Initial Environmental Examination

Project Number: 51308-008
September 2023

India: Uttarakhand Climate Resilient Power System Development Project

Main Report Part 2

Prepared by Power Transmission Corporation of Uttarakhand Limited and Uttarakhand Power Corporation Limited for the Asian Development Bank.

6.3.4. Elephant Corridors

362. The north-western elephant habitats that once extended from Katerniaghat Wildlife Sanctuary in the east to the Yamuna River in the west are now fragmented at many places. The steep Himalayas and the Shivaliks bound this elephant range to the north and the fertile Terai to the south. The increase in human populations and associated developmental activities have fragmented and reduced the elephant habitats and impacted the movement of elephants, resulting in increased human-elephant conflict. As a result, the elephant population (numbering approximately 2070; MoEFCC 2017) distributed along the foothill of the Himalayas in Uttarakhand and Uttar Pradesh is now broken up into six sub-populations. From west to east, the populations include those between the Yamuna and Ganga Rivers, the Ganga and Khoh Rivers, the Khoh and Gola Rivers, the Gola and Sharda Rivers, in and around Dudhwa Tiger Reserve, and that of the Katerniaghat Wildlife Sanctuary. The major breaks in this elephant range are along the Ganga River, along the Gola River, along the Sharda canal, and between Dudhwa National Park and Katerniaghat Wildlife Sanctuary, thus severely hindering elephant movement. In several other places too, the habitat connectivity is under severe threat of breaking up.

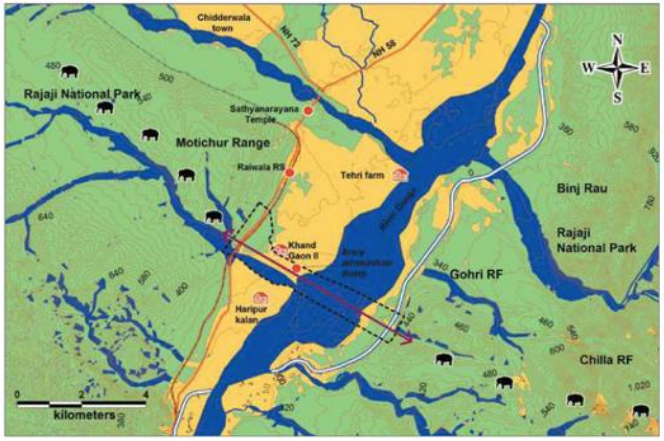
363. The elephant habitat in the Ganga - Khoh section comprises the Gohri and Chilla Ranges of Rajaji Tiger Reserve, Haridwar Forest Division and Lansdowne Forest Division of Uttarakhand, and Bijnor Forest Division of Uttar Pradesh, supporting about 250-300 elephants. The last two decades have seen a rapid expansion of human settlements adjacent to the Laldhang-Kotdwar forest route and Kotdwar. Human encroachment into forest areas has also increased, what with the large Van Gujjar population and the expansion of agriculture and industrial activity. These factors have severely affected the elephant distribution in this stretch. Two elephant corridors have been identified in this region.

364. The elephant habitat in the Khoh and Gola River section comprises part of Lansdowne Division, Corbett Tiger Reserve, Ramnagar Forest Division, Terai West and Terai Central Forest Divisions, and supports more than 1000 elephants. A large human population (including Gujjars); a network of highways; the mushrooming of resorts along the Kosi River; sand and boulder mining on the Nihal and Gola riverbeds and sand mining on the Kosi riverbed; NTFP collection, illegal extraction of timber and grazing; and industrialisation (especially in Terai Central and adjacent areas of Terai East) have severely affected elephant habitat and the movement of elephants across the habitat. The elephant movement between Terai Central and Terai East (across the Gola River) is completely impaired due to the presence of an Indian Oil depot, a Railway Sleeper Factory, an ITBP camp and encroachments. The landscape had five corridors of which one, Gola Rankhu and Gorai - Tanda has been impaired in the last few years.

365. The elephant habitats in the Gola River and Sharda River section comprise the Terai East and Haldwani Forest Divisions in Uttarakhand and Pilibhit Tiger Reserve in Uttar Pradesh. The habitat is quite fragmented and the movement of elephants between the Khatima and Surai Ranges across the Sharda canal in Terai East Forest Division is very limited due to the coming up of a four-lane highway between Khatima and Tanakpur and encroachment along the Sharda canal.

