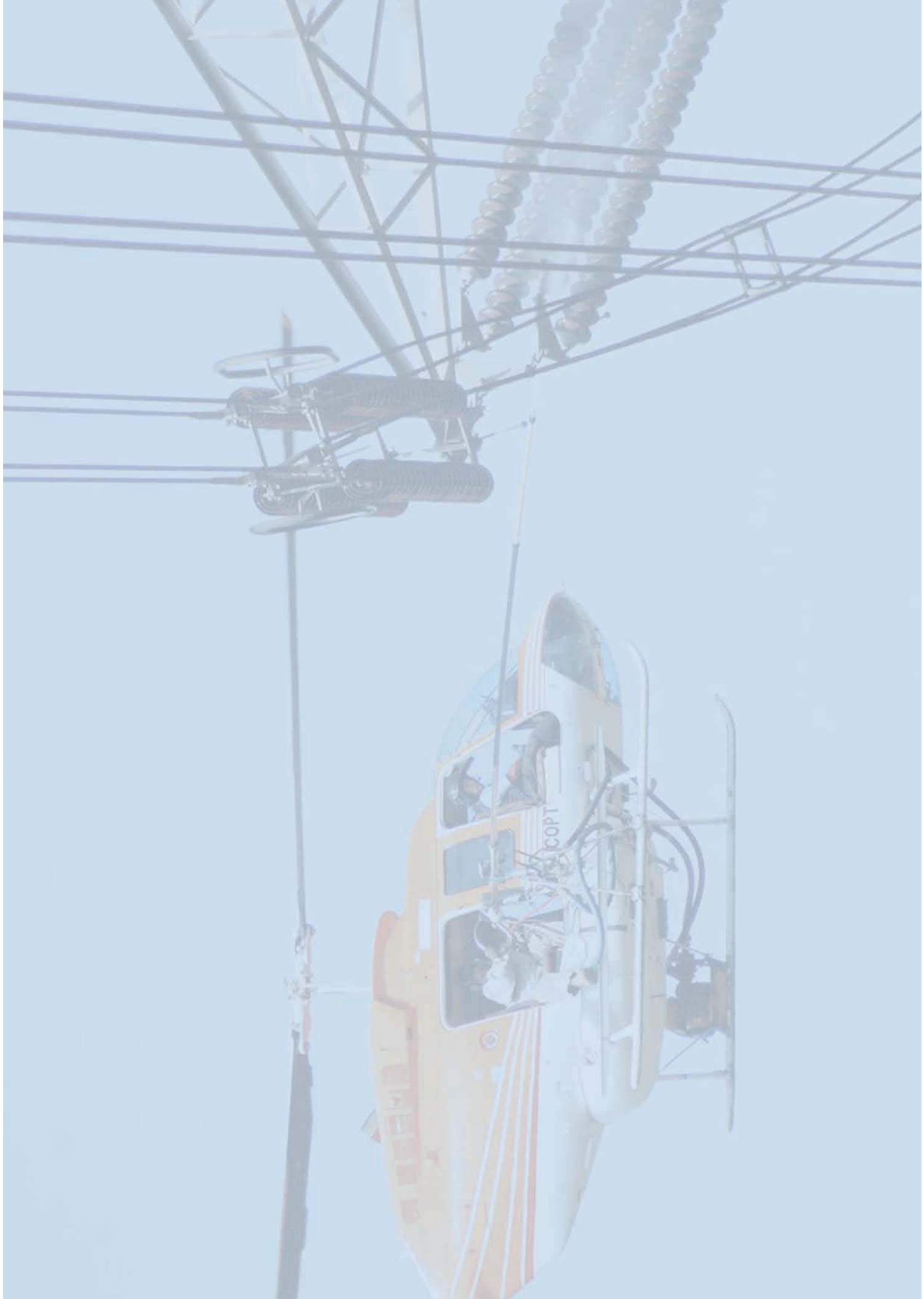


# **Annexure**



**Annexure 1**  
**(As referred to in Para 2.5)**

**Statement showing 18 selected projects for Performance Audit along with completion status as on December 2018**

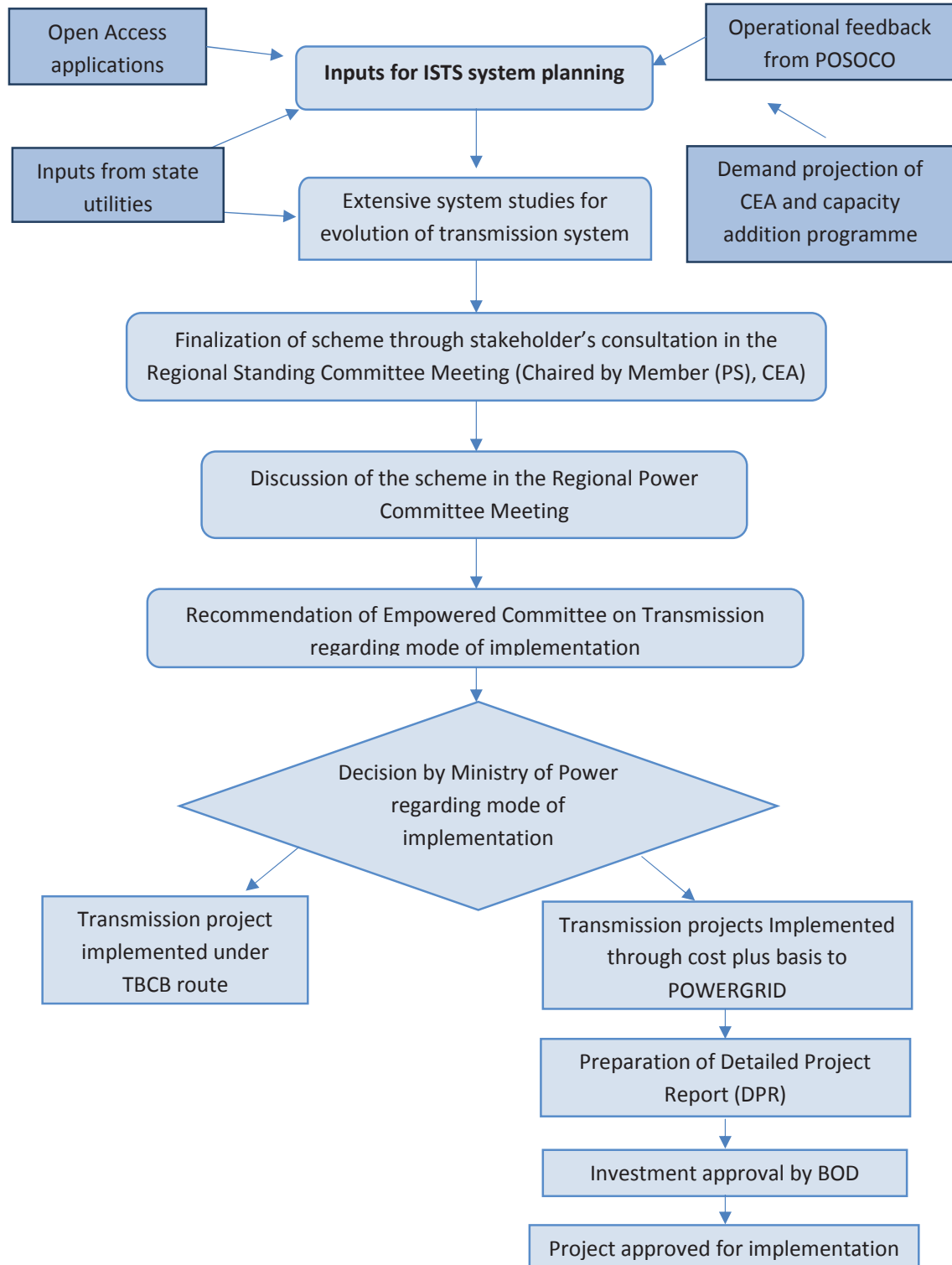
Sl. No.	Name of the Project	Date of Investment Approval	Investment approval cost (₹ in crore)	Capital expenditure upto 31 March 2017 (₹ in crore)	Whether completed or on-going as on December 2018
	<b>System Strengthening Project</b>				
1	System Strengthening - XIX in Southern Regional Grid (SRSS - XIX)	31.08.2012	1,935.35	1,717.50	Completed in March 2015
2	Transmission System for Krishnapatnam UMPP -PART B	08.02. 2012	1,927.16	1,718.60	Completed in April 2016
	<b>Total</b>			<b>3,436.10</b>	
<b>(II)</b>	<b>Generation Associated project</b>				
3	Transmission System Strengthening in Western Part of WR FOR IPP Generation Projects in Chhattisgarh - DPR 4	17.11.2011	2,127.51	2,356.30	Completed in December 2017
4	System Strengthening in North/ West part of WR for IPP Projects in Chhattisgarh (DPR -5)	27.12.2011	1,746.65	1,825.10	Completed in December 2017
5	Common System associated with East Coast Energy Private Limited and NCC, Power Projects Limited LTOA Generation Projects in Srikakulam Area-Part-B	28.03.2013	2,514.88	1,955.60	Completed in December 2018
