

# Semi-Annual Environment Safeguard Monitoring Report

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**Loan Number : 3365-IND**

**Reporting Period: Till Dec.'17**

## Green Energy Corridor and Grid Strengthening Project

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**Implementing Agency : POWERGRID**

**Executing Agency : POWERGRID**

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## ABBREVIATIONS

ADB	–	Asian Development Bank
CEA	–	Central Electricity Authority
CPTD	–	Compensation Plan for Temporary Damages
CTU	–	Central Transmission Utility
DFO	–	Divisional Forest Officer
ESPP	–	Environment and Social Policy & Procedures
ESMD	–	Environment & Social Management Department
EMP	–	Environmental Management Plan
GRM	–	Grievances Redressal Mechanism
GRC	–	Grievance Redressal Committee
HVDC	–	High Voltage Direct Current
IEE	–	Initial Environmental Examination
Km/km	–	Kilometers
MoEFCC	–	Ministry of Environment, Forest and Climate Change
NBWL	–	National Board for Wildlife
PAPs	–	Project Affected Persons
POWERGRID	–	Power Grid Corporation of India Ltd.
PMU	–	Project Management Unit
RE	–	Renewable Energy
RoW	–	Right of Way
S/s	–	Substation
SBWL	–	State Board for Wildlife
USD	–	United States Dollar
VSC	–	Voltage Source Converter

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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 Green Energy Corridor and Grid Strengthening Project has been planned to facilitate the transfer of renewable energy, as well as increasing interregional connectivity. This project is a subset of India's 'green energy corridor' initiative to ensure that transmission system development is commensurate with renewable energy capacity development over time. The project will also incorporate increasing interregional transmission capacity between the southern and western regional systems via an 800 kV HVDC link. The Green Energy Corridor and Grid Strengthening Project includes of number of projects consisting of 800 kV HVDC, 765 kV and 400 kV, 320 kV VSC based transmission lines and associated 800 kV HVDC & 320 kV terminals, 765/400kV substation as part of increased inter-regional connectivity between India's western and southern regional power grids. The details of projects are as below;

- a. Establishment of +800 kV, 6000 MW HVDC system between the Western (Raigarh) and Southern (Pugalur) Regions;

Southern Region is facing power deficit mainly due to delay/deferment of anticipated generation projects and non-availability of gas for existing gas projects in Southern Region. Presently, maximum power demand of Southern region is about 39,000 MW and faces a deficit of about 3400 MW inspite of import capacity of about 4950 MW from NEW grid. As per 18<sup>th</sup> EPS of CEA the expected power demand of Southern region by the end of XII and XIII plan would be about 57,200 MW and 82,200 MW respectively. Power transfer requirement to Southern Region is expected to increase in coming years. Therefore, in view of large deficit and requirement of transmission system to meet future demands, the implementation of HVDC link has been proposed with a capacity of 6000 MW.

- b. Establishment of Pugalur - Trichur 2000 MW VSC Based HVDC System;

Considering the RoW problem in Kerala and dispersal of power beyond Pugalur, establishment of Voltage Source Converter (VSC) based 2000 MW HVDC link between Pugalur and North Trichur (Kerala) has been proposed. The present project will improve import capability of Southern Region.

- c. Green Energy Corridor (Part-D);

About 33 GW Renewable capacity addition has been envisaged in 12<sup>th</sup> Plan in the eight renewable energy rich States, viz. Rajasthan, Gujarat, Tamil Nadu, Maharashtra, Karnataka, Andhra Pradesh, Himachal Pradesh and J&K through Wind/ Solar & small Hydro generation. Considering above quantum of envisaged renewable capacity, it is expected that some of the Renewable Energy (RE) resource rich States including Rajasthan shall have more RE capacity than the capacity required for fulfilling their Renewable Purchase Obligations (RPO).

Further, such RE rich host State may not absorb full RE energy locally particularly during the other than peak hour conditions when renewable generation is at peak. Intermittency/ variability, inherent characteristics of renewable, also necessitates requirement of strong grid interconnections for grid stability.

For dispersal of power, high capacity transmission corridor, as part of inter-State transmission system, connecting major renewable pockets is being proposed right from the Bhuj Pooling Station in Gujarat (Western Region) to Moga in Punjab (Northern Region) via Chittorgarh/ Ajmer/ Bikaner in Rajasthan (NR). For onward dispersal of power beyond Ajmer/ Bikaner, 765 kV High capacity transmission corridor is proposed towards Moga in Punjab, a major load centre in Northern Region, as part of the subject scheme "Green Energy Corridors ISTS - Part-D".

- d. 400 kV AC Power Transmission system associated with HVDC terminal stations at Pugalur, Tamil Nadu

The Project involves construction of 400 kV AC Transmission system for transfer of power from Pugalur HVDC Terminal to 400 kV AC network of Tamil Nadu.

The total project cost is about \$2.5 billion. However, to meet the funding requirement for the proposed project, Asian Development Bank (ADB) has accepted POWERGRID's proposal to finance \$500 million as Sovereign loan under Loan No.-3365-IND for implementation of Green Energy Corridor and Grid Strengthening Project. The funding for the remaining part will be met from POWERGRID's own Internal Resources (IR). The above said was signed on 23<sup>rd</sup> February, 2017 and became effective from 22<sup>nd</sup> March, 2017. The loan closing date is 30<sup>th</sup> June, 2021.

