Procedure for Relieving Congestion in Intra State Transmission system of Maharashtra State.

In accordance with the Maharashtra Electricity Regulatory Commission (Electricity Grid Code) Regulations, 2020

MAHATRANSCO
Maharashtra State Electricity Transmission Co. Ltd.

Prepared by

STATE TRANSMISSION UTILITY

MAHARASHTRA STATE ELECTRICITY TRANSMISSION COMPANY LIMITED

CE (STU)
MSETCL

TABLE OF CONTENTS

PROCEDURE FOR RELIEVING CONGESTION IN INTRA STATE TRANSMISSION SYSTEM OF MAHARASHTRA STATE

1. INTRODUCTION:

1.1 This procedure is herein after called " Procedure for relieving congestion in InSTS.

1.2 Three different types of congestion occur in InSTS viz.

a. Elements of InSTS getting critically loaded due to flow of Inter State power.

b. Congestion occurring in InSTS corridors connecting Intra state control areas.(violation of ATC)

c. Critical loading/Non-compliance of N-1 concerning InSTS elements requiring corrective actions in order to remove security constraints.

d. Congestion due to low voltages below the minimum specified in MEGC 2020.

1.3 This procedure has been developed by STU in consultation with SLDC in compliance of Clause 44.1 of MEGC 2020.

1.4 This procedure shall be reviewed by GCC and shall be provided to all users of InSTS.

1.5 This procedure shall be kept on the websites of SLDC and STU.

1.6 Once these procedures are operationalised, the procedures based on central commission's relevant regulations seize to be applicable for elements of InSTS except for those cases as described in the ensuing paragraphs.

2. DEFINITIONS:

2.1. **"Total Transfer Capability (TTC)"** means the amount of electric power that can be transferred reliably by the InSTS under a given set of operating conditions.

2.2. "**Available Transfer Capability (ATC)"** means the transfer capability of the Inter-control area transmission system available for scheduling commercial transactions (through Long Term Opens Access (LTOA), Medium Term Open Access (MTOA) and Short-Term Open Access (STOA)) in a specific direction, considering the network security. Mathematically, ATC is the Total Transfer Capability Less Transmission Reliability Margin.

2.3. **"Congestion"** means a situation where the demand for transmission capacity exceeds the Available Transmission Capability (ATC);

2.4 **"Congestion charge"** means the supplementary charge kicked in on one or more Regional entities in one or more Regions for transmission of power from one Region to another or from one State to another within a Region when the deviations from the schedule cause the net drawl of power in the inter-regional or intra-regional transmission links to go beyond the Total Transfer Capability limit;

2.5 **"Control area"** means an electrical system bounded by interconnections (tie lines), metering and telemetry, where it controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system;

2.6 **"Transmission Reliability Margin (TRM)"** means the amount of margin kept in the Total Transfer Capability (TTC) necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in the system conditions.

2.7 **"Under Frequency Relay (UFR)"** means a relay which operates when the system frequency falls below a specified limit and initiates load curtailment.

2.8 **"df/dt Relay"** means a relay which operates when the rate of change of system frequency (over time) goes higher than a specified limit and initiates load curtailment.

2.9 **"Spinning Reserve"** means the Capacities which are provided by the devices including generating station or units thereof synchronized to the grid and which can be activated on the direction of the System Operator and effect the change in active power.

2.10 **"Intra State Generating Station (InSGS)"** means a generating station connected to intra-State Transmission System whose scheduling is to be coordinated by SLDC.

2.11 **"Intra State Transmission System" (InSTS)** means any system for conveyance of electricity by transmission lines within the area of the State and includes all transmission lines, sub-stations, and associated equipment of transmission licensees in the State excluding ISTS;

2.12 **Voltage Standards (As per MEGC 2020)**

As per the clause 37.13 of MEGC 2020, All users shall attempt to ensure that grid voltages always remain within the limits specified in CEA (Grid Standards) Regulations, 2010 as amended from time to time and as mentioned below:

Voltage -kV(rms)		
Nominal	Maximum	Minimum
765	800	728
400	420	380
220	245	198
132	145	122
110	121	99
100	110	90
66	72	60
33	36	30
22	24	20
11	12	10

2.13 **"Boisar flowgate - Details given in annex. 1 and 3**

2.14 **Kalwa flowgate – Details given in annex. 1**

2.15 **Borivali flowgate- Details given in annex. 1**

2.16 **Trombay flowgate- Details given in annex. 1**

3. SCOPE:

This procedure is applicable to all generating stations, distribution licensees, STU, SLDC, Transmission licensees & Users in the state of Maharashtra.

