfS. In case of shortfall in meeting the above criteria, the BESSD shall be levied liquidated damages for such shortfall and shall duly pay such damages to NHPC to enable NHPC to remit the amount to APDISCOMs / Buying Entity under BESSA. Amount of such liquidated damages shall be twice the Capacity Charges (Capacity Charges shall mean Applicable Tariff as defined under Article 9 of the BESPA) for the capacity not made available. The Minimum Monthly Average Availability as specified above, shall however be relaxable by NHPC to the extent of grid non-availability for evacuation which is beyond the control of the BESSD (as certified by the SLDC/RLDC) and / or upon occurrence of Force Majeure event as identified in BESPA (and occurrence of such Force Majeure event(s) has been mutually agreed) and affecting availability and supply of Contracted Capacity.	**Minimum Monthly Annual Average Availability of 95%:** During any ~~Month~~ **Year** for the Contracted Capacity, BESSD shall be required to maintain minimum ~~Monthly~~ **Annual** average availability of 95%. Monthly Annual Average Availability shall be calculated as per methodology given in **Schedule-B of this Agreement** ~~the RfS~~. In case of shortfall in meeting the above criteria, the BESSD shall be levied liquidated damages for such shortfall and shall duly pay such damages to NHPC to enable NHPC to remit the amount to ~~APDISCOMs~~ **APTRANSCO** / Buying Entity under BESSA. Amount of such liquidated damages shall be twice the Capacity Charges (Capacity Charges shall mean Applicable Tariff as defined under Article 9 of the BESPA) for the capacity not made available. The Minimum ~~Monthly~~ **Annual** Average Availability as specified above, shall however be relaxable by NHPC to the extent of grid non-availability for evacuation which is beyond the control of the BESSD (as certified by the SLDC/RLDC) and / or upon occurrence of Force Majeure event as identified in BESPA (and occurrence of such Force Majeure event(s) has been mutually agreed) and affecting availability and supply of Contracted Capacity.
49	Article 4, 4.4.2 (a) Page 192 of BESPA	…….. Round Trip Efficiency: The BESSD shall maintain AC to AC roundtrip efficiency (RtE) of system on a monthly basis. Calculation of Round-Trip Efficiency shall be as per the methodology specified in RfS. The BESSD shall be liable for liquidated damages, if any, as per following criteria: (i) For 70% ≤ RtE < 85% there shall be a liquidated damage levied @ APPC charge of previous financial year of	…….. Round Trip Efficiency: The BESSD shall maintain AC to AC roundtrip efficiency (RtE) of system on a monthly basis. Calculation of Round-Trip Efficiency shall be as per the methodology specified in RfS. The BESSD shall be liable for liquidated damages, if any, as per following criteria: (i) For 70% ≤ RtE < 85% there shall be a liquidated damage levied @ APPC charge of previous financial year of APDISCOMs levied upon excess conversion losses considering system RtE = 85%

		APDISCOMs levied upon excess conversion losses considering system RtE = 85% (ii) For RtE <70%, there shall be a liquidated damage levied @1.5 times APPC charge of previous financial year of the APDISCOMs upon the excess conversion losses considering system RtE = 85%. (iii) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85%	(ii) For RtE <70%, there shall be a liquidated damage levied ~~@1.5 times~~ APPC charge of previous financial year of the APDISCOMs upon the excess conversion losses considering system RtE = 85% **and tariff payment for the corresponding month shall not be made to the BESSD**. (iii) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85%
50	Article 4, 4.4.3 Page 193 of BESPA	**Shortfall in meeting Performance Criteria:** **Following provisions shall be applicable on the Contracted Capacity guaranteed to be offtaken by NHPC:** Subsequent to COD of full Project Capacity, in case the Monthly Availability demonstrated by the BESSD is less than the minimum as specified above, such shortfall in performance shall make the BESSD liable to pay the liquidated damages provided in the BESSA as payable by NHPC to Buying Entity and shall duly pay such damages to NHPC to enable NHPC to remit the amount to Buying Entity. Liquidated damages on account of shortfall in meeting the minimum Availability criteria as per Article 4.4.2 (a) will be computed as follows: Liquidated damages = (A – B) x C x D x 2 where, A is Guaranteed Monthly Availability as per Article 4.4.2 (a) above; B is Actual Monthly System Availability, as calculated as per Schedule-B of this Agreement; C is Contracted Capacity; D is Tariff / Capacity Charges/MW/month as discovered through bidding process; In case the BESSD fails to meet the monthly RtE demonstration as per Article 4.4.2 (b), additional Liquidated Damages for the unavailability of the required minimum RtE shall be applicable for the entire month. For avoidance of any doubt, liquidated damages as specified	**Shortfall in meeting Performance Criteria:** Following provisions shall be applicable on the Contracted Capacity guaranteed to be offtaken by NHPC: Subsequent to COD of full Project Capacity, in case the ~~Monthly~~ **Annual** Availability demonstrated by the BESSD is less than the minimum as specified above, such shortfall in performance shall make the BESSD liable to pay the liquidated damages provided in the BESSA as payable by NHPC to Buying Entity and shall duly pay such damages to NHPC to enable NHPC to remit the amount to Buying Entity. Liquidated damages on account of shortfall in meeting the minimum Availability criteria as per Article 4.4.2 (a) will be computed as follows: Liquidated damages = (A – B) x C x D x 2 **x n** where, A is Guaranteed ~~Monthly~~ **Annual** Availability as per Article 4.4.2 (a) above; B is Actual ~~Monthly~~ **Annual** System Availability, as calculated as per Schedule-B of this Agreement; C is Contracted Capacity; D is Tariff / Capacity Charges/MW/month as discovered through bidding process; **n = 12;** **In case of first & last year of operations are part years, then 'n' shall be regulated accordingly.** In case the BESSD fails to meet the monthly RtE demonstration as per Article 4.4.2 (b), additional Liquidated Damages for the unavailability of the required minimum RtE shall be applicable for the entire month. For avoidance of any doubt, liquidated damages as specified above are mutually exclusive and independent, therefore, in case of levying of liquidated damages against ~~Monthly~~ **Annual** Average Availability and Round-

<table>
<tr><td></td><td></td><td>above are mutually exclusive and independent, therefore, in case of levying of liquidated damages against Monthly Average Availability and Round-Trip Efficiency, both damages shall be payable by the BESSD. Illustrations regarding calculation of liquidated damages are provided at Schedule-2 of this Agreement.</td><td>Trip Efficiency, both damages shall be payable by the BESSD. Illustrations regarding calculation of liquidated damages are provided at Schedule-2 of this Agreement.</td></tr>
<tr><td>51</td><td>Article 6, 6.1.4 Page 201 of BESPA</td><td>The BESSD shall take separate, metered connection for the Auxiliary Power load of BESS. Cost of Auxiliary power shall be borne by the BESSD as per the concerned State regulations.</td><td>The BESSD shall take separate, metered connection from APDISCOMs for the Auxiliary Power load of BESS and can draw auxiliary power at 33kV level after the Metering Point. Cost of Auxiliary power shall be borne by the BESSD as per prevailing tariff <s>the concerned State regulations</s>.
However, During construction phase, the BESSD shall make their own arrangements or APTRANSCO/Discom will extend power supply on chargeable basis.
The BESSD shall make his own arrangements to meet the water requirements during construction and O&M period.</td></tr>
<tr><td>52</td><td>Article 10 of BESPA,
New Clause 10.8</td><td>New Clause added</td><td>Viability Gap Funding:
10.8.1 In line with the ‘Operational Guidelines for implementation of CPSU component under scheme for VGF for development of BESS’ issued by MoP dated 17.10.2024 for the CPSU’s, NHPC was included in the scheme, accordingly, BESSD selected as per this RfS is eligible for grant of Viability Gap Funding (VGF) support by the Central Government for development of Battery Energy Storage Systems, and the same will be disbursed through the Ministry of Power.
10.8.2 The VGF amount eligible for BESS for contracted capacity calculated @Rs. 27,00,000/MWh (Rupees Twenty Seven Lakhs per MWh) or upto 30% of the capital cost of the Project Capacity awarded, whichever is lower.
10.8.3 BESS Developer shall submit audited statement towards incurred certificate for the capital cost incurred for the Project awarded capacity, duly certified by the Statutory Auditors, within six months from the COD.
10.8.4 In case, VGF sanctioned amount is more than 30% of the certified capital cost, then VGF sanctioned amount shall stand revised to 30% of the certified capital cost and VGF disbursement amount shall be adjusted from the subsequent tranches or recovered from developer, as applicable. Disbursement of VGF will be carried out in 5 tranches, as follows:
<table>
<tr><th>Disbursement of VGF</th><th>% of total VGF Sanctioned</th></tr>
<tr><td>Upon achieving Financial Closure as per the BESPA, subject to submission of Bank</td><td>10</td></tr>
</table>
</td></tr>
</table>

Guarantee to the BIA and possession of 90% of the total land required for the Project by the BESSD	
Upon achieving Commercial Operation Date (COD) of the Project	45
Upon completion of 1st year after COD	15
Upon completion of 2nd year after COD	15
Upon completion of 3rd year after COD	15
Total	**100**

10.8.5 The VGF shall be disbursed to BESSD through NHPC on certification of the achievement of the disbursement schedule milestone and submission of the required Bank Guarantee by BESSD to NHPC. VGF shall be disbursed by NHPC to BESSD only after receipt of same from the Government of India.

