

SECTION I: PROJECT DESCRIPTION

1.1 Background

Northern Region has been witnessing a rapidly growing power demand. Present power demand of Northern Region has already gone up to 38979 MW and as per the 17th Electric Power survey, the demand of power of Northern Region would increase to 48137 MW and 66583 MW by 2011-12 and 2016-17 respectively. Presently, power deficit of the order of 6940 MW has been witnessed in Northern Region. To mitigate the shortages in Northern Region, a large quantum of import of power from other regions have been envisaged. To absorb & transfer power, various transmission schemes have been undertaken. However, transmission planning is a continuous process based on demand/supply scenario and operational experience to fill the missing links. Accordingly, for reliable transfer of power to various load centers, Northern Region System Strengthening Scheme-XXIV has been planned.

Eastern Part of Northern Region has large Generation complexes like Singrauli, Rihand, Anpara, Obra etc. With major load centres located in Western part of Northern Region, power in general flows from Eastern to Western part of Northern Region. Further, with new generations in Eastern part of Northern Grid and increased import from Eastern Region, the quantum of power flow over East –West corridor is expected to increase.

Presently for transfer of power to Punjab, Haryana and Jammu & Kashmir, most of the lines are routed via NCR area. The NCR area witnesses both heavy pollution and foggy condition especially during winter. Cascaded tripping of many lines in this area has been witnessed in the past.

Considering this, an additional transmission corridor for transfer of power from Eastern part of NR to Haryana in Western part, via Bareilly-Kashipur-Roorkee-Sahranpur-Dehradun corridor has been planned and is being implemented under different scheme. 400 kV D/C (Quad) line under the subject project would connect Dehradun to Abdullapur (in Haryana) and would improve system reliability of NR, particularly during foggy conditions.

Power Grid Corporation of India Ltd. (POWERGRID) has prepared the Final Environment Assessment Report for Dehradun - Abdullapur 400 kV D/C (quad) line under Northern Region System Strengthening Scheme-XXIV being implemented with funding assistance from The World Bank under PSDP-V loan. The present report describes the environmental issues/affects that have been encountered or may arise due to setting up this project in state of Uttar Pradesh, Haryana & Uttarakhand and various mitigation measures are being taken care of by POWERGRID during construction and maintenance stages.

1.2 Project Highlights

a)	Project	:	Northern Region System Strengthening Scheme-XXIV
b)	Location of the Project	:	Northern Region
c)	Beneficiary States	:	Northern Region Constituents
d)	Project Cost	:	Rs.704.56 Crores at 2 nd Quarter 2010 Price Level (including IDC of Rs.44.99 Crores)

1.3 Project Scope

The complete scope of the transmission lines and Substations to be implemented under the above scheme is as follows:

Transmission Lines

1. Dehradun - Abdullapur 400kV D/C (Quad) Line
2. Dulhasti – Kishenpur 400 kV D/c (Quad) Line.

Substation

1. Dehradun 400/220 kV (POWERGRID) Substation - (Extension)
2. Abdullapur 400/220 kV (POWERGRID) Substation - (Extension)
3. Kishenpur 400/220 kV (POWERGRID) Substation - (Extension)
4. Ballia 400/220 kV (POWERGRID) Substation (Extension)

However, only Dehradun-Abdullapur 400 kV D/C (quad) line (excluding associated bays) is funded under The World Bank financing. Remaining scope of works are being implemented through domestic funding.

This Report deals with Dehradun - Abdullapur 400 kV D/C (quad) line which is under The World Bank funding.

1.4 Objective of the Project

The objective of the system is to:

- Provide adequate transmission system for reliable transfer of power from Eastern part of Northern region to Western part of Northern region.
- Improve system reliability of Northern region under all operating conditions by providing an alternate path (other than NCR).
- Increase power transmission capacity of National Grid.

1.5 Beneficiaries

The target beneficiaries of this project are the constituent states of Northern Region. It will help to maintain system stability, security of the combined grid under all operating conditions. The system will also increase the capacity of National Grid. A power map showing the Northern Region System Strengthening XXIV (NRSS XXIV) is placed as **Exhibit-1**.

SECTION II: BASE LINE DATA

2.0 The project is an inter-state one and is spread / located in the States of Uttarakhand, Uttar Pradesh & Haryana the basic details of the area under project are given below:

2.1 Uttarakhand

The State of Uttarakhand is situated in the northern part of India shares international boundary with China in the north and Nepal in the east. It has an area of 53,483 sq.km and lies between latitude 28° 43'N-31° 28' N and longitude 77°34' and 81°03'E.

Physiographically, the State can be divided into three regions:

- (i) The Himalayas
- (ii) The Shiwaliks
- (iii) The Terrain region.

The land use pattern of the state is given in following table:

Land use	Area in ' 000 ha	Percentage
Total Geographical area	5,843	
Reporting Area for land utilization	5673	100
Forests	3486	61.45
Not available for cultivation	441	7.77
Permanent Pasture & Grazing land	199	3.51
Land under misc. tree crops & groves	384	6.77
Culturable waste land	303	5.34
Fallow land other than current fallows	71	1.25
Current fallows	75	0.62
Net area Sown	754	13.29

Source: Land use statistics, Ministry of Agriculture, GOI, 2008-09

Population

As per Census 2011, the population of the state is 10.12 million which constitutes 0.84% of the country's population. Rural population constitutes 69.45% and urban population 30.55%. The population density is 189 persons per sq.km. The livestock population of the state as per Livestock Census 2007 is 5.14 million.

Climate

The climate of Uttarakhand is temperate, marked by seasonal variations in temperature but also affected by tropical monsoons. January is the coldest month, with daily high temperature averaging below freezing in the north and near 70 °F (21 °C) in the southeast. In the north, July is the hottest month, with temperatures typically rising from the mid-40 °F to about 70 °F daily. In the southeast, May is the warmest month, with daily temperatures normally reaching the low 100s°F (about 38 °C) from a low around 80 °F (27 °C). Most of the state's roughly 60 inches (1,500 mm) of annual precipitation is brought by the southwest monsoon, which blows from July through September. Floods and landslides are problems during the rainy season in the lower stretches of the valleys. In the northern parts of the state, 10 to 15 feet (3 to 5 meters) of snowfall is common between December and March.

Rainfall

The average annual rainfall is 1,550 mm.

Soil

Uttarakhand has various types of soil, all of which are susceptible to soil erosion. In the north, the soil ranges from gravel (debris from glaciers) to stiff clay. Brown forest soil often shallow, gravelly, and rich in organic content is found farther to the south. The Bhabar area is characterized by soils that are coarse-textured, sandy to gravelly, highly porous, and largely infertile. In the extreme southeastern part of the state, the Tarai soils are mostly rich, clayey loams, mixed to varying degrees with fine sand and humus; they are well suited to the cultivation of rice and sugarcane.

Mineral Resources

Uttarakhand lacks mineral and energy resources sufficient for rapid industrialization. Aside from silica and limestone, which are the only minerals that are found and mined in considerable quantities, there are small reserves of gypsum, magnesite, phosphorite, and bauxite.

Water Resources

The two main rivers of India have their source in Uttaranchal. Ganga and Yamuna have many tributaries which flow through the mountainous terrains of Uttaranchal and then enter to Delhi and Uttar Pradesh. The waters of these rivers are very pure and is said to have medicinal properties.

Rivers in Uttaranchal are associated with the lives of people; they represent high ascetic value with great cultural significance. Various dams have been constructed on these rivers that provide electricity to the whole state and even to the neighboring states. The state has the capability to generate many mega watts of power.

Ecological Resources

The recorded forest area of the state is 34,651 sq.km. which constitutes 64.79% of its geographical area. Reserved Forests constitute 71.11%, Protected Forests 28.52% and Unclassed Forests constitute 0.35% of the total forest area. **Forest map of Uttarakhand is enclosed as Map-1.**

Protected Areas

The state has 6 National Parks, 6 Wildlife Sanctuaries and 2 Conservation Reserves covering a cumulative area of 7,376 sq.km. which constitutes 13.79% of its geographical area. The famous Corbett Tiger Reserve is located in the state covering an area of 0.13 million ha. Nanda Devi Biosphere Reserve with an area of 0.59 million ha is also located in this state.

The **400 KV D/C Dehradun-Abdullapur transmission line** passes through Dehradun district of Uttarakhand. The details of forest cover of all above mentioned district are as follows:

District	Geographic area (Sq. Km.)	Assessment (Sq.Km.)			Total	% of G.A
		Very dense forest	Moderate dense forest	Open forest		
Dehradun	3088	583	695	332	1610	52.14

Forest Survey Report 2013

Human and Economic Development

Uttarakhand economy mainly relies on tourism industry. Uttarakhand, being situated on the foothills of Himalayas, comprises of numerous hill stations which attract tourists from all across the

globe thereby bringing money to the state.

The next most important contributor to the economy of Uttarakhand is the agricultural sector. Cereals, pulses, oil seeds, sugar cane and onion are the major crops grown here.

2.2 Uttar Pradesh (UP)

Uttar Pradesh, the most populous state of the country, has a geographical area of 2,40,928 sq.km which constitutes 7.3% of the total area of the country. It shares border with nine states as well as international border with Nepal. Uttar Pradesh is situated between 23°52' N -30°24' N latitude and 77°05'E - 84°38'E longitude.