## 1.1 OVERALL PROJECT DESCRIPTION

Following subprojects are covered under the subject loan:

1. Establishment of +800 kV, 6000 MW HVDC system between the Western (Raigarh) and Southern (Pugalur) Regions;
  - a) Establishment of Raigarh  $\pm 800$  kV HVDC Station with 6000 MW HVDC terminals.
  - b) Establishment of Pugalur  $\pm 800$  kV HVDC Station with 6000 MW HVDC terminals.
2. Establishment of Pugalur - Trichur 2000 MW VSC Based HVDC System;
  - a) Establishment of VSC based  $\pm 320$  kV, 2000 MW HVDC link between Pugalur and North Trichur (Kerala)- **Underground Cable portion: 32 km**
  - b)  $\pm 320$  kV, 2000 MW VSC based HVDC terminal at Pugalur.
  - c)  $\pm 320$  kV, 2000 MW VSC based HVDC terminal at North Trichur.
3. Green Energy Corridor (Part-D)
  - a) Ajmer (New) – Bikaner (New) 765 kV D/c line – **263 km**
  - b) Bikaner (New) – Moga (POWERGRID) 765 kV D/c line – **293 km**
  - d) LILO of one circuit of 400 kV Bhadla (RVPN) - Bikaner (RVPN) D/c line at Bikaner (New) – **9 km**
  - c) 765/400 kV Substation at Bikaner.

#### 4. 400 kV AC Power Transmission system associated with HVDC terminal stations at Pugalur, Tamil Nadu

- a) Pugalur HVDC Station – Pugalur (Existing) 400 kV (quad) D/c line- **58 km**.
- b) Pugalur HVDC Station – Arasur 400 kV (quad) D/c line - **60 km**
- c) Pugalur HVDC Station – Thiruvallam 400 kV (quad) D/c line - **390 km**
- d) Pugalur HVDC Station – Edayarpalayam 400 kV (quad) D/c line - **57 km**
- e) Edayarpalayam – Udumulpet 400 kV (quad) D/c line - **54 km**

### 1.2 PROJECT OBJECTIVES

The objective of the project is to increase transmission of renewable energy and interregional connectivity leading to increase in overall efficiency and more reliable transmission system capacity in selected regions of India.

### 1.3 ENVIRONMENTAL CATEGORY

As per the Asian Development Bank's (ADB) classification of project on the basis of potential environmental impacts, the Green Energy Corridor and Grid Strengthening Project is classified as Environmental Category 'B'.

### 1.4 ENVIRONMENTAL PERFORMANCE INDICATOR:

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

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

### 1.5 OVERALL PROJECT PROGRESS, AGREED MILESTONES & COMPLETION SCHEDULES

Name of project	Project Details	Progress as on Dec.'2017	Completion Schedule
Establishment of +800 kV, 6000 MW HVDC system between the Western (Raigarh) and Southern (Pugalur) Regions	<b>Substation:</b> a) Establishment of Raigarh ±800 kV HVDC Station with 6000 MW HVDC terminals. b) Establishment of Pugalur ±800 kV HVDC Station with 6000 MW HVDC terminals	Engineering, Foundation and Civil Works are under progress	Nov.'2019
Establishment of Pugalur - Trichur 2000 MW VSC Based HVDC System	<b>Transmission Line:</b> Establishment of VSC based ±320 kV, 2000 MW HVDC link between Pugalur and North Trichur (Kerala) (UG cable: 32 Kms)	Engineering and Civil Works are under progress	Apr.'2020

	<p><b>Substation:</b></p> <p>a) <math>\pm 320</math> kV, 2000 MW VSC based HVDC terminal at Pugalur.</p> <p>b) <math>\pm 320</math> kV, 2000 MW VSC based HVDC terminal at North Trichur.</p>		
Green Energy Corridor (Part-D)	<p><b>Transmission Line:</b></p> <p>a) Ajmer (New) – Bikaner (New) 765 kV D/c</p> <p>b) Bikaner (New) – Moga (POWERGRID) 765 kV D/c</p> <p>c) LILO of one circuit of 400 kV Bhadla (RVPN) - Bikaner (RVPN) D/c line at Bikaner (New)</p> <p><b>Substation:</b></p> <p>a) 765/400 kV Substation at Bikaner.</p>	Foundation and Erection are under progress.	May'2019
400 kV AC Power Transmission system associated with HVDC terminal stations at Pugalur, Tamil Nadu	<p><b>Transmission Line:</b></p> <p>a) Pugalur HVDC Station – Pugalur (Existing) 400 kV (quad) D/c.</p> <p>b) Pugalur HVDC Station – Arasur 400 kV (quad) D/c.</p> <p>c) Pugalur HVDC Station – Thiruvalem 400 kV (quad) D/c.</p> <p>d) Pugalur HVDC Station – Edayarpalayam 400 kV (quad) D/c.</p> <p>e) Edayarpalayam – Udumulpet 400 kV (quad) D/c.</p>	Engineering Works are under progress	Feb.'2020

## SECTION 2: COMPLIANCE STATUS WITH APPLICABLE STATUTORY 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 forest area. Prior approval from Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India has to be obtained before construction of line in forest areas.	The project involves a total of 3.7 kms (14.49 ha.) of forest land enroute of 1216 kms. POWERGRID has submitted diversion proposal for obtaining clearance from Ministry of Environment, Forests and Climate Change. Details of clearance status are presented in <b>Table-1</b> .