6	Transmission System associated with Pallatana Gas Based Power Project and Bongaigaon Thermal Power Station (TS for bongaigaon merged)	25.02.2010	2,144.00	1,804.20	Completed in November 2018
7	North East - Northern / Western Inter-connector - I (Subansiri&Kameng)	24.02.2009	11,130.19	8,125.90	On-going (Anticipated date March 2022)
8	WR-NR HVDC Interconnector for IPP Projects in Chhattisgarh (DPR-9)	26.03.2012	9,569.76	7,084.30	Completed in September 2017
9	Transmisison system for development of pooling Station in Northern part of West Bengal and Transfer of power from Bhutan to NR/WR	15.04.2010	4,404.57	3,089.40	Completed in March 2018
10	Transmission System of Vindhyachal-IV and Rihand-III (1000MW) Generation Projects	16.03.2010	4,672.99	2,874.50	Completed in August 2015
11	Transmission System For Phase-I Generation Projects in Orissa (Part- C)	15.03. 2011	2,569.25	2,699.00	Completed in August 2015
12	Transmission system for Phase-I generation Projects in Jharkhand and West Bengal Part B	08.02.2012	3,201.44	3,628.90	Completed in October 2016
13	Transmission System Phase-I Generation Projects in Jharkhand and West Bengal - Part A2	27.12.2011	2,422.66	2,383.30	Completed in April 2016
	<b>Total</b>			<b>37,826.50</b>	

