INITIAL ENVIRONMENTAL EXAMINATION REPORT

FOR PROPOSED

220 KV D/C Line from Lata-Tapovan to Joshimath

PTCUL

POWER TRANSMISSION CORPORATION OF UTTARAKHAND LIMITED

Prepared For

Asian Development Bank

Under

Power Transmission Corporation of Uttarakhand Ltd

(ADB FINANCIAL ASSISTANCE PROJECT, PFR-IV)

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List of Abbreviations

ADB	**Asian Development Bank**
BOD	**Board of Directors**
CEA	**Central Electricity Authority**
DC or D/C	**Double Circuit**
DPR	**Detailed Project Report**
EA	**Executing Agency**
EMP	**Environmental Management Program**
EHV	**Extra High Voltage**
GoI	**Government of India**
GIS	**Gas Insulated Substation**
HEP	**Hydro Electric Power**
IEE	**Initial Environmental Examination**
Km	**Kilo Meter**
MOEF	**Ministry of Environment and Forest**
MW	**Mega Watt**
MU	**Million Units**
MOP	**Ministry of Power**
NIT	**Notice of Inviting Tender**
PTCC	**Power Telecom Co-ordination Committee**
PTCUL	**Power Transmission Corporation of Uttarakhand Limited**
PGCIL	**Power Grid Corporation of India Limited**
PLF	**Plant Load Factor**
ROW	**Right of Way**
UED	**Uttarakhand state Energy Department**

1.0 INTRODUCTION

1. India has a large projected demand-supply gap and has extensive potential for hydropower development. Hydropower generation capacity has lagged behind particularly during the last two decades. Since 1975, the share of hydropower generation capacity has come down to a level of 25% against a desired level of 40%. Therefore, hydropower development is being given priority to improve hydro/thermal mix for optimizing the efficiency of country's power system and usage of resources for sustainable power generation in an environment friendly manner. Apart from being an environmentally clean source of power, hydropower would also provide a peaking power option for the country. Government is showing strong commitment towards hydropower projects and has launched a 50,000 MW Hydro Electric Initiative.

2. Uttarakhand state is endowed with tremendous hydro power potential. At present there is an urgent necessity for constructing a power evacuation system of the order of 6,000 to 6,500 MW of generation project in Yamuna, Bhagirathi, Alaknanda and Sharda Basin. Under the Uttarakhand Power Sector Investment Project, the Government of India (GOI) and Asian Development Bank (ADB) propose development of a robust transmission system to evacuate 5,000 MW power from existing and new hydropower plants in the state of Uttarakhand. The project supports sector reforms, commercialization of hydropower resource and strengthening of the in-state grid. Uttarakhand state's Energy Department (UED) is the Executing Agency (EA), whereas Power Transmission Corporation of Uttarakhand Ltd. (PTCUL) is the Implementing Agency for the transmission component.

3. The first Detailed Project Report (DPR) was prepared for the whole transmission network component by Power Grid Corporation of India Ltd. (PGCIL) under contract to PTCUL whereas the Initial Environmental Examination (IEE) reports have been prepared by the IA directly. The Environmental Categorization for the sub-project transmission component is Category B. The IEE report conforms to the Ministry of Environment & Forests (MoEF) guidelines and regulations and is consistent with ADB Operations Manual F1/BP and F1/OP (2003), Environment Policy, and Environmental Assessment Guidelines (2003).[1]

4. The proposed transmission system has been envisaged in consultation with CEA and other beneficiary constituents for the reliable evacuation of 171 MW Power from 220 KV D/C Tapovan to Joshimath.

5. **Background:** Uttarakhand is one of the most beautiful and enchanting region of northern India. Nature has endowed this land with so much beauty and spiritual bliss that it is also known as Dev Bhoomi, the Land of Gods. Ganga, Yamuna and scores of other rivers originate in Uttarakhand. Among them Ganga is the most holy and prominent as she represents the soul of India, her rich culture, history and civilization. In Sanskrit 'Himalaya' means Abode of Snow, truly characterizing the vast permanent snow fields above the snowline? In the heart of these majestic mountains lies the state of Uttarakhand with Kumaon region in its east and Garhwal in the west. Uttarakhand came into existence on 9th November 2000 as the 27th state of the Republic of India. It was carved out of Uttar Pradesh. The state has been granted status of special category state by Union Cabinet on 2nd May, 2001. Uttarakhand is a border state bordering China and Nepal. Geographically Uttarakhand is situated between 77^0 34' to 81^0 2' East longitude and 28^0 4' to 31^0 27' North latitude. Uttarakhand is predominantly a hilly state with

[1] ADB. 2003. *Operations Manual, Environment Policy*, *Environmental Guidelines for Selected Industrial and Power Projects,* and *Environmental Assessment Guidelines. Manila.*

88% of hilly area. The climate of the state varies from subtropical in valleys to temperate on higher slopes. Total area of Uttarakhand is 53,483 Sq KM, which is 1.73% of the total area of India. The state is very rich in natural resources specially forest and water, as it has many glaciers, dense forests, mountain peaks and a network of mighty rivers viz., Ganga, Yamuna, Ramganga, Kosi etc. A total of 64.6% of the area is under forest cover.

6. Uttarakhand has inherited its present administrative set-up from its parent state, Uttar-Pradesh. The facts and figure about Uttarakhand are as follows-

Divisions	2
Districts	13
Tehsils	78
Development Blocks	95
Muncipal Areas	71
Nyay Panchayat	670
Gram Panchayat	7,227
Villages	16,826

MAP OF UTTARAKHAND

Demography

Population	84,79,562
Male	43,16,401
Female	41,63,161
Rural	63,09,317
Decadal Increase	19.2(1991-2001)
Population Density	159 Per Sq Km
Sex Ratio	964 Per Thousand
Per Capita Income	Rs 12000 Per Year
Birth Rate	40.6
Infant Mortality Rate	52.4
Literacy Rate	72.28%
Male	84.01%
Female	60.26%
Decadal Literacy Rate	14.47%
Literacy Rate	72.28%
Male	84.01%
Female	60.26%
Decadal Literacy Rate	14.47%

District Wise Population Distribution (2001 census)

S. No	District Name	Male	Female	Total
1	Almora	2,93,576	3,36,970	6,30,446
2	Bageshwar	1,18,202	1,31,250	2,49,453
3	Champawat	1,10,916	1,13,545	2,24,461
4	Chamoli	1,83,033	1,86,165	3,69,198
5	Dehradun	6,75,549	6,05,334	12,79,083
6	Haridwar	7,73,173	6,71,040	14,44,213
7	Nanital	2,20,336	3,62,576	7,62,912
8	Pauri	3,31,138	3,65,713	6,96,851
9	Pithoragarh	2,27,592	2,34,557	4,62,149
10	Rudraprayag	1,07,425	1,20,036	2,27,461
11	Tehri	2,94,842	3,09,766	6,05,608
12	Udham Singh Nagar	6,49,020	5,85,528	12,34,548
13	Uttarkashi	1,51,599	1,42,580	2,94,179
	Total	**43,16,401**	**41,63,161**	**84,79,562**

7. **Uttarakhand - Tourism State:** Tourism is one of main sources of income at Uttarakhand. The northern areas of Uttarakhand are part of the Great Himalayas range, with average heights up to 3,000-5,000 meters. The famous peaks are Nanda Devi (7,816m), Trishul (7,120m) and Panchchuli (6910m). Southern Uttarakhand has plains that are part of the Terai foothills, where temperatures are higher and towns more accessible. The state is not industrially developed and tourism is the mainstay of the economy. For the last 7 years, Dehradun, the largest town, has been its provisional capital. It has a well-connected railhead and a small domestic airport.

8. To most travelers, Uttarakhand is associated with its ancient traditions of Hinduism that flourished in its high Himalayan reaches. The source of India's most revered and important rivers - Ganga as well as Yamuna respectively called Gangotri and Yamunotri, lies here. These two spots, along with the shrines of Badrinath and Kedarnath, make the four holy sites (Char Dham) that Hindus aspire to visit. Snow-bound for most of the year, these are open from May to October. Lower south, along the Ganges lie the sacred towns of Rishikesh (43km from Dehradun) and Haridwar (connected by rail to Delhi).

9. Uttarakhand popular hill stations include Mussourie (2,000m; 35 km from Dehradun) and Nainital (2,000m; 35km from railhead Kathgodam). Corbett National Park is its noted wildlife sanctuary. The combination of mountains and rivers yields opportunities for trekking, river rafting, hiking, which the state is promoting now. Rishikesh is a hub of water adventure sports. There is also a skiing destination in Auli.

Infrastructure

S. No.	Items	Year/ Period	Number
1.	Important Tourist Places	2006-2007	214
2.	Developed Tourist Places	2006-2007	124
3.	Tourist Rest Houses	2006-2007	174
4.	No. of Beds in Tourist Rest. Houses	2006-2007	6,764
5.	Rain Baseras	2006-2007	32
6.	No. of Beds in Raien Basera	2006-2007	1,610
7.	No. of Hotels and Paying Guest Houses	2006-2007	2,312
8.	No. of Dharamshala	2006-2007	802

Tourist Statistics

S. No.	Items	Year/ Period	Number
1.	In Tourist Places (including Pilgrims)	2007	2,26,00,000
	(i) Indian Tourist	2007	2,21,00,000
	(ii) Foreign Tourist	2007	1,06,000
2.	In Important National Parks	2007	1,99,043
	(i) Indian Tourist	2007	18,3481
	(ii) Foreign Tourist	2007	15,562

10. Uttarakhand is a predominantly agricultural state with 75% of the people deployed in this sector. Uttarakhand has a tremendous potential and advantage in the herbal area and has been declared as an Herbal State and a maximum number of Ayurvedic and Homoeopathic medicines depend on plant sources and its biodiversity. It also has the distinction to become the first state in the nation to declare its Health & Population Policy in December 2002 through which it hopes to integrate the services of different systems of medicine such as Ayurveda, Homoeopathy and Unani to achieve synergy. The National Rural Health Mission (2005-12) seeks to revitalize local health traditions and mainstream AYUSH into the public health system.

11. The state is well linked by state highways, national highways and district roads. The state has broad gauge railway lines but only in the plain areas. Airports at Dehradun (Jollygrant) and Pantnagar are civil airports in the state.

12. **POWER TRANSMISSION CORPORATION OF UTTARAKHAND LIMITED (PTCUL):** State government power transmission utility company was established to facilitate transfer of power and to improve the transmission of electricity system within the state, thus leading to the formation of the State Power Grid. The PTCUL main objective is to evacuate the power from Yamuna, Bhagirathi, and Alaknanda and Sharda river basins.

13. The ensuing Asian Development Bank's loan Project will provide optimized power system expansion of the northern grid and increase the pace of economic development in less-developed regions in Uttarakhand State. The Project supports Government goal of providing affordable universal power service by 2020. The need of the hour is to ensure equitable distribution of energy, augmentation of existing transmission capacity, put an integrated robust transmission system in place within cost, quality and time parameters and maintain grid discipline within the frame work of the prescribed grid code. PTCUL's response is a balanced combination of reliability, security and economy. PTCUL believes that these guiding principles must match rising expectations of a cleaner, safer, healthier environment and of people, both affected and benefited by its activities.

14. Uttarakhand state is endowed with tremendous hydro power potential. At present there is an urgent necessity for constructing a power evacuation system of the order of 6,000 to 6,500 MW of generation project in Yamuna, Bhagirathi, Alaknanda and Sharda Basin.

15. **Scope of Work & Methodology Adopted:** A team of PTCUL, headed by qualified and experienced engineer specially assigned this work has carried out the IEE of this project. The team conducted reconnaissance survey to identify the major environmental issues. Accordingly, field surveys were also undertaken to assess physical and biological environment. Detailed assessment of the baseline environment has been conducted for the distance up to 5 Km. on the either side of proposed alignment and data collection from secondary source has been done to support the findings of the field survey. The field studies were supported by data collected from secondary sources such as Internet, Forest Atlas of India, and Statistical Handbook for Uttarakhand District Maps, National Atlas and Thematic Mapping Organization, Geological Survey of India, Physical map of Uttarakhand etc.

16. The broad scope of the study is:

i) To conduct field visits to collect data relevant to the study area and also collect secondary data so as to establish the baseline environmental status of the study area;
ii) To assess the impacts on environmental attributes due to the location, design, construction and operation of the proposed project;
iii) To prepare a mitigation plan outlining the measures for protecting the environment including institutional arrangement and environmental monitoring;
iv) To identify critical environmental attributes required to be monitored subsequent to the implementation of the proposed project; and
v) To carry out consultation with local people so as to identify the public perception of the project.
vi) Borrower (i.e. PTCUL) will submit environmental monitoring reports to ADB at regular intervals.

2.0 DESCRIPTION OF THE PROJECT

17. **The Project.** The proposed 220 KV Double Circuit Transmission line from Tapovan to Joshimath will be financed under Tranche 4 of the ADB assisted Uttarakhand Power Sector Investment Project. The location map of this line is presented as **figure 2.1 and figure 2.2**. For the 220 KV double circuit Lata-Tapovan – Joshimath transmission line, this IEE document is based on the data contained in the Environmental and Social Impact Assessment Report submitted by PTCUL on Feb 01, 2005 and this revised report has been prepared by the IA directly. The Environmental Categorization for the sub-project transmission line is **Category B**.

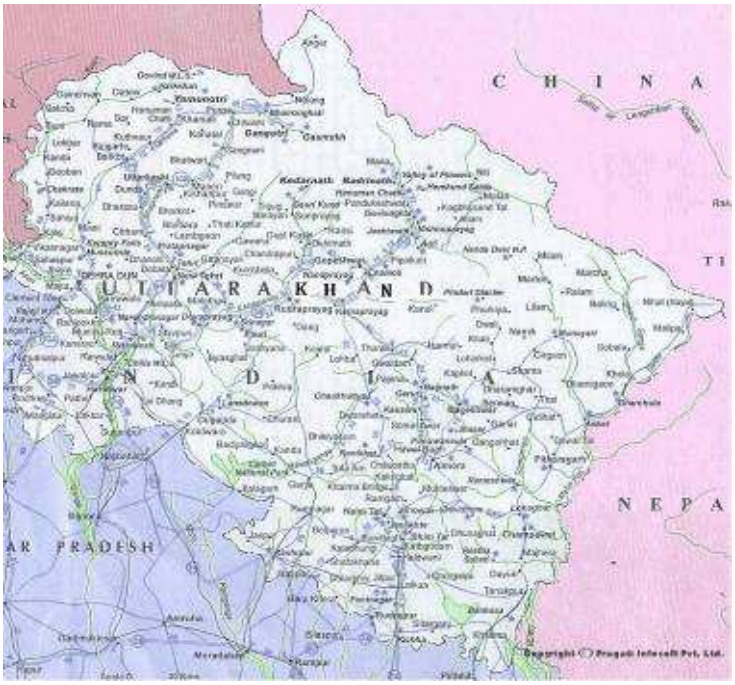


Figure 2.1: Location map of the proposed Site

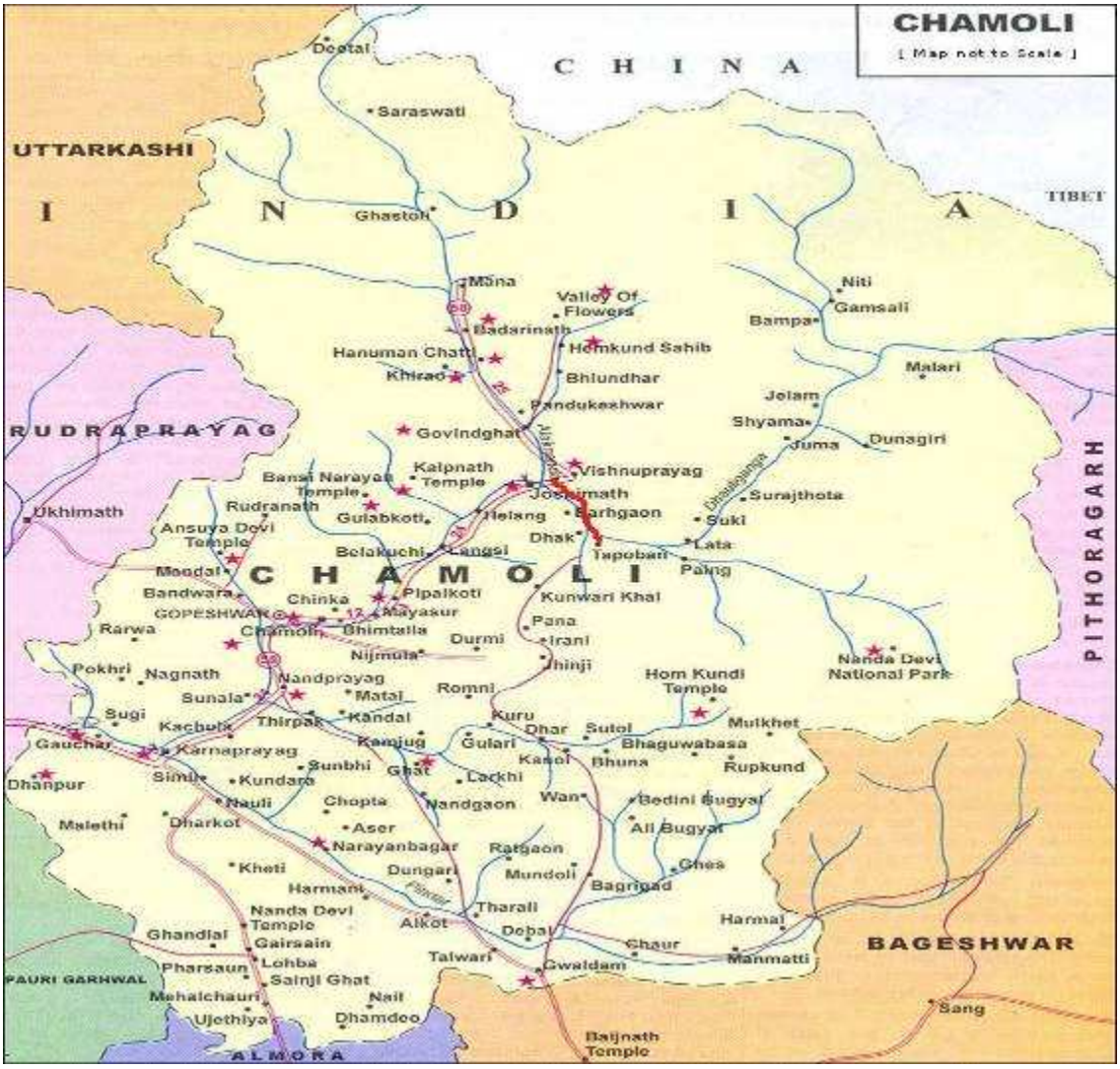


Figure 2.2: Location map of the proposed line

18. **Need for the Project:** The proposed transmission system has been envisaged in consultation with Central Electricity Authority (CEA), the GOI nodal agency for Energy planning and other beneficiary constituents for the reliable evacuation of 171 MW of Power of M/s. NTPC at Tapovan HEP for further distribution among beneficiary states. Some units of this project are scheduled to be commissioned within 11th plan followed by subsequent units at some intervals.

19. A unified Transmission system having regional/ state level collaboration for power evacuation from this project will be shared by Uttarakhand and other Northern region states such as Delhi, Himachal Pradesh, Punjab, Rajasthan, Haryana and Uttar Pradesh. These will be connected through the proposed Intra-State transmission system and through existing lines/interconnection to other regions. Techno-Economic clearance of the proposed project has been obtained from Central Electricity Authority (CEA) vide letter no. 12A/G/2006-SP&PA/39 dated 09/01/2007(enclosed) and proposal has been examined by Ministry of Power, GoI and found in order vide letter no. 11/5/2004-IC dated 4th May, 2007 **(Annexure-1, Annexure-2).** This project has been approved by the BOD of PTCUL on 29.09.05 and Detailed Project Report of this project has been approved by the CEA vide letter number 12A/G/SP&PA-08/572 dated 24/06/09 (**Annexure-3)**.

20. **Project Location:** The project falls under the Chamoli District of Uttarakhand. It lies in the North of Chamoli district. The project route alignment is shown in the **figure 2.3**.

Figure 2.3: Route Map of 220 KV D/C Tapovan to Joshimath Line showing the alternatives out of which alternative one is best suitable.

21. For the 220 KV Double Circuit transmission line between Tapovan to Joshimath line this IEE document is prepared on the data contained in the Environmental and Social Impact Assessment Report submitted by PTCUL on Feb 01, 2005.

22. There is no change in the physical condition and location, land acquisition, forest land etc. as mentioned in the report prepared earlier in Feb 2005 as the terrain will remain the same. National Park and dense population (ROW) has been avoided by selecting the route alignment.

23. This sub-project is the part of the Tranche 4 of the ADB Uttarakhand Power Sector Investment Project. This report depicts the details of IEE for proposed new 220 KV D/C Tapovan to Joshimath Line for which the survey has already been completed. The IEE report describes the environment in the State of Uttarakhand, where the proposed transmission project is to be located and various measures that will be taken by PTCUL during design, construction and

maintenance stages altogether to avoid and wherever not possible to mitigate the effect on environment of various construction activities.

