GEOLOGICAL FEASIBILITY REPORT FOR CONSTRUCTING 2.80 KMS ELECTRIC LINE, FROM A PART OF *SAUD VILLAGE TO PURTI TOK OF SIRAGA VILLAGE*, UNDER *DAYAL UPADHYAY VILLAGE ELECTRIFICATION PLAN*, OVER FOREST (2.5 KMS) & CIVIL SOYAM LAND (0.30KMS), DISTRICT- UTTARKASHI, UTTARAKHAND

SUBMITTED FOR

Executive Engineer (Project)
UTTARAKHAND POWER CORPORATION LTD (UPCL)
Rural Electrification Unit, Dehradun
Uttarakhand

SUBMITTED BY

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"USE GEOLOGICAL KNOWLEDGE FOR MAKING DISASTER RESILIENT COMMUNITY"

GEOLOGICAL FEASIBILITY REPORT FOR CONSTRUCTING 2.80 KMS ELECTRIC LINE, FROM A PART OF *SAUD VILLAGE TO PURTI TOK OF SIRAGA VILLAGE*, UNDER *DAYAL UPADHYAY VILLAGE ELECTRIFICATION PLAN*, OVER FOREST (2.5 KMS) & CIVIL SOYAM LAND (0.30KMS), DISTRICT- UTTARKASHI, UTTARAKHAND

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2. SATELLITE VIEW OF THE PROPOSED ALIGNMENT SITE
3. DEPARTMENTAL GEOREFERENCE MAP
4. PROPOSED ALIGNMENT ON TOPOSHEET

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GEOLOGICAL FEASIBILITY REPORT FOR CONSTRUCTING 2.80 KMS ELECTRIC LINE, FROM A PART OF *SAUD VILLAGE TO PURTI TOK OF SIRAGA VILLAGE*, UNDER *DAYAL UPADHYAY VILLAGE ELECTRIFICATION PLAN*, OVER FOREST (2.5 KMS) & CIVIL SOYAM LAND (0.30KMS), DISTRICT- UTTARKASHI, UTTARAKHAND

TERMS OF REFERENCE

The study, entitled **"Geological Feasibility Report for constructing 2.80 kms Electric Line, from a part of *Saud village to Purti Tok of Siraga village*, under *Deen Dayal Upadhyay village Electrification Plan*, over Forest (2.5kms) & Civil Soyam (0.30kms) Land, Dist. Uttarkashi, Uttarakhand"** requested by Executive Engineer (Project) **Uttarakhand Power Corporation Ltd (UPCL)**, Rural Electrification Unit, Dehradun, Uttarakhand, via **letter No. 478/RED(De.)UPAKALI/2018-19/Forest, Dated 30-06-18,** to Chief Geological Consultant of Progressive Geological & Geotechnical Services (PG2S), Mr Bhuwan Joshi, Empanelled Geologist, Govt. of Uttarakhand & RQP- IBM, Govt. of India; for geological assessment of the proposed alignment land, Dist Dehradun, Uttarakhand.

Undersigned (Geological Consultant) carried site assessment on 04/07/18 & geologically evaluated the alignment for construction of Electric line/discussed with the implementing agency. During the field visit Representative of Uttarakhand Power Corporation Ltd (UPCL) accompanied with the Geologist; geological assessment carried as per available land & community needs.

LOCATION SITE

The above mentioned proposed alignment falls under forest (2.5kms) & civil soyam (0.30kms) land; administrative belongs to Development Block- Mori, Dist. Uttarkashi, Uttarakhand.

Uttarkashi district lies in the northwestern part of Uttarakhand state. It is bounded by North Latitude 30° 27′ 18″ and 31° 27′ 42″ and East Longitude 77° 48′ 26″ and 79° 24′ 00″ and falls in Survey of India Degree sheet Nos. 53E, F, I, J and M. The geographical

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area of the district is 8016 km^2. The district is important from religious point of view as the two holy rivers namely Ganga and Yamuna have their emerging points in this district. Uttarkashi district, the largest district of Uttarakhand, is also important from strategic point of view as it shares its NE boundary with China.

PURPOSE AND SCOPE

Electric Line of 11KV of 2.80 kms is proposed from a part of Saud village to Purti Tok of Siraga village, Development block- Mori, District- Uttarkashi, construction proposed by Uttarakhand Power Corporation Ltd, Dehradun. Geological assessment of the route alignment is proposed for construction of this 2.80kms electric line, with mainly following objectives-

- Find out the Regional Geological correlation/setup of the proposed site
- Geological survey of the area.
- Based on Geological & Hazard survey, point out feasibility & possible recommendations for development.

