



# Environmental Monitoring Report

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Project Number: 44426-014/44917-014  
July 2018

Period: October 2017 – March 2018

## IND: National Grid Improvement Project

Submitted by

Power Grid Corporation of India Limited, Gurgaon, Haryana

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(भारत सरकार का उद्यम)



POWER GRID CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

पावरग्रिड

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CIN : L40101DL1989GOI038121

Ref: C/CP/ADB-VII & VIII

Date: June 19, 2018

Mr. Kenichi Yokoyama  
Country Director, INRM  
Asian Development Bank  
4, San Martin Marg, Chanakyapuri  
New Delhi - 110021.



Sub: Loan 2787-IND & 2788-IND: National Grid Improvement Project - Semi-Annual Environment and Social Safeguard Monitoring Reports for the period of October, 2017 – March, 2018.

Dear Sir,

This has reference to submission of Semi-Annual Environment and Social Safeguard Monitoring Reports under Loan Nos. 2787-IND & 2788-IND.

As part of the compliance requirement to loan covenants of subject Loan(s) (Ln 2787: Schedule 5, para 19 and Ln 2788: Clause 17.6), Semi-Annual Environment and Social Safeguard Monitoring Reports for the period of October, 2017 – March, 2018 is attached, please.

Thanking you,

Yours faithfully,

*K. Nagraj Bhat*

(K.Nagraj Bhat)

Dy. General Manager (CP)

19/6/18

Attach: As above



Self copy recd 19.06.18

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स्वहित एवं राष्ट्रहित में ऊर्जा बचाएं  
Save Energy for Benefit of Self and Nation

# Semi-Annual Environment Safeguard Monitoring Report

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**Loan Number** : 2787-IND & 2788 -IND

**Reporting Period** : Oct.'17 to Mar.'18

## National Grid Improvement Project

**Prepared by** : ESMD, CORPORATE CENTRE, POWERGRID

**Implementing Agency** : POWERGRID

**Executing Agency** : POWERGRID

**Date** : 15.06.2018

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## ABBREVIATIONS

|           |   |  |
|-----------|---|--|
| ADB       | – | Asian Development Bank                     |
| APs       | – | Affected Persons                           |
| CEA       | – | Central Electricity Authority              |
| CTU       | – | Central Transmission Utility               |
| EA        | – | Executing Agency                           |
| EIA       | – | Environment Impact Assessment              |
| ESPP      | – | Environment and Social Policy & Procedures |
| ESMD      | – | Environment & Social Management Department |
| EMF       | – | Electro Magnetic Fields                    |
| EMP       | – | Environmental Management Plan              |
| GIS       | – | Gas Insulated Switchgear                   |
| GO        | – | Government Order                           |
| GoI       | – | Government of India                        |
| GRM       | – | Grievances Redressal Mechanism             |
| GRC       | – | Grievance Redressal Committee              |
| HVDC      | – | High Voltage Direct Current                |
| IEE       | – | Initial Environmental Examination          |
| IPP       | – | Independent Power Producer                 |
| km        | – | Kilometers                                 |
| LTOA      | – | Long-Term Open Access                      |
| 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                                 |
| WR        | – | Western Region                             |
| NR        | – | Northern Region                            |

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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.

POWERGRID has received a nos. of Long-Term Open Access (LTOA) applications from Independent Power Producer (IPP) generation projects coming up in Chhattisgarh for transfer of power to different target regions viz. Western and Northern region. It is estimated that IPP generation projects with long-term power transfer requirement of about 15000-16000 MW is coming up in Raigarh (Kotra), Champa, Raigarh (Tamnar) and Raipur generation complex in Chhattisgarh progressively in next 3-4 years. Out of the 15000-16000 MW quantum of power transfer requirement, about 5000 MW power is indicated for transfer to Northern region as the target region and balance power is to be transferred to the Western region. For evacuation and transfer of power from these generation projects, 765/400kV High Capacity Pooling stations viz. at Raigarh (Kotra), Raigarh (Tamnar), Raipur and Champa is proposed. However, considering the quantum of power transfer requirement (about 5000 MW) to Northern region, it is proposed that a new high capacity transmission corridor may be developed to effect above transfer.