24. **Salient features of the scheme:**

a. Line length approximately 12.2 km

b. The line will be constructed on self supporting latticed type steel towers with ACSR Zebra conductor in bundle of four conductors per phase. Due to corridor constraints and surge impedance loading consideration and quantum of power of 2,500 MW in N-1[1] condition, Twin bundle conductor has been selected.

25. **Salient features of the construction:**

a. Tower body extensions of +3, +6, +9 M & leg extensions of +1.5, +3, +4.5 M are envisaged.

b. The leg extensions will result in reduced benching and excavation volumes.

c. The GIS survey route alignment, soil investigation; tree enumeration etc. on the line route has been completed by PTCUL. The estimate for the line has been based on this survey.

d. The system study for the evacuation plan has been carried out by the PTCUL's Mi-power software.

e. The tower, its body, leg extension and foundation designs for normal, wet/SFR, DFR & HR for ACSR Twin Zebra conductor have been completed.

26. The details of Technology features of the 220 KV double circuit Lata-Tapovan – Joshimath transmission line are given in **Annexure – 6**.

27. **Implementation Schedule.** The proposed project involves construction of approximately 12.5 Km. 220 KV D.C. line from Lata-Tapovan P/H – Joshimath S/s. Since the construction of substation does not involve, hence the land acquisition is not involved. In case of construction of new transmission line, the project would involve administration formalities, survey work, forest case and clearance, design and engineering of hard wares, tender for procurement, civil work related to 12.5 Km line, erection of towers, line stringing and testing and commissioning. All the above work is expected to take total 720 days after the award of contract. The total project cost is anticipated to Rs. 33.47corers. . The Implementation Bar Chart is attached as **Annexure – 4.**

[1] EXPLANATION of N-1 condition: "In the event of outage (Breakdown/Shutdown) of one circuit, the other circuits should be capable of evacuating the entire power."

3.0 DESCRIPTION OF ENVIRONMENT

28. The description of the surrounding environmental conditions around the proposed transmission line areas is given briefly in following sections.

3.1 Physical Resources and Environmental Settings

29. The area along the proposed transmission line runs into ridges and valleys. Most of the terrain is mountainous consisting of high rise ridges, hills and plateaus and flat pieces of land are rare. The soil found is alluvial soil. The transmission line route alignment will cross the Dholiganga River near between village Badagaon and Dhak.

30. **Chamoli district:** Chamoli lies in the Central Himalaya and constitutes a part of the celebrated 'Kedar Kshetra'.The District Chamoli is surrounded by Uttarkashi in North-West, Pithoragarh in South-West, Almora in South East, Rudraprayag in South-West and Tehri Garhwal in West. The geographical area of the District is around 7,520 sq. Kms.

31. The project site is forest land, civil forest land and uncultivated barren. The proposed site is 21 Km away from the NH-58 connecting Haridwar to Rudraprayag and Chamoli Districts. All the major utilities like Fire station, Hospital, Police station, Schools, Colleges etc. are available in the Chamoli District. The district Headquarter is at Gopeshwar, total district area is 7,951 Sq. Kilometers; total population is 3,70,359 and having a literacy percentage of 76.23%.

32. The study area is characterized by reserved forest, civil soyam forest and unirrigated crop land. The area comprised mainly forest, soyam forest, non agriculture, agriculture fields and thick vegetation bushes in between. The study area runs into series of ridges and valleys. Each is leads to another coiling up in seemingly unending chains. Most of the terrain is mountainous consisting of high rise ridges, hills and plateaus and flat pieces of land are rare. The soil found is alluvial soil.

33. **Study Area – Transmission line:** The study area comprises of mainly scrub, bushes and trees. The temperature varies maximum of 36^{o}C to minimum of 0^{o}C. The average rainfall in the area is 1,547 mm. The soil in the study area is yellowish in color with loamy texture. The geology consists of mixed alluvium and sandstone shale grit and conglomerate. The region consists of entirely medium to high grade metamorphic rocks and is intruded by latter volcanic rocks. The study area is not a flood prone area. The population in the study area consists of mostly farmers and workers.

34. **Seismicity:** The study area falls under Zone IV and slightly above on modified Mercalli Intensity Scale, where the maximum intensity could reach VIII which is not the most severe seismic zone and is referred as Medium Damage Risk Zone.

35. **Climate:** As the elevation of the district ranges from 800 mts. to 8,000 mts. above sea level the climate of the district very largely depend on altitude. The winter season is from about mid November to March. As most of the region is situated on the southern slops of the outer Himalayas, monsoon currents can enter through the valley, the rainfall being heaviest in the monsoon from June to September.

36. **Soil:** Soil is the thin upper most layer of the earth’s crust. It supports all forests, grass lands and crops from which all living creatures on earth derive their food. In the hilly mountainous Himalayan region the soils found are mountain soils. These soils include peat, meadow, forest and hill soils. The soils found at the project site are entisols comprising mainly

combination of younger alluvial and old alluvial soil. The soil of the area is basically the product of fluvial process of the river Alaknanda and its tributaries. The alluvial soil of the area is dry, porous, sandy, faint yellow and consists of clay and organic matter. It is slightly acidic in reaction. The new alluvial is less acidic as compared to the old alluvial. Its pH value varies from 5.5 to 9.0 the old alluvial on the other hand occurs in the upper and middle parts of the valleys. These deposits contain alternating beds of pebbles, gravel or boulder with loose sand and clays. The old alluvial have relatively high percentage of acid and soluble Mg accompanied by Ca. The pH value ranges between 4.2 and 5.5. In certain parts, both the old and new alluvial are so combined that it is difficult to distinguish them.

37. **Geology and Minerals:** A fairly thick group of sedimentary rocks occurs ranging in age between Eocene and Pieistocene period of geological succession. The most part along the alignment and the valley portion along the Bhagirathi river area are covered by thick alluvial deposits belonging to sub-Recent and recent periods. The thick sedimentary rocks of the Tertiary period have been observed on patches along the alignment and found to be over thrust due to the tectonic forces. Overall the study area along the alignment is dominated by mainly the unconsolidated sedimentary deposits consisting of alluvial. The study falls under Zone IV which is equivalent to seismic intensity VIII on Modified Mercalli Intensity Scale. This is not the most severe seismic zone and is refer as medium damage risk zone.

3.2 Ecological Resources

Flora

38. **Ferns:** Over 120 species of fern grow in damp ravines, Covered rocks and tree trunks. Fueli Ferns grow abundantly in the monsoon month of July, August and September. The forest of the district can be divided into the botanical divisions listed below-

39. **Himalayan Sub-tropical Pine:** These forests are wound between the heights of 910 m. to 1,825 m. throughout the district. The trees which are commonly found in these forests are *Anyar, Caryoptexis wallichii, Rubus ellipticus, Rhus semialata and Desmodiumsamuense* on the northern aspect of the hills.

40. **Moist Temperate Seral Forest:** These forests are found between the altitudes of 1,200 m. to 2,150 m along the streams and newly formed beds with undergrowth of *Sarococca preuniformus spp. Barberis spp. and Ainslea aptera* especially in western part of the Joshimath and the eastern part of Karnprayag tehsils.

41. **Banj Oak Forests:** These are found between the heights of 1,825m and 2,450 m but at place their limits ascent up to 2,600 m. on the southern aspect and descend to 1,200 m. on the northern aspect of the hills. Trees commonly met with in these forests are *Buras, anyar, carpinus, viminea and Ilex odorala*.

42. **Oak Scrub Forests:** These forests are found in the localities of *banj oak* forests near the habitations. Sometimes due to excessive damage, *banj oak* is replaced by scattered bushes of *Barberis Chitriya, Basiatice and Cretaegus cronulata*.

43. **Tilonj Forests**: These forests are found between the same altitudes as those of the oak and are associated with *the lauraceous, ilex, betula alnoides*, etc. The shrubby under growth consist of *Robus spirea, indigofera* and *Ainslea aftera*.

44. **Lower Blue Pine Forest:** These forests are found between the heights of 1,825 meters and 2,600 meters Especially in Tehsils Chamoli and Karnprayag having *Euscholtzia polistachya, Vibumun foctens, Rosa microphylla, Vibumun cotonifoliun, Exaecarea acerifolia*, etc. as shrubby under growth.

45. **Dry Coniferous Forest:** On deep soil between the altitude of 1,825 mts and 2,600 mts over a small area on all aspects except the steep southern slopes with quartzitic sub soil, mainly Deodar is found associated with *Kharasu, Akhrot, Kharif, Syan and Maira*, The under growth consist of shrubs such as *Aveliatryflora, Sumiperous, Macropoda, Prunus jacqumontii, Ribes grosulaia* and *Rosa scricea*, the shrubby under growth consisting of *Achyranthes bidentata* and *Aralia cissifolia*

46. **Moist Temperate Deciduous Forest:** These forests are found on deep moist soils between the heights of 1,825 meters and 2,750 meters along hill stream. The top canopy consist of *pangar, kanchula, maira sour, akhrot, dalla and kabasi,* the shrubby under growth consisting of *viburum spirea, sorbiflora barberis supp. Strodilanthas wallichii* , etc.

47. **Cypress Forests:** These forests are found between the heights of 2,125 meters and 2,600 meters on rocky slopes and precipitous ground mixed with *tilong, kali, Corpinus ninerea, Eunonimus pendulus, Ilex, Machilusdutti*, etc.

48. **Kharasu Forests:** The *Kharasu* forests are found between the heights of 2,450 meters and 300 meters mixed with *kanchula, pangar, Saur and burans*. The shrubby undergrowth consists of *Rosa scricea, Rosa macrephylla, Viburum foeten, Contoneaster ocuminate, Ribes glaciaia* and *ringals.*

49. **Western Oak Forests:** These forests are commonly found on the southern aspect of hills between the altitudes of 2,450 meters and 2,900 meters mixed with *Kharasu, tilonj, pangar, kanchula, kabasi,* etc. the chief undergrowth being *Rhamnus purpurrea, Wickstroemia cancacenda, Rosa macrophylla, Skimmia bursola, Rubus niveus*. Among creepers which are found here are Vitis *semicordata, Schizandras grandiflora* and *Hedera helix*.

50. **Dry Temperate Deciduous Forests:** These forests consisting of *kabasi trees* are found between the heights of 2,450 meters and 2,750 meters in the northern part of the district, *Lonicara spp.* and *Rosa serecea,* being the shrubby undergrowth.

51. **Temperate Hippophae Scrub Forests:** These forests consisting of ames scrubs, are found between the heights of 2,275 meters and 3,200 meters n gravel beds along the banks of the streams mixed with *gadbhains*.

52. **Kharak Forests:** The forests are found above the altitude of 2,215 meters and have practically no tree growth except the *Rumex nepalensis* undergrowth.

53. **Ringal Forests:** These occur above the height of 2,425 meters mixed with high level *oak* and *coniferous* trees.

54. **Alpine Fir Birch Forests:** These grow better between the heights of 2,900 meters and 3,500 meters in all aspects of the hills except in the moist areas. The plants growing in these forests are fir, birch and Rhododendron. The ungrowth consists of *Pyrus folilosa, Cotoneaster acuminata, Rosa sericea, Ribes glaciala, Ribes rubrum, Lonicera spp.* and *Smilex vaginate.*

55. **Birch - Rhododendrons Forests:** These forests are found between the altitudes of 2900 meters and 4125 meters and in them are found the stunted *bhuj* and rhododendrons with *Pyrus foliolose* as 90 percent of the undergrowth. Other plants which grow here are *Rubus niveus, Swilax vaginate, Cotoneaster spp. Lonicera spp.* and *Pologorum vaccinifolium*.

56**.** **Alpine Scrub Forests:** Between the altitudes of 3,350 meters and 4,275 mts and with a rainfall above 1,016 mm. evergreen scrubs are found consisting of *Rhododendron asthopogen, Junipexus recurva, J. communis, Lonicera parviflora,* etc. In the dry inner ranges having a rainfall less than 255 mm grow exeophytic dwarf shrubs consisting of *Eurotia ceratoides, junipexus pseudosabina, J. communis* and *Caranga sp. ad Artimisia spp.*

57**.** **Alpine Pastures:** Between the heights of 2,050 meters and 2,975 mts on the northern aspect of the hills and between the altitudes of 2,500 meters and 4,425 meters on the southern aspect of the hills the land is covered with short grasses and herbs, which are used as pasture where professional graziers bring their cattle.

58**.** **Other Forests:** In the warm valleys of the extreme southern part of the district some species of the trees of the plains such as *mango, jamun, pipal, banyan and shisham* grow here and there up to an altitude of about 915 meters The 'Sal' which is found up to a height of 1,220 meters, is seldom seen north of the river Pindar but it is usually not allowed to stand near cultivated tracts because it is said to attract white ants. The Tun and the Kharik, or Kharak are to be seen growing up to an elevation of about 1,250 meters which is also suitable for the growth of haldu and dhauri. Carefully proctected by the cultivator on the pugar (terrace wall of the field), the leaves of the bhyunl tree afford excellent fodder for the cattle.

59. In the Alaknanda valley, the bases, slopes, gorges and tops of the hills up to the height of 1,067 meters are well wooded with high trees such as *catechu, bahera, har (or harara), amaltas, bel, kachnar and dhak*. A large variety of creepers some of which have broad green leaves also thrive I in the vicinity of the trees.

60. From about 1,220 mts to 1,829 mts, Chir abounds and above this level oak and chimul are found, the former being a hard wood, is used for making agricultural implements and the latter for fuel. The Chir wood is commonly used for building purposes in the district, and its logs and sleepers are floated down the Alaknanda to the plains. Chir is also tapped for resin but quantity of turpentine produced in the district is small.

61. Above an elevation of 3,439 meters *Moru or Tilonj and Kharasu* grow and their timber is also used for manufacturing agricultural implements. The pangar or horse chestnut and the maple are found up to a height of 3,048 meters, especially in the Riniganga valley. The wood of the latter is used for making drinking vessels and bowls known as lahauri-doba.

62. *Spruce, silver-fir, kail and kharasu, oak* and some trees of small economical value are the principal trees found in the forests of the upper Himalayas (above 3,048 meters). Fine forests of silver-fir, kail and pine occupy the slopes on the left bank of Alaknanda from Pipalkoti to Joshimath. The Surai of Himalaya sypress and the Himalayan cedar forests which lie along the Alaknanda in patti Talla Painkhanda and the Neoza pine forests near Tapovan along the Dhauli, are fairly extensive and have trees of *thuner (yew), papari (boxwood), Kharasu and deodar*. The birch grows up to an elevation of about 3,658 meters above which lies an expanse covered with bush and grass variegated in summer by Alpine forests of many colours. The

places of richest vegetation are between the elevation of 2,134 meters and 3,658 meters where the epiphytic form of flora, ferns, mosses, creepers and many varieties of flowers make the region beautiful especially after the rainy season. *Colquhounia* is abundant on the main Badrinath and Trishul ranges and ringals form the undergrowth of the forests uo to an altitude of 2,286 meters

63. Many medicinal blooms, herbs and plants, greatly valued in Ayurveda grow in the district. Most of the flowers and plants come up during the rains but wither away from October to May, imparting the characteristic brown color to the countryside during the winter. In these parts *Senecio rufinervis*, a perennial herb forms dense undergrowth to the exclusion of most other plants. Aromatic plants are found in abundance at higher altitudes. The groves in the district covering an area of 430.72 hectares are mostly in the warm deep southern valley and consist of chiefly of mango, guava, banana, papaya and jackfruit trees but apple, pear, peach, plum, apricot, cherry, chestnut, mulberry, strawberry, litchi and loquat also flourish. Other cultivated trees of the district include species of citron of which the chief is Malta, lime, and sweet-lime and orange which, though thriving in the warm valleys can also be grown up to a height of about 1,677 meters. The vine is raised in groves where the rains are not too heavy.

64. The chief varieties of timber trees found in the groves of the district are *pine, tun, deodar* and many varieties of walnut. The timber of the *deodar* tree is considered to be sacred and is noted for durability and resisting insect, pest and dry rot. It is great demand for making doors and roof f temples. In the past a very fine grove of deodars surrounded the Binsar temple in the south-western extremity of Tehsil Karanprayag.

65. **Fauna:** The district is rich in fauna and has been the habitat, from time immemorial, of a large variety of mammals, various species of bird, reptiles and fish. In the Mahabharata, there is mention of deer hunting in this area by the Pandu, the father of Pandavas, who is said to have taken up his abode in Pandukeshwar. About the middle of the Nineteenth century many villages were deserted because of the dread of wild animals. Tigers are found up to an elevation of about 3,048 meters and in the past haunted the big forests of Chandpur and Dudhatoli, occasionally reaching the thick forests of Vasuki and Tungnath. The number of wild animals has considerably decreased on account of their destruction and thinning of the forests.

66. **Animals:** The cat family is abundant in these mountains and would include the Tiger, Panther, Civet cat, Leopard cat and Jungle Cat. Relatives of the domesticated dog would include the Himalayan Silver Fox and the Jackal. Various species of deer including the Musk Deer and the Barking Deer roam in the forest. Sambhar and Gural as well as the Bear and the Porcupine can also be seen. The flying mammal, the Bat too is common. Among the most adorable animals in this region are the Chipmunk, the Rhesus Monkey and the Flying Squirrel.

67. **Birds:** Over 400 varieties of birds have been recorded in the Himalayan region. The shore Bird- Musphekraa forest host, the Jewel Thrush, Black headed Oriole, Black headed yellow Bulbul, Rosy Minivet, Laughing Thrush, Golden Backed Wood pecker and the Blue fly Catcher, Wintering waterfowl include the Goosander, Brahminy Duck & Green Shank, Grey headed Fishing Eagles may also be seen by the river edge. After ascending over 5,000 feet, the Woodpecker, Thrush & Warbler become more common, between 8,000-11,000 feet, Grosbeak, Rock Thrush, Crested black Tit & red headed Laughing Thrush are a plenty.

3.3. Human and Economic Development.

68. This section discusses the baseline scenario of the socio-economic environment in the study area. The issues discussed are population, education, employment, community services and transportation. For assessing the baseline socio-economic data, information from secondary data sources i.e. the 2001 census data has been considered. The district-wise population and forest details are given in **Table- 3.6.1** and **Table- 3.6.2.**

69. **Health Environment:** The project site is situated in hilly region in very good climatic condition; there is no air, noise, water and industrial pollution. Health environment is very good as both men and women are hard working by nature and fruits & herbs available locally are the part of their eating habits.

70. **Historical, Cultural and Archaeology Sites/Places.** There are no archaeological, historical importance sites or protected monuments in the study area along the alignment.

71. **Agriculture:** The cultivation in the Pauri district is carried on largely by making terraces on the sloping hillsides. Sheep rearing for production of wool and meat, orchard raising, spinning and weaving of wool and other cottage industries etc. are source of income but it does not have much potential. Horticulture is another source of income which has enough potential. In the summer's season, tourism is one of the sources of income.

Table 3.6.1 District wise Geographical Area, Population, Forest Area, Per Capita Forest Area, Forest Area as Percentage of Geographical

Sl. No.	Name of District	Geographical Area (Sq. Km.)	Population	Under Forest Department	Under Revenue Department	Panchayat Forest under Van Panchayats			Under Private/ Other Agencies (Municipal, cantt, Central Deptt etc.)	Total Forest Area	Per capital Forest Area (Sq. km.)	Forest area under forest deptt. As per cent age of geographical area	Total Forest area as percentage of geographical area
						Area Completely recorded as Van Panchayat	Area under control of Van Panchayat but recorded in Reserved forest of Forest deptt.	Total					
1	Chamoli	8,030	3,70,359	2,817.199	447.174	1,786.706	0.000	1,786.706	9.924	5,061.003	0.013665	35.08	**60.03**

(Uttarakhand Forest Statistics 2006-07)

Table 3.6.2: Analysis of Forest Based on the Satellite Imageries done by Forest Survey of India

Sl. No.	Name of District	Geographical Area (Sq. Km.)	Very Dense Forests	Moderate Dense Forests	Open Forests	Total	Forest cover as percentage of Geographical Area	Recorded Forest Area as percentage of Geographical Area
1	Chamoli	8,030	406	1,558	734	2,698	33.6	63.03

(Uttarakhand Forest Statistics 2006-07)

3.4 Social and Ecological Resources

72. The study area along the alignment falls in the Chamoli district.

73. **Population:** The study area falls in the Chamoli district of Uttarakhand state. Population details as per the 2001 census are as below:

S. No	District Name	Male	Female	Total
1.	Chamoli	1,83,033	1,86,165	3,69,198

Age Groups

S. No.	District Name	0-4 Years	5-14 Years	15-59 Years	60 Years and above
1.	Chamoli	37,744	92,976	2,04,492	35,147

74. **Education:** Chamoli has an average literacy rate of 76.23% higher than the national in average of 59.5%. Male literacy is 75.43% and female literacy is 89.66%.