The state can be divided into two physiographic zones:

- Vast Gangetic Plains having highly fertile alluvial soil
- Smaller Southern Hill Plateau.

The land use pattern of the state is given in following table:

Land use	Area in ' 000 ha	Percentage
Total Geographical area	24,093	
Reporting Area for land utilization	24,170	100.00
Forests	1,658	6.86
Not available for land cultivation	3,268	13.52
Permanent Pasture & other Grazing land	65	0.27
Land under misc. tree crops & groves	374	1.55
Culturable waste land	440	1.82
Fallow land other than current fallows	540	2.23
Current fallows	1,408	5.83
Net area Sown	16,417	67.92

Source: Land use statistics, Ministry of Agriculture, GOI, 2008-09

Population

Population of the state is 199.58 million (Census 2011) constituting 16.49% of country's population. Rural and Urban population is 77.72% and 22.28% respectively. Population density is 828 persons per sq.km. The livestock population of the state is 60.27 million (Livestock Census 2007).

Climate

The climate in Uttar Pradesh varies substantially. The Gangetic plain, which covers three-quarters of the state, is dry and dusty in summer. But, during the monsoons between June and September, it is transformed into carpets of lush green fields. The monsoons also spell disaster for some regions, when the Ganga and its tributaries overflow their banks and flood large tracts of land.

Winter is severe, the Gangetic plains are fairly cold with temperatures coming down as low as 3°C though average temperatures remain around a pleasant 18°C. Summers are extremely hot in the plains with maximum temperature reaching as high as 45°C. The intensity of the summer months is

magnified by the hot winds called 'loo' that blows across the plains in May and June, the hottest months of the year.

Rainfall

The average annual rainfall varies from 1,000 to 1,200 mm.

Soil

Transmission lines are passing through Indo-Gangetic plains. Predominant soil in the area is alluvial soil.

Water resources

The main rivers of the state from west to east are the Yamuna, Ganga, Ramganga, Gomati and Ghaghara. All the rivers, except the Gomati, emerge from the Himalayas. The Yamuna and the Ganga flow from north-east to south-west in their upper mountainous courses, from north to the south in western parts of the state and thereafter from north-west to south-east joining at Allahabad.

Mineral Resources

The state is poor in mineral resources. Only considerable deposits are of limestone, red sandstone in Mirzapur, Dolomite occurs in small quantities in Banda and Varanasi. Pyrophyllite and diaspore in Jhansi and Hamirpur districts. Coal is available in Sonebhadra.

Ecological Resources

The recorded forest area of the state is 16,583 sq.km. which is 6.88% of its geographical area. Reserved Forests constitute 70.31%, Protected Forests 8.56% and Unclassed Forests 21.12%. **Refer Map-2 for Forest map of Uttar Pradesh.**

Protected Area

Uttar Pradesh has one National Park and 23 Wildlife Sanctuaries covering 5,712 sq.km. which constitutes 2.37% of the state's geographical area. The oldest Wild Life Sanctuary of the country, the Chandraprabha Wild Life Sanctuary is located in Uttar Pradesh. Uttar Pradesh has one Tiger Reserve namely, Dudhwa Katarniaghat (extension) which is also famous for Swamp Deer and Rhinoceros.

Forest Cover

The forest cover in the state, based on interpretation of satellite data of October 2008 to January 2009, is 14,338 sq.km. which is 5.95% of the state's geographical area. In terms of forest canopy density classes, the state has 1,626 sq.km. area under very dense forest, 4,559 sq.km. area under moderately dense forest and 8,153 sq.km. area under open forest.

The state has 27 forest types which belong to five forest type groups, viz. Tropical Semi Evergreen, Tropical Moist Deciduous, Littoral & Swamp, Tropical Dry Deciduous and Tropical Thorn Forests.

400 KV D/C Dehradun-Abdullapur transmission line is passing through Saharanpur district of Uttar Pradesh. The detail of forest is given in following table:

District	Geographic area (Sq. Km.)	Assessment (Sq.Km.)				% of G.A
		Very dense forest	Mod. dense forest	Open forest	Total	
Saharanpur	3689	0	175	200	375	10.17

Forest Survey Report 2013

Human and Economic Development

Uttar Pradesh is the most populous state in the country. It is the fourth largest state in geographical area (2,40,928 sq.km.)

Economy

Uttar Pradesh is rich in human and natural resources. Most of State's farm land is well watered and naturally fertile U.P is the largest producer of food grains and oilseeds in the country. It leads all the states in India in the production of wheat, maize, barley, gram, sugarcane and potatoes. Wheat, rice, sugar cane, pulses, oil seeds and potatoes are its main products. Sugar cane is an important cash crop almost throughout the state and sugar mills and other cane crushers who produce Gur and Khandsari are common throughout the state. Uttar Pradesh is an important state as far as horticulture is concerned.

Industries

There are different types of minerals and several industries have come up based on the minerals. There are cement plants in the Mirzapur area in the Vindhya region, a bauxite based aluminum plant in the Banda area, Coal deposits are found in the Singrauli area. The industries include a large printing establishment units engaged in manufacturing of scales, locks, letter boxes, furniture, badges and belts, leather goods, scissors etc. Handloom, carpet, glass, electrical goods, electroplating, building material industries are also found in this State.

2.3 Haryana

The state of Haryana, with a geographical area of 44,212 sq.km, lies between 27°39' N -30°55' N latitude and 74°27'E - 77°36' E longitude. Physiographically, the state is divided into three zones, viz. the Shiwaliks, the Aravalli hills and the Indo-Gangetic plains. The land use pattern of the state is given below:

Land use	Area in '000 ha	Percentage
Total geographical area	4,421	
Reporting area for land utilization	4,371	100.00
Forests	40	0.92
Not available for cultivation	573	13.11
Permanent pasture and other grazing lands	30	0.69
Land under misc. tree crops & groves	12	0.28
Culturable wasteland	29	0.67
Fallow land other than current fallows	05	0.12
Current fallows	105	2.40
Net area sown	3,576	81.81

Source: Land use statistics, Ministry of Agriculture, GOI, 2008-09

Population

The population of the state is 25.35 million (*Census 2011*) which constitutes 2.09% of the country's population. Of this, rural population is 65.21% and urban population 34.79%. The population

density is 573 persons per sq.km. The livestock population is 8.86 million (*Livestock Census 2007*).

Climate

The climate of Haryana varies too much. It is cold in winter. In the beginning of summer the climate is dry, but when rains set in it is moist in the extreme.

Rainfall

The rainfall varies from 213 mm in south-west to 1,400 mm in the north-east.

Temperature

The annual mean temperature varies between 22.5°C to 25°C.

Mineral Resources

The main minerals of Haryana are slate stone, lime stone, gypsum, China clay, Marble, Sulphur.

Water Resources

The rivers which flows through Haryana is the Ghaggar, which passes through the northern fringes of the state. Haryana is a beneficiary of the multi-purpose project on Satluj with Beas, where it shares benefit with Punjab and Rajasthan. Major irrigation projects are Western Yamuna Canal, Bhakra Canal System and Gurgaon Canal. The state has completed Jui Loharu and Sewani lift irrigation schemes.

Ecological Resources

The recorded forest area is 1,559 sq.km. which is 3.53% of the geographical area of the state. Reserved Forests constitute 15.97%, Protected Forests 74.28% and Unclassed Forests 9.75%.

Forest map of Haryana is enclosed as Map-3.

Three types of forest are recorded in the State.

- Tropical Dry Deciduous in the eastern part
- Tropical Moist Deciduous in the Shiwalik region
- Tropical Thorn Forests in the western part of the state.

The **400 KV Dehradun-Abdullapur** line passes through following Yamuna Nagar Distt of Haryana. Details of forest cover of these districts are as follows.

District	Geographic area (Sq. Km.)	Assessment (Sq.Km.)				% of G.A
		Very dense forest	Mod. dense forest	Open forest	Total	
Yamuna Nagar	1768	21	86	82	189	10.69

Source: Forest survey report 2013

Protected Areas

An area of 303.92 sq.km. is being managed as protected area under two National Parks (i.e. Kalesar National Park and Sultanpur National Park) and 8 Wildlife Sanctuaries. This constitutes 0.69% of the state's geographical area.

Human and Economic Development

Haryana has become India's fastest growing state, offering its citizens the third highest per capita income. Agricultural development in Haryana has been tremendous. Per capita per day availability of milk is 579 grams against the Indian average of 180 grams.

The major industries are cement, sugar, paper, cotton, textiles, glassware, brassware, cycles, tractors (largest production in the country), motorcycles, timepieces, automobile tyres and tubes, sanitary ware, television sets, steel tubes, hand tools, cotton yarn, refrigerators, vanaspati, ghee and canvas shoes. A factory of the Hindustan Machine Tools producing tractors is located at Pinjore.

Haryana produces the largest number of tractors in the country. It is well known for its handloom products. Panipat has earned the reputation of being the "weaver's city" of India for its exquisite hand-tufted woolen carpets and colorful handloom products.

