Semi-Annual Environmental Safeguard Monitoring Report

Loan Number : 2823-IND
Reporting Period : Oct.' 14 to Mar.'15

National Power Grid Investment Program – Project 3

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Implementing Agency : POWERGRID

Executing Agency : POWERGRID

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ABBREVIATIONS

ADB	–	Asian Development Bank
APs	–	Affected Persons
CTU	–	Central Transmission Utility
EA	–	Executing Agency
EIA	–	Environment Impact Assessment
ESPP	–	Environment and Social Policy & Procedures
EMF	–	Electro Magnetic Fields
EMP	–	Environmental Management Plan
EPS	–	Electric Power Survey
GIS	–	Gas Insulated Switchgear
GO	–	Government Order
GOI	–	Government of India
GRM	–	Grievances Redressal Mechanism
GRC	–	Grievance Redressal Committee
IEE	–	Initial Environmental Examination
ISTS	–	Inter-State Transmission System
km	–	Kilometers
LILO	–	Loop-in Loop-out
MoEF	–	Ministry of Environment and Forests
PAPs	–	Project Affected Persons
POWERGRID	–	Power Grid Corporation of India Ltd.
PMU	–	Project Management Unit
RoW	–	Right of Way
RAP	–	Rehabilitation Action Plan
S/s	–	Substation
NER	–	North Eastern Region
NR	–	Northern Region
UT DD	–	Union Territory of Daman & Diu
UT DNH	–	Union Territory of Dadra & Nagar Haveli
ESMD	–	Environment & Social Management Department

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SECTION 1: INTRODUCTION

Power Grid Corporation of India Ltd. (POWERGRID), the Central Transmission Utility (CTU) of the country, is engaged in power transmission with the mandate for planning, co-ordination, supervision and control over complete Inter-State transmission system. It has been contributing significantly towards development of Indian power sector by undertaking coordinated development of power transmission network along with effective and transparent operation of regional grids and through continuous innovations in technical & managerial fields.

The present peak demand of Union Territory of Dadra & Nagar Haveli (UT DNH) is of the order of 500MW. As per the 17th Electric Power Survey (EPS), projected peak demand is about 780MW by the end of 11th Plan. Presently, UT DNH is connected to Inter-State Transmission System (ISTS) network through Vapi – Kharadpada 220kV D/C line and the demand is met through this line as well as through interconnection at Gujarat Energy Transmission Corporation Limited (GETCO) network. Considering the long-term requirement to meet projected demand of UT DNH with reliability and security, an interconnection with ISTS network at 400kV level is required. Towards this, establishment of a 400/220kV Gas Insulated Switchgear (GIS) with 2x315MVA capacity near Kala, a load centre in UT DNH, is proposed. In order to interconnect the proposed 400kV substation, Loop-in Loop-out (LILO) of Vapi-Navi Mumbai 400 kV D/C line at Kala is proposed.

Similarly The Union Territory of Daman & Diu (UT DD) does not have its own power generation and is getting only an average of 140 -150 MW as a daily power schedule. The present Peak demand of UT DD in Western Region is about 280MW and the 17th EPS had projected a peak demand of about 550MW by the end of XI plan. Presently, the demand is met from drawl through 220kV ISTS/STU network. However, to meet the increased demand of UT DD, interconnection of UT DD network with ISTS network at 400kV level is required. Accordingly, it was proposed to establish a 400/220kV S/s at a suitable location in UT DD and agreed in the 29th meeting of Standing Committee on Power System Planning in Western Region (WR) held on 10.09.2009. Towards this, establishment of a 400/220kV substation with 2x315MVA capacity near Magarwada, a major load centre in UT DD, is proposed. Further, this substation is proposed as GIS grid substation keeping in view the non-availability of adequate land for establishment of GIS S/s. In order to interconnect the proposed 400 kV substation, LILO of Navsari-Boisar 400kV D/C line at Magarwada is proposed.

To meet the funding requirement, ADB has accepted POWERGRID proposal to finance the above subprojects under Loan No. 2823–IND, National Power Grid Development Investment Programme- Project 3. The loan was signed on 30th March 2012 and became effective from 7th May 2012. The loan closing date is 31st March 2015.

1.1 OVERALL PROJECT DESCRICTION

The National Power Grid Development Program Project-3 covered under Loan No. 2823-IND includes following transmission lines and substations:

(i) Establishment of 400/220 kV GIS Substation at Kala along with LILO of Vapi-Navi Mumbai 400 kV D/C line at Kala in UT DNH.
(ii) Establishment of 400/220 kV GIS Substation at Magarwada along with LILO of Navsari-Boisar 400 kV D/C line at Magarwada in UT DD.

1.2 PROJECT OBJECTIVES

The main objective of this project is to cater the long term power transfer requirement to meet projected power demand of UT DNH & UT DD with reliability and security.

1.3 ENVIRONMENTAL CATEGORY

As per the Asian Development Bank's (ADB) classification of project on the basis of potential environmental impacts, the National Power Grid Development Investment Programme- Project 3 is classified as Environmental Category 'B'.