10.8.6 The BESSD shall submit Bank Guarantee equal to the sanctioned VGF, prior to disbursement of VGF by NHPC. This BG shall be liable for encashment to recover the VGF amount in the event of non-fulfilment of the performance parameter(s) as per clause 4.4.2 and 4.4.3. The BG for the VGF sanctioned up to COD will be released after five (05) years of Commercial operation. If the BESSD fails to commission the project in the timeline provided in this BESPA, and project got terminated after disbursement of the quantum of VGF, NHPC will have full right to recover the total amount of VGF being disbursed till the date of termination of BESPA plus interest @ SBI-MCLR (1 Year) plus five percent, as existing on the date of disbursement, accrued from the date of disbursement on the disbursed amount. In case Project capacity is being reduced as per article 4.6.1(b) of this BESPA, recovery of VGF amount shall be made on pro-rata basis corresponding to the capacity being terminated. NHPC will have the right to recover the VGF disbursed through encashment of BG, if the BESPA gets terminated within the first 5 years after COD of the Project, on account of reasons solely attributable to the BESSD. Irrespective of the year of termination within the first 5 years after COD, the VGF amount to be recovered will be fixed as the amount disbursed **till date of termination of BESPA** plus interest @ SBI-MCLR (1 Year) plus 5 percent, as existing on the date of disbursement, accrued from the date of disbursement on the disbursed amount. If the Project is transferred or sold to a third party during the above tenure, the BG will be re-issued by the new entity, corresponding to the amount applicable. The sale/transfer of the Project shall be effective only on submission of BG by new

			entity.
53	Article 11, 11.2(a) Page 213 of BESPA	Act of God, including, but not limited to lightning, fire and explosion (to the extent originating from a source external to the site), earthquake, volcanic eruption, landslide, flood, pandemic, cyclone, typhoon or tornado if it is declared / notified by the competent state / central authority / agency (as applicable), or verified to the satisfaction of Procurer;	Act of God, including, but not limited to ~~lightning, fire and explosion (to the extent originating from a source external to the site),~~ earthquake, volcanic eruption, landslide, flood, pandemic, cyclone, typhoon or tornado if it is declared / notified by the competent state / central authority / agency (as applicable), or verified to the satisfaction of Procurer;
54	2 of Schedule B of BESPA Page 238	The BESSD shall make the BESS available for 2 operational cycle per day, i.e. 2 complete charge-discharge cycle per day. Following provisions shall be applicable on the Project Capacity: ……	The BESSD shall make the BESS available for 2 operational cycle per day, i.e. 2 complete charge-discharge cycle per day. **Charging and Discharging from the BESS shall be solely as per the schedule by APDISCOMs/SLDC. APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS. The cooling period required for intermittent charging, intermittent discharging, reversal of cycle from charging to discharge and vice versa, shall be stated by the bidder in their proposal, as stated in the RfS, without fail. However, BESSD should allow the BESS to be charged to its full depth in two separate discontinuous spells and discharged in three separate discontinuous spells per cycle, in a staggered manner, without transitioning between charging and discharging states, to meet grid exigencies whenever required.** **However, due to grid exigencies if any, whenever the mode of BESS transitions from charging to discharging or from discharging to charging during an intermediary cycle (before reaching full depth charging/discharging), it will be considered as one cycle, subject to maximum cooling time of 1 hour or as stated by the bidder in their offer, whichever is lesser.** Following provisions shall be applicable on the Project Capacity: ……
55	2 (i) of Schedule B of BESPA Page 238	The procurement shall be in power (MW) terms. The BESSD shall install, operate and maintain the BESS to offer facility to the Buying Entity to charge and discharge the BESS on an "on demand" basis. The BESSD shall guarantee a minimum system availability of 95% on monthly basis. The BESSD shall pay the liquidated damages for such shortfall and shall duly pay such damages to NHPC to enable NHPC to remit the	The procurement shall be in power (MW) terms. The BESSD shall install, operate and maintain the BESS to offer facility to the Buying Entity to charge and discharge the BESS on an "on demand" basis. The BESSD shall guarantee a minimum system availability of 95% on ~~monthly~~ **Annual** basis. The BESSD shall pay the liquidated damages for such shortfall and shall duly pay such damages to NHPC to enable NHPC to remit the amount to Buying Entity under BESSA. Amount of such liquidated damages shall be twice the

		amount to Buying Entity under BESSA. Amount of such liquidated damages shall be twice the Capacity Charges for the capacity not made available.	Capacity Charges for the capacity not made available.
56	2 (ii) of Schedule B of BESPA Page 238	Availability of the project shall mean the ability of the BESS to execute a function i.e. charging or discharging, when called upon to do so, as per the schedule or signal provided by the off-taker, subject to the minimum system ratings specified herein. In addition, the BESSD shall also demonstrate, on monthly basis, 100% of the minimum dispatchable capacity of the BESS as required under Clause 6.1 e iv of RfS.	Availability of the project shall mean the ability of the BESS to execute a function i.e. charging or discharging, when called upon to do so, as per the schedule or signal provided by the off-taker, subject to the minimum system ratings specified herein. In addition, the BESSD shall also demonstrate, on monthly basis, 100% of the minimum dispatchable capacity of the BESS as required under Clause 6.1 e iv of RfS. **System Monthly availability shall be calculated as per above for each month. On the basis of monthly Availability, average of actual monthly availability for each month shall be taken for calculation of Annual System Availability.**
57	2 (iii) of Schedule B of BESPA Page 238	The BESSD shall guarantee AC to AC roundtrip efficiency (RtE) of system on monthly basis. The BESSD shall be liable for Liquidated Damages to the off-taker, if any, on account of excess conversion losses, based on the following conditions: (a) For RtE <70%, there shall be a liquidated damage @ 1.5 times of APPC charge of previous financial year of the Discom/ APDISCOMs of excess conversion losses considering system RtE = 85%; For 70% ≤ RtE < 85%, there shall be a liquidated damage levied @ APPC tariff of last year of buying entity, per unit of excess conversion losses considering system RtE = 85%. (b) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85%	The BESSD shall guarantee AC to AC roundtrip efficiency (RtE) of system on monthly basis. The BESSD shall be liable for Liquidated Damages to the off-taker, if any, on account of excess conversion losses, based on the following conditions: (a) For RtE <70%, there shall be a liquidated damage @ ~~1.5 times of~~ APPC charge of previous financial year of the Discom/ APDISCOMs of excess conversion losses considering system RtE = 85% **and tariff payment for the corresponding month shall not be made to the BESSD**. For 70% ≤ RtE < 85%, there shall be a liquidated damage levied @ APPC tariff of last year of buying entity, per unit of excess conversion losses considering system RtE = 85%. (b) For RtE > 85%, there shall be incentive @Rs. 0.50 per unit of excess discharge of energy considering system RtE = 85%.
58	2 (iii) (b) of Schedule B of BESPA Page 238	……. Note: • The scheduled capacity shall be subject to the system power rating specified in Clause 1 above • The BESSD shall take separate, metered connection for the Auxiliary Power load of BESS	……. Note: • The scheduled capacity shall be subject to the system power rating specified in Clause 1 above • The BESSD shall take separate, metered connection **from APDISCOMs** for the Auxiliary Power load of BESS
59	5 (c) of	Planned Maintenance Outage duly informed by the BESSD to the off-taker with at least one month's prior notice, subject	Planned Maintenance Outage duly informed by the BESSD to the off-taker

	Schedule B of BESPA Page 239	to total no. of planned outage period being not more than 34 hours in a two-month period. BESSD will have to comply with the Charging and Discharging Schedule as intimated by Buying Entity.	with at least one month's prior notice, subject to total no. of planned outage period being not more than 34 hours in a two-month period. **The BESSD shall take up all planned maintenance outages between 9: 00 Hrs to 14:00 Hrs only.** BESSD will have to comply with the Charging and Discharging Schedule as intimated by Buying Entity. **APDISCOMs will provide tentative day-ahead schedules, however, real-time charging and discharging instructions will be given with two-block advance notice. This notice shall consider cool-off time required for the BESS.**
60	New Clause 8 of Schedule B of BESPA Page 240	New Clause added	Licensed copies of IEC 62933-2-1 shall be supplied by BESS developers to APTRANSCO.
61	XIV of BESSA Page 252	The Buying Entity shall be responsible for obtaining Grid Access as per the regulations of State Electricity Regulatory Commission within 30 days of signing of BESSA, at its own risk and cost. It is further clarified that the Entities (BESSD and Buying Entity) as indicated in the Detailed Procedure issued subsequently under the above Regulation, will be responsible for their respective obligation irrespective of the provisions of the RfS, BESPA and BESSA.	~~The Buying Entity shall be responsible for obtaining Grid Access as per the regulations of State Electricity Regulatory Commission within 30 days of signing of BESSA, at its own risk and cost. It is further clarified that the Entities (BESSD and Buying Entity) as indicated in the Detailed Procedure issued subsequently under the above Regulation, will be responsible for their respective obligation irrespective of the provisions of the RfS, BESPA and BESSA.~~
62	Article 1, 1.1 of BESSA Page 252	The Tariff applicable for the sale of BESS Capacity by NHPC to the Buying Entity under this Agreement shall be the Tariff as applicable for payment by NHPC to BESSD under the terms of the BESPA between NHPC and the BESSD (Individual BESSDs tariff as per schedule B) fixed for entire term of agreement at delivery point and in addition thereto a trading margin of 0.5% of the applicable capacity charges / tariff OR 7 paise / kWh as the case may be and any taxes and duties including GST (if applicable) for making BESS capacity available to the Buying Entity under this Agreement, shall be payable by the Buying Entity to NHPC over and above of the Applicable Tariff under BESPA, which NHPC shall be entitled	The Tariff applicable for the sale of BESS Capacity by NHPC to the Buying Entity under this Agreement shall be the Tariff as applicable for payment by NHPC to BESSD under the terms of the BESPA between NHPC and the BESSD (Individual BESSDs tariff as per schedule B) fixed for entire term of agreement at delivery point and in addition thereto a trading margin of ~~0.5% of the applicable capacity charges / tariff OR~~ 7 paise / kWh ~~as the case may be~~ and any taxes and duties including GST (if applicable) for making BESS capacity available to the Buying Entity under this Agreement, shall be payable by the Buying Entity to NHPC over and above of the Applicable Tariff under BESPA, which NHPC shall be entitled to appropriate as its income.

		to appropriate as its income.	
63	Article 1, 1.2 of BESSA Page 252	As per provisions of the BESPA, the BESSDs are permitted for full as well as part commissioning of the Project even prior to the SCD. In case of early part / full commissioning of the Project(s) prior to SCD, Buying Entity shall purchase the BESS Capacity at Applicable capacity charges / tariff as per the BESPA, plus NHPC's Trading Margin of Rs 0.5% of the Applicable capacity charges / Tariff OR 7 paise / kWh as the case may be as per BESPA.	As per provisions of the BESPA, the BESSDs are permitted for full as well as part commissioning of the Project even prior to the SCD. In case of early part / full commissioning of the Project(s) prior to SCD, Buying Entity shall purchase the BESS Capacity at Applicable capacity charges / tariff as per the BESPA, plus NHPC's Trading Margin of ~~Rs 0.5% of the Applicable capacity charges / Tariff OR~~ 7 paise / kWh ~~as the case may be~~ as per BESPA.
64	Article 1, 1.3 of BESSA Page 253	Incentive for Higher Round Trip Efficiency of 85%: BESSD will be liable to receive an amount calculated @ INR 0.5/kWh for incremental supply on account of Roundtrip Efficiency in excess of 85%	Incentive for Higher Round Trip Efficiency of 85%: BESSD will be liable to receive an amount calculated @ INR 0.5/kWh for incremental supply on account of Roundtrip Efficiency in excess of 85%. **The BESSD shall be liable for liquidated damages if any, as per following criteria:** **(i) For 70% ≤ RtE< 85% there shall be a liquidated damage levied @ APPC tariff of previous financial year of the Discom/ APDISCOMs for the excess conversion losses considering system RtE = 85%.** **(ii) For RtE<70%, there shall be a liquidated damage @ APPC tariff of previous financial year of the Discom/ APDISCOMs for the excess conversion losses considering system RtE = 85% and tariff payment for the corresponding month shall not be made to the BESSD.**
65	Article 2, 2.3 of BESSA Page 254	In the event of payment of a Monthly Bill by the Buying Entity beyond the Due Date, a Late Payment Surcharge (LPS) shall be payable by the Buying Entity to NHPC on the outstanding payment, at the base rate of Late Payment Surcharge applicable for the period for the first month of default. "Base rate of Late Payment Surcharge" means the marginal cost of funds based lending rate for one year of the State Bank of India, as applicable on the 1st April of the financial year in which the period lies, plus five percent and in the absence of marginal cost of funds based lending rate, any other arrangement that substitutes it, which the Central Government may, by notification, in the Official Gazette, specify.	In the event of payment of a Monthly Bill by the Buying Entity beyond the Due Date, a Late Payment Surcharge (LPS) shall be payable by the Buying Entity to NHPC on the outstanding payment, **as per Late Payment Surcharge Rules 2022 as amended from Time to Time** ~~at the base rate of Late Payment Surcharge applicable for the period for the first month of default. "Base rate of Late Payment Surcharge" means the marginal cost of funds based lending rate for one year of the State Bank of India, as applicable on the 1st April of the financial year in which the period lies, plus five percent and in the absence of marginal cost of funds based lending rate, any other arrangement that substitutes it, which the Central Government may, by notification, in the Official Gazette, specify.~~ The Late Payment Surcharge shall be claimed by NHPC through the Supplementary Bill. Late Payment Surcharge shall be payable on the