GEOLOGY IN BRIEF

The brief Litho-tectonic successions of Uttarkashi area/region is established as below: -

Group	Formation	Rock Type
Vaikrita	Joshimath	Sillimanite/ Kyanite /Garnet bearing Biotite -Muscovite schistwith gneiss and migmatite
VAIKRITA THRUST		
Almora	Munsiari **(Higher Himalayan Crystallines)**	a3:- **Phylonite Schist** **a2:- Mylonitized porphyroclastic augen gneiss, Mica schist and minor amphibolites.** **a1:- Porphyroclastic granite gneiss, mica schist,**

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		and amphibolite
MAIN CENTRAL THRUST		
Ramgargh		Quartz porphyry and porphyritic granite
RAMGARH THRUST		
Jaunsar	Nagthat-Berinag	Orthoquartzites inter-bedded with slates
KROL/BERINAG THRUST		
Tejam Damtha	Deoban Rautgara	Cherty dolomite and dolomitic limestone Sub-greywacke to sub-litharenite

Proposed alignment area regionally falls in to **CENTRAL CRYSTALLINE ZONE** of Almora Group of *Munsyari Formation of rocks,* close to **MAIN CENTRAL THRUST.**

MUNSIARI FORMATION

Because of the extensive presence of metamorphics and gneisses of the Great Himalaya, this Formation is commonly referred as the 'Central Crystallines' or the 'Higher Himalayan Crystallines.' Lithologicaly this formation is subdivided into three litho-units. The southernmost part is composed of porphyroclastic granite gneiss, mica schist and amphibolites. The central region is composed of mylonitized porphyroclastic augen gneiss, mica schist and amphibolites. The northern most unit is characterized by phylonite schist.

SITE INVESTIGATIONS AND FESIBILITY STATEMENT

State- Uttarakhand,

Dist- Uttarkashi,

Development Block- Mori,

Proposed electric Line- Saud village to Purti tok of Siraga village,

Proposed Structure- 11KV Electric line over forest (2.5kms) & civil soyam (0.30kms) land, total 2.80 kms

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Proposed electrification alignment- over forest & civil land, as per coordinates below- total 34 point coordinates given for representation of the alignment (attached as annexure)

Starting point coordinate of the alignment

- Latitude- 31° 04́ 23.730 "N
- Longitude- 78° 11́ 34.340 "E
- Height(MSL)- ± 1940m

End point coordinates of the alignment

- Latitude- 31° 04́ 8.990"N
- Longitude- 78° 12́ 24.580"E
- Height(MSL)- ± 2115m

Proposed area for construction of electric line- about 1m width of the alignment proposed, requirement of the Land within 2.8kms is about 0.46 Ha.

Topography- alignment starts from a Saud village, a part of Sankari-Taluka Motor Roadside up to Purti tok of Siraga village, as per electric line survey standards

Gradient- moderate, as per electric line survey standards

Seismicity- Zone-IV & V, as per Seismic Zone map of India

Rainfall- Good, max during monsoon period (July to September).

Adjoining Land use- private land, Forest etc

Soil Cover & characteristics-variously soil covered, mostly thin, in the base of the valley the profile increases.

Rock Exposures & Detail- Proposed alignment falls within central crystalline zone of Himalaya, close proximity with Main Central Thrust, a regional discontinuity of Himalaya, the pattern of rock exposure is as discussed in the Geology paragraph. As per survey total 34 point coordinates given for alignment representation (map attached as annexure)

Ground water/Spring history/Ground seepage- not applicable

Local Community person- NA

Especial observation- The alignment starts from Saud village up to Purti Tok of Siraga village, total length of the alignment is 2.8kms, both villages comes under the same development block, alignment starts with about 1940m MSL to end with about 2115m MSL, the alignment crosses mainly two mountain valleys, near the end point of the

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alignment a major landslide scarp is developed, also visible in satellite imagery, the crown part is in the about south-east direction whereas the accumulation zone is in the about north-western direction at a bank of local "Sia Gad" /Sia Gadhera, length of the slide is about 340m, width is varying between about 40 to 95m. This landslide often cuts off the lone road connection between Taluka village and Sankri village.