1.4 ENVIRONMENTAL PERFORMANCE INDICATOR:

The following parameters considered as key indicators for this project need to be monitored to evaluate the environmental performance.

1. Selection of optimum route which has least environment impact on environment and also avoid protected area/ecological sensitive area/ historical or cultural monuments
2. Compliance to all applicable statutory requirements
3. Compliance with Environment Management Plan

1.5 OVERALL PROJECT PROGRESS, AGREED MILESTONES & IMPLEMENTATION SCHEDULES

Name of sub project	Project Details	Progress as on Mar.' 2015	Completion Schedule
Sub Project -1	**Transmission Line** • LILO of 400kV D/C Vapi-Navi Mumbai line at Kala Substation (multi-circuit tower) - 9 km **Substation** • Establishment of 400/220 kV GIS Substation at Kala in UT DNH	Commissioned in Mar.'2014	July' 13
Sub Project -2	**Transmission Line** • LILO of 400kV D/C Navsari - Boisar line at Magarwada Substation (multi-circuit tower) - 16 km **Substation** • Establishment of 400/220 kV GIS Substation at Magarwada in UT DD	Commissioned in Nov.'2014	Jan' 14

SECTION 2 : COMPLIANCE STATUS WITH APLLICABLE STATUTORY ENVIRONMENTAL REQUIREMENTS:

S. No.	Legal Requirements	Applicable Attributes	POWERGRID's Compliance Status
1.	Forest (Conservation) Act, 1980	This Act is applicable whenever a transmission line traverses through forest area. Prior approval from Ministry of Environment & Forests (MoEF), Govt. of India has to be obtained before construction of line in forest areas	The project involves a total of 0.46 km (2.1 ha.) of forest land in two transmission lines covered under the subject loan. POWERGRID has submitted forest diversion proposals to State/UT for obtaining clearance from Ministry of Environment and Forest. Details of forest involved and status of forest clearance is presented below in **Table-1.**
2.	Batteries (Management and Handling) Rules, 2001	As per the Rule, Bulk consumers shall have the responsibility to dispose all used batteries to dealers, manufacturer, registered recycler, reconditioners or at the designated collection centres only. Half-yearly return (Form-8) for the same is to be submitted to the concerned State Pollution Control Board.	No used batteries have been replaced so far.
3.	Hazardous Wastes (Management , Handling and Transboundary Movement) Amendment Rules, 2008	As per Rules, used mineral oil (Schedule I, category – 5.1) is categorized as hazardous waste and require proper handling, storage and disposed only to authorised disposal facility (registered recyclers/ reprosessors). Half-yearly return (Form -13) for the same is to be submitted to the concerned State Pollution Control Board.	Transformer oil is changed only after 10-15 years of operation Since projects are under implementation phase, oil change/ replacement is not envisaged at present.
4.	Ozone Depleting Substances (Regulation and Control) Rules, 2000	Controls and regulations specified on manufacturing, import, export, and use of CFC compound.	Necessary provisions have been made in contract document for restricting the use CFC compound.

Table – 1 : Details of Forest Involvement and Forest Clearance Status

Sl. No.	Transmission line section	Forest stretch involved (in km)	Forest area (in Ha.)	Name of the State/ UT	Status
1.	LILO of 400kV D/C Vapi-Navi Mumbai line at Kala Substation (multi-circuit tower) - 9 km	0.36	1.64	UT	In-principle and Final clearance from RMoEF, Bhopal obtained on 24th Dec.' 2013 and 28th March' 2014 respectively.
2.	LILO of 400kV D/C Navsari - Boisar line at Magarwada Substation- 16 km	0.10	0.46	Gujarat	In-principle forest clearance from RMoEF, Bhopal obtained on 20th June'14. Compliance report submitted which is under process for final clearance.

Note: *As per MoEF guideline dated 08.08.2014 allowing work in forest area after deposition of funds and issuance of working clearance. After deposition of all funds as per in-principle approval, work has been carried out in forest area as above guideline. Compliance for the same is under process. As per MoEF guideline, Final approval is to be issued within 5 years of in-principle approval.*

SECTION 3 : COMPLIANCE STATUS WITH MAJOR LOAN COVENANTS

POWERGRID has complied with various environmental as agreed in the loan covenants. The point wise compliance status is presented in the table below.