		The Late Payment Surcharge shall be claimed by NHPC through the Supplementary Bill. Late Payment Surcharge shall be payable on the outstanding payment beyond the Due Date at the base rate of Late Payment Surcharge applicable for the period for the first month of default. The rate of Late Payment Surcharge for the successive months of default shall increase by 0.5 percent (50 bps) for every month of delay provided that the Late Payment Surcharge shall not be more than 3 percent higher than the base rate at any time:	outstanding payment beyond the Due Date at the base rate of Late Payment Surcharge applicable for the period for the first month of default. The rate of Late Payment Surcharge for the successive months of default shall increase by 0.5 percent (50 bps) for every month of delay provided that the Late Payment Surcharge shall not be more than 3 percent higher than the base rate at any time: .....
66	Article 2, 2.9.3 of BESSA Page 258	If the NHPC agrees to the claim raised in the Bill Dispute Notice issued pursuant to Article 2.9.2, the NHPC shall make appropriate adjustment in the next Monthly Bill.	If the NHPC agrees to the claim raised in the Bill Dispute Notice issued pursuant to Article 2.9.2, the NHPC shall make appropriate adjustment in the next Monthly Bill. **In such a case excess amount shall be governed as per Late Payment Surcharge Rules 2022 as amended from Time to Time.**
67	Article 2, 2.11.3 of BESSA Page 260	The provisions of Article 4.4.1 of the BESPA shall be applicable mutatis mutandis to this Agreement. BESSD, in any Contract Year except for the Contract Year ending on 31st March immediately after COD of the Project, shall not be obliged to supply / make available any BESS capacity beyond / over and above Contracted Capacity. After the declaration of UCOD / COD, Charging power for charging of the BESS Capacity shall be scheduled and supplied by the Buying Entity. In no case, Buying Entity shall demand / schedule any energy in excess of 85% of the energy scheduled considering minimum round trip efficiency of the BESS being 85%. However, in case BESSD could demonstrate Round trip Efficiency in excess of 85%, for such incremental energy on account better Round Trip Efficiency, BESSD will be liable to receive an amount calculated @ INR 0.50/kWh for such incremental supply on account of higher Round trip efficiency. Schedule of charging and Discharging will be as per extant regulations / provisions. Further, during a Day, Buying Entity shall not ask for / schedule any BESS capacity / Energy in excess of 2 cycles of charge and discharge of 2 hours each. For an example, in a cycle charge to the rated	The provisions of Article 4.4.1 of the BESPA shall be applicable mutatis mutandis to this Agreement. BESSD, in any Contract Year except for the Contract Year ending on 31st March immediately after COD of the Project, shall not be obliged to supply / make available any BESS capacity beyond / over and above Contracted Capacity. After the declaration of UCOD / COD, Charging power for charging of the BESS Capacity shall be scheduled and supplied by the Buying Entity. In no case, Buying Entity shall demand / schedule any energy in excess of 85% of the energy scheduled considering minimum round trip efficiency of the BESS being 85%. However, in case BESSD could demonstrate Round trip Efficiency in excess of 85%, for such incremental energy on account better Round Trip Efficiency, BESSD will be liable to receive an amount calculated @ INR 0.50/kWh for such incremental supply on account of higher Round trip efficiency. **Charging and Discharging from the BESS shall be solely as per the schedule by APDISCOMs/SLDC**. ~~Schedule of charging and Discharging will be as per extant regulations / provisions~~. Further, during a Day, Buying Entity shall not ask for / schedule any BESS capacity / Energy in excess of 2 cycles of charge and discharge of 2 hours each. For an example, in a cycle charge to the rated capacity for 2 hours is permitted which could be a single stretch of 2 hours or multiple stretch having total cumulative time period of 2 hours. Similarly, for discharge, there could be a single stretch of 2 hours or multiple stretch

		capacity for 2 hours is permitted which could be a single stretch of 2 hours or multiple stretch having total cumulative time period of 2 hours. Similarly, for discharge, there could be a single stretch of 2 hours or multiple stretch having total cumulative time period of 2 hours subject to condition that total scheduled discharge of energy from BESS as demanded by the Buying Entity shall be limited to 85% of the energy supplied by the Buying Entity.	having total cumulative time period of 2 hours subject to condition that total scheduled discharge of energy from BESS as demanded by the Buying Entity shall be limited to 85% of the energy supplied by the Buying Entity. .....
68	Schedule 2 of BESPA Page 242		Modified Illustration attached
69	Annexure-8		Modified Illustration attached
70	Annexure-9		Modified Table attached

All other terms & conditions of the Bid Document shall remain unchanged.

General Manager (CC-I)

Email: contcivil1-co@nhpc.nic.in

SCHEDULE 2

ILLUSTRATIONS (Modified)

(Please refer Article 4.4 of this Agreement)

Illustration

a. **System Availability**

Under a BESPA between an off-taker and BESSD for a capacity 'C', the Schedule and Actual Injection into/Drawl from the Grid from the Project, as per the DSM/ UI Reports published by the SLDC for a Sample Day is shown below:

Date	Block	Drawl (from Grid) MUs (Charging) X	Injection (into Grid) MUs (Discharging) (Y)	Schedule MUs (Z)	Time-block Availability, (TA) = (Xi/Zi) + (Yi/Zi)
01-May-24	1	0.147	0	0.147	1.00
01-May-24	2	0.147	0	0.147	1.00
01-May-24	3	0.125	0	0.147	0.85
01-May-24	4	0	0	0	NA
01-May-24	5	0	0	0	NA
01-May-24	6	0	0	0	NA
01-May-24	7	0	0	0	NA
01-May-24	8	0	0	0	NA
01-May-24	9	0	0	0	NA
01-May-24	10	0	0	0	NA
01-May-24	11	0	0	0	NA
01-May-24	12	0	0	0	NA
01-May-24	13	0	0	0	NA
01-May-24	14	0	0	0	NA
01-May-24	15	0	0	0	NA
01-May-24	16	0	0	0	NA
01-May-24	17	0	0	0	NA
01-May-24	18	0	0	0	NA
01-May-24	19	0	0	0	NA
01-May-24	20	0	0	0	NA
01-May-24	21	0	0	0	NA
01-May-24	22	0	0	0	NA
01-May-24	23	0	0	0	NA
01-May-24	24	0	0.125	0.125	1
01-May-24	25	0	0.125	0.125	1
01-May-24	26	0	0.125	0.125	1
01-May-24	27	0	0.125	0.125	1
01-May-24	28	0	0.125	0.125	1

01-May-24	29	0	0.125	0.125	1
01-May-24	30	0	0.100	0.125	0.8
01-May-24	31	0	0.084	0.125	0.67
01-May-24	32	0	0	0	NA
01-May-24	33	0	0	0	NA
01-May-24	34	0	0	0	NA
01-May-24	35	0	0	0	NA
01-May-24	36	0	0	0	NA
01-May-24	37	0	0	0	NA
01-May-24	38	0	0	0	NA
01-May-24	39	0	0	0	NA
01-May-24	40	0	0	0	NA
01-May-24	41	0	0	0	NA
01-May-24	42	0	0	0	NA
01-May-24	43	0	0	0	NA
01-May-24	44	0.147	0	0.147	1.00
01-May-24	45	0.147	0	0.147	1.00
01-May-24	46	0.147	0	0.147	1.00
01-May-24	47	0.147	0	0.147	1.00
01-May-24	48	0.147	0	0.147	1.00
01-May-24	49	0.147	0	0.147	1.00
01-May-24	50	0.147	0	0.147	1.00
01-May-24	51	0.147	0	0.147	1.00
01-May-24	52	0	0	0	NA
01-May-24	53	0	0	0	NA
01-May-24	54	0	0	0	NA
01-May-24	55	0	0	0	NA
01-May-24	56	0	0	0	NA
01-May-24	57	0	0	0	NA
01-May-24	58	0	0	0	NA
01-May-24	59	0	0	0	NA
01-May-24	60	0	0	0	NA
01-May-24	61	0	0	0	NA
01-May-24	62	0	0	0	NA
01-May-24	63	0	0	0	NA
01-May-24	64	0	0	0	NA
01-May-24	65	0	0	0	NA
01-May-24	66	0	0	0	NA
01-May-24	67	0	0	0	NA
01-May-24	68	0	0	0	NA
01-May-24	69	0	0	0	NA
01-May-24	70	0	0	0	NA
01-May-24	71	0	0	0	NA
01-May-24	72	0	0	0	NA
01-May-24	73	0	0	0	NA
01-May-24	74	0	0	0	NA

01-May-24	75	0	0	0	NA
01-May-24	76	0	0	0	NA
01-May-24	77	0	0	0	NA
01-May-24	78	0	0	0	NA
01-May-24	79	0	0	0	NA
01-May-24	80	0	0.116	0.125	0.93
01-May-24	81	0	0.116	0.125	0.93
01-May-24	82	0	0.116	0.125	0.93
01-May-24	83	0	0.116	0.125	0.93
01-May-24	84	0	0.125	0.125	1.00
01-May-24	85	0	0.116	0.125	0.93
01-May-24	86	0	0.116	0.125	0.93
01-May-24	87	0	0.116	0.125	0.93
01-May-24	88	0	0	0	NA
01-May-24	89	0	0	0	NA
01-May-24	90	0	0	0	NA
01-May-24	91	0	0	0	NA
01-May-24	92	0.125	0	0.147	0.85
01-May-24	93	0.125	0	0.147	0.85
01-May-24	94	0.125	0	0.147	0.85
01-May-24	95	0.129	0	0.147	0.88
01-May-24	96	0.132	0	0.147	0.90
Total		**2.231**	**1.871**		**0.94**

i is the i^{th} Timeblock in the day.
The System Availability for the day is calculated as the mean of **Column TA**, for all time-blocks where **Column Z is not zero**.
From the above table, Day's System Availability = **0.94**
Similarly, the System availability shall be calculated for 2880 time-blocks (96*30) in a month (considering 30 days in a month), excluding time-blocks where Grid is unavailable or in case of Force Majeure.