Based on the discussion with IPPs and Central Electricity Authority (CEA) as well in the 29th & 30th Standing Committee meeting on Power System planning in Western region/11<sup>th</sup> meeting of WR constituents regarding LTOA application in WR, transmission system for above generation projects in Chhattisgarh with power transfer requirement to target regions was agreed. Looking at the transmission system requirement for transfer of power to Northern/Western region from generation projects coming up in Chhattisgarh, a comprehensive transmission scheme on system strengthening in Western- Northern inter-regional HVDC transmission corridor is proposed.

Presently, North-West inter-regional transmission corridors are being developed with AC technology. However, considering the long distance as well quantum of power transfer requirement to NR from IPP generation projects in Chhattisgarh, it is proposed that power from IPP generation projects in Chhattisgarh can be transferred over HVDC system. Development of such HVDC transmission corridors shall facilitate in establishing transmission corridors with hybrid technology. This shall also facilitate in meeting controlled power flow requirement, flexibility of operation as well as maintaining system parameters within limits through its control mechanism. For this  $\pm 800$ kV, 3000MW HVDC bipole between Champa Pooling Station and Kurukshetra, a major load center in NR is proposed. For power transfer from Kurukshetra onwards, a 400kV transmission corridor towards Nakodar/ Jallandhar in Punjab is proposed. It is also proposed that provision should be kept to upgrade above HVDC Bipole to 6000MW at a later date with increased power transfer requirement to Northern region.

Under Additional funding, Project "Inter-Regional System Strengthening Scheme for WR and NR (Part-B)" involves construction of about 408 km of 400 kV & 765 kV transmission lines in Northern Region. Number of generation projects is coming up in Western region and power import to Northern region from Western region is increasing. With the growth in power demand, it is expected that power transfer requirement from

Western region would increase. The project aims to provide additional strengthening between Northern and Western regions.

To meet the funding requirement for the proposed project, Asian Development Bank (ADB) has accepted POWERGRID's proposal to finance a loan of USD 750 million (USD 500 million as Sovereign & USD 250 million as Non-Sovereign) for implementation of HVDC Sub- Station at Champa & Kurukshetra and some package of transmission line. The funding for the remaining part will be met from POWERGRID's own Internal Resources (IR). The loan no.2787 & 2788 was signed on 30<sup>th</sup> March, 2012 and became effective from 22<sup>nd</sup> October, 2012. The loan closing date is 30<sup>th</sup> June, 2018.

## 1.1 OVERALL PROJECT DESCRIPTION

The National Grid Improvement Project covered under Loan No. 2787-IND and 2788 - IND involves following projects:

1. Establishment of HVDC Inter-regional transmission system between the Northern (Haryana) and Western (Chhattisgarh) regions. The detail scope of the project covered under above loans include following transmission facilities:
  - i. Construction of  $\pm 800$ kV HVDC Bipole between Champa (in Chhattisgarh) and Kurukshetra (in Haryana);
  - ii. Establishment of 800kV HVDC terminals at Champa and Kurukshetra
2. Inter-Regional System strengthening Scheme for WR and NR (Part-B)\*
  - i. Orai-Aligarh 765 kV D/c line;
  - ii. Orai-Orai (UPPTCL) 400kV D/c (Quad) line;
  - iii. LILO of Agra-Meerut 765 kV S/c line at Aligarh substation;
  - iv. LILO of Kanpur- Jhatikara 765 kV S/c line at Aligarh substation.

\* Associated substation facilities are not covered under the funding.

## 1.2 PROJECT OBJECTIVES

The objective of the project is to provide transmission arrangement so as to transfer power from future IPP generation projects in the State of Chhattisgarh to Northern and Western region with reliability and security.

The additional components under IRSSS (Part-B) aim to facilitate the efficient and reliable power transfer between NR and WR.