Geotechnical Consideration- recommended for foundation design of transmission towers/poles and others

Important Hazards- Earthquake, Landslides & associated multiple hazards

FEASIBILITY STATEMENT

Based on above fact & community needs, **proposed construction of 11kv electric line over forest (2.5kms) & civil soyam (0.30kms) land** from a part of Saud village to Purti tok of Siraga village, total length-2.80kms i.e. Latitude- 31° 04́ 23.730 "N, Longitude- 78° 11́ 34.340"E to Latitude- 31° 04́ 8.990"N, Longitude- 78° 12̀ 24.580"E, Block- Mori, Dist. Uttarkashi ***is feasible with certain measures/recommendations, as*** **mentioned** ***in the next para of the report***

CONCLUSION & RECOMMENDATIONS

Proposed alignment falls within central crystalline zone of Himalaya, close proximity with Main Central Thrust, a regional discontinuity of Himalaya, the pattern of rock exposure is as discussed in the Geology paragraph. As per survey total 34 point coordinates given for alignment representation (map attached as annexure). The alignment starts from Saud village up to Purti Tok of Siraga village, total length of the alignment is 2.8kms, both villages comes under the same development block, alignment starts with about 1940m MSL to end with about 2115m MSL, the alignment crosses mainly two mountain valleys, near the end point of the alignment a major landslide scarp is developed, also visible in satellite imagery, the crown part is in the about south-east direction whereas the accumulation zone is in the about north-western direction at a bank of local "Sia Gad" /Sia Gadhera, length of the slide is about 340m, width is varying between about 40 to 95m.

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This landslide often cuts off the lone road connection between Taluka village and Sankri village.

The proposed construction of 11kv electric line over forest (2.5kms) & civil (0.30kms) land from a part of Saud village to Purti tok of Siraga village, total length-4.50kms i.e. Latitude- 31° 04́ 23.730 "N, Longitude- 78° 11́ 34.340"E to Latitude- 31° 04́ 8.990"N, Longitude- 78° 12̀ 24.580"E, Block- Mori, Dist. Uttarkashi recommended, under safety measures.

Author (geologist) suggests following recommendations for safe construction & hazard minimization for proposed 11kv electric line construction at above mentioned location site (above mentioned alignment):-

- The partially proposed alignment falls over bank areas/valley area of river, in some distantly but this type of areas are water saturated areas in the mountainous parts, so while assessing the ground strength through geotechnical means/load bearing analysis of the power transmission towers of the alignment partly ground water consideration would be useful.
- Separate geotechnical assessment/load bearing analysis of all power transmission tower locations must be done.
- The 3.50 kms of the alignment proposed over the forest land so current safety measures would be recommended to reduce the impact of this to wildlife habitat
- Closed wire/covered wire system would be recommended for the alignment.
- The design of the transmission towers/poles in such a way that wildlife could not able to come over there or affect the strength of the tower/poles.
- All related BIS codes, for construction of electric line in seismically active Himalayan terrain, recommended to be followed.
- Digging/drilling for establishment of Power Transmission towers recommended to be done by latest technique so that minimum disturbances/destruction of the surrounding ground may be ensured.
- The excavated material should be properly managed/dumped for minimize the sliding hazard.

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- After cutting the local vegetation within the alignment some instability problem of the ground may be arise so provision of proper protection measures/slope stability measures must be done for constructing the power transmission towers (retaining wall, breast wall, crate wall, concreting etc).

CIRTIFICATION

BHUWAN JOSHI, Empanelled Geologist, RQP, IBM, Govt. of India with Business Address: - House No.-6, Kamal Bhawan, Vijay Colony, Lane No.-1, do hereby certify that:-

a) I am Consulting Geologist registered with National & State Accreditation bodies.
b) I am Life member of Himalayan Geology, Wadia Institute of Himalayan Geology, 33-GMS road, Dehradun
c) I hold M.Sc. Geology from University of Lucknow, Lucknow.
d) I was associated as RA with Wadia Institute of Himalayan Geology, Dehradun.
e) I have obtained various trainings from JNU, New Delhi, Centre University, Allahabad, Wadia Institute of Himalayan Geology, Anna University, NIDM, IIRS, Dept. of Space, Govt of India etc, related to my professional Career.
f) I am consulting various departments in the state as per their requirement.
g) This report is based on Field work as well as table work