Illustarion of calaculation for Annual Average Availability on the basis of monthly availability:

Month	**Monthly Average Availability**	**Annual Average Availability = {∑(MonthlyAverage Availability)}/ 12**
1	95%	$\frac{(95\%+95\%+93\%+97\%+93\%+98\%+95\%+92\%+96\%+95\%+91\%+90\%)}{12}$ =94.16% Say (94%)
2	95%	
3	93%	
4	97%	
5	93%	
6	98%	

7	95%	
8	92%	
9	96%	
10	95%	
11	91%	
12	90%	

Assuming the following parameters:

a. Total Contracted Capacity = 500 MW, **C**

b. Quoted monthly Capacity charges = 2 lakhs/MW/month, **D**

c. Annual system availability (as per procedure above) is calculated to be 0.94, **B**

d. Guaranteed Annual System Availability = 0.95, **A**

Liquidated Damages on account of shortage in Annual System Availability, as calculated from formula provided in Article 4.4.3:

Liquidated damages = (A – B) x C x D x 2 x n

= (0.95-0.94) x 500 x 2 x 12

= 120 lakhs

b. **System Efficiency**

The present illustration is for calculating the Daily System Efficiency as demonstration only. The same methodology shall be used for calculation of monthly system efficiency as per Clause 6.1.e.iii of RfS.

$$\text{System Efficiency} = \frac{\text{Total of Column (Y)}}{\text{Total of Column (X)}} = \frac{1.871}{2.231} = 0.84$$ (rounded off to 2 decimal places)

Assuming:

a. Monthly System Efficiency = 0.84,

b. Total Monthly Drawl from the Grid (Charging Power) = 66.93 MUs (2.231 x 30)

Liquidated Damages is calculated @ APPC for excess loss of energy considering expected System Efficiency to be 85%

Excess conversion losses = (0.85-0.84) x Total Drawl from the grid in the month (i.e. Charging Energy)

Liquidated Damages for the month = Rs. 0.01 x 66.93 x APPC Tariff, for eg Rs 3/kWh

= Rs. 2.008 Millions

= Rs. 20.08 lakh

Annexure - 8

ILLUSTRATIONS (Modified)

(Please refer Clause 6 under Section 3B of the RfS)

Illustration

a. **System Availability**

Under a BESPA between an off-taker and BESSD for a capacity 'C', the Schedule and Actual Injection into/Drawl from the Grid from the Project, as per the DSM/ UI Reports published by the SLDC for a Sample Day is shown below:

Date	Block	Drawl (from Grid) MUs (Charging) X	Injection (into Grid) MUs (Discharging) (Y)	Schedule MUs (Z)	Time-block Availability, (TA) = (Xi/Zi) + (Yi/Zi)
01-May-24	1	0.147	0	0.147	1.00
01-May-24	2	0.147	0	0.147	1.00
01-May-24	3	0.125	0	0.147	0.85
01-May-24	4	0	0	0	NA
01-May-24	5	0	0	0	NA
01-May-24	6	0	0	0	NA
01-May-24	7	0	0	0	NA
01-May-24	8	0	0	0	NA
01-May-24	9	0	0	0	NA
01-May-24	10	0	0	0	NA
01-May-24	11	0	0	0	NA
01-May-24	12	0	0	0	NA
01-May-24	13	0	0	0	NA
01-May-24	14	0	0	0	NA
01-May-24	15	0	0	0	NA
01-May-24	16	0	0	0	NA
01-May-24	17	0	0	0	NA
01-May-24	18	0	0	0	NA
01-May-24	19	0	0	0	NA
01-May-24	20	0	0	0	NA
01-May-24	21	0	0	0	NA
01-May-24	22	0	0	0	NA
01-May-24	23	0	0	0	NA
01-May-24	24	0	0.125	0.125	1
01-May-24	25	0	0.125	0.125	1
01-May-24	26	0	0.125	0.125	1
01-May-24	27	0	0.125	0.125	1
01-May-24	28	0	0.125	0.125	1

01-May-24	29	0	0.125	0.125	1
01-May-24	30	0	0.100	0.125	0.8
01-May-24	31	0	0.084	0.125	0.67
01-May-24	32	0	0	0	NA
01-May-24	33	0	0	0	NA
01-May-24	34	0	0	0	NA
01-May-24	35	0	0	0	NA
01-May-24	36	0	0	0	NA
01-May-24	37	0	0	0	NA
01-May-24	38	0	0	0	NA
01-May-24	39	0	0	0	NA
01-May-24	40	0	0	0	NA
01-May-24	41	0	0	0	NA
01-May-24	42	0	0	0	NA
01-May-24	43	0	0	0	NA
01-May-24	44	0.147	0	0.147	1.00
01-May-24	45	0.147	0	0.147	1.00
01-May-24	46	0.147	0	0.147	1.00
01-May-24	47	0.147	0	0.147	1.00
01-May-24	48	0.147	0	0.147	1.00
01-May-24	49	0.147	0	0.147	1.00
01-May-24	50	0.147	0	0.147	1.00
01-May-24	51	0.147	0	0.147	1.00
01-May-24	52	0	0	0	NA
01-May-24	53	0	0	0	NA
01-May-24	54	0	0	0	NA
01-May-24	55	0	0	0	NA
01-May-24	56	0	0	0	NA
01-May-24	57	0	0	0	NA
01-May-24	58	0	0	0	NA
01-May-24	59	0	0	0	NA
01-May-24	60	0	0	0	NA
01-May-24	61	0	0	0	NA
01-May-24	62	0	0	0	NA
01-May-24	63	0	0	0	NA
01-May-24	64	0	0	0	NA
01-May-24	65	0	0	0	NA
01-May-24	66	0	0	0	NA
01-May-24	67	0	0	0	NA
01-May-24	68	0	0	0	NA
01-May-24	69	0	0	0	NA
01-May-24	70	0	0	0	NA
01-May-24	71	0	0	0	NA
01-May-24	72	0	0	0	NA
01-May-24	73	0	0	0	NA
01-May-24	74	0	0	0	NA

01-May-24	75	0	0	0	NA
01-May-24	76	0	0	0	NA
01-May-24	77	0	0	0	NA
01-May-24	78	0	0	0	NA
01-May-24	79	0	0	0	NA
01-May-24	80	0	0.116	0.125	0.93
01-May-24	81	0	0.116	0.125	0.93
01-May-24	82	0	0.116	0.125	0.93
01-May-24	83	0	0.116	0.125	0.93
01-May-24	84	0	0.125	0.125	1.00
01-May-24	85	0	0.116	0.125	0.93
01-May-24	86	0	0.116	0.125	0.93
01-May-24	87	0	0.116	0.125	0.93
01-May-24	88	0	0	0	NA
01-May-24	89	0	0	0	NA
01-May-24	90	0	0	0	NA
01-May-24	91	0	0	0	NA
01-May-24	92	0.125	0	0.147	0.85
01-May-24	93	0.125	0	0.147	0.85
01-May-24	94	0.125	0	0.147	0.85
01-May-24	95	0.129	0	0.147	0.88
01-May-24	96	0.132	0	0.147	0.90
Total		**2.231**	**1.871**		**0.94**

i is the i^{th} Timeblock in the day.
The System Availability for the day is calculated as the mean of **Column TA**, for all time-blocks where **Column Z is not zero**.
From the above table, Day's System Availability = **0.94**
Similarly, the System availability shall be calculated for 2880 time-blocks (96*30) in a month (considering 30 days in a month), excluding time-blocks where Grid is unavailable or in case of Force Majeure.

Illustarion of calaculation for Annual Average Availability on the basis of monthly availability:

Month	**Monthly Average Availability**	**Annual Average Availability = {∑(MonthlyAverage Availability)}/ 12**
1	95%	$\frac{(95\%+95\%+93\%+97\%+93\%+98\%+95\%+92\%+96\%+95\%+91\%+90\%)}{12}$ =94.16% Say (94%)
2	95%	
3	93%	
4	97%	
5	93%	
6	98%	

7	95%	
8	92%	
9	96%	
10	95%	
11	91%	
12	90%	

Assuming the following parameters:

a. Total Contracted Capacity = 500 MW, **C**

b. Quoted monthly Capacity charges = 2 lakhs/MW/month, **D**

c. Annual system availability (as per procedure above) is calculated to be 0.94, **B**

d. Guaranteed Annual System Availability = 0.95, **A**

Liquidated Damages on account of shortage in Annual System Availability, as calculated from formula provided in Clause 6.2:

Liquidated damages = (A – B) x C x D x 2 x n

= (0.95-0.94) x 500 x 2 x 12

= 120 lakhs

b. **System Efficiency**

The present illustration is for calculating the Daily System Efficiency as demonstration only. The same methodology shall be used for calculation of monthly system efficiency as per Clause 6.1.e.iii.

$$\text{System Efficiency} = \frac{\text{Total of Column (Y)}}{\text{Total of Column (X)}} = \frac{1.871}{2.231} = 0.84$$ (rounded off to 2 decimal places)

Assuming:

a. Monthly System Efficiency = 0.84,

b. Total Monthly Drawl from the Grid (Charging Power) = 66.93 MUs (2.231 x 30)

Liquidated Damages is calculated @ APPC for excess loss of energy considering expected System Efficiency to be 85%

Excess conversion losses = (0.85-0.84) x Total Drawl from the grid in the month (i.e. Charging Energy)

Liquidated Damages for the month = Rs. 0.01 x 66.93 x APPC Tariff, for eg Rs 3/kWh

= Rs. 2.008 Millions

= Rs. 20.08 lakh

Annexure-9

PROJECT LOCATION DETAILS (Modified)

(Bidders are requested to contact the concerned person of the substation for further details, if required

Sl No.	Project Location (within the State of Andhra Pradesh)	Project Capacity in (MW/MWh)	Land Available (In Acre)	Bay Availability	GPS Location	Contact Person	Phone No
1	400kV Substation (AIS), Jammalamadugu	225/450	~~Area1: 3.67 Area2: 5.46~~ **Plot-1 about 15 acres (beside 400kV Switchyard) and Plot- 2 about 5 acres (beside 132kV switchyard)**	~~2Nos 220KV bays available~~ **Power evacuation infrastructure up to the 33 kV level (including Bays) shall be developed by APTRANSCO**	14°55'59.48"N 78°18'54.91"E	DEE AEE	9550299929 9491256082
2	400kV Substation (AIS), Ghani	225/450	~~11.25~~ **Plot of about 12 acres beside 400kV switchyard**	~~Space available for 4 Nos bays. New Bay to be Constructed~~ **Power evacuation infrastructure up to the 33 kV level (including Bays) shall be developed by APTRANSCO**	15°68'02.48"N 78°25'06.55"E	DEE	9490154309
3	220kV Substation (AIS),Kuppam	50/100	~~4~~ **Plot-1: about 2.2 acres (beside 220KV switchyard) and Plot-2 about 0.7 acres (beside control room).**	~~for 2 Nos bays (132kV). New Bay to be Constructed~~ **Power evacuation infrastructure up to the 33 kV level (including Bays) shall be developed by APTRANSCO**	12.811312"N 78.377142"E	DEE	7702745080 9000485267
Total Capacity		500/1000					

AGREEMENT (RIGHT TO USE)

This right to use agreement ("Agreement") is made and executed on this _____th day of _____, _____ by and between:

_____ (CIN: _____) a Company registered under the provisions of the Companies Act, 2013 having its registered office at _____(hereinafter referred to as the "First Party which expression shall, unless it be repugnant to the context or meaning thereof, be deemed to mean and include its nominees, successors, "representatives, administrators and assigns) acting through its duly authorized representative _____ Aadhar Number_____ PAN: _____ Age: _____ years Resident (_____) authorized vide board resolution dated _____ being party of the **FIRST PART.**

AND

_____[**insert the name of the BESSD**] (CIN: _____ Company registered under the provisions of the Companies Act, 2013 having its registered office at _____ (Hereinafter referred to as the "Second Party" which expression shall, unless it be repugnant to the context or meaning thereof, be deemed to mean and include its nominees, successors, representatives, administrators and assigns) acting through its duly authorized representative _____ Aadhar Number_____ PAN: _____ Age: _____ years

Resident (_____) authorized vide board resolution dated _____ being party of the **SECOND PART.**

The First Party, and the Second Party are hereinafter collectively referred to as the "Parties" and sometimes individually as "**Party**".