District	Junior Basic Schools	Senior Basic School	Higher Secondary School	Degree Colleges PG Colleges	ITI	Poly-Technic
Chamoli	979	223	126	07	05	01

Source- National Information Center

75. **Employment:** More than 37% of the people of Uttarakhand are defined as workers in relation to the rest of the population. There is a percentile increase in the proportion of marginal workers from six to 10% from 1991 to 2001 (and decline in the proportion of main workers). There is another aspect too; the highly qualified people of Uttarakhand leave the State for better employment/ business opportunities. “This is adversely affecting the State in launching any ambitious scheme due to the paucity and unavailability of indigenous human resources.” But now due to development of Basis Infrastructure and Industrial Policies of GoU the situation is reversing and rate of employment has increase. Moreover, 70% employment in the state industries has been reserved for the people of Uttarakhand.

76. **Employment**

District	Total Workers	Main Workers	Marginal Workers	Non-Workers
Chamoli	16,4,729	96,900	67,829	2,05,630

Source- Census of India 2001

77. **Community Services**

District	Allopathic	Ayurvedic	Homeopathic	Primary Health Centers	T.B. Hospital	Family Welfare Centers
Chamoli	29	51	05	12	01	91

Source- National Information Center

78. **Transportation:** Chamoli is about 153 Km. and Tapovan is about 204 Km. from Rishikesh on National Highway 58. There is an airport at Jollygrant which is 17 Km. from Rishikesh. The road network in the study area can be described as moderate. The road is in moderate condition as there are heavy rains in the project area. The villages in the study area connected by branch roads and semi constructed roads. The road condition in the interiors is rather bad condition and for some propose tower erection sites do not have proper access roads.

79. **Economic Scenario:** Both Rabi as well as Kharif crops are harvested. The main Kharif crops are paddy, small millets and potato and Chief Rabi crops are wheat and barley. In the project area 88% of the land is either covered by forests or is barren and uncultivable. The land is low in fertility except in the valleys and even land is too few and far between. Shorter agricultural season, low temperature, high altitude, smallness of land holding, perpetual problem of soil erosion due to steep gradients etc. are other inhibiting factors effecting agriculture. The cultivation in these areas is carried on largely by making terraces on the sloping hillsides. Sheep rearing for production of wool and meat, orchard raising, spinning and weaving of wool and other cottage industries etc. are source of income but it does not have much potential. Horticulture is another source of income which has enough potential.

80. In the summer's season, tourism is one of the sources of income. The major tourist destinations are Auli, Badrinath, Charanpaduka, Gopeshwar, Hemkund Sahib, and Tapovan Nanda Devi National Park. Triyugi Narayan Temple, Yamunotri Temple and Yogadhyan Badri Temple are the famous temples. At a distance of 16 km from Tapovan is the Auli. It is one of the few places in India offering winter sports like Ice Skiing. One has to go to Auli by a ropeway from Vishnugad. The Nanda Devi National Park is 23 km away from the town of Vishnugad. One can trek to the park, which abounds in rare flora and fauna. The tourists can go to Badrinath, Kedarnath, Chopta, Valley of Flowers and Hem Kund Sahib Gurudwara on excursion from Vishnugad.

81. **Health Environment:** The project site is situated in hilly region in very good climatic condition; there is no air, noise, water and industrial pollution. Health environment is very good as both men and women are hard working by nature and fruits & herbs available locally are the part of their eating habits.

82. **Historical, Cultural and Archaeology Sites/Places:** There are no archaeological, historical importance sites or protected monuments in the study area along the alignment.

4.0 PTCUL's APPROACH FOR ROUTE SELECTION

83. **ROUTE SELECTION-(ASSESSMENT & MANAGEMENT PROCESS):** At the planning stage itself, one of the factors that govern the establishment of the transmission system in the state is the infringement of forest area and scarce land. Wherever such infringements are substantial, different alternative options are to be considered. While identifying the transmission system for a generation project or as a part of state power grid, preliminary route selection is done by PTCUL based on the Topo sheets of survey of India and Forest Atlas (Govt. of India's publication);

84. During route alignment all possible efforts are made to avoid the forest area infringement completely or to keep it to the barest minimum. Whenever it becomes unavoidable due to the geographical locations/terrain, mitigation costs involved towards avoidance needs to be worked out.

85. 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 habitation.
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, Biosphere reserves and eco-sensitive zones;The line route does not infringe with area of natural resources.

86. **Alternatives for Transmission Line Alignment.** In order to achieve this, PTCUL has undertaken route selection for individual transmission lines in close consultation with representatives from State Forest Department, the Ministry of Environment and Forests and the Department of Revenue. Although under National law, PTCUL has the right (Indian Electricity (Supply) Act, 1948, Section-42) 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 principle, alignments are generally cited 3-5 km away from major towns, whenever possible, to account for future urban expansion.
- Similarly, forests are avoided to the maximum extent possible. 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.

87. In addition, care is also taken to avoid Protected Parks/Forests, Bird Sanctuaries and any other forest area rich in wild life.

88. Keeping above in mind the various routes of line, the transmission system has been so aligned that it takes care of above factors. As such different alternatives were studied with the help of Govt. published data like Forest Atlas, Survey of India topographical maps etc. to arrive

at most optimum route which can be taken up for detailed survey and assessment of environmental & social impacts for their proper management.

89. At different tower locations for its protection retaining/revetment walls shall be constructed in which weep holes shall be provided along-with a mesh so that ground runoff water may pass through this mesh through weep holes after getting duly filtered.

90. **Figure 2.3** gives the route alignment of 220 KV D/C Tapovan to Joshimath transmission line for which, the following **Table 4.1** gives the description of alternate alignment.

Table 4.1 Evaluation of route alignment alternatives of 220 KV D/C Tapovan to Joshimath transmission line

Sl. No.	Description	Alignment-I	Alignment-II	Alignment-III
1	Route Particulars			
i)	Length	12.2 Kms	13.0 Kms	13.5 Kms
ii)	Terrain	100% Hilly	100% Hilly	100% Hilly
a	Hilly/ Plain In (Kms) %	60% / 40%	65% / 35%	65% / 35%
b)	Agriculture	15%	10%	10%
c)	Wet/ Marshy	–	–	–
d)	Estuarine	–	–	–
e)	Other type of land	–	–	–
2	Environmental Details			
i)	Name of District / District details (through which transmission line Pass)	Chamoli	Chamoli	Chamoli
ii)	Population of district	370,359	370,359	370,359
a)	Details of poverty line (In Rs.)	Rs. 3000 /-	Rs. 3000 /-	Rs. 3000 /-
b)	No. of People / Percentage of people below poverty line	35%	35%	35%
iii)	Town in Alignment (nearby)	Vishnuprayag, Badagaon, Dhak	Vishnuprayag, Badagaon, Dhak	Vishnuprayag, Badagaon, Dhak
iv)	House with in ROW	Nil	Nil	Nil
v)	Forest in Km. / Ha	13.2 Kms / 29 Ha	13.65 Kms / 30 Ha	13.4 Kms / 28.6 Ha
a)	Type of forest: Reserve / Protected / Mangrove / Wild life area / any other environment	Reserve Soyam	Reserve Soyam	Reserve Soyam

Sl. No.	Description	Alignment-I	Alignment-II	Alignment-III
	sensitive area	Private	Private	Private
b)	% of Forest	60.03	60.03	60.03
c)	Type of Fauna & Flora	Jungle fox, Cat, Bhutia Dog, Leopard, Jackol, Sambhar etc. Trees, Chir, Uttis etc.	Jungle fox, Cat, Bhutia Dog, Leopard, Jackol, Sambhar etc. Trees, Chir, Uttis etc.	Jungle fox, Cat, Bhutia Dog, Leopard, Jackol, Sambhar etc. Trees, Chir, Uttis etc.
d)	Endangered species if any	Nil	Nil	Nil
e)	Historical / Cultural monument	Nil	Nil	Nil
f)	Any other relevant information	Nil	Nil	Nil
3	Consumption cost			
i)	Crop	Extend of damage can be evaluated during detailed survey		
ii)	Forest (Approx. no of trees)	1000	1050	1500
4	No. of Crossing			
i)	Railway	No	No	No
ii)	Trans. Line	No	No	No
iii)	River Xing etc.	1	1	1
5	Construction Problem	Forest Clearance, no other specific problem	Forest Clearance, no other specific problem	Forest Clearance, no other specific problem
6	O&M Problem	Minimum	Moderate	Moderate
7	Overall Remarks	Best Suitable	_	_

91. **Reasons for selection of final Route:** Considering the various reasons based on information in the table **Alignment – I** is best suitable. It involves lesser forest and minimum ROW problems, hence, selected for detailed survey as final route.

5.0 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

Environment Impacts and Mitigation Measures

92. **Environment problems due to project location and design:** Potential adverse environment impacts associated with transmission lines has been avoided or minimized through careful route selection. The following factors have been incorporated while selecting the alignment. For the selection of the optimum route, consideration was given to ensure that route:

(i) Minimizes human resettlements
(ii) Does not affect monuments of cultural or historical importance
(iii) Does not create a threat to the survival of any community with special reference to tribal communities:
(iv) Does not affect any public utility services like playgrounds or schools:
(v) Does not pass through any sanctuaries, national park, etc, and
(vi) Minimizes damage to existing forest resources.

93. The alignment is sited 3-5 km away from major settlements, whenever possible, to account for future urban expansion. Forests areas and thick vegetation areas are avoided wherever possible; however route alignment passes through forest area. Alignment in this project has avoided wetlands and geologically unstable areas, which can also pose foundation related problems.

94. Land values are not expected to be affected, as the selected transmission line route generally passes through forest area, uninhabited areas and cultivated lands. According to the Electricity (Supply) Act, 1948 no land acquisition is required for placing transmission towers on private land. However any damage to the crops during the construction phase of the project will be duly compensated. Associated impacts on agricultural land will be restricted to the construction phase and will be temporary in nature. Agricultural land will be lost permanently at the base of the transmission tower. After construction, Agricultural land within the transmission corridors can be used again for farming purpose.

95. **Environmental problems associated with Construction and Operation Stage.** The project activities during construction phase will involve clearing of trees along the route alignment wherever required, excavation for installation of towers, erection of towers, civil works related to transmission line and line stringing. During the operation phase, most of the construction phase impacts will get stabilized and the impacts will be restricted only to the operation and maintenance of the project.

96. The impacts on the environment from various activities of the project can be categorized as follows:

- Impact on Physical Resources
  - Impact on Topography
  - Impact on Climate
- Impact on Environmental Resources
  - Impact on Air Quality
  - Impact on Noise Levels
  - Impact on surface Water Quality
  - Impact on ground Water Quality

- Impact on Soils and Geology
- Impact on Ecological Resources
  - Terrestrial Ecology
  - Wild Life
  - Aquatic Ecology
- Impact on Human Environment
  - Health and Safety
  - Agriculture
  - Socio-economics
  - Resettlement and Rehabilitation
  - Cultural sites
  - Traffic and Transport
  - Interference with other utilizes and traffic
- Waste Disposal
  - Solid waste disposal
  - Liquid waste disposal

97. The impacts of the project activities on various environmental attributes are discussed in subsequent sections.

Impact on Physical Resources

98. **Impact on Topography:** During the construction of the transmission line, the topography will change due to excavation and erection of tower, fill and cut for the leveling the tower erection place. The most prominent impact on the surface topography will be due to the removing of the trees in the hilly region at the tower erection site and all along the Right Of Way (ROW) for construction facilitation. This will lead to change in the surface features only. The impact will be irreversible as the present features along the ROW will be changed due to presence of the transmission line.

99. No topographical changes are envisaged during the operation phase of the transmission line. The existing access routes will be utilized during the operation and maintenance of the transmission lines.

100. **Impact on Climate:** The study area along the ROW is predominantly forest area, thick patches of vegetation in the project area. However, impact on the climate conditions from the proposed projects both during the construction and operation phases will not be significant.

Impact on Environmental Resources:

101. **Impact on Air Quality:** During the construction phase, the activity would involve excavation for the tower erection, movement of transporting vehicles carrying the construction materials etc. along the haul road (through unbuilt roads, but are not maintained). At majority of locations, movement of vehicle is not possible; from approach road to construction site material will be head loaded or using other means like donkeys and horses etc. All these activities would give rise to emission of dust particles thereby affecting air quality marginally at the site which although will be transitory in nature. Sprinkling of water during excavation will reduce the dust emission to the greater extent.

The construction of transmission line will not have any negative impact on the air quality of the region during the operation phase.

102. **Impact on Noise Levels:** During the construction phase, the major sources of noise pollution are movement of vehicles transporting the construction material and equipment to the site. Since most of the access roads along the alignment are not motor able, material transfer has to be done by non-motorize transport vehicle. The major work of the construction is expected to be carried out during the day time. The noise produced during the construction will have negligible impact on the Villagers as they are too far as already discussed the predominant land use along the most part of alignment is forest area. There will be very limited presence of population being exposed to noise generated during the construction phase.

103. During the operation phase of the project, there will noise from the corona noise from the conductors which will be felt only up to 15 to 30 m area, hence the ambient noise level meets the CPCB standard for residential areas (55 dB(A) during daytime and 45 dB(A) during night time).

104. **Impact on Surface Water Quality:** The construction and operation of the transmission lines will not have any major impact on the surface and ground water quality in the area. Contamination to water bodies may result due to spilling of construction materials and surface runoff from the construction site joining the water body. There may be increase in the turbidity levels in Alaknanda River temporarily where the proposed alignment is crossing and if the surface runoff during construction meets the river. This can be avoided by careful selection of the tower site and the access roads so that the surface runoff does not meet the river. Care shall be taken to locate the temporary construction worker sheds away from the water bodies. Adequate drinking water facilities, sanitary facilities and drainage in the temporary sheds of the construction workers should be provide to avoid the surface water pollution. Provision of adequate washing and toilet facilities should be made obligatory. This should from an integral component in the planning stage before commencement of construction activity.

105. **Impact on Ground Water Quality:** Ground water pollution can take place, if chemical substances and oily waste get leached by precipitation of water and percolate to the ground water table. For transmission line construction activity, no chemical substance or oil is used hence there is no impact on ground water quality.

106. **Impact on Soil and Geology:** The impact on soils will be due to the soil erosion at the tower construction site and along the access routes due to excavation activity and land clearance the erosion prone areas have been minimized while site selection for towers. Leveling and stabilization of tower construction sites will be done after completion of construction activity.

107. Geological impacts are related to damage due to seismic conditions. The study falls under Marcalli intensity scale zone IV where the max. Intensity could reach VIII which is not severe seismic zone. However, foundation design of the towers shall be done considering the probability of occurrence of earthquake at the design stage itself.

108. **Impact on Ecological Resources:** There is no national wildlife park, bird sanctuary, wetland in the route alignment of the proposed transmission line although the study area for route alignment has forest area, thick vegetation. The ecological impacts are briefly describe in the following sections

109. **Impact on Terrestrial Ecology:** The initial construction works along the alignment involves land clearance, cutting, filling and leveling may cause loss of vegetation. This will be irreversible impact. Care has been taken to avoid the thick vegetation as far as possible and tower locations are selected at the hilltops where the vegetation is thin. This will minimize the tree loss. Compensation will be pay to the tree owners in the private areas. Clearing of forest area is involved along the route alignment, hence the compensatory a forestation is required for which clearance will be obtained from the appropriate authority of the forest department and amount for compensation will be paid.

110. There is no sensitive ecological area / protected forest area such as national wildlife park, bird sanctuary crossing the proposed route alignment.

111. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion. However, such impacts would be primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigate measures like paving and surface treatment and water sprinkling.

112. During operation phase corridor along the alignment will be chopped of vegetation and lopping of trees will be done for maintenance purpose. This will also reduce the chances of fires due to electric sparks.

113. **Wild Life:** For selecting the route alignment, wild life travel routes has been avoided as far as possible during the field visits.

114. **Impact on Aquatic Ecology:** The proposed transmission line would cross over the river Kosi and its tributes. No significant impacts on aquatic ecology of the river are envisaged, as there will be careful selection of the tower sites near the river, to avoid the river pollution and disturbance to the aquatic fauna of the area.

Impact on Human Environment

115. **Health and Safety:** Health and safety impacts will be in terms of risk of accidents and exposure to electromagnetic fields along the alignment. The accidents may due to electro-cutting, lightening, fires and explosions. To avoid this, the houses will not be allowed within the ROW of the project. Necessary training regarding safety aspects to the personnel working at the line will be provided by the contractor. Personal protective equipments like safety gloves, helmet, mufflers etc will be provided during construction period and during the maintenance work. First aid facilities will be made available with the labor gangs and doctors called in from nearby towns when necessary. Workers are also covered by the statutory Workmen Compensation Act by the contractor.

116. **Agriculture:** Impact on agriculture would be due to the permanent and temporary loss of agricultural land due to tower location in the agricultural field and loss of crop for access route etc. There will not be any land acquisition for the tower erection. As far as possible the prime agricultural land will be avoided and the construction will be done after crop harvesting.

117. **Socio-economics:** Construction of transmission line will generate local employment, as number of unskilled labors (men/women) will be required at the time of construction activities. Local employment during this period will increase socio-economic standards.

118. **Resettlement and Rehabilitation:** For the construction of transmission line no land acquisition is required, hence, there is no resettlement and rehabilitation is involved in the project.

119. **Cultural sites:** There are no archaeological, historical or cultural important sites along the route alignment; hence the impacts on these sites are not envisaged.

120. **Traffic & Transport:** During the construction phase, traffic disturbance needs to be minimized by avoiding high-density areas, proper traffic signs, ensuring proper access roads and avoiding road blockage.

121. **Interference with Other Utilities and Traffic:** As per regulations enacted by Government of India and Uttarakhand, it is mandatory for PTCUL 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 PTCUL 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. 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 passes near the airport, the towers beyond specified height are painted in alternate orange and white stripes for easy visibility and warning lights are placed on the top of these towers.

Waste Disposal

122. **Solid Waste Disposal**

The solid waste generation will be at the location of the tower erection site which will include metal scraps, wooden packing material etc. Wooden waste and metal scrap will be collected and disposed of in compliance with the Environmental Protection Act, 1986, and applicable regulations and rules.

123. **Sanitary Waste Disposal:** The labour camps at the site of tower erection will be temporary in nature and the human excreta will not be significant to cause contamination of ground water. Those places where most labor will be staying will be near hamlets which shall use the community services for solid waste, water and sanitation. Adequate drinking water facilities, sanitary facilities and drainage in the temporary sheds of the construction workers should be provide to avoid the surface water pollution. Provision of adequate washing and toilet facilities should be made obligatory. This should from an integral component in the planning stage before commencement of construction activity.

124. **Liquid Waste Disposal:** There will be no oil or chemical waste generates during the construction of transmission line, hence no mitigation is required.

125. A summary of the Environmental Management Plan along with the environmental impact matrix and the mitigation measures are given in **Table - 5.1** below.

Table – 5.1: Environmental Impact Matrix

Sl. No.	Environmental attribute	Potential impacts	Nature of impact	Magnitude of impacts			Mitigation measures	Implementation & Monitoring
				Low	Medium	High		
A.	**Physical Resources**							
1.	Topography	Change in the surface features and present aesthetics due to the construction of the project.	Direct/Local/ irreversible		X		The compensatory afforestation of double the area of forest land in ROW will be undertaken by the Forest Department to compensate for the loss on PTCUL expenses to minimize the impact of loss of vegetation as per existing norms under the Forest (Conservation) Act, 1980.	Before construction phase
2.	Climate	No impacts on the climatic conditions	Direct/Local/ irreversible	X			No measure impact on the climatic conditions, hence no mitigation is required	
B.	**Environmental Resources**							
1.	Air Quality	Project will have marginal impact on air quality during the construction period due to increase in the dust emission.	Direct/Local/ reversible	X			Water Spraying at construction site, limited bare soils, maintenance of vehicles etc.	During construction activity
2.	Noise	Noise due to general construction activities.	Direct/Local/ reversible	X			Restriction of noise generating activities at night and use of personal protective equipment like ear plugs, mufflers etc.	During construction activity
		Noise arising from corona noise from conductors	Direct/Local/ reversible	X			Monitoring of possible corona noise to identify and correct problems.	During operational phase
3.	Surface and Ground Water quality	Runoff from the construction site	Direct/Local/ reversible	X			Careful sitting of towers and access roads.	Before and during construction activity
		Domestic wastewater from construction sites	Direct/Local/ reversible	X			Domestic waste treatment by providing septic tank soak pits..	During construction and operation
4.	Soils and Geology	Soil erosion due to tower erecting and clearing of vegetation in the ROW and access roads.	Direct/Local/ reversible				Avoiding sites, which are prone to the soil erosion. Leveling of tower construction sites. Use of few access roads. Rehabilitation and stabilization of disturbed land.	During and after the construction activity
		Damage due to seismic activity	Direct/regional / reversible	X			Site selection and proper tower foundation design considering the geological conditions and seismicity of the area.	Before the construction activity.