SECTION III: POLICY, LEGAL & REGULATORY FRAMEWORK

POWERGRID's activities by their inherent nature and flexibility have negligible impacts on environmental and social attributes. Indian laws relating to environmental and social issues have strengthened in the last decade both due to local needs and international commitments. POWERGRID undertakes its activities within the purview of Indian laws keeping in mind appropriate international obligations and directives and guidelines with respect to environmental and social considerations of Funding Agencies.

3.1 ENVIRONMENTAL

3.1.1 Constitutional Provisions

Subsequent to the first United Nations Conference on Human Environment at Stockholm in June, 1972, which emphasized the need to preserve and protect the natural environment, the Constitution of India was amended through the historical 42nd Amendment Act, 1976 by inserting Article 48-A and 51-A (g) for protection and promotion of the environment under the Directive Principles of State Policy and the Fundamental Duties respectively. The amendment, *inter alia* provide:

"The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country". [New Article 48A]

"It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". [New Article 51A (g)]

Article 21 of the constitution provides, "no person shall be deprived of his life or personal liberty except according to procedure established by law".

Article 21 is the heart of the fundamental rights and has received expanded meaning from time to time after the decision of the Supreme Court in 1978. The Article 21 guarantees fundamental right to life – a life of dignity to be lived in a proper environment, free of danger of disease and infection. The right to live in a healthy environment, as part of the Article 21 of the Constitution. Recently, Supreme Court has broadly and liberally interpreted the Article 21, transgressed into the area of protection of environment, and held that the protection of environment and citizen's right to live in eco-friendly atmosphere interpreted as the basic right guaranteed under Article 21.

Thus the Indian Constitution has now two fold provision:

- (a) On the one hand, it gives directive to the State for the protection and improvement of environment.
- (b) On the other hand the citizens owe a constitutional duty to protect and improve natural environment.

3.1.2 MANDATORY REQUIREMENTS (NATIONAL)

- **MOP order/sanction under The Electricity Act, 2003**

Sanction of MOP, GOI is a mandatory requirement for taking up any new transmission project under the section 68(1) of The Electricity Act, 2003. The sanction authorize POWERGRID to plan and coordinate activities to commission the new projects. Electricity act does not explicitly deal with environmental implications of activities related to power transmission. However, POWERGRID always integrates environmental protection within its project activities.

- **Forest Clearance Under The Forest (Conservation) Act, 1980**

When transmission projects pass through forest land, clearance has to be obtained from relevant authorities under the Forest (Conservation) Act, 1980. This Act was enacted to prevent rapid deforestation and environmental degradation. State governments cannot de-reserve any forest land or authorize its use for any non-forest purposes without approval from the Central Government. POWERGRID projects, when involving forest areas, undergo detailed review and approval procedures to obtain a Forest Clearance certificate from Ministry of Environment and Forests (MOEF), Government of India before starting any construction activity in designated forest area.

- **Environmental Clearances under Environment (Protection) Act, 1986**

Since transmission line projects are environmentally clean and do not involve any disposal of solid waste, effluents and hazardous substances in land, air and water they are kept out of the purview of Environment (Protection) Act, 1986. However, the recent amendment in the Environment (Protection) Act, 1986 made it necessary to obtain clearance from MOEF for power transmission projects in three districts in the Aravalis (*viz.*, Alwar in Rajasthan and Gurgaon/ Nuh-Mewat in Haryana). The Aravali range, in these areas, is heavily degraded; hence, any industrial activity there becomes critical. Environment Impact Notification, 2006 lays down specific project categories that require clearance from MOEF, Power transmission projects are not included in this list.

- **Batteries (Management and Handling) Rules, 2001**

MOEF vide its notification dt. 16th May, 2001 under the section of 6, 8 and 25 of the Environment (Protection) Act, 1986 has put certain restriction on disposal of used batteries and its handling. As per the notification it is the responsibility of bulk consumer (POWERGRID) to ensure that used batteries are not disposed off, in any manner, other than by depositing with the dealer/manufacturer/registered recycler/importer/re-conditioner or at the designated collection centers – and to file half yearly return in prescribed form to the concerned State Pollution Control Board.

- **The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008**

MOEF vide its notification dt. 20th May, 1986 under the section of 6, 8 and 25 of the Environment (Protection) Act, 1986 has put used mineral oil under the category of hazardous waste which require proper handling and disposal. As per the notification, all used oil is to be auctioned / sold to registered recyclers only and file annual return on prescribed form to the concerned State Pollution Control Board.

- **Ozone Depleting Substances (Regulation and Control) Rules, 2000**

MOEF vide its notification dt. 17th July, 2000 under the section of 6, 8 and 25 of the Environment (Protection) Act, 1986 has notified rules for regulation/control of Ozone Depleting Substances under Montreal Protocol adopted on 16th September 1987. As per the notification certain control and regulation has been imposed on manufacturing, import, export and use of these compound. POWERGRID is following provisions of notification and is phasing out all equipment which uses these substances and planning to achieve CFC free organization in near future.

- **The Biological Diversity Act, 2002**

Under the United Nations Convention on Biological Diversity signed at Rio de Janeiro on the 5th day of June, 1992 of which India is also a party, MOEF has enacted the Biological Diversity Act, 2002 to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith. As per the provision of act certain area which are rich in biodiversity and encompasses unique and representative ecosystems are identified and designated as Biosphere Reserve to facilitate its conservation. All restrictions applicable to protected areas like National Park & Sanctuaries are also applicable to these reserves. POWERGRID will abide by the provision of act wherever applicable and try to totally avoid these biosphere reserves while finalizing the route alignment.

3.1.3 FUNDING AGENCIES

WB Operational Policies (OP) 4.01/ **ADB's** Operations Manuals (OM) - F1/BP and **JBIC** Environmental Guidelines: These outlines funding agencies policy and procedures for environmental assessment (EA) of different developmental projects. All these guidelines classified developmental projects into three categories (A-C) based on its possible environmental and social impacts though WB & ADB has another category F1 applicable only to projects involving a credit line through a financial intermediary.

Transmission line projects are categorized as category-B project having limited impact that can be further minimized through mitigative/management measures and would normally require only an environmental review. POWERGRID takes remedial measures to prevent, minimize, mitigate, or compensate for adverse impact and improve environmental performance. Environment Assessment will take into account the natural environment, human health and safety, social aspects and trans-boundary and global environmental aspects. During EA process public is also informed at every stage of project execution and their views are considered during decision-making process.

3.1.4 PRESCRIPTIVE FRAMEWORK (NATIONAL)

- Applicable Legislations

3.1.5 RELEVANT POLICIES

- National Conservation Strategy and Policy Statement on Environment and Development, 1992
- Policy statement for Abatement of pollution, 1992
- National Environment Policy, 2006

3.2 SOCIAL

3.2.1 Constitutional Provisions

Constitutional provisions in regard to social safeguards are well enshrined in the preamble such as **JUSTICE**, social, economic and political; **LIBERTY** of thought, expression, belief, faith and worship; **EQUALITY** of status and of opportunity; **FRATERNITY** assuring the dignity of the individual and the unity and integrity of the Nation. Fundamental Rights and Directive Principles guarantee the right to life and liberty. Health, safety and livelihood have been interpreted as part of this larger right. Social safeguards provisions are dealt in detail in different Articles such as Article-

14, 15 17, 23, 24, 25, 46, 330, 332 etc. POWERGRID, through this document, ESPP, commits itself to implementing the said constitutional provision in true spirit to fulfill its environmental and social obligations and responsibilities.

3.2.2 MANDATORY REQUIREMENTS (NATIONAL)

- **National Rehabilitation and Resettlement Policy, 2007**

The Ministry of Rural Development, GoI, has notified “The National Rehabilitation, and Resettlement Policy” in October 2007 applicable to all development projects involving displacement of 400 or more families en masse in plain areas or 200 or more families en masse in hilly areas. It essentially addresses the rehabilitation of Project Affected Families (PAFs) and provides a broad canvas for an effective consultation between PAFs and the project authorities. It has also listed R&R measures and entitlements for different category of PAFs. Though the national policy as such, is not applicable to POWERGRID because transmission projects do not involve displacement of such a large number of families, since land required for substations is quite small. However, the entitlement benefits listed in the national policy for PAFs have been adopted by POWERGRID in its “Social Entitlement Framework” that is being implemented wherever land acquisition for substations is undertaken.

- **Right of Way (RoW) And Compensation Under Electricity Act, 2003**

The act has a provision for notifying transmission company under section 164 (B) to avail benefits of eminent domain provided under the Indian Telegraph Act, 1885. MOP, GOI vide gazette notification dt 23.12.2003 had already notified POWERGRID under this section of said act. Therefore, for the purpose of placing of any wires, poles, etc., POWERGRID has all the powers that the telegraph authority possesses. Thus, POWERGRID can erect and construct towers without actually acquiring the land. However, all damages due to POWERGRID activity are compensated at market rate. Power transmission schemes are always planned in such a way that the power of eminent domain is exercised responsibly.

- **Provisions under The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013**

When land is acquired for sub-stations, POWERGRID will follow procedures laid down under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. POWERGRID sub-stations have never resulted in large scale displacement or loss of livelihoods. There have been only marginal impacts due to flexibility exercised by POWERGRID in selecting sites. The LA Act specifies that in all cases of land acquisition, no award of land can be made by the government authorities unless all compensation has been paid.