Project Specific Covenants	Reference	Status of Compliance
The Borrower shall ensure that the Project and Project facilities are assessed, designed, implemented, constructed, operated, maintained, and monitored in accordance with all applicable environmental laws, rules, and regulations of the Guarantor, relevant States, and ADB's Safeguard Policy Statement (2009), as set out in the EARF, the ESPP, IEE, (or environmental impact assessment, if applicable).	LA, Sch. 5, para. 4	Being complied with.
The Borrower shall ensure that : (i) the EMP and the mitigation measures included therein, as specified in the IEE, (or environmental impact assessment, if applicable), and EARF, as applicable, are properly and promptly implemented; (ii) the EMP and mitigation measures included therein are updated at the engineering design stage and incorporated into the bidding documents and civil works/supply contracts; (iii) any adverse impact on the environment that may arise from Project implementation is promptly mitigated or minimized in accordance with the EMP; (iv) any major accidents, including safety breaches, violation of environmental standards, and corrective measures taken in respect thereof, are reported forthwith to ADB; (v) reports on the implementation of the EMP are submitted to ADB at least semi-annually, and that ADB is allowed to conduct annual environmental reviews; and (vi) reports and information are provided to ADB on request to enable it to verify that the goods and services financed out of the proceeds of the Loan have been produced in a responsible manner with a view to resource efficiency, waste minimization, and other environmental considerations.	LA, Sch. 5, para. 5	 Complied Approved EMP and the mitigation measures as included in IEE are being implemented. Complied Complied. All measures listed in EMP implemented. No such incident reported till date. Complied Complied
The Borrower shall ensure that the Project and/or Project facilities are not located within national parks, forests, and wildlife sanctuaries, unless prior environmental clearances are obtained from the relevant government agencies, and that the monuments of cultural or historical importance are avoided.	LA, Sch. 5, para. 6	N.A. No such protected area (National Parks, Wildlife Sanctuaries etc) are involved in the transmission line route alignment. Complied. Careful route alignment has avoided all such areas.

The Borrower shall ensure effective implementation of following activities, including as required, that all bidding documents and contracts for Works contain provisions that require contractors to: (a)comply with the measures relevant to the contractor set forth in the IEE, the EMP, and the RP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report; (b)make available a budget for all such environmental and social measures; (c)provide the Borrower with a written notice of any unanticipated environmental, resettlement or indigenous peoples risks or impacts that arise during construction, implementation or operation the Project that were not considered in the IEE, the EMP, and the RP; (d)adequately record the condition of roads, and other infrastructure prior to starting to transport materials and construction; and (e) reinstate pathways, other local infrastructure, and land to at least their pre-project condition upon the completion of construction.	LA, Sch. 5, para. 17	Complied
The Borrower shall ensure that construction contracts contain binding requirements for contractors upon completion of construction to fully reinstate pathways, other local infrastructures, and agricultural land to at least their pre-Project condition; and a provision is made for adequate recording of the condition of roads, agricultural land and other infrastructure prior to transport of material and commencement of construction.	LA, Sch. 5, para. 19	Complied.
The Borrower shall do the following: (a) submit semi-annualSafeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission; (b) if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP and the RP, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan; and (c) report any breach of compliance with the measures and requirements set forth in the EMP or the RP promptly after becoming aware of the breach.	LA, Sch. 5, para. 20	 Being complied. No such issues come across till date. Will be complied incase of any breach. But till date no such breach reported.
The Borrower shall ensure that subsequent to award of civil works contract in respect of the Project, no civil works are started by the contractor unless the applicable provisions of the RF, RP, EARF and EMP, as approved by ADB, have been complied with.	LA, Sch. 5, para. 21	Compliance ensured.

Any changes to the location, land alignment, or environment impacts on account of detailed designs of the Project shall be subject to prior approval by ADB in accordance with the Project, selection criteria and procedures included in Schedule 4 of the FFA, before commencement of civil works for transmission lines under the Project.	LA, Sch. 5, para. 23	Not applicable as no such deviation reported.

SECTION: 4 COMPLIANCE STATUS WITH ENVIRONMENT MANAGEMENT AND MONITORING PLAN STIPULATED IN IEER AND AS AGRRED WITH ADB

The subprojects are implemented as per approved IEE and EMP and in accordance with applicable laws & ADB's Safeguard Policy Statement (2009). POWERGRID has prepared Initial Environmental Examination (IEE) reports including Environmental Management Plan (EMP) and mitigation measures to ensure that all the anticipated environment impacts due to the project activities are minimized wherever possible. The EMP describes a detailed site-specific mitigation measures and monitoring plans anticipated during different stages of the proposed project i.e. pre-construction, construction, and operation & maintenance phase. A summary of monitoring requirements has also been included which identifies when and where the parameter will be monitored, how often and against what aspect. For proper implementation of EMP and other mitigation measures separate fund has been allocated in the project cost.

Rs. 38.17 lakhs have been deposited for diversion of 1.64 ha forest land for construction of LILO of 400kV D/C Vapi-Navi Mumbai line at Kala Substation and Rs. 8.3 lakhs for diversion of 0.46 ha of forest land for construction of LILO of 400kV D/C Navsari - Boisar line at Magarwada Substation.

Monitoring the implementation of environmental mitigation measures is required to ensure that these are undertaken in accordance with the EMP, and to enable mitigation to be adapted and refined as required. A summary of the environmental mitigation measures and monitoring requirements and its compliance by POWRGRID is given below in **Table 2**.