WHEREAS the First Party is having clear, valid and marketable freehold rights and in possession of land admeasuring _____ hectare equivalent to _____acre situated _____, (hereinafter referred to as the ("**Demised Property**") more particularly detailed and described in the *Annexure-A* attached herewith this Agreement.

AND WHEREAS the First Party has acquired freehold/ rights by way of allotment order/letter Dt. _____, details of which are duly been mentioned in the *Annexure-B* attached herewith this Agreement.

AND WHEREAS the First Party has acquired the freehold rights of the Demised Property for setting up, Intra-State Transmission System (InSTS), and identified the Demised Property for setting up of 500MW/1000MWh Battery Energy Storage System (BESS) ("Project") and to carry out all activities and uses incidental or ancillary thereto and as per the provisions of the aforesaid lease deeds, the First Party is entitled to grant right to use the Demised Property to Second Party for BESS project as per the decision of APTRANSCO.

AND WHEREAS the First Party has agreed to provide the _____ acre of land and described as Demised Property as per Annexure-A, for setting up of 500 MW/1000MWh Battery Energy Storage System (BESS) awarded to the Second Party by NHPC Limited. The Second Party has been selected as a successful bidder under Section 63 of the Electricity Act through a competitive bid organized by NHPC Limited vide its Rfs _____ dated _____. Further the above Project is awarded to the Second Party by NHPC Limited vide LOA No. _____ dated _____.

AND WHEREAS in order to meet the business requirements and to fulfilment of its purpose to develop the Project, the First Party has agreed to grant the right to use the Demised Property in favour of the Second Party and the Second Party has agreed to take the right to use the Demised Property throughout the term of this agreement.

NOW, THEREFORE, IN ORDER TO SUBSTANTIATE AND RECORD THE TERMS AND CONDITIONS OF THE AGREEMENT AND IN CONSIDERATION OF THE MUTUAL COVENANTS AND FOR OTHER GOOD VALUABLE CONSIDERATION, THE PARTIES AGREE AS FOLLOWS:

1. That in consideration of the First Party granting right to use the Demised Property to the Second Party from the signing of this agreement till the 6 months post the completion of terms of NHPC's procurement agreement with Second Party ("**Right to Use Term**") for more clarity, the right to use tenure shall include (i) Development period (i.e. SCOD within 18 months from effective date of BESPA and SCOD extensions if any), (ii) Tenure of the BESPA (ie. 12 years from SCOD), and (iii) 6 months period to transfer the project and relevant permissions to NHPC Limited.

2. The Second Party shall remunerate the First Party, an amount equivalent to Rs. 1 (one) per annum towards rent ("**Right to Use Rent**") payable by the First Party under the Right to Use agreements. Further the due date of first instalment of payment is on the anniversary of this agreement and subsequently, annual payment shall be made by the Second Party within 30 days after the submission of documentary evidence for remittance of land lease amounts.

Save and except the Right to Use Rent, no other amount shall be payable by the Second Party to First Party or to any third party for the right to use the Demised Property granted under this Agreement.

3. That the Second Party shall have right to use the Demised Property, however, all other rights (including but not limited to leasehold/freehold rights, and sublease) shall always remain vested with the First Party.

4. That the rights of the Second Party under this Agreement shall be limited to use the Demised Property, develop the Project and to raise construction thereon in accordance with the sanctioned lay-out/approval granted by the governmental authority, perform the erection, maintenance and operation as well as rights to mortgage, assign the above agreement to its lenders upon an intimation to the First Party.

5. That the First Party shall always be responsible and continue to deposit land revenue or other taxes, NA charges, if any, levied on the Demised Land.

6. The Second Party acknowledges and agrees that it shall be solely responsible for obtaining all statutory or regulatory approvals, clearances, permissions, licenses, or permits ("Approvals") pertaining to this agreement or BESS project. The First Party shall not, under any circumstances, be held liable for any failure by the Second Party to obtain such Approvals.

7. The Second Party agrees that the settlement of any disputes, claims, actions, demands, or proceedings with public/statutory bodies, local authorities, state authorities, or any other relevant entities ("Disputes") pertaining to BESS Project shall be the sole responsibility of the Second Party.

8. The Second Party hereby indemnifies and holds harmless the First Party, its officers, directors, employees, agents, representatives, and properties, from and against any and all claims, actions, demands, proceedings, prosecutions, attachments, liabilities, damages, losses, expenses, penalties, taxes, or charges arising out of or in connection with this agreement.

9. That it is specifically and categorically agreed between the Parties that Second Party may, for financing of the Project, create encumbrance over its Project assets and assign its rights under this agreement in favour of lenders/security trustee for the benefit of lenders without any prior approval from the First Party.

10. That the First Party shall not do any act or omission which may prevent the Second Party from using the Demised Premises for the Project.

11. In the event when both the parties mutually agree to terminate the Agreement, on account of force majeure or any other reason, termination shall take effect from the date and time to be agreed upon mutually.

12. This agreement shall be governed by & construed in accordance with the laws of India. Any dispute or difference arising out of this agreement shall be amicably settled between the parties.

13. That all costs and expenses towards the execution of this Agreement shall be borne by the Second Party.

IN WITNESS WHEREOF THIS AGREEMENT HAS BEEN EXECUTED BY PARTIES HERETO ON THE DATE, MONTH AND YEAR MENTIONED HEREIN ABOVE.

FIRST PARTY	**SECOND PARTY**
FOR APTRANSCO's _____kV Sub-Station	**For _____[BESSD]**
WITNESS 1	**WITNESS 1**
WITNESS 2	**WITNESS 2**

Annexure-A

(Details of the Demised Property such as Land Coordinates, Area, Layout)

Annexure-B

(Govt Order/letter Details of the leased Deed)

Transmission corporation of AP Limited

From
Superintending Engineer
400 kV OMC Circle,
Kadapa.

To
The Chief Engineer
400 kV Construction,
Vidyuth Soudha, Hyderabad.

Lr. NO.SE/400 kV OMC/KDP/ AET/F. 02/D.No.1459/15, Dt.15/10/15

Sir,

Sub:- 400 kV Construction Division, Kadapa – Construction of 400/220/132 kV SS at Jammalamadugu–Earth Resistivity report– Regg.

Ref:-1) Memo.No.CE/400KV/Constn/SE/D2-A2/JMDSS/F.Techno/D.No.531/15, Dt: 09/09/2015

2) Lr. NO.EE/400 kV Constn.Div./KDP/F. 5/D.No.950/15, Dt.15/10/15

****

Adverting to the memo under reference 1st cited, the earth resistivity tests conducted at 400/220/132KV Substation Jammalamadugu site from 07.10.2015 to 15.10.2015 in the following areas. And it is also submit that on 07.10.2015 (6.8cm) and 08.10.2015 (34.4cm) there is heavy rainfall in the switchyard area these readings are taken in full wet condition of the yard, water stored in the cable trenches and low laying areas. While designing the earth mat this factor also may be considered. It is also observed that in 400kv Future yard area average resistivity is 1520.37 Ω-m. which is not disturbed and original soil. Whereas the Present 400kv yard is disturbed i.e blasting done for laying of foundations and backfilled with excavated earth and the average resistivity is 328.43 Ω-m. In 4P6 and 2P8 areas are not able to take readings because electrodes are not penetrating.

1) 400KV Present Switchyard Area (264.25mx145m)
2) 220KV Present Switchyard Area (132.5mx407.5m)
3) 132KV Present Switchyard Area (64.2mx145.8m)
4) 400KV Future Switchyard Area (264.25mx155m)

The average resistivity in the present area by considering switchyard areas 1, 2 and 3 is 329.395 Ω-m. The average resistivity by considering switchyard area 1, 2, 3 and 4 is 627.139 Ω-m.

Further the following documents are submitted for ready reference.

i) Sketch of area wise average resistivity taken in 400KV, 220KV & 132KV Switchyard with dimensions.
ii) The rainfall data during 1st September to 15th October of 2015 in Mylavaram mandal

Encl:- 1) Earth resistivity repot
2) Sketch
3) Rainfall data

Superintending Engineer
400kv OMC Circle
APTRANSCO, Kadapa.