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Sl. No.	Name of the Project	Date of Investment Approval	Investment approval cost (₹ in crore)	Capital expenditure upto 31 March 2017 (₹ in crore)	Whether completed or on-going as on December 2018
<b>(III) Inter - Regional</b>					
14	Inter-Regional System Strengthening Scheme for NR and WR (Part-B)	24.12.2014	6,517.36	2,779.70	Completed in April 2018
15	Wardha - Hyderabad 765 KV Link [Earstwhile Common Transmission Scheme Associated with ISGS Projects in Vemagiri Area of Andhra Pradesh - Part -B]	29.01.2015	3,662.02	2,136.80	Completed in July 2017
	<b>Total</b>			<b>4,916.50</b>	
<b>(IV) Green Corridor</b>					
16	Green Energy Corridor: Inter State Transmission Scheme (ISTS) Part A	17.04.2015	1,479.30	525.54	Completed in June 2018
17	Green Energy Corridors: Inter State Transmission Scheme (ISTS) - Part - B	17.04.2015	3,705.61	1,564.20	On-going (Anticipated date February 2019)
18	Green Energy Corridor: Transmission scheme for Renewable Generation Projects – Part C	02.07.2015	2,247.37	263.14	On-going (Anticipated date January 2019)
	<b>Total</b>			<b>2,352.88</b>	
	<b>Grand total (I+II+III+IV)</b>			<b>48,531.98</b>	

**Annexure 2**  
**(As referred to in Para 3.1)**

Flow chart showing the activities from transmission project conceptualization to project approval



**Annexure 3**  
(As referred to in Para No. 4.2.1)

**Statement showing instances of re-alignment of forest area after submission of forest clearance proposal**

Sl. No.	Transmission Projects	Details	Management's Reply	Audit Remarks
1	Transmission System associated with Pallatana Gas Based Power Project and Bongaigaon Thermal Power Station project	In Pasighat - Roing 132 kV SC line, initial forest proposal was submitted on 14 September 2010 (for Pasighat Division- 36.07 Ha and Roing Division - 117.7 Ha). However, the same was withdrawn by PGCIL and a fresh proposal was submitted (31 January 2012) due to re-alignment of line as the earlier route envisaged for Pasighat Division was inaccessible and was subject to prolonged disruption of road communication. This delayed the forest clearance process.	1) <b>Pasighat – Roing 132 kV SC line:</b> The forest proposal was submitted based on preliminary survey of the route. However, during detailed survey it was noticed that the locations were inaccessible for almost 7 to 8 months during monsoons; and communication remained cut off for most part of the year and the locations became accessible only after October.	1) <b>Pasighat – Roing 132 kV SC line:</b> The initial proposal was submitted on 14 September 2010 and the same was withdrawn by POWERGRID on 31 January 2012, i.e., after a lapse of almost two years. This needs justification. Besides, had POWERGRID carried out the detailed survey before preparation of BOQ and Cost estimates as mandated by WPPP, the fact about the inaccessibility of the route would have become apparent much earlier and re-alignment of the proposed land could have been avoided. Instead, POWERGRID had submitted the proposal based on preliminary survey only.