4. MEASURES TO RELIEVE CONGESTION OCCURING IN ELEMENTS OF InSTS DUE TO FLOW OF INTER STATE POWER:

4.1 In case of critical loading of InSTS elements due to flow of Inter State power causing security constraints such as unacceptable loading close to thermal loading, Non-compliance of N-1, Voltage degradation etc. the same may be taken up by MSLDC with WRLDC who intern shall take up with NLDC to impose congestion as per "Measures to relieve congestion in real time operation Regulations 2009" and amendments thereof.

4.2 MSLDC shall ascertain that the congestion is largely due to flow of Inter state power and not attributable to Intra state entities.

4.3 In case of more than 50% of power flowing on InSTS elements, is attributable to Interstate power, MSLDC shall report the matter to STU who intern will take up with WRPC for declaring such element as Deemed ISTS.

5. MEASURES TO RELIEVE CONGESTION IN CORRIDORS BETWEEN INTRA STATE CONTROL AREAS:

5.1. MSLDC shall determine corridor wise TTC/ATC/TRM for corridors between Intra state control areas on a monthly basis and monitor congestion in real time and issue warning notices / alert messages to state entities.

5.2. The Intra State corridors / flow gates to be monitored for congestion control by SLDC are

a. ATC violations of rest of Maharashtra with Mumbai

b. TPC-AEML

c. TTC/ATC of Important Flow gates

d. Import ATC of Mumbai

e. Export ATC of Mumbai

5.3. In case of congestion actual flow exceeding ATC, MSLDC shall take up with upstream / exporting control areas to control injection and downstream / importing control areas to control drawl.

5.4. In case of inadequate response or power system slipping into alert state MSLDC as per Clause 13 of " Procedure for deviation settlement of state entities and energy accounting of the state" shall invoke centralised MOD principle and despatch generation. The schedule of such generators used for centralised MOD shall be revised as per the quantum required by MSLDC and the same is scheduled to a Virtual State Entity (VSE) created for the state by MSLDC for the purpose of counter party in the scheduling process. Any deviations from schedule by such generators shall be treated in accordance with the MERC DSM Regulations, 2019 and amendments thereof. However the centralized MOD principle/VSE mechanism needs to apply on certain generators only (Those that can relieve congestion) by increasing/decreasing schedule's shall use discretion based on their expertise if such contingency is not covered in this procedure.

5.5. The process described above normally can be done by revising the schedules of generators in the upstream to back down and generators in the downstream to pick up generation. Backing down of generation shall be done following merit order stack in which costliest generator would be

considered first followed by the next costlier generator. Similarly, for picking up the generation the least cost generator in the merit order shall be considered first. However, the generators with URS shall be considered for centralised MOD to relieve congestion.

5.6. It may not be always possible to follow Merit order despatch as described in section 5.5 due to congestion and MSLDC would use discretion to pick select generators to redispatch to ensure grid security, till such time Security Constrained Economic Despatch (SCED) is implemented by MSLDC.

5.7. In case of system emergencies or delays in getting relief through centralised MOD/Generation redispatch mechanism, MSLDC may choose to order for Load shedding of non-critical loads which may have to be complied with immediately by concerned DISCOMS. In case of delay in response from DISCOMs, MSLDC may advise transmission companies/STU to open radial feeders. MSLDC shall prepare the list of such radial feeders meant for emergency measures.

5.8. In case of tripping of elements in the inter control area corridors / flow gates, or degraded voltage profile MSLDC shall revise TTC/ATC/TRM in real time and inform through email/website to all stakeholders.

5.9. The above technical and the commercial means to control congestion can be supplemented by commercial incentives / penalties mechanism through congestion charge similar to the Central Regulation. GCC can accordingly recommend to the Hon'ble MERC to bring such regulation in the state.

6. MEASURES TO RELIEVE CONGESTION IN InSTS ELEMENTS:

6.1. Congestion in Intra state elements is especially due to non-compliance of N-1, issues related to voltage profile, etc. leading to security violations in the grid in addition to violation of affecting transfer capability between control areas, flowgate violations, violation of import capability/ export capability (as the case may be) of the control area or State.

