भारत सरकार / Government of India
विद्युत मंत्रालय / Ministry of Power
केन्द्रीय विद्युत प्राधिकरण / Central Electricity Authority
प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग
System Planning & Project Appraisal Division
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Sewa Bhawan, R. K. Puram, New Delhi-110066 [ISO: 9001:2008]
वेबसाइट / Website: ूवमंण्दपवण्प्र

No. 26/10/2014-SP&PA/ 1425-38 **Date: 1st July, 2015**

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Sub: 38th meeting of the Standing Committee on Power System Planning in Western Region

Sir,

The 38th meeting of the Standing Committee on Power System Planning in Western Region will be held shortly. The agenda notes for the meeting are available on CEA website (www.cea.nic.in at the following link: Home page-Wing Specific Document-Power Systems-Standing Committee on Power System Planning-Western Region).

The date and venue of the meeting will be intimated in due course.

Yours faithfully,

1/7/2015.

(Awdhesh Kr.Yadav)
Director, SP&PA

1.0 Confirmation of the minutes of 37th meeting of the Standing Committee on Power System Planning in Western Region (SCPSPWR) held on 5th September, 2014 at NTPC Western Regional Headquarters, Andheri (East), Mumbai.

1.1 GETCO vide their letter no. MD/STU/CEA-37th SCM/511/36 dated 12.11.2014 has their comments on point no. 2 (Inclusion of cost of new schemes in the minutes of the meeting), 20 (Laying of cable in DGEN-Vadodara 400 kV D/C line at DGEN end) and 22 of the minutes of meeting of the 37th Standing Committee on Power System Planning in Western Region held on 05.09.2014.

1.2 The cost of the new schemes agreed in the 37th Standing Committee on Power System Planning in Western Region held on 05.09.2014 is as given below:

S.No.	Transmission System agreed during the 37th SCPSPWR	Approximate cost of the scheme (Rs crores)
1	Procurement of one no. 333 MVA, 765/400 kV and two nos. of 500 MVA, 765/400 kV ICTs for Western Region	45.28
2	Procurement of spare 765 kV reactors for Western Region	19.50
3	Procurement of spare 125 MVAR, 400 kV reactors for Western Region	13.00
4	Installation of 2X500 MVA, 400/220 kV transformer at Indore(PG) 765 kV substation	25.51
5	Installation of 1X315 MVA, 400/220 kV transformer at Itarsi (PG) 400 kV substation	12.75
6	Evacuation of Renewable Energy generations located in WR and NR to Northern Region states along with reactive compensation	697.00
7	Inter-regional System Strengthening Scheme for NR & WR along with reactive compensation	380.00

POWERGRID may confirm the above indicated cost of the schemes.

1.3 The cost of the transmission schemes already under implementation on cost plus basis by POWERGRID or through tariff based competitive bidding route is as given below:

Projects under construction in WR by POWERGID on cost plus basis			
S.No.	**Name of the scheme**	**Cost in Rs crores**	**YTC(levelised), Rs crores (@ 17% of the cost)**
1	Trans. System strengthening in Western part of WR for IPP Generation Projects in Chhatishgarh - part-D	2127.51	361.68
2	System Strengthening in North/West part of WR for IPP Project in Chhattisgarh. Part - E	1746.65	296.93
3	System Strengthening in Raipur - Wardha Corridor fo IPP Project in Chhattisgarh - Part - F	1422.85	241.88
4	Transmission System Associated with Mauda - II Gen. Proj. (2x660 MW)	1575.3	267.80
5	Transmission System Associated for Solapur STPP (2x660MW) Gen. Proj.	63.32	10.76
6	Inter-Regional System Strengthening Scheme in WR and NR (Part-A)	1315.9	223.70
7	Transmission System Associated with KAKRAPAR APP - 3&4	378.71	64.38
8	Transmission System Associated with LARA STPS - I NTPC	400.47	68.08
9	Interstate Transmission system for Renewables-WR I	2487	422.79
10	System strengthening associated with Mundra UMPP	483	82.11
	Total	12001	2040

Projects under construction/bidding in WR through TBCB					
S.No	**Name of the scheme**	**Cost in Rs crores**	**YTC(levelised), Rs crores**	**BPC**	**Successful Bidder**
Under Construction					
1	System strengthening common for WR and NR	2900	199.53	PFCCL	Sterlite Transmission Projects Ltd
2	System strengthening for WR	1720	142.128	PFCCL	Sterlite Transmission Projects Ltd
3	Part ATS of RAPP U-7&8 in Rajasthan	310	36.5	PFCCL	Sterlite Grid Limited
Bidding process completed					
4	Transmission System Strengthening associated with	2845	210.99	RECTPCL	POWERGRID

	Vindhyachal – V				
6	Transmission System Associated with DGEN TPS (1200 MW) of Torrent Power Ltd.	275	58.4	PFCCL	Instalaciones Inabensa S.A.
7	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part- A)	4070	290.147	RECTPCL	POWERGRID
8	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part- B)	3684	256.7	RECTPCL	POWERGRID
Bidding under process					
9	Additional System Strengthening for Sipat STPS	867		PFCCL	
10	System strengthening for IPPs in Chhattisgarh and other generation projects in Western Region	823		PFCCL	
11	Additional System Strengthening Scheme for Chhattisgarh IPPs – Part B	1930		PFCCL	
Bidding process to be taken up					
12	Additional inter-Regional AC link for import into Southern Region i.e. Warora – Warangal and Chilakaluripeta - Hyderabad - Kurnool 765kV link	8570		PFCCL	
13	Common Transmission System for Phase-II Generation Projects in Odisha and Immediate Evacuation System for OPGC (1320 MW) Project in Odisha	2748		PFCCL	
	Total	**30742**			

1.4 Regarding point no.20 on Laying of cable in DGEN-Vadodara 400 kV D/C line at DGEN end, GETCO has stated that the scheme cannot be awarded as the due diligence was not done as per procedure to look for all options. GETCO vide their letter dated 09.02.2015 has not given go ahead to CTU for implementation of 400 kV, 125 MVAR bus reactor at 765/400 kV Vadodara substation to compensate reactive power due to proposed laying of 3 km cable in DGEN- Vadodara 400 kV D/C line at DGEN end.

1.5 CEA vide their letter dated 07.04.2015 has furnished clarifications to GETCO giving details of the deliberations done among CEA, CTU, GIDC and Torrent Energy Limited to arrive at the decision for provision of cable in DGEN- Vadodara 400 kV D/C line (Copy of the letter enclosed). GETCO in reply to CEA letter has stated that due diligence for various RoW alternatives with the participation of all WR constituents and also approval for such a material change in the scope of 400 kV D/c DGEN-Vadodara line having huge cost implications was not done(copy enclosed).

1.6 Member may deliberate and confirm the minutes of the 37th meeting of the Standing Committee on Power System Planning in Western Region.

2.0 Review of Progress on Earlier Agreed Transmission Schemes.

2.1 The status of implementation of transmission projects under tariff based competitive bidding are enclosed at Annexure-1.

2.2 POWERGRID may intimate/furnish the status of transmission schemes under implementation by them.

2.3 Members may deliberate.

3.0 In principle approvals granted to POWERGRID.

3.1 In order to control overvoltage condition prevailing in the grid following proposals of POWERGRID regarding commissioning of line reactors as bus reactors till the availability of the associated line were agreed in principle by CEA:

(i) Commissioning of 2X80MVAR, 400kV Line reactors associated with Aurangabad – Boisar 400kV D/C (Quad) line as bus reactor at 400kV Boisar substation.
(ii) Commissioning of Satna end 240MVAR, 765kV Line reactor associated with Satna – Vindhyachal 765kV circuit – 2 as bus reactor at Satna sub station.
(iii) Commissioning of 765 kV, 240 MVAR line reactor associated with Satna-Vindhyachal 765 kV S/c line-1 as bus reactor at Satna substation.
(iv) Commissioning of 765 kV, 240 MVAR Line Reactor associated with Jabalpur-Bina 765 kV S/C line-3 as Bus Reactor at Bina substation.

3.2 These line reactors commissioned as bus reactors were to be restored as line reactors with commissioning of the associated lines. POWERGRID may kindly intimate the present status of the line reactors commissioned as bus reactors and the associated lines.

S.No.	Line Reactors (MVAR)	Substation	Associated Transmission Line	Date / schedule of	
				Comm. of Line reactor as Bus Reactor	Restoration of Bus Reactor as Line Reactor
(i)	2X80	Boisar 400 kV S/s	Aurangabad – Boisar 400kV D/C (Quad) line.		
(ii)	1X240	Satna 765 kV S/s	Satna – Vindhyachal 765kV circuit – 1		
(iii)	1X240	Satna 765 kV S/s	Satna – Vindhyachal 765kV circuit – 2		
(iv)	1X240	Bina 765 kV S/s	Jabalpur-Bina 765 kV S/C line-3		

3.3 Members may please note.

4.0 Proposal of Series Reactors in Western Region- Agenda by POWERGRID

4.1 Director (SP&PA), CEA stated that short circuit studies carried out by POWERGRID for 2017-18 condition indicates the short circuit level of 70 kA at Wardha 400 kV bus, 47 kA at Wardha 765 kV bus, 96 kA at Champa 400 kV bus and 70 kA at Champa 765 kV bus. The short circuit levels are exceeding the design limit of 40 kA and 50 kA at Wardha and Champa respectively.

4.2 In the 37th meeting of SCPSP-WR, to limit the short circuit level, bus splitting of 765 kV and 400 kV bus at Wardha and Champa along with provision of 12 ohm series, as detailed below, was proposed:

S. No.	BUS	Series Reactor (Line / Bus)	Bus Split Arrangement	
			Bus A	**Bus B**
1.	**Wardha 400 kV**	➢ 12 ohm on both circuits of Wardha – Mauda 400 kV D/c line. ➢ 12 ohm on both circuits of Wardha – Warora Pool/Parli 400 kV D/c line	➢ Wardha – Raipur 400 kV D/c line ➢ Wardha – Akola 400kV D/c line ➢ Wardha – Aurangabad (PG) 400kV D/c line ➢ 400kV side of 1no. 1500 MVA, 765/400kV ICT ➢ 400kV side of 3nos. 315MVA, 400/220kV ICT ➢ 400kV, 50MVAR Bus Reactor	➢ Wardha – Mauda 400 kV D/c line ➢ Wardha – Warora Pool/Parli 400kV D/c line ➢ 400kV side of 2nos. 1500 MVA, 765/400kV ICT
2.	**Wardha 765 kV**	➢ 12 ohm on Wardha 765 kV Bus Sectionalizer	➢ Wardha – Seoni 765 kV 2xS/c line ➢ Wardha – Nizamabad 765kV D/c line ➢ 765kV side of 3nos. 1500 MVA, 765/400kV ICT ➢ 765kV, 3x110MVAR Bus Reactor ➢ 765kV, 3x80MVAR Bus Reactor	➢ Wardha – Raipur Pool 765 kV 2xD/c line ➢ Wardha – Aurangabad 765 kV 2xD/c line
3.	**Champa 400 kV**		➢ Champa Pool – Lanco TPP 400 D/c line ➢ Champa Pool – Lara STPP 400 D/c line ➢ Champa Pool – Karnataka PCL 400kV D/c line ➢ 400kV side of 3nos. 1500 MVA, 765/400kV ICT ➢ 400kV, 80MVAR Bus Reactor	➢ Champa Pool – KSK Mahanadi PCL 400 2xD/c line ➢ Champa Pool – MB TPP 400 D/c line ➢ 400kV Side of 3nos. 1500 MVA, 765/400kV

				ICT
4.	**Champa 765 kV**	➢ 12 ohm on both circuits of Champa Pool – Raipur Pool 765 kV D/c line ➢ 12 ohm on both circuits of Champa Pool – Raigarh Pool (Kotra) 765 kV 2xS/c line ➢ 12 ohm on both circuits of Champa Pool – Dharamjaigarh 765 kV 2xS/c line	➢ Champa Pool – Raipur Pool 765kV D/c line ➢ Champa Pool – Raigarh Pool (Kotra) 765kV S/c line 1 ➢ 765kV side of 3nos. 1500 MVA, 765/400kV ICT ➢ 765kV, 3x80MVAR Bus Reactor	➢ Champa Pool – Dharamjaigarh Pool 765kV 2xS/c line ➢ Champa Pool – Raigarh Pool (Kotra) 765kV S/c line 2 ➢ 765kV side of 3nos. 1500 MVA, 765/400kV ICT

4.3 In the meeting, it was decided that POWERGRID would organize a meeting of prospective vendors of Fault Level Limiter / Series reactor with WR beneficiaries to discuss the technological issues / operational experiences.

4.4 A workshop was organized by POWERGRID on 10th March 2015. The presentation made in the workshop was circulated to the standing committee through e-mail by POWERGRID.

4.5 Members may deliberate.

5.0 Retention of Aurangabad (PG) 400/220 KV, 2 x 315 MVA ICTs along with its associated bays and provision of 2X500MVA, 400/220kV ICT to Parli (PG) switching station- Agenda by MSETCL

5.1 In the 37th Standing Committee Meeting of CEA on Power system planning in Western Region, POWERGRID has proposed installation of 2x500MVA, 400/220kV ICTs at Parli (PG) switching station in view of high loading observed on 400/220 kV ICTs and 220 kV lines emanating from 400/220 kV Parli (MSETCL) substation.

5.2 In the 37th SCMPSPWR, MSETCL has proposed to retain 1X315MVA, 400/220kV ICT out of 2X315MVA 400/220kV ICT at Aurangabad (PG), and shifting of second 1X315MVA, 400/220kV ICT from Aurangabad (PG) to Parli (PG) 400kV switching station. MSETCL has proposed shifting of 1X315MVA, 400/220kV ICT from Aurangabad (PG) as they have already taken up the work of establishment of 400/220 substation at Taptitanda and 765/400 kV Ektoni substation to cater Aurangabad load .

5.3 During the 37th SCMPSPWR, as the proposal of one no. of 400/220 kV ICT at Aurangabad (PG) and Parli 400 kV switching station by MSETCL was not fulfilling the N-1 transmission planning criteria, it was agreed that the provision of 2nd 400/20 kV ICTs at Auangabad(PG) and Parli 400 kV substation would be discussed in the next SCMPSPWR.

5.4 MSETCL vide their letter dated 24.03.2015 has consented for retention of 2X315MVA, 400/220kv ICT at Aurangabad (PG) and provision of 2X500MVA,

400/220kV ICT at Parli (PG) switching station, in view of the N-1 Transmission Planning Criteria and overloading of 400/220 kV ICTs observe at their Aurangabad and Parli 400/220 kV subsations. MSETCL has planned the following 220 kV network for dispersal of power from Aurangabad (PG) and Parli(PG) 00/ 220 kV substation:

Aurangabad (PG) 400/220 kV, 2X315 MVA substation:

(i) LILO of both circuits of Chitegaon- Shendra 220 kV D/C line at Aurangabad (PG) 400/20 kV, 2X315 MVA substation.

Parli (PG) 400/220 kV, 2X500 MVA substation:

(i) LILO of both circuits of Parli-Harngul 220 kV line at Parli (PG) 400/220 kV, 2X500 MVA substation.
(ii) LILO of Parli- Osmanabad 220 kV D/C line at Parli (PG) 400/220 kV, 2X500 MVA substation.

5.5 Aurangabad (PG) 400/220 kV, 2X315 MVA substation is an existing substation and is in commercial operation from 01.02.2014, therefore MSETCL is requested to implement the 220 kV interconnections as soon as possible. Parli (PG) is an existing 400 kV switching station and the 220 kV interconnections needs to be implemented by MSETCL in the matching time frame of the 2X500 MVA ICTs at Parli (PG).

5.6 Members may deliberate.

6.0 Additional 400 kV feed to Goa

6.1 The peak demand met by Goa during the year 2014-15 was 489 MW and as per the 18th EPS, the peak demand is expected to grow to 815 MW by the end of 12th Plan (2016-17) and 1192 MW by the end of 13th plan (20121-22). At present demand of Goa is mainly catered through Mapusa 3x315 MVA, 400/220 substation, which gets, it feed from Kolhapur 400 kV substation through a 400 kV D/C line. Goa system is also connected with Maharashtra and Karnataka through 220 kV lines.

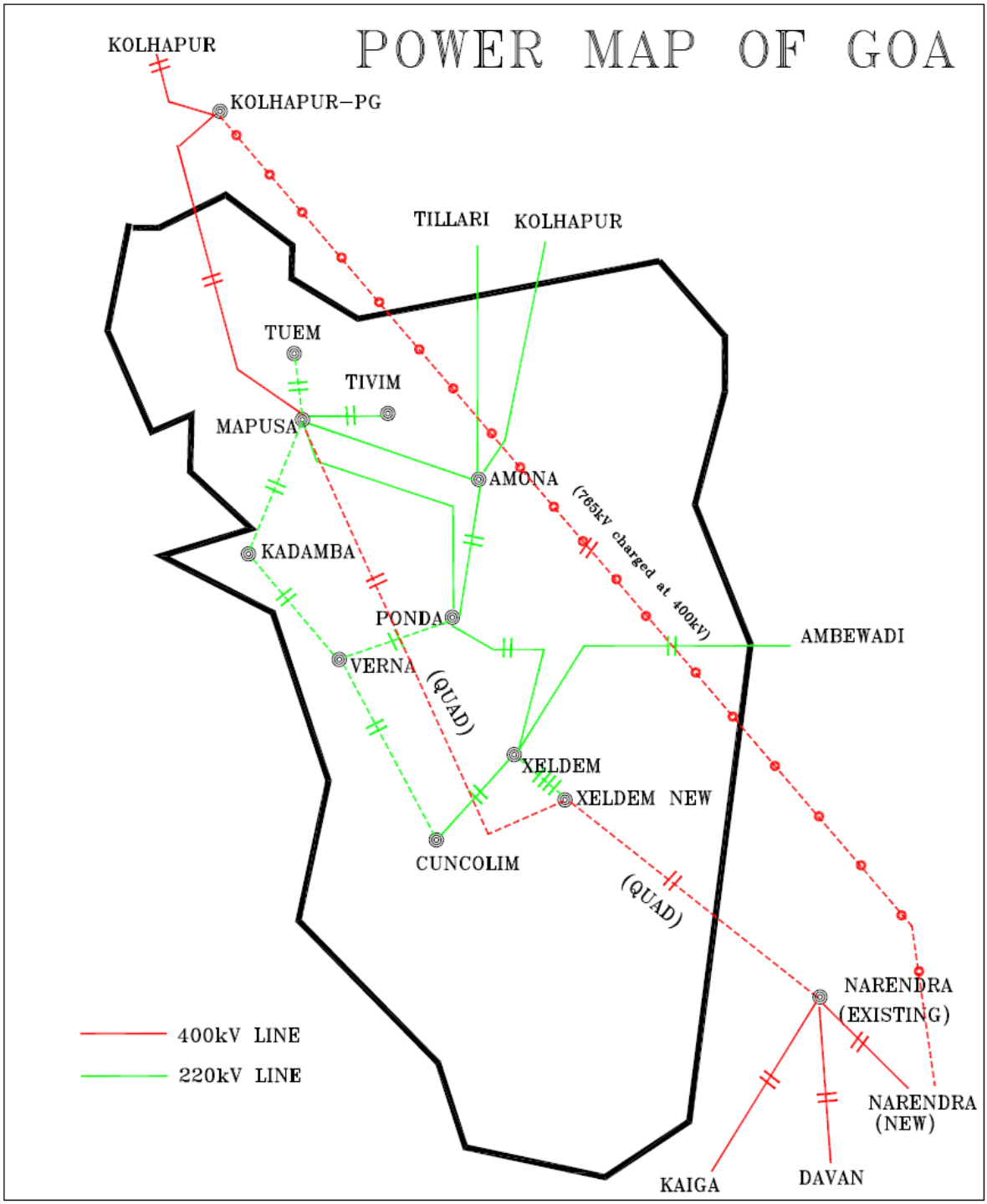
6.2 In persuasion of decisions made in the meeting held on 2.03.2015 at CEA, New Delhi regarding the transmission plan for implementation of 24x7 power supply in the State of Goa, provision of a second 400 kV substation in Goa along with its interconnections with the Inter State Transmission System has been jointly studied by CEA, CTU and Electricity Department of GOA.