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Annexure,

1. **Profile photographs of proposed area**
2. **Satellite view of the proposed alignment site**
3. **Departmental Georeference map**
4. **Proposed alignment on Toposheet**

ANNEXURE-1

A VIEW OF PURTI TOK OF VILLAGE SIRAGA, PROFILE PICTURE-1,

STARTING POINT OF THE PROPOSED ALIGNMENT, PROFILE PICTURE-2,

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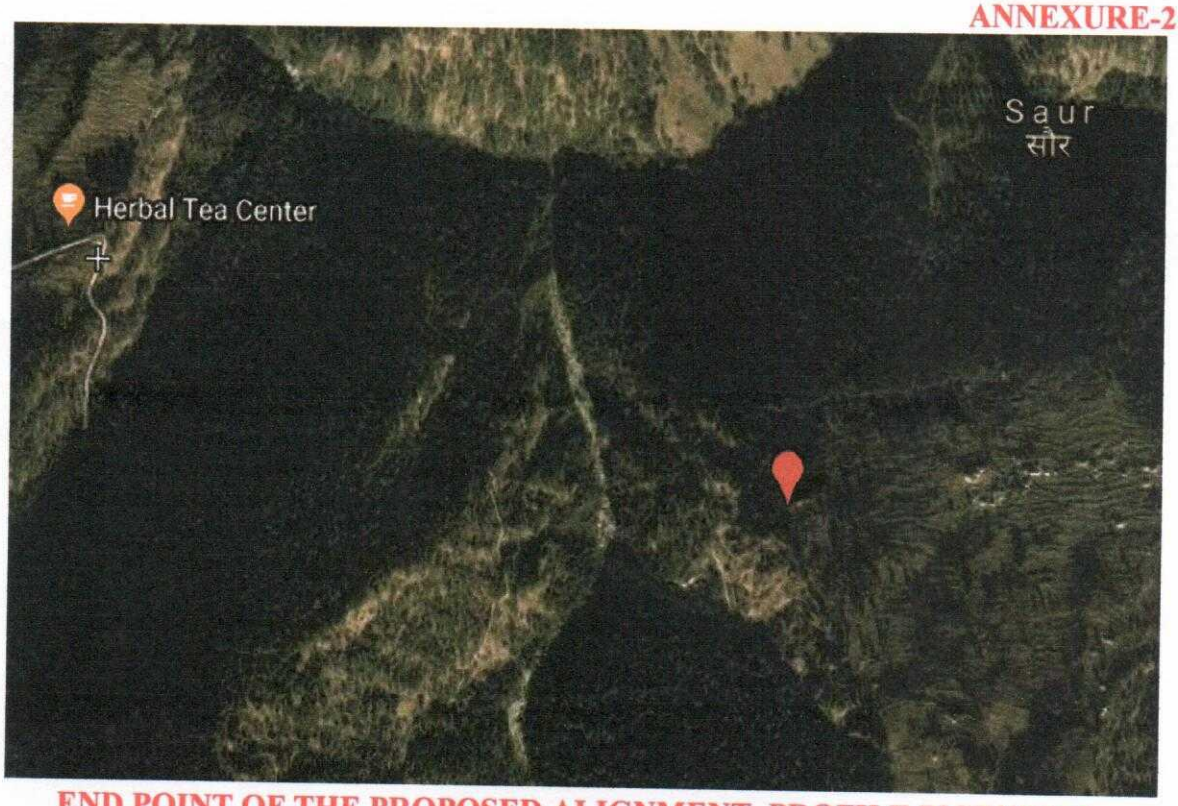
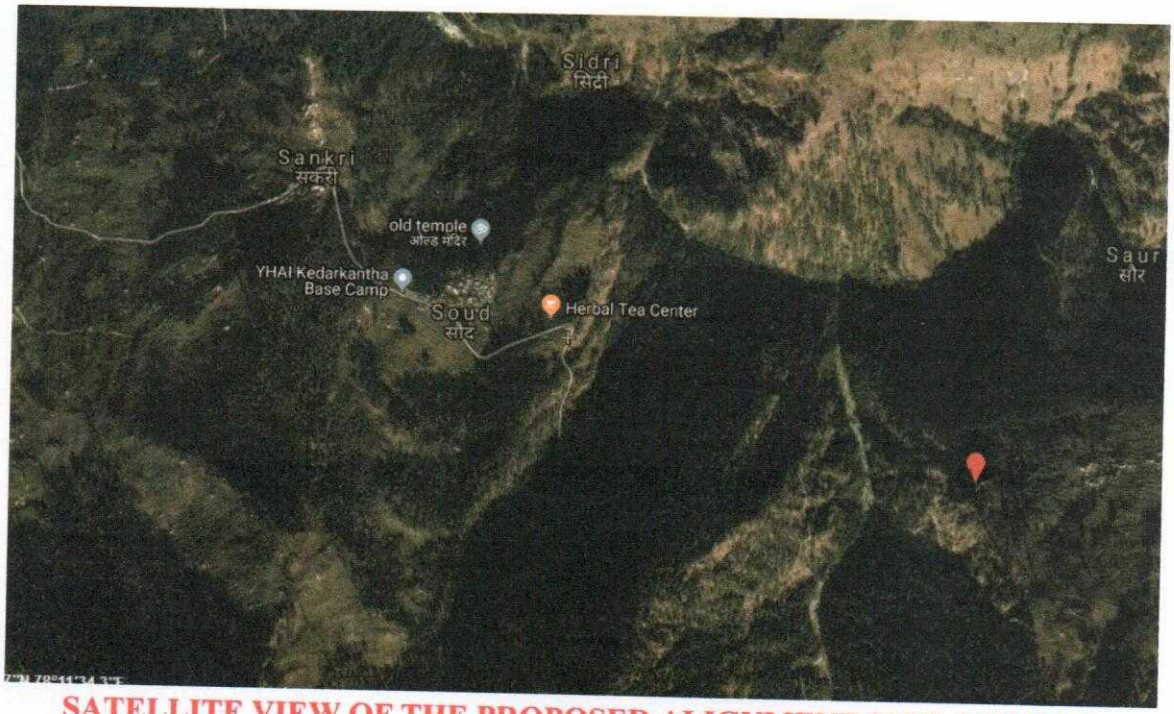
ANNEXURE-2