C.	**Ecological Resources**							
1.	Terrestrial Ecology	Loss of vegetation	Direct/Local/ irreversible		X		Location of towers at the forest area and thick vegetated area. Selection of few access roads. Compensation to the tree owners. The a forestation two times of the trees cleared along the route alignment will be done by the forest department for which PTCUL will pay the amount to them.	Before the construction phase
2.	Terrestrial Fauna	Disturbance to the local fauna during construction	Direct/Local/ reversible	X			Wildlife routes and their habitats has been avoided as far as possible during the route selection.	Before and during construction phase
		Disturbance to the local fauna during operation	Direct/Local/ reversible	X			Monitoring of line especially for bird strikes during the operation and use of deflectors if required.	During operation phase
3.	Aquatic Ecology	No significant impacts envisaged	Direct/Local/ reversible	X			No mitigations required	Before and during construction phase
D.	**Human Environment**							
1.	Health and Safety	Exposure to electromagnetic fields	Direct/Local/ continuous	X			Alignment route away from the settlement. No houses in the immediate vicinity and will be allowed in the ROW of the alignment. No mitigations required.	Before and after the construction phase.
		Fires, explosion and other accidents at the route alignment of transmission line.	Direct/Local	X			Use of personal protective equipments during construction. By lopping and chopping of trees fire hazards will be avoided during maintenance period. Regular inspection of lines for faults prone to accidents.	During construction and operation phase
2.	Agriculture	Permanent and temporary loss of agriculture land due to tower erection and due to access routes.	Direct/Local/ reversible	X			Avoid prime agriculture land. Assessment of land required and compensation. Construction activity after crop harvesting and selection of few access routes.	Before and during construction phase.
3.	Socio-economics	Beneficial impacts from rural and urban electrification. Job opportunities during construction phase	Direct/regional		X		Unskilled labor and indirect benefits. Overall economic growth of the region.	During operational phase
4.	Resettlement	Resettlement of the house falling along the ROW.	Direct/Local/ reversible	X			Route alignment is selected in such a way that there is no resettlement issue.	Before the construction phase.

5.	Cultural sites	No archaeological, historical or cultural important sites are affected by the construction of the lines.	Direct/Local/ reversible	X			No archaeological, historical or cultural important sites are affected, hence no mitigation required	--
6.	Traffic and Transportation	Traffic congestion due to movement of construction vehicles	Direct/Local/ reversible	X			Avoid high density traffic areas, proper traffic signs at the construction site, ensuring proper access roads	During construction phase
E	Solid Waste Generation	Probability of Surface and ground water pollution	indirect/Local/ reversible	X			Separated wooden and scrap will be collected and disposed of in compliance with the Environmental Protection Act, 1986, and applicable regulations and rules.	During operation phase

6.0 INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MONITORING PROGRAM

6.1 Institutional arrangements

126. The mitigation measures suggested requires monitoring of environmental attributes both during construction and operational phase of the project. PTCUL has set up an environmental cell for dealing with the various environmental issues at both the Corporate and Field levels to monitor and implement environmental good practices.

127. The Environment Management Cell is headed by qualified and experienced engineer who is well aware of the project activities and its impacts on the environment. The engineer has been deputed to give guidance to the personnel and contractors to adopt the environmental good practice while implementing the project.

128. The duties of the Environment Management Cell at the corporate level:

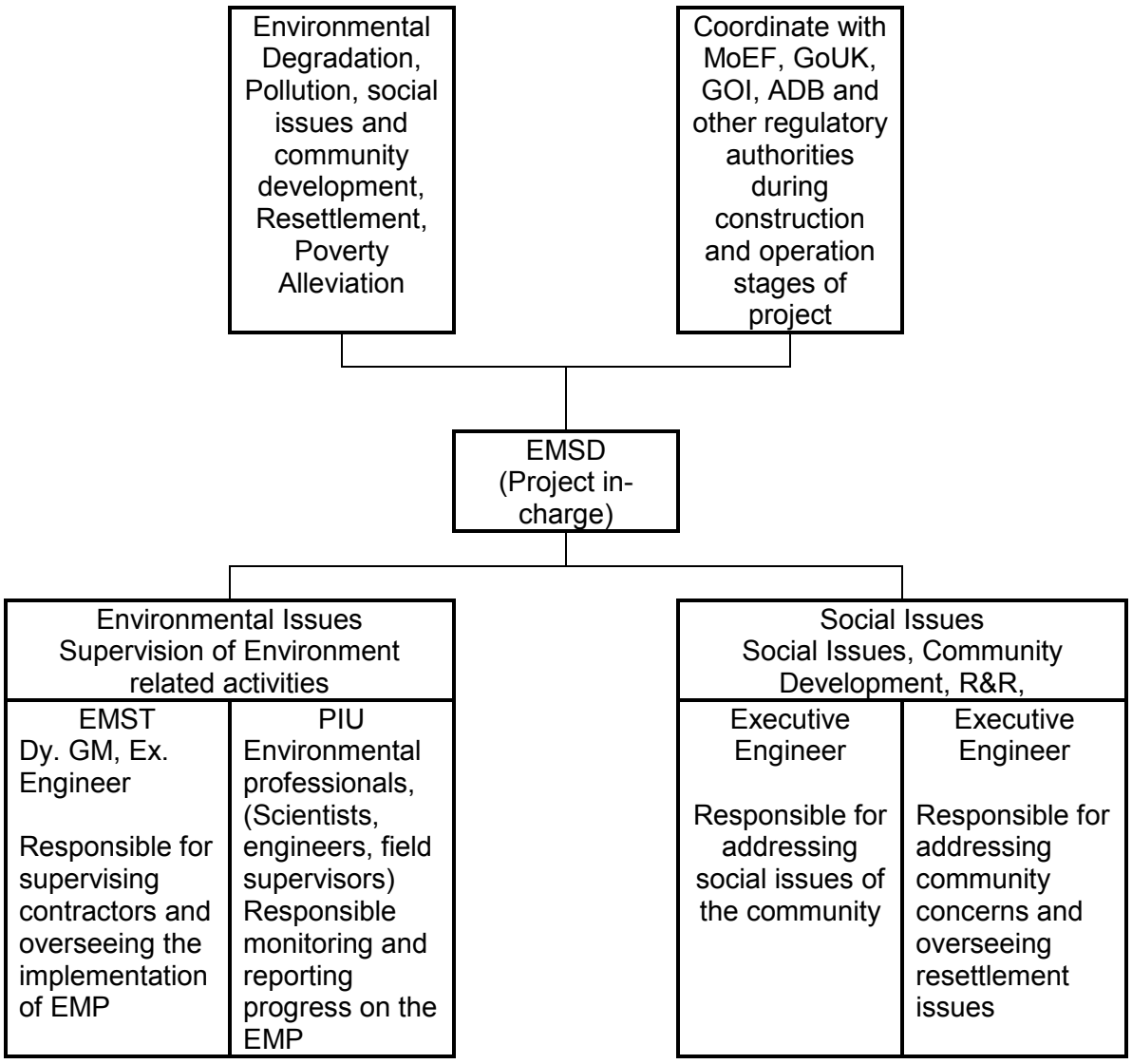
- Monitoring and implementation of mitigation measures during construction and operation phases of the project.
- Prepare suitable environmental management reports at various sites.
- Advising and coordinating field environmental management cells activity towards effective environment management.
- Prepare environment and safety manual for the operation of transmission lines/sub-stations.
- Liaise with the Ministry of Environment Forest (MoEF), State Department of environment, forest officers, State Pollution Control Boards and seek their help to solve the environment related issues of the project implementation.
- Advice to project planning cell on environmental and social issues while route selection of the alignment at the planning stage to avoid negative environmental impact.
- Provide training and awareness on environmental and social issues related to power transmission projects to the project staff.

129. The duties of the Environment Management Cell at the Field level:

- Implement the environment policy guidelines and environmental good practices at the sites.
- Advising and coordinating the field offices activity towards effective environment management.
- Implement environment and safety manual.
- Liaise with the forest department and seek help of forest officers in resolving environment monitoring related issues.
- Carry out environmental and social survey in conjunction with project planning cell while route selection of the alignment at the planning stage to avoid negative environmental impact.
- Make the contractor staff aware on environmental and social issues related to power transmission projects so that EMP could be managed effectively.

130. The diagram below depicts the institutional organization structure showing the various entities PTCUL and their role Vis-a-Vis- other government agencies.

Diagram 6.1.1 Institutional Structures and Responsibility for Environmental Management Plan at Power Transmission Corporation of Uttarakhand Limited (PTCUL)



EMSD = Environmental Management and Social Department, EMP = environmental management plan, EMST = Environmental management and Social Team, MOEF = Ministry of Environment and Forests, PIU = Project Implementation Unit

6.2 Environmental Monitoring

131. During the construction and operation phase of this project, the monitoring of the environmental aspects shall be done at the transmission line by a competent officer of the General Manager rank at the corporate level and Executive Engineer at the field level offices. During the construction phase, the Contractor should ensure that activities like handling of earth

works clearing work, access road construction, putting proper traffic signals is done properly to have minimum impact. This in turn should be monitored by the Engineer-in–Charge of the individual transmission line project.

132. Monitoring of sanitary waste treatment should be done periodically to avoid water pollution. Other environmental good practices include noise abatement, maintaining hygienic conditions, maintenance of fire and safety equipment etc. Monitoring report should be prepared once in six months with the corrective action plan for the problem areas. Overall the environmental good practices should be followed as per environmental policy guidelines.

6.3 **Critical Environmental Review Criteria**

133. **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 sqm for each tower foundation. Rest of the area under the tower continues to be under use by the land owner. Forest cover felled in the Right of Way (ROW) is allowed to regenerate except in 3 meter wide strips, after construction work is over. The compensatory afforestation of equal to double the area of forest land under the ROW is undertaken by the Forest Department. The EMP includes compensation for the loss by minimizing the impact of loss of vegetation as per existing norms under the Forest (Conservation) Act, 1980.

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

135. **Endangering of species:** No endangered species of flora and fauna exist in the project area as well as in the affected forest thus there seems to be no possibility of endangering/causing extinction of any species.

136. **Promoting undesirable rural-to urban migration:** The project will not cause any submergence or loss of land holdings that normally trigger migration. It also does not involve acquisition of any private land holdings. Hence, there is no possibility of any migration.

137. **Increase in affluent/poor income gap:** The project will increase availability and reliability of power in Uttarakhand State. It is well known that power is a key input to the economic development of any area. Past experience indicates that economic development leads to generation of more jobs which in turn should raise the living standards of poor. Thus the project is expected to contribute in reduction of affluent/poor income gap by providing opportunities for employment and rural based economic activities.

6.4 Environmental Management Plan

138. The environmental management and monitoring plan (EMP) that was prepared for the project in 2005 was the basis for determining the anticipated impacts, monitoring requirements, and development of mitigation measures with respect to the following stages: (i) pre-construction, (ii) construction, and (iii) operation and maintenance. Detailed, site-specific

mitigation measures and monitoring plans are developed and will be implemented during the project implementation phase. The Detailed EMP is also attached in the **Annexure-7**.

139. **Environmental Management Plan Budget Costs:** The main benefits of the environmental mitigation plan are (i) ensuring that environmental standards are met during design, construction, and operation of the project; (ii) providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping. Without such expenditures, the project might generate large environmental impacts, causing the biophysical environment in the area to deteriorate and indirectly depressing the economies of local communities.

140. **Table 4.3** gives an illustrative analysis of the three alignments for the proposed subproject. Summary EMP for the project components is provided in Table as **Annexure- 7**. The compliance with the EMP has been prepared based upon optimum and reasonable costs that are derived upon minimization of mitigation measures on a "least-cost" basis. Cost estimate summaries for the implementation of environmental mitigation measures, and monitoring costs, independent audit costs for the project is provided in **Table 6.4.1** and **Table 6.4.2** during pre-construction and construction stage respectively.

Table 6.4.1: Transmission line EMP cost

Sl. No.	Item Description (Quantity of Mitigation measures)	Quantity	(In INR-Rupees) Lacs
1.	**Pre-Construction stage**		
A.	Total Forest cost (Compensatory afforestation and Approval of forest land)-***Tree plantation shall be done by Forest Department for which necessary payment will be made by the PTCUL. PTCUL shall deposit the amount for the following;*** ***A)*** Plantation of trees ***B)*** Net Present Value (NPV) ***C)*** Lease Rent for 30 years ***D)*** Maintenance for 3-5 years ***E)*** Plantation of bonsai tree below the transmission line conductor	10000 trees to be planted for cutting of approximately 1000 of trees	300.00
B.	Centages and Contingencies for forest @8% of forest clearance		24.00
C.	**Crop compensation**	Exact crop compensation will be evaluated during final survey	15.00
D.	Power Telecom Co-ordination Committee (PTCC) clearance	Lump sum	1.00
Total EMP cost during pre construction stage			**340.00 lacs**

Table 6.4.2: EMP Cost during Construction Stage

S. No.	Activity	Unit	Rate (INR)	Quantity	Amount (INR) Lacs
1	**Safety awareness program among the villagers and workmen.** The contractor will conduct Information Education and Consultation Communication (IEC) campaigns at least every other month, addressed to all site staff and labour to the immediate local community and project affected people about the project related environment management and social issues.	No.	-	at least every other month	Contractor shall implement the same as per clause 22.1 of Section 8 – Special Condition of Contract
2	Personal Protective Equipment (PPE) such as Safety Helmets, gumboots, safety Jackets, Ear plugs & Nose masks to workers working at construction site. The minimum number of PPE shall be 75 each of define item at one time.	No.	-	75	The contractor will maintain a stock of at least 75 PPE's in his stores for uses as per clause no 22.2 of Section 8 - Special Condition of Contract.
3	Environmental enhancement such as repairing, whitewashing of worship places and schools, provision of drinking water facilities, sitting benches etc. and development of green belt along the worship place and schools, repairing of approach road and provision of bathing ghats close to project site. Detail plan with costing will be prepared by Implementing Agency and upon approval by Engineer/PTCUL, it will be executed. Upon verification of concerned Engineer, the payment shall be done.	Lump sum			5.50
4	Medical camps for workmen and society including checkup of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS and health awareness program on monthly basis shall be done by the Contractor. Payment to the contractor for preparation and implementation this	No.	15000	30	4.50

S. No.	Activity	Unit	Rate (INR)	Quantity	Amount (INR) Lacs
	program shall not exceed the provisional sum dedicated for this purpose (***Clause 22.2.7 of Section – 8 of Special Condition of Contract***)				
Total EMP cost during construction stage					**10.00**

6.5 Economic Assessment

141. Energy demand has been growing at about 13% faster than gross domestic product during the last five years, and continued expansion of the energy and electricity supply and delivery infrastructure will enable rapid growth in the agriculture and industry sectors. To meet economic growth targets in the Uttarakhand state, electricity supplies will need to grow at substantial rates. The development of natural resources based generating capacity (hydro) in the state will introduce a greater diversity in sources of electricity supply and with that enhanced security of supply. Uttarakhand has only hydropower as one of its resources. Hydropower development is being given priority to improve hydro/thermal mix for optimizing the efficiency of country's power system and usage of resources for sustainable power generation in an environment friendly manner.

142. The Uttarakhand Power Sector Investment Project will generate significant benefits – it will (i) serve as a catalyst for Uttarakhand Energy development and provide a suitable power trading capacity to the state; (ii) reduce dependence on energy from the National grid as Uttarakhand does not have its own Coal/fossil fuel powered power plant, thereby enhancing the state balance of payments account; and (iii) enhance the flow of capital into the Uttarakhand State, thereby leaving scarce national resources for other projects, while at the same time generating tax revenues for the State Government. The proposed project will minimize the environmental costs of providing the required increase in power evacuating capacity of the state. Apart from being an environmentally clean source of power, hydropower also provides a peaking power option for the country. From the operational angle, hydro projects also provide synergy for optimizing generation, result in fuel savings, minimize greenhouse gases and produce power in environment friendly manner, supporting sustainable development.

143. This line will evacuate 171 MW (approx. 674.08 MU per year, considering the PLF=0.45) of power which will generate a revenue of Rs.94.3 million per year based on the wheeling charges @ Rs. 0.14 per unit.

6.6 Associated Facilities

144. The total proposed power evacuation by 220 KV D/C Lata Tapovan to Joshimath line is 171 MW (Approx.). This transmission line will evacuate the 171 MW power of Tapovan Hydro Electric Power House Project of M/s NTPC and other hydro projects which will come in future.

145. For the evacuation of power of above project, approval of construction of 220 KV D.C Tapovan to Joshimath line is covered under PFR-IV which is approved by CEA and MoP **(Annexure-1 & Annexure-2)**

146. The detailed map of the Alaknanda basin provides a layout of the above projects and the transmission capacity of the basin as **Annexure-5**.

7.0 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

147. Whenever a power transmission system is planned and put up for the Government's approval, a Gazette notification of the transmission scheme is made in the state Gazette under section 29(II) of the Electricity (Supply) Act of 1948. The details of the schemes including the locations (villages/towns) through which it will pass should be published in daily news papers of the area for information and to solicit comments, from the public within stipulated period. This is to allay fears and apprehensions of people and the objections or suggestions received, are considered in the location of the project. Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction and the related issues are covered separately in the social assessment report.

148. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to transmission line;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.

Process Adopted:

149. Public consultation is an integral part of EMP report. Community consultations covering Environmental and Social aspects have been done close to proposed route of transmission line with Panchayat members and local villagers including women group. Local communities, who are primary stakeholders, have been chosen for consultation. Focused group discussion with the local community is adopted as a tool for the consultation along the transmission line. The local communities had been informed in advance about the date, venue, and purposes of the public consultation with briefing on project interventions including its benefits and disadvantages. The environmental concerns and suggestions made by the participants has been listed out, discussed and dissolved.

150. The details of scheme including the locations (villages/towns) where the route alignment of transmission line is proposed is published in daily news papers Amar Ujala, Uttarakhand edition, Danik Jagran, Uttarakhand edition and Times of India , Delhi edition) for information and to solicit comments from the public within stipulated period is given in **Annexure 8.1**.

151. Information about the proposed project in English and Local language (Hindi) is shared, which is given in **Annexure 8.2 (a) & Annexure 8.2 (b)**.

152. Public Consultation and Awareness Program in English and Local language (Hindi) for the proposed project is done based on certain questions, which is given in **Annexure 8.3 (a) & Annexure 8.3 (b)**.

Outcome of Public Consultation:

153. Most of the people seems to be unaware of the environment problems but after awareness and consultation program, people felt necessary to have new transmission line in the interest of development of state. After the discussion, the response of the people was obtained on the response sheet. Public consultation details are summarized in following **table**:

Public Consultation Details:

S. No.	Issues	Public Response	PTCUL's Explanations
1.	Are you aware of the project?	Most of the people were unaware of the project.	Officers of PTCUL team explained the importance of project and its benefits.
2.	Are you aware of the environmental issues related to the project?	a. Generally people were worried about the cutting of trees.	a. Consultation team ensured the people that double the afforestation will be done by the forest department at the expenses of PTCUL to compensate the deforestation. It was also briefed that route alignment is done in such a way that minimum tree cutting is required.
		b. Some people were worried about the dust emission.	b. It was informed that soil excavation area is very less for construction of tower foundation and during the construction spray of water will be done to mitigate the dust emission.
		c. Few people also enquired about the traffic/heavy vehicle traffic.	c. Officers explained that tower will be transported in parts and it will be done by using the normal trucks.
		d. Some people were worried about noise of transport vehicles	d. It was explained to them that construction period for tower foundation near to the specific village is very short and it is in weeks.
		e. Some people asked the question about the cutting of land (benching work) and stabilization of land, if any.	e. It was briefed that designing of towers (uneven legs extensions) is done in such a way that minimum cutting of land, if any, is required. Even if cutting of land is require, stabilization of land will done by constructing retaining/breast wall and by doing revetment work.

S. No.	Issues	Public Response	PTCUL's Explanations
3.	Other issues	a. Some people, especially ladies, were worried about the nuisance by the outside workers.	a. Public was ensured that contractor will be asked strictly to maintain the discipline among the outside workers.
		b. Some people asked about the employment from this project.	b. It was informed that contractor will be asked to prefer the local employment for unskilled jobs. Indirect income to the villagers will be generated in the form of purchases by the outside workers for their daily needs and in the form of animal transportation of material, if required.
		c. Some people asked about importance of constructing power line in an already electrified village.	c. It was explained to them that this line will be of high voltage and will evacuate the power generated in HEPs to load centers. This will solve the problem of power shortage, provide quality power at low cost to the state consumers and by selling the surplus power it will increase the revenue of the State of Uttarakhand.
		d. Some people enquired about the loss to their personal land and crops, if any.	d. It was ensured to them that it will be avoided. However, if there is any loss it will be compensated as per departmental norms. Crop compensation will be provided to them by PTCUL but the case will be processed by the State Government Revenue Department.