S. No.	Legal Requirements	Applicable Attributes	POWERGRID's Compliance Status
2.	Wildlife (Protection) Act, 1972	This Act is applicable whenever a transmission line traverses protected area such as National Parks, Wildlife Sanctuaries etc. Prior approval from Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India has to be obtained before construction of line in protected areas.	The UG portion (32 Kms) of $\pm 320$ kV line between Pugalur and North Trichur involves 0.49 km (0.098 ha) of Peechi Wildlife Sanctuary. POWERGRID has submitted diversion proposal for obtaining clearance from Ministry of Environment, Forests and Climate Change. Details of clearance status are presented in <b>Table-1</b> .
3.	Batteries (Management and Handling) Rules, 2001	To avoid/minimize lead pollution, 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.	Since the instant project is under implementation phase, no used batteries have been replaced so far.
4.	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	As per the notification, used mineral oil is categorized as hazardous waste and requires proper handling, storage and disposed only to authorised disposal facility (registered recyclers/ reprocessors). Annual return (Form -13) for the same is to be submitted to the concerned State Pollution Control Board.	Transformer oil (Used mineral oil) is changed only after 10-15 years of operation Since the instant project is under implementation phase, oil change/ replacement is not envisaged at present.
5.	Ozone Depleting Substances (Regulation and Control) Rules, 2000	Controls and regulations specified on manufacturing, import, export, and use of CFC compounds.	Necessary provisions have been made in contract document for restricting the use/supply of CFC compounds.

**Table-1: Details of Forest/ Wildlife Clearance Status**

Sl. No.	Name of the Line	Forest Area (Ha.)	State	Present Status
1.	<b>Establishment of +800kV, 6000MW HVDC system between the Western (Raigarh) and Southern (Pugalur) Regions</b>			
	<b><i>Transmission line not covered under funding</i></b>			
2.	<b>Establishment of Pugalur - Trichur 2000 MW VSC Based HVDC System</b>			
a.	$\pm 320$ kV 2000 MW VSC based HVDC link	0.244	Kerala	Affected forest area already stand diverted to National Highway



	between Pugulur and North Trichur (Kerala)			Authority of India (NHAI). Matter taken up with RMoEFCC, Bangalore for necessary permission/ clearance. However, due to changes in the road alignment of NHAI, some wildlife area belonging to Peechi Vazhani Wildlife Sanctuary got involved.  Forest proposal for Thrissur Division (0.146 ha) forwarded to Nodal Officer (NO) on 09.10.17. Wildlife proposal involving Peechi Wildlife Sanctuary (0.098 ha) recommended in SBWL on 16.08.17 and forwarded to MoEFCC on 14.12.17 for consideration in NBWL meeting.
<b>3.</b>	<b>Green Energy Corridor (Part-D)</b>			
a.	Ajmer (New) –Bikaner (new) 765 kV D/c	-	-	No forest area involved.
b.	Bikaner (New) – Moga (POWERGRID) 765 kV D/c	9.12	Punjab	Forest proposal submitted and uploaded online on 11.07.17. Proposal under formulation at DFO. However, DFO raised some queries on 07.12.17 which have been clarified on 22.12.17.
c.	LILO of one circuit of 400 kV D/c Bhadla (RVPN) – Bikaner (RVPN) Line at Bikaner (New)	-	-	No forest area involved.
<b>4.</b>	<b>400 kV AC Power Transmission system associated with HVDC terminal stations at Pugalur, Tamil Nadu</b>			
a.	Pugalur HVDC Station – Pugalur (Existing) 400kV (quad) D/c	-	-	No forest involved
b.	Pugalur HVDC Station – Arasur 400kV (quad) D/c	-	-	No forest involved
c.	Pugalur HVDC Station – Thiruvalam 400kV (quad) D/c	5.13	Tamil Nadu	Forest proposal under preparation and to be submitted shortly.
d.	Pugalur HVDC Station – Edayarpalayam 400kV (quad) D/c	-	-	No forest involved
e.	Edayarpalayam – Udumulpet 400kV (quad) D/c	-	-	No forest involved

**SECTION 3: COMPLIANCE STATUS WITH MAJOR LOAN COVENANTS**

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

<b>Project Specific Covenants</b>	<b>Reference</b>	<b>Status of Compliance</b>
The Borrower shall ensure that the preparation, design, construction, implementation, operation and decommissioning of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Guarantor and the relevant States relating to environment, health and safety; (b) the ESPP; (c) the Environmental Safeguards; and (d) all measures and requirements set forth in the IEE, the EMP, and any corrective or preventative actions set forth in the Safeguards Monitoring Report.	LA, Sch. 5, para. 13	Being complied.
The Borrower shall ensure that (a) 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 unless requirements on biodiversity conservation and sustainable natural resource management in Environmental safeguards are met; (b) the monuments of cultural or historical importance are avoided; and (c) works do not commence without obtaining prior forest clearances, wherever applicable.	LA, Sch. 5, para. 14	Being complied.
The Borrower shall make available necessary budgetary and human resources to fully implement the EMP, the CPTD and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	LA, Sch. 5, para. 18	Complied/Being complied.
The Borrower shall ensure that all bidding documents and contracts for Works contain provisions that require contractors to: <ul style="list-style-type: none"> <li>(a) comply with the measures relevant to the contractor set forth in the IEE, the EMP and the CPTD (to the extent they concern impacts on affected people during construction), and any corrective or preventative actions set forth in a Safeguards Monitoring Report;</li> <li>(b) make available a budget for all such environmental and social measures;</li> </ul>	LA, Sch. 5, para. 19	Complied/Being complied.