## 1.3 ENVIRONMENTAL CATEGORY

As per the Asian Development Bank's (ADB) classification of project on the basis of potential environmental impacts, the National Grid Improvement 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 with Environment Management Plan

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

| Name of project  | Project Details   | Progress as on March 2018  | Completion Schedule  |
|--|---|--|----------------------|
| Establishment of HVDC inter-Regional Transmission System between the Northern (Haryana) and Western (Chhattisgarh) Regions | <p><b>Transmission Line:</b><br/>Construction of +800kV HVDC Bipole between Champa (in Chhattisgarh) and Kurukshetra (in Haryana)</p> <p><b>Substation:</b><br/>Establishment of 800kV HVDC terminals at Champa and Kurukshetra</p>   | Pole-I commissioned in Mar'17 and 2nd pole Pole-II commissioned in September, 2017 | June 2017 (extended) |
| Inter-Regional System Strengthening Scheme for WR and NR (Part-B)  | <p><b>Transmission Line:</b></p> <ul style="list-style-type: none"> <li>• Orai-Aligarh 765 kV D/c line</li> <li>• Orai-Orai (UPPTCL) 400 kV (Quad) line</li> <li>• LILO of Agra-Meerut 765 kV S/c line at Aligarh substation</li> <li>• LILO of Kanpur- Jhatikara 765 kV S/c line at Aligarh substation.</li> </ul> | <p>Ckt-1 commissioned in Mar.'18</p> <p>Lines commissioned in Mar.'18</p>          | April 2018           |

### SECTION 2 : COMPLIANCE STATUS WITH APLLICABLE 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 & Forests (MoEF), Govt. of India has to be obtained before construction of line in forest areas | Champa-Kurukshetra Line involves a total of 57.58 kms (397.313 ha.) of forest land enroute of 1365 kms. POWERGRID has submitted forest diversion proposals to respective states for obtaining clearance from Ministry of Environment and Forest. Details of forest clearance status are presented in <b>Table-1</b> . Similarly under IRSSS (Part-B), about 6.96 ha forest area is involved in 3 lines for which forest diversion approvals are being obtained. Details of forest clearance status are presented in <b>Table-1 (A)</b> . |
| 2.     | Batteries (Management and Handling) Rules, 2001 | To avoid/minimize lead pollution, Bulk consumers shall have the responsibility to dispose all used batteries   | Since the instant project is under implementation phase, no used batteries have been replaced so far.  |



| S. No. | Legal Requirements   | Applicable Attributes   | POWERGRID's Compliance Status   |
|--------|--|---|---|
|        |  | 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.   |   |
| 3.     | Hazardous Wastes (Management, Handling and Transboundary Movement) Amendment Rules, 2008 | 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. |
| 4.     | 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 Clearance Status of 800 kV HVDC Champa-Kurukshetra line

| Sl. No.      | Transmission line section                  | Forest involved (in km) | Forest involved (in Ha.) | Name of the State(s) | Status   |
|--------------|--|-------------------------|--------------------------|----------------------|--|
| 1            | Western Region-I portion of the HVDC line  | 28.00                   | 193.161                  | Chhattisgarh         | Final approval obtained on 07.09.15.   |
| 2            | Western Region-II portion of the HVDC line | 28.4                    | 196.008                  | MP                   | Final approval obtained on 08.09.16  |
| 3            | Northern Region-I portion of the HVDC line | 1.03                    | 7.14                     | UP                   | Forest area involved only strip plantation along road/canal crossings.<br><br>Banda-Etawah Section: Final approval obtained on 09.03.18. |
|              |  | 0.14                    | 1.004                    | Haryana              | Bulandshahr-Kurukshetra Section: Stage-I issued on 15.07.15. Working permission obtained.<br>Final approval obtained on 29.08.14.        |
| <b>Total</b> |  | <b>57.57</b>            | <b>397.313</b>           |                      |  |