Sl. No.	Transmission Projects	Details	Management's Reply	Audit Remarks
		<p>➤ Similarly, in Pallatana - Surajmaninagar (TSECL) 400 kV DC line (Udaipur region), forest proposal was re-submitted (22 January 2011) since the earlier proposal (2 July 2010) was for 3.923 Ha, whereas after joint verification, the actual forest area was found to be of 3.345 Ha only. The forest area required for diversion was yet again reduced (04June 2011) to 2.161 Ha due to incorrect alignment of the transmission line on the map.</p>	<p>2) <b>Pallatana - Surajmaninagar 400 kV DC line:</b> The area was revised to 3.345 Ha based on joint verification; and later to 2.161 Ha as some of the plot was confirmed as non-forest area. It was further stated that identification of land is the responsibility of State Revenue Department and POWERGRID has no role in the same.</p>	<p>2) <b>Pallatana - Surajmaninagar 400 kV DC line:</b> WPPP requires carrying out of detailed survey of forest stretches likely to be involved <b>before</b> preparation of BOQ and Cost estimates (i.e., before attaining Investment Approval). This essentially means that detailed surveys should be carried out <b>before</b> submission of forest proposals. Had POWERGRID followed the same in principle, instances of deviations in the area assessed by POWERGRID from the area assessed by State Authorities could have been minimised. Further, Management's contention that identification of land is the responsibility of State Revenue Department and POWERGRID has no role in the same is not tenable as the task of carrying out of detailed survey of forest stretches to be encountered before investment approval by POWERGRID is clearly mandated by its own WPPP.</p>

Sl. No.	Transmission Projects	Details	Management's Reply	Audit Remarks
2	Transmission line associated with 'North East-Northern/Western Interconnector-I (Subansiri&Kameng) project	<p>➤ In case of 'Lower Subansiri – BiswanathChariyali (Pooling Point) kV 2 DC lines with twin lapwing conductor' of Arunachal Pradesh, first forest clearance proposal was submitted by Company 05 June 2008. However, forest proposal was returned by Forest Division on 01-04-2009, stating that the actual forest area to be diverted would be 84 Ha, instead of 24.117 Ha as claimed by PGCIL. This error was because PGCIL had not adhered to the guidelines of Forest Conservation Act, 1980 regarding 'effective area' to be considered for 400kV Transmission Lines. Accordingly, PGCIL revised and re-submitted the proposal for diversion of 74.32 Ha of land vide their letter dated 13.04.2009.</p> <p>➤ <b>Kameng - Balipara 400 kV DC line:</b> Similarly, for the Assam portion of the</p>	<p>1) <b>Lower Subansiri – Biswanath Chariyali (Pooling Point) kV 2 DC lines with twin lapwing conductor (Arunachal Pradesh and Assam Portion):</b> The affected area for forest compensation was calculated considering following the principles of avoidance, minimization and mitigation; and hence, different widths of Right of Ways (6m width and 46m width) were considered for laying of the transmission lines.</p> <p>2) <b>Kameng - Balipara 400 kV DC line (Assam and Arunachal Pradesh):</b> The</p>	<p>1) <b>Lower Subansiri – Biswanath Chariyali (Pooling Point) kV 2 DC lines with twin lapwing conductor (Arunachal Pradesh and Assam Portion):</b> It is evident that the guideline of Forest Conservation Act, 1980 regarding 'effective area' to be considered for 400 kV transmission lines was not adhered to by POWERGRID. Besides, the reply is silent regarding how forest land under Subansiri Reserved Forest in Assam falling under NHPC could not be identified during survey carried out by POWERGRID.</p> <p>2) <b>Kameng - Balipara 400 kV DC line:</b> Width of ROW for different types of transmission</p>