Figure 43: Elephant Corridors

Source Locations: https://www.wti.org.in/projects/right-of-passage-national-elephant-corridors-project/



Map of the Chilla – Motichur Corridor showing artefacts and Khand Gaon-III village

E1 - Chilla- Motichur

Ecological priority: High
Conservation feasibility: High

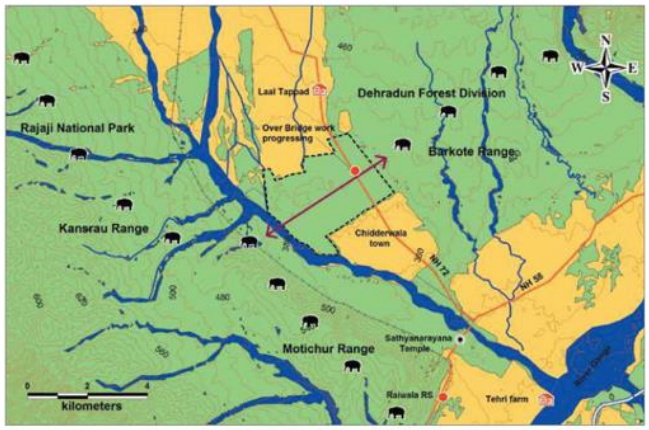
Estimated elephant numbers in the landscape
Rajaji National Park: 309
(Elephant Population Estimation, Uttarakhand, 2015)

Threats

1. Settlements: Anthropogenic pressure (fuelwood collection and grazing) from fringe villages (Khandgaon-II and III and Haripurkalan) impacted the corridor forest. Khandgaon-III has now been relocated to Lalpani, Rishikesh.
2. Highway traffic: Heavy traffic on NH 72 severely affects elephant movement. Between 6 am and 6 pm, 808 vehicles move through the corridor per hour on average. A further 333 vehicles ply per hour between 6 pm and 6 am. Although an overpass for vehicles was planned and work started about three years ago, this is currently on hold. The incomplete structure and construction debris has severely affected elephant movement.
3. Railway line (Haridwar- Dehradun): Over 60 trains pass through the corridor every day, with an average of 2.5 trains per hour. Train-hits on this line have resulted in the death of 22 elephants since 1987.
4. Chilla power canal: With its cemented embankments, the Chilla power canal is a major hurdle to elephant movement. The small bridge on the canal is mostly used by solitary bulls and at times by small herds. Traffic movement between Chilla and Rishikesh hinders elephant movement.
5. Army ammunition dump: The concrete boundary of this area hinders elephant movement. Sound pollution from nearby firing range also affects elephant movement.

CONSERVATION PLAN

1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement.
2. Rehabilitation of Khandgaon-III: villagers that resided within the corridor have been relocated to Lalpani Block II of the Rishikesh Range.
3. Construction of a flyover on NH 72 in the corridor area has to be completed as soon as possible due to heavy vehicular movement throughout the day.
4. Train speeds need to be regulated and an Animal Detection System installed along the tracks. Dumping of food waste on tracks in the corridor must be prevented. Until the Animal Detection system is in place, night patrolling of
critical sections of the track by Wildlife Trust of India, Northern Railways and the Uttarakhand Forest Department should continue.
5. The army ammunition dump should be shifted to alternate site outside the corridor.
6. Animal friendly bridges have to be created on the Chilla power canal, with sufficient width to facilitate animal movement. The movement of vehicles between Chilla and Rishikesh needs to be regulated, especially in the mornings and evenings.
7. Habitat restoration of the degraded corridor forest in the land vacated by Khandgaon-III residents needs to be undertaken



Map of the Kansrau- Barkote Corridor

E2 - Kansrau-Barkote

Ecological priority: High
Conservation feasibility: High

Estimated elephant numbers in the landscape
Rajaji National Park: 309
Dehradun Forest Division: 27
(Elephant Population Estimation, Uttarakhand, 2015)
The corridor is used by bulls and small groups of 10-12 elephants.

Threats
1. Highway traffic: High traffic on NH 72 severely impacts elephant movement. On average, 243 vehicles move through the corridor per hour. An average of 344 vehicles ply per hour between 6 am and 6 pm, with a further 142 vehicles per hour between 6 pm and 6 am.
2. Anthropogenic pressure: Firewood collection and cattle grazing by the people of Lal Thappar, Chandi, Chiddarwala and Sergarh villages on the fringes of the corridor forest have degraded the quality of vegetation. Illicit felling of trees is also reported from the corridor area.
3. High-tension power line: Two high-tension power lines pass through the corridor forest on either side of the Jakhan River.

CONSERVATION PLAN
1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement.