Project: 400/220/132 kV Sub Station Jammalamsdugu, APTRANSCO	
Instrument Make:	MEGGER
Instrument Model No:	DET4TD2
Insutrument Sl.No.:	1000347101114260

Testing Area: 4P1 400kV Present — Date:15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	67.00	842.29	63.00	792.00	86.00	1081.14	77.00	968.00	631.49
2	5		31.43	45.00	1414.29	43.40	1364.00	39.00	1225.71	35.00	1100.00	
3	10		62.86	8.99	565.09	7.09	445.66	8.45	531.14	9.40	590.86	
4	15		94.29	1.95	183.86	2.66	250.80	3.19	300.77	2.70	254.57	
5	25		157.14	0.07	11.00	0.61	95.86	2.50	392.86	1.40	220.00	

Testing Area: 4P2 400 kV Present — Date:15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	30.10	378.40	22.20	279.09	23.10	290.40	27.00	339.43	283.06
2	5		31.43	20.10	631.71	3.83	120.37	7.00	220.00	6.25	196.43	
3	10		62.86	13.58	853.60	2.55	160.29	3.96	248.91	4.00	251.43	
4	15		94.29	2.95	278.14	1.03	97.11	2.19	206.49	2.65	249.86	
5	25		157.14	2.59	407.00	0.22	34.57	1.53	240.43	1.13	177.57	

Testing Area: 4P3 400 kV Present — Date:15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	18.10	227.54	9.85	123.83	18.70	235.09	17.30	217.49	248.71
2	5		31.43	4.41	138.60	6.57	206.49	12.59	395.69	10.70	336.29	
3	10		62.86	6.96	437.49	3.15	198.00	5.79	363.94	6.29	395.37	
4	15		94.29	4.37	412.03	2.13	200.83	2.25	212.14	3.73	351.69	
5	25		157.14	1.46	229.43	0.59	92.71	0.47	73.86	0.80	125.71	

(T. DUTTA)

Testing Area: 4P4 400 kV Present — Date:10.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	21.60	271.54	23.00	289.14	13.49	169.59	18.00	226.29	197.33
2	5		31.43	7.76	243.89	10.10	317.43	8.10	254.57	9.00	282.86	
3	10		62.86	4.46	280.34	5.50	345.71	3.40	213.71	4.40	276.57	
4	15		94.29	0.46	43.37	1.96	184.80	1.20	113.14	1.75	165.00	
5	25		157.14	0.18	28.29	0.71	111.57	0.34	53.43	0.48	75.43	

Testing Area: 4P5 400 kV Present — Date:15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	16.53	207.81	10.07	126.59	15.59	195.99	11.68	146.21	122.96
2	5		31.43	3.51	110.31	2.54	79.83	4.20	132.00	6.67	209.63	
3	10		62.86	1.39	87.37	1.75	110.00	2.91	182.91	3.23	203.03	
4	15		94.29	1.04	98.06	1.01	95.23	1.72	162.17	1.21	114.09	
5	25		157.14	0.35	55.00	0.05	7.86	0.68	106.86	0.18	28.29	

Testing Area: 4P7 400 kV Present — Date:15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	200-250 mm	12.57	Due to transformer Plinth area. Not possible to conduct the test				33.10	416.11	18.40	231.31	487.02
2	5		31.43					21.50	675.71	17.10	537.43	
3	10		62.86					8.40	528.00	7.42	466.40	
4	15		94.29					5.10	480.86	5.14	484.63	
5	25		157.14					2.95	463.57	3.73	586.14	

(S. DUTTA)

Testing Area: 2P1 220kV Present — Date: 12.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	13.46	169.21	9.87	124.08	Cable ducts and filling works are in progress				258.76
2	5		31.43	7.29	229.11	6.41	201.46					
3	10		62.86	4.29	269.66	3.91	245.77					
4	15		94.29	3.2	301.71	3.4	320.57					
5	25		157.14	2.15	337.86	2.47	388.14					

Testing Area: 2P2 220kV Present — Date: 12.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	14.21	178.64	14.97	188.19	15.2	191.09	14.3	179.77	187.95
2	5		31.43	6.01	188.89	2.5	78.57	5.95	187.00	7.5	235.71	
3	10		62.86	4.12	258.97	2.12	133.26	2.95	185.43	4.5	282.86	
4	15		94.29	2.29	215.91	1.63	153.69	2.01	189.51	2.95	278.14	
5	25		157.14	0.55	86.43	1.42	223.14	1.1	172.86	0.96	150.86	

Testing Area: 2P3 220kV Present — Date: 11.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	69.08	868.43	42	528.00	59	741.71	45	565.71	452.21
2	5		31.43	11.14	350.11	15.2	477.71	16.1	506.00	12.95	407.00	
3	10		62.86	5.06	318.06	9.1	572.00	8.1	509.14	5.76	362.06	
4	15		94.29	4.51	425.23	5.71	538.37	4.9	462.00	4.25	400.71	
5	25		157.14	0.95	149.29	2.67	419.57	1.55	243.57	1.27	199.57	

Testing Area: 2P4 220kV Present — Date: 15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	25.8	324.34	20.5	257.71	31.23	392.61	29.3	368.34	308.47
2	5		31.43	12.93	406.37	14.7	462.00	15.1	474.57	14.1	443.14	
3	10		62.86	5.76	362.06	6.11	384.06	6.95	436.86	6.16	387.20	
4	15		94.29	1.13	106.54	2.71	255.51	2.91	274.37	2.51	236.66	
5	25		157.14	0.33	51.86	1.13	177.57	1.25	196.43	1.09	171.29	

S. DUTTA

Testing Area: 2P5 220kV Present — Date: 12.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	20.3	255.20	19.6	246.40	21.4	269.03	23	289.14	270.82
2	5		31.43	5.67	178.20	6.75	212.14	7.96	250.17	10.1	317.43	
3	10		62.86	5.24	329.37	5.1	320.57	6.15	386.57	9.1	572.00	
4	15		94.29	2.93	276.26	3.95	372.43	2.29	215.91	3.1	292.29	
5	25		157.14	0.25	39.29	2.29	359.86	0.6	94.29	0.89	139.86	

Testing Area: 2P6 220kV Present — Date: 15.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	25.1	315.54	8.63	108.49	24.7	310.51	10.5	132.00	236.86
2	5		31.43	12.15	381.86	6.46	203.03	11.84	372.11	8.5	267.14	
3	10		62.86	5.75	361.43	5.57	350.11	2.76	173.49	5.95	374.00	
4	15		94.29	2.2	207.43	1.53	144.26	1.67	157.46	3.15	297.00	
5	25		157.14	1.2	188.57	0.88	138.29	0.05	7.86	1.57	246.71	

Testing Area: 2P7 220kV Present — Date: 12.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	21.4	269.03	16.2	203.66	21.5	270.29	27.1	340.69	268.86
2	5		31.43	11.09	348.54	10.1	317.43	9.8	308.00	12.75	400.71	
3	10		62.86	4.18	262.74	5.69	357.66	6.5	408.57	7.95	499.71	
4	15		94.29	1.66	156.51	2.55	240.43	3.65	344.14	2.95	278.14	
5	25		157.14	0.38	59.71	0.7	110.00	0.38	59.71	0.9	141.43	

Testing Area: 2P9 220kV Present — Date: 12.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	42.5	534.29	40.4	507.89	38.5	484.00	34.2	429.94	635.47
2	5		31.43	22.7	713.43	30.1	946.00	31.6	993.14	27.5	864.29	
3	10		62.86	11.05	694.57	12.5	785.71	16	1005.71	12.09	759.94	
4	15		94.29	6.14	578.91	7.1	669.43	8.15	768.43	7.05	664.71	
5	25		157.14	2	314.29	2.23	350.43	1.95	306.43	2.15	337.86	

S. DUTTA

Testing Area:	2P10 220kV Present								Date: 12.10.2015		
Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	45.1	566.97	47.5	597.14	40.7	511.66	50.3	632.34	499.93
2	5		31.43	17.9	562.57	19	597.14	23.2	729.14	25.1	788.86	
3	10		62.86	4.69	294.80	5.25	330.00	10	628.57	16	1005.71	
4	15		94.29	2.25	212.14	3.5	330.00	14.59	1375.63	2.95	278.14	
5	25		157.14	0.85	133.57	0.75	117.86	0.9	141.43	1.05	165.00	

Testing Area:	1P2 132kV Present								Date:10.10.2015		
Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	5.96	74.93	5.70	71.66	5.80	72.91	5.64	70.90	285.62
2	5		31.43	5.25	165.00	5.20	163.43	5.10	160.29	4.95	155.57	
3	10		62.86	4.90	308.00	4.75	298.57	4.60	289.14	3.85	242.00	
4	15		94.29	4.10	386.57	4.25	400.71	3.90	367.71	3.54	333.77	
5	25		157.14	3.90	612.86	3.20	502.86	3.50	550.00	3.09	485.57	

Testing Area:	1P1 132kV Present								Date:10.10.2015		
Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	250-300 mm	12.57	5.96	74.93	5.7	71.66	Readings not taken due to Founations are under progress				298.46
2	5		31.43	5.25	165.00	5.2	163.43					
3	10		62.86	4.9	308.00	4.75	298.57					
4	15		94.29	4.1	386.57	4.25	400.71					
5	25		157.14	3.9	612.86	3.2	502.86					

(S. DUTTA)

Testing Area: 4F1 400 kV Future — Date:07.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	62.30	783.20	63.90	803.31	55.10	692.69	52.90	665.03	1283.75
2	5		31.43	46.00	1445.71	48.60	1527.43	36.50	1147.14	48.00	1508.57	
3	10		62.86	21.90	1376.57	21.60	1357.71	17.40	1093.71	24.20	1521.14	
4	15		94.29	15.39	1451.06	13.54	1276.63	13.84	1304.91	15.38	1450.11	
5	25		157.14	6.00	942.86	10.74	1687.71	12.16	1910.86	11.00	1728.57	

Testing Area: 4F2 400 kV Future — Date:11.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	123.00	1546.29	157.00	1973.71	110.10	1384.11	120.10	1509.83	1591.95
2	5		31.43	46.00	1445.71	47.00	1477.14	52.00	1634.29	55.00	1728.57	
3	10		62.86	28.00	1760.00	23.00	1445.71	21.20	1332.57	22.50	1414.29	
4	15		94.29	17.25	1626.43	15.13	1426.54	14.13	1332.26	14.50	1367.14	
5	25		157.14	12.86	2020.86	12.15	1909.29	11.05	1736.43	11.25	1767.86	

Testing Area: 4F3 400 kV Future — Date:11.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	145.40	1827.89	163.00	2049.14	120.00	1508.57	105.00	1320.00	1463.19
2	5		31.43	43.50	1367.14	59.60	1873.14	40.10	1260.29	49.60	1558.86	
3	10		62.86	19.50	1225.71	18.30	1150.29	19.00	1194.29	20.90	1313.71	
4	15		94.29	17.00	1602.86	11.93	1124.83	12.50	1178.57	13.29	1253.06	
5	25		157.14	13.28	2086.86	10.00	1571.43	8.30	1304.29	9.50	1492.86	

Testing Area: 4F4 400 kV Future — Date:07.10.2015

Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	54.00	678.86	61.00	766.86	54.50	685.14	55.80	701.49	1593.62
2	5		31.43	44.00	1382.86	46.00	1445.71	42.80	1345.14	46.00	1445.71	
3	10		62.86	23.00	1445.71	28.00	1760.00	25.00	1571.43	23.90	1502.29	
4	15		94.29	20.00	1885.71	22.00	2074.29	23.00	2168.57	25.80	2432.57	
5	25		157.14	13.20	2074.29	14.20	2231.43	13.50	2121.43	13.70	2152.86	

(S. DUTTA)

Testing Area:	4F5 400 kV Future								Date:11.10.2015		
Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	101.00	1269.71	119.00	1496.00	126.00	1584.00	148.00	1860.57	1638.12
2	5		31.43	48.00	1508.57	49.25	1547.86	65.00	2042.86	62.45	1962.71	
3	10		62.86	23.50	1477.14	28.19	1771.94	27.10	1703.43	30.15	1895.14	
4	15		94.29	15.20	1433.14	16.72	1576.46	15.20	1433.14	14.50	1367.14	
5	25		157.14	10.86	1706.57	12.20	1917.14	9.46	1486.57	10.96	1722.29	