Table – 1(A): Details of Forest Clearance Status of lines under IRSSS (Part-B)

| Sl. No       | Name of the Line  | Forest involved (in km) | Forest involved (in Ha.) | Name of the State | Present Status  |
|--------------|---|-------------------------|--------------------------|-------------------|---|
| 1.           | Orai - Aligarh 765 kV D/c                                       | 0.95                    | 6.38                     | Uttar Pradesh     | <p>Forest area involved only strip plantation along road/canal crossings.</p> <p><b>Jalaun (0.268 ha):</b> Stage-I issued on 17.01.18. Payment deposited on 09.03.18. Compliance is under process.</p> <p><b>Mainpuri, Firozabad, Etah (2.82 ha):</b> Forest Proposal uploaded online on 31.05.17. NO forwarded proposal to RMoEF on 02.04.18.</p> <p><b>Auraiya, Etawah, Mainpuri (1.6206 ha):</b> Forest proposal submitted on 09.02.17. Proposal forwarded to RMoEFCC on 14.11.17. RMoEF raised some queries on 14.12.17 which have been replied on 06.03.18. RMoEF again raised queries on 03.04.18.</p> <p><b>Hathras, Aligarh (1.6677 ha):</b> Proposal submitted on 10.08.17. Proposal forwarded to RMoEF on 27.02.18. RMoEF has raised queries on 23.03.18.</p> |
| 2.           | Orai - Orai (UPPTCL) 400 kV D/c (Quad) line                     | 0.04                    | 0.184                    |                   | <p>Forest area involved only strip plantation along road/canal crossings.</p> <p>Forest proposal submitted on 10.09.16. Proposal forwarded to RMoEF on 11.10.17. RMoEF raised some queries on 25.10.17. Clarifications forwarded to NO on 04.01.18. NO again raised queries on 12.03.18 which are under preparation.</p>  |
| 3.           | LILO of Agra-Meerut 765 kV S/c line at Aligarh substation       | 0.062                   | 0.397                    |                   | <p>Forest area involved only strip plantation along road/canal crossings.</p> <p>Proposal submitted on 13.07.17. NO raised some queries on 11.08.17 and 11.12.17 which were complied. Due to change in forest area, proposal is being processed again.</p>  |
| 4            | LILO of Kanpur -Jhatikara 765 kV S/c line at Aligarh substation | Nil                     | Nil                      |                   | No forest area involved.  |
| <b>Total</b> |   | <b>1.052</b>            | <b>6.961</b>             |                   |   |

**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. 12 | 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; (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. 13 | Being complied.             |
| In the event irrigation supplies are disrupted and affected farmers experience losses, the Borrower shall ensure that a provision is made for independent valuation of the losses and timely compensation in respect thereof.  | LA, Sch. 5, para. 16 | Being complied.             |
| The Borrower shall make available necessary budgetary and human resources to fully implement the EMP, the CPTD and the RP.   | LA, Sch. 5, para. 17 | Being complied.             |
| The Borrower shall ensure that all bidding documents and contracts for works contain provisions that require contractors to:<br>(a) comply with the measures relevant to the contractor set forth in the IEE, the EMP, the CPTD and the RP (to the extent they concern impacts on affected people during Construction), and any corrective or preventative actions set forth in the Safeguards Monitoring Report;<br>(b) make available a budget for all such environmental and social measures;<br>(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 the RP; | LA, Sch. 5, para. 18 | Complied.                   |

|  |                             |   |
|--|-----------------------------|---|
| <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, the CPTD 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;</p> | <p>LA, Sch. 5, para. 19</p> | <p>Being complied.</p> <p>No such issues come across till date.</p>   |
| <p>(c) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP, the CPTD and the RP 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>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, the CPTD and the RP, as approved by ADB, have been complied with.</p>  | <p>LA, Sch. 5, para. 20</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 under the Project.</p>  | <p>LA, Sch. 5, para. 22</p> | <p>No such deviations reported so far.</p>  |