154. The following people were present during the Public Consultation.

Name of village – Tapovan

Date: 14-10-2008

S. No.	Name	Age	Gender	Occupation
1	Sh. Darbaan singh	76	Male	Farmer
2	Sh. Kailash Nautiyal	30	Male	Shopkeeper
3	Sh. Vinod Negi	18	Male	Student
4	Sh. Ranjeet Singh Bisht	20	Male	Shopkeeper
5	Sh. Harak Singh Dungriyal	45	Male	Shopkeeper
6	Sh. Jay Lal	45	Male	Labour
7	Sh. Khusanand	45	Male	Agriculture
8	Sh. Govind Prasad Chamoli	78	Male	Agriculture
9	Sh. Dwarika Prasad Thapliyal	58	Male	Retired
10	Sh. Om Prakash	32	Male	Contractor
11	Sh. Surendra Singh	33	Male	Agriculture

Name of village – Dhak

Date: 14-10-2008

S. No.	Name	Age	Gender	Occupation
1	Sh. Ramesh Chandra Semwal	48	Male	Postmaster
2	Sh. Bhagwati Prasad	51	Male	Agriculture
3	Sh. Mohan Singh Bisht	50	Male	Agriculture
4	Smt. Nanda Devi	43	Female	Housewife
5	Smt. Manorama Devi	47	Female	Housewife
6	Smt. Aneeta Devi	25	Female	Member of Panchayat
7	Sh. Sukhdev Prasad	45	Male	Agriculture
8	Sh. Devender	22	Male	Contractor
9	Sh. Bhagat Singh Bisht	35	Male	Agriculture
10	Sh. Mahaveer Thapliyal	28	Male	Agriculture
11	Sh. Mahendra Lal	23	Male	Agriculture

Name of village – Badagaon

Date: 14-10-2008

S. No.	Name	Age	Gender	Occupation
1	Sh. Puskar Singh	34	Male	Labour
2	Sh. Vikram Lal	30	Male	Labour
3	Sh. Narayan Singh	48	Male	Farmer
4	Sh. Shiv Singh	65	Male	Farmer
5	Sh. Manoj Singh	26	Male	Shopkeeper
6	Sh. Jawahar Singh	60	Male	Farmer
7	Sh. Raghunath Singh	60	Male	Farmer
8	Sh. Suraj Singh Bhandari	25	Male	Shopkeeper
9	Sh. Ajit Pal	32	Male	Shopkeeper
10	Sh. Shyam Singh	42	Male	Farmer
11	Sh. Rajesh Vedval	28	Male	Student

Attendance sheet and Photographs of public consultation are enclosed as **Annexure-8.4** and **Annexure 8.5** respectively.

8.0 FINDINGS AND RECOMMENDATIONS

155. Impacts are manageable and can be managed cost effectively - Environmental impacts are likely to result from the proposed transmission system development. Careful mitigation and monitoring, specific selection criteria and review/assessment procedures for candidate subprojects have been specified to ensure that minimal impacts take place. The detailed design would ensure inclusion of any such environmental impacts that could not be specified or identified at this stage are taken into account and mitigated where necessary. Those impacts can be reduced through the use of mitigation measures such as correction in work practices at the construction sites, or through the careful selection of sites and access routes.

156. Benefits far outweigh negative impacts - The proposed project will improve operational efficiency and quality of power, reliability of the system and at the same time will reduce losses. Evacuation of power from the region will boost economic development of the area and by strengthening the power transmission infrastructure. Overall, the major social and environmental impacts associated with transmission projects are limited to the construction period and can be mitigated to an acceptable level by implementation of recommended measures and by best engineering and environmental practices. It is been evaluated form the impact matrix that the project will not have significant negative environmental impacts and the project would help in improving the socio-economic conditions of this developing state. As the project falls in category B as per the ADB's guidelines, no detailed EIA study is required.

9.0 CONCLUSIONS

157. The IEE performed by IAs to date is adequate for purposes of project implementation. Based on the environmental assessment and surveys conducted for the Project, the potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified in IEEs, EIAs, and EMP. Adequate provisions are being made in the Project to cover the environmental mitigation and monitoring requirements, and their associated costs.

158. As already mentioned, new 220 KV D/C Tapovan to Joshimath line will evacuate the 171 MW power of Hydro- electric power project in Alaknanda basin. This line will improve operational efficiency, quality of power, reliability of the system and at the same time will reduce losses. The 220 KV D/C Tapovan to Joshimath transmission line will boost to the economic and industrial development of Uttarakhand state as State will get 12% free power as well as transmission charges.

159. Overall, the major social and environmental impacts associated with transmission project is limited to the construction period and can be mitigated to an acceptable level by implementation of recommended measures and by best engineering and environmental practices.

Central Electricity Authority
भारत सरकार
Government of India
प्रणाली आयोजना एवं परियोजना मूल्यांकन
System Planning & Project Appraisal Division
सेवा भवन, आर.के.पुरम
Sewa Bhawan R K Puram,
नई दिल्ली - 110066
New Delhi -110066

No. 12A/G/2006-SP&PA/ 39 **Date: 09.01.2007**

Sub:- Integrated Transmission System in Uttaranchal

Sir,

Managing Director, PTCUL vide letter no. 12/PTCUL/MD/CEA dt. 03.01.07 have furnished the details of the transmission proposal to be constructed by them from the generating projects in Uttaranchal. Copy of their letter along with the enclosure is enclosed. PTCUL have requested that the revised proposal for transmission of power from the hydropower projects in Uttaranchal be sent to MoP and DEA for signing ADB loan agreement. The revised project proposals envisages power evacuation system for 5406.5 MW of generation projects in Yamuna, Bhagarathi, Alaknanda and Sarda basin projects for an estimated cost of Rs. 2446.74 croes based on the 4th quarter price of 2004 (excluding IDC).

The issue of PTCUL proposing to take up transmission system for development of comprehensive/integrated power evacuation system in Uttaranchal was discussed in the meeting taken by Secretary (Power) on 15th September 2006. As the issue of inter-state transmission was also involved, it was decided that before taking further action, the matter needs discussion in the regional power committee of the Northern Region.

The matter was discussed in the 2nd TCC meeting held at Moussoorie on 9th November 2006, wherein Chairman/members of TCC observed that PTCUL could take up the intra-state transmission system up to the pooling point on their own, for which there was no requirement of any commitment for payment of transmission charges by other constituents and arrangement of recovery of transmission charges will be only between PTCUL and the generators and it was agreed in TCC that PTCUL/generators would apply for open access for inter-state transmission system to CTU so that POWERGRID in consultation with

CEA could firm up inter-state transmission system and necessary modification in the system up to pooling point would also be firmed up in the process. The above views of TCC was endorsed in the 3rd NRPC meeting held at Mossoourie on 10th November 2006.

Based on the decision taken in the TCC and NRPC meeting, the proposal of PTCUL and the scope of transmission have been examined, it is found that PTCUL has proposed the transmission system from the generation projects within Uttaranchal and up to the pooling point within Uttaranchal i.e 400 kV Tehri/ Koteshwar pooling station, 400 kV Roorkee, Kashipur and Pithoragarh.

In view of the above and as the transmission system proposed by PTCUL would not have any direct commitment for payment of transmission charges by the other constituents and recovery mechanism is only between PTCUL and the generators, we have no objection to PTCUL taking up implementation of this transmission system.

Encl:- As above.

7/11/07

(A K Asthana)
Chief Engineer(SP&PA)

1. Joint Secretary (Trans.), MoP,
   S.S. Bhawan, Rafi Marg, New Delhi

2. Director (Projects), PGCIL,
   'Saudamini', Plot no.2, Gurgaon.

Copy to : Shri S Mohan Ram, Managing Director, PTCUL

POWER TRANSMISSION CORPORATION OF UTTARAKHAND LTD.

Integrated Power Transmission System of Uttarakhand

XI PLAN (2007 - 2012)

(MoP (GoI) OM 11/5/2004-IC dt. 04.05.2007 & CEA No. 12A/G/2006-SP&PA/39 dt. 09.01.2007)

Generating Scheme	Transmission Work	Ckt. Kms. / Capacity / No.	Est. cost ending 4th Quarter 2004 (Rs. in crores)		Est. cost ending 2nd Quarter 2009 (Rs. in crores)	Target
			in M US $	Rs. in Cr.		
(I) YAMUNA BASIN						
Arokot (72 MW)	220 KV D.C. Mori -Nogaon - Khodri Line	2x100	18.60	80.00	175.00	10-11
	220 KV D.C. Arakot Tuni - Mori Line	2x40	7.45	32.00	50.00	10-11
Tuni Plasu (42 MW)	LILO of 220 KV Arakot Tuni - Mori Line at Tuni Plasu	2x2	0.37	1.60	2.50	10-11
Hanol Tuni (45 MW)	LILO of 220 KV Arakot Tuni - Mori Line at Hanol Tuni	2x3	0.56	2.40	3.75	10-11
Mori Hanol (63 MW)	LILO of 220 KV Arakot Tuni - Mori Line at Mori Hanol	2x2	0.37	1.60	2.50	10-11
Jakhol Sankri (33 MW)	220 KV D.C. Jakhol Sankri - Mori (220 KV) Line	2x30	5.58	24.00	37.50	10-11
Natwar Mori (33 MW)	LILO of 220 KV Jakhol Sankari - Mori (220 KV) at Naitwar Mori	2x8	1.47	6.40	10.00	10-11
Vyasi (120 MW)	LILO of 220 KV Lakhwar - Khodri Line at Vyasi	2x5	0.93	4.00	6.25	10-11
Lakhwar (300 MW)	LILO of 220 KV Mori - Khodri Line at Nogaon	2x5	0.93	4.00	6.25	10-11
	220 KV Mori Substation	2X50 MVA	13.95	60.00	150.00	09-10
	220 KV Substation Nogaon	2X50 MVA	13.95	60.00	150.00	11-12
TOTAL (708 MW)		**200 MVA**	**64.16**	**276.00**	**593.75**	
(II) BHAGIRATHI BASIN						
Loharinagpala (600MW)	400KV D.C. Loharinagpala-Koteshwar Line & LILO of Loharinagpala-Koteshwar Line at Pala - Maneri	2x92	40.00	184.00	464.25	10-11
Pala Maneri (480 MW)	220 KV D.C. Line from 400 KV Substation, Roorkee (PGCIL) - 220 KV Substation, Roorkee	2x15	2.79	12.00	18.75	11-12
Kotlibhel IA (195 MW)	220 KV D.C. Kotlibhel St. II - Roorkee Line	2x90	25.12	108.00	247.50	11-12
Kotlibhel IB (320 MW), Kotlibhel St-II (530 MW)	220 KV D.C. Kotlibhel 1B - Kotlibhel St. II Line & LILO of this line at Kotlibhel IA	2x34.5	6.51	28.00	60.38	11-12
Bhilangana I (22.5 MW)	220 KV D.C. Bhilangana III - Ghansali Line	2x15	2.79	12.00	18.75	7-8
Bhilangana II (49 MW)	LILO of 220 KV D.C. Bhilangana III - Ghansali Line at Bhilangana II	2x1	0.17	0.74	1.25	7-8
Bhilangana III (24 MW)	220 KV Ghansali - Chamba Line	2X50	9.30	40.00	40.00	7-8
	220 KV Ghansali Substation	2X50 MVA	0.23	50.00	6.25	08-09
	220 KV Bay at Chamba	1	11.63	1.00	87.50	08-09
TOTAL (2220.5 MW)			**98.54**	**435.74**	**944.63**	
(III) ALAKNANDA BASIN						
Lata Tapovan (171 MW)	400 KV D.C. Vishnugad - Kuwari Pass (Pipalkoti) Line	20	9.30	40.00	75.00	10-11
Badrinath (140 MW)	LILO of 400 KV Vishnugad - Kuwari Pass (Pipalkoti) Line at Vishnugad Pipalkoti	3	1.40	6.00	11.25	11-12
Vishnugad (520 MW)	LILO of 400 KV Vishnu Prayag-Muzzaffarnagar Line at Kuwari Pass	5	2.33	10.00	23.75	11-12
Pipalkoti (444 MW)	400 KV D.C. Kuwari Pass (Pipalkoti) - Karanprayag Line	45	20.93	90.00	213.75	10-11

Bawala Nandprayag (132 MW) Nandprayag Langrasu (141 MW) Devsari (300 MW)	400 KV D.C. Srinagar 400 KV S/s - Srinagar Power House (HEP)	6	2.79	12.00	22.50	10-11
	220 KV D.C. Tapovan - Joshimath Line	21	4.19	16.80	26.25	10-11
	LILO of 220 KV Tapovan-Joshimath Line at Badrinath	62	11.63	50.00	77.50	10-11
	220 KV D.C. Joshimath - Kuwaripass (Pipalkoti) Line	30	8.37	36.00	82.50	10-11
	220 KV D.C. Devsari-Karanprayag Line	26	4.56	20.80	32.50	10-11
	220 KV D.C. Nandprayag-Karanprayag Line	20	3.72	16.00	25.00	10-11
	LILO of 220 KV Nandprayag-Karanprayag Line at Langrasu	8	1.51	6.40	10.00	10-11
	400 KV DC Karanprayag - Srinagar Line	70	32.56	140.00	332.50	11-12
	220 KV D.C. Baramwari - Srinagar Line	70	13.02	56.00	87.50	10-11
	400 KV D.C. Srinagar - Kashipur Line	140	40.93	200.00	525.00	11-12
	LILO of 400 KV (I Ckt.) Kuwari Pass (Pipalkoti) - Srinagar Line at Karanprayag	10	4.65	20.00	37.50	11-12
	LILO of 400 KV (II Ckt.) Kuwari Pass (Pipalkoti) - Srinagar Line at Karanprayag	16	7.44	32.00	60.00	11-12
Singoli Bhatwari (60 MW)	LILO of 220 KV Baramwari - Srinagar Line at Singoli Bhatwari	10	1.86	8.00	12.50	10-11
Gaurikund (19 MW) Phatabyung (11 MW)	132 KV D.C. Gaurikund – Baramwari line	30	4.65	20.00	37.50	10-11
	LILO of 132 KV Gaurikund – Baramwari Line at Phatabyung	5	0.70	3.00	6.25	10-11
	400 KV S/s Karanprayag	2x240 MVA	34.65	125.00	350.00	11-12
	400 KV Substation, Kuwaripass (Pipalkoti)	2x240 MVA	29.07	125.00	312.50	10-11
	400 KV S/s Srinagar	2x240 MVA	18.60	80.00	250.00	10-11
	400 KV Srinagar Bay at 400 KV S/s Kashipur	1	0.93	4.00	12.50	10-11
	220 KV S/s Baramwari	2X50 MVA	13.95	60.00	150.00	09-10
	220 KV Bays at Srinagar	2	0.47	2.00	12.50	10-11
TOTAL (1938 MW)			274.21	1179.00	2786.25	
(IV) SHARDA BASIN						
Khasiabara (260 MW) Urthingsobla (280 MW)	220 KV Madkot - Khasiabara Line	12	2.33	10.00	15.00	10-11
	400 KV D.C. Urthing Sobla - Pithoragarh	105	34.42	148.00	393.75	11-12
	LILO (220 KV) of 400 KVUrthing Sobla - Pithoragarh line at Dharchulla	10	4.65	20.00	37.50	11-12
	400 KV Khasiabara - Pithoragarh Line	95	40.93	164.00	356.25	10-11
	220 KV D.C. Pithoragarh (PGCIL) - Almora	80	14.88	64.00	100.00	10-11
	220 KV Madkot Substation	2x25 MVA	11.63	50.00	125.00	10-11
	220 KV Substation, Dharchulla	2X50 MVA	11.63	50.00	150.00	10-11
	220 KV Substation, Almora	2x100 MVA	11.63	50.00	87.50	10-11
TOTAL (540 MW)			132.10	556.00	1265.00	
GRAND TOTAL (5406.5 MW)*			569.01	2446.74	5589.63	

** Excluding small hydro electric projects*

Annexure- 2

No. 11/5/2004-IC
Government of India
Ministry of Power
*****

Shram Shakti Bhawan, Rafi Marg
New Delhi, the 4th May 2007

OFFICE MEMORANDUM

Sub: Uttaranchal Power Sector Development Project with ADB assistance – Proposal – Regarding.

*****

The undersigned is directed to refer to DEA's O.M. No. 21/1/2005-ADB.II dated 1.8.2006 on this subject and to state that the Government of Uttaranchal/ Power Transmission Corporation of Uttaranchal had earlier proposed earlier an Integrated Power Transmission System for the State with ADB assistance. The said transmission system scheme will be constructed from the generating projects in Uttaranchal. The revised project proposal as forwarded by PTCUL for ADB assistance has been reviewed by Central Electricity Authority (CEA). The proposal envisages construction of a power evacuation system for 5406 MW in the four river basin projects of the State at an estimated cost of Rs.2,446.74 crore.

The proposal has been examined in this Ministry and is found to be in order (copy of the details sent by them is enclosed).

It is requested that this detailed revised proposal be recommended by DEA for assistance by ADB.

Encl: As above.

(Alok Kumar)
Director (IC)
(Tele: 23714000 / Fax: 23717519)

To

The Ministry of Finance,
Department of Economic Affairs,
(Shri U Chatterjee, Under Secretary (ADB-II),
North Block, New Delhi (Fax: 23092477)

Copy to

1. Shri S. Mohan Ram, MD, PTCUL, 7-8, Lane No.1, Vasant Vihar Enclave, Dehra Dun, Uttaranchal (Fax: 0135-2762460)
2. Secretary (Power), Government of Uttaranchal
3. JS(Trans) (along with its encl.)

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Annexure- 3

Central Electricity Authority
Government of India
System Planning & Project Appraisal Division
Power system wing, Sewa Bhawan
R K Puram, New Delhi -110066

No. 12A/G/SP&PA-08/ 572 Dated: 24th June 2009

Shri Anil Kumar Gupta,
Executive Director (Projects)
Power Transmission Corporation of Uttarakhand Limited,
Urja Bhawan Campus,
Dehradun-248 001

Subject: DPRs of ADB Financed Projects-reg.

Sir,

This is in reference to your letter no. 304/ED (Projects)/PTCUL dated 2.6.2009 vide which modified DPRs of following transmission assets were submitted.

Sr. No.	Name of Transmission Scheme
1	220 kV D/c Lata Tapovan PH – Joshimath (Twin) line
2	220 kV D/c Joshimath – Pipalkoti (Quad) line
3	400 kV D/c Vishnugad PH – Pipalkoti (Twin) line
4	400 kV D/c Srinagar PH – Srinagar (Twin) line
5	400 kV D/c Srinagar – Kashipur (Quad) line
6	2 nos. 400 kV bays at existing Kashipur S/S
7	400/220 kV GIS substation at Pipalkoti
	TOTAL

The total estimated cost on these works has been worked out to be 1288.80 crores including IDC.

PTCUL has requested CEA to examine the above projects as the Debt portion of total estimated cost is planned to be funded by ADB.

The DPRs of above works have been examined and our comments are enclosed.

(Naresh Bhandari) 24/6/2009
Director

Central Electricity Authority
Government of India
System Planning & Project Appraisal Division
Power system wing, Sewa Bhawan
R K Puram, New Delhi -110066

DPRs for construction of transmission system in Uttaranchal under ADB package

PTCUL have proposed for taking up following transmission works with ADB financing. These projects are located in Alaknanda basin.

Sr. No.	Name of Transmission Scheme	Estimated cost (crores)
1	220 kV D/c Lata Tapovan PH – Joshimath (Twin) line	33.47
2	220 kV D/c Joshimath – Pipalkoti (Quad) line	88.25
3	400 kV D/c Vishnugad PH – Pipalkoti (Twin) line	59.64
4	400 kV D/c Srinagar PH – Srinagar (Twin) line	40.10
5	400 kV D/c Srinagar – Kashipur (Quad) line	838.10
6	2 nos. 400 kV bays at existing Kashipur S/S	10.42
7	400/220 kV GIS substation at Pipalkoti	218.82
	TOTAL	1288.80

The total estimated cost on these works has been worked out to be 1288.80 crores including IDC. Brief detail of each of the projects and our comments are given below:

1. 220 kV D/c Lata Tapovan PH – Joshimath (Twin) line

It has been indicated that the line would be required to evacuate approx 171 MW from Lata Tapovan power house of NTPC. Keeping in consideration of the scarcity of Right of Way (ROW) in the hills and evacuation requirement of future projects, twin zebra conductor has been chosen in each circuit. The line length is approx 12.2 Km. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA and as per comprehensive master plan evolved for evacuation of power from different river valley projects in Uttarakhand. As such, the proposal for 220 kV D/c Lata Tapovan – Joshimath (Twin) line (approx. 12.2 Km) is generally in order.

2. 220 kV D/c Joshimath – Pipalkoti (Quad) line

It has been indicated that the line would be required to evacuate power from Lata Tapovan, Badrinath and future projects having magnitude of approx 1000 MW to 400/220 kV Pipalkoti S/S, in Alaknanda basin. Keeping in consideration of the scarcity of Right of Way (ROW) in the hills and evacuation requirement of future projects, quad zebra conductor has been chosen in each circuit. The line length is approx 20.3 Km. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA and as per comprehensive master plan evolved for evacuation of power from different river valley projects in Uttarakhand.