3.2.3 FUNDING AGENCIES

For POWERGRID, mandatory requirements *vis-à-vis* Funding Agencies is comprehensive Resettlement and Rehabilitation (R&R) guidelines and an entitlement framework as per World Bank Operational Directives 4.30 (O.P.4.12) and O.P.4.10 and ADB’s Operations Manual OM-F2/BP.

- **World Bank OD 4.30 (OP-4.12): Involuntary Resettlement**

This directive describes Bank Policy and procedures on involuntary resettlement as well as

conditions that borrowers are expected to meet during operations involving resettlement of affected groups. It requires an entitlement framework aimed at restoration, replacement and participation of affected groups. A detailed social assessment and development of an action plan having list of measures for betterment/restoration of lost assets/income is required to be submitted to bank before start of project work. However where only a few people (e.g. about 100-200 individuals) are to be relocated at a particular location, appropriate compensation for assets, logistical support for moving and a relocation grant may be the only requirements but the principle on which compensation is to be based will remain same as for larger groups.

- **World Bank OP 4.10: Indigenous People (IP)**

This directive describes World Bank policies and procedures for projects that affect indigenous people. The objective is to ensure that development benefits are socially and culturally compatible and that the IPs are consulted. Thus, the Indigenous People Development Plan/Tribal Development Plan is to be prepared as a prerequisite. POWERGRID will not only incorporate the IP component whenever necessary, but will also pay attention to marginalized groups such as women, children, etc.

- **ADB Operations Manual –F2/BP: Involuntary Resettlement**

The OP describes Bank Policy and procedures on involuntary resettlement as well as conditions that borrowers are expected to meet during operations involving resettlement. Its objective is to avoid such resettlement as far as possible if unavoidable measures like assistance to affected persons for restoration of their assets/livelihood as would have been in the absence of project. It also classified project into three categories like category-A where resettlement is significant and involve physical displacement of more than 200 persons, which require a detailed resettlement plan. Category B is that where resettlement is not that significant and requires a short resettlement plan. Category-C is that where no resettlement of people is foreseen and neither requires resettlement plan nor a resettlement framework.

POWERGRID emphasizes that displacement is not an issue with transmission projects because land below tower/line is not acquired and only a small piece of land is required for substations. However, all affected persons/families shall be provided compensation and Rehabilitation Assistance (RA) along with other measures as per POWERGRID's social entitlement framework which is based on these directives/manuals and National R&R Policy to restore income/livelihood of all affected persons.

3.2.4 PRESCRIPTIVE FRAMEWORK (NATIONAL)

- National and State-wide Laws and Policies Relating to Land Acquisition and Issues of R&R
- *Maharashtra Project Affected persons Rehabilitation Act, 1986.*

3.2.5 RELEVANT POLICIES

- Resettlement and Rehabilitation Policy - Coal India Ltd., May,2008
- Resettlement and Rehabilitation Policy - NHPC Ltd., 2007
- Policy for Rehabilitation and Resettlement of Land Owners – Land Acquisition Oustees – Haryana State, December,2007;
- The Orissa Resettlement and Rehabilitation Policy, Orissa, May, 2006;
- Resettlement and Rehabilitation Policy – NTPC Ltd., June, 2005.

SECTION-IV: MAJOR FEATURES OF FINAL ROUTE & ENVIRONMENTAL IMPACT

4.1 ROUTE SELECTION

Environmental impact of transmission line projects are not significant and are mostly localized to Right of Way (ROW). However, transmission line project has some affects on natural and socio-culture resources. These impacts can be minimized by careful route selection. To minimize these possible impact POWERGRID at the system planning stage itself try to avoid ecological sensitive areas like forest/ Wildlife Sanctuaries/ National Parks etc. Wherever such infringements are substantial, different alternative options are considered to select most viable route alignment. For further optimization of route modern survey techniques/tools like Total Stations are also applied. In the instant projects also these techniques have been used for studied of 3 alternatives route. Details of three alternative routes and detailed suvey are enclosed as **Annexure-I**. Moreover, availability of various details, constraints like topographical and geotechnical details, forest and environmental details etc. help in planning the effective mitigative measures including engineering variations depending upon the site situation/location. The route/ site selection criteria followed by POWERGRID is detailed below

Environmental Criteria for Route Selection

POWERGRID's route selection criteria are based on the principle of

- ***Avoidance***
- ***Minimization***
- ***Mitigation***

Environmental Criteria for Route Selection

For selection of optimum route, the following points are taken into consideration

- (i) The route of the proposed transmission lines does not involve any human rehabilitation.
- (ii) Any monument of cultural or historical importance is not affected by the route of the transmission line.
- (iii) The proposed route of transmission line does not create any threat to the survival of any community with special reference to Tribal Community.
- (iv) The proposed route of transmission line does not affect any public utility services like playgrounds, schools, other establishments etc.
- (v) The line route does not pass through any sanctuaries, National Park etc.
- (vi) The line route does not infringe with area of natural resources.

In order to achieve this, POWERGRID undertakes route selection for individual transmission lines in close consultation with representatives from the Ministry of Environment and Forests and the Department of Revenue. Although under National law POWERGRID has the right of eminent domain, yet alternative alignments are considered keeping in mind the above-mentioned factors during site selection, ***with minor alterations often added to avoid environmentally sensitive areas and settlements at execution stage.***

- As a rule, alignments are generally cited 10-15 km away from major towns, whenever possible, to account for future urban expansion (refer final route map).
- Similarly, forests are avoided to the extent possible, and when it is not possible, a route is selected in consultation with the local Divisional Forest Officer, that causes minimum damage to existing forest resources.

- Alignments are selected to avoid wetlands and unstable areas for both financial and environmental reasons.

In addition, care is also taken to avoid National parks and sanctuaries and any other forest area rich in wild life. Keeping above in mind the routes of line under this transmission system have been so aligned that it takes care of above factors.

Similarly the TOR for detailed survey using modern tool like Total Stations also contained parameters to avoid/reduce environmental impact while deciding the final route alignment. The major objectives for detailed survey are summarized below:

- (i) *The alignment of transmission line shall be most economical from the point of view of construction and maintenance.*
- (ii) ***Routing of transmission line through protected and reserved forest area should be avoided. In case it is not possible to avoid the forest or areas having large trees completely then keeping in view of the overall economy, the route should be aligned in such a way that cutting of trees is minimum.***
- (iii) ***The route should have minimum crossing of major rivers, railway lines, and national/state high ways, overhead EHP power lines and communication lines.***
- (iv) *The number of angle point shall be kept to a minimum.*
- (v) *The distance between the terminal points specified shall be kept shortest possible, consistent with the terrain that is encountered.*
- (vi) ***Marshy and low line areas, river beds and earth slip zones shall be avoided to minimum risk to the foundations.***
- (vii) *It would be preferable to utilize level ground for the alignment.*
- (viii) *Crossing of power line shall be minimal. Alignment will be kept at a minimum distance of 300 meters from power lines to avoid induction problems on the lower voltage lines.*
- (ix) *Crossings of communication lines shall be minimized and it shall be preferably at right angle, proximity and paralyses with telecom lines shall be eliminated to avoid danger of induction to them.*
- (x) ***Area subjected to flooding searches streams shall be avoided.***
- (xi) ***Restricted areas such as civil and military airfield shall be avoided. Care shall also be taken to avoid the aircraft landing approaches.***
- (xii) ***All alignment should be easily accessible both in dry and rainy seasons to enable maintenance throughout the year.***
- (xiii) ***Certain areas such as query sites, tea, tobacco and saffron fields and rich plantation, gardens and nurseries that will present the owner problems in of right of way and leave clearance during construction and maintenance should be avoided.***
- (xiv) ***Angle point should be selected such that shifting of the point within 100 m radius is possible at the time of construction of the line.***
- (xv) ***The line routing should avoid large habitation densely populated areas to the extent possible***
- (xvi) *The area requires special foundations and those prone to flooding should be avoided*
- (xvii) *For examination of the alternatives and identification of the most appropriate route, besides making use of information/data/details available/extracted through survey of India topographical maps and computer aided processing of NRSA satellite imagery, the contractor shall also carry out reconnaissance/preliminary survey as may be required for the verification and collection of additional information/data/details.*
- (xviii) *The contractor shall submit his preliminary observation and suggestion along with various information/data/details collected and also processed satellite imagery data, topographical map data marked with alternative routes etc. The final evaluation of the alternative routes shall be conducted by the contractor in consultation with owners' representatives and*

optimal route alignment shall be proposed by the contractor. Digital terrain modeling using contour data from topographical maps as well as processed satellite data shall be done by the contractor for the selected route. A flythrough perspective using suitable software(s) shall be developed or further refinement of the selected route. If required site visit and field verification shall be conducted by the contractor jointly with the owners' representatives for the proposed route alignment.