Sl. No.	Transmission Projects	Details	Management's Reply	Audit Remarks
		<p>Transmission line, although the initial forest proposal was submitted on 05-06-2008, it was identified later on that 7.105 Ha of forest land under Subansiri Reserved Forest in Assam fell under the project area of NHPC. Hence, proposal for diversion of the same was forwarded to the Nodal Officer on 09.02.2009. However, PGCIL, vide their letter dated 16.05.2009, submitted a separate proposal for diversion of 9.89 Ha (instead of the earlier 7.105 Ha) of forest land because it was felt that there should be a change in consideration of total effective land.</p> <p>➤ Similarly, in the case of Kameng - Balipara 400 kV DC line, initial proposal submitted on 13.06.2008 was for 95.842 Ha (for Arunachal Pradesh). However, on field</p>	<p>variation in the proposal was due to consideration of different widths for hill tops with deep valleys on the underside and rest of the area. However, Forest Authorities directed POWERGRID to consider ROW corridor of 46m for the entire stretch.</p>	<p>lines has been mandated by Forest Conservation Act, 1980 and therefore, the re-alignment of forest area in the instant case could have been avoided had POWERGRID ensured adherence with the same.</p>

Sl. No.	Transmission Projects	Details	Management's Reply	Audit Remarks
		<p>verification, the actual area was found to be 133.56 Ha and as such, on 06.05.2009 POWERGRID was asked to resubmit the proposal with the revised area and the same was forwarded to DFO on 12.05.2009.</p>		
3	<p>Transmission system for Phase I generation Projects in Jharkhand and West Bengal (Part B) Project</p>	<p>➤ In case of Varanasi - Sarnath 400 kV DC Quad Transmission Line associated with above project, application for Varanasi region for 0.092 Ha was submitted on 27-12-2013. However, later Company assessed that some more forest stretch would be involved in Jaunpur region as well for which forest clearance proposal was submitted on 23.06.2014.</p>	<p>1) <b>Varanasi - Sarnath 400 kV DC Quad Transmission Line:</b> Since it was made mandatory to file forest proposal online, the same was submitted online on 12 March 2014.</p>	<p>1) <b>Varanasi - Sarnath 400 kV DC Quad Transmission Line:</b> Management's reply is not specific to audit observation, i.e., re-submission of forest proposal on 23 June 2014 on account of requirement of additional forest stretch for Jaunpur region.</p>

**Annexure 4**  
**(As referred to in Para 4.7.2)**

**Statement showing Details of line loading in respected of selected transmission schemes**

Sl. No.	Project Name	Transmission line	date of commissioning	Max loadability per ckt (MW)	Average power flow	Max power flow	% average power flow	% of max power flow w.r.t Max loadability
1	System Strengthening - XIX in Southern Regional Grid (SRSS - XIX)	1) Kurnool - Thiruvalem 765 KV DC line (355 KM)	Nov-14	2,500	622.18	1619.55	24.89	64.78
2	Transmission System Strengthening in Western Part of WR FOR IPP Generation Projects in Chhattisgarh - DPR 4	1) Wardha - Aurangabad 765 KV DC line (350 KM)	Jul-14	2,500	1,151.38	1648.79	46.06	65.95
		2) Aurangabad - Boisar 400 KV DC Quad (336 KM)	Dec-17	2,186	295.77	645.68	13.53	29.54
3	System Strengthening in North/ West part of WR for IPP Projects in Chhattisgarh (DPR -5)	1) Aurangabad - Padghe 765KV DC (279 KM)	Dec-17	2,500	439.44	1217.38	17.58	48.70
4	Common System associated with East Coast Energy Private Limited and NCC, Power Projects Limited LTOA Generation Projects in Srikakulam Area-Part-B	1) Angul - Jharsuguda 765 KV DC (245 KM)	Dec-18	2,500	586.38	735.81	23.46	29.43
		2) Jharsuguda - Dharamjaigarh 765 KV DC line (156 KM)	Nov-18	2,500	508.12	255.93	20.32	10.24
5	Transmission system associated with Pallatana Gas Based Power Project abd Bongaigaon Thermal Power Station	1) Silchar - Purba Kanchan Bari (TSECL) 400 kv dc line - 122 km	Jun-15	360	19.19	96.33	5.33	26.76
		2) Silchar - Melriat (New) 400KV DC line - 160 km	Nov-18	360	26.86	70.48	7.46	19.58
		3) Silchar - Imphal (New) 400 KV dc line - 140 km	Mar-15	1,093	78.67	346.97	7.20	31.74
6	North East - Northern / Western Interconnector - I (Subansiri & Kameng)	1) Biswanath Chariyali - Agra Pole -I 800kv 6000MW HVDC bipole line - 1971 km	Oct-15	3,000	244.00	2021	8.13	67.37
		2) Balipara - Bongaigaon 400 kV DC Line (Quad) - 300 KM	Nov-14	2,186	145.90	965.05	6.67	44.15
7	WR-NR HVDC Interconnector for IPP Projects in Chhattisgarh (DPR-9)	1) 800 kV, 3000MW HVDC bipole between Champa	Mar-17	3,000	612.42	1859	20.41	61.97