6.3 As per the new Planning Criteria under “n-1-1” contingency of 400 kV Kolhapur – Mapusa D/C line, there shall be severe constraints, in meeting the demand of Goa on remaining 220 kV network. To improve the reliability and power supply situation in Goa, an additional 400 kV in feed to Goa proposed. The details of the study done is enclosed as Annexure-2. Two alternatives have been explored as given below:

1. New 2x500MVA, 400/220kV Substation at Xeldem
   OPTION 1: Narendra (existing) - Xeldam 400 kV D/C (quad) line.
   OPTION 2: Narendra (existing) - Xeldam– Mapusa400 kV D/C (quad) line.

2. New 2x500MVA, 400/220kV Substation at Ponda
   OPTION 1: Narendra (existing) - Ponda 400 kV D/C (quad) line.
   OPTION 2: Narendra (existing) - Ponda– Mapusa400 kV D/C (quad) line.

Establishment of a new 400 kV substation at Xeldam or at Ponda with 400 kV feed from Narendra (existing) 400/220 kV substation in Karnataka is required in Goa in order to ensure reliable supply of power. As there is space constraint at Ponda therefore the new 400 kV substation may be established at Xeldam.



6.4 To enable Goa to import power for improve the reliability and power supply situation , the following Inter State Transmission System scheme is proposed:

(i) Establishment of 2X500 MVA, 400/200 kV substation at Xeldam and its interconnection with Narendra (existing) 400 kV substation through 400 kV D/C line with quad conductor. The interconnection between the existing 220 kV Xeldam substation and the proposed 400/220 kV Xeldam substation could

be through bus extension or through 220 kV interconnecting lines, as the case may be.

(ii) 400kV (Quad) connectivity between the new substation at Xeldem and Mapusa to take care of any N-1-1 contingencies involving outage of any one 400kV infeed to Goa.

6.5 Members may deliberate and concur the proposal.

7.0 Transmission System Strengthening associated with Mundra UMPP.

7.1 The following System Strengthening associated with Mundra UMPP was agreed in the 36th Standing Committee on Power System Planning of WR held on 29.08.2013:

(i) LILO of both circuits of Mundra UMPP – Limbdi 400 kV D/c (triple snowbird) at Bachau.

(ii) Mundra UMPP – Bhuj pooling station 400 kV D/c line (triple snowbird).

The Mundra UMPP – Bhuj Pooling station 400 kV D/c line would be routed through Bachau 400 kV substation. The Mundra UMPP- Bachau section of the line would be implemented first so as to establish LILO of one circuit of Bachau – Versana 400 kV D/C line at Mundra UMPP. The Bachau – Bhuj pool section of the line, would be implemented in matching time frame of establishment of 765/400 kV Bhuj pool station.

7.2 MoP vide its OM no.15/9/2013-Trans dated 5-9-2014/ 25-9-2014, has approved implementation of the scheme by POWERGRID under compressed time schedule.

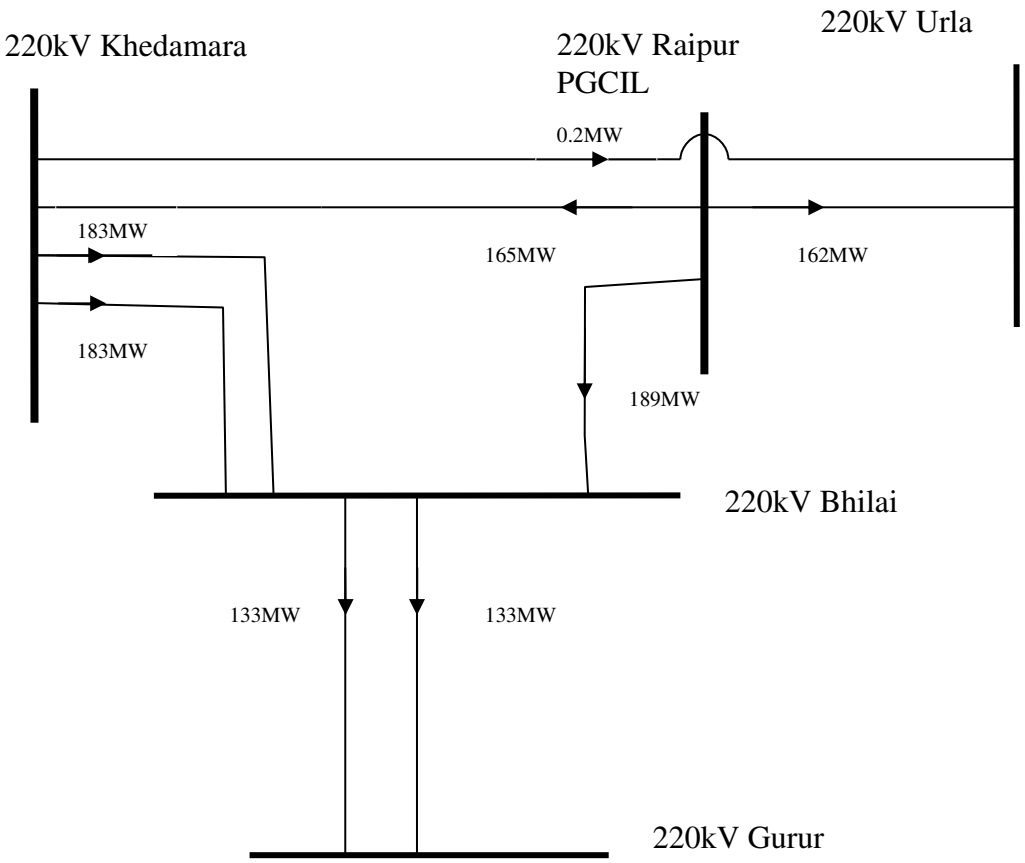
7.3 Subsequently, POWERGRID has requested that the routing of Mundra UMPP – Bhuj pool 400 kV D/C line through Bachau 400 kV substation may be removed from the scope of works and has suggested for direct 400 kV line between Mundra UMPP and Bhuj Pool due to severe RoW constraints in vicinity of Bachau. POWERGRID has sought in - principle approval of CEA for the change in scope and modification of MoP O.M no.15/9/2013-Trans dated 5/25-9-2014, through which MoP has approved implementation of the scheme by POWERGRID under compressed time schedule.

7.4 CEA has suggested that POWERGRID may immediately take up the implementation of **item (i)** of the System strengthening scheme associated with Mundra UMPP viz., LILO of both circuits of Mundra UMPP – Limbdi 400 kV D/c (triple snowbird) at Bachau and modification in the scope of item (ii) would be taken up after deliberation in the Standing committee meeting on power system planning in WR. In view of the above, POWEGRID has split the system strengthening associated with Mundra UMPP into two parts viz. Part A and Part B. Part A of the scheme consists LILO of both circuits of Mundra UMPP – Limbdi 400kv D/C (triple snow bird) at Bachau. The balance portion of the scheme (Part B) shall be taken separately after its finalization SCM on power system planning in WR.

7.5 As per the already agreed scheme the length of the CGPL- Bhuj pool 400 kV D/C was about 175 kms as it was being routed through Bachau. With suggested modification by POWERGRID, the line goes straight from CGPL to Bhuj pool and its length is about 100 kms. Members may deliberate**.**

8.0 Rearrangement of existing 220 kV circuit between 400 kV Khedamara (CSPTCL) and 400 kV Raipur, Kumhari (PGCIL).

8.1 CSPTCL Vide letter no. 02-12/SE(C&RA)/2102 dated 12.03.2015 have proposed that the rearrangement of existing 220 kV circuit between 400 kV Khedamara (CSPTCL) and 400 kV Raipur, Kumhari (PGCIL). The loading on 220kV D/C line between Khedamara (CSPTCL) and 220kV Bhilai and 220kV S/C line between Raipur, PGCIL and 220kV Bhilai are 183MW/Ckt and 189MW respectively. To Manage contingencies/availing shut down for the above two lines are very difficult. The single line diagram for the present case showing power flow results (simulated by CSPTCL for 2016-17 conditions) is as under:

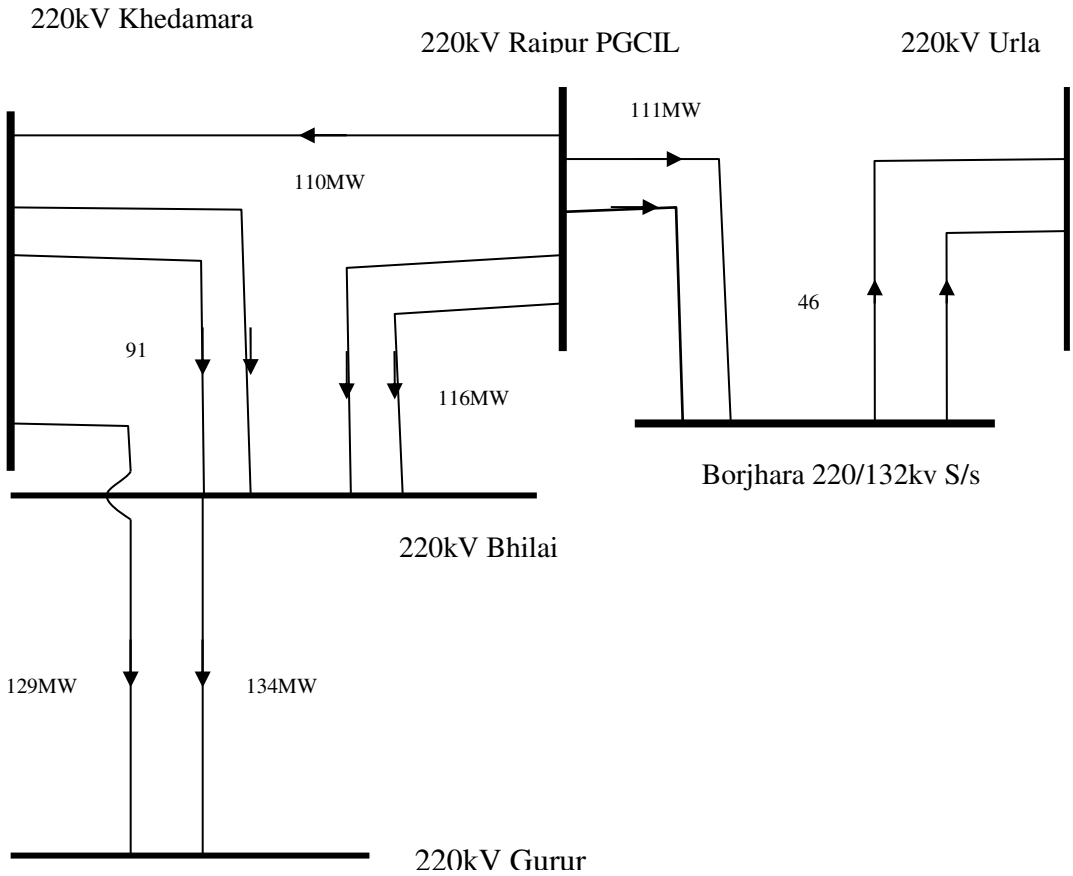


8.2 The proposed rearrangement of existing 220 kV circuit between 400 kV Khedamara (CSPTCL) and 400 kV Raipur, Kumhari (PGCIL) is as under:

i. Rearrangement of 220kV Khedamara (CSPTCL) – Raipur (PGCIL) line in such away that 220kV substation Gurur would receive power directly from 400/220kV Khedamara (CSPTCL) one circuit. 220kV Bhilai substation would receive power directly from 400/220kV substation Raipur (PGCIL) through 220kV D/C line.

ii. In the 37th SCM of WR held on 5.9.2014 the LILO of 220 kV Raipur (PGCIL) – Urla at Borjhara S/s and LILO of 220 kV Khedemara (Bhilai) –Urla line at Borjhara were agreed for feeding the proposed Borjhara S/s at 220kv level. The 220kV S/C line from Khedamara – Borjhara line which would formed after implementation LILO of 220 kV Khedemara (Bhilai) –Urla line at Borjhara would be LILO at 220kV Raipur PGCIL S/s. For implementation of LILO of Khedamara – Borjhara line at 220kV Raipur PGCIL needs 2nos of 220kV bays.

8.3 The single line diagram for the proposed rearrangement showing the power flow results (simulated by CSPTCL for 2016-17 conditions) is as under:



11.4 POWER GRID may clarify the availability of 2nos of 220kV bays at Raipur PGCIL S/s and Members may deliberate.

9.0 Modification in transformation capacity at Itarsi S/s

9.1 In the 37th Standing Committee Meeting on Power System Planning of WR held on 05.9.2014, MPPTCL proposal of an additional 1x315 MVA, 400/220kV transformer along with two nos. of 220 kV bays at Itarsi (PG) 400/220 kV S/s, to ensure the reliability of supply to 220 kV substations around Itarsi and Betul area was agreed.

9.2 POWER GRID vide their letter no. C/CTU/W/Itarsi dated 23.03.2015 has proposed that rating of additional (2nd) ICT to be installed at Itrasi be revised to 500MVA instead of 315MVA, as the cost of 400/220kV ICT of 500MVA and 315MVA is generally of same order.

9.3 Members may deliberate.

10.0 POWER GRID works associated with system strengthening scheme for IPPs in Chhattisgarh and other Generation projects in Western Region.

10.1 The system strengthening for IPPs in Chhattisgarh and other generation projects in Western region was discussed and agreed in the 36th Standing Committee on power system planning of Western Region held on 29.08.2014. In 32nd Empowered Committee on Transmission held on 17.01.2014, wherein under the scope of works , it has been specified that 2 no. of 400 kV line bays existing at Gwalior 765/400 kV sub-station would be utilized for terminating Gwalior – Morena 400 kV D/C line.

10.2 POWER GRID vide their letter no. C/ENG/W/00/CTU/PLG dated 12.03.2015 has informed that due to severe space constraints at Gwalior 765/400kV substation, 2nos of existing 400kV line bays at Gwalior substation have already been utilized for installation of 2nos of 125MVAR bus reactors at Gwalior S/s under transmission system associated with phase – 1 generation projects in Odisha part – C.

10.3 In the 34th Standing Committee on Power system Planning of Western Region held on 9.05.2012, provision of bus reactors at seventeen locations was agreed to contain the voltage conditions in WR. This included provision of one no.125MVAR bus reactor at Gwalior 400kV S/s. POWER GRID may clarify regarding installation of 2nos of 125MVAR bus reactors at Gwalior S/s and utilization of the two nos of 400kV bays at Gwalior S/s (released by charging of Gwalior-Agra lines at 765 kV level) which was to be utilized for terminating Gwalior – Morena 400 kV D/C line.

10.4 Members may deliberate.

11.0 Erection of 132 KV D/C line from 132 KV Taloda substation (existing) of MSETCL to 132 KV Sarvala substation (proposed) of GETCO- proposal by Gujarat.