END POINT OF THE PROPOSED ALIGNMENT, PROFILE PICTURE-3,



SATELLITE VIEW OF THE PROPOSED ALIGNMENT SITE, PROFILE PICTURE-4,

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TOPOGRAPHIC VIEW OF THE PROPOSED ALIGNMENT SITE, PROFILE PICTURE-5,

TOPOGRAPHIC VIEW OF THE PROPOSED ALIGNMENT SITE, PROFILE PICTURE-6, (END POINT)

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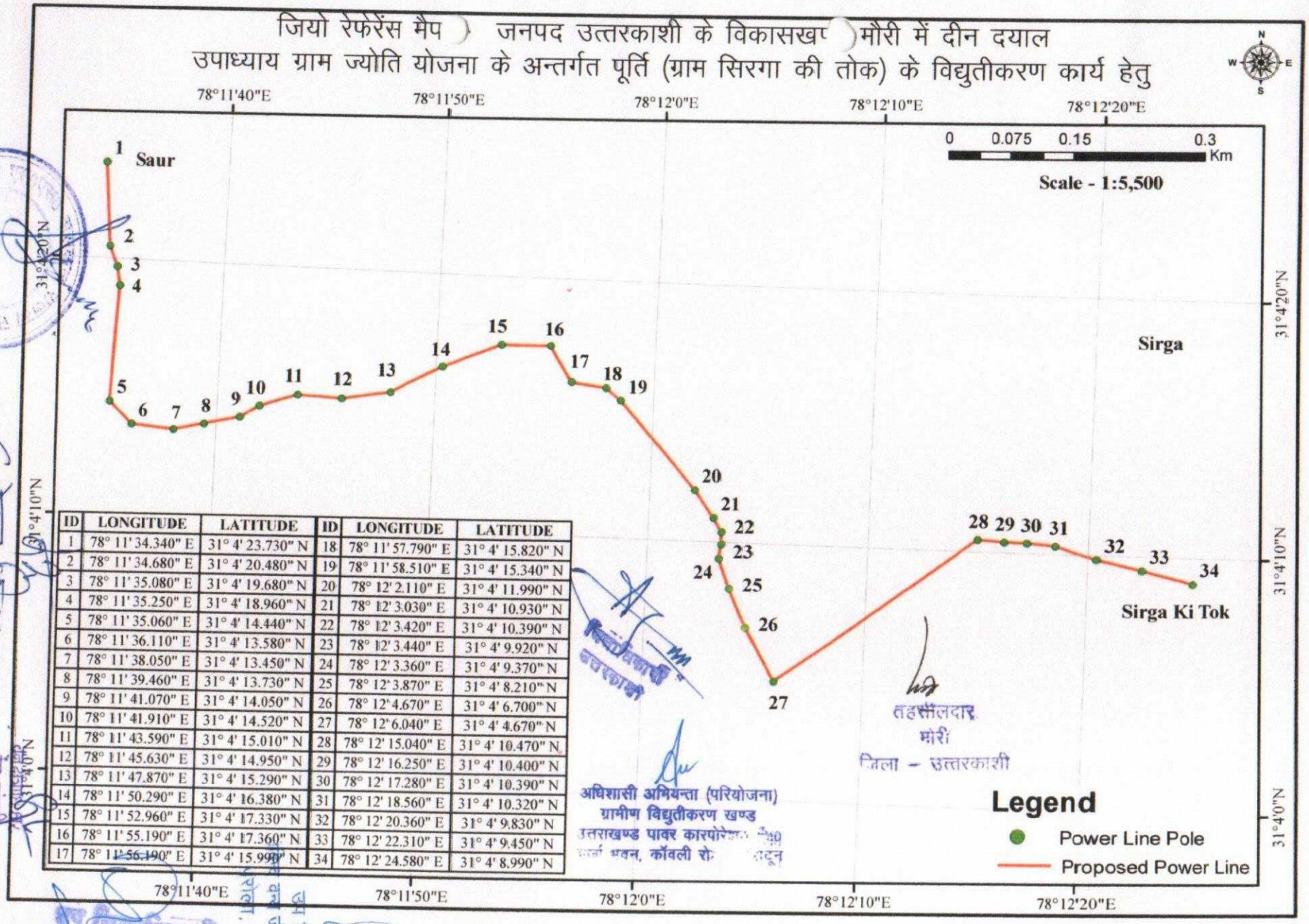
जियो रेफेरेंस मैप) जनपद उत्तरकाशी के विकासखण्ड मौरी में दीन दयाल उपाध्याय ग्राम ज्योति योजना के अन्तर्गत पूर्ति (ग्राम सिरगा की तोक) के विद्युतीकरण कार्य हेतु



ID	LONGITUDE	LATITUDE	ID	LONGITUDE	LATITUDE
1	78° 11' 34.340" E	31° 4' 23.730" N	18	78° 11' 57.790" E	31° 4' 15.820" N
2	78° 11' 34.680" E	31° 4' 20.480" N	19	78° 11' 58.510" E	31° 4' 15.340" N
3	78° 11' 35.080" E	31° 4' 19.680" N	20	78° 12' 2.110" E	31° 4' 11.990" N
4	78° 11' 35.250" E	31° 4' 18.960" N	21	78° 12' 3.030" E	31° 4' 10.930" N