As such, the proposal for 220 kV D/c Joshimath – Pipalkoti (Quad) line (approx. 20.3 Km) is generally in order.

3. 400 kV D/c Vishnugad PH – Pipalkoti (Twin) line

It has been indicated that the line would be required to evacuate 520 MW power to 400/220 kV Pipalkoti S/S. Keeping in consideration of the scarcity of Right of Way (ROW) in the hills and evacuation requirement of future projects, quad moose conductor has been chosen in each circuit. The line length is approx 20 Km. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA and as per comprehensive master plan evolved for evacuation of power from different river valley projects in Uttarakhand. As such, the proposal for 400 kV D/c Vishnugad PH – Pipalkoti (Twin) line (approx. 20.3 Km) is generally in order.

4. 400 kV D/c Srinagar PH – Srinagar (Twin) line

It has been indicated that the line would be required to evacuate 330 MW power to 400/220/132 kV Srinagar S/S. Keeping in consideration of the scarcity of Right of Way (ROW) in the hills and evacuation requirement of future projects, twin moose conductor has been chosen in each circuit. The line length is approx 14 Km. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA and as per comprehensive master plan evolved for evacuation of power from different river valley projects in Uttarakhand. As such, the proposal for 400 kV D/c Srinagar PH – Srinagar (Twin) line (approx. 14 Km) is generally in order.

5. 400 kV D/c Srinagar – Kashipur (Quad) line

It has been indicated that the line would be required to evacuate 2500 MW power from 400 kV Srinagar S/S to 400 kV Kashipur Pooling station. From Kashipur onwards, the power would be evacuated through central transmission system. Keeping in consideration of the scarcity of Right of Way (ROW) in the hills and evacuation requirement of future projects, Quad bersimis conductor has been chosen in each circuit. The line length is approx 152.8 Km. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA and as per comprehensive master plan evolved for evacuation of power from different river valley projects in Uttarakhand. As such, the proposal for 400 kV D/c Srinagar – Kashipur (Quad) line (approx. 152.8 Km) is generally in order.

6. 2 nos. 400 kV bays at existing Kashipur S/S

It has been indicated that two bays are required for termination of 400 kV Srinagar-Kashipur D/c line. The space for construction of bays at Kashipur S/S is available. The above work is a part of proposed Uttarakhand Integerated Transmission System as agreed by CEA. As such, the proposal for constructing two nos. of 400 kV bays at Kashipur S/S for terminating Srinagar – Kashipur line is in order.

7. 400/220 kV GIS substation at Pipalkoti

PTCUL has proposed 400/220 kV GIS substation to pool power from 220 kV Joshimath S/S and Vishnugad generating station at 400 kV level. This power would be transmitted through 400 kV D/c Pipalkoti-Karanprayag line to Karanprayag 400 kV S/S. In the integrated transmission system in Uttarakhand agreed by CEA vide letter dated 9.1.2007 the Pipalkoti S/S was proposed to be constructed with 2x240 MVA ICT. However, with given quantum of power required to be handled at this S/S the proposal for 2x315 MVA 400/220 kV transformers is generally in order. As Uttarakhand is predominantly hilly state and availability of land for substation is limited, GIS S/S is proposed in place of conventional AIS S/S which would reduce cost of development of land and civil works which are very high in hilly terrain.

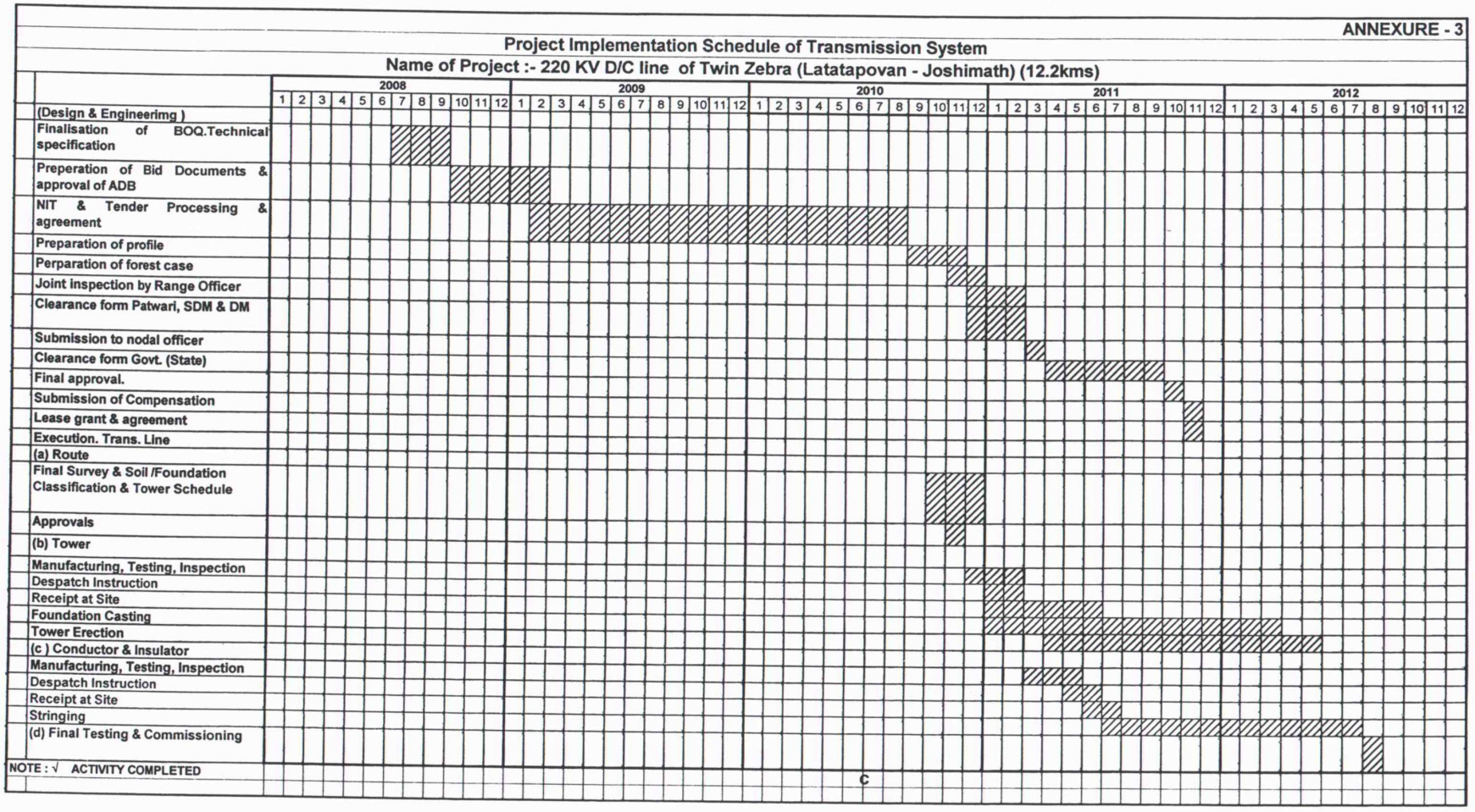
COST ASPECT

The total estimated cost of the above works as indicated in the DPR is around 1288.80 crores. This includes IDC and other charges. PTCUL has indicated that works would be awarded through competitive bidding process. As such the price of works may be restricted to the actual bid price. Further, it has been observed that project overheads and contingencies @ 8% have been considered. This includes cost of forest clearance, crop compensation and PTCC clearance. It is to inform that cost of such activities be taken on actual basis. For estimate purpose, project overheads and contingencies as general provision be taken as 3% instead of 8%.

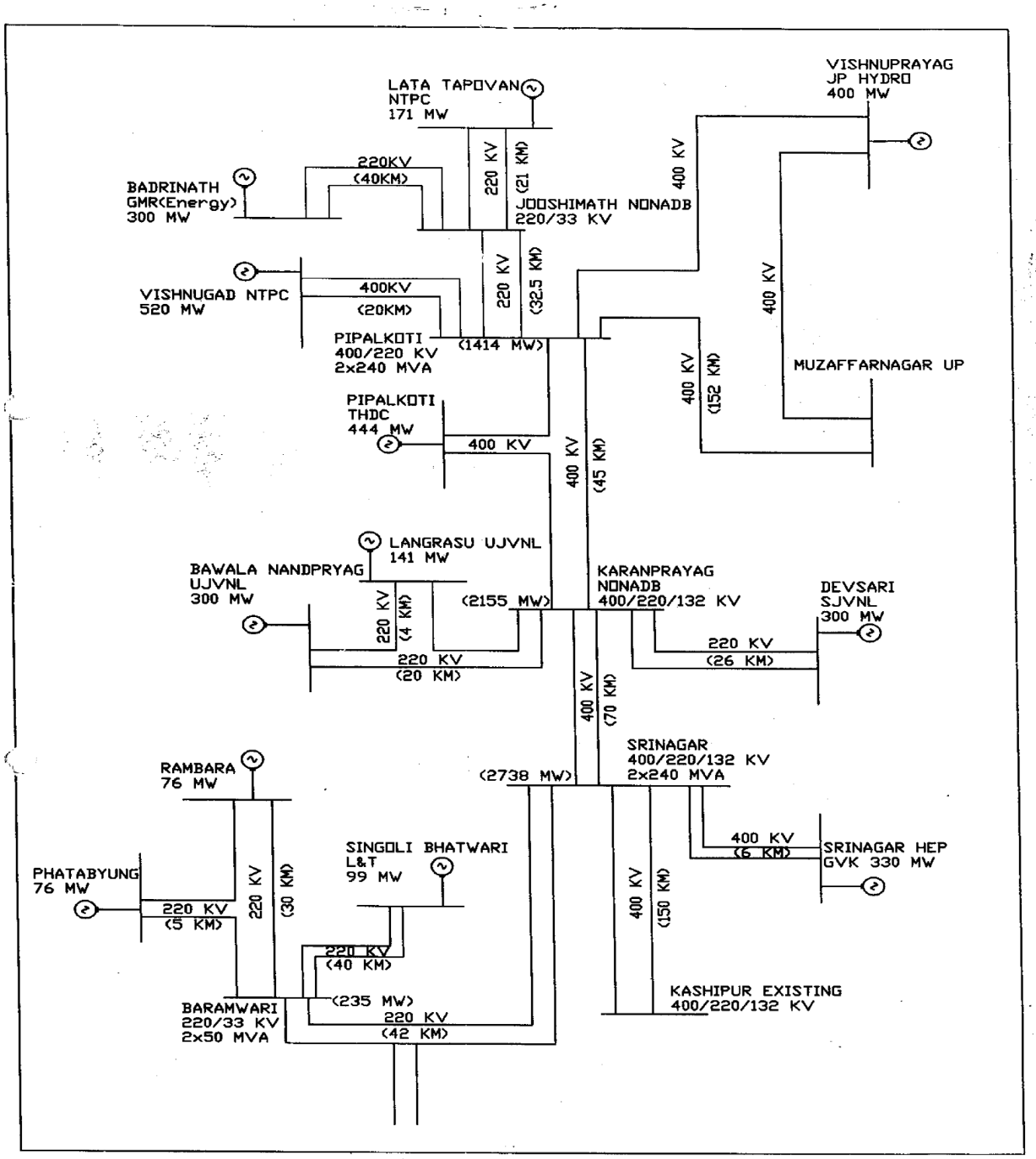
ANNEXURE - 3

Project Implementation Schedule of Transmission System

Name of Project :- 220 KV D/C line of Twin Zebra (Latatapovan - Joshimath) (12.2kms)



Annexure- 5


LATA TAPOVAN
NTPC
171 MW
220 KV
(21 KM)
220KV
(40KM)
BADRINATH
GMR(Energy)
300 MW
JOSHIMATH NONADB
220/33 KV
VISHNUPRAYAG
JP HYDRO
400 MW
400 KV
VISHNUGAD NTPC
520 MW
400KV
(20KM)
220 KV
(32.5 KM)
PIPALKOTI
400/220 KV
2x240 MVA
(1414 MW)
400 KV
(152 KM)
MUZAFFARNAGAR UP
PIPALKOTI
THDC
444 MW
400 KV
400 KV
(45 KM)
LANGRASU UJVNL
141 MW
BAWALA NANDPRYAG
UJVNL
300 MW
220 KV
(4 KM)
(2155 MW)
KARANPRAYAG
NONADB
400/220/132 KV
DEVSARI
SJVNL
300 MW
220 KV
(20 KM)
220 KV
(26 KM)
400 KV
(70 KM)
SRINAGAR
400/220/132 KV
2x240 MVA
(2738 MW)
RAMBARA
76 MW
400 KV
(6 KM)
SRINAGAR HEP
GVK 330 MW
SINGOLI BHATWARI
L&T
99 MW
PHATABYUNG
76 MW
220 KV
(5 KM)
220 KV
(30 KM)
400 KV
(150 KM)
220 KV
(40 KM)
(235 MW)
BARAMWARI
220/33 KV
2x50 MVA
220 KV
(42 KM)
KASHIPUR EXISTING
400/220/132 KV

Annexure – 6

Technical Aspects

Design Parameter:

I. Wind Zone- 4
II. Reliability class- 2
III. Terrain Condition- 2
IV. Maximum conductor temperature - 85^0

Line configuration: The 220KV D/C line shall have twin configuration of ACSR Zebra bundle conductors.

Towers: Self supporting latticed bolted steel towers, fabricated from structural steel angle section shall be used. Tower components and bolts & nuts shall be hot dip galvanized. Normally the following four types of tower shall be used in these lines.
i) 'A' type suspension towers for 0 degree angle of deviation with I suspension string.

ii) 'B' type suspension towers up to 15 degree angle of deviation with tension insulator string.

iii) 'C' type tension towers up to 30 degree angle of deviation with tension insulator strings. These may also be used as major obstacle crossing towers.

iv) 'D' type tension towers up to 60 degree angle of deviation with tension insulator strings. These may also be used as section towers.

In addition to the above, special towers for major river crossing, power line crossing and the places where the terrain is particularly different, such as approach to the sub-station; forest stretches etc. shall also be used. All standard and special towers shall be designed in accordance with the latest edition of IS-802(part-I)-1995.

Revetment and Benching: Hilly and undulating stretch, wherever the line is passing through, revetment and benching shall be provided as per site conditions.

Conductors: Twin ACSR 'Zebra' conductors (54/3.18 Aluminum and7/3.1mm steel) of overall diameter 28.62mm shall be used per phase. The horizontal sub-conductor spacing will be 475mm.

Earth wire: Two 7/3.66mm galvanized steel earth wire shall be used on the line so that it can withstand two successive lightning stroke of 150KA. Shielding angles of 20 deg is considered for transmission line.

Grounding: The tower footing resistance shall be kept below 10 ohms. Normally pipe type grounding shall be used. In case of rocky ground where the ground resistance is high, counterpoise earthings shall be used to bring the tower footing resistance down to acceptable level.

Insulator and Hardware Fittings: High strength glazed electro porcelain/ toughened glass standard disc insulators shall be used. The following types of insulator strings along with hardware fittings shall be used:

	No. of discs	**Diameter (mm)**	**Ball to ball spacing(mm)**	**Nominal Creep age distance(mm)**	**Electro mechanical strength of Unit Disc (KN)**
(a).Single Suspension(Tower A)	2x14	280	145	330	120
(b). Twin Tension(Tower B, C & D)	4x16	280	145	330	120
(c).Pilot String	1x24	280	145	330	120

Note: Equivalent composite insulators may also be considered for use based on the results of detailed studies.

Suitable hardware fittings shall be used for attachment of the insulators with the tower at one end and also for supporting the conductors at the other end. Corona control rings of grading rings will be used for improving corona and RIV performance as well as to improve the voltage distribution across the insulators discs.

Line Accessories:

i). Mid Span compression joint for conductor/earth wire: Compression joints suitable for conductor/earth wire shall be used for joining two lengths of conductor/earth wire. The minimum slipping strength of the joint after compression shall not be less than 95% of the UTS of conductor/earth wire.

ii). Repair sleeve for conductor: Repair sleeve shall be used only for repairing not more than two strands broken in the outer layer of aluminium. It shall be of compression type in two parts with provision of seat of sliding of keeper piece.

iii). Flexible copper bond for earth wire: Flexible copper bonds shall be used for good electrical continuity between the earth wire and the tower. Two bonds per suspension tower and four bonds per tension tower shall be used.

iv). Vibration dampers for earth wire: Stockbridge vibration dampers shall be used to reduce the maximum dynamic strain caused by Aeolian vibrations to a value of 150 micro-strains.

v). Spacers/Spacer dampers: Twin spacer dampers shall be used for line conductor bundle and Twin rigid spacers shall be used for jumpers. These shall maintain sub-conductor spacing of 457 mm under all working conditions and also help in restoration of the bundle after abnormal electrical conditions.

River Crossings: Special towers shall be used for major river crossings where the span is more than 600 meters with anchor towers on either end of river crossing span.

Power line, Railway line, Road and P & T line crossing: The transmission lines shall be crossing power lines, river, roads and P & T lines for which suitable extensions of towers shall be used. The standard extensions normally used for various types of towers are as follows: **A, B, C & D: 3m, 6m, and 9m**

Protection System of Transmission Line: 220KV lines shall have MAIN-I and MAIN-II protection as three zone distance type with carrier aided inter-tripping feature. 220KV lines shall also be provided with two stages over voltage protection. Further, all 220KV lines shall be provided with single and three phase auto re-closing facility to allow re-closing of circuit breakers in case of transient faults. These lines shall also be provided with distance to fault locators to identify the location of fault on transmission lines.

The wind zone: The weight of tower will vary in an ascending order from wind zone 1 to wind zone 6 as the transverse load on the tower considered owing to the wind pressure increase in the same patter. The identification of wind zone is based on the wind zone map given in IS: 875 (Part – I) 1987 and the past experience in the region. In the Project Wind Zone is considered as 4.