<p>(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 of the Project that were not considered in the IEE, the EMP, the CPTD and any corrective or preventative actions set forth in a Safeguards Monitoring Report;</p> <p>(d) adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction; and</p> <p>(e) reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.</p>		
<p>The Borrower shall do the following:</p> <p>(a) submit semiannual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission;</p> <p>(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 CPTD, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan;</p> <p>(c) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP and the CPTD promptly after becoming aware of the breach; and</p> <p>(d) in the event unexpected significant safeguard impacts are identified, promptly engage qualified and experienced external expert or agency under terms of reference intimated to ADB, to verify information produced through the Project monitoring process, and facilitate the carrying out of any verification activities by such external experts.</p>	<p>LA, Sch. 5, para. 20</p>	<p>Being complied.</p> <p>No such issues come across till date.</p> <p>Will be complied in case of any breach. But till date no such breach reported.</p> <p>Will be complied if such situation warrants.</p>
<p>The Borrower shall ensure that subsequent to award of Works contract, no Works are commenced by the contractor unless the applicable provisions of the IEE, the EMP and the CPTD, as approved by ADB, have been complied with.</p>	<p>LA, Sch. 5, para. 21</p>	<p>Compliance ensured</p>
<p>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 before commencement of Works for transmission lines or substations under the Project.</p>	<p>LA, Sch. 5, para. 23</p>	<p>No such deviations reported so far.</p>

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

The instant project is being implemented as per approved IEE and EMP and in accordance with ESPP & 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 detailed site-specific mitigation measures and monitoring plans for impacts 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.

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 vis-a vis to compliance status by POWRGRID's is given in **Table 2**.

**TABLE – 2 : ENVIRONMENT MANAGEMENT PLAN**

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
<b>Pre-construction</b>								
1	Location of line towers and line alignment and design	Exposure to safety related risks	Setback of dwellings to line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites	Tower location and alignment selection with respect to nearest dwellings	Setback distances to nearest houses – once	POWERGRID	Part of tower sitting survey and detailed alignment survey & design	Complied during survey. Route alignment criterion is part of survey contract.
2	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 not 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 Govt.	Process, equipment and system design	Exclusion of CFCs stated in tender specification – once	POWERGRID	Part of tender specifications for the equipment	Complied
					Phase out schedule to be prepared in case still in use – once			
3	Transmission line design	Exposure to electromagnetic interference	Line design to comply with the limits of electromagnetic interference from power lines including those of ICNIRP	Electromagnetic field strength for proposed line design	Line design compliance with relevant standards – once	POWERGRID	Part of design parameters	Complied. Designed as per guidelines of ICNIRP and ACGIH and checked by CPRI &M/s PTI, USA

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
4	Substation location and design	Exposure to noise	Design of plant enclosures to comply with National ambient noise standards which are also compatible with the EHS guidelines of the World Bank.	Expected noise emissions based on substation design	Compliance with regulations - once	POWERGRID	Part of detailed siting survey and design	Complied
		Social inequities	Careful selection of site to avoid encroachment of socially, culturally and archaeological sensitive areas (i.e. sacred groves, graveyard, religious worship place, monuments etc.)	Selection of substation location (distance to sensitive area).	Consultation with local authorities - once	POWERGRID	Part of detailed siting survey and design	Complied during survey. Route alignment criterion is part of survey contract.
5	Location of line towers & line alignment and design	Impact on water bodies	Avoidance of such water bodies to the extent possible. Avoidance of placement of tower inside water bodies to the extent of possible	Tower location and line alignment selection (distance to water bodies)	Consultation with local authorities – once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	Complied Route alignment criterion is part of survey contract.
		Social inequities	Careful route selection to avoid existing settlements and sensitive locations	Tower location and line alignment selection (distance to	Consultation with local authorities and land owners – once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	
			Minimise impact on agricultural land	Tower location and line alignment selection (distance to agricultural land)	Consultation with local authorities and land owners – once			

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
			Careful selection of site and route alignment to avoid encroachment of socially, culturally & archaeological sensitive areas (i. g. sacred groves, graveyard, religious worship place, monuments etc.)	Tower location and line alignment selection (distance to sensitive area)	Consultation with local authorities - once			
6	Securing lands for substations.	Loss of land/ income change in social status etc.	In the case of Involuntary Acquisitions, Compensation and R&R measures are extended as per provision of RFCTLARRA, 2013 <sup>1</sup>	Compensation and monetary R&R amounts/ facilities extended before possession of land.	As per provisions laid out in the act	POWERGRID	Prior to award/start of substation construction.	Land for proposed substations are either prior existing land under POWERGRID's control or Govt land or private land purchased through willing buyer – willing seller basis on negotiated rates. For details of lands & compensation thereof refer Social Monitoring Report
7	Line through protected area/ precious ecological area	Loss of precious ecological values/ damage to precious species	Avoid siting of lines through such areas by careful site and alignment selection (National Parks, Wildlife Sanctuary, Biosphere Reserves/ Biodiversity Hotspots)	Tower location and line alignment selection (distance to nearest designated ecological protected/ sensitive areas)	Consultation with local forest authorities - once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	In spite of best efforts, sanctuary area of 0.098 ha (0.49 km) in Peechi Wildlife Sanctuary could not be avoided. However, permission of NBWL as per the provisions of Wildlife (Protection) Act, 1972 is under progress

<sup>1</sup> No Involuntary acquisition of land (permanent) is involved, hence this clause shall not be applicable.

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
			Minimize the need by using RoW wherever possible	Tower location and line alignment selection	Consultation with local authorities and design engineers- once	POWERGRID	Part of tower siting survey & detailed alignment survey and design	Complied
8	Line through identified Elephant corridor / Migratory bird	Damage to the Wildlife/ Birds and also to line	Study of earmarked elephant corridors to avoid such corridors, Adequate ground clearance, Fault clearing by Circuit Breaker, Barbed wire wrapping on towers, reduced spans etc., if applicable	Tower location and line alignment selection.  Minimum /maximum ground clearance	Consultation with local forest authorities – once.  Monitoring – quarterly basis	POWERGRID	Part of tower sitting and detailed alignment survey & design and Operation	Complied. The routes of proposed lines don't form part of any such areas.
			Avoidance of established/ identified migration path (Birds & Bats). Provision of flight diverter/ reflectors, bird guard, elevated perches, insulating jumper loops, obstructive perch deterrents, raptor hoods etc <sup>2</sup> , if applicable	Tower location and line alignment selection	Consultation with local forest authorities - once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	
9	Line through forestland	Deforestation and loss of biodiversity edge effect	Avoid locating lines in forest land by careful site and alignment selection	Tower location and line alignment selection (distance to	Consultation with local authorities-once	POWERGRID	Part of tower siting survey and detailed alignment survey and design	Complied/Being complied. Route alignment finalised by taking consideration of minimum impact on

<sup>2</sup> As per International/National best practices and in consultation with concerned forest/wildlife Authority.



Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	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	nearest protected or reserved forest)	Consultation with local authorities and design engineers- once			forest area after consultation with concerned authorities. However, in spite of best efforts, an area of 14.49ha (3.7 km) forest land could not be avoided. The Forest clearance under applicable regulatory framework for forest.
			Measures to avoid invasion of alien species	Intrusion of invasive species	Consultation with local forest authorities-once			
			Obtain statutory clearances from the Government	Statutory approvals from Government	Compliance with regulations – once for each			
10	Lines through farmland	Loss of agricultural production/ change in cropping pattern	Use existing tower or footings wherever possible.	Tower location and line alignment	Consultation with local authorities and	POWERGRID	Part of detailed alignment survey and design	Complied during survey which is part of survey contract.
			Avoid sitting new towers on farmland wherever feasible	Tower location and line alignment selection	Consultation with local authorities and design engineers- once		Part of detailed sitting & alignment survey /design	
11	Noise related	Nuisance to neighbouring properties	Substations sited and designed to ensure noise will not be a nuisance and shall comply with National Ambient Noise Standards, which are also compatible with the EHS guidelines of the World Bank.	Noise levels	Noise levels to be specified in tender documents- once	POWERGRID	Part of detailed equipment design	Complied. Maximum noise limit of 80 (dB)A stated in the technical specification for transformer.
12	Interference with drainage patterns/ irrigation channels	Flooding hazards/ loss of agricultural production	Appropriate sitting 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/Being complied. Appropriate siting of towers ensured during alignment survey and Tower spotting to avoid channel interference.

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
13	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 clean up equipment.	Equipment specifications with respect to potential pollutants	Tender document to mention specifications – once	POWERGRID	Part of detailed equipment design /drawings	Complied. Underlying pit with a storage capacity of at least 20% of the total oil of the transformer & a common Secondary Containment of capacity of 220% of largest transformer oil volume is part of detailed design
			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.
14	Equipments submerged under flood	Contamination of receptors	Substations constructed above the high flood level(HFL) by raising the foundation pad	Substation design to account for HFL (elevation with respect to HFL elevation)	Base height as per flood design- once	POWERGRID	Part of detailed substation layout and design/drawings	Complied. Substations are designed above HFL.
15	Explosions /Fire	Hazards to life	Design of substations to include modern fire fighting equipment	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					
<b>Construction</b>								
16	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	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied.  Low noise producing machineries/ equipments are being used.

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
					of each construction phase			
17	Physical construction	Disturbed farming activity	Construction activities on cropping land timed to avoid disturbance of field crops (within one month of harvest wherever possible).	Timing of start of construction	Crop disturbance – Post harvest as soon as possible but before next crop – once per site	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being complied. Construction on farm land undertaken mostly during post-harvest period.
18	Mechanized construction	Noise, vibration and operator safety, efficient operation	Construction equipment to be well maintained.	Construction equipment – estimated noise emissions	Complaints received by local authorities – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being complied. 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)	Construction period	
19	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)	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)	Construction period	Complied/ Being Complied

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
20	Construction activities	Safety of local villagers	Coordination with local communities for construction schedules, Barricading the construction area and spreading awareness among locals	Periodic and regular reporting /supervision of safety arrangement	No. of incidents- once every week	POWERGRID (Contractor through contract provisions)	Construction period	All required safety precautions have been taken. Most of the tower locations are in farm/barren land. Hence, the cases of traffic obstruction are not envisaged. No accidents reported during the reporting period.
		Local traffic obstruction	Coordination with local authority, requisite permission for smooth flow of traffic. Imposing speed limits on Project vehicles in project/habitation areas.	Traffic flow (Interruption of traffic)	Frequency (time span)- on daily basis	POWERGRID (Contractor through contract provisions)	Construction period	
21	Temporary blockage of utilities	Overflows, reduced discharge	Measure in place to avoid dumping of fill materials in sensitive drainage area	Temporary fill placement (m <sup>3</sup> )	Absence of fill in sensitive drainage areas – every 4 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied
22	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 <sup>2</sup> )	Clearance strictly limited to target vegetation – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied
			No use of herbicides and pesticides					
23	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 max. tree height at maturity, in	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.