5	78° 11' 35.060" E	31° 4' 14.440" N	22	78° 12' 3.420" E	31° 4' 10.390" N
6	78° 11' 36.110" E	31° 4' 13.580" N	23	78° 12' 3.440" E	31° 4' 9.920" N
7	78° 11' 38.050" E	31° 4' 13.450" N	24	78° 12' 3.360" E	31° 4' 9.370" N
8	78° 11' 39.460" E	31° 4' 13.730" N	25	78° 12' 3.870" E	31° 4' 8.210" N
9	78° 11' 41.070" E	31° 4' 14.050" N	26	78° 12' 4.670" E	31° 4' 6.700" N
10	78° 11' 41.910" E	31° 4' 14.520" N	27	78° 12' 6.040" E	31° 4' 4.670" N
11	78° 11' 43.590" E	31° 4' 15.010" N	28	78° 12' 15.040" E	31° 4' 10.470" N
12	78° 11' 45.630" E	31° 4' 14.950" N	29	78° 12' 16.250" E	31° 4' 10.400" N
13	78° 11' 47.870" E	31° 4' 15.290" N	30	78° 12' 17.280" E	31° 4' 10.390" N
14	78° 11' 50.290" E	31° 4' 16.380" N	31	78° 12' 18.560" E	31° 4' 10.320" N
15	78° 11' 52.960" E	31° 4' 17.330" N	32	78° 12' 20.360" E	31° 4' 9.830" N
16	78° 11' 55.190" E	31° 4' 17.360" N	33	78° 12' 22.310" E	31° 4' 9.450" N
17	78° 11' 56.190" E	31° 4' 15.990" N	34	78° 12' 24.580" E	31° 4' 8.990" N