Annexure –7

ENVIRONMENT MANAGEMENT PLAN

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Pre -construction / Design Phase						
Selection of alignment	1. Impact on habitations/Settlements 2. Impact on trees / plantations 3. Impact on eco-sensitive areas	1. **Avoidance of:** • *Human settlements and grazing land* • *Environmental sensitive locations such as school, colleges, hospitals, religious structures, monuments etc* • *Notified Eco-sensitive locations and dense plantation* • *State / National / International boundaries* • *Socially, Culturally, Archaeologically sensitive area* 2. Consultation with local villagers and relevant authorities	**Nearest distance from:** • Human settlements and grazing land • Environmental sensitive locations such as school, colleges, hospitals, religious structures, monuments etc • Notified Eco-sensitive locations and dense plantation • State / National / International boundaries • Socially, Culturally, Archaeologically sensitive area	Once - at time of detailed siting and alignment survey and design	PTCUL	During detailed alignment survey and design

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Location of transmission towers.	• Exposure to safety related risks • Impact on water bodies, railway lines, roads etc	1. Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at site 2. Avoidance of location of towers nearest to the water bodies, railway lines and roads at maximum extent possible 3. Consultation with local villagers and landowners	Tower Location and alignment selection with respect to the nearest dwellings and nearby water bodies, railway lines and roads	Distance to nearest houses, water bodies, railway lines and roads	PTCUL	Part of Tower sitting survey and detailed alignment survey
Transmission line design crossing the existing transmission line(s)	Exposure to electromagnetic interference	Transmission line design to comply with the limit of exposure to electromagnetic interference from overhear power lines	Electromagnetic field strength for proposed line design	Line design compliance with relevant standards	PTCUL	During detailed alignment survey and design

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Transmission line through forest land / jungle (if necessary)	Deforestation and Loss of biodiversity	1. Avoid encroachment by careful site and alignment selection 2. Minimize the need by using existing towers, tall towers and ROW, wherever possible 3. Obtaining forest clearance as necessary	Tower location and alignment nearest or within the forest area / jungle	1. Tower Location 2. Consultation with local villagers and forest department 3. Consultation with design engineers	PTCUL	During detailed alignment survey
Encroachment into farmland	Loss of agricultural productivity	1. Use existing tower footings/towers wherever possible 2. Avoid sitting new towers on farmland wherever feasible 3. Farmers compensated for any permanent loss of productive land 4. Farmers/landowners compensated for significant trees that need to be trimmed/ removed along ROW.	1. Tower location and line alignment selection 2. Design of Implementation of Crop Compensation (based on affected area) 3. Design of Implementation of Tree compensation (estimated area to be trimmed/removed) 4. Statutory approvals for tree	Consultation with local authorities and design engineers – once & Consultation with affected parties – once in a quarter	PTCUL	During detailed alignment survey and before setting up of tower

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
			trimming /removal			
Air Craft hazards from Tower	Nearest Air port and distance from Tower location	The site should be at appropriate distance from nearest air port/air force station etc.	Distance from nearest Air port	The site should be at least 15 km distance from nearest air port/air force station etc.	PTCUL	During detailed alignment survey
Tree cutting on private land	Impact on environment	Tree plantation in case of cutting tress on private land	Number of tree to be cut	Number of tree to be cut due to proposed TL	PTCUL	During detailed alignment survey
Construction Phase						
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	PTCUL / Supervision Consultant/ Contractor	Throughout the construction period

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Site Clearance	Vegetation	Minimum disturbance to vegetation shall be permitted due to tower erection	Vegetation marking and clearance control	Once per site – as approved by site in charge	PTCUL / Supervision Consultant/ Contractor	Once during construction period
Physical Construction	Disturbed nearby farming activities	Construction activities on land timed to avoid disturbance on the nearby field crops (within 1 month of harvest wherever possible)	Time period of available field crop	• Crop disturbance- post harvest • Crops – once	PTCUL / Supervision Consultant/ Contractor	Throughout the construction period
Mechanized Construction	Noise and Vibration	• The machines should be properly fitted with silencers • Regular maintenance of constructional equipments • Turning off plant when not in use	Constructional equipments	Once at the start of constructional activities and at least once during middle of construction stage	PTCUL / Supervision Consultant/ Contractor	Throughout the 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) nearest dwelling or social institution	Use of established roads wherever possible every 2 weeks	PTCUL / Supervision Consultant/ Contractor	Throughout the construction period
	Increased land requirement for temporary accessibility	New access ways restricted to a single carriageway width within the ROW	Access width (meters) & Tower location and line alignment	Consultation with local authorities and land owners- Once	PTCUL / Supervision Consultant/ Contractor	Throughout the construction period

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
			selection (distance to agricultural land)			
Tree cutting or Trimming of trees within ROW	1. Fire hazards, 2. Loss of vegetation and biodiversity	1. Trees allowed to grow up at specified height within ROW by maintaining adequate clearance between the tree top and the conductor as per regulation 2. Trees that can survive pruning to comply should be pruned instead of cleared 3. Pruned trees or felled trees to be disposed off with consultation to the respective Forest Department. 4. Compensatory afforestation for each tree felled.	1. Species specific tree retention as approved by statutory authorities (maximum height at maturity) 2. Disposal off felled trees as complied by Forest Department. 3. Compensatory afforestation for each tree felled.	1. Presence of target species in ROW following vegetation clearance - once 2. No. of trees planted as compensatory afforestation (two times)	PTCUL /Supervision Consultant/ Contractor	After deforestation
Wood/vegetation harvesting	Loss of vegetation and deforestation	Construction workers prohibited from harvesting wood in the project area during their employment (apart from locally employed staff continuing current legal activities).	Illegal wood /vegetation harvesting (area in m^2, number of incidents reported)	Complaints by local people or other evidence of illegal harvesting - every 2 weeks	PTCUL /Supervision Consultant/ Contractor	Construction period

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Tower construction- Disposal of surplus Earthwork/ fill	1. Accidental runoff and 2. Solid waste disposal can cause groundwater contamination	1. Excess fill from tower foundations excavation (being fertile top soil) shall be used in backfilling while erection of towers and the remaining to be spread in the nearby agricultural fields. 2. Regular check over accidental spillage 3. Excavated unsuitable material shall be disposed off at proper location	1. Type and quantity of spillage 2. Soil disposal location and volume(m^3)	1. Appropriate fill disposal sites- every two weeks 2. Acceptable solid waste disposal sites- every 2 weeks.	PTCUL /Supervision Consultant/ Contractor	Construction period
Storage of constructional materials	Accidental contamination in groundwater	Fuel and other hazardous materials to be stored securely.	Location of hazardous material, spill reports (type of chemical spilled and quantity, etc)	Fuel storage location and regular check over the same	PTCUL /Supervision Consultant/ Contractor	Construction period
Construction schedules	Noise nuisance to neighboring 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	PTCUL, UJVNL, Contractor through contract provisions	Construction period

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Provision of facilities to the constructional workers	Contamination of receptors (land, air, water)	Proper sanitation, water supply and waste disposal facilities	Amenities of workforce facilities	Presence of proper sanitation, water supply and waste disposal facilities	PTCUL /Supervision Consultant/ Contractor	Construction period
Encroachment into farmland	Loss of agricultural productivity	Use existing access roads wherever possible	Usage of existing utilities	Complaints received by local people/authorities— every 2 weeks	PTCUL /Supervision Consultant/ Contractor	Construction period
		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^3)			
		Repair /reinstate damaged bunds, etc. after construction completed	Status of facilities (earthwork in m^3)			
	Social inequities	Compensation for temporary loss in agricultural production	Implementation of Crop compensation (amount paid, dates, etc.)	Consultation with affected parties— once in a quarter	PTCUL /Supervision Consultant/ Contractor	
Health and Safety of Workers	Injury and Sickness	1. Safety equipments for constructional workers 2. Contract provisions specifying minimum requirements for construction camps	Safety provision during construction; and Contract provision for safety issue	Contract clauses compliance – once every quarter	PTCUL /Supervision Consultant/ Contractor	Construction period

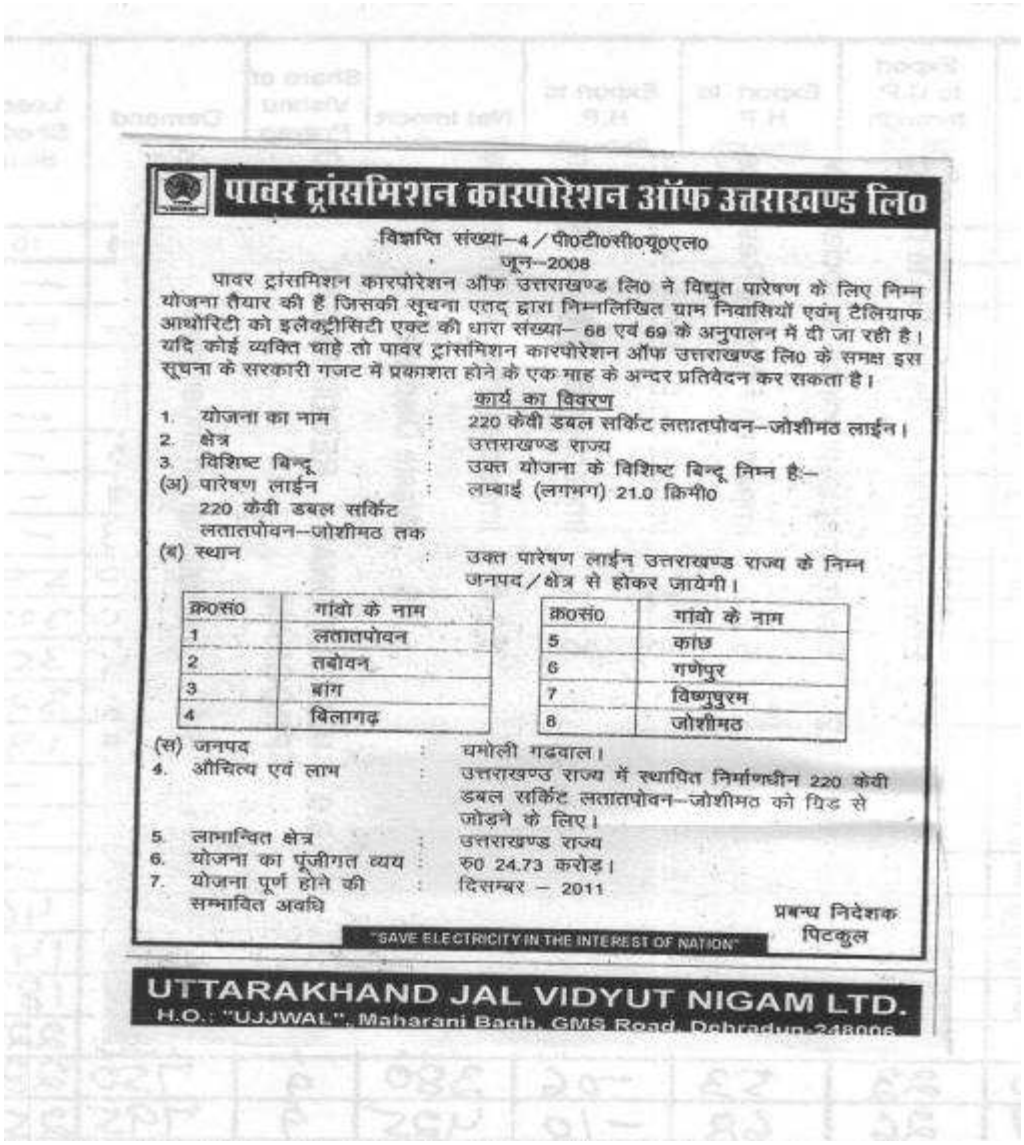
Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
		3. Contractor to prepare and implement health and safety camps 4. Contractor to arrange for health and safety training sessions				
Involuntary resettlement or land acquisition	Social inequities	Compensation paid for temporary/ permanent loss of productive land as per LAA & its process	RAP implementation	Consultation with affected parties – once in a quarter	PTCUL with the help of Supervision Consultant	During detailed alignment survey and design
Vehicular movement during Construction	Danger to local villagers	Safety awareness program among the villagers prior to construction	Safe movement of the construction vehicles	Safe driving of construction vehicle	PTCUL / Supervision Consultant/ Contractor	Once during construction period
Inadequate Construction stage monitoring	Likely to maximize damages	1. Training of environmental monitoring personnel 2. Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirements 3. Appropriate contract clauses to ensure	1. Training Schedules 2. Respective contract checklist and remedial actions taken thereof. 3. Compliance report related to environmental aspects for the contract	1. Number of programs attended by each person – once a year 2. Submission of duty completed checklists of all contracts for each site – once 3. Submission of duty completed compliance report for each site – once	PTCUL /Supervision Consultant/ Contractor	Construction period

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
		satisfactory implementation of contractual environmental mitigation measures 4. Monitoring of Ambient Air and Ambient Noise at construction site close to habitations		4. Monitoring of Ambient Air and Ambient Noise at construction site close to habitations at regular intervals		
Environmental enhancement along the project site						Construction period
Operational Phase						
Location of 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 distance ("as built" diagram)	Setback distances to nearest houses – once in quarter	PTCUL	During Operation
Workers' health and safety	Injury and Sickness / Health hazards	1. Careful design 2. Safety awareness 3. Fire emergency plan 4. Training and capacity building 5. Adequate sanitation and medical facilities	Usage of appropriate technologies, Awareness amongst the staff, provision of facilities etc	1. Capacity building and training – once a year 2. Complaints received from staff – every two weeks	PTCUL	During Operation

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 100% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding ("as-built" diagrams)	Bunding capacity and permeability - once	PTCUL	During operations
Inadequate provision of staff/workers health and safety during operations	Injury and sickness of staff /workers	1. Careful design using appropriate technologies to minimize hazards 2. Safety awareness raising for staff. 3. Preparation of fire emergency action plan and training given to staff on implementing emergency action plan 4. Provide adequate sanitation and water supply facilities	1. Usage of appropriate technologies (lost work days due to illness and injuries) 2. Training/awareness programs and mock drills 3. Provision of facilities	1. Preparedness level for using these technologies in crisis – once each year 2. Number of programs and percent of staff /workers covered – once each year 3. Complaints received from staff /workers every 2 weeks	PTCUL	During operations
Electric Shock hazards	Injury / Mortality	1. Careful design 2. Safety awareness 3. Fire emergency plan 4. Security fences around substation 5. Barriers to prevent climbing	1. Proper maintenance of fences, barriers, signals etc 2. No. of injuries and accidents	Every month	PTCUL	During Operation

Project Activity / Stage	Potential Impact	Proposed Mitigation Measures	Parameters to be Monitored	Measurement and Frequency	Institutional responsibility	Implementation Schedule
		6. Warning signals				
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	PTCUL	During Operation
Operation and maintenance staff skills less than acceptable	Unnecessary environmental losses of various types	1. Adequate training to all the staff 2. Preparation and training in the use of O and M manuals and standard operating practices	Training / Mock drills for all the staff	Number of programs and number of staff covered – once every year	PTCUL	During Operation
Environmental monitoring	Inadequate Environmental monitoring will cause diminished ecological and social values	Staff to receive training of environmental monitoring at various point of time during operation	1.Environmental and social parameters 2.Training / Mock drills / Awareness for all the staff	1.Environmental parameters-every 6 months 2.Number of programs and number of staff covered – once every year	PTCUL	During Operation
Noise generating equipments	Nuisance to neighboring properties	Equipments to be well installed with noise absorbing techniques	Noise level in dB (A)	Every month or as desired in consultation with affected parties (if any)	PTCUL	During Operation

Annexure 8.1



पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि0

विज्ञप्ति संख्या–4 / पी0टी0सी0यू0एल0
जून–2008

पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि0 ने विद्युत पारेषण के लिए निम्न योजना तैयार की है जिसकी सूचना एतद् द्वारा निम्नलिखित ग्राम निवासियों एवंम् टैलियाफ आथोरिटी को इलैक्ट्रीसिटी एक्ट की धारा संख्या– 68 एवं 69 के अनुपालन में दी जा रही है। यदि कोई व्यक्ति चाहे तो पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि0 के समक्ष इस सूचना के सरकारी गजट में प्रकाशत होने के एक माह के अन्दर प्रतिवेदन कर सकता है।

कार्य का विवरण

1. योजना का नाम : 220 केवी डबल सर्किट लतातपोवन–जोशीमठ लाईन।
2. क्षेत्र : उत्तराखण्ड राज्य
3. विशिष्ट बिन्दू : उक्त योजना के विशिष्ट बिन्दू निम्न है:–
(अ) पारेषण लाईन : लम्बाई (लगभग) 21.0 किमी0
220 केवी डबल सर्किट लतातपोवन–जोशीमठ तक
(ब) स्थान : उक्त पारेषण लाईन उत्तराखण्ड राज्य के निम्न जनपद / क्षेत्र से होकर जायेगी।

क्र0सं0	गांवो के नाम
1	लतातपोवन
2	तबोवन
3	बांग
4	बिलागढ़

क्र0सं0	गांवो के नाम
5	कांछ
6	गणेपुर
7	विष्णुपुरम
8	जोशीमठ

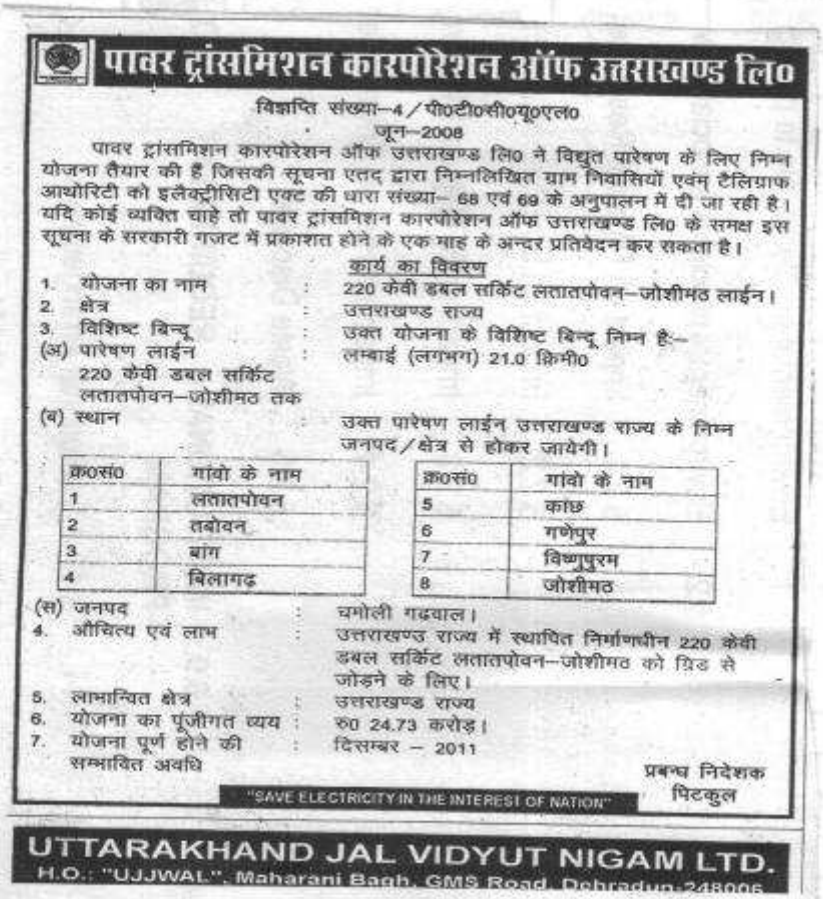
(स) जनपद : चमोली गढ़वाल।
4. औचित्य एवं लाभ : उत्तराखण्ड राज्य में स्थापित निर्माणधीन 220 केवी डबल सर्किट लतातपोवन–जोशीमठ को ग्रिड से जोड़ने के लिए।
5. लाभान्वित क्षेत्र : उत्तराखण्ड राज्य
6. योजना का पूंजीगत व्यय : रु0 24.73 करोड़।
7. योजना पूर्ण होने की सम्भावित अवधि : दिसम्बर – 2011

प्रबन्ध निदेशक
पिटकुल

"SAVE ELECTRICITY IN THE INTEREST OF NATION"

UTTARAKHAND JAL VIDYUT NIGAM LTD.
H.O.: "UJJWAL", Maharani Bagh, GMS Road, Dehradun-248006

AMAR UJALA (19 June 2008)



पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि०

विज्ञप्ति संख्या–4 / पी०टी०सी०यू०एल०

जून–2008

पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि० ने विद्युत पारेषण के लिए निम्न योजना तैयार की है जिसकी सूचना एतद् द्वारा निम्नलिखित ग्राम निवासियों एवंम् टैलिग्राफ आथोरिटी को इलैक्ट्रीसिटी एक्ट की धारा संख्या– 68 एवं 69 के अनुपालन में दी जा रही है। यदि कोई व्यक्ति चाहे तो पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि० के समक्ष इस सूचना के सरकारी गजट में प्रकाशत होने के एक माह के अन्दर प्रतिवेदन कर सकता है।

कार्य का विवरण

1. योजना का नाम : 220 केवी डबल सर्किट लतातपोवन–जोशीमठ लाईन।
2. क्षेत्र : उत्तराखण्ड राज्य
3. विशिष्ट बिन्दू : उक्त योजना के विशिष्ट बिन्दू निम्न है:–
(अ) पारेषण लाईन : लम्बाई (लगभग) 21.0 किमी०
220 केवी डबल सर्किट लतातपोवन–जोशीमठ तक
(ब) स्थान : उक्त पारेषण लाईन उत्तराखण्ड राज्य के निम्न जनपद / क्षेत्र से होकर जायेगी।

क्र०सं०	गांवो के नाम
1	लतातपोवन
2	तबोवन
3	बांग
4	बिलागढ़

क्र०सं०	गांवो के नाम
5	काछ
6	गणेपुर
7	विष्णुपुरम
8	जोशीमठ

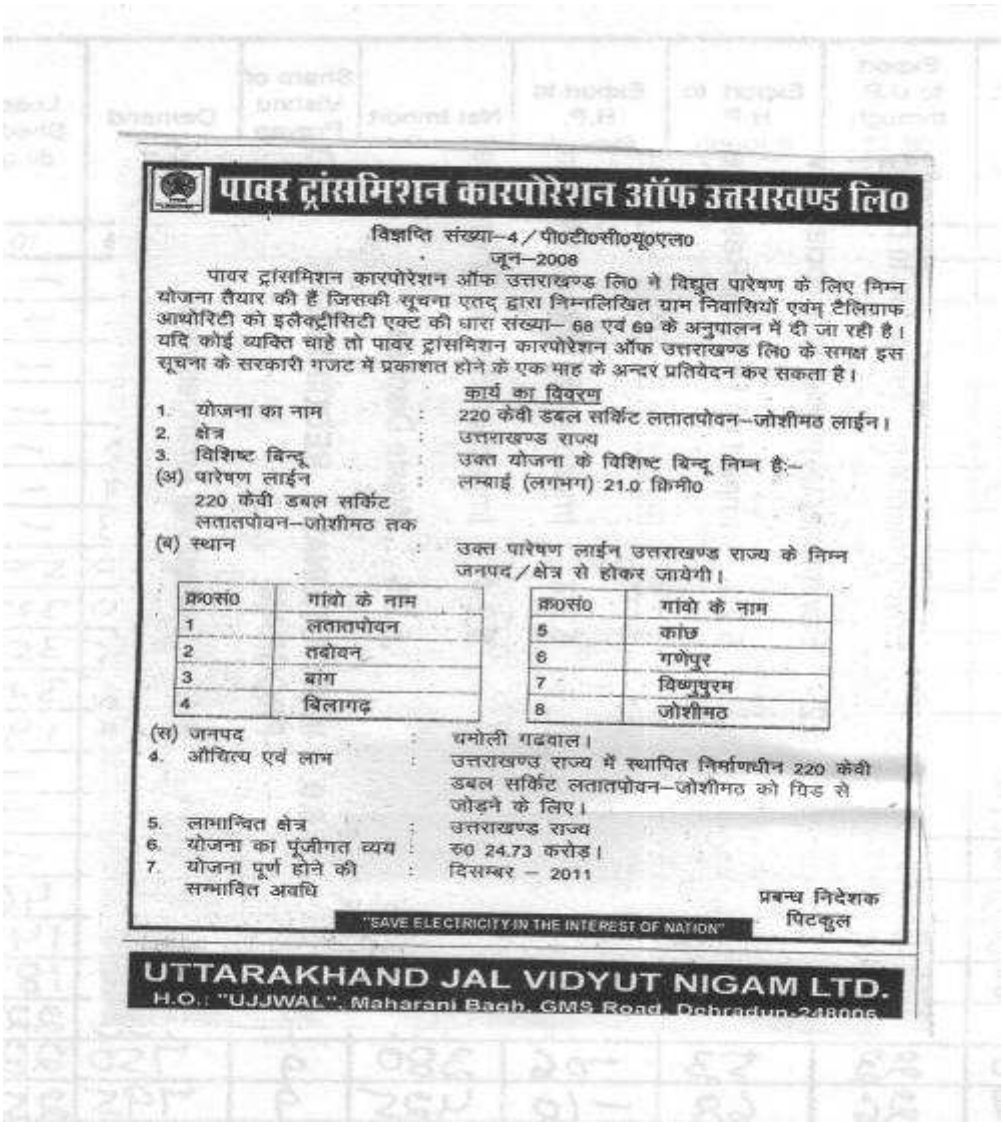
(स) जनपद : चमोली गढ़वाल।
4. औचित्य एवं लाभ : उत्तराखण्ड राज्य में स्थापित निर्माणधीन 220 केवी डबल सर्किट लतातपोवन–जोशीमठ को ग्रिड से जोड़ने के लिए।
5. लाभान्वित क्षेत्र : उत्तराखण्ड राज्य
6. योजना का पूंजीगत व्यय : रु0 24.73 करोड़।
7. योजना पूर्ण होने की सम्भावित अवधि : दिसम्बर – 2011