- (xix) **Final digitized route alignment drawing with the latest topographical and other details/features including all river railway lines, canals, roads etc. upto 8 Kms on both side of selected route alignment shall be submitted by the contractors for owners approval along with report containing other information / details as mentioned above.**

Based on above the most optimum route alignments are finalized. In the instant project also such studies have been carried out and final route alignment has been finalized and chosen for construction. The major features of transmission line covered under this project are as follows

400 KV D/C Dehradun-Abdullapur Line

The total length of line is 89.141 Kms. Road Network is very good all along the route. The alignment is well connected with many pucca/moorum roads besides interconnection with major Distt. Roads and State Highway respectively.

Road network is available in the project area. The line corridor involves crossing through NH-73A, NH-73, NH-72 & SH-3.

Sl.No.	National Highway No.	From Tower No.	To Tower No.	Remarks
1.	NH-73A	AP-63	AP-64	Jagadhri to Ponta Sahib
2.	NH-73	AP-77	AP-78	Jagadhri to Ambala
3.	NH-72	13/1	AP-14	Saharanpur to Harbatpur
4.	NH-72	AP-18A	AP-19	Saharanpur to Harbatpur
Sl.No.	State Highway No.	From Tower No.	To Tower No.	
1.	SH-3	AP-9	AP-9A	Dehradun-Dharawala

The line corridor involves 15 power line crossings of voltage levels 132 KV, 220 KV & 66 KV.

Sl.No.	Voltage Level	From Tower No.	To Tower No.
1.	132 KV S/C	AP-2	AP-3
2.	132 KV S/C	AP-7	AP-8
3.	132 KV S/C	AP-13	AP-13/1
4.	220 KV S/C	AP-13/1	AP-14
5.	132 KV S/C	AP-18	AP-18A
6.	220 KV S/C	AP-56	AP-57
7.	220 KV S/C	AP-57	AP-58
8.	66 KV D/C	AP-61B	AP-61C
9.	66 KV D/C	AP-69A	AP-69B
10.	66 KV S/C	70/1	70/2
11.	220 KV D/C	AP-71A	AP-71B
12.	132 KV S/C	AP-72A	AP-72B
13.	66 KV D/C	AP-73	AP-74
14.	220 KV S/C	AP-76	AP-77
15.	66 KV S/C	AP-77	AP-78

The final route has been selected after studying 3 alternatives. (Exhibit-2)

- From **AP-19 to AP-32**, the final route passes though Kalsi Reserve forest area of Uttarakhand. The line length through Kalsi Reserve Forest is around 11.173 kms.

One alternative route passes through the Firing Zone and also involves maximum forest area and more nos. of trees. This route also passes through heavy dense forest area. Hence, this route is avoided.

Other alternative route passes through the Kalesar National park, Haryana and involves more forest area and more tree felling. This route also passes through heavy dense forest area. Hence, this route is also avoided.

- From **AP-32 to AP-52**, the final route passes through Saharanpur reserve forest area of Uttar Pradesh. The line length through reserve forest is around 7.431 Km. The alternative routes pass through Firing Zone and through Kalesar National Park. Hence, they have been avoided.

The nearest Airport is Dehradun. Both unskilled and semi-skilled labour for construction purposes are available locally in nearby villages along the line. Local labours are quite conversant with the normal construction activity. The minimum wages of unskilled labour and that of semi-skilled labour is notified by State Govt. and payment of wages not less than the notified minimum wages is made. Route alignment map is placed as **Annexure-II**.

Details of Forest involvement

400 KV D/C Dehradun-Abdullapur involves 51.3958 ha forest land in Dehradun Distt of Uttarakhand, 34.1826 ha forest land in Saharanpur Distt of Uttar Pradesh & 2.364 ha forest land in Yamuna Nagar Distt of Haryana. However, felling of trees will be restricted to barest minimum and rests are only lopped / pruned to maintain electrical clearance.

The line passes through Shivalik Elephant Reserve in Uttarakhand and Uttar Pradesh Elephant reserve in Uttar Pradesh. The above mentioned reserves could not be avoided due to location of Kalesar National Park on one side and Army firing Zone on the other side. As per MoEF Notification dated 19.12.2012 for taking up non-forestry activities in Wildlife habitats, recommendation of Standing Committee of National Board for Wildlife is required for non-forestry activities in Wildlife Sanctuaries, National parks, Tiger Reserves, Conservation reserves but not in Elephant Reserve. **NoC from Chief Wildlife Wardens of both States have been obtained and are enclosed as Annexure-VI.**

PCCF (WL) and Chief Wildlife Warden, Uttarakhand asked Wildlife Institute of India (WII) to study the effects of transmission line construction on elephants in the proposed area. WII enumerated the following impacts of proposed power transmission line (Dehradun-Abdullapur power transmission line 400 kV D/C; Quad by Power Grid Corporation of India Ltd.) on elephants in Kalsi forest division (part of Shivalik Elephant Reserve):

1. During construction phase new road creation, disturbance due to tree felling, strip clearance and working labour line and their activities are major threat factors. Actions to address these issues would require appropriate measures to be taken by the project proponent.
2. The strip clearing (46 m wide and 11.173 km in length) to route power transmission line through Kalsi Forests (Timli Range) and its maintenance will create a secondary habitat conditions favorable for habitat utilization by several wildlife including elephants due to fodder availability. Year round protection of this altered habitats have to be ensured.
3. To avoid electrocution death of Asian elephant the maximum vertical sag point of transmission line in any point (either valley, undulating or hilly) is mentioned 10 m and above in the report is satisfactory. However, if the vertical sag point height of transmission line can be increased to

the level of 12 m it will be desirable.

Based on the above recommendations, **PCCF (WL) and Chief Wildlife Warden, Uttarakhand has issued NoC on 04.03.14.**

Chief Wildlife Warden, Uttar Pradesh has issued NoC on 17.04.14 on following conditions:

1. Execution of the project shall be done in accordance with Ministry of Environment and Forests letter no. F.No. 8-44/2011-FC (pt) dated 24.01.2012.
2. User Agency shall comply with all provisions of Wildlife (Protection) Act, 1972 and its amendments during the execution of the project.
3. User Agency shall ensure that height of the conductors should be 12 m and above from ground during construction of transmission line.
4. User Agency shall deposit 5% of the project cost of the area falling in Elephant Reserve and cost for wildlife protection and development of natural habitats as per Government of India guidelines.
5. User Agency shall provide one vehicle (Bolaro/ Scorpio) to Chief Wildlife Warden for protection of wildlife in Elephant Reserve Area.
6. User Agency shall comply with all other conditions issued by Government of India.

Forest Clearance

Forest Approval under Forest (Conservation) Act, 1980 for 51.3958 ha forest land in Dehradun Distt of Uttarakhand and 2.364 ha forest land in Yamuna Nagar Distt of Haryana has been obtained. Proposal for 34.1826 Ha forest land in Saharanpur Distt of Uttar Pradesh is under process.

(ENVIRONMENTAL IMPACT MATRIX)

S. No.	PARAMETERS	EXTENT OF IMPACT
1.	Total Line length : 89.141 Km	--
2.	Type of line : 400 KV D/C	---
3.	Forest land traversed (Km)	19.118 kms
4.	Forest land traversed (ha)	87.9424 ha
5.	Forest type	RF & PF
6.	Forest density	0.2 to 0.6
7.	Rare/ endangered flora	Nil
8.	Rare/ endangered fauna	Nil
9.	Migrating Wildlife/ breeding ground	None
10.	National Park / Sanctuaries	None
11.	Amt. of wet land traversed	Nil
12.	Soil erodability	Low
13.	Historical / Cultural Monument	None
14.	Relocation of villagers	None
15.	Loss/ Hindrance to Public Utilities	Negligible, restricted to construction phase only.

4.2 Forest clearance status of transmission line is as follows

As per the requirement of Forest (Conservation) Act, 1980 prior approval of Government of India has been obtained following due process. The forest involvement of forest area in the transmission line and status of forest clearance is as follows

Sr No.	Name of Line/Length	Forest Area (Ha)	State	Status
1	400 KV D/C Dehradun-Abdullapur	51.3958	Uttarakhand	Stage-I issued on 27.06.14. Stage-II issued on 08.09.14.
		34.1826	U.P.	Stage-I issued on 27.08.14. Compliance forwarded to RMoEF, Lucknow on 14.11.14. RMoEF, Lucknow on 09.01.15 has asked for compliance against recommendation of Chief Wildlife Warden. DFO, Saharanpur on 23.01.15 has raised demand note for 5% of project cost of line passing the elephant reserve. Payment deposited. Demand note for providing vehicle obtained on 04.03.15. Payment under approval.
		2.364	Haryana	Stage-I issued on 30.01.14. Stage-II issued on 22.04.14.

Compliance of conditions stipulated in the clearance letter like payment towards compensatory afforestation, Net Present Value, dwarf tree plantation cost etc were paid to State Govt of Uttarakhand, U.P. and Haryana.

Forest proposal for obtaining clearance from MoEF submitted to concern State forest authorities (**Forest proposals are annexed as Annexure-III**). Forest Clearance letters obtained from RMoEF & MoEF are enclosed as **Annexure-IV**.