#### **SECTION: 4 COMPLIANCE STATUS WITH ENVIRONMENT MANAGEMENT AND MONITORING PLAN STIPULATED IN IEER 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**

| Project activity /stage  | Potential impact   | Proposed mitigation measure   | Parameter to be monitored   | Measurement & frequency   | Institutional responsibility | Implementation schedule  | Compliance Status   |
|--|--|---|---|---|------------------------------|--|---|
| <b>Pre-construction</b>  |  |   |   |   |                              |  |   |
| 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/ Being 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 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           |                              |  |   |
| Transmission line design   | Exposure to electromagnetic 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  |

| <b>Project activity /stage</b>   | <b>Potential impact</b>  | <b>Proposed mitigation measure</b>   | <b>Parameter to be monitored</b>  | <b>Measurement &amp; frequency</b>                         | <b>Institutional responsibility</b> | <b>Implementation schedule</b>                                       | <b>Compliance Status</b>  |
|--|--|--|---|--|-------------------------------------|--|---|
| 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/ Being Complied during survey. Route alignment criterion is part of survey contract.   |
|  | Social inequities  | Careful route selection to avoid existing settlements  | Tower location & line alignment selection (distance to nearest dwellings or social                      | 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  | 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/ Being Complied during survey. An area of 397.313 ha (57.58 Km) is falling within forest land in the states of Madhya Pradesh, Chhattisgarh, Uttar Pradesh and Haryana for 800 kV Champa-Kurukshetra line. Approx. 6.961 ha (1.052 km) is falling within forest land in state of Uttar Pradesh for lines under IRSSS (Part-B). However, the alignments do not encompass any National Parks/Sanctuaries or other protected / sensitive areas. |

| <b>Project activity /stage</b>       | <b>Potential impact</b>                | <b>Proposed mitigation measure</b>   | <b>Parameter to be monitored</b>   | <b>Measurement &amp; frequency</b>                              | <b>Institutional responsibility</b> | <b>Implementation schedule</b>                       | <b>Compliance Status</b>   |
|--------------------------------------|--|--|--|---|-------------------------------------|--|--|
| 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 protected or reserved forest) | Consultation with local authorities - once                      | POWERGRID                           | Part of detailed siting and alignment survey/design  | Complied/ Being Complied. Route alignment finalised by taking consideration of minimum impact on forest area after consultation with concerned authorities. Details of Forest Clearance status is provided in Table 1 & 1 A.                                   |
|                                      |  | Minimise the need by using existing towers, tall towers and RoW, wherever possible               |  | Consultation with local authorities and design engineers - once |                                     |  |  |
|                                      |  | 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/ Being 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 |  |



| Project activity /stage                                 | Potential impact                                 | Proposed mitigation measure   | Parameter to be monitored  | Measurement & frequency   | Institutional responsibility | Implementation schedule                                 | Compliance Status  |
|---|--|---|--|---|------------------------------|---|--|
|   |  |   | 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 undertaken at regular interval (maximum noise limit is 80 (dB)A as per technical specification for 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 clean-up 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.   |  |   |                              |   |  |

| Project activity /stage                 | Potential impact  | Proposed mitigation measure   | Parameter to be monitored   | Measurement & frequency   | Institutional responsibility   | Implementation schedule | Compliance Status  |
|---|---|---|---|---|--|-------------------------|--|
| <b>Construction</b>                     |   |   |   |   |  |                         |  |
| 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/ Being Complied<br><br>Low noise producing machineries/ equipments are being used.  |
| 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 as per Sec-II, 2.5)    | Construction period     | Construction on farm land undertaken mostly during post-harvest period. (Details of tree, crop compensation paid is provided separately in Social Monitoring Report) |
| 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 as per Sec-VIII, 44.7) | 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 possible.                               | 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.   |