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मौरी
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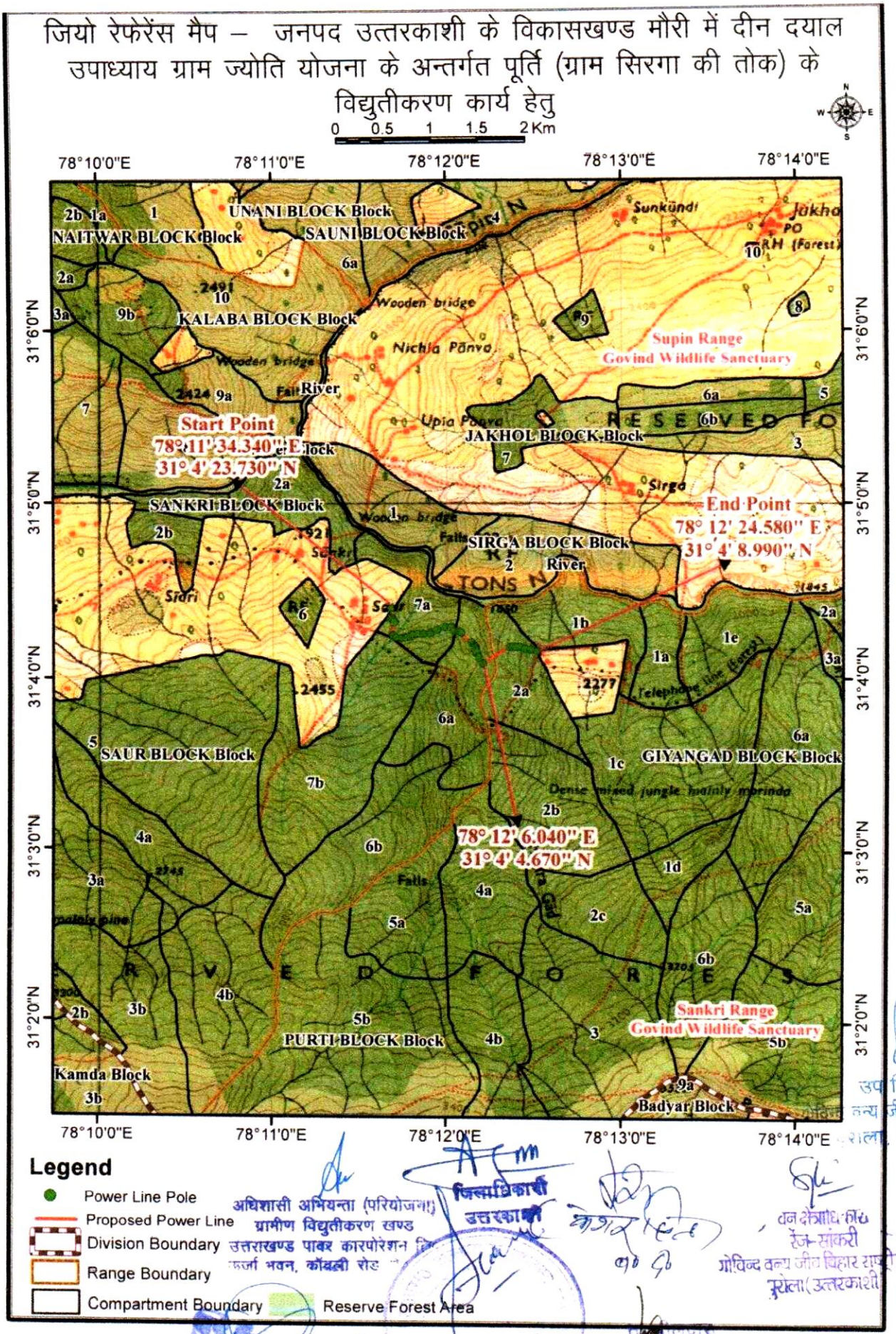

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जिलाधिकारी
उत्तरकाशी

उप निदेशक
वन्य जीव विहार
उत्तराखण्ड

वन क्षेत्राधिकारी
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