6.2. Since the congestion is attributable to various state entities and with varying extent, pre-planned remedial measures have to be planned for each case to implement suitable actions in real time in a prompt manner.

6.3. The congestion removal can be done by generation regulation / Load shedding / Load flow diversion/line switching by different entities. MSLDC shall identify all such corridors and control actions required by carrying out power flow studies to know the sensitivities. MSLDC shall keep the list of elements likely to be subjected to congestion and prepare remedial action plan. The list of elements of scenarios of congestion and

remedial action plans are enclosed at Annexure-II. The remedial action plans shall be fine tuned depending on the real time system conditions. The details combined in Annexure – II shall be reviewed on yearly basis or as and when required.

6.4. In case of Congestion occurring due to Inter State power on InSTS elements, efforts shall be made use power tracing methods to determine whose power (which generators?, which loads?) is flowing on the congested / overloaded element.

6.5. The concerned utilities shall be directed by MSLDC to take actions as per 6.1.3/6.1.4. and these shall be complied with promptly.

6.6. The above measures if required may have to be supplemented by procedure described in sections 5.4 to 5.8.

6.7. For congestion control or to facilitate planned shutdown, the schedules of certain generators are moderated by MSLDC. These generators shall not be included in the generators considered for centralized MOD and for providing spinning reserve.

6.8. **Consequences for event of default:**

6.9. In case of defaults for above conditions, appropriate action as per Section – 33 (Compliance of Directions) of the Electricity Act, shall be initiated by MSLDC by giving prior notice (for a period not less than 15 days) and adequate opportunity shall be given to the concerned Generators, Transmission/Distribution Licensees, Control Centres or Users, etc to represent the case before MSLDC.

6.10. In case concerned Generators, Transmission/Distribution Licensees, Control Centres or Users fails to address/rectify the breach expressed by MSLDC in the Notice within stipulated time, or if the default is intentional/caused constraint or violation the MSLDC shall proceed in accordance with the appropriate provisions of the Act/Regulations.

7. GRIEVANCE REDRESSAL:

7.1. MSLDC shall refer the Complaints regarding unfair practices, delays, discrimination, lack of information, supply of wrong information or any other matters to the Commission for redressal.

7.2. Any disputes between concerned Generators, Transmission/Distribution Licensees, Control Centres or Users shall be resolved in GCC Forum subject to jurisdiction of the MERC.

7.3. Pending the decision of the State Commission, the directions of the MSLDC shall be complied by the concerned Generators, Transmission/Distribution Licensees, Control Centres or Users.

8. REMOVAL OF DIFFICULTIES:

8.1. In case of any difficulty in implementation of this procedure, MSLDC/STU may approach the GCC through OCC for review or revision of the procedure with requisite details.

9. GENERAL:

9.1. All costs/expenses/charges associated with the measures to be implemented to relieve congestion SPS/LTS etc. implementation of Islanding Schemes shall be borne by the concerned Generators, Transmission/Distribution Licensees, Control Centres or Users, as the case may be.

9.2. The concerned Generators, Transmission/Distribution Licensees, Control Centres or Users shall abide by the provisions of the Electricity Act, 2003, the MERC Regulations, Indian Electricity Grid Code and MERC (State Grid Code) Regulation - 2020, and applicable CERC and MERC regulations as amended from time to time.

9.3. This procedure aims at prompt implementation of measures suggested in this SOP after system studies, along with other directions issued by MSLDC considering the system security is the main objective. However, some adjustments may be required in real time and these shall be in the form of directions of MSLDC and shall be complied with. Failure to comply shall be taken up appropriately as per section 33(1),33(2),33(5) and section 142 of IE Act.

9.4. This procedure shall be reviewed once in a year.

ANNEXURE 1

Flow gates: -

1. **Boisar Flowgate:-**

   220kV Boisar (PG) – Boisar (M) T/C (Ckt III HTLS, other ckts HTLS being done)

   220kV Boisar (PG) – Borivali S/C (HTLS)

   LTS provided on 220kV Boisar (M) – Boisar (PG), if overloading occurs, alarm at 810 Amps and LTS operates at 900 Amps

   The details of LTS are enclosed in Annexure III

2. **Kalwa Flow gate(220KV): -**

   220kV Kalwa – Salsette D/C

   220kV Kalwa – Trombay S/C

   220kV Kalwa – Mulund – Trombay S/C

   220kV Kalwa – Mulund – Bhandup S/C

   220kV Kalwa – Bapgaon-Ghatghar S/C

   220kV Kalwa – Borivali S/C

   220kV Kalwa – Colourchem S/C

   Affects when tripping of 400KV Kalwa-Padghe S/C, 400KV Kalwa -Kharghar S/C 400KV Talegaon -kalwa S/C 400KV Talegaon Kharghar S/C or N-1-1.