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
		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	Presence of target species in RoW following vegetation	POWERGRID (Contractor through contract)	Construction period	Complied/ Being 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 <sup>2</sup> )	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.
24	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 <sup>2</sup> , number of incidents reported)	Complaints by local people or other evidence of illegal harvesting – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied  No complaints received on illegal harvesting.
25	Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Soil excavated from tower footings/ substation foundation disposed of by placement along roadsides, or at nearby house blocks if requested by landowners	Soil disposal locations and volume (m <sup>3</sup> )	Acceptable soil disposal sites – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/Being complied. 90-95% of the excavated soil is used for refilling/ resurfacing and rest is being disposed off along with other debris at selected location
26	Substation construction	Loss of soil	Loss of soil is not a major issue as excavated soil will be mostly reused for leveling and re-filling. However, in case of requirement of excess	Borrow area sitting (area of site in m <sup>2</sup> and estimated volume in m <sup>3</sup> )	Acceptable soil borrow areas that provide a benefit - every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
			soil the same will be met from existing quarry or through deep excavation of existing pond or other nearby barren land with agreement of local communities					
		Water pollution	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season	Seasonal start and finish of major earthworks(P <sup>H</sup> , BOD /COD, Suspended solids, others )	Timing of major disturbance activities –prior to start of construction activities	POWERGRID (Contractor through contract provisions))	Construction period	Complied/ Being Complied
27	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 <sup>2</sup> )	Amount of ground disturbance – every 2 weeks	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.
				Statutory approvals	Statutory approvals for tree clearances – once for each site			
28	Tower erection Substation foundation-disposal of surplus earthwork/fill	Waste disposal	Excess fill from substation/tower foundation excavation disposed of next to roads or around houses, in agreement with the local community or landowner.	Location and amount (m <sup>3</sup> )of fill disposal	Appropriate fill disposal locations – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
29	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 <sup>3</sup> ) 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.
30	Construction schedules	Noise nuisance to neighbouring properties	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction (noise emissions, [dB(A)])	Daytime construction only – every 2 weeks	POWERGRID (Contractor through contract provisions)	Construction period	Construction activity restricted to day time only
31	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	No complaints received
32	Influx of migratory workers	Conflict with local population to share local resources	Using local workers for appropriate asks	Avoidance/reduction of conflict through enhancement/augmentation of resource requirements	Observation & supervision—on weekly basis	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied. Local workforce being used based on skill and no incidents of conflict reported so far

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
33	Lines through 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)	Construction period	Being 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 completed	Status of facilities (earthwork in m <sup>3</sup> )							
Repair /reinstate damaged bunds etc after construction completed	Status of facilities (earthwork in m <sup>3</sup> )							
		Loss of income.	Land owners/ farmers compensated for any temporary loss of productive land as per existing regulation.	Process of Crop/tree compensation in consultation with forest dept.(for timber yielding tree) and Horticulture deptt. (for fruit bearing tree)	Consultation with affected land owner prior to implementation and during execution.	POWERGRID	During construction	Tried to minimise the loss. Details of tree, crop compensation paid is provided separately in Social Monitoring Report
34	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 <sup>2</sup> ; amount of bunds constructed	Incorporating good design and construction management practices – once for each site	POWERGRID (Contractor through contract provisions)	Construction period	Complied/ Being Complied
			Limit site clearing to work areas					
			Regeneration of vegetation to stabilise works areas on completion (where applicable)					



Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
			Avoidance of excavation in wet season	[length in meter, area in m <sup>2</sup> , or volume in m <sup>3</sup> ]				
			Water courses protected from siltation through use of bunds and sediment ponds					
35	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 provisions)	Construction period	Complied/ Being Complied
			As much as possible existing access ways will be used	Design basis and layout	Incorporating good design engineering practices– once for each site			
			Productive land will be reinstated following completion of construction	Reinstatement of land status (area affected, m <sup>2</sup> )	Consultation with affected parties – twice – immediately after completion of construction			
		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 (for details of tree, crop compensation paid please refer Social Monitoring Report)

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
36	Flooding hazards due to construction impediments of natural drainage	Flooding & loss of soils, contamination of receptors (land, water)	Avoid natural drainage pattern/ facilities being disturbed/blocked/ diverted by on-going construction activities	Contract clauses (e.g. suspended solids and BOD/COD in receiving water)	Incorporating good construction management practices-once for each site	POWERGRID (Contractor through contract provisions)	Construction period	Complied/Being complied. Good construction management practices are employed at sites to avoid blockage of natural drainage and resultant flooding.
37	Equipment submerged under flood	Contamination of receptors (land, water)	Equipment stored at secure place above the high flood level(HFL)	Store room level to be above HFL (elevation difference in meters)	Store room level as per flood design-once	POWERGRID	Construction period	All equipment foundations are designed above HFL.
38	Inadequate siting of borrow areas (quarry 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	Extra aggregates not required till date. However, If needed it will be sourced through approved/registered borrow/quarry area.
39	Health and safety	Injury and sickness of workers and members of the public	Safety equipment's (PPEs) for construction workers Contract provisions specifying minimum requirements for construction workers camps Contractor to prepare and implement a health and safety plan. Contractor to arrange for health and safety training sessions	Contract clauses (18.1.3, 18.3.1.1, 18.3.1.4 etc) (requirements of worker camp, number of incidents and total lost-work days caused by injuries and sickness)	Contract clauses compliance – once every quarter	POWERGRID (Contractor through contract provisions)	Construction period	Complied with project specific safety plan and general conditions of contract, which covers all applicable regulations..  Photographs related to use of PPEs, labour camp facilities, training and other EMP compliance are placed as <b>Plate-1</b>

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
40	Inadequate construction stage monitoring	Likely to maximise damages	Training of environmental monitoring personnel	Training schedules	No. of programs attended by each person – once a year	POWERGRID	Routinely throughout construction period	Provides proper training and have very good environmental monitoring process.  Appropriate clause incorporated in contract 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	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	Compliance report related to environmental aspects for the contract	Submission of duly completed compliance report for each contract – once			
<b>Operation and Maintenance</b>								
41	Location of line towers and line alignment & 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.	Compliance with setback distances (“as-built” diagrams)	Setback distances to nearest houses – once in quarter	POWERGRID	During operations	Will be complied during O & M stage
42	Line through identified bird flyways, migratory path	Injury/ mortality to birds, bats etc. due to collision and electrocution	Avoidance of established/ identified migration path (Birds & Bats). Provision of flight diverter/reflectors, elevated perches, insulating jumper loops, obstructive perch deterrents, raptor hoods etc., if applicable	Regular monitoring for any incident of injury/mortality	No. of incidents- once every month	POWERGRID	Part of detailed siting and alignment survey /design and Operation	-do-