11.1 GETCO vide their letter dated 28.04.2015 has given a proposal of Erection of 132 KV D/C line from 132 KV Taloda substation (existing) of MSETCL to 132 KV Sarvala substation (proposed) of GETCO. The summary of the proposal is a given below:

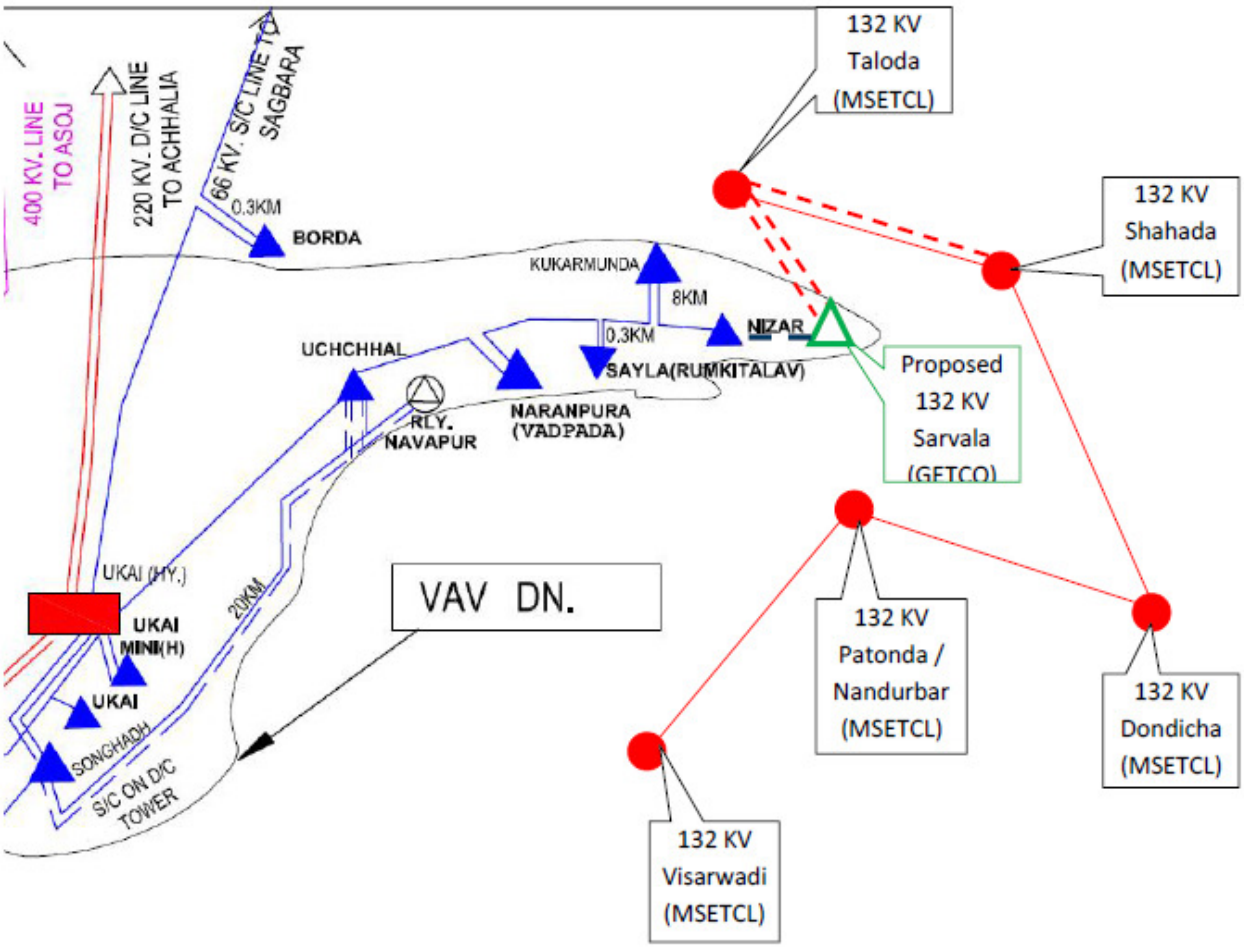
(i) Five Nos. of 66 kV substations have been established at Uchhal, Naranpura, Sayla, Kukarmunda and Nizar substations in the tribal area of Tapi to provide reliable power supply.

(ii) All these five substations are fed through a long 66 KV S/C line from 220/66 KV ICTs at Ukai Hydro power station which is around 95 Kms long. Due to long length of the 66 KV line, the voltage profile of 66 KV Nizar substation, located at extreme end, is very poor i.e about 58 kV.

(iii) Tapi district of Gujarat State and Nandurbar district of Maharashtra State are border location of two States. To provide reliable and un-interrupted power supply to tribal area population around Nizar area of Tapi, an alternative source of power supply from adjoining network of MSETCL (132 KV Taloda substation) can be availed.

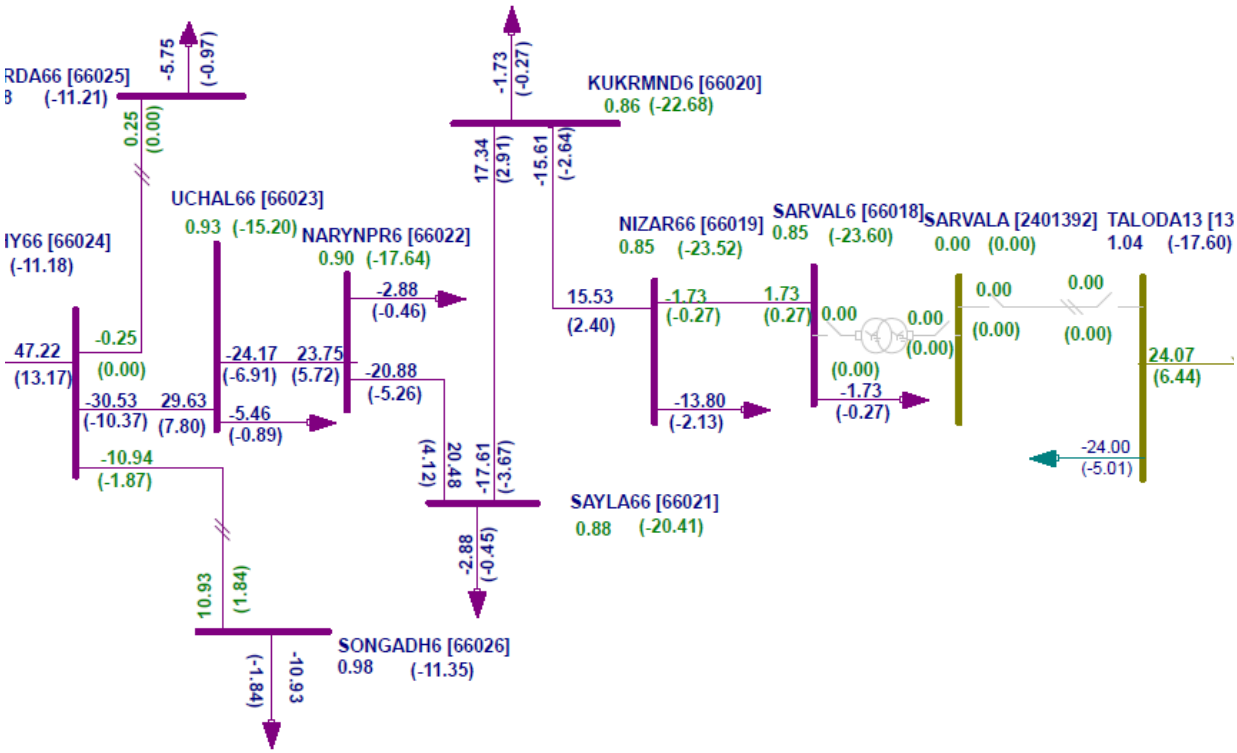
(iv) GETCO proposal to provide alternative source of power supply to Tapi area includes:
   a) Establishment of 132/66 kV Sarvala substation (Gujarat area)
   b) Sarvala (GETCO) – Taloda (MSETCL) 132 kV D/C line with route length of about 15 kms (8 kms in Gujarat and 7 kms in Maharastra).
   c) Two nos. of 132 kV bays at Taloda 132 kV (MSETCL) substation.

(v) A diagram depicting the proposal is shown below:

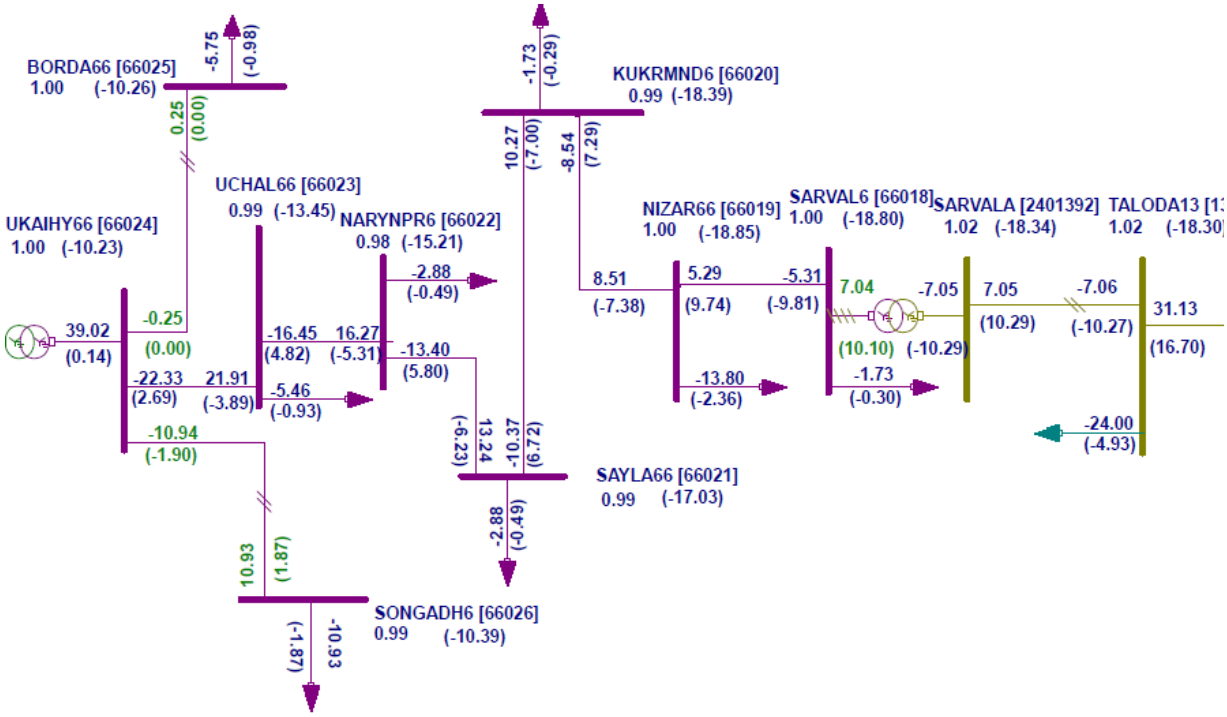


(vi) The maximum demand on the five no. of 66 kV substation is of the order of 20-25 MW. Studies has been carried out by GETCO for three conditions:

a) Without 132 kV interconnection between Taloda (MSETCL) and Sarvala (GETCO) substations. The studies shows there is power flow about 30 MW on Ukai- Uchal-Naranpura-Sayla-Kukarmunda-Nizar 66 kV S/C line with voltage of 56 kV (0.85 p.u) observed at Nizar.

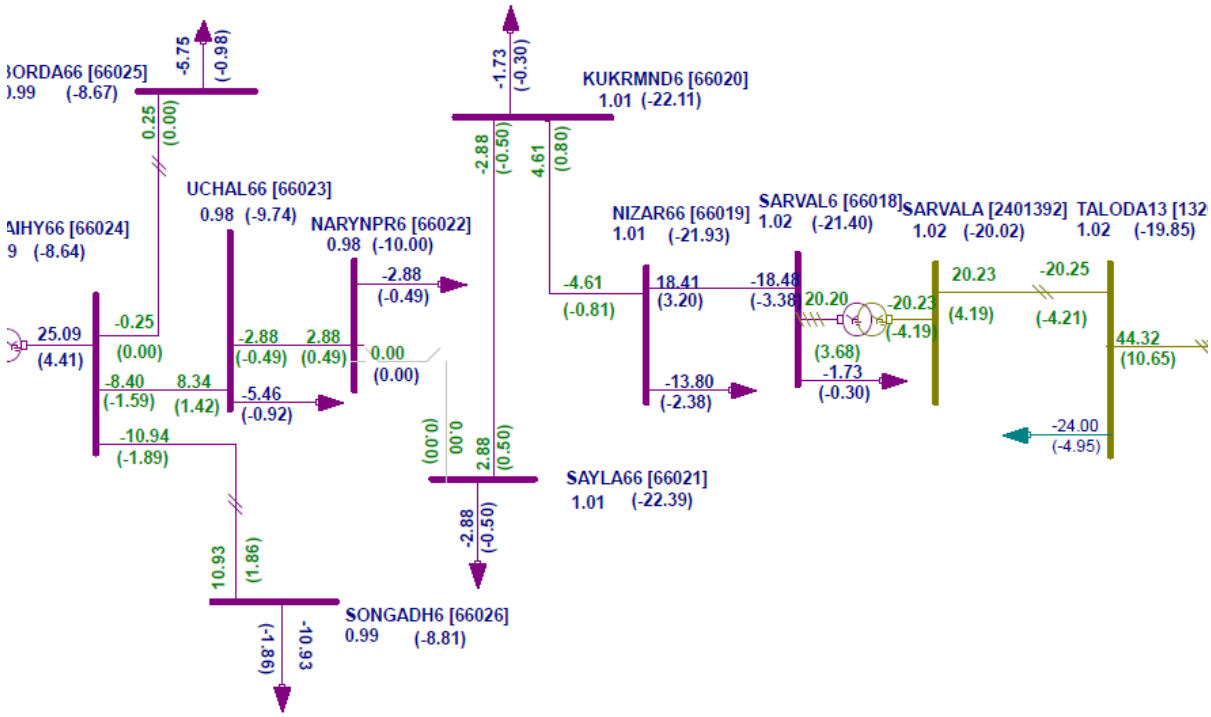


b) With 132 kV interconnection between Taloda (MSETCL) and Sarvala(GETCO) substations. The studies shows there is power flow of about 23 MW on Ukai- Uchal-Naranpura-Sayla-Kukarmunda-Nizar 66 kV S/C line and about 7 MW power flow from Maharastra to Gujarat on the Taloda-Sarvala 132 kV D/C line. The voltages observed on the 5 nos. of 66 kV substations (Uchal, Naranpura, Sayla, Kukarmunda and Nizar) is around 1 p.u.



c) With 132 kV interconnection between Taloda (MSETCL) and Sarvala(GETCO) substations and Naranpura-Sayla 66 kV S/C line kept

open. In this case load of the Sayla, Kukarmunda and Nizar 66 kV substations is met from Maharastra system radially. Load of Uchal and Naranpura 66 kV substations are met through the Ukai-Uchal-Naranpura 66 kV S/C radial line. The studies shows there is power flow of about 20 MW Maharastra to Gujarat on the Taloda-Sarvala 132 kV D/C line. The voltages observed on the 5 nos. of 66 kV substations (Uchal, Naranpura, Sayla, Kukarmunda and Nizar) is in the range .98 p.u to 1.02 p.u.



11.2 GETCO has intimated that proposal has been discussed with MSETCL. The modalities of the proposal mutually finalized between GETCO and MSETCL is as given below:

a) The work of construction of 132 KV D/C line from 132 KV Taloda (MSETCL) s/s to 132 KV Sarvala (GETCO) along with 2 Nos. of 132 KV bays at 132 KV Taloda s/s shall be executed by GETCO under supervision of MSETCL.

b) The cost of land required for 2 Nos. of 132 KV bays at 132 KV Taloda s/s shall be borne by GETCO as per prevailing rates.

c) Operation and Maintenance of line shall be carried out by GETCO in coordination with MSETCL as per the agreement to be executed between MSETCL and GETCO.

d) The proposed s/s and link line shall be operated in “Radial Mode” using Maharashtra STU network but shall not be considered for any other transactions or Open Access.

e) The necessary “COMMERCIAL AGREEMENT” for billing and energy exchange shall be executed between MSEDCL and concerned DISCOM of Gujarat.

f) GETCO shall obtain approval from WRPC for the purpose of "Regional Energy Accounting (REA)" on account of this radial operation and supply to Gujarat via Maharashtra Transmission system.

g) The metering to both ends of the lines will be done by GETCO as per the requirement of STU & MSEDCL.

11.3 Members may deliberate on the GETCO proposal.

12.0 Issues related 400/220kV Navi Mumbai (PGCIL) S/s and associated 220kV interconnection with MSETCL.

12.1 In the 25thSCM of WR held on 30.09.2006, the following scope of works were agreed to be implemented under Western Regional system strengthening scheme (WRSS – V) by PGCIL.

(i) 400kV Vapi – Navi Mumbai D/C line.
(ii) LILO of 400kV Lonikhand/Pune – Kalwa line at Navi Mumbai.
(iii) Establishment of 400/220kV 2X315MVA new (GIS) at Navi Mumbai.
(iv) 220kV Vapi – Khadoli D/C line.

12.2 In 27th SCM of WR held on 30.07.2007, Pune (PG) – Navi Mumbai (PG) 400kV D/C line was agreed as a regional system strengthening scheme in Western Region to be implemented in time frame of Krishnapatnam UMPP.

12.3 In the 32nd SCM of WR held on 13.05.2011, PGCIL requested for reconsideration of Pune (PG) – Navi Mumbai (PG) 400kV D/C line in view of severe RoW constraints envisaged during implementation and it was agreed that MSETCL could suggest alternative location for termination of line from Pune for onward dispersal of power.

12.4 In the 35th SCM of WR held on 3/1/2013, PGCIL has informed that LILO of Lonikhand/ Pune – Kalwa 400kV S/C line at Navi Mumbai as agreed under WRSSS – V, would have involved crossing of Line and also some additional tower locations. POWER GRID has proposed LILO of Kharghar – Padghe section of Line -1 at Navi Mumbai, which has also been agreed by MSETCL. It was also agreed for laying of 1.5km of 400kV under ground cable near gantry of Navi Mumbai sub – station with an estimated cost of Rs 55 crores to expedite the implementation of LILO arrangement.

12.5 In the 35th SCM of WR held on 3/1/2013, in view of severe RoW problem PGCIL has proposed that 400kV Vapi – Navi Mumbai D/C line may be terminated at Kudus S/s of MSETCL. The above proposal of PGCIL was agreed and PGCIL agreed to continue their efforts for completing the balance portion of the Vapi – Navi Mumbai 400kV D/C line.

12.6 MSETCL vide their letter dated 8th April, 2015 has requested for review of the 400kV Navi Mumbai (PG) S/s due to the following reasons:

a) 400/220kV Navi Mumbai (PG) S/s is not getting feed from ISTS source.

b) Burden of additional POC charges on Maharashtra as well as WR constituents.
c) High capital cost on account of under ground cable and severe RoW constraints.

12.7 Members may deliberate.

13.0 Development of infrastructure for Transmission System strengthening for evacuation of power from New and Renewable energy based power projects in Madhya Pradesh – under green energy corridors.