TABLE – 2 : ENVIRONMENT MANAGEMENT PLAN

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Pre-construction							
Location of transmission towers and transmission line alignment and design	Exposure to safety related risks	Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites.	Tower location and line alignment selection with respect to nearest dwellings	Setback distances to nearest houses - once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	Complied during survey. Route alignment criterion is part of survey contract.
Equipment specifications and design parameters	Release of chemicals and gases in receptors (air, water, land)	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Exclusion of PCBs in transformers stated in tender specification - once	POWERGRID	Part of tender specifications for the equipment	Complied. As per technical specification PCB is not used or it should not be detectable (i.e less than 2mg/kg) as per IEC 61619 or ASTM D4059
		Processes, equipment and systems not to use chlorofluorocarbons (CFCs), including halon, and their use, if any, in existing processes and systems should be phased out and to be disposed of in a manner consistent with the requirements of the Government	Process, equipment and system design	Exclusion of CFCs stated in tender specification –	POWERGRID	Part of tender specifications for the equipment	Complied
				Phase out schedule to be prepared in case still in use – once		Part of equipment and process design	Complied
Transmission line design	Exposure to electromag netic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Electromagnetic field strength for proposed line design	Line design compliance with relevant standards - once	POWERGRID	Part of detailed alignment survey and design	Complied. Designed as per guidelines of ICNIRP and ACGIH and checked by CPRI and M/s PTI, USA
Substation location and design	Exposure to noise	Design of plant enclosures to comply with noise regulations.	Expected noise emissions based on substation design	Compliance with regulations - once	POWERGRID	Part of detailed siting survey and design	Complied

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Location of transmission towers and transmission line alignment and design	Impact on water bodies and land	Consideration of tower location at where they could be located to avoid water bodies or agricultural land.	Tower location and line alignment selection (distance to water and/or agricultural land)	Consultation with local authorities and land owners - once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	Complied during survey. Route alignment criterion is part of survey contract.
	Social inequities	Careful route selection to avoid existing settlements	Tower location and line alignment selection (distance to nearest dwellings or social institutions)	Consultation with local authorities and land owners - once	POWERGRID	Part of detailed tower siting and alignment survey and design	
		Minimise need to acquire agricultural land	Tower location and line alignment selection (distance to agricultural land)	Consultation with local authorities and land owners - once	POWERGRID	Part of detailed tower siting and alignment survey and design	
Involuntary resettlement or land acquisition	Social inequities	Compensation paid for temporary/permanent loss of productive land as per LAA and its process	RAP implementation	Consultation with affected parties –once in a quarter	POWERGRID	Prior to construction phase	Complied. Progressive social entitlement framework is part of policy and implemented in true spirit
Encroachment into precious ecological areas	Loss of precious ecological values/ damage to precious species	Avoid encroachment by careful site and alignment selection	Tower location and line alignment selection (distance to nearest designated ecological protection area)	Consultation with local forest authorities - once	POWERGRID	Part of detailed siting and alignment survey /design	Complied during survey. Route alignment criterion is part of survey contract. An area of 2.1 ha (0.46 Km) is falling within forest land in the state of Gujarat and UT DNH. However, the alignments do not encompass any National Parks/Sanctuaries or other protected / sensitive areas.
Transmission line through forestland	Deforestation and loss of biodiversity	Avoid encroachment by careful site and alignment selection	Tower location and line alignment selection (distance to nearest	Consultation with local authorities -	POWERGRID	Part of detailed siting and alignment	Complied. Route alignment finalised by taking consideration of

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
		Minimise the need by using existing towers, tall towers and RoW, wherever possible	protected or reserved forest)	once Consultation with local authorities and design engineers - once		survey/design	minimum impact on forest area after consultation with concerned authorities. Forest Clearance from MoEF under progress
		Obtain statutory clearances from the Government	Statutory approvals from Government	Compliance with regulations – once for each subproject			
Encroachment into farmland	Loss of agricultural productivity	Use existing tower footings/towers wherever possible	Tower location and line alignment selection	Consultation with local authorities and design engineers - once	POWERGRID	Part of detailed alignment survey and design	Complied during survey which is part of survey contract. However, as per law of land no land is acquired for transmission line tower but all damages are compensated as per provision of Electricity Act, 2003 and Indian Telegraph Act, 1885.
		Avoid siting new towers on farmland wherever feasible	Tower location and line alignment selection	Consultation with local authorities and design engineers - once		Part of detailed siting and alignment survey /design	
		Farmers compensated for any permanent loss of productive land	Design of Implementation of Crop Compensation (based on affected area)	Consultation with affected parties – once in a quarter		Prior to construction phase	
		Farmers/landowners compensated for significant trees that need to be trimmed/ removed along RoW.	Design of Implementation of Tree compensation (estimated area to be trimmed/ removed)	Consultation with affected parties – once in a quarter		Part of detailed siting and alignment survey /design	
			Statutory approvals for tree trimming /removal	Compliance with regulations – once for each subproject			Forest Clearance from MoEF under Forest (Conservation) Act, 1980 is in progress
Noise related	Nuisance to neighbouring properties	Substations sited and designed to ensure noise will not be a nuisance.	Noise levels	Noise levels to be specified in tender documents – once	POWERGRID	Part of detailed equipment design	Proper monitoring of noise level at regular interval (maximum noise limit is 80 (dB)A as per technical specification for