| Project activity /stage               | Potential impact                                       | Proposed mitigation measure   | Parameter to be monitored  | Measurement & frequency  | Institutional responsibility  | Implementation schedule | Compliance Status   |
|---------------------------------------|--|---|--|--|---|-------------------------|---|
|                                       | 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/<br>Being Complied   |
| Temporary blockage of utilities       | Overflows, reduced discharge                           | Temporary placement of fill in drains/canals not permitted.   | Temporary fill placement (m <sup>3</sup> )   | Absence of fill in sensitive drainage areas - every 4 weeks                      | POWERGRID (Contractor through contract provisions as per Sec-II, 2.6)                   | Construction period     | Complied/<br>Being Complied   |
| 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 as per Sec-VIII, 43.5 & Sec. II, 2.6) | Construction period     | Proper clearance ensured through prior permission of concerned authority/owners.  |
| 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, | 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/<br>Being Complied   |

| Project activity /stage          | Potential impact                                      | Proposed mitigation measure  | Parameter to be monitored   | Measurement & frequency  | Institutional responsibility   | Implementation schedule | Compliance Status   |
|----------------------------------|---|--|---|--|--|-------------------------|---|
|                                  |   | 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.  |
| 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 as per Sec-II, 2.3)                  | Construction period     | No complaints received on illegal harvesting  |
| 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 <sup>3</sup> )  | 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/Being Complied. Approx. 159 m3 for A Type and 365 m3 for D Type tower earth is excavated at each tower location and 90-95% of this is used for refilling/ resurfacing and rest is being disposed 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 <sup>2</sup> )                                    | Amount of ground disturbance - every 4 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. 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 | Waste disposal  | Excess fill from tower foundation excavation disposed of next to roads   | Location and amount (m <sup>3</sup> )of fill disposal   | Appropriate fill disposal locations - every 2 weeks  | POWERGRID (Contractor through  | Construction period     | Complied/ Being Complied  |

| Project activity /stage                          | Potential impact                              | Proposed mitigation measure   | Parameter to be monitored   | Measurement & frequency  | Institutional responsibility  | Implementation schedule | Compliance Status   |
|--|---|---|---|--|---|-------------------------|---|
| surplus earthwork/fill                           |   | or around houses, in agreement with the local community or landowner  |   |  | contract provisions as per Sec-II, 2.6 & Sec-VIII, 43.5)                            |                         |   |
| 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.                                      |
| 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 as per Sec-VIII, 44.7)            | Construction period     | Construction activity 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     | 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 & | Construction period     | Being complied. No complaints received from local peoples/authorities |
|  |   | Ensure existing irrigation facilities are maintained in working condition   | Status of existing facilities   |  |   |                         |   |
|  |   | Protect /preserve topsoil and reinstate after construction completed  | Status of facilities (earthwork in m <sup>3</sup> )   |  |   |                         |   |

| Project activity /stage          | Potential impact                         | Proposed mitigation measure  | Parameter to be monitored   | Measurement & frequency  | Institutional responsibility   | Implementation schedule | Compliance Status  |
|----------------------------------|--|--|---|--|--|-------------------------|--|
|                                  |  | Repair /reinstate damaged bunds etc after construction completed               | Status of facilities (earthwork in m <sup>3</sup> )   |  | Sec-II, 2.7  |                         |  |
|                                  | 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   | Tried to minimise the loss. (Details of tree, crop compensation paid is provided separately 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 <sup>2</sup> ; amount of bunds constructed [length in meter, area in m <sup>2</sup> , or volume in m <sup>3</sup> ]) | Incorporating good design and construction management practices – once for each site | POWERGRID (Contractor through contract provisions as per Sec-II,2.8) | Construction period     | Complied/ Being Complied   |
|                                  |  | Limit site clearing to work areas  |   |  |  |                         |  |
|                                  |  | Regeneration of vegetation to stabilise works areas on completion (where       |   |  |  |                         |  |
|                                  |  | 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     | 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/ Being Complied   |

| Project activity /stage                  | Potential impact   | Proposed mitigation measure  | Parameter to be monitored   | Measurement & frequency  | Institutional responsibility   | Implementation schedule                  | Compliance Status   |
|--|--|--|---|--|--|--|---|
|  |  | 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 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 (for details of tree, crop compensation paid please refer Social Monitoring Report) |
| 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/ Being Complied  |
| Health and safety                        | Injury and sickness of workers and members of the public | Contract provisions specifying minimum requirements for construction camps<br>Contractor to prepare and implement a health and safety plan.<br>Contractor to arrange for health and safety training sessions | 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 per Sec-II, 2.2 (v,vii,viii) and also Safety precautions in spe. contract Condition 43.2) | Construction period                      | Complied with project specific safety plan and general conditions of contract, which covers all applicable regulations.   |
| 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 | Provides proper training and have very good environmental monitoring process.   |