13.1 The Government of Madhya Pradesh through its New & Renewable Energy Department (MPNRED) has taken the policy initiative for implementation of Wind, Solar, Biomass and Mini-Micro hydel power based projects. In response to request for proposal of MPNRED, various developers have shown interest for development of RE project with a cumulative capacity of about 5850 MW in MP state. These projects shall be developed during the next 5 years and the capacity wise details are as given below:

S.No	RE projects proposed in next 5 years	Capacity in MW
1	Wind Power	2704.55
2	Solar Power	2588.42
3	Mini-Micro Power Projects	282.70
4	Biomass Power Projects	271.40
	Total	**5847.07**

The transmission system strengthening associated with the RE projects would be implemented by Madhya Pradesh Power Transmission Company Limited (MPPTCL). The broad details of the transmission system proposed are as given below:

a) The total cost of the transmission system strengthening proposed has been estimated as Rs. 4700 crores. This is further divided into Phase-I works, Phase-II works and RE interconnection works.

b) The estimated cost of transmission schemes proposed under Phase-I works is Rs. 2100 crores and interalia, includes creation of 3 nos. of 400 kV substations (namely Mandsaur, Ujjain and Sagar), 8 nos. of 220 kV substations (namely at Sendhwa, Gudgaon, Kanwan, Suwasara, Ratangarh, Sailana, Jaora and Susner), 670 ckm of 400 kV line and 1278 ckm of 220 kV lines. Phase-I works are targeted to be completed by 2018. The details are given below:

S.No.	Transmission element	Length (KM)/Substation capacity (MVA).
1	220kV D/C line from Julwaniya 400kV S/s to Sendhwa 220kV S/s	35
2	220/132kV S/s at Sendhwa.	1X160+ 1X63 = 223MVA
3	220kV D/C line from Betul 220kV S/s to	35

	Gudgaon 220kV S/s	
4	220/132kV S/s at Gudgaon	1X160+ 1X63 = 223MVA
5.	220/132kV S/s at Kanwan	1X160+ 1X63 = 223MVA
6.	220kV D/C line from Badnawar 400kV S/s to Kanwan 220kV S/s	20
7.	220kV D/C line from Kanwan 220kV S/s to Dhar 220kV S/s	35
8.	400/220kV S/s at Mandsaur	2x315+2x160 =950MVA
9.	400kV D/C line from Nagda 400kV S/s to Mandsaur 400kV S/s	100
10.	LILO both circuits of Nagda - Neemuch 220kV line at Mandsaur 400kV S/s	20
11.	LILO both circuits of Badod-Kota-Modak 220kV line at Suwasara 220kV S/s	20
12.	220kV D/C line from Mandsaur 400kV S/s to Marut Shakti Pool 220kV S/s	65
13.	220/132kV S/s at Suwasara	2x160+1x63 =383MVA
14.	220/132kV S/s at Ratangarh 400kV S/s	2x160+1x63 =383MVA
15.	220kV D/C line from Neemuch 220kV S/s to Ratangarh 400kV S/s	65
16.	220kV/132 S/s at Sailana 400kV S/s	2x160+1x63 =383MVA
17.	220kV Interconnector between Sailana 400kV S/s and Ratlam Switching 220kV S/s	25
18.	2nd Circuiting of Ratlam Switching - Daloda 220kV line	72
19.	LILO of Ratlam-Daloda 220kV line at Jaora 220kV S/s	15
20.	220/132kV S/s at Jaora (Upgradation)	2x160 =320MVA
18.	400/220kV S/s at Sagar (Upgradation)	2x315=630MVA
19.	LILO of one circuit of Satna(PGCIL) - Bina(PGCIL) 400kV line at Sagar 400kV S/s	35

20.	400/220kV S/s at Ujjain	2x315+2x160 =950MVA
21.	400kV D/C line from Nagda 400kV S/s to Ujjian 400kV S/s	55.00
22.	400kV D/C line from Indore(PGCIL) 765kV S/s to Ujjian 400kV S/s	45.00
23.	220kV D/C line from Rajgarh(B) 220kV S/s to Susner 220kV S/s	72.00
24.	LILO both circuits of Ujjain - Badod 220kV and Ujjain-Nagda 220K line at Ujjain 400kV S/s	40.00
25.	220kV D/C line from Badod 220kV S/s to Susner 220kV S/s	35.00
26.	220kV D/C line from Ujjain 400kV S/s to Susner 220kV S/s	100.00
27.	400kV D/C line from Ashta 400kV S/s to Ujjian 400kV S/s	100
28.	220/132kV S/s at Susner	2x160+1x63 =383MVA

c) The estimated cost of transmission schemes proposed under Phase-II works is Rs. 1475 crores and interalia, includes 2 nos. of 400 kV substation (namely at Ratangarh and Sailana) , 3 nos. of 220 kV substations (namely at Sonkatch, Petlawad and Sheopur kalan), 340 ckm of 400 kV lines, 816 ckm of 220 kV lines and 6 no. of 220 kV statcoms. Phase-II works are targeted to be completed by 2020. The Phase-II works would be considered by MPPTCL after review in 2016 based on the works completed and expected RE projects. The details of Phase – II are given below:

S.No.	**Transmission element**	**Length (KM)/Substation capacity (MVA).**
1	220/132kV S/s at Sonkatch	1x160+1x63 =223MVA
2	220kV D/C line from Ashta 400kV S/s to Sonkatch 220kV S/s	50
3	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Sendhwa 220kV S/s.	-
4	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Gudgaon 220kV S/s.	-
5.	220kV D/C line from Kukshi 220kV S/s to Rajgarh(D) 220kV S/s	60
6.	220/132kV S/s at Petlawad	1x160+1x63 =223MVA
7.	220kV D/C line from Badnawar 400kV S/s to Petlawad 220kV S/s	50

8.	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Suwasara 220kV S/s	-
9.	400/220kV S/s at Ratangarh (Upgradation)	2x315+2x160 +1x63=1013 MVA
10.	400kV D/C line from Mandsaur400 to Ratangarh 400kV S/s.	100
11.	220kV D/C line from Ratangarh 400kV S/s to Bhanpura 220kV S/s	100
12.	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Ratangarh 400kV S/s	-
13.	400/220kV S/s at Sailana (Upgradation)	2x315=630MVA.
14.	400kV D/C line from Badnawar400 to Sailana 400kV S/s	70
15.	220kV D/C line from Sailana 400kV S/s to Jaora 220kV S/s	36
16.	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Sailana 400kV S/s	-
17.	1 No. STATCOM of (+)100/(-)100 MVAR,220kV at Susner 220kV S/s	-
18.	220/132kV S/s at Sheopurkalan	2x160+1x63 =383MVA
19.	Sabalgarh - Sheopurkalan 220kV D/C line	110

d) The estimated cost of transmission schemes proposed under RE interconnection works is Rs. 1125 crores. This includes development of transmission works required for interconnection of the renewable projects with the MP grid. This would be executed by MPPTCL at the cost of project developers.

13.2 The above intrastate scheme includes 400kV D/C line from Indore (PGCIL) 765kV S/s to Ujjian 400kV S/s, which would require two nos. of 400 kV bays at Indore 765/400 kV substation of POWERGRID.

13.3 Members may deliberate and concur.

13.0 Operational feedback by NLDC.

13.1 The operational feedback by NLDC on Transmission constraints in Western Region, for the quarter January to March 2015, is enclosed at Annexure- 3.

Member may deliberate.

14.0 **Open Access Meeting.**

14.1 The 20th meeting of WR constituents regarding connectivity/ open access applications was held on 17.02.2015 at POWERGRID Gurgaon. Minutes of the meeting was circulated by POWERGRID vide their letter no. C/CTU/W/06/OA-20/MOM dated 31.03.2015.

14.2 Members may deliberate.

14.3 The 21st meeting of WR constituents regarding connectivity/ open access applications would be held after Standing Committee meeting. The agenda would be circulated by POWERGRID.

15.0 Any other item with the permission of the chair.

Annexure-1

Status of TBCB Tr. Projects

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
1	2	3	4	5	6	7
1.	Scheme for enabling import of NER/ER surplus by NR	(i) Bongaigaon-Siliguri 400 kV Quad D/C	PFC	ENICL (Sterlite Technologies Ltd)	1700	**Line commissioned in 11/14**
		(ii) Purnea-Biharsharif 400 kV D/C Quad D/C				**Line Commissioned in 9/2013**
2.	System Strengthening in NR for import of power from North Karanpura and other projects outside NR and System Strengthening in WR for import of power from North Karanpura and other projects outside Western Region and also for projects within Western Region.	1. Sipat/Korba (Pooling) – Seoni 2. Lucknow-Bareilly 3. Bareilly-Meerut 4. Agra-Gurgaon 5. Gurgaon-Gurgaon (PG) 6. Gurgaon S/S	REC	NKTCL(Reliance Power Transmission Company Ltd)	2700	SPV acquired by Reliance on 20-05-2010 (Effective date) Approval u/s 164 received on 12.08.2013 Matter was in CERC for revision of tariff and extension of date of commissioning. NKTCL filed an appeal in appellate tribunal challenging CERC order of 9.5.2013. Appellate Tribunal has given final judgment on 2.12.13 setting aside CERC order and allowing the appeal. NKTCL is initiating steps for implementing

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						of order. The judgment of Appellate Tribunal accepts delay in clearance under section-164 as force majeure. According NKTCL have requested MoP to extend the validity of section 68 clearance vide their letter dtd 14.1.2014 Beneficiaries have appealed SC. **Work Yet to start.**
3.	Talcher-II Augmentation System	(i)Talcher II- Rourkela 400 kV D/C Quad line (ii)Talcher II – Behrampur 400 kV D/C line (iii)Behrampur-Gazuwaka 400 kV D/C line (iv)400/220 kV, 2x315 MVA Behrampur substation	REC	TTCL(Reliance Power Transmission Company Ltd.)	1400	LOI issued on 18-12-2009 SPV acquired by Reliance on 27-04-2010 (Effective date) Matter was in CERC for revision of tariff and extension of date of commissioning. TTCL filed an appeal in appellate tribunal challenging CERC order of 9.5.2013. Appellate Tribunal has given final judgment on 2.12.13 setting aside CERC order and allowing the appeal. TTCL is initiating steps for implementing of order. The judgment of Appellate Tribunal accepts

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						delay in clearance under section-164 as force majeure. According TTCL have requested MoP to extend the validity of section 68 clearance vide their letter dtd 14.1.2014. Beneficiaries have appealed SC. **Work yet to start.**
4.	Transmission System Associated with Krishnapattnam UMPP-Synchronous interconnection between SR and WR (Part-B)	(i) Raichur-Sholapur 765 kV S/C line-1-208 ckm	REC	RSTCL(Consortium of Patel-Simplex-BSTranscomm)	440	**Commissioned on 30.6.2014**
5.	System strengthening common for WR and NR		PFC	JTCL(Sterlite Grid)	1720	➢ LOI placed on 31.01.2011 ➢ Special Purpose Vehicle acquired on 31.03.2011 ➢ Scheduled Completion Date is 31.03.2014. ➢ Transmission License granted on 12.10.2011. ➢ Tariff adoption approval on 28.10.2011 ➢ Clearance under Section

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		(i) Dhramjaygarh-Jabalpur 765 kV D/C 765 kV lines				164 : received on 12.07.2013 **Length-760ckm, Locations-985, Foundation-794, Tower Erection-762, Stringing completed-416ckm,** Progress affected due to pending forest Clearance (284 Ha in MP and 114Ha in Chhattisgarh) and Severe row problem. JTCL informed stage –II clearance has been issued in MP and is pending in Chhattisgarh **Line expected to be commissioned by 07/15**

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		(ii) Jabalpur-Bina 765 kV S/C line				**Length-237ckm, Locations-610, Foundation-577, Tower Erection-577, Stringing completed-218ckm,** Progress affected due to pending forest Clearance (140Ha in MP) and Severe row problem. JTCL informed that Stage-II clearance has been issued in MP in March-2015 **Line expected to be commissioned by 06/15**
6.	System strengthening for WR		PFC	BDTCL(Sterlite Grid)	2900	➢ LOI placed on 19.1.2011 ➢ SPV acquired on 31.3.2011 ➢ Trans. license received on 12.10.2011 ➢ Approval u/s 164 received on 29.01.2013 ➢ Tariff adoption on28.10.2011 ➢ Original COD : Mar2014

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		(i) Jabalpur-Bhopal 765 kV S/C line				**Length-260ckm, Locations-664, Foundation-644, Tower Erection-633, Stringing completed-234ckm,** Progress affected due to pending forest Clearance (112Ha in MP) and Severe row problem. Stage-II Clearance is pending in MP **Line expected to be commissioned by 05/15**
		(ii) Bhopal-Indore 765 kV S/C line				**Line commissioned in 10/14**
		(iii) 2x1500 MVA 765/400 kV				

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		substation at Bhopal				**Commissioned in 7/2014**
		(iv) Bhopal-Bhopal (MPPTCL) 400 kV D/c quad line.				**Commissioned in 7/2014**
		(v) Aurangabad-Dhule 765 kV S/C line				**Line commissioned in 10/14**
		(vi) Dhule-Vadodara 765 kV S/C line				**Ready for commissioning in 2/2015**
		(vii) 2x1500 MVA, 765/400 kV substation at Dhule				CEA Inspection completed and s/s is ready for energisation since 28.2.14.
		(viii) Dhule - Dhule(Msetcl)400 kV D/C Line				**Line ready for commission since 9/2014 (400 kV bays by MSETCL at Dhule s/s is under construction and schedule for**

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						completion by Mar 2015)
7.	Transmission system associated with IPPs of Nagapattinam/ Cuddalore Area-Package A		PFC	PGCIL	1025	➢ SPV acquired on 29/03/2012 ➢ Tr. License issued on 15.7.2013 ➢ Tariff adoption by CERC on 9.5.2013. ➢ Clearance U/s 164 received on 9.12.2013. ➢ Scheduled COD 29.3.2015 (30months effective from 20.6.13, date of grant of license) Work awarded on 16.5.2014 to M/s Gammon and M/s IComm
		(i) Nagapattinam Pooling Station-Salem 765 kV D/C line - 200km				**Length-400ckm, Locations-543, Foundation-179, Tower Erection-19, Stringing completed-0ckm**
		(ii) Salem-Madhugiri 765 kV S/C line –217km				**Length-244ckm, Locations-647, Foundation-561, Tower Erection-413, Stringing completed-69ckm**
8.	Transmission	(i) Vemagiri Pooling Station–	REC	PGCIL	1300	SPV acquired on 18/04/2012

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
	System associated with IPPs of Vemagiri Area-Package A	Khammam 765 kV 1xD/C (1st ckt.) line. (ii) Khamam-Hyderabad 765 kV 1xD/C (1st ckt.) line.				Put on hold as commissioning of the associated generating station is delayed due to non-availability of gas. **The scheme is under consideration of CERC for the decision of its implementation.**
9.	Transmission System required for evacuation of power from Kudgi TPS (3x800 MW in Phase-I) of NTPC Limited.		REC	Kudgi TCL (M/s L&T Infrastructure Development Projects Limited)	1240	(i) LOI placed on31/07/13 (ii) SPV acquired on 30.8.2013 (iii) PG submitted on 22.8.2013 (iv) Tr. License application filed in CERC on2.9.2013 and application for tariff adoption filed on 2.9.2013. Tr. License issued on 7.1.2014 and tariff adoption by CERC on 8.1.2014. (v) Clearance U/s 164 – issued 24.4.2014 Awarded EPC contract 7.1.2014 detailed contract signed on 24.2.2014 Financial closure on 24.2.2014
		(i)Kudgi TPS – Narendra 400 kV 2xD/C line (I&II)				**Length-36ckm, Locations-46,**

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						Foundation-9, **Tower Erection-5,** **Stringing completed-0ckm,** **Scheduled completion : 28.02.2015(18month)**
		(ii)Narendra (New) – Madhugiri 765 kV D/C line				**Length-760ckm,** **Locations-867,** **Foundation-604,** **Tower Erection-450,** **Stringing completed-22ckm,** **Scheduled completion: 31.12.2015(28 month)**
		(iii)Madhugiri – Bidadi 400 kVD/C Line				**Length-190ckm,** **Locations-235,** **Foundation-143,** **Tower Erection-87,** **Stringing completed-0ckm,** **Scheduled completion: 31.12.2015(28 month)**
10.	Transmission system for system strengthening in SR for import of power from ER		REC	Vizag Transmission Limited	1180	(i) LOI placed on 31.07.13 (ii) Special Purpose Vehicle acquired on 30.8.2013 (iii) Tr. License issued on 8/1/2014 and tariff adoption

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						by CERC on 23/1/2014 (iv) Clearance U/s 164 – received on 21.05.2014 (v) Schedule COD 30.8.2016 Work awarded on 28.2.2014 to Tata Proj. Icomm, L&T and M/s Gammon
		(i) Srikakulam PP – Vemagiri-II Pooling Station 765 kV D/c line-334km				**Length- 668ckm, Locations-868, Foundation-313, Tower Erection-91, Stringing completed-0ckm,**
		(ii) Khammam(existing) – Nagarjuna Sagar 400 kV D/c line-145km				**Length- 292ckm, Locations-400, Foundation-151, Tower Erection-74, Stringing completed-0ckm,**
11	Transmission System for Patran 400kV S/S		PFC	PTCL (Techno Electric and Engineering Company Ltd.)	200	(i) LOI placed on 17.09.2013 (ii) SPVacquired on 13.11.2013 (iii) Application for adoption of tariff filed in CERC. Hearing on 18.03.2014. (iv) Application for grant of

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						License filed in CERC. Hearing on 18.03.2014 (v) Clearance under Section 164 : Request not received in MoP (vi) Scheduled COD: 13.05.2016.
		(i) LILO of both circuits of Patiala-Kaithal 400kV D/c at Patran (Triple snow Bird Conductor)				Work yet to award
		(ii) 2x500 MVA, 400/220 kV Substation at Patran				Work yet to award
12	Eastern Region System Strengthening Scheme-VI		PFC	DMTCL (Essel Infraprojects Ltd.)	540	(i) LOI placed on 17.10.2013 (ii) Special Purpose Vehicle acquired on 10.12.2013 (iii) Tariff adoption approval issued by CERC on 20.5.2014 (iv) Transmission license received on 30.5.2014 (v) Clearance u/s 164 : received on4/9/2014 (vi) Scheduled COD: 01.07.2016.