3. **Trombay Flow gate: -**

   220kV Trombay (M)-Trombay (T) D/C

   220kV Kalwa – Salsette – Trombay (T) D/C

   2X220/110kV Trombay (M) ICTs, 200MVA Each.

   All the lines are HTLS.

   If Trombay (T) – Salsette D/C out, then Trombay (M) – Trombay (T) loading would be critical.

   If Trombay (T) generation is low, then emergency action needed.

4. Borivali Flow gate: -

220kV Kharghar – Borivali D/C (HTLS)

220kV Kalwa – Mulund – Bhandup – Borivali S/C (HTLS)

220kV Kalwa – Borivali S/C (HTLS)

220kV Boisar (PG) – Borivali S/C

220kV Tarapur – Borivali (M) S/C

220kV Boisar (M) – Borivali S/C.

Borivali flow gate intern depends upon 400kV Kalwa, 400kV Kharghar i.e. Tarapur – 1 & 2, Kalwa ICTs and Kharghar ICTs.

Borivali (Tata):- 220kV Borivali (M) – Borivali (T) D/C

Borivali (AEML) :- 220kV Borivali (M) – Borivali (AEML) D/C

Gorai (AEML) D/C

Aarey (AEML) D/C

Main sources to AEML are Dahanu and Borivali (M).

Receives power from the flow gate.

5. 400kV Kalwa Flow gate: -

400kV Padghe – Kalwa D/C

400kV Kharghar – Kalwa S/C

400kV Talegaon – Kalwa S/C

TTC/ATC already determined for 3300 / 3000 / 2700 MW of Mumbai Demand.

This flow gate is also affected in case of tripping of HVDC single/bipole

6. Kharghar Flow gate: -

220kV Kharghar – Nerul – Trombay S/C (HTLS)

220kV Kharghar – Sonkhar – Trombay S/C (HTLS)

220kV Kharghar – Borivali (M) D/C (HTLS)

400/220kV Kharghar ICTs, 3x315 MVA

Uran generation affects Kharghar ICTs

ANNEXURE 2

Sr.NO.	Voltage Level	Name of Element/ICT/Line	Possible congestion reasons	Operational measures carried out by MSLDC
			765KV	
1	765KV	Ektuni 765KV /400KV 1500MVA ICT 1 /2	ICT loading around 1600-1800 MW and N-1 non-compliant	1)Reduction of generation at Upstream i.e. APML Tiroda, RIPL Nandgaonpeth , Koradi 2 the sensitivity of generation readuction for APML(765KV level) is 17%, for APML (400KV Level) is 13% , RIPL 10% and Koradi 2 is 13%
				2) Opening of EHV lines at downstream has very less effect i.e
				A) Opening of Ektuni-Bableshwar SC opening releases congestion only 6.38 %
				B) Opening of Taptitanda one ICT releases congestion by only 2.2%
				C)Ektuni-Taptitanda DC opening releases congestion by 16.77% but increases loading on 400KV Akola-Bhusawal S/C.
				Remark- As the above measures are temporary, long-term measures are required.
			500KV	
1	500KV	HVDC Bipole	HVDC Bipole trips/outage	1)ATC/TCC reduction of state by WRLDC
				2) Monitoring loading of 400KV Talegaon PG-Khargar and 400KV Talegaon PG-kalwa and require to increase

				Mumbai embedded generation
				3) If loading on above 400KV lines persists load curtailment required to be carried out.
				Remark- As the above measures are temporary, long-term measures are required.
2	500KV	HVDC Pole1/Pole 2	HVDC Pole1 /pole 2 trips/outage	1)ATC/TCC reduction of state by WRLDC
				2) Monitoring loading of 400KV Talegaon PG-Khargar and 400KV Talegaon PG-kalwa and increase of Mumbai embedded generation
				3)If loading on above 400KV lines persists load curtailment required to be carried out.
				Remark- As the above measures are temporary, long-term measures are required.
400KV				
1	400kV	Padghe ICTs	600MVA ICT outage not feasible	1)315MVA ICT get overloaded first.
				2) Transferring of 500/600MVA ICT to 220kV transfer bus is not possible due to constraint of TBC (Single Conductor).
2	400kV	Bableshwar ICTs	N-1 non compliant loading around 1700MW in peak season	During Peak loading conditions ICT's are not N-1 compliant.