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
							transformer- Cl. 6.0.20)
Interference with drainage patterns/Irrigation channels	Flooding hazards/loss of agricultural production	Appropriate siting of towers to avoid channel interference	Tower location and line alignment selection (distance to nearest flood zone)	Consultation with local authorities and design engineers - once	POWERGRID	Part of detailed alignment survey and design	Complied during survey. Route alignment criterion is part of survey contract.
Escape of polluting materials	Environmental pollution	Transformers designed with oil spill containment systems, and purpose-built oil, lubricant and fuel storage system, complete with spill cleanup equipment.	Equipment specifications with respect to potential pollutants	Tender document to mention specifications - once	POWERGRID	Part of detailed equipment design /drawings	Complied. Oil sump of sufficient capacity (200% by volume of oil tank in transformer) is provided for every transformer.
		Substations to include drainage and sewage disposal systems to avoid offsite land and water pollution.	Substation sewage design	Tender document to mention detailed specifications - once	POWERGRID	Part of detailed substation layout and design /drawings	Complied. Provision of soak pit is part of design where sewage line is not present.
Explosions /Fire	Hazards to life	Design of substations to include modern fire control systems/ firewalls.	Substation design compliance with fire prevention and control codes	Tender document to mention detailed specifications - once	POWERGRID	Part of detailed substation layout and design /drawings	Complied. Fire fighting equipments are integral part of Substation design
		Provision of fire fighting equipment to be located close to transformers.					
Construction							
Equipment layout and installation	Noise and vibrations	Construction techniques and machinery selection seeking to minimize ground disturbance.	Construction techniques and machinery	Construction techniques and machinery creating minimal ground disturbance- once at the start of each construction phase	POWERGRID (Contractor through contract provisions as per Sec- VII, 44.7)	Construction period	Complied. Low noise producing machineries/ equipments are being used.
Physical construction	Disturbed farming activity	Construction activities on cropping land timed to avoid disturbance of	Timing of start of construction	Crop disturbance –Post harvest as soon as possible	POWERGRID (Contractor through	Construction period	Complied. Construction on farm land undertaken mostly during

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
		field crops (within one month of harvest wherever possible).		but before next crop - once per site	contract provisions as per Sec-II, 2.5)		post harvest period. (Compensation amount paid to be given in Social Monitoring Report)
Mechanized construction	Noise, vibration and operator safety, efficient	Construction equipment to be well maintained.	Construction equipment – estimated noise emissions	Complaints received by local authorities - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-VIII,	Construction period	No complaints received so far
	Noise, vibration, equipment wear and tear	Turning off plant not in use.	Construction equipment – estimated noise emissions and operating schedules	Complaints received by local authorities - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-VIII, 44.7)	Construction period	
Construction of roads for accessibility	Increase in airborne dust particles	Existing roads and tracks used for construction and maintenance access to the line wherever	Access roads, routes (length and width of new access roads to be constructed)	Use of established roads wherever possible - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.8)	Construction period	Most Sites are easily accessible and existing road are used for construction activity.
	Increased land requirement for temporary accessibility	New access ways restricted to a single carriageway width within the RoW.	Access width (meters)	Access restricted to single carriage - way width within RoW - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.8)	Construction period	Complied
Temporary blockage of utilities	Overflows, reduced discharge	Temporary placement of fill in drains/canals not permitted.	Temporary fill placement (m^3)	Absence of fill in sensitive drainage areas - every 4 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.6)	Construction period	Complied

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Site clearance	Vegetation	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control (area in m^2)	Clearance strictly limited to target vegetation - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-VIII, 43.5 & Sec. II, 2.6)	Construction period	Complied
Trimming /cutting of trees within RoW	Fire hazards	Trees allowed growing up to a height within the RoW by maintaining adequate clearance between the top of tree and the conductor as per the regulations.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in meters)	Presence of target species in RoW following vegetation clearance – once per site	POWERGRID (Contractor through contract provisions)	Construction period	Regulated felling of tree in RoW is carried out with permission of owner & revenue authority keeping required electrical clearance as per design.
	Loss of vegetation and deforestation	Trees that can survive pruning to comply should be pruned instead of cleared.	Species-specific tree retention as approved by statutory authorities	Presence of target species in RoW following vegetation clearance – once per site	POWERGRID (Contractor through contract provisions)	Construction period	Complied
		Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.	Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2)	Use or intended use of vegetation as approved by the statutory authorities – once per site	POWERGRID (Contractor through contract provisions)	Construction period	All felled trees are handed over to owner for disposal. POWERGRID has no role in storage and disposal of felled tree/wood.
Wood/ vegetation harvesting	Loss of vegetation and deforestation	Construction workers prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities)	Illegal wood /vegetation harvesting (area in m^2, number of incidents reported)	Complaints by local people or other evidence of illegal harvesting - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.3)	Construction period	No complaints received on illegal harvesting