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		(i) 2x500 MVA, 400/220 kV GIS Substation at Darbhanga with space for future extension (500 MVA)				Land 100% Civil work 1% Equip Supply 0% Equip. Erection 0%
		(ii) 2x200 MVA, 400/132 kV GIS Substation at Mothihari with space for future extension (200 MVA)				Land 100% Civil work 1% Equip Supply 0% Equip. Erection 0%
		(iii) Muzaffarpur(PG)-Darbhanga 400 kV D/c line with triple snowbird conductor				Loc 166 Fdn 40 TE 0 STG 0/64 KM
		(iv) LILO of Barh – Gorakhpur 400 kV D/c line at Mothihari, 400kV 2xD/C quad				Loc 209 Fdn 20 TE 0 STG 0/76 KM
13	Part ATS for RAPP U-7&8 in Rajasthan	(i) RAPP - Shujalpur 400kV D/C line	PFC	RAPPTCL(Sterlite Grid Ltd)	310	(i) LOI placed on 17/09/13 (ii) Special Purpose Vehicle acquired on 12/03/2014 (iii) Scheduled COD: 28.02.2016. (iv) Clearance under Section 164 :

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						Engg work started and EPC Contract awarded. work expected to start by 11/2014. Forest proposal (30 ha) has been initiated. Loc 514 Fdn 290 TE 150 Stg 0/310 ckm
14	ATS of Unchahar TPS	(i) Unchahar – Fatehpur 400 kV D/C line	REC	UnchaharTCL(PGCIL)	70	(i) LOI placed on 14/02/14. (ii) SPV acquired on 24/03/2014. (iii) Transmission license granted (iv) Tariff charged adopted by CERC and approval recd on 3.7.2014 (v) Clearance under Section 164 : Newspaper/Gazette publication completed, Application submitted to CEA/MoP is under process Scheduled completion : 23/09/2016 Procurement process is under

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
						progress and award by Nov2014.
15	Eastern Region System Strengthening Scheme-VII	(ii) Purulia PSP(WB) – Ranchi (PG) 400 kV D/C line (iii) Chaibasa – Kharagpur 400 kV D/C line	PFC	PKTCL (Sterlite Grid Ltd.)	370	(i) LOI placed on 17.09.2013 (ii) Special Purpose Vehicle acquired on 09.12.2013 (iii) Application for adoption of tariff filed in CERC. Hearing on 27.02.2014. (iv) Application for grant of License filed in CERC. Hearing on 27.02.2014. (v) Clearance under Section 164 : Request not received in MoP (vi) Scheduled COD: 09.03.2016. **Work yet to start.**
16.	NR System strengthening Scheme-NRSS-XXXI(Part-A)	(i) 7x105 MVA (1 phase), 400/220 kV GIS at Kala amb (ii) LILO of both ckt of Karcham Wangtoo-Abdullapur 400 kV D/c line at Kala Amb(on M/C tower)	REC	PGCIL	225	(i) LOI placed on 26/02/14. (ii) Special Purpose Vehicle acquired on 12/05/2014. (iii) Transmission license granted (iv) Tariff charges adopted CERC (v) Clearance under Section 164: is under process will be applied

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
		(iii) 40% series compensation on 400 kV Karcham Wangtoo – Kala Amb D/C line at Kala Amb end				after finalisation of land for s/s which shall be finalised by Dec. 2014? **(vi) Scheduled COD : 12/07/2017** **S/s Package has been awarded to Siemens on August 2014**
17.	Northern Region System Strengthening Scheme, NRSS-XXXI (Part-B)	(i) Kurukshetra-Malerkotla 400 kV D/C line (ii) Malerkotla-Amritsar 400 kV D/C line	REC	M/s Essel Infraprojects Ltd	265	(i) LOI placed on 26/02/14. (ii) SPV acquired on 12/05/2014. (iii) Trans. license received on 25.8.2014 (iv) Tariff adoption approved by CERC: on 7.8.2014 (v) Clearance under Section 164 : submitted in MoP in 9/2014 (vi) Scheduled completion : 12/09/2016 Loc 787 Fdn 80 TE 0 Stg 0/392 km
18	Northern Regional System	(i) Jullandhar – Samba 400 kV D/C line	REC	Sterlite Technologies Ltd.	2621	**i)** The LoI has been issued on 23.05.2014, **however,**

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
	Strengthening Scheme, NRSS-XXIX	(ii) Samba – Amargarh 400 kV D/C line (iii) GIS Sub- station at Amargarh 400/220 kV S/s (iv) LILO of both circuit of Uri – Wagoora Line 400 kV D/C line				**approval for transfer of SPV to selected bidder is pending with MoP** ii) Scheduled completion: 05/08/2018
19	Transmission System associated with DGEN TPS (1200 MW) of Torrent Power Ltd.	(i) DGEN TPS – Vadodara 400 kV D/C, Twin Moose line (ii) Navsari – Bhestan 220 kV D/C line	PFC	M/s Instalaciones Inabensa, S.A. Spain	275	(i) LoI issued on 19.05.2014 (ii) **Approval under section 68 on 30.01.2014.** (iii) Process of SPV transfer in progress
20	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-A)	(i) Gadarwara STPS-Jabalpu Pool 765 D/C line (ii) Gadarwara STPS- Warora P.S. (New) 765 D/C line (iii) LILO of both Ckts. Of Wardha-Parli 400 kV D/C at Warora P.S. (2xD?C) (iv) Warora 765/400 kV P.S. (2x1500 MVA)	REC	PGCIL	2525	(i) Date of issuance of RFQ :15.08.2014 (ii) Date of RFP:14.11.2014 (iii) Date of signing of TSA: 09.02.2015 The Financial Bids for the projects have been opened on 27.02.2015. SPVs are expected to be transferred to selected bidder in FY 2014-15.

S.N.	Name of the Project	Scope of works	BPC	Implementing Agency	Estd. cost (Rs crores)	Current Status
21	Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-B)	(i) Warora P.S.-Parli (New) 765 kV D/C line (ii) Parli(New)-Solapur 765 D/c line (iii) Parli (New)-Parli (PG) 400 kV D/C (Quad) line (iv) 765/400 kV Parli (New) Sub-station (2x1500 MVA)	REC	PGCIL	2360	(i) Date of issuance of RFQ :07.08.2014 (ii) Date of RFP:14.11.2014 (iii) Date of signing of TSA: 09.02.2015 The Financial Bids for the projects have been opened on 27.02.2015. SPVs are expected to be transferred to selected bidder in FY 2014-15. **Completion Target: January,2017**
22	Transmission System Strengthening associated with Vindhyachal- V	(i) Vindhyachal P. S- Jabalpur P. S. 765 kV D/C line	REC	PGCIL	1050	(i) Date of issuance of RFQ :20.08.2014 (ii) Date of RFP:22.10.14 (iii) SPV has been acquired by the successful bidder on 26.02.2015 (iv) Date of filing of petition for adaptation of tariff and grant of license : 26.02.2015 **Completion Target: June,2018**
	Total				**26416**	

Goa 24x7 Study Report on Transmission Plan

1.0 Introduction

In persuasion of decisions made in the meeting held on 2.03.2015 at CEA, New Delhi regarding the transmission plan for implementation of 24x7 power supply in the State of Goa, provision of a second 400 kV substation in Goa along with its interconnections with the Inter State Transmission System has been jointly studied by CEA, CTU and Electricity Department of GOA.

At present demand of Goa is mainly catered through Mapusa 3X315 MVA, 400/220 substation, which gets, its feed from Kolhapur 400 kV substation through a 400 kV D/C line. Goa system is also connected with Maharashtra and Karnataka state grids through 220 kV lines.

As per the new Planning Criteria under "n-1-1" contingency of 400 kV Kolhapur – Mapusa D/C line, there shall be severe constraints in meeting the demand of Goa on remaining 220 kV network. Hence it becomes imperative to plan for a second 400kV infeed to Goa in order to provide operational reliability and flexibility to the state.

2.0 Transmission System Alternatives

The following strengthening of intra-state transmission system of Goa (220 kV and above) has been planned by Electricity Department Goa:

Transmission lines:

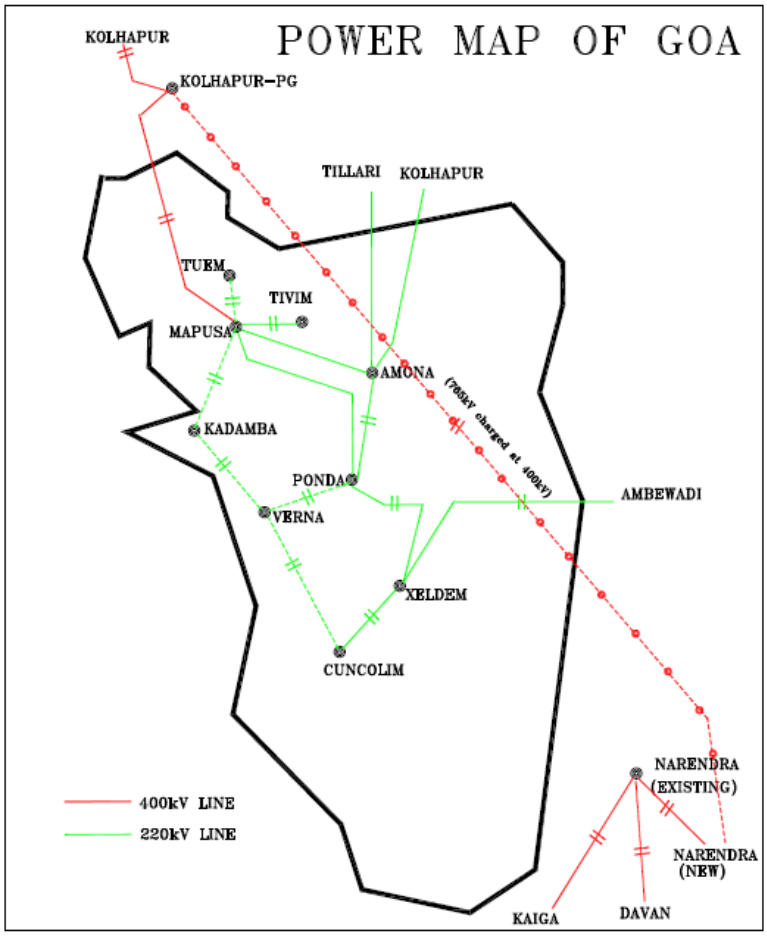
S.No.	Transmission lines
1	Ponda - Verna 220kV D/C line
2	Mapusa - Kadamba 220kV D/C line
3	Kadamba - Verna 220kV D/C line
4	Verna - Cuncolim 220kV D/C line
5	Mapusa-Teum 220 kV D/C line
6	LILO of 2nd circuit of Ambewadi - Ponda 20 kV D/C line at Xeldam (LILO of one circuit. at Xeldam already done)

Substations:

S.No.	Substations	Voltage rating	Transformation capacity
1	Verna (GIS)	220/110	2X160
2	Kadamba(GIS)	220/110	2X100

3	Ponda (Augmentation)	220/33	1x50
4.	Teum	220/33	3X63

The power map below shows all Planned/Under Construction transmission lines (220kV and above) in the state of Goa.



To improve the reliability and power supply situation in Goa, an additional 400 kV in feed to Goa proposed. **Two alternatives** have been explored as given below:

1. **New 2x500MVA, 400/220kV Substation at Xeldem**
   OPTION 1: Narendra (existing) - Xeldam 400 kV D/C (quad) line.
   OPTION 2: Narendra (existing) - Xeldam– Mapusa400 kV D/C (quad) line.

2. **New 2x500MVA, 400/220kV Substation at Ponda**
   OPTION 1: Narendra (existing) - Ponda 400 kV D/C (quad) line.
   OPTION 2: Narendra (existing) - Ponda– Mapusa400 kV D/C (quad) line.

3.0 System Study

3.1 LGB Considered

- Time frame : 2021-22 (End of 13th Plan)
- Goa Generation : 0
- Goa Load : 1192 MW

Load details by the end of 13th Plan were finalised in a meeting held between CEA and Goa Electricity Department at Panaji, Goa on 8th April, 2015.

Sl. No.	Substation Name	Installed Capacity (IC) in MVA	Planned(P) /Existing (E)	Loading on 18.03.2014 at 17.30 hrs in MW	Load expected by 2021-22 in MW
1.	Tivim	3x100, 220/110 kV	E	171	200
2.	Amona	2x50, 220/33 kV	E	33	80
3.	Xeldam	2x100, 220/110 kV + 1x50,220/33 kV	E	93	150
4.	Ponda	3x100, 220/110 kV+ 1x50, , 220/33 kV 1X50,220/33KV	E P	161	200
5.	Cuncolim	3x50, 220/33 kV	E	50	100
6.	Verna (GIS)	2x160, 220/110	P		160
7.	Kadamba (GIS)	2x100, 220/110 kV	P		130
8.	Tuem	3x63, 220/33 kV	P		100

3.2 Study Results

The following cases in 2021-22 time frame were studied:

Case#	Proposed Transmission System	Exhibit#
1	Without a second 400kV infeed to Goa	EXHIBIT-1
2	With Xeldem – Narendra (existing) 400kV D/c (quad) line	EXHIBIT-2
3	With Narendra (existing) – Xeldem – Mapusa 400kV D/c (quad) corridor	EXHIBIT-3
4	With Ponda – Narendra (existing) 400kV D/c (quad) line	EXHIBIT-4
5	With Narendra (existing) – Ponda – Mapusa 400kV D/c (quad) corridor	EXHIBIT-5

Observations:

i) Case#1: A loading of about 830MW is observed on Kolhapur – Mapusa 400kV D/c line which is on the higher side. Further, the system does not meet N-1-1 contingency criteria.

ii) Case#2: Loading on Kolhapur – Mapusa 400kV D/c line is about 575MW and that on proposed Narendra (existing) – Xeldem 400kV D/c line is about 540MW. Loading on Mapusa – Kadamba 220kV D/c line (190MW) and on Xeldem – Cuncolim 220kV D/c line (240MW) are significant and would be on the higher side in case of outage of one ckt of the D/C line.

iii) Case#3: Loading on Kolhapur – Mapusa 400kV D/c line reduces to 434MW and that on proposed Narendra (existing) – Xeldem 400kV D/c line and Xeldem – Mapusa 400kV D/c (quad) line is about 700MW and 300MW respectively. However, Mapusa – Kadamba 220kV D/c line gets significantly loaded

(260MW). Loading on Xeldem – Cuncolim 220kV D/c line is 175MW. Further, the system is able to survive an N-1-1 outage condition in the event of outage of Narendra – Xeldem 400kV D/c (Exhibit-6) and outage of Kolhapur (PG) – Mapusa 400kV D/c (Exhibit-8).

iv) Case#4: Loading on Kolhapur – Mapusa 400kV D/c line is about 550MW and that on proposed Narendra (existing) – Ponda 400kV D/c line is about 550MW. Loading on Mapusa – Kadamba 220kV D/c line (214MW) is significant while that on Xeldem – Cuncolim 220kV D/c line (74MW) is eased as compared to Case#2.

v) Case#5: Loading on Kolhapur – Mapusa 400kV D/c line reduces to 450MW and that on proposed Narendra (existing) – Ponda 400kV D/c line and Ponda – Mapusa 400kV D/c (quad) line is about 650MW and 230MW respectively. However, Mapusa – Kadamba 220kV D/c line gets significantly loaded (267MW). All other 220kV line loadings are seen to be well within limits. Further, the system is able to survive an N-1-1 outage condition in the event of outage of Narendra – Ponda 400kV D/c (Exhibit-7)

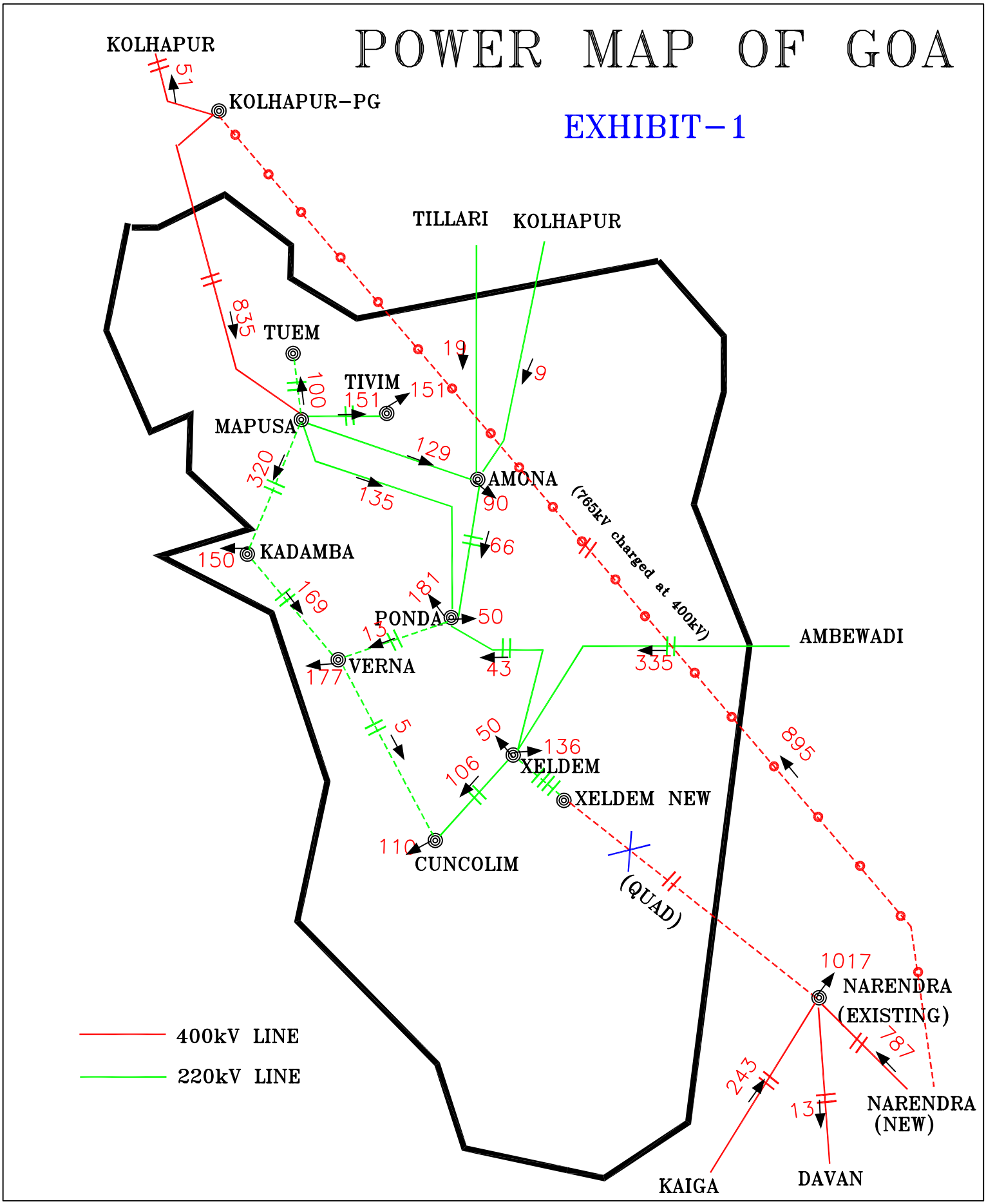
Establishment of a new 400 kV substation at Xeldam or at Ponda with 400 kV feed from Narendra (existing) 400/220 kV substation in Karnataka is required in Goa in order to ensure reliable supply of power. As there is space constraint at Ponda therefore the new 400 kV substation may be established at Xeldam.