3	400kV	Lonikand 1 ICTs	220KV Interconnector with Lonikand- 2 need to be made ON	This results into increase in loading of 220kV Urse-Chinchwad line hence strengthening is required.
4	400kV	Alkud ICT	only one ICT and N-1 non compliant (wind injection)	**Long term measure;-**
				Second ICT is required.
5	400kV	Akola (M) ICT's	N-1 non compliant in case of Paras units not on Bar.	Additional ICT is proposed which needs to be commissioned on priority.
6	400kV	Nanded ICT's	N-1 non compliance loading around 550MW	**Long term measure;-**
				Considering the load growth redundancy needs to be explored.
7	400kV	Taptitanda ICT's	N-1 non compliance loading around 550MW	**Long term measure;-**
				Considering the load growth redundancy needs to be explored.
8	400KV	Jejuri-Koyna stage 4 Line & Lonikand-jejuri line	Tripping /outage on any line	1) Shifting of load on Lonikand 2 and Lamboti through 220KV and 132KV levels Load of Yawat, markal, Phursunigi, Kurndwada etc. is carried out by MSLDC.
				2) Work of LILO of 400kV Lonikand - Karad line is proposed in STU plan, which needs to be commissioned on top priority.
				3) LTS scheme to be provided on 400kV Jejuri-Koyna stage 4 line.

9	400KV	Chandrapur II-Nanded ckt 1 /2	In case of full generation at Chandrapur switching and Dhariwal and less requirement of HVDC power.	1) It is observed that loading on Chandrapur II-Nanded ckt 1 /2 increases depending upon HVDC Bhadravati power flow.
				2) Generation reduction at Chandrapur 8 & 9 unit may be required under contingencies.
10	400KV	Bableshwar-Padghe ckt 1 /2	Tripping /Outage on either ckt	1) The remaining line gets loaded according to HVDC power flow.
				2) Opening of Dhule-Bableshwar S/C
11	400KV	Chakan-Talegaon PG	Due to high import at 400kV Talegaon PG from Pune PG and Aurangabad PG, loading of this line increases.	**Long term measures**
				1) Explore the possibility to making LILO of Talegaon PG-Lonikand line LILO at Chakan
				2) HTLS of Existing line i.e. 400KV Talegaon -Chakan, 220KV Talegaon PG-Talegaon Ambi D/C and 220KV Urse-Chichwad S/C
				3) Explore the installation of Phase shifting TF to divert the power flow on other ckts.
12	400KV	Kolhapur -Kolhapur PG ckt 1/2	In case of high RE injection from SR through these D/C lines gets loaded.	1) This results in to increase in loading of Kolhapur- Karad-Lonikand corridor which ultimately results into increase in loading of 400kV Kharghar-Talegaon and Kalwa Talegaon.
				2) This matter needs to be taken up in CEA standing committee.
13	400KV	Parli (PG)-Parli (M) ckt 1/2	Not N-1 Compliant	1.Increasing Koyna IV generation

				2.Opening of 400kV Parli – Solapur (M) line as per real time condition or opening of 220kV Parli – Murud line as per real time condition in consultation with ALDC.
				3.Increasing Parli Generation
				4.The constraint on these lines imposing the limitations on state TTC/ATC.
				Hence, explore the possibility of additional circuit or strengthening of lines by HTLS.
14	400KV	Parli(M)-Lonikand 2 ckt 1/ 2	Not N-1 Compliant	Increasing of koyna IV generation.
				Hence, explore the possibility of additional circuit or strengthening of lines by HTLS
220kV				
1	220kV	Kalwa 2 - Colorchem	Radial operation of colorchem in case of tripping of 220kV Padghe – Temghar – Colorchem corridor.	**Long term measures-**
				1. Upgradation with HTLS conductor on 220kV Padghe – Temghar, Temghar – Colorchem – Kalwa corridor.
				2. Additional source to colourchem substation required.
2	220kV	Kalwa– Temghar ckt	high loaded line, requires switching ON 220kV interconnector at Kalwa.	HTLS to be done on priority