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Soil excavated from tower footings disposed of by placement along roadsides, or at nearby house blocks if requested by landowners	Soil disposal locations and volume (m^3)	Acceptable soil disposal sites - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-VIII, 43.5 & Sec-II, 2.6)	Construction period	Complied Approx. 86 (A Type) - 379(D Type) m3 earth is excavated at each tower location and 90-95% of this is used for refilling/resurfacing and rest is being disposed off along with other debris at selected location.
Site clearance	Vegetation	Tree clearances for easement establishment to only involve cutting trees off at ground level or pruning as appropriate, with tree stumps and roots left in place and ground cover left undisturbed	Ground disturbance during vegetation clearance (area, m^2)	Amount of ground disturbance - every 4 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied. Regulated felling of tree in RoW is carried out with permission of owner & revenue authority keeping required electrical clearance as per design. All felled trees are handed over to owner for disposal.
			Statutory approvals	Statutory approvals for tree clearances – once for each site	POWERGRID (Contractor through contract provisions)	Construction period	
Tower construction – disposal of surplus earthwork/fill	Waste disposal	Excess fill from tower foundation excavation disposed of next to roads or around houses, in agreement with the local community or landowner	Location and amount (m^3)of fill disposal	Appropriate fill disposal locations - every 2 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.6 & Sec-VIII, 43.5)	Construction period	Complied
Storage of chemicals and materials	Contamination of receptors (land, water, air)	Fuel and other hazardous materials securely stored above high flood level.	Location of hazardous material storage; spill reports (type of material spilled, amount (kg or m^3) and action taken to control and clean up spill)	Fuel storage in appropriate locations and receptacles - every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Stored at designated place only.
Construction	Noise	Construction activities	Timing of construction	Daytime	POWERGRID	Construction	Construction activity

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
schedules	nuisance to neighbouring properties	only undertaken during the day and local communities informed of the construction schedule.	(noise emissions, [dB(A)])	construction only - every 2 weeks	(Contractor through contract provisions as per Sec-VIII, 44.7)	period	restricted to day time only
Provision of facilities for construction workers	Contamination of receptors (land, water, air)	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Amenities for Workforce facilities	Presence of proper sanitation, water supply and waste disposal facilities - once each new facility	POWERGRID (Contractor through contract provisions)	Construction period	Complied. No complaints received
Encroachment into farmland	Loss of agricultural productivity	Use existing access roads wherever possible	Usage of existing utilities	Complaints received by local people /authorities - every 4 weeks	POWERGRID (Contractor through contract provisions as per Sec-II, 2.8) Sec-II, 2.5 & Sec-II, 2.7	Construction period	Complied. No complaints received from local peoples/ authorities
		Ensure existing irrigation facilities are maintained in working	Status of existing facilities				
		Protect /preserve topsoil and reinstate after construction	Status of facilities (earthwork in m^3)				
		Repair /reinstate damaged bunds etc after construction	Status of facilities (earthwork in m^3)				
	Social inequities	Compensation for temporary loss in agricultural production	Implementation of Crop compensation (amount paid, dates, etc.)	Consultation with affected parties – once in a quarter	POWERGRID	Prior to construction	Complied. (Compensation amount paid to be given in Social Monitoring Report)
Uncontrolled erosion/silt runoff	Soil loss, downstream siltation	Need for access tracks minimised, use of existing roads.	Design basis and construction procedures (suspended solids in receiving waters; area re-vegetated in m^2; amount of bunds constructed [length in meter, area in m^2, or volume in m^3])	Incorporating good design and construction management practices – once for each site	POWERGRID (Contractor through contract provisions as per Sec-II, 2.8) As per Sec-II, 2.6	Construction period	Complied
		Limit site clearing to work areas					
		Regeneration of vegetation to stabilise works areas on completion (where applicable)					

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
		Avoidance of excavation in wet season					
		Water courses protected from siltation through use of bunds and sediment ponds					
Nuisance to nearby properties	Losses to neighbouring land uses/ values	Contract clauses specifying careful construction practices.	Contract clauses	Incorporating good construction management practices – once for each site	POWERGRID (Contractor through contract provision as per Sec-II, 2.8)	Construction period	Complied. No complaints received
		As much as possible existing access ways will be used	Design basis and layout	Incorporating good design engineering practices– once for each site			Complied
		Productive land will be reinstated following completion of construction	Reinstatement of land status (area affected, m^2)	Consultation with affected parties – twice – immediately after completion of construction and after the first harvest			No complaints received
	Social inequities	Compensation will be paid for loss of production, if any.	Implementation of Tree/Crop compensation (amount paid)	Consultation with affected parties – once in a quarter	POWERGRID	Prior to construction	Compensation provided as per POWERGRID's procedure for tree/crop compensation
Inadequate siting of borrow areas	Loss of land values	Existing borrow sites will be used to source aggregates, therefore, no need to develop new sources of aggregates	Contract clauses	Incorporating good construction management practices – once for each site	POWERGRID (Contractor through contract provisions)	Construction period	Complied