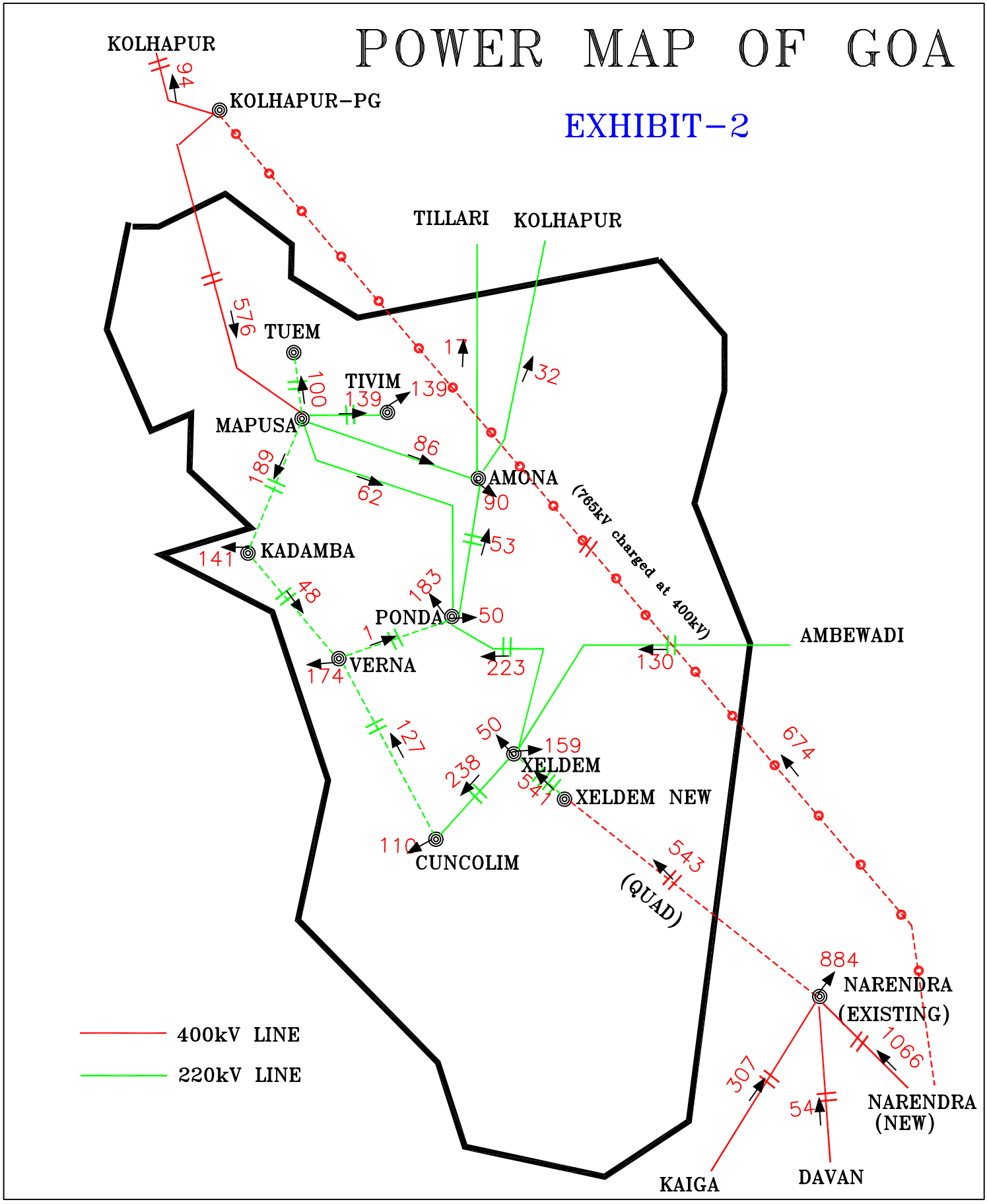
4.0 Recommendations

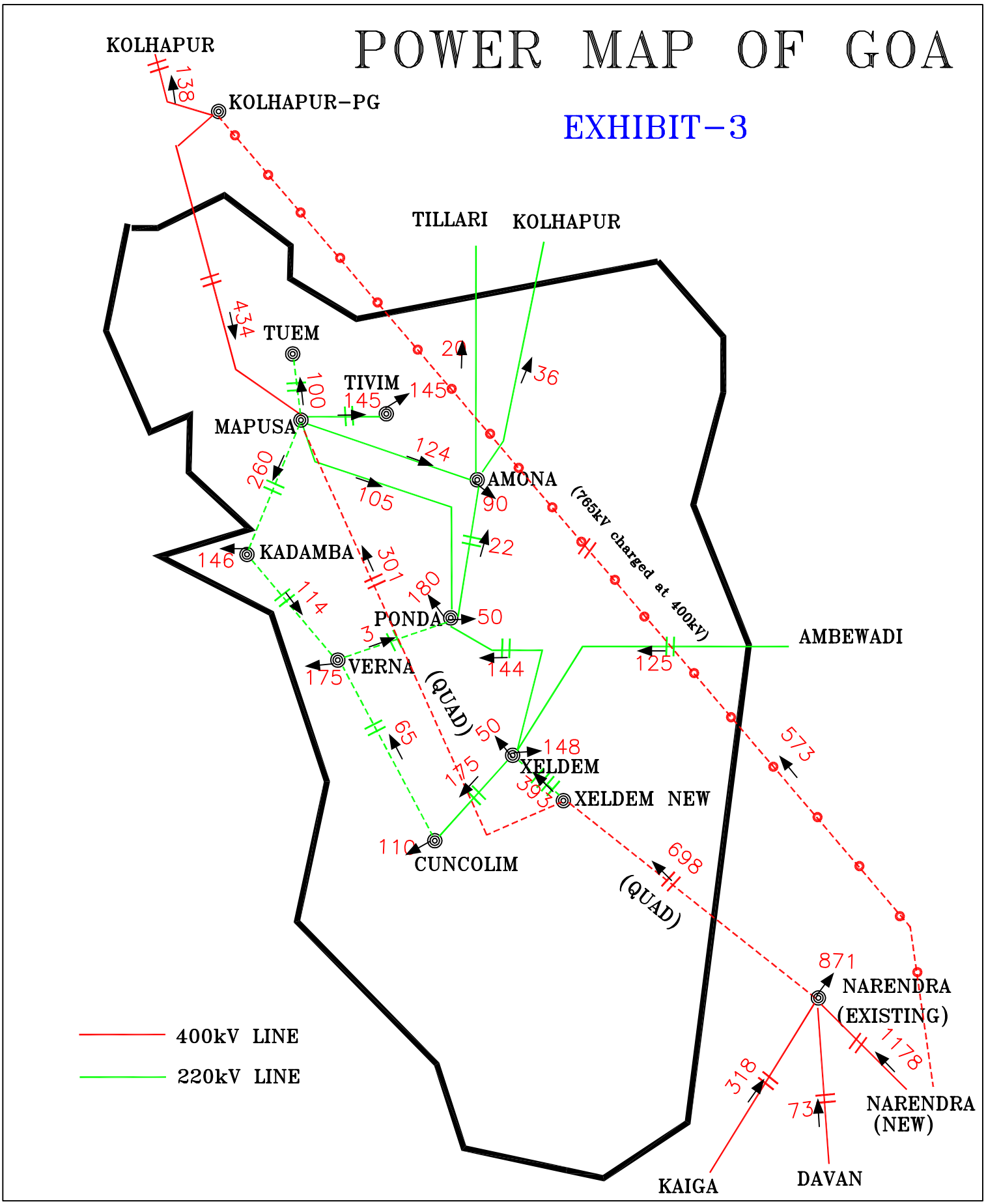
1. Establishment of 2X500 MVA, 400/20 kV substation at Xeldam and its interconnection with Narendra (existing) 400 kV substation through 400 kV D/C line with quad conductor. The interconnection between the existing 220 kV Xeldam substation and the proposed 400/220 kV Xeldam substation could be through bus extension or through 220 kV interconnecting lines, as the case may be.

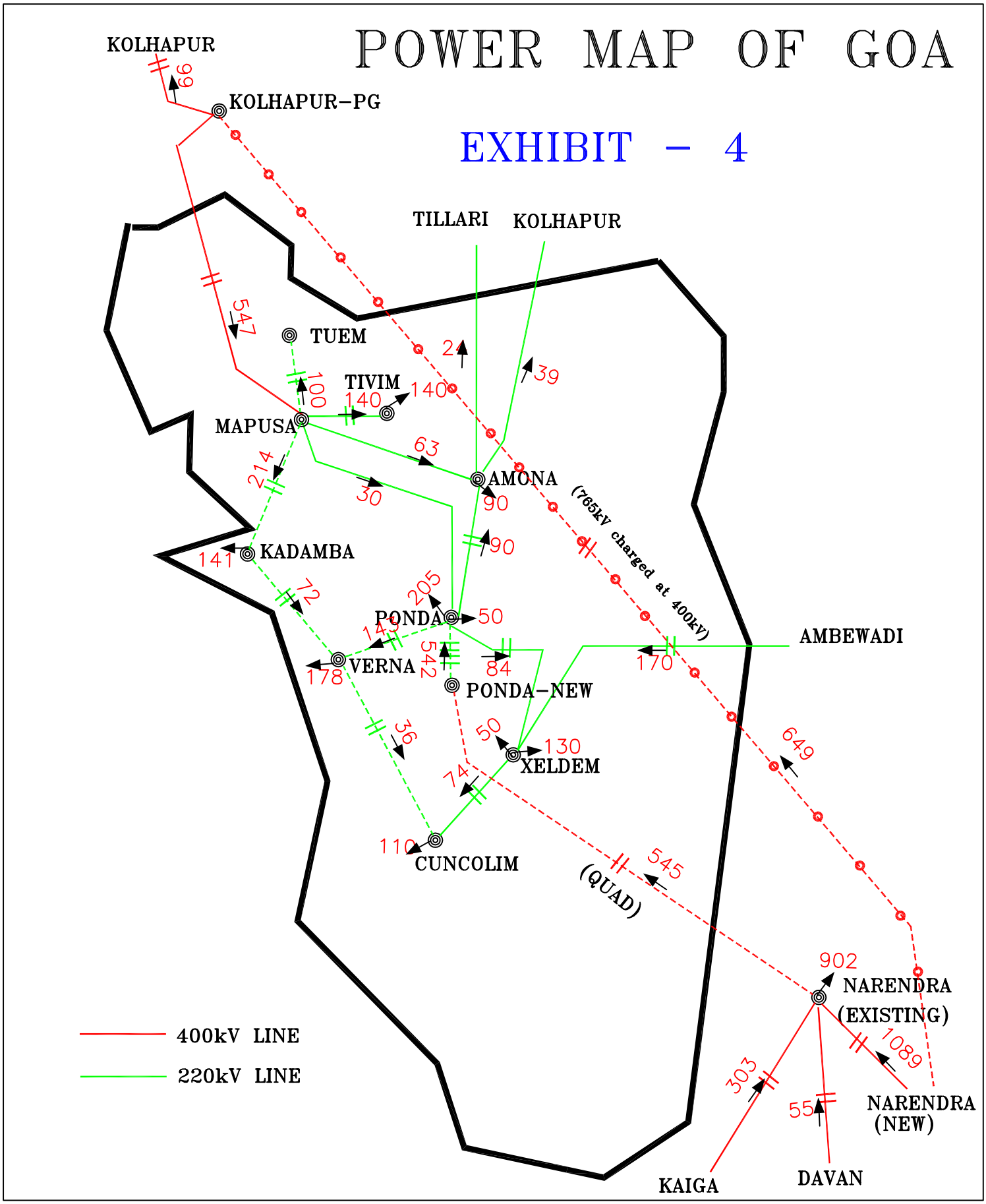
2. 400kV (Quad) connectivity between the new substation at Xeldem and Mapusa is recommended to take care of any N-1-1 contingencies involving outage of any one 400kV infeed to Goa. (refer exhibits 6 and 7)

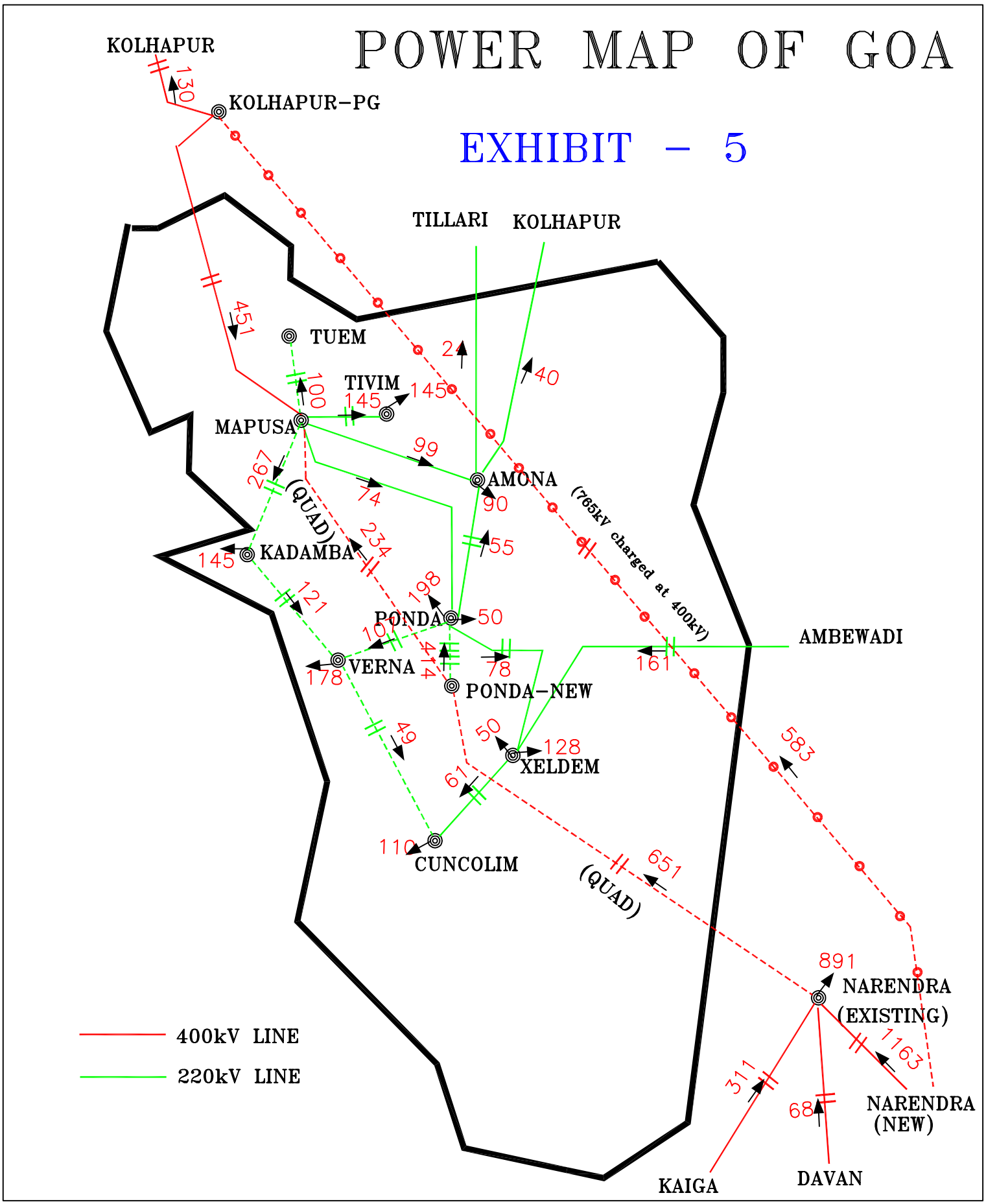
3. Mapusa – Kadamba 220kV D/c line, which has been planned by the state, is seen to get significantly loaded in several cases. Hence, the line may be planned with high capacity conductor.

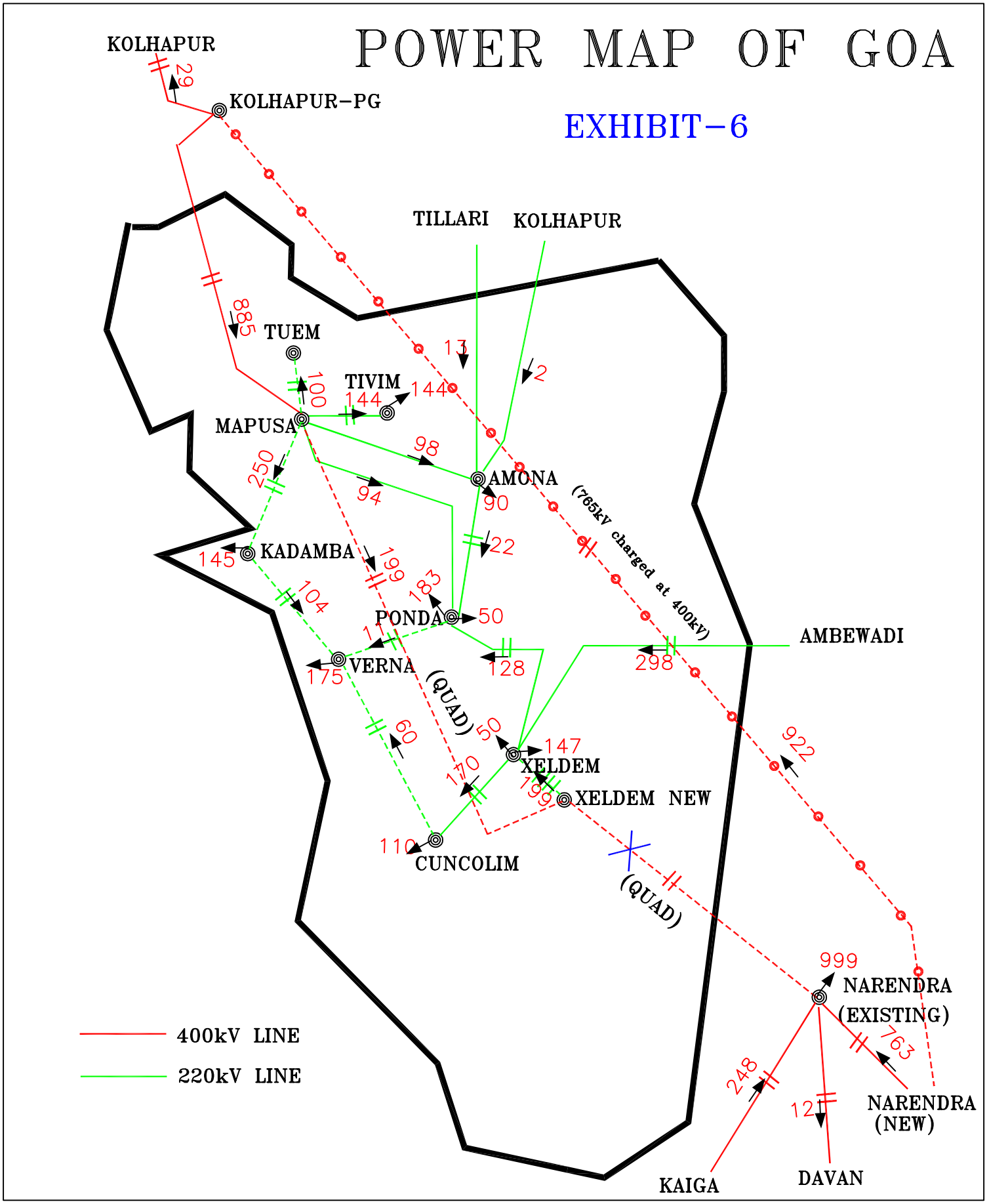

POWER MAP OF GOA
EXHIBIT – 1
KOLHAPUR
51
KOLHAPUR–PG
TILLARI
KOLHAPUR
835
TUEM
19
9
100
TIVIM
151
151
MAPUSA
129
320
AMONA
135
90
(765kV charged at 400kV)
66
150
KADAMBA
169
181
PONDA
50
13
AMBEWADI
177
VERNA
43
335
5
50
136
XELDEM
895
106
XELDEM NEW
110
CUNCOLIM
(QUAD)
1017
NARENDRA
(EXISTING)
787
243
131
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE

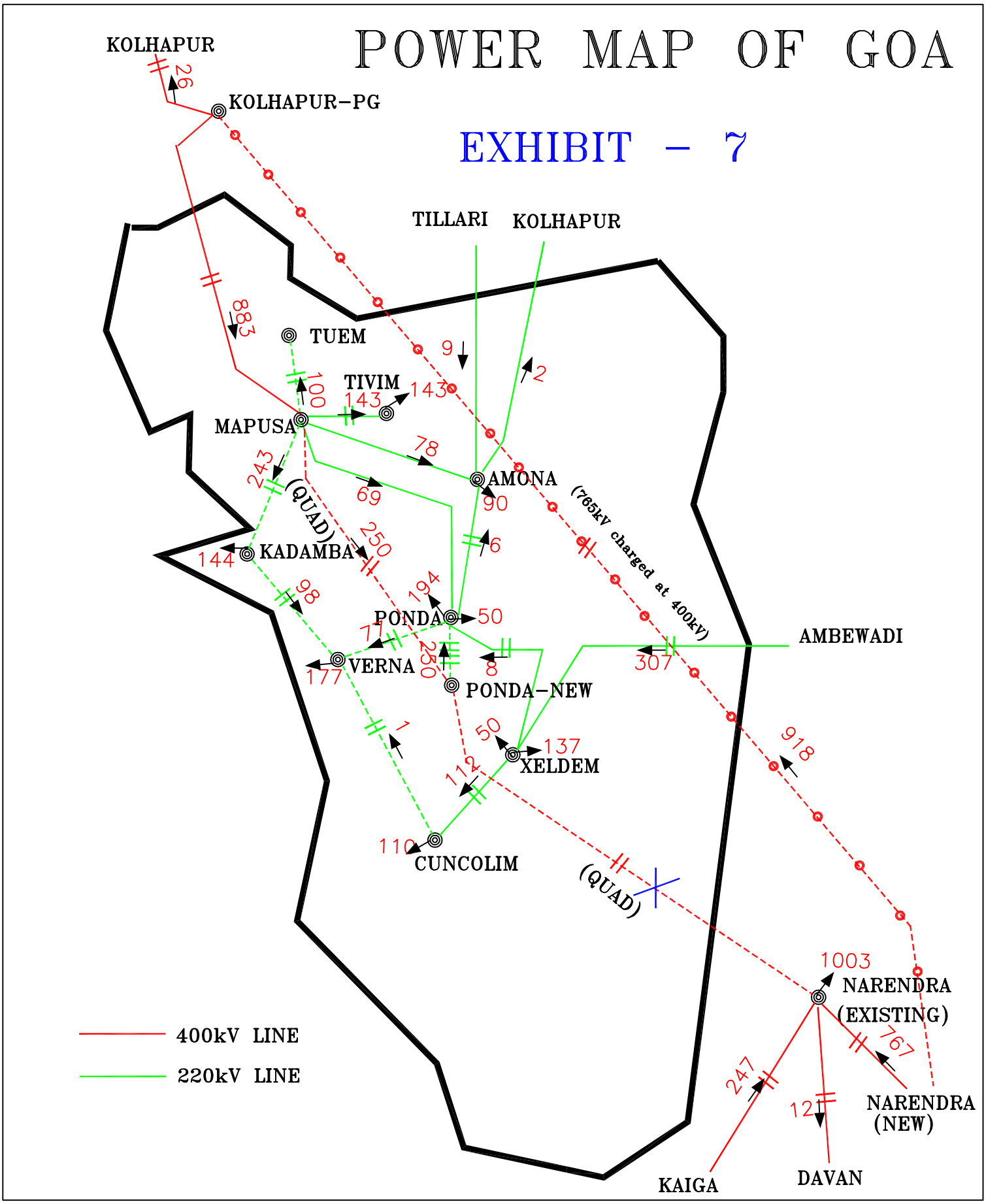

POWER MAP OF GOA
EXHIBIT-2
KOLHAPUR
94
KOLHAPUR-PG
TILLARI
KOLHAPUR
576
TUEM
17
32
100
TIVIM
139
139
MAPUSA
86
189
AMONA
62
90
(765kV charged at 400kV)
53
141
KADAMBA
48
183
PONDA
50
1
AMBEWADI
174
VERNA
223
130
50
159
674
127
XELDEM
238
541
XELDEM NEW
110
CUNCOLIM
543
(QUAD)
884
NARENDRA
(EXISTING)
1066
307
54
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE

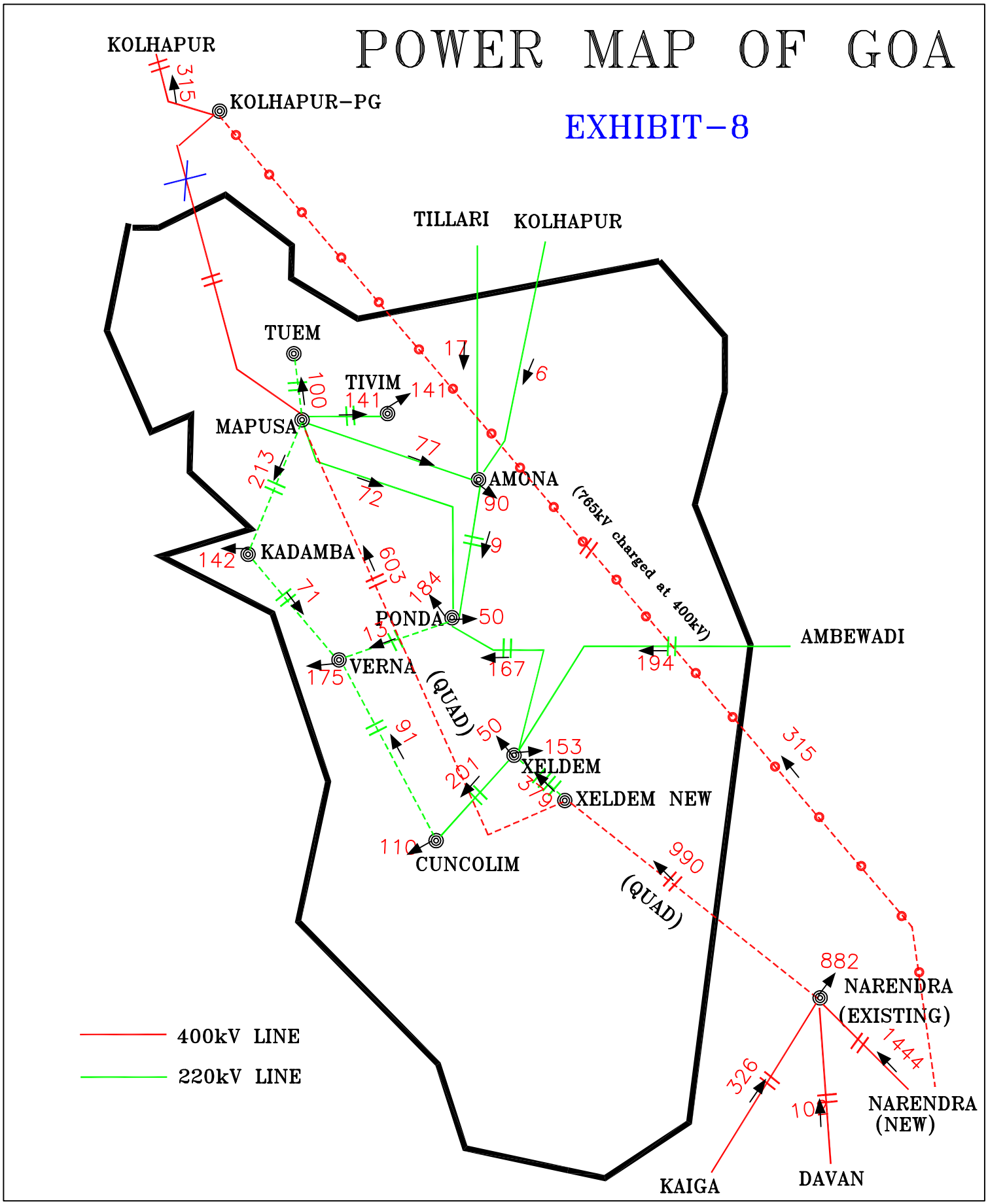

POWER MAP OF GOA
EXHIBIT-3
KOLHAPUR
138
KOLHAPUR-PG
TILLARI
KOLHAPUR
434
TUEM
20
36
100
TIVIM
145
145
MAPUSA
124
260
AMONA
105
90
(765kV charged at 400kV)
146
KADAMBA
301
22
180
114
PONDA
50
3
AMBEWADI
175
VERNA
144
125
(QUAD)
65
50
148
573
175
XELDEM
393
XELDEM NEW
110
CUNCOLIM
698
(QUAD)
871
NARENDRA
(EXISTING)
1178
318
73
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE


POWER MAP OF GOA
EXHIBIT – 4
KOLHAPUR
69
KOLHAPUR–PG
TILLARI
KOLHAPUR
547
TUEM
24
39
100
TIVIM
140
140
MAPUSA
63
214
AMONA
30
90
(765kV charged at 400kV)
90
141
KADAMBA
72
205
PONDA
50
143
542
84
AMBEWADI
178
VERNA
170
PONDA–NEW
36
50
130
649
XELDEM
74
110
CUNCOLIM
545
(QUAD)
902
NARENDRA
(EXISTING)
1089
303
55
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE


POWER MAP OF GOA
EXHIBIT – 5
KOLHAPUR
130
KOLHAPUR–PG
TILLARI
KOLHAPUR
451
TUEM
24
40
100
TIVIM
145
145
MAPUSA
99
267
(QUAD)
AMONA
(765kV charged at 400kV)
14
90
234
55
145
KADAMBA
121
198
PONDA
50
10
414
78
VERNA
178
161
AMBEWADI
PONDA–NEW
49
50
128
XELDEM
583
61
110
CUNCOLIM
651
(QUAD)
891
NARENDRA
(EXISTING)
1163
311
68
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE


POWER MAP OF GOA
EXHIBIT-6
KOLHAPUR
29
KOLHAPUR-PG
TILLARI
KOLHAPUR
885
TUEM
13
2
100
TIVIM
144
144
MAPUSA
98
250
94
AMONA
90
(765kV charged at 400kV)
145
KADAMBA
199
22
104
183
PONDA
50
11
AMBEWADI
175
VERNA
(QUAD)
128
298
60
50
147
922
170
XELDEM
199
XELDEM NEW
110
CUNCOLIM
(QUAD)
999
NARENDRA
(EXISTING)
763
248
121
NARENDRA
(NEW)
KAIGA
DAVAN
400kV LINE
220kV LINE


POWER MAP OF GOA
EXHIBIT – 7
KOLHAPUR
26
KOLHAPUR–PG
883
TILLARI
KOLHAPUR
TUEM
9
2
100
TIVIM
143
143
MAPUSA
78
243
(QUAD)
AMONA
69
90
(765kV charged at 400kV)
250
6
144
KADAMBA
98
194
PONDA
50
77
AMBEWADI
177
VERNA
250
8
307
PONDA–NEW
1
50
137
XELDEM
918
112
110
CUNCOLIM
(QUAD)
1003
NARENDRA
(EXISTING)
767
247
NARENDRA
(NEW)
12
KAIGA
DAVAN
400kV LINE
220kV LINE


POWER MAP OF GOA
EXHIBIT-8
KOLHAPUR
315
KOLHAPUR-PG
TILLARI
KOLHAPUR
TUEM
17
6
100
TIVIM
141
141
MAPUSA
77
213
AMONA
90
12
9
142
KADAMBA
603
184
71
PONDA
50
15
VERNA
175
167
194
AMBEWADI
(765kV charged at 400kV)
315
(QUAD)
50
153
91
207
XELDEM
319
XELDEM NEW
110
CUNCOLIM
990
(QUAD)
882
NARENDRA
(EXISTING)
1444
326
NARENDRA
(NEW)
10
KAIGA
DAVAN
400kV LINE
220kV LINE

Annexure-3

Chapter 4: Transmission Constraints in Western Region

4.1. Transmission Line Constraints

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Figure/ Table no.	Has the constraint occurred in earlier quarter?
1.	**400 kV Aurangabad(PG) -Aurangabad (MSETCL) D/C**	With commissioning of 765 kV Raipur-Wardha -Aurangabad D/C and high demand of Maharashtra, the constraint has shifted to 400kV Aurangabad(PG)-Aurangabad(MS) D/C in the absence of 220kV network from 400kV Aurangabad (PG) S/S, 2x315MVA ICTs are in idle charged condition.	Critical Loading of 400 kV Aurangabad (PG) - Aurangabad (MSETCL) D/C leading to n-1 non-compliance.	Fig. 52	Yes. Constraint observed from July'14 after commissioning of 765 kV Wardha-Aurangabad D/C lines. **4 circuits of 765 kV Wardha – Aurangabad:** There are 4 circuits of 765 kV Wardha – Aurangabad commissioned till date. All the 4 circuits are never usually in simultaneous operation as that will severely load the Aurangabad (PG) – Aurangabad D/C and Aurangabad (PG) - Aurangabad ceases to be n-1 compliant. Also, frequent high voltages at Wardha are also observed. So, usually two circuits are kept open at a time. 765kV Aurangabad-Dhule(BDTCL) S/C and 400kV Dhule(BD)-Dhula(MS) D/C are idle charged due to non-readiness of 400kV bays at Dhule (MS) S/S which would relieve 400 kV

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Figure/ Table no.	Has the constraint occurred in earlier quarter?
					Aurg'd(PG)-Aurangabad (MSETCL) D/C. More outlets from Aurangabad (PG) towards western/ coastal Maharashtra required to be commissioned expeditiously. Viz. 765 kV Aurangabad-Padghe D/C and 400 kV Aurangabad-Boiser D/C and 400 kV Bableshwar-Kudus D/C. Commissioning of 765kV transmission system envisaged for Tiroda evacuation up to 765kV Ektuni(Aurangabad-MS) is to be completed on priority. The operational flexibility in real time is reduced leading to constraints in facilitating planned transmission outage in above corridor.
2.	**Constraints in 400 kV Khandwa – Dhule - Bableshwar-Padghe corridor**	With high Maharashtra Demand of the order of 17500-18500 during morning peak and no Generation at RGPPL and low generation at Jaigad and Parli and SSP generation is less.	400 kV Khandwa-Dhule - Bableshwar-Padghe corridors carrying more than 500 MW in each ckt. The corridor is N-1 non-compliant.	Fig 54	Yes, It was reported earlier also. Constraint observed when Maharashtra demand is high. 400 kV Tapthithanda-Bableswar D/C commissioned on 31.12.14. Commissioning of 400 kV Bableswar-Kudus D/C and Kudus Sub-station to be expedited by MSETCL.

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Figure/ Table no.	Has the constraint occurred in earlier quarter?
3.	**765 kV Tirora-Koradi III - Akola II D/C and 765/400 kV ICT at Tirora and 765/400 kV ICT at Akola II**	When generation at Tirora is 1800-2400 MW.	The system is not n-1 compliant. It has been observed that tripping of 765 kV Tirora ICT or 765 Akola II ICT would cause sudden increase in the power on Tirora-Warora lines causing oscillations in the grid.		Yes, It was reported in the last quarter. In the absence of complete evacuation of Tiroda generation, high generation at Tiroda also contributes high loading of 400 kV Aurg'd(PG)-Aurangabad (MSETCL) D/C. Commissioning of 765kV transmission system envisaged for Tiroda evacuation up to 765kV Ektuni (Aurangabad-MS) is to be completed on priority. Commissioning of 400 kV Bableswar-Kudus D/C and Kudus Sub-station to be expedited by MSETCL.
4.	**400kV Wardha-Parli D/C**	With high Maharashtra Demand of the order of 18500-20000MW during morning peak and no Generation at RGPPL and low generation at Jaigad and Parli. High drawal of Southern Region through 765kV Raichur-Sholapur D/C also contributes critical loading of this section.	High loading of Wardha-Parli D/C	Fig 55	Constraint was severe when demand in Maharashtra was high along with restriction in Koyna hydro generation due to low water level. Import TTC for Maharashtra control area has to be restricted to 7000 MW as interstate transmission system is inadequate for such high demand of more than 19000 MW in Maharashtra.
5.	**400kV Parli(PG)-Sholapur(PG) D/C**	With high demand of Maharashtra, Goa and high drawal of Southern Region	Critical loading of Parli(PG)-Sholapur(PG) D/C and frequent operation of associated SPS	Fig 51	Yes. Severe constraints observed in this quarter till commissioning of 765kV Pune-Sholapur S/C on 28.2.15. The operational flexibility in real time was reduced leading to

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Figure/ Table no.	Has the constraint occurred in earlier quarter?
					constraints in facilitating planned transmission outage in this corridor. 765kV Pune-Sholapur S/C helps under contingency in real time and has improved reliability in this corridor. 765 kV Aurangabad - Sholapur D/C to be expedited.
6.	**400 kV Aurangabad-Pune D/C**	With commissioning of 400 kV Akola-II-Taptithanda-Aurangabad (MS) and 765 kV Wardha - Aurangabad D/C and high demand of Maharashtra, the constraint has shifted to Aurangabad. Intra state transmission within Maharashtra is not scheduled along with Interstate Transmission schemes.	The transmission system at 220kV Pune is inadequate (only 2 lines from 220kV Pune (PG)). 400/220kV one ICT at Pune is kept open to control loading on 220kV lines from Pune (PG).		Yes. It was reported in last quarter also. Scheduling of state generators on merit order dispatch leads to security constrained dispatch scenario within Maharashtra. Further 220 kV network from Aurangabad (PG), Taptithanda and Pune to be planned and expedited by MSETCL. 765 kV Aurangabad-Padghe D/C and 765 kV Aurangabad - Dhule to be expedited.
7.	**765kV Sasan-Satna D/C**	Sasan UMPP has an envisaged capacity of 3960 MW. Presently 5x660MW units of Sasan are commissioned and in operation. Sasan Power has also sent advance notice for synchronization of the 6th unit. The installed capacity at Vindhyachal-I, II, III	High loading of 765kV Sasan-Satna lines.	Fig 53	As a part of the contingency arrangements one 500 MW unit of Vindhyachal-IV is being evacuated through NR via 400 kV Vindhyachal-Rihand-III line. In addition an SPS for unit tripping in case of loss of 765 kV Sasan-Satna lines has also been commissioned. The commissioning of 765 kV Vindhyachal pooling

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints	Figure/ Table no.	Has the constraint occurred in earlier quarter?
		and IV is 4260 MW. This includes 2x500 MW units of Vindhyachal-IV. The total generation at Sasan and Vindhyachal complex is around 6500 MW.			station and 765kV Sasan-V'chal PS S/c and V'chal PS-Satna one ckt has relieved Sasan-Satna D/C. But Transmission system beyond Gwalior i.e., 765kV Gwalior-Jaipur D/C to be expedited.
8.	**400 kV SSP-Asoj S/C and SSP-kasor S/C**	SSP generating full and with high demand in Gujarat coupled with less generation at APL and CGPL, Mundra. (Particularly during coal shortage)	Continuous loading of above 550MW in SSP-Asoj and SSP-Kasor.	Fig 56 Fig 57	Yes, This constraint was observed in the previous quarter. Bus split operation was done from 22.9-30.9.14. Due to less generation at SSP, constraints were not observed in this quarter.