प्रबन्ध निदेशक
पिटकुल

"SAVE ELECTRICITY IN THE INTEREST OF NATION"

UTTARAKHAND JAL VIDYUT NIGAM LTD.
H.O.: "UJJWAL", Maharani Bagh, GMS Road, Dehradun-248006

DANIK JAGRAN (19 June 2008)



पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि०

विज्ञप्ति संख्या–4 / पी०टी०सी०यू०एल०
जून–2008

पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि० ने विद्युत पारेषण के लिए निम्न योजना तैयार की हैं जिसकी सूचना एतद् द्वारा निम्नलिखित ग्राम निवासियों एवंम् टैलिग्राफ आथोरिटी को इलैक्ट्रीसिटी एक्ट की धारा संख्या– 68 एवं 69 के अनुपालन में दी जा रही है। यदि कोई व्यक्ति चाहे तो पावर ट्रांसमिशन कारपोरेशन ऑफ उत्तराखण्ड लि० के समक्ष इस सूचना के सरकारी गजट में प्रकाशत होने के एक माह के अन्दर प्रतियेदन कर सकता है।

कार्य का विवरण

1. योजना का नाम : 220 केवी डबल सर्किट लतातपोवन–जोशीमठ लाईन।
2. क्षेत्र : उत्तराखण्ड राज्य
3. विशिष्ट बिन्दू : उक्त योजना के विशिष्ट बिन्दू निम्न है:–
(अ) पारेषण लाईन : लम्बाई (लगभग) 21.0 किमी०
220 केवी डबल सर्किट लतातपोवन–जोशीमठ तक
(ब) स्थान : उक्त पारेषण लाईन उत्तराखण्ड राज्य के निम्न जनपद / क्षेत्र से होकर जायेगी।

क्र०सं०	गांवो के नाम
1	लतातपोवन
2	तपोवन
3	बांग
4	बिलागढ़

क्र०सं०	गांवो के नाम
5	काछ
6	गणेपुर
7	विष्णुपुरम
8	जोशीमठ

(स) जनपद : चमोली गढवाल।
4. औचित्य एवं लाभ : उत्तराखण्ड राज्य में स्थापित निर्माणधीन 220 केवी डबल सर्किट लतातपोवन–जोशीमठ को ग्रिड से जोड़ने के लिए।
5. लाभान्वित क्षेत्र : उत्तराखण्ड राज्य
6. योजना का पूंजीगत व्यय : रु० 24.73 करोड़।
7. योजना पूर्ण होने की सम्भावित अवधि : दिसम्बर – 2011

प्रबन्ध निदेशक
पिटकुल

"SAVE ELECTRICITY IN THE INTEREST OF NATION"

UTTARAKHAND JAL VIDYUT NIGAM LTD.
H.O.: "UJJWAL", Maharani Bagh, GMS Road, Dehradun-248006

TIMES OF INDIA (19 June 2008)

Annexure 8.2 (a)

Public Information

General public is hereby informed that constructions of Extra High Voltage lines are proposed with the financial assistance of Asian Development Bank. Power generated in Hydro Electric Power Houses will be evacuated by these lines, which are under construction/proposal nearby.

Following points are for your awareness:-

1. Sate of Uttarakhand will progress by leaps and bounce due to more power generated, as the state will get free 12% of the generated electric power as well as the transmission charges by transmitting the electric power. Thus the state will get more revenue and more electric power. You all will get uninterrupted electric power supply due to this more power generated. The extra revenue generated will be used in various development activities of state, which will increase your living standards.

2. Construction of these lines will generate local employment, as large number of unskilled labors (men/women) will be required at the time of construction activities. Completion period of these projects will be around 2-3 years. Local employment which you get during this period will increase your living standards.

PTCUL Department needs your co-operation for successful completion of these projects. Let us together contribute for the prosperity of the state.

Thank You

By-

Dy. General Manager
(ADB Project works)
Urja Bhavan Compound
Kanwali Road , Dehradun
Ph. No. 0135-2761587

Power Transmission Corporation of Uttarakhand Ltd.
(A Government of Uttarakhand Undertaking)

Annexure-8.2(b)

सार्वजनिक सूचना

सर्वसाधारण को सूचित किया जाता है कि एशियन डवलपमैंट बैंक की वित्तीय सहायता से उच्च शक्ति की विद्युत लाईनों का निर्माण किया जाना प्रस्तावित है। इन लाईनों के निर्माण से निर्माणधीन/प्रस्तावित विद्युत ग्रहों के उत्पादन की निकासी की जायेगी। आस–पास बनने वाले विद्युत गृहों के उत्पादन की निकासी की जाएगी।

आप सभी को निम्न बिन्दुओं से अवगत कराना है :–

1. विद्युत उत्पादन अधिक होने से उत्तराखण्ड राज्य का अत्याधिक विकास होगा क्योंकि विद्युत उत्पादन का 12 प्रतिशत हिस्सा राज्य को मुफ्त प्राप्त होगा तथा विद्युत के पारेषण से पारेषण शुल्क प्राप्त होगा। इस प्रकार उत्तराखण्ड राज्य को राजस्व एवं विद्युत दोनों प्राप्त होगें। अधिक विद्युत प्राप्त होने पर आप सभी को निरन्तर विद्युत मिलेगी। राज्य का राजस्व आप सभी के लिए विभिन्न विकास योजनाओं में उपयोगी होगा तथा सभी का जीवन स्तर बढ़ेगा।

2. विद्युत लाईनों के निर्माण के दौरान स्थानीय निवासियों को रोजगार प्राप्त होगा क्योंकि अकुशल श्रमिक (पुरूष एवं महिला) की निर्माण कार्य के दौरान अत्यधिक आवश्यकता होगी। यह परियोजना लगभग दो से तीन साल में पूरी होगी। इस अवधि में रोजगार प्राप्त होने से आप सभी का जीवन स्तर बढ़ेगा।

उपरोक्त परियोजना के सफल निर्माण हेतु विभाग (पिटकुल) को आप सभी का सहयोग चाहिए। आईये आप और हम मिलकर राज्य की खुशहाली में अपना योगदान दें।

धन्यवाद

द्वाराः

उपमहाप्रबन्धक
ए0डी0बी0 परियोजना कार्य
ऊर्जा भवन परिसर
कांवली रोड, देहरादून–248001
फोन नं0–0135–2761587

पावर ट्रांसमिशन कारपोरेशन आफ उत्तराखण्ड लि0
(उत्तराखण्ड सरकार का उपक्रम)

Annexure 8.3 (a)

Public Consultation and Awareness Program

(ADB Financed Project, PFR-IV)

Name of Project: Construction of 220 KV Double Circuit Lalta Tapovan – Joshimath Line

Following General Knowledge was shared /imparted during the Public Consultation and Awareness Program.

(1) Are you aware of the project?

(2) How this will benefit you personally society and state as a whole?

(3) What are the environmental issues related to the project?

(4) What are the disadvantages and how these can be mitigated?

(5) Considering all the positive & negative factors, should the project be implemented or not?

Dy. General Manager
(ADB Project works)
Urja Bhavan Compound
Kanwali Road, Dehradun
Ph. No. 0135-2761587

Annexure-8.3(b)

जनजागरूकता एवं विचार विमर्श कार्यक्रम

(ए0डी0बी0 पोषित परियोजना–पी0एफ0आर0–IV)

परियोजना का नाम – जल विद्युत गृह लता तपोवन से जोशीमठ तक 220 के0वी0 लाईन का निर्माण कार्य

जनजागरूकता एवं विचार विमर्श कार्यक्रम के अर्न्तगत निम्नलिखित सामान्य ज्ञान का आदान–प्रदान किया गया।

1. क्या आप परियोजना से परिचित हैं ?
2. यह किस प्रकार आपको व्यक्तिगत रूप से, समाज एवं राज्य को लाभान्वित करेगा ?
3. इस परियोजना से सम्बन्धित पर्यावरण के मुद्दे क्या हैं ?
4. परियोजना के निर्माण से क्या नुकसान हैं एवं उनके प्रभाव को किस प्रकार कम किया जा सकता है ?
5. सभी सकारात्मक एवं नकारात्मक पहलुओं/तथ्यों को ध्यान में रखते हुये क्या परियोजना का निर्माण करना चाहिये या नहीं ?

उपमहाप्रबन्धक
ए0डी0बी0 परियोजना कार्य
ऊर्जा भवन परिसर
कांवली रोड, देहरादून–248001
फोन नं0–0135–2761587

Annexure 8.4

ए0डी0वी0 वित्त पोषित परियोजना हेतु जन जागरूकता अभियान

स्थान : TAPOVAN   दिनांक : 14-10-2008   समय : 08·45 Hr.

परियोजना का नाम :– लता–तपोवन विद्युत गृह से जोशीमठ से 400 के0वी0 उपसंस्थान पीपलकोटी तक 220 के0वी0 डबल सर्किट लाईन का निर्माण कार्य

क्रम सं0	नाम एवं पिता/पति का नाम	आयु	लिंग	व्यवसाय	टिप्पणी	हस्ताक्षर
1	Sri Darbaan Singh S/o Sri Amar Singh	76	Male	Agriculture	Agree	[signature]
2	" Kailash Nautiyal " Vijay Prasad	30	"	Shopkeeper.	"	[signature]
3	" Vinod Negi " Asan Singh Negi	18	"	Student.	"	[signature]
4	" Ranjeet Singh Bist " Mahipal Singh Bist	20.	"	Shopkeeper	"	[signature]
5	" Harak Singh Burgiyal Jhagar " "	45	"	"	"	[signature]
6	" Jay lal Bachnu lal	45	"	Labour	"	[signature]
7	" Kushlanand Mahimanand	45	"	Agriculture.	"	[signature]
8	" Govind prasad chamoli Shyme datt	78	"	"	"	[signature]
9	" Dwarika Prasad Thapliyal Ishwardatt	58	"	Retired	"	[signature]
10	" Om Prakash Lati B. K.	32	"	Contractor	"	[signature]
11	" Surendra Singh Dhariyal Balwant "	39	"	Agriculture	"	[signature]

हस्ताक्षर
जनप्रतिनिधि

हस्ताक्षर
अवर अभियन्ता

हस्ताक्षर

ए०डी०वी० वित्त पोषित परियोजना हेतु जन जागरूकता अभियान

स्थान : DHAK दिनांक : 14-10-2008 समय : 11-25 hrs

परियोजना का नाम : उक्त तपोवन विद्युत गृह से जोशीमठ से 400 केवी० उपसंस्थान पीपलकोटी तक 220 केवी० डबल सर्किट लाईन का निर्माण कार्य

क्रम सं०	नाम एवं पिता/पति का नाम	आयु	लिंग	व्यवसाय	टिप्पणी	हस्ताक्षर
1	Sri Ramesh Chandra Semval S/o Sri Ram Chandra Semwal	48	Male	Post-master	Agree	[signature]
2	" Bhagwati Prasad Budhiprasad Semwal.	51	"	Agriculture.	"	[signature]
3	" Mohan Singh Bist Ram Singh Bist	50	"	"	"	[signature]
4	Ms Nanda Devi	43	Female	Housewife	"	[signature]
5	" Manorama Devi W/o Sri Mohan Singh.	47	"	"	"	[signature]
6	Ms. Aneeta Devi W/o Sri Bhagwati Prasad	25	"	Member of gram panchayat.	"	[signature]
7	Sri Sukhdev Prasad Thapliyal S/o Sri Narottan Prasad	45	Male	Agriculture	"	[signature]
8	Sri Devendra S/o Sri Ramot	22	"	Contractor.	"	[signature]
9	Sri Bhagat Singh Bist S/o Sri Dharam Singh Bist	35	"	Agriculture	"	[signature]
10	Sri Mahaveer Thapliyal S/o Sri Rameshwar Prasad Thapliyal	28	"	"	"	[signature]
11	Sri Mahendra Lal " Banke Lal	23	"	"	"	[signature]

हस्ताक्षर
जनप्रतिनिधि

हस्ताक्षर
अवर अभियन्ता

Executive Engineer (Project)
Power Trans. Corpn. of Uttarakhand Ltd.
हस्ताक्षर E.E.
DEHRADUN

ए0डी0बी0 वित्त पोषित परियोजना हेतु जन जागरूकता अभियान

स्थान : BADAGAON   दिनांक : 14-10-2008   समय : 13 · 15 Hrs

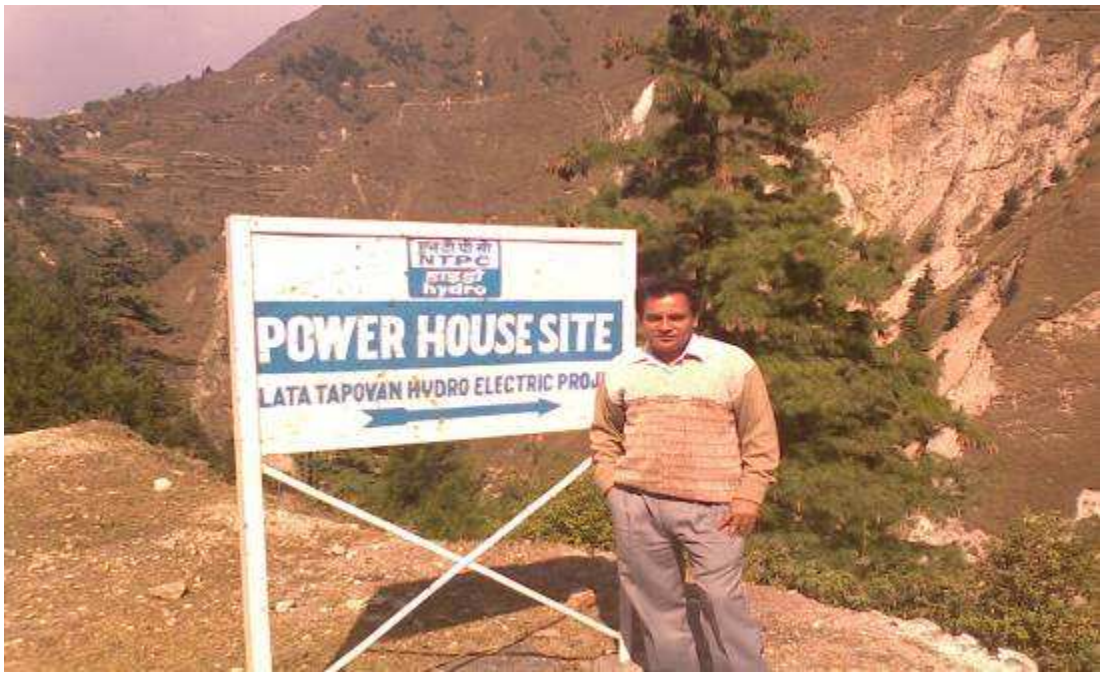
परियोजना का नाम : उत्ता-तपोवन विद्युत गृह से जोशीमठ से 400 के0वी0 उपसंस्थान पीपलकोटी तक 220 के0वी0 डबल सर्किट लाईन का निर्माण कार्य

क्रम सं0	नाम एवं पिता/पति का नाम	आयु	लिंग	व्यवसाय	टिप्पणी	हस्ताक्षर
1	Sri Pushkar Singh S/o Sri Balvant Singh	34	Male	Labour	Agree	[signature]
2	" Vikram Lal Mahipa Lal	30	"	"	"	विक्रमलाल
3	" Narayan Singh Bachan Singh	48	"	Farmer.	"	[signature]
4	" Shiv Singh Aman Singh	65	"	"	"	शिव सिंह
5	" Manoj Singh Mangal Singh	26	"	Shopkeeper	"	मनोजसिंह
6	" Jawahar Singh Shital Singh	60	"	Farmer	"	[signature]
7	" Raghunath Singh Bachan Singh	60	"	"	"	[signature]
8	" Suraj Singh Bhandari Govind Singh Bhandari	25	"	Shopkeeper	"	[signature]
9	" Ajit Pal Vijay Singh	32	"	"	"	अजीत पाल
10	" Shyam Singh Aftab Singh	42	"	Farmer	"	[signature]
11	" Rajesh Vedwal Trilochan Vedwal	28	"	Student	"	[signature]

हस्ताक्षर जनप्रतिनिधि   हस्ताक्षर अवर अभियन्ता   Executive Engineer, Power Trans. Corpn. of Uttarakhand Ltd., DEHRADUN 248001

Annexure 8.5

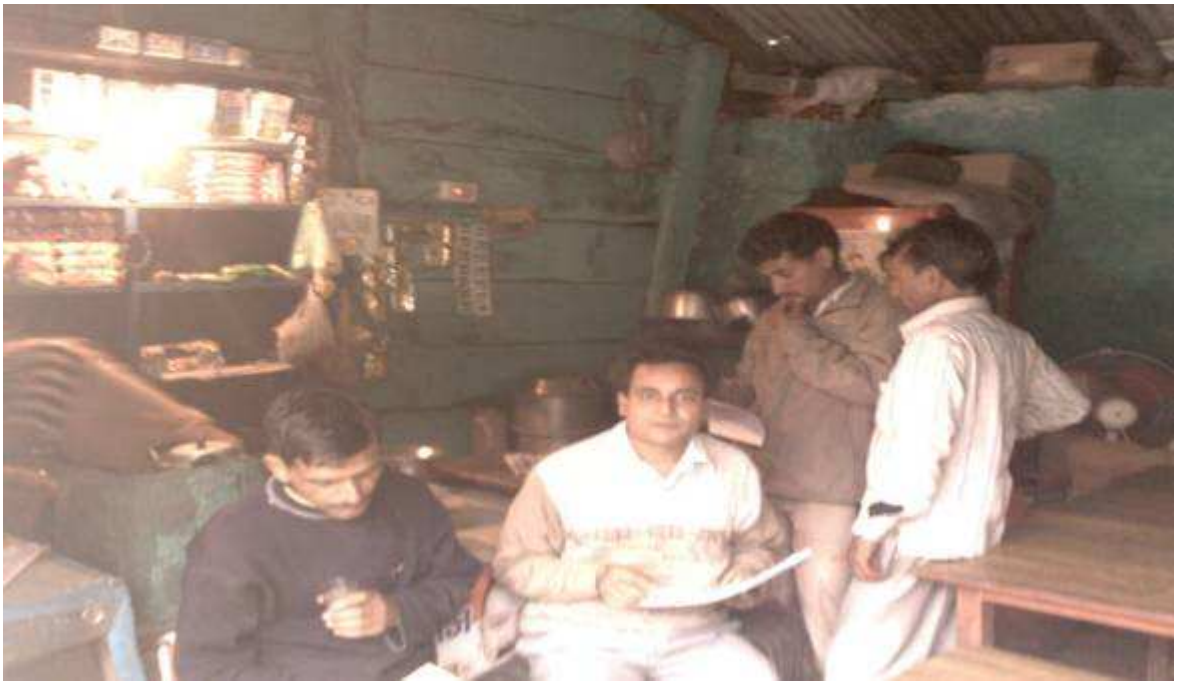
TAPOVAN



TAPOVAN

BADAGAON

BADAGAON



DHAK

DHAK