| Project activity /stage  | Potential impact                          | Proposed mitigation measure   | Parameter to be monitored  | Measurement & frequency   | Institutional responsibility | Implementation schedule | Compliance Status   |
|--|---|---|--|---|------------------------------|-------------------------|---|
|  |   | Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental  | Respective contract checklists and remedial actions taken thereof.             | Submission of duly completed checklists of all contracts for each site - once |                              |                         | Appropriate clause incorporated in contract provision for EMP implementation. Site managers review the implementation on daily basis.               |
|  |   | Appropriate contact clauses to ensure satisfactory implementation of contractual environmental  | Compliance report related to environmental aspects for the contract            | Submission of duly completed compliance report for each contract - once       |                              |                         |   |
| <b>Operation and Maintenance</b>   |   |   |  |   |                              |                         |   |
| 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.                                | 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   |
| 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    | In design and operation, standards of safety procedure followed. Proper safety training to all workers and primary safety kits/PPEs are provided in |



| Project activity /stage                                      | Potential impact                                  | Proposed mitigation measure   | Parameter to be monitored  | Measurement & frequency   | Institutional responsibility | Implementation schedule | Compliance Status  |
|--|---|---|--|---|------------------------------|-------------------------|--|
|  |   | Safety awareness raising for staff.   | Training/awareness programs and mock drills                                    | Number of programs and percent of staff /workers covered – once each year |                              |                         | every site. Regular mock drills on fire and other occupational hazards will be organised.          |
|  |   | 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                     |                              |                         |  |
| 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 technology in crisis – once a month    | POWERGRID                    | Design and Operation    | Will be complied. Used of technology which trip the line in fraction of seconds to prevent hazards |
|  |   | Security fences around substations  | Maintenance of fences  | Report on maintenance – every 2 weeks                                     |                              |                         | Security fences will be maintained at every substation.  |
|  |   | Barriers to prevent climbing on/dismantling of transmission towers  | Maintenance of barriers  |   |                              |                         | Sufficient barriers will be maintained   |
|  |   | Appropriate warning signs on facilities   | Maintenance of warning signs   |   |                              |                         | Warning system will be maintained for alarm  |
|  |   | 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  |                              |                         | Regular mock drills on electric and other occupational hazard will be organised                    |
| 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               | 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  |
|--|--|--|--|---|------------------------------|-------------------------|--|
|  |  | 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               | Training will be imparted regular interval   |
| 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                    | Operations              | Will be complied   |
| 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                    | Operations              | Designed as per guidelines of ICNIRP and ACGIH and checked by CPR1 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              | Will be complied   |

**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

| <b>Environmental Monitoring Tasks</b>  | <b>Implementation Responsibility</b>                     | <b>Implementation Schedule</b>   |
|--|--|--|
| <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 58.62 km which is only 3.30 % of total line length of 1773 km Bipole line. Besides this environmental sensitive/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 is not anticipated.

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 subprojects.

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

POWERGRID has a well establish Grievance Redressal Mechanism (GRM) inbuilt in the process itself to receive complaints and grievances to facilitate concerns of project affected persons (PAPs). 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 have been received till date. However, Grievance Redressal Committee (GRC) has been constituted with representatives from POWERGRID, Revenue authorities, PAPs and Gram Panchayat in case of Champa terminal station. Details of which are elaborated in Social Safeguard Monitoring Report.

#### **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 404.27ha. (only 3.30%) of forest 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,

use of metallic return in HVDC system instead of earth electrode stations resulting in further reduction in requirement of precious land and enhanced safety due to reduced risk of exposure to electro-magnetic field. 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.



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