A detailed compensatory afforestation scheme for carrying out afforestation in lieu of above diversion has been prepared by forest authorities. POWERGRID has already paid CA cost Rs. 3,24,32,195/- , Net Present Value Cost Rs. 8,24,54,986/- and plantation & other charges Rs. 1,65,12,049/- to concerned State Govts. Details are given below

S.No	Name of Line	State Govt.	Forest Area (Ha)	CA amount (Rs)	NPV amount (Rs)	Plantation & Other amount (Rs)	Total	Forest Clearance Status
1	400 KV D/C Dehradun-Abdullapur	UTKD	51.3958	1,33,90,000	4,82,60,656	79,66,349	6,96,17,005	Stage-II obtained
		UP	34.1826	1,64,73,000	3,20,97,462	83,17,000	5,68,87,462	Stage-I obtained
		HR	2.364	25,69,195	20,96,868	2,28,700	48,94,763	Stage-II obtained
TOTAL			87.9424	3,24,32,195	8,24,54,986	1,65,12,049	13,13,99,230	

4.3 Environment Clearance

Environmental clearance under Environment (Protection) Act, 1986 is not required. It is required only when transmission line passes through Gurgaon/Nuh-Mewat distt of Haryana and Alwar district of Rajasthan.

SECTION-V: POTENTIAL ENVIRONMENTAL IMPACT, EVALUATION AND ITS MANAGEMENT

5.1 Impact Due to Project Location and Design

Environmental impacts of transmission line projects are not far reaching and are mostly localized to ROW. However, transmission line project has some affects on natural and socio-culture resources. To reduce environmental impacts, environmentally sensitive area like water bodies, temple, school building etc. have been avoided by putting special tower. To reduce tree cutting in forest/ orchard, extension tower has been provided at different locations to avoid power lines, roads, canal crossing etc. Details of tower extensions provided are annexed as **Annexure-V**. These impacts can be minimized by careful route selection. Although, all possible measures have been taken during the finalization of route alignment for the proposed transmission line but due to peculiarity of terrain and demography of the area where project is being implemented, some environmental impacts may be there. The explanations in brief with regard to specific environment review criteria based on preliminary survey are as follows

(i) Resettlement

As described earlier all measures are undertaken by POWERGRID at line routing stage itself to avoid settlements such as cities, villages etc. It may be noted from the above description that final route alignments do not impact habitation. Moreover, keeping in mind that no land is acquired for tower foundation as per existing law, the project does not require any resettlement of villagers.

Land for extension in sub station is already available for proposed bays in the existing substations. Hence no fresh land acquisition or R&R issues are involved for existing Substations.

(ii) Land value depreciation

Based on past experience land prices are generally expected to rise in the areas receiving power. Further, transmission lines generally pass through uninhabited area, agriculture fields and forests, where the land-use is not going to change in foreseeable future. Therefore, the value of land will not be adversely affected to a significant degree.

(iii) Historical/cultural monuments/value

As per the POWERGRID's policy of route selection only that route alignment is finalized this avoids all the historical and cultural monuments. As per the assessment carried out with State revenue authorities and ASI, no such monuments are getting affected in the instant project.

(iv) Encroachment into precious ecological areas

As already explained all precautions have been taken to avoid routing of line through forest and ecological sensitive areas and National park/Sanctuaries. However, complete avoidance of forest area was not possible in 400 KV Dehradun-Abdullapur transmission line. The route of proposed transmission line are so finalized that it affects minimum forest area in consultation with forest department. Out of total transmission lines length of about 89.141 Kms. about 19.118 Kms (**21.44%**) length shall pass through forest land consisting of 87.9424 Ha. forest area in the states of Uttarakhand, Uttar Pradesh & Haryana.

The line passes through Shivalik Elephant Reserve in Uttarakhand and Uttar Pradesh Elephant

reserve in Uttar Pradesh. The above mentioned reserves could not be avoided due to location of Kalesar National Park on one side and Army firing Zone on the other side. As per MoEF Notification dated 19.12.2012 for taking up non-forestry activities in Wildlife habitats, recommendation of Standing Committee of National Board for Wildlife is required for non-forestry activities in Wildlife Sanctuaries, National parks, Tiger Reserves, Conservation reserves but not in Elephant Reserve. **NoC from Chief Wildlife Wardens of both States have been obtained and are enclosed as Annexure-VI.**

400 KV D/C Dehradun-Abdullapur transmission line shall pass (about 19.118 Kms) through forest. With provision of Compensatory Afforestation on double degraded forest land, the overall forest status will in many cases improve. To mitigate losses to existing forests, clearing of the transmission line Right-of-way will be done under supervision of Forest Department, and some low canopy seed trees and shrubs may be kept intact if they do not interfere with tower erection and line installation. The wood will be sold by the Forest Department, who will also retain the sale proceeds. Three-meter wide strips of land under each conductor will be cleared and maintained as maintenance rows, but the remaining land will be allowed to regenerate. Lopping of trees to maintain line clearance will be done under the direction/supervision of POWERGRID & Forest Department. POWERGRID will provide construction crews with fuel wood or alternative fuels as a precaution against collection of fuel wood from nearby forest.

The total forest involvement and trees enumerated in the forest area is given below:

S.No.	Name of Line	Forest Area (Ha)	State Govt.	No. of Tree Enumerated
1	400 KV D/C Dehradun- Abdullapur	2.364	HR	472
		34.1826	UP	3202
		51.3958	UTKD	6501
	TOTAL	87.9424		10175

Transmission lines can serve as new access routes into previously inaccessible or poorly accessible forests, thereby accelerating forest and wildlife loss. In such cases, POWERGRID cannot take action itself, but local Forest Department personnel will normally assess the dangers and take appropriate action, such as establishing guard stations at the entrance to the forest etc. cost of which is borne by POWERGRID and is included in the compensatory afforestation scheme. Given the already easy access and degraded conditions at the proposed projects sites, this problem is not expected to be encountered. Nonetheless, POWERGRID staff will report to the Forest Department any noticeable encroachment induced by the Projects.

(v) Encroachment into other valuable lands

Impacts on agricultural land will be restricted to the construction phase and when large-scale maintenance measures are required. Some stretch of the line will pass through Agricultural fields. Agricultural land will be lost at the base of the tower, which is estimated to be 0.2-1 sq. m per average farm holding (**Fig-1**).

400 KV D/C Dehradun-Abdullapur line of 89.141 Km a total of 247 towers are required which may impact land area of 0.0247 ha. The total land loss estimated to be about **0.0247 ha** which is negligible and will not adversely affect the land holding.

In areas where line traverses through agricultural land, compensation is paid to owners for any crop damage incurred as a result of construction activities. POWERGRID field staff will consult affected villagers and local revenue department and apprise him about the project and tower

location, which shall be erected in the agricultural land, for compensation. Revenue department, after evaluating the loss due to construction activity and productivity of land, arrives at the compensation cost that is paid to farmer. Agricultural activities will be allowed to continue following the construction period. If bunds or other on-farm works are disturbed during construction or maintenance, they will be restored to the owner's satisfaction following cessation of construction or maintenance activities. In the event that private trees are felled during construction or maintenance operations, compensation will be paid to the owner in an amount determined by the estimated loss of products from the tree over an eight year period (for fruit bearing trees) and for other trees compensation is finalized in consultation with local forest authorities. Agricultural lands under private ownership are being identified, and in accordance with normal POWERGRID procedures compensation is paid to the affected villagers (**Annexure-VII**). It is estimated that total compensation towards crops/trees shall be in the tune of Rs. 70.02 Lakhs. **Budgetary provision Rs. 70.02 Lakhs is made in the cost estimate to meet these expenses. (Annexure-VIII).**

(vi) **Interference with other utilities and traffic**

As per regulations enacted by Government of India, it is mandatory for POWERGRID to seek clearance prior to construction from department of Railways, Telecommunications and wherever necessary from aviation authorities that are likely to be affected by the construction of transmission lines. The transmission lines affect nearby telecommunication circuits by causing electrical interference. A standing committee Power Telecom Co-ordination Committee (P.T.C.C.) has been constituted by Government of India to plan and implement the mitigating measures for the induced voltage which may occur to nearby telecom circuit and suggest necessary protection measures to be adopted. The committee suggests measures like rerouting of the telecom circuits, conversion of overhead telecom circuits into cables etc. to minimize the interference.

The cost of such measures is determined by the Committee and is shared by POWERGRID and Telecom Department on the basis of prevailing norms and guidelines. Though the exact cost to mitigate the impacts of induction in neighboring telecom circuits would vary from case to case, the cost on an average works out to be Rs.50000/- per km for POWERGRID. Provision to meet these expenses has been made in the cost estimate for the same.

Wherever transmission line crosses the railways, clearance is taken from that department. In general, the system is planned and executed in such a way that adequate clearance is maintained between transmission lines on the one hand, and railways, civil aviation and defense installations on the other. Wherever the transmission lines pass by the airports the towers beyond specified height are painted in alternate orange and white stripes for easy visibility and warning lights are placed atop these towers. All necessary clearance have already been obtained or in the advance stage of processing with relevant authorities.

(vii) **Interference with drainage pattern**

As the transmission lines are constructed aerially and the blockage of ground surface is limited to area of tower footings, which is very small, there is little possibility of affecting drainage pattern. Since in the instant project most of the line is being constructed in the plain area no such impact is encountered till date and during further implementation if such instances are reported, flow will be trained and guided to safe zones.