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
43	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	-do-
44	Oil spillage	Contamination of land/nearby water bodies	Each transformer has a secure and impervious underlying pit with a storage capacity of at least 20% of the total oil volume of the transformer and the individual pits are connected to a main collection sump of capacity of 220% of largest transformer oil volume, which acts as a Secondary Containment, in case of a leakage. (refer para 8.6 of TS)	Substation bunding (Oil sump) ("as-built" diagrams)	Bunding (Oil sump) capacity and permeability - once	POWERGRID	During operations	-do-
45	SF <sub>6</sub> management	Emission of most potent GHG causing climate change	Reduction of SF <sub>6</sub> emission through awareness, replacement of old seals, proper handling & storage by controlled inventory and use, enhance recovery and applying new technologies to reduce leakage	Leakage and gas density/level	Continuous monitoring	POWERGRID	During Operations	-do-

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
46	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	-do-
			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			
47	Electric Shock Hazards	Injury/ mortality to staff and public	Careful design using appropriate technologies to minimise hazards	Usage of appropriate technologies (no. of injury incidents, lost work days)	Preparedness level for using these technology in crisis- once a month	POWERGRID	Design and Operation	-do-
			Security fences around substations	Maintenance of fences	Report on maintenance – every 2 weeks			
			Barriers to prevent climbing on/ dismantling of towers	Maintenance of barriers				
			Appropriate warning signs on facilities	Maintenance of warning signs				

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
			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			
48	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 & line maintenance crews. Preparation and training in the use of O&M manuals and standard operating practices	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	POWERGRID	Operation	-do-
49	Inadequate periodic environmental monitoring.	Diminished ecological and social values.	Staff to receive training in environmental monitoring of project O & M activities	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	POWERGRID	Operation	-do-
50	Equipment specifications and design parameters	Release of chemicals and gases in receptors (air, water, land)	Processes, equipment and systems using chlorofluorocarbons (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	Operation	-do-
51	Transmission line maintenance	Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Required ground clearance (meters)	Ground clearance -once	POWERGRID	Operation	-do-

Cl. No.	Project activity / stage	Potential Impact	Proposed mitigation measures	Parameter to be monitored	Measurement & frequency	Institutional responsibility	Implementation schedule	Compliance Status
52	Uncontrolled growth of vegetation	Fire hazard due to growth of tree/shrub /bamboo along RoW	Periodic pruning of vegetation to maintain requisite electrical clearance No use of herbicides/pesticides	Requisite clearance (meters)	Assessment in consultation with forest authorities- once a year (pre/post monsoon)	POWERGRID	Operation	-do-
53	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 & consultation with affected parties if any - once	POWERGRID	Operation	-do-

## SECTION: 5 APPROACH AND METHODOLOGY ENGAGED FOR ENVIRONMENT MONITORING OF THE PROJECT

Environmental monitoring is a continuous process throughout 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 & 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
<b>Pre-Construction Phase</b>		
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.
<b>Construction Phase</b>		
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.
<b>Operation and Maintenance Phase</b>		
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 MONITORING OF 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 for proposed projects was restricted to 3.7 km which is only 0.3 % of total line length of 1216 km lines. However, a small stretch (0.49 km) of underground portion of  $\pm 320$  kV Pugalur-North Trichur line is passing through Peechi Vazhani Wildlife sanctuary which is unavoidable as no other utility corridor is available to lay the power cable. Moreover, actual area involved/affected is very small to the tune of 0.098 ha. as the said line will be laid underground with RoW of 2m only. Further, the line is passing along the pre-existing NH-544 corridor in the wildlife area which is already disturbed/fragmented and hence, no additional impact on wildlife and its habitat is anticipated. Additionally, conditions/recommendations of SBWL/NBWL as mentioned in wildlife permission shall be complied with, which in turn will further negate any residual impacts due to construction of said line.

The proposed 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 takes place during ordinary operations of 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 concentrated to one place (localized) rather it is widely dispersed that provide adequate buffering to air environment. Therefore, impacts on air quality from construction activities are considered insignificant. Further, 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 anticipated.

## **SECTION: 7 ANY OTHER MONITORING OF ENVIRONMENTAL ASPECTS, IMPACTS OBSERVED DURING IMPLEMENTATION**

Except the predicted impacts as mentioned in EMP, no other unanticipated impacts were observed during the implementation of projects. As regard Safety, all required measures are in place including due precautions/awareness programs as well as ensuring use of PPEs, which is evident from the fact that no accidents (fatal or non-fatal) including major/minor injuries were reported during the reporting period from any of the construction sites.

## **SECTION: 8 DETAILS OF GRIEVANCE REDRESS COMMITTEE AND COMPLAINT RECEIVED AND ACTION TAKEN**

Grievance Redress Mechanism (GRM) is an integral and important mechanism for addressing/resolving the concern and grievances in a transparent and swift manner. Many minor concerns of peoples are addressed during public consultation process initiated at the beginning of the project. For handling grievance, Grievance Redress Committee (GRC) has been established both at the project/scheme level and at Corporate/HQ level. The project level GRCs have been established include members from POWERGRID, Local Administration, Panchayat Members, Affected Persons