Testing Area:	4F6 400 kV Future								Date:11.10.2015		
Sl. No.	Electrode Spacing S(Mtr.)	Electrode Depth	Constant K(2ΠS)	Direction N-S		Direction E-W		Direction NW-SE		Direction NE-SW		Average resistivity (in Ω-mtr.)
				R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	R (in Ω)	ρ (in Ω-mtr.)	
1	2	150-200 mm	12.57	115.23	1448.61	120.37	1513.22	111.25	1398.57	105.00	1320.00	1551.60
2	5		31.43	47.68	1498.51	64.96	2041.60	55.98	1759.37	69.32	2178.63	
3	10		62.86	17.58	1105.03	19.75	1241.43	18.25	1147.14	30.45	1914.00	
4	15		94.29	15.26	1438.80	12.93	1219.11	12.40	1169.14	19.54	1842.34	
5	25		157.14	11.75	1846.43	10.10	1587.14	8.12	1276.00	13.28	2086.86	

Note: 4P6 & 2P8 areas are not tested due to Hard rock, water stagnation and electrodes are not penetrating particulamly in 4P6 area

Note 1) 400KV Present Switchyard Averare Resistivity. (in Ω-m) 328.430 (4P1, 4P2, 4P3, 4P4, 4P5 & 4P7)

2) 220KV Switchyard Averare Resistivity. (in Ω-m) 367.714 (2P1, 2P2, 2P3, 2P4, 2P5, 2P6, 2P7, 2P9 & 2P10)

3) 132KV Switchyard Averare Resistivity. (in Ω-m) 292.041 (1P1, 1P2)

4) 400KV Future Switchyard Averare Resistivity. (in Ω-m) 1520.370 (4F1, 4F2, 4F3, 4F4, 4F5 & 4F6)

5) Total AverageResistivity without 400KV Future (in Ω-m) only switchyard area 329.395

6) Total Average Resistivity (Present + Future) (in Ω-m) 627.139

For M/s. Techno

(Soumya Datta)
Site-in-Charge

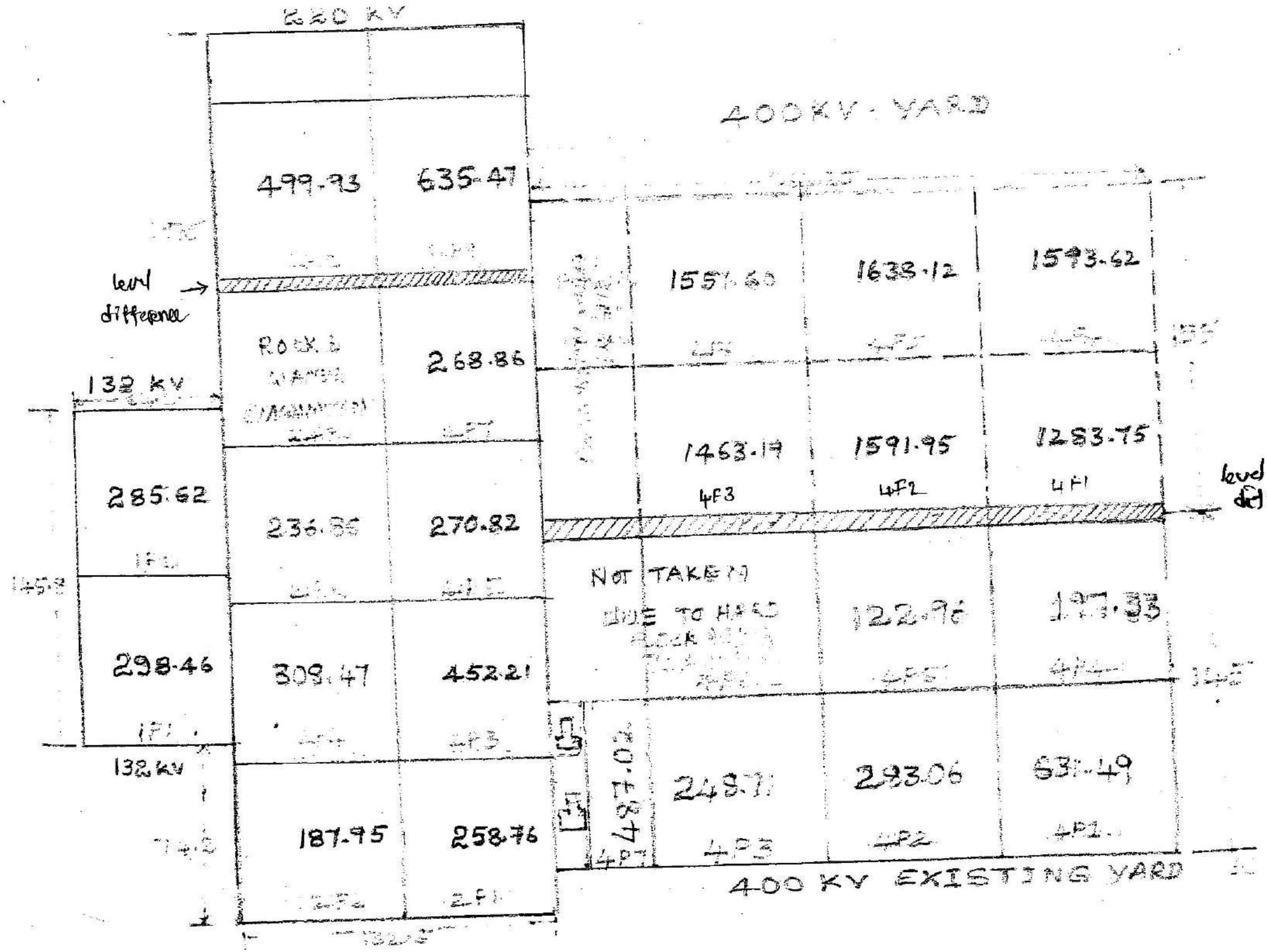
For APTRANSCO

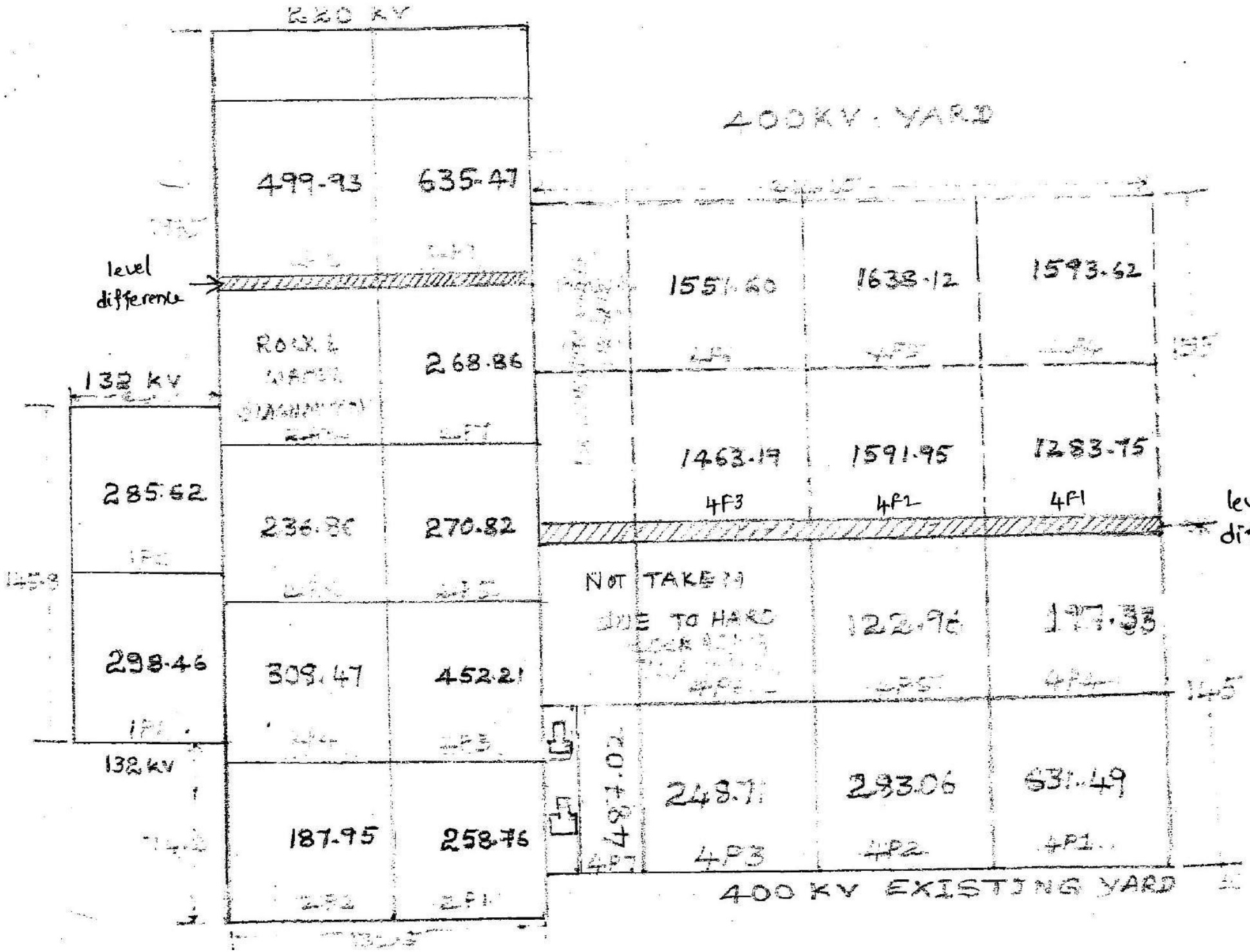
Assistant Engineer
400KV Constn. SD
APTRANSCO Kadapa

Asst. Executive Engineer
400KV Constn. SD
APTRANSCO Kadapa

EXECUTIVE ENGINEER
400 KV Construction Division
A. P. Trans Co. Kadapa.

Superintending Engineer
400 KV. OMC Circle
A P. TRANSCO, KADAPA


220 KV
400KV YARD
499.93
635.47
level difference
2.68.86
132 KV
285.62
236.86
270.82
298.46
452.21
132 KV
187.95
258.76
1551.60
1638.12
1593.62
1463.19
1591.95
1283.75
4F3
4F2
4F1
level
NOT TAKEN
DUE TO HARD
122.96
487.02
293.06
631.49
400 KV EXISTING YARD


220 KV
400KV. YARD
499.93
635.47
level difference
ROCK & WATER
268.86
132 KV
285.62
236.86
270.82
298.46
309.47
452.21
132 KV
187.95
258.76
1551.60
1638.12
1593.62
1463.19
1591.95
1283.75
4F3
4F2
4F1
NOT TAKEN
DUE TO HARD
122.96
197.33
248.71
293.06
631.49
4P3
4P2
4P1
400 KV EXISTING YARD

TRANSMISSION CORPORATION OF ANDHRA PRA MITED

Soil Resistivity

TRANSMISSION CORPORATION OF ANDHR ESH LIMITED

FROM
The Superintending Engineer,
400 KV O.M.C .CIRCLE,
TRANSCO Nilayam, Sankarapuram,
KADAPA.