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Health and safety	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)	Contract clauses compliance – once every quarter	POWERGRID (Contractor through contract provisions as pe Sec-II, 2.2 (v,vii,viii) and also Safety precautions in Special Contract Condition 43.2)	Construction period	Complied. Safety awareness programme conducted for contractors/ workers regularly.
		Contractor to prepare and implement a health and safety plan.					
		Contractor to arrange for health and safety training sessions					
Inadequate construction stage monitoring	Likely to maximise damages	Training of POWERGRID environmental monitoring personnel	Training schedules	Number of programs attended by each person – once a year	POWERGRID	Routinely throughout construction period	Provided proper training to have very good environmental monitoring process. Appropriate clause incorporated in contact provision for EMP implementation. Site managers review the implementation on daily basis.
		Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirements	Respective contract checklists and remedial actions taken thereof.	Submission of duly completed checklists of all contracts for each site - once			
		Appropriate contact clauses to ensure satisfactory implementation of contractual environmental mitigation measures.	Compliance report related to environmental aspects for the contract	Submission of duly completed compliance report for each contract - once			
Operation and Maintenance							
Location of transmission towers and transmission line alignment and design	Exposure to safety related risks	Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and	Compliance with setback distances (“as-built” diagrams)	Setback distances to nearest houses – once in quarter	POWERGRID	During operations	Designed as per guidelines of ICNIRP and ACGIH and checked by CPRI and M/s PTI, USA

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
		the regulation of supervision at sites.					
Equipment submerged under flood	Contamination of receptors (land, water)	Equipment installed above the high flood level (HFL) by raising the foundation pad.	Substation design to account for HFL ("as-built" diagrams)	Base height as per flood design - once	POWERGRID	During operations	Safety margin of 300 mm above the HFL is part of all foundation design.
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious sump areas with a storage capacity of at least 100% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding (Oil sump) ("as-built" diagrams)	Bunding (Oil sump) capacity and permeability - once	POWERGRID	During operations	Oil sump of sufficient capacity (200% by volume of oil tank in transformer) is provided for every transformer.
Inadequate provision of staff/workers health and safety during operations	Injury and sickness of staff /workers	Careful design using appropriate technologies to minimise hazards	Usage of appropriate technologies (lost work days due to illness and injuries)	Preparedness level for using these technologies in crisis – once each year	POWERGRID	Design and operation	Being Complied. In design and operation standards of safety procedure followed. Proper safety training to all workers and primary safety kits/PPEs are provided in every site. Regular mock drills on fire and other occupational hazards are organised.
		Safety awareness raising for staff.	Training/awareness programs and mock drills	Number of programs and percent of staff /workers covered – once each year			
		Preparation of fire emergency action plan and training given to staff on implementing emergency action plan					
		Provide adequate sanitation and water supply facilities	Provision of facilities	Complaints received from staff /workers every 2 weeks			

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Electric Shock Hazards	Injury/ mortality to staff and public	Careful design using appropriate technologies to minimise hazards	Usage of appropriate technologies (number of injury incidents, lost work days)	Preparedness level for using these techn. in crisis – once a month	POWERGRID	Design and Operation	Being Complied.
		Security fences around substations	Maintenance of fences	Report on maintenance – every 2 weeks			
		Barriers to prevent climbing on/dismantling of transmission towers	Maintenance of barriers				
		Appropriate warning signs on facilities	Maintenance of warning signs				
		Electricity safety awareness raising in project areas	Training /awareness programs and mock drills for all concerned parties	Number of programs and percent of total persons covered –once each year			
Operations and maintenance staff skills less than acceptable	Unnecessary environmental losses of various types	Adequate training in O&M to all relevant staff of substations & transmission line maintenance crews.	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	POWERGRID	Operation	Being Complied. Training will be imparted regular interval
		Preparation and training in the use of O&M manuals and standard operating practices					
Inadequate periodic environmental monitoring.	Diminished ecological and social values.	Power Grid staff to receive training in environmental monitoring of project operations and maintenance activities.	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	POWERGRID	Operation	Being Complied. Training will be imparted regular interval

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
Equipment specifications and design parameters	Release of chemicals and gases in receptors (air, water, land)	Processes, equipment and systems using cholofluorocarbons (CFCs), including halon, should be phased out and to be disposed of in a manner consistent with the requirements of the Govt.	Process, equipment and system design	Phase out schedule to be prepared in case still in use – once in a quarter	POWERGRID	Operations	Being Complied.
Transmission line maintenance	Exposure to electromag netic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Required ground clearance (meters)	Ground clearance - once	POWERGRID	Operations	Designed as per guidelines of ICNIRP and ACGIH and checked by CPRI and M/s PTI, USA.
Noise related	Nuisance to neighbouring properties	Substations sited and designed to ensure noise will not be a nuisance.	Noise levels (dB(A))	Noise levels at boundary nearest to properties and consultation with affected parties if any - once	POWERGRID	Operations	Being Complied.