3	220kV	Padghe – Wada	Radial operation of 3 substation in case of outage/Tripping	LTS to be provided to avoid overloading of 220kV Kolshet – Kamba line.
				Long term measures-
4	220kV	Padghe – Nalasopara (Tap to Vasai)	Overloading of line in case of tripping of 220kV Nalasopara – Boisar (PG)	Separate source at Vasai substation to be explored.
5	220kV	Boisar (M) – Boisar (PG) ckt – 1/2	Boiser flow gate lines are important for Mumbai.	HTLS to be done on priority
6	220kV	Padghe - Jambhul	Radial operation of 4 substations in case of outage/Tripping	To avoid overloading of remaining lines, HTLS to be done & LTS to be provided.
7	220kV	Padghe - Pal	Radial operation of 4 substations in case of outage/Tripping	To avoid overloading of remaining lines, HTLS to be done & LTS to be provided .
8	220kV	Urse – Chinchwad 1	Loaded line, during peak hrs load to be shifted from Chinchwad to Kandalgaon	1.Opening of 220kV Chinchwad – Hinjewadi line provided all other lines to Kandalgaon to be in service.
				2.Shifting of Chinchwad load on Lonikand.

				Long term measures-
				3.Upgradation of line with HTLS conductor
9	220kV	Talegaon (Ambi) – Talegaon (PG) ckt 1/2	Loaded line feeding Pune 250MW	**Long term measures-**
				Upgradation of line with HTLS conductor
10	220kV	Talegaon (Ambi) - Urse	Loaded line feeding Pune 230MW	**Long term measures-**
				Upgradation of line with HTLS conductor
11	220kV	Jejuri – Lonand	loaded line LTS operated many times	**Long term measures-**
				1.Upgradation of line with HTLS conductor
12	220kV	Jejuri - Baramati	High loading due to agriculture load around 250MW	220kV Baramati – Lonand to be kept open as per real time condition.
				Long term measures-
				Upgradation of line with HTLS conductor
13	220kV	Chakan - Chinchwad	Overloading during tripping of Urse – Chinchwad line or outage on 220kV Chakan – Bhosari line.	LTS to be provided on the line.
14	220kV	Phursungi - Parvati	Radial operation of Jejuri-Kondwa-Nanded city-Flagship	**Long term measures-**
				1.Upgradation of line with HTLS conductor
				2. LTS to be provided on the Jejuri-Kondwa line.
15	220kV	Jejuri - Kondhwa	Radial operation of Kondwa-Nanded city-	**Long term measures-**
				1.Upgradation of line with HTLS conductor

			Flagship - Parvati	2. LTS to be provided on the Phursungi - Parvati line.
16	220kV	Nashik – Babhaleshwar ckt 1/2	Source to Nashik city, loaded lines 280MW each, when only one-unit at Nashik is running	1.Atleast one unit of NTPS is required to be scheduled in spite of high cost by violating MoD.
				2.Shifting of Ranwad load on Manmad.
				3.There are number of occasions of LTS operation.
				Long term measures-
				Upgradation of line with HTLS conductor
17	220kV	220kV Badnera-Wardha (PG) and 220kV Dhamangaon-Badnera	In case of tripping of either 220kV Badnera-Wardha (PG) or 220kV Dhamangaon-Badnera the other ckt gets overloaded (depending on Paras generation and Akola (Apatapa) ICT loading)	**Long term measures-**
				To relieve the congestion exploring the possibilities of providing 500MVA ICT at 400kV Nandgaonpeth (Rattan India) with evacuation to Badnera.
132kV				
1	132KV	Kanhan-Mansar	Radial feeder	Commissioning of By-pass isolator at 132kV Pench S/s so that second source could be made available at Mansar through 132kV Kanhan-Pench-Mansar.
				In case of tripping of Kanhan Mansar line, solar generation at Mansar is affected.
2	132KV	Bhandara-Kardha D/c Line	In case of tripping of either ckt's the other	Implementation of HTLS Scheme for Bhandara-Kardha D/c Line. Or