representative and reputed persons from the society on nomination basis under the chairmanship of project head. The corporate level GRC functions under the chairmanship of Director (Projects) and includes one representative from corporate ESMD who is conversant with the environment & social issues. However, some minor issues related to assessment of compensation amount were brought to the notice of Project officials, which were resolved instantly and amicably through discussion & deliberation in the presence of Revenue/district officials. 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 except the involvement of 3.7 km of forest and 0.49 km of Wildlife sanctuary area. However, with the condition of raising the compensatory afforestation on double the area and measures like extended tower to reduce tree felling will go a long way in mitigating the likely loss of vegetation. Besides, conditions/recommendations of forest & wildlife clearance shall be complied with, which in turn will further negate any residual impacts. Moreover, some environmental impacts are anticipated, mostly during construction period which have been mitigated successfully by implementing the EMP. POWERGRID approach of project implementation involving selection of 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. There will be optimization of RoW resulting in reduction in land requirement due to high power carrying capacity of these lines. Besides this, direct or indirect benefits of the subprojects like the employment opportunity, improved & uninterrupted power supply, improvement in infrastructure facilities, improved business opportunity will outweigh the negative impacts of the project. Since the Green Energy Corridor subproject is planned to evacuate clean and green energy through renewable sources, the benefits associated with such projects like reduction in emission of Green House Gases (GHGs) and resultant warming & climate change shall offset possible adverse impact if any

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**General Manager (ESMD)**

### Plate 1: Use of PPEs & Safe Working Practices





## Safety Awareness/Training



**L&T CONSTRUCTION**  
**POWER TRANSMISSION & DISTRIBUTION IC**  
 Ref: IM-12-A Rev 04

**PEP TALK REPORT**

Name of the Site :  $\pm 320$  kv HVDC PTL Project .

Location : 54/0 .

Name of the Section Incharge:

Name of the EHSO : Mr. Shrikant .

Name of the Sub-Contractor/Dept.: M/s. MSS -

Number of workmen present : 12 .

Date & Time : 01.12.17. 8.00Am,

Topics discussed :

- > Safe working procedure. Explained briefly about material handling.
- > Importance of PPE Explained while working inside the pit. during the time of template setting.
- > Importance of ladder Explained about checking of ladder and also three point movement while ascending and descending on ladder.

Response of workmen : Found good response from workmen.

Remark / Any significant problem identified:

Site Engineer: *[Signature]*

EHSO: *[Signature]*





## Compliance of Safety Checklist





**POWER GRID CORPORATION OF INDIA LTD.,  
SOUTHERN REGION TRANSMISSION SYSTEM - II  
SITE SAFETY INSPECTION REPORT  
EXCAVATION & FOUNDATION**

1. **DATE OF INSPECTION:** 25-11-17.      2. **LOCATION NO:** 5410.  
 3. **NAME OF THE LINE:** 320kV HVDC PTL.      4. **NAME OF THE AGENCY:** LWT Construction.  
 5. **SITE ENGINEER / SUPERVISOR OF THE AGENCY:** Mr. Lakshminarayan.

S.NO:	CHECKLIST	YES / NO	REMARKS, IF ANY
1	Sufficient Angle of Repose / slope provided to prevent collapse of soil at vulnerable locations.	Yes.	Slopes are ensured while excavation.
2	Adequate shoring and shuttering provided in collapsible soil conditions.	NA.	-
3	(a) Drilling and Blasting, if any, carried out with adequate precautions. (b) Whether the blaster is a valid license holder?	NA.	Blasting and Drilling not required.
4	Dewatering of the pits is being done, wherever required.	NA.	Dewatering not required.
5	Adequate warning / protection to public / live stock moving nearby ensured.	Yes.	Warning Barrication tape secured around the area.
6	Clear edges to prevent fall of objects inside the pit - the excavated earth, stones and tools dumped atleast one metre away from the pit edges.	Yes.	All material kept 1.5 meter from pit.
7	Check List / Instructions in the language understood by the workers available.	Yes.	During the time of tool box talk explained in local & official language.
8	All ladders used are of sound construction, free from any defect.	Yes.	Ladder checked and inspected.
9	All the workers inside the pit are provided with good quality Safety Helmets.	Yes.	ISO standard helmet provided.
10	All the workers engaged in steel work are provided with Leather Safety Gloves.	Yes.	Cotton hand gloves provided.
11	The workers engaged in concreting work inside the pit are provided with gumboots.	Yes.	Adequate gumboots provided.
12	Appropriate safety posters / messages / warnings are displayed properly.	Yes.	Do and Don't poster displayed.
13	Adequate site briefings to the workers being done by the Supervisor / Engineer of the Agency.	Yes.	Daily peptalk conducted.
14	(a) First aid box with adequate contents available. (b) Number of First Aid Trained persons and their names.	Yes.	First aid box are provided in adequate nos.
15	Concreting completed within 48 hours of excavation, in water logged / collapsible locations, as the stability of the pit decreases with increase in time.	NA.	-
16	Machines like concrete mixer, vibrator, etc, placed sufficiently away from the pit to avoid collapse of the pit due to vibrations produced by these machines.	Yes.	Supervision done for all material kept 1.5 mtr away from pit.
17	The steel plate (chute) used for pouring the concrete into the pit properly anchored to prevent the same from falling into the pit, endangering the persons inside the pit.	Yes.	adequate length of chute provided.
18	Jacks used for supporting the template are properly positioned to avoid sliding down of the template from the jacks and endangering the workers.	Yes.	Yes adequate length of pins provided to

SIGNATURE / NAME / DESIGNATION OF POWER GRID REPRESENTATIVE  
  


SIGNATURE / NAME / DESIGNATION OF AGENCY'S REPRESENTATIVE  
  


- Copy To:**  
 (1) PROJECT MANAGER, M/s V Chandrasekar      (2) VP / GM, M/s \_\_\_\_\_  
 (2) AGM(CONST) \_\_\_\_\_      (3) CM (SAFETY) / BANGALORE \_\_\_\_\_



## Facilities for Construction Worker