TO
The Chief Engineer ,
400 KV Construction,
APTRANSCO VidyutSoudha,
Hyderabad500 082.

Lr.No. SE / 400 KV OMC Circle/KDP/AET/ F. / D.No. 1985 /15, Dt. 31 -12-2015.

Sir,

Sub:- APTRANSCO – 400 KV OMC Circle, Kadapa – Construction of 400/220KV Substation at Ghani, Kurnool Dist. – Soil resistivity report submitting for arranging Earth mat design – Reqeusted - Regarding .

5/1 116
1146

Ref:-1) Lr.No.AEE/400KV Construction/SD/F.QMDC Line/D.No.36/15, dt.04-12-2015
2) Lr.No.EE/400KV/const/ATP/F.GHNSS/D.No.942/15, dt.05-12-2015

@@@@

The soil earth resistivity values recorded at 400/220KV Ghani Substation swithc yard is herewith submitting for arranging earth mat design at the earliest.

Sl. No.	Location	GPS Co-odinates	Avg. Soil Resistivity in Ω-mtr
A	400KV Switch yard step-1		
1	Location-1	E-0205443 N-1735946	240.83
2	Location-2	E-0205308 N-1735900	235.43
3	Location-3	E-0205812 N-1735112	271.14
4	Location-4	E-0205018 N-1735873	344.62
5	Location-5	E-0205337 N-1735973	318.56
6	Location-6	E-0205408 N-1735993	423.58
B	400KV Switch yard step-2		
1	Location-1	E-0205438 N-1735861	398.29
2	Location-2	E-0205456 N-1735787	264.34
3	Location-3	E-0205391 N-1735735	249.03
4	Location-4	E-0205305 N-1735724	215.24
5	Location-5	E-0205289 N-1735804	156.54
6	Location-6	E-0205430 N-1735874	471.62
7	Location-7	E-0205356 N-1735849	398.64
C	400KV Switch yard step-3		
1	Location-1	E-0205559 N-1735691	185.04
2	Location-2	E-0205510 N-1735686	292.81
3	Location-3	E-0205441 N-1735668	425.12
4	Location-4	E-0205376 N-1735650	398.19
5	Location-5	E-0205293 N-1735611	273.90

4/1/16

The readings of soil resistivity in different directions in the 400KV and 220KV Switchyard are enclosed herewith.

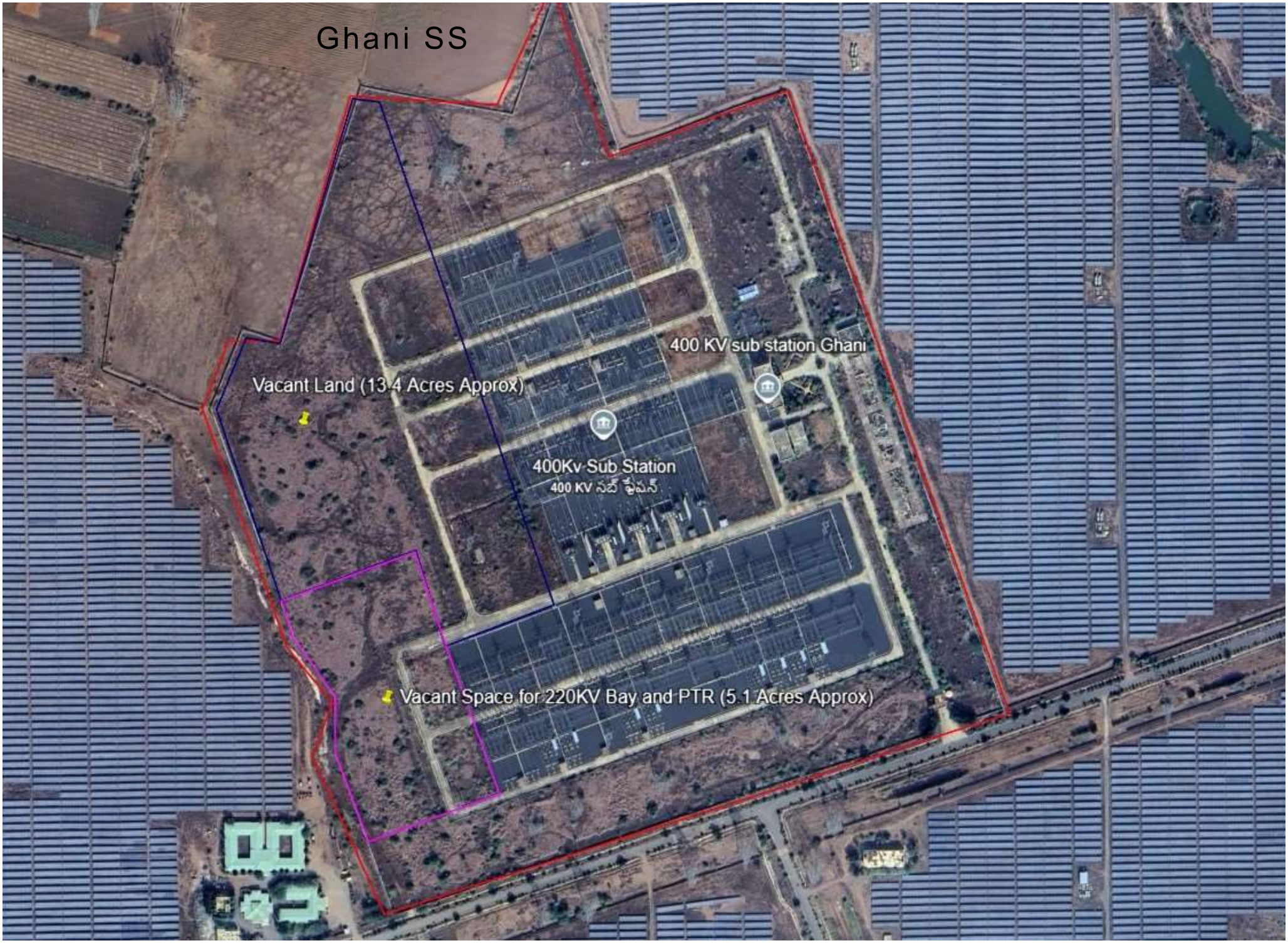
Encl:-Soil resistivity Report in duplicate

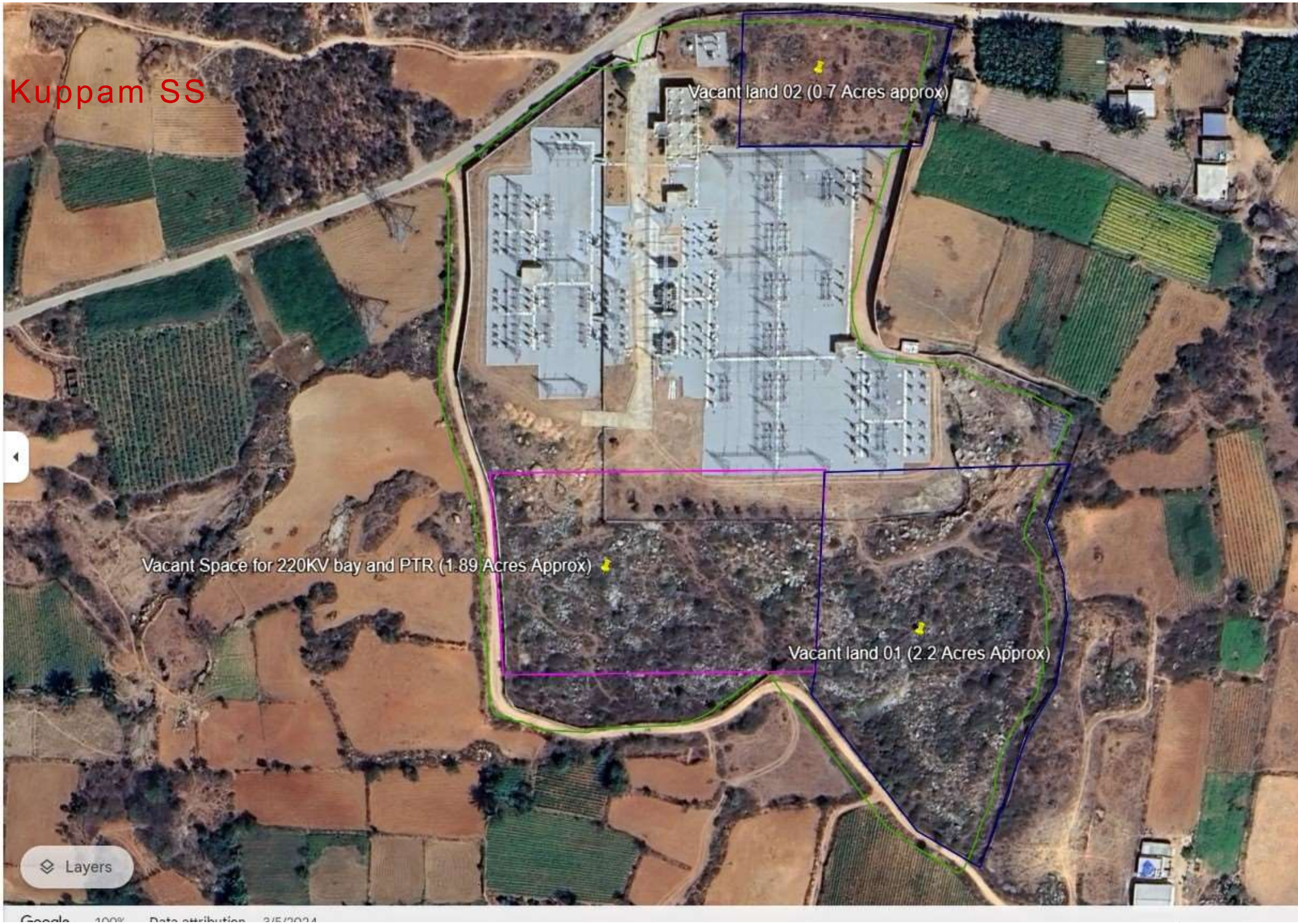
SUPERINTENDING ENGINEER
400 KV OMC CIRCLE:: KADAPA

Copy to the Executive Engineer/400KV Constn/Anantapur.

ANNEXURE-13


Jammalamadugu SS
Vacant Space for 220KV bay and PTR (2.7 Acres Approx)
400KV Substation
Jammalamadugu
Vacant Land 02 (5 Acres Approx)
Vacant Land 01 (18.8 Acres approx)
1/3


Ghani SS
400 KV sub station Ghani
Vacant Land (13.4 Acres Approx)
400Kv Sub Station
400 KV సబ్ స్టేషన్
Vacant Space for 220KV Bay and PTR (5.1 Acres Approx)


Kuppam SS
Vacant land 02 (0.7 Acres approx)
Vacant Space for 220KV bay and PTR (1.89 Acres Approx)
Vacant land 01 (2.2 Acres Approx)
Layers