SECTION: 5 ENVIRONMENT MONITORING - APPROACH AND METHODOLOGY

Environmental monitoring is a continuous process through out the Project life cycle starting from site selection to construction and maintenance state. A Project Management Unit (PMU) has been set up headed by Executive Director (Corporate Planning) at headquarters to coordinate and implement all environment and social issues with the assistance of functional department like Environment & Social Management Deptt., Engineering etc. Apart from site managers review the progress on daily basis and regular project review meetings held at least on monthly basis, chaired by the Executive Director of the region wherein the environmental aspects of the projects are discussed and remedial measures taken wherever required. The exceptions of these meetings will be submitted to the Directors and Chairman and Managing Director (CMD).

POWERGRID has a separate monitoring department which carry out real time monitoring of all parameters of project implementation including the environment and social issues. Such issues are discussed in detail during every quarter in the Project Review Meeting (PRM) Chaired by Director (Project). CMD also takes periodic review of project implementation

A summarized environmental monitoring plan with implementation schedule at different stage of subprojects implementation is presented in the table below

Environmental Monitoring Tasks	**Implementation Responsibility**	**Implementation Schedule**
Pre-Construction Phase		
Monitor contractor's detailed alignment survey to ensure relevant environmental mitigation measures in EMP have been included.	POWERGRID with assistance of project implementation unit	Prior to POWERGRID approval of contractor's detailed alignment survey.
Construction Phase		
Regular monitoring and reporting of contractor's compliance with contractual environmental mitigation measures.	POWERGRID with assistance of project implementation unit	Continuous as per IEER and EMP throughout construction period.
Operation and Maintenance Phase		
Observations during routine maintenance inspections of substations and transmission lines RoWs. Inspections will include monitoring implementation status of mitigation measures specified in EMP.	POWERGRID	As per POWERGRID inspection schedules and EMP provisions.

SECTION: 6 ENVIRONMENTAL RECEPTORS/ ATTRIBUTES

It is evident that environmental impacts associated with power transmission project are not far reaching as these developmental activities are non polluting in nature and do not involve any disposal of solid waste, effluents and hazardous substances on land, air and water. Although, there are some localized impacts on natural resources like forest whenever transmission line passes through forest area, however, it can be avoided or minimized through careful route and site selection.

By adopting careful route selection by using modern technique like GPS, GIS, remote sensing etc. the total forest involvement was restricted to only 1.84 % i.e. 0.46 km of total line length of 25 km transmission system which is insignificant. Besides this protected area like national parks, sanctuaries, eco-sensitive zones, tiger reserves and biosphere reserves etc were completely avoided. Hence, impact on wildlife and its habitat too is not

anticipated.
The project doesn't have much anticipated impact on environmental attributes like air, water, soil etc. and are mostly concentrated to construction stage. Air quality impact is restricted to the construction phase only as no emissions to air during ordinary operations transmission lines. Impacts on air quality due to airborne dust in the vicinity of the work sites (at points along the route of the transmission line where towers are located) mainly result from excavation and construction activities and tail gases from construction equipments and vehicles. Since all the proposed alignments are accessible, no construction of access roads is envisaged thereby avoiding any airborne dust pollution in the vicinity. The construction activities are small scale and of a temporary nature. Moreover, the activities are not localized to any residential area and are widely dispersed that provide adequate buffering to air environment. Therefore, impacts on air quality from construction activities are considered insignificant. No liquid effluent is generated due to project activity. However, small quantities of domestic sewage from staff quarters and construction camp is generated which is discharged in local soak pits. Construction of transmission tower foundation, stringing and other activities are mostly manual in nature and use heavy equipment or blasting is not envisaged. The main noise sources during the construction phase are from equipments and transportation vehicles. However, no significant noise level variation from construction related activities is observed.

SECTION: 7 OTHER ENVIRONMENTAL ASPECTS, IMPACTS OBSERVED DURING IMPLEMENTATION

Except the predicted impacts as mentioned in EMP, no other unanticipated impacts were observed during the implementation of subprojects.

SECTION: 8 GRIEVENCE REDRESSAL MECHANISM

Grievance Redressal Mechanism (GRM) is well enshrined in POWERGRID process. In respect to Environment related issues, people intend to move directly to court of law/ National Green Tribunal as the issues are quite important to human life. We are pleased to confirm that no grievances in response to violation/ non-compliance of legal requirements related to environment issues have been received till date.

SECTION: 9 CONCLUSION

It is may be noted from above that the subprojects activities are non-polluting in nature and don't have significant adverse impacts on environment. However, some environmental impacts are anticipated, mostly during construction period which have been mitigated successfully by implementing the EMP. POWERGRID approach starting from selection of most optimum route before design stage, proper implementation of EMP and monitoring mechanism throughout project life cycle supported by strong institutional arrangement has considerably nullified the adverse impacts arising out of project activities. Besides this, many direct and indirect benefits of the projects like enhanced employment opportunity, improvement in infrastructure, improved business opportunity will outweigh the likely negative impacts of the project.

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