4.2. ICT Constraints

Sl. No	ICT	Season/ Antecedent Conditions	Description of the constraints	Figure/ table no.	Has the constraint occurred in earlier quarter? Details.
1	**2x500MVA 400/220kV Asoj ICTs**	SSP generating full and many units at Wanakbori, Ukai, Gandhar, GPEC kept out on Merit order despatch.	It is observed that the loading on ICTs at Asoj (2x500MVA) are in the range of 300-370 MW resulting in 'N-1' non-compliance.		Yes. It was reported from Apr'13. 3rd ICT at Asoj commissioned on 16.3.15. and loading on ICTs relieved.
2	**2X315 MVA Khandwa ICTs**	Madhya Pradesh meeting high demand of above 7000 MW	It is observed that the loading on ICTs at Khandwa (2x315MVA) are above 200 MW and additional ICT has to be proposed.	Fig 61	Yes, the issue has been raised in the previous quarter.
3	**2X315 MVA Satna ICT**	Madhya Pradesh meeting high demand of above 7000 MW	It is observed that the loading on ICTs at Satna (2x315MVA) are above 200 MW and additional ICT has to be proposed.	Fig 60	Yes, Constraint observed when MP is meeting high demand.
4	**2 X 1500 MVA Aurangabad (PG) ICTs**	Maharashtra meeting high demand of above 18500 MW	It is observed that the loading on ICTs are more than 800 MW resulting in 'N-1' non-compliance.	Fig 58	Yes, reported earlier. Constraints observed in this quarter also with high demand of Maharashtra. The operational flexibility in real time is reduced leading to constraints in facilitating planned transmission outage in this corridor. This is a constraint for keeping 765kV Wardha-Aurangabad all the four

					ckts in service. 765 kV outlets from Aurangabad towards Padhge and Dhule have to be expedited.
5	**3 X 315 MVA Bhopal ICTs**	Madhya Pradesh meeting high demand of above 7000 MW	It is observed that the loading on ICTs at Bhopal (3x315MVA) are above 200 MW and additional ICT has to be proposed	Fig 59	No
6	**1X315 MVA Satpura ICT**	Madhya Pradesh meeting high demand of above 7000 MW and commisoning of Stapura Unit 10 & 11	The ICT is getting loaded above 200 MW for most of the time. Additional ICT to be proposed	Fig 62	No
7	**2 X 315 MVA Chakkan ICTs**	Maharashtra meeting high demand of above 18500 MW	It is observed that the loading on ICTs at Chakkan (2x315MVA) are above 200 MW and additional ICT has to be proposed	Fig 63	No

8	**3X315 MVA Lonikhand ICTs**	Maharashtra meeting high demand of above 18500 MW	It is observed that the loading on ICTs at Lonikhand 3x315MVA) are above 200 MW and additional ICT has to be proposed or 2x500MVA ICTs at Lonikhand-II are under utilized and the 220 kV lines from lonikhand II and Pune(PG) to be expedited.	Fig 64	No

4.3. Nodes Experiencing Low Voltage

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Figure/ table no.	Has the constraint occurred in earlier quarter? Details.
1	Padghe, Vapi	Load Centres of Maharashtra and Gujarat	High Loading concentrated in the area	Fig 65, Fig 66	Yes, It was reported earlier also.

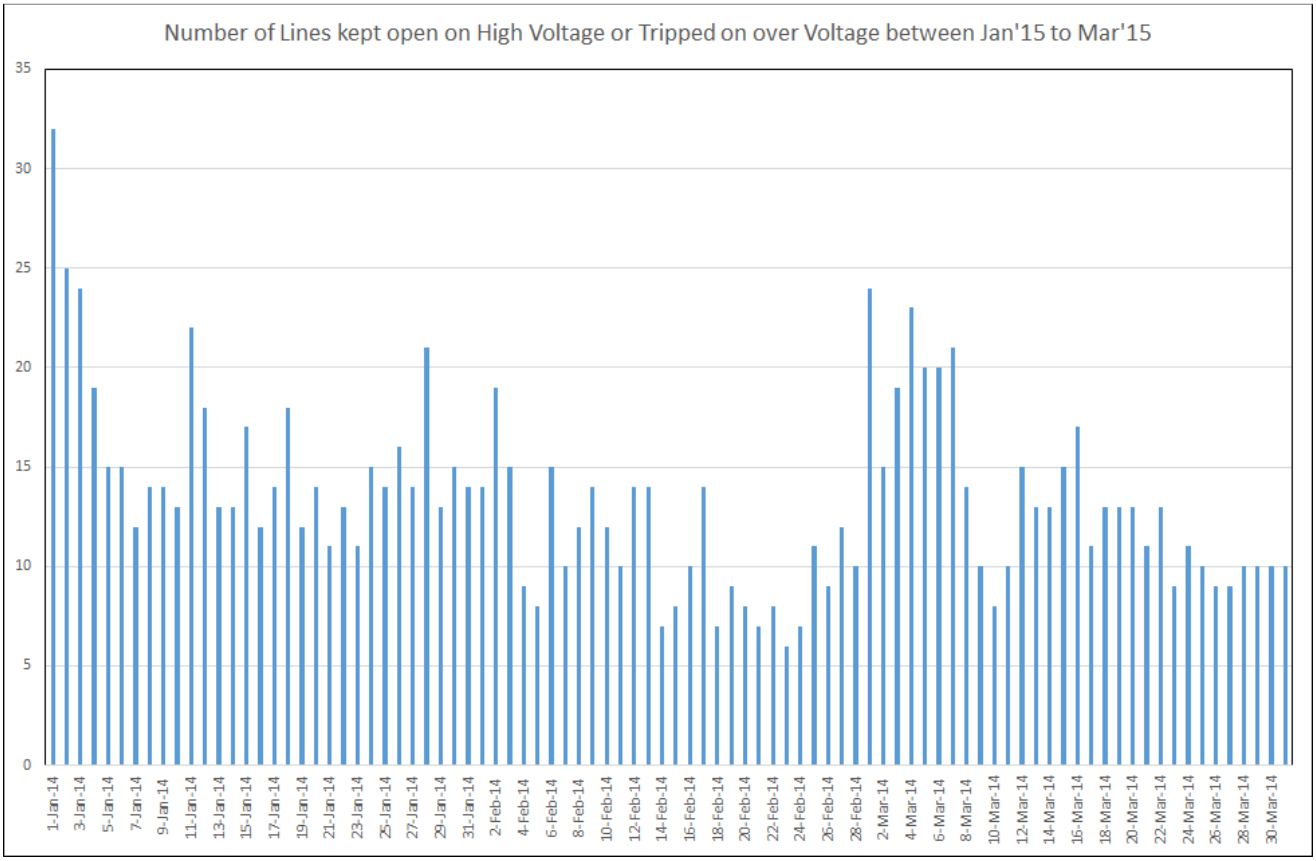
4.4. Nodes Experiencing High Voltage

Sl. No	Nodes	Season/ Antecedent Conditions	Description of the constraints	Figure/ table no.	Has the constraint occurred in earlier quarter?
1.	**400 kV Nodes :** Satna, Khandwa, Bhadrawati, Raipur, Dehgam, Satpura, Nagda, Koradi, Kalwa, New Koyna, Lonikhand, Karad, Kolhapur, Parli(MS), Chandrapur, Dhule , Solapur(PG) , Aurangabad (MS) , Asoj, Wanakbori, GPEC, Bhilai , Rajgarh, Akola, Damoh, Birsinghpur, Katni, Bhatapara, Raigarh, RGPPL,JPL, Durg PS, Pirana(PG), **765 kV Nodes :** Wardha, Durg	Low demand/ absence of adequate reactors	Inadequate reactive compensation leading to opening of lines. Atleast one circuit of 400 kV Durg - Wardha is kept open frequently to control the high voltage at Wardha and Durg.	Fig 67 to Fig 101	Yes, reported earlier.

4.5. Lines opened on high voltage

Transmission Lines (s) opened	Corresponding nodes experiencing high voltage	Graph No.
400 kV RGPPL-Nagothane one ckt	RGPPL	Graph of Predominant node experiencing High Voltage is given from Fig 65
400 kV RGPPL-New Koyna one ckt	RGPPL	
400 kV Karad Jaigad one ckt	Karad	
400 kV Karad-Kolhapur one ckt	Karad,Kolhapur	
400 kV Kolhapur-Solapur one ckt	Kolhapur	
400 kV Kolhapur-Mapusa one ckt	Kolhapur,Mapusa	
400 kV Birsinghpur-Katni one ckt	Birsinghpur,Katni	
400 kV Birsingpur-Damoh one ckt	Birsinghpur, Damoh	
400 kV Damoh-Katni S/C	Katni,Damoh	
400 kV Indirasagar-Nagda S/C	Indirasagar, Nagda	
400 kV SSP-Dhule one ckt	SSP,Dhule	
400 kV Nagda-Rajgarh one ckt	Nagda,Rajgarh	
400 kV SSP-Rajgarh one ckt	SSP,Rajgarh	
400 kV Khandwa-Rajgarh one ckt	Khandwa, Rajgarh	
400 kV Lonikhand-Koyna IV	Koyna IV	
400 kV Kosamba-Choronia one ckt	Kosamba	
400 kV Ukai Kosamba one ckt	Kosamba	
765 kV Seoni-Wardha one ckt	Wardha	
400 kV Nagda-Dehgam one ckt	Nagda,Dehgam	
400 kV Solapur-Karad S/C	Karad	
400 kV Bina(MP)-Bhopal one circuit	Bhopal	
765 kV Durg –Wardha one Circuit	Durg, Wardha	
400 kV Bhusawal-Aurangabad S/C	Bhusawal	
400 kV Asoj-Choronia one ckt	Asoj	
400 kv Choronia-Ranchorpura S/C	Choronia,Ranchorpura	

400 kV Taptithanda-Bableshwar one ckt	Taptithanda	
400 kV Koyna IV-New Koyna one ckt	Koyna IV, New Koyna	
400 kV Shingaji-Pithampur one ckt	Shingaji	
400 kV Bhusawal-Bableshwar S/C	Bhusawal	



4.6. Lines/ICTs opened to control overloading

Sl. No	Transmission Element (s) opened	Overloaded corridor	Remarks
1.	400/220 kV Pune(PG) one ICT	To control loading in 220 kV Pune(PG) –Talegaon D/C lines	Additional 220kV outlets from Pune (PG) to be expedited by MSETCL.
2.	400/220kV 2 x 315 MVA Aurangabad(PG) ICTs		Idle charged in the absence of 220kV downstream network, which has to be expedited by MSETCL.
3.	400/220kV 2 x 315 MVA Sholapur(PG) ICTs		Idle charged in the absence of 220kV downstream network, which has to be expedited by MSETCL.
4.	400/220kV 2 x 315 MVA Warora ICTs		Idle charged in the absence of 220kV downstream network, which has to be expedited by MSETCL.

4.7. Delay in transmission lines affecting grid operation adversely

Sl. No.	Transmission Corridor	Proposed Commissioning Date	Actual/ Likely Commissioning Date	Transmission Constraint Caused
1.	400kV Bays at Dhule(MS)	Mar'14	May'15	765kV Aurangabad(PG)-Dhule(BDTCL) S/C and 400kV Dhule(BD)_Dhule(MS) idle charged due to non-availability of bays at 400kV Dhule(MSETCL) end
3.	400 kV Mundra-Zerda D/C	Mar'13	Severe ROW problem reported	Would complete the transmission system for APL, Mundra. WIP/Severe RoW Issue and Forest

				Clearance pending, waiting for SBWL meeting
4.	400 kV Vadinar-Amreli D/C	July'13	-do-	Would complete Vadinar evacuation and relieve Hadala-Chorania S/C. However, interim arrangement with completed portion of Amreli-Vadinar one ckt terminated at Jetpur and one ckt at Hadala relieved loading of Chorania –Kasor.
4.	400 kV Amreli – Kasor D/C	June'13	-do-	Would relieve Chorania-Kasor S/C. However, interim arrangement with completed portion of Amreli-Vadinar D/C, one ckt terminated at Jetpur and one ckt at Hadala has relieved the loading of Chorania – Kasor.
5.	765 kV Tiroda-Akola-II-Aurangabad(MS) D/C	Dec13.	-do-	Commissioning of all 765kV transmission system envisaged for Tiroda evacuation up to 765kV Ektuni (Aur'd (MS)) is to be completed on priority.
6	400 kV Essar Mahan-Bilaspur Pooling station D/C	Mar13	-do-	This would complete transmission system planned for evacuation of Essar Mahan(2x600MW) which is on interim connectivity with LILO of 400 kV Korba-V'chal-1and restricted depending on availability of Transmission capacity.
7	765 kV Gwalior-Jaipur D/C	Mar'14	-do-	With commissioning of 6x660MW units at Sasan, commissioning of 765 kV Gwalior-Jaipur D/C need to be expedited otherwise this would cause constraints in evacuation of full power on LTA on WR-NR corridor.
8	765 kV Sasan-Vindhyachal Pooling station and Associated		Land Acquisition Problem	The loading of 765 kV Sasan-Satna each circuit is more than 1500 MW/Ckts with the commissioning of 5 X 660 MW units at Sasan. Sasan-6 also is commissioned in

	Vindhyachal pooling Ckts			Mar'15. The commissioning of 765 kV Vindhyachal pooling station and 765kV Sasan-V'chal PS S/c and V'chal PS-Satna one ckt has relieved Sasan-Satna D/C. But Transmission system beyond Gwalior ie., 765kV Gwalior-Jaipur D/C to be expedited.

4.8. The Substations where Fault Level Exceeds 32 kA

Station	Three phase fault (kA)
RAIPUR	51
CHANDRAPUR	47
CHANDRAPUR-II	46
VINDHYACHAL	46
KORBA-NTPC	43
VINDHYACHAL-IV	42
WARDHA	41
BHILAI	40
BHADRAWATI	39
WARORA	38
SASAN	38
NSPCL	37
RAIPUR_PS	35
DEHGAM	34

4.9. Other Issues in Western Region

- **Any substation layout, which affected grid operation adversely:**

1. At 765kV and 400kV Aurangabad (PG), many tie breakers are not commissioned. 765/400kV Aurangabad ICT-2 is connected only to 400 kV bus-2 and whenever Bus -2 shut down is availed, ICT-2 would be under shut down. Aurangabad being a very important S/S, feeding Maharashtra, the loadings of 765/400kV ICTs are always above 750MW. The operational flexibility in real time is reduced leading to constraints in facilitating planned transmission outage in this corridor.

2. On 12th Mar'15, Emergency outage of 400 kV bus#2, 765/400 kV ICT-2 at Aurangabad was requested to attend broken conductor. Emergency Outage of one ckt of 400kV Aurangabad-Waluj was also requested. when 400 kV bus 2 was taken out the following were noticed:

   - LR of 400 kV Boiser line-1 at Aurangabad tripped
   - LR of 400 kV Boiser line-2 at Aurangabad tripped
   - 400/220 kV ICT-2 at Aurangabad also de-energized (as tie bay is yet to be commissioned)
   - 400 kV bus-1 voltage seen to be 222 kV
   - 765 kV bus voltage seen to dip to 746 kV

3. At 765kV Aurangabad (PG), 4 ckts of 765k V Wardha-Aurangabad are commissioned and L/R of upcoming 765kV Auragabad-Padghe are connected as B/R. At present, Tie CBs are not commissioned for the following elements:

765kV Wardha-Aurangabad-1 connected to 765kV Bus-II only (Tie CB is yet to be revived after the blast occurred in Dec'14).

765kV Wardha-Aurangabad-2 connected to 765 kV Bus-II only (Tie CB Not in service).

765kV Wardha-Aurangabad-3 connected to 765kV Bus-II only (Tie CB yet to be brought into service even though it was certified that it is ready during first time charging).

240 MVAR LR of Aurangabad-Padghe-I charged as BR is connected to 765 kV Bus-I only.

240 MVAR LR of Aurangabad-Padghe-II charged as BR is connected to 765 kV Bus-I only.

On 4th Apr15, emergency shut down of 400kV Aurangabad (PG) – Aurangabad (MS) one ckt was given and only 765 kV Wardha-Aurangabad ckt-1 was in service (to facilitate outage and to control loading on other ckt). Since 765kV Aurangabad voltage was less, code was given for taking out one 240 MVAR bus reactor at Aurangabad which caused separation of 765kV Bus1&2 as 2x240MVAR LR of Padghe 1&2 were connected only to bus-1 and tie CB's are not commissioned. This also leads to sudden rise in voltage with loss of 3x240MVAR reactors at a time.