			ckt gets overloaded.	Exploring possibilities of second source to either 132kV Kardha S/s or 132kV Sakoli S/s.
3	132KV	Chikhali-Dhad	Radial feeder	Expedite second source works from Bokardhan S/s.
4	132KV	Dharni S/s	Radial S/s	Explore the possibilities for providing second source.
5	132KV	Padegaon-Canpack (new)-SAT	Radial feeder	Explore the possibilities for providing second source.
6	132KV	Jalna-Ambad-Ghansawangi	Radial feeder	Explore the possibilities for providing second source to both Ambad S/s and Ghansawangi S/s
7	132KV	Parbhani-Pathri	Radial feeder	Explore the possibilities for providing second source at Pathri S/s.
				In case of tripping of Parbhani-Pathri line, solar generation at Pathri is affected.
8	132KV	Telgaon-Majalgaon	Radial feeder	Explore the possibilities for providing second source at Majalgaon S/s.

ANNEXURE 3

LTS for Boisar Flow gate

220 kV Boisar (MS)	To avoid the overloading on ICT at 220kV Boisar. Necessary Modification for PLCC Channel 1 & Channel 2 along with additional relay for Additional stage to be provided at 132kV Boisar MIDC ss.	**Condition :**Overload setting
		For ICT 1
		Alarm if ICT loading > 100 % of F.L with a delay of 1 sec
		Stage 1 if ICT loading >720 A with a delay of 1.3 sec
		Stage 2 if ICT loading > 720 A with a delay of 3 sec
		For ICT 2&3
		Alarm if ICT loading > 100 % of F.L with a delay of 1 sec
		Stage 1 if ICT loading > 960 A with a delay of 1.3 sec
		Stage 2 if ICT loading > 960 A with a delay of 3 sec
		Action:
		Stage 1 (Load to be trimmed)
		Tripping at 132kV Palghar s/s: (49MW)
		33 kVSaphale (5MW), 33 kVValan (4.5MW), 33 kVPalghar (6MW), 33 kV Genesis (6MW), 33 kVAlyali (10MW), 33 kVMaswan (2.5MW), 33 kV Manor (12MW), 33 kVNandore (3MW)
		Tripping at 132kV MIDC Boisar s/s: (75MW)-(PLCC CH 1)

		132/33 kV 50 MVA Tf1 LV (43.02MW), 132/11 kV 25 MVA Tf1 LV (11.6MW),132/11 kV 25 MVA Tf2 LV (11.2MW),
		132/11 kV 25 MVA Tf4 LV (9.08MW)
		Stage 2(Load to be trimmed as per existing) **132kV Palghar s/s: (49MW)**
		Tripping at 132kV MIDC Boisar s/s: (112MW)-(PLCC CH-2)
		132/33 kV 50 MVA Tf1 LV (43.02MW), 132/33 kV 50 MVA Tf2 LV (37.08MW), 132/11 kV 25 MVA Tf1 LV (11.6MW), 132/11 kV 25 MVA Tf2 LV (11.2MW), 132/11 kV 25 MVA Tf4 LV (9.08MW)
220 kV Boisar (MS)	**To avoid the overloading on 220 kV Boisar(PG)-Boisar (MS) 1,2&3**	**Condition :**
	To avoid the overloading on PGCIL line at 220kV Boisar. Existing setting is confirming to given guidelines. LTS Setting kept at 120% of the capacity of conductor for 3 secs.	Alarm if line loading > 810 A with a delay of 5 sec
		Stage 1 if line loading >900 A with delay 3 sec
		Action:
		Tripping at 32kV Palghar s/s: (49MW)
		33 kV Saphale(5MW), 33 kV Valan (4.5MW), 33 kV Palghar(6MW), 33 kV Genesis (6MW),33 kV Alyali (10MW), 33 kV Maswan (2.5MW), 33 kV Manor(12MW), 33 kV Nandore (3MW)

		Tripping at 132kV MIDC Boisar s/s: (112MW)-(PLCC)
		132/33 kV 50 MVA Tf1 LV (43.02MW), 132/33 kV 50 MVA Tf2 LV (37.08MW),132/11 kV 25 MVA Tf1 LV (11.6MW), 132/11 kV 25 MVA Tf2 LV (11.2MW), 132/11 kV 25 MVA Tf4 LV (9.08MW)
		Tripping at 220kV Boisar s/s: (32MW)
		33 kV Feeder No 3 (8MW), 33 kV Feeder No 4 (4MW), 33 kV Feeder No 7 (13MW) and 33 kV Feeder No 8 (7MW)