5.2 Environmental Problems Due to Design

(i) Escape of polluting materials

The equipments installed on lines are static in nature and do not generate any fumes or waste materials. To avoid/minimize during construction phase a clause has been included in the contract document and is being monitored regularly by the site engineers (Refer EMP).

(ii) Explosion/fire hazards

During the survey and site selection for transmission lines, it has been ensured that these are kept away from oil/gas pipelines and other sites with potential for creating explosions or fires. Fires due to flashover from lines can be a more serious problem in forest. However, adequate safety measures shall be taken to avoid such incidence besides this forest authorities also incorporate measures like making fire lines to prevent spreading of fire in the affected forest area.

(iii) Erosion hazards due to inadequate provision for resurfacing of exposed area

Adequate measures are taken to re-surface the area where excavation works are done. Topsoil disturbed during the development of sites will be used to restore the surface of the platform (**Exhibit-3**). Infertile and rocky material will be dumped at carefully selected dumping areas and used as fill for tower foundations.

(iv) Environmental aesthetics

Since spacing between the towers in case of 400 KV lines is approx. 330-400 meters these will not affect the visual aesthetics of the localities particularly when it is ensured to route the lines as far away from the localities as possible. POWERGRID takes up plantation of trees to buffer the visual effect around its substations and to provide better living conditions. Wherever POWERGRID feels it appropriate, discussions will be held with local Forest Department officials to determine feasibility of planting trees along roads running parallel to transmission lines to buffer visual effect in these areas. In addition, towers may be painted grey or green to merge with the background.

(v) Noise/vibration nuisances

The equipment installed at sub-station are mostly static and are so designed that the noise level always remains within permissible limits i.e. 85 dB(A) as per Indian standards. The noise levels reported during normal operating conditions are about 60 to 70 dB(A) at 2 m. distance from the equipment. To contain the noise level within the permissible limits whenever noise level increases beyond permissible limits, measures like providing sound and vibration dampers and rectification of equipment are undertaken. In addition, plantations of sound absorbing species like Casuarinas, Tamarind, and Neem are raised at the sub-stations that reduce the sound level appreciably. It is reported that 93 m³ of woodland can reduce the noise level by 8 dB. Actual noise levels measured at perimeters of existing Substations are 25 to 35 dB(A).

Noise during construction phase is periodically monitored and due maintenance of equipments are ensured to keep the noise level well within the prescribed limit.

(vi) Blockage of wildlife passage

The lines are passing through mostly agricultural, wasteland and affected forests. The line is passing through Elephant Reserve. The measures proposed by Chief Wildlife Wardens of Uttar

Pradesh and Uttarakhand are being complied. Sufficient height is being maintained by providing extension towers in the forest area.

5.3 Environmental Problems during Construction Phase

(i) Uncontrolled silt runoff

The project involves only small scale excavation for tower foundations at scattered locations that are re-filled with excavated material as the major portion of the project area is in plain hence uncontrolled silt run off is not expected.

(ii) Nuisance to nearby properties

As already described in preceding paras, during site selection due care is taken to keep the transmission line away from settlements. Further, all the construction activities will be undertaken through the use of small mechanical devices e.g. tractors and manual labour therefore nuisance to the nearby properties if any, is not expected. The construction activities are normally undertaken in lean period and post harvesting to avoid/minimize such impact. The photographs are enclosed as **Exhibit-4**.

(iii) Interference with utilities and traffic and blockage of access way

Access to the site will be along existing roads or village paths; minor improvements to paths may be made where necessary, but no major construction of roads will be necessary either during construction or as a part of maintenance procedures. It may be noted that access road (Metalled / Non-metalled /cart roads) are existing to access all angle points and construction of no new road is envisaged (taking 200 m as buffer zone which can always be accessed through head load) for this line. **(Annexure-IX)** Even if at some places it is found that access road is not available than existing field/path is upgraded/augmented for utilization and compensation for any damage to crop or field is paid to the owner. In many areas such improvement in access road is highly appreciated by the local population.

As and when a transmission line crosses any road/ railways line, the short span angle (DT) towers are located at a distance so as not to cause any hindrance to the movement of traffic. Stringing at the construction stage is carried out during lean traffic period in consultation with the concerned authorities and angle towers are planted to facilitate execution of work in different stages.

(iv) Inadequate resurfacing for erosion control

Since proposed line is to be constructed in plain area where erosion problem is not anticipated. However, if due to terrain at some points transmission towers may be placed on slopes and erosion prone soils internationally accepted engineering practices will be undertaken to prevent soil erosion. This will include cutting and filling slopes wherever necessary. The back cut slopes and downhill slopes will be treated with revetments. As explained above adequate steps shall be taken to resurface the area after construction. Wherever sites are affected by active erosion or landslides, both biological and engineering treatment will be carried out, e.g. provision of breast walls and retaining walls, and sowing soil binding grasses around the site. Furthermore, construction is generally undertaken outside the rainy season. As the proposed line is mostly passing through plain areas (80%), no such problems are anticipated.

(v) Inadequate disposition of borrow area

As mentioned earlier the transmission tower foundations involve excavations on small scale basis

and the excavated soil is utilized for back filling. In case of substations generally the sites are selected in such a manner that the volume of cutting is equal to volume of filling avoiding borrowing of the area. As such acquisition/opening of borrow area is not needed.

(vi) **Protection of Worker's health/safety**

The Safety Regulations/Safety Manual published by POWERGRID, and included in tender documents will guide provisions for workers' health and safety. Various aspects such as, work and safety regulations, workmen's compensation, insurance are adequately covered under the Conditions of Contract, a part of bidding documents. **(Annexure-X)**

POWERGRID has framed guidelines/checklist for workers' safety as its personnel are exposed to live EHV apparatus and transmission lines. These guidelines/checklist include work permits and safety precautions for work on the transmission lines both during construction and operation **(Annexure-XI)** and is monitored regularly by site in-charge and corporate Operation Services. In addition training is imparted to the workers in fire fighting and safety measures. **(Exhibit-5)** Safety tools like helmet, safety belt, gloves etc. are provided to them in accordance to the provisions of Safety Manual. First aid facilities will be made available with the labour gangs, and doctors called in from nearby towns when necessary. The number of outside (skilled) labourers will be quite small, of the order of 25-30 people per group. The remaining workforce of unskilled labourers will be comprised of local people. Workers are also covered by the statutory Workmen (Compensation) Act. POWERGRID has a dedicated unit to oversee all health and safety aspects of its project under the Operation Service Deptt. Regular health checkups are conducted for construction workers. The construction sites and construction workers' houses will be disinfected regularly if required. In order to minimize/checking of spread of socially transmitted diseases e.g. HIV/AIDS etc. POWERGRID will conduct awareness building programs on such issues for the construction workers. **(Annexure-XII)**

5.4 Environmental Problems Resulting from Operation

(i) O&M Staff/Skills less than acceptable resulting in variety of adverse effects

The O&M program in POWERGRID is normally implemented by sub-station personnel for both, the lines as well as sub-stations. However in respect of the long distance transmission lines there are monitoring offices that are located at various points en-route. Monitoring measures employed include patrolling and thermo-vision scanning. The supervisors and managers entrusted with O&M responsibilities are intensively trained for necessary skills and expertise for handling these aspects.

A monthly preventive maintenance program will be carried out to disclose problems related to cooling oil, gaskets, circuit breakers, vibration measurements, contact resistance, condensers, air handling units, electrical panels and compressors. Any sign of soil erosion is also reported and rectified. Monitoring results are published monthly, including a report of corrective action taken and a schedule for future action.

POWERGRID is following the approved international standards and design, which are absolutely safe. Based on the studies carried out by different countries on the safety of EHV lines in reference to EMF affect POWERGRID have also carried out such studies with the help of PTI, **USA** and **CPRI, Bangalore** on their design. The studies inferred that the POWERGRID design are safe and follow the required international standard. Because of issues relating to need to ensure health and safety relating to the line such as fire safety, safe voltages on metallic parts of buildings, and safety clearances to avoid flashover, the transmission lines will not pass directly

over any residential properties and as such the potential for EMF effects to occur will be further diminished. Given that it will be necessary to ensure that there are no properties in the ROW beneath and to the sides of the overhead line, automatic mitigation against EMF will be provided between the source of potentially high strengths (the transmission line) and the residential properties.