Sl. No.	Project Name	Transmission line	date of commissioning	Max loadability per ckt (MW)	Average power flow	Max power flow	% average power flow	% of max power flow w.r.t Max loadability
		Pooling Station (WR) - Kurukshetra (NR)-Pole -I (with provision to upgrade HVDC terminal to 6000MW at a later date) (1365 KM)						
		2) 800 kV, 3000MW HVDC bipole between Champa Pooling Station (WR) - Kurukshetra (NR)-Pole -II (with provision to upgrade HVDC terminal to 6000MW at a later date)	Sep-17	3,000	699.13	1870	23.30	62.33
9	Transmission System of Vindhyachal-IV and Rihand-III (1000MW) Generation Projects	1) Satna-Gwalior 765 KV 2xSC line (CKT-I 360 KM, CKT II - 359 KM)	Feb-14	2,500	453.00	300.4	18.12	12.02
		2) Gwalior-Jaipur (RVPN) 765 kv sc line (300 KM)	Aug-15	3,000	571.00	571	19.03	19.03
10	Transmission System For Phase-I Generation Projects in Orissa (Part- C)	1) Jabalpur Pooling Station - Bina 765 KV DC line (238 KM)	Dec-13	2,500	295.03	583.58	11.80	23.34
		2) Bina - Gwalior 765 KV SC (3rd circuit) line (241 KM)	May-14	2,500	391.7	1038	15.67	41.52
		3) Gwalior - Jaipur 765 kv SC (2nd circuit) line (300 KM)	Aug-15	3,000	571.00	571	19.03	19.03
11	Transmission system for Phase I generation Projects in Jharkhand and West Bengal Part B	1) Varanasi - Kanpur 765 KV DC 362 KM line	Jul-16	2,500	361.23	597.8	14.45	23.91
12	Transmission System for Phase - I Generation Projects in Jharkhand and West Bengal - Part A2	1) Ranchi New (765/400kv substation) - Dharamjaygarh/near Korba 765 kv SC line (339 KM)	Dec-15	2,500	102.95	753	4.12	30.12
		2) Gaya - Varanasi 765 kv SC line (246 KM)	Apr-16	2,500	157.02	582.02	6.28	23.28

Sl. No.	Project Name	Transmission line	date of commissioning	Max loadability per ckt (MW)	Average power flow	Max power flow	% average power flow	% of max power flow w.r.t Max loadability
		3) Balia – Varanasi 765kV S/c line	Mar-16	2,500	131.48	627.29	5.26	25.09
13	Transmission System for Krishnapatnam UMPP -PART B	1) Sholapur - Pune 765 KV SC line - 269KM	Feb-15	2,500	358.37	1167	14.33	46.68
		2) Raichur-Sholapur 765 kV S/C line	Dec-13	2,750	799.56	1361.3	29.07	49.50
14	Inter Regional System Strengthening Scheme for NR and WR (Part-B)	1) Jabalpur Pooling station - Orai 765 kv dc line -361 km	Mar-18	3,000	264.18	892	8.81	29.73
		2) Orai - Aligarh 765 kv DC line - 300 km line I	Apr-18	2,500	1,285.23	1785.1	51.41	71.40
15	Wardha Hyderabad 765 kv link [Erstwhile Common Transmission Scheme Associated with ISGS Projects in Vemagiri Area of Andhra Pradesh - Part -B]	2) Wardha-Nizambad 765 kV D/C line I	Mar-17	2,500	2,109.88	2351.48	84.40	94.06
17	Green Energy Corridors: Inter State Transmission Scheme (ISTS) - Part - B	1) Banaskanta - Chittorgarh (New) 765 KV DC Line - I	Mar-19	3,000	203.80	361	6.79	12.03
		3) Chittorgarh - Ajmer (New) 765 KV DC Line - 199 KM line I	Dec-17	2,500	73.28	305.78	2.93	12.23
18	Green Energy Corridor: Transmission scheme for Renewable Generation Projects – Part C	1) Bhuj Pool - Banaskanta 765 kv DC line - 309 KM	Jan-19	2,500	77.50	766.34	3.10	30.65