Poly Chlorinated Biphenyls (PCBs) due to its high heat capacity, low flammability and low electrical conductivity was extensively used as insulating material in capacitors and transformers. But after the finding that these PCBs are non-biodegradable and has carcinogenic tendency, its use in electrical equipments as insulating medium has been banned all over the world long back. However, it has been reported in some studies that chances of contamination of oil with PCB is possible. Keeping that in mind, POWERGRID has taken all possible steps in association with NGC, UK and setup Regional testing laboratories for testing of existing oil for PCB traces and results of this suggests that PCB contamination is not an issue with POWERGRID. The World Bank has also made following comments after a detailed study on Management of PCBs in India: **“Power Grid was the most advanced in testing for PCBs of the organizations visited for this project. They have established a procedure for identification of the presence of PCBs in transformer oil and more detailed analysis for positive identification sample. To date no significant concentrations of PCBs have been detected. Power Grid does not appear to have any significant issues regarding PCB management and have initiated a testing program. The experience & laboratories of Power Grid could be used to provide a national PCB auditing service”.**

5.5 CRITICAL ENVIRONMENTAL REVIEW CRITERIA

(i) Loss of irreplaceable resources

The transmission projects do not involve any large-scale excavation and land is lost to the extent of 0.2-1 sq m only for each foundation. As **19.118 Km (87.8424 Ha.)** of the line is passing through forest area some loss of vegetation is anticipated but with provisions of compensatory afforestation on double degraded forest land will compensate the loss of vegetation. The forest land identified for such plantation by forest department is in various Forest Divisions of the concerned State Govt The cost of Compensatory Afforestation, Net present value, plantation and other charges Rs. 1313.99 lakhs has been paid to forest department. Budget provision of Rs. 1313.99 Lakhs has been kept for the cost of compensatory afforestation and net present value. **(Annexure-VIII)**

(ii) Accelerated use of resources for short-term gains

The project will not be making use of any natural resources occurring in the area during construction as well as maintenance phases. The construction material such as tower members, cement etc shall come from factories while the excavated soil shall be used for backfilling to restore the surface. Thus the project shall not cause any accelerated use of resources for short term gains.

(iii) Endangering of species

No endangered species of flora and fauna exist in the project area and are not getting affected thus there is no possibility of endangering/causing extinction of any species.

(iv) Promoting undesirable rural-to urban migration

The project will not cause any submergence or loss of land holdings due to land acquisition that normally trigger migration. It also does not involve acquisition of any private land holdings. Hence, there is no possibility of any migration.

5.6 PUBLIC CONSULTATION

Public consultation/information is an integral part of the project implementation. Public is informed about the project at every stage of execution. During survey also POWERGRID's site officials meet people and inform them about the routing of transmission lines. During the construction, every individual, on whose land tower is erected and people affected by ROW, are consulted.

Apart from this, public consultation using different technique like Public Meeting, Small Group Meeting, informal Meeting as per **Environmental Social Policy & Procedures of POWERGRID (ESPP)** shall also be carried out during different activities of project cycle. During such consultation the public will be informed about the project in general and in particular about the following:

- complete project plan (i.e. its route and terminating point and substations, if any, in between);
- POWERGRID design standards in relation to approved international standards;
- Health impacts in relation to EMF;
- Measures taken to avoid public utilities such as school, hospitals, etc.;
- Other impacts associated with transmission lines and POWERGRID's approach to minimizing and solving them;
- Land acquisition details, proposed R&R measures and compensation packages in line with POWERGRID's policy;
- Trees and crop compensation process.

Apart from organizing many informal group meetings in different villages (**Table-5.1**) public meeting were also organized in the routes of transmission lines. To get the maximum participation during the Public consultation Program a notice was served well in advance to the villagers. The details of line and its importance were explained to the villagers. The details of public consultation along with photographs are enclosed as **Annexure-XIII**. The program was arranged in interactive way and queries like crop compensation, route alignment etc. were replied. Most of the participants were small farmers and were worried about their land through which the line will pass. They were informed that POWERGRID will not acquire their land for construction of transmission lines. Only towers will be spotted in their fields where they can do farming without any fear because the tower height is very high and even tractor can pass below the tower. Moreover, there is no risk of passing current from the above line as there is foolproof system of earthing for tower. The consultation process was appreciated by the villagers. They were happy to know about the transparent policy of POWERGRID for execution of the project and promised to extend their cooperation during construction of the line. The process of such consultation and its documentation shall continue during project implementation and even during O&M stage.

**Table.5.1
Informal Group Meeting**

Sl. No.	Name of Transmission Line	Date of meeting	No. of villagers attended	Name of Village	Remarks
1	400 KV D/C	25.01.11	07	Badshahibag	Village Panchayat
2	Dehradun-	05.01.11	06	Faizabad	representatives,

3	Abdullapur	26.02.11	10	Areiwala	farmers, teachers and others. Compensation for Crops/trees, utilization of road path was main concern, which was clarified during meeting.
4		16.02.11	05	Urjani	
5		14.02.11	10	Shahpur	

Gram sabha Meetings were held on 26.11.12 (Rehna Gram Panchayat) and 09.07.12 (Aaduwala gramsabha) and Gram Sabha has given NoC under FRA, 2006 for construction of line. The details of Gram sabha Resolution procedure and certificate are also enclosed as **Annexure-XIII**.

5.7 Conclusions

From the above discussion, it would seem that the area is rich in physical resources. But careful route selection has minimized involvement of forest area to the extent possible but could not be completely avoided due to terrain and other physiographical reasons. Thus, routes selected for detailed survey are the most optimum alignment and involved minimum forest. The project is coming under the P2 category or non sensitive as only **21.44% (87.9424 Kms.) of total length (89.141 Kms.)** is passing through forest in the State of Uttar Pradesh, Uttarakhand and Haryana, which is already degraded in nature. The infrastructural constraints are very real and pose a limiting factor on the development of the area. The above facts while on the one hand underline the need for implementation of the project for overall development of the area and on another hand suggest that a detailed E.I.A. may not be necessary.

SECTION-VI: MONITORING AND ORGANISATIONAL SUPPORT STRUCTURE

6. ENVIRONMENTAL MONITORING PROGRAM IN POWERGRID

Monitoring is a continuous process for POWERGRID projects at all the stages be it the site selection, construction or maintenance.

The success of POWERGRID lies in its strong monitoring systems. Apart from the site managers reviewing the progress on daily basis regular project review meetings are held at least on monthly basis which is chaired by Executive Director of the region wherein apart from construction issues the environmental aspects of the projects are discussed and remedial measures taken wherever required. The exceptions of these meetings are submitted to the Directors and Chairman and Managing Director of the Corporation. The progress of various on-going projects is also informed to the Board of Directors. Following is the organization support system for proper implementation and monitoring of Environmental & Social Management Plan:

6.1 Corporate Level

An Environmental Management Cell at corporate level was created within POWERGRID in 1992 and subsequently upgraded to an Environment Management Department (EMD) in 1993 and in 1997 it has been further upgraded to Environment & Social Management Deptt. (ESMD) by incorporating social aspects of project. Briefly, the ESMD's responsibilities are as follows:

- Advising and coordinating RHQs and Site to carry out environmental and social surveys for new projects.
- Assisting RHQs and site to finalize routes of entire power transmission line considering environmental and social factors that could arise enroute
- Help RHQs and Site to follow-up with the state forest offices and other state departments in expediting forest clearances and the land acquisition process of various ongoing and new projects
- Act as a focal point for interaction with the MoEF for expediting forest clearances and follow-ups with the Ministry of Power.
- Imparts training to POWERGRID's RHQs & Site Officials on environment and social issues and their management plan.

6.2 Regional Level

At its Regional Office POWERGRID has an Environmental and Social Management Cell (ESMC) to manage Environmental and Social issues and to coordinate between ESMD at the corporate level and the Construction Area Office (CAO). The key functions envisaged for ESMC are:

- Advising and coordinating field offices to carry out environmental and social surveys for new projects envisaged in the Corporate Investment Plan
- Assisting the ESMD and CAO to finalize routes of entire power transmission lines considering the environmental and social factors that could arise en-route.
- To follow-up forest clearances and land acquisition processes with state forest offices and other state departments for various ongoing and new projects

- Acting as a focal point for interaction with the ESMD and CAOs on various environmental and social aspects.

6.3 Site Office

At the Site level, POWERGRID has made the head of the CAOs responsible for implementing the Environmental and Social aspect of project and are termed as Environmental and Social Management Team (ESMT). Key functions of the ESMT are:

- Conduct surveys on environmental and social aspects to finalize the route for the power transmission projects
- Conduct surveys for the sites to be considered for land acquisition
- Interact with the Forest Departments to make the forest proposal and follow it up for MOEF clearance
- Interact with Revenue Authorities for land acquisition and follow it up with Authorized Agencies for implementation of Social Management Plan (SMP)
- Implementation of Environment Management Plan (EMP) and SMP
- Monitoring of EMP and SMP and producing periodic reports on the same.

It may be noted that POWERGRID is well equipped to implement and monitor its environment and Social Management plans.

As regards monitoring of impacts on ecological resources particularly in Forest, Sanctuary or National Park, it is generally done by the concerned Divisional Forest Officer, Chief Wildlife Warden and their staff as a part of their normal duties. A monitoring system (done by the Forest Department) is also in place for compensatory forests established as part of the Project. A detailed Environment Management Plan (EMP) including monitoring plan for all possible environmental and social impact and its proper management has been drawn and is being implemented at site during various stage of project execution. The updated EMP with compliance status for subject line is enclosed as **Annexure-XIV**.

6.4 Environmental Review: Periodic review by corporate ESMD and higher management including review by POWERGRID's CMD of all environmental and social issues is under taken to ensure that EMP and other measures are implemented at site. Besides it's annual review by independent Auditor under ISO: 14001 shall also be undertaken for compliance of agreed policy and management plan. The copy of recent annual audit report is placed as **Annexure-XV**.