Map of the Motichur- Barkote and Rishikesh Corridor

E3 - Motichur-Barkote & Rishikesh

Ecological priority: High
Conservation feasibility: High

Estimated elephant numbers in the landscape
Rajaji Tiger Reserve: 309
Dehradun Forest Division: 27
(Elephant Population Estimation, Uttarakhand, 2015).

Threats
1. Settlements and biotic pressure: Though the corridor has no settlements, biotic pressure arises from the large human population of fringe villages. The people of Sahab Nagar, Khairi Kalan and Khairi Khurd collect fuelwood and Non Timber Forest Produce (NTFP) from the corridor forest, which has degraded its habitat.
2. Highway traffic: High traffic and the expansion of NH 72 is severely affecting elephant movement. The ongoing expansion of NH 72 has further hindered elephant movement due to sound pollution, increased human presence and construction material being dumped along the corridor.
3. A high-tension electric line passes through Suswa 5 Block of the Motichur Range and Gola 6b Block of Rishikesh Range. The sagging of this electric line could be fatal for elephants.

CONSERVATION PLAN
1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement.
2. Electric line pillar posts in the corridor need to be strengthened and the high-tension line should be periodically monitored to prevent sagging.
3. Activities detrimental to wildlife movement within the forest should be prevented.
4. As the corridor forest runs along NH 72 for about a kilometre, speed breakers should be installed at both ends of this stretch to reduce vehicular speeds at night, since the majority of elephant movement is reported after dark.

	5. Suitable elephant proof barriers could be dug along the forest boundary of Suswa 5 Block of the Motichur Range and Golatappar 7b Block of the Barkote Range to reduce conflict in fringe villages. A 500-metre-long trench is already in place along the forest boundary of the Gola 6b Block of the Rishikesh Range.

Map of the Motichur–Gohri Corridor showing the land to be secured

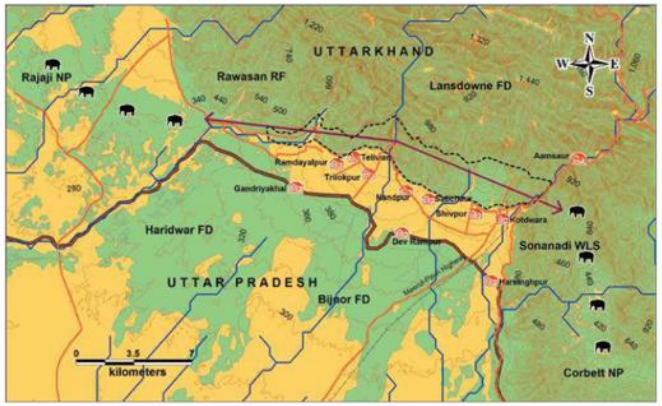
E4 - Motichur - Gohri

Ecological priority: Medium
Conservation feasibility: Medium

Estimated elephant numbers in the landscape
Rajaji National Park: 309
(Elephant Population Estimation, Uttarakhand, 2015)

Threats
1. Highway traffic: Heavy traffic on NH 72 severely affects elephant movement. On average, 571 vehicles per hour move through the corridor. Between 6 am and 6 pm, 808 vehicles ply per hour. A further 333 vehicles ply per hour between 6 pm and 6 am. Although an overpass for vehicles was planned and work started about three years ago, this is currently on hold. The incomplete structure and construction debris has severely affected elephant movement.
2. Railway line: (Haridwar- Rishikesh): Between 14 and 16 trains pass through the corridor every day, of which four trains run between 6 pm and 6 am.
3. Settlements: Tehri Farm, Gohri Maphi and Ganga Bhogpur settlements act as physical barriers and are sources of anthropogenic pressure, hindering the free movement of elephants and other wild animals.
4. Chilla power canal: With its cemented embankments, the Chilla power canal is a major hurdle to elephant movement. The small bridge on the canal is mostly used by solitary bulls and rarely by small herds. Traffic movement between Chilla and Rishikesh hinders elephant movement.
5. Satyanarayan Temple: Biotic pressure from devotees as well as the structure itself hinders animal movement.
6. Satyanarayan Forest Rest House is situated inside the corridor.

CONSERVATION PLAN
1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement.
2. Construction of a flyover on NH 72 in the corridor area has to be completed as soon as possible due to heavy vehicular movement throughout the day. Until the flyover is completed vehicle speeds within the corridor should be regulated by suitable physical barriers.
3. Traffic movement between Chilla and Rishikesh has to be regulated.
4. Train speeds must be regulated and steps taken to prevent the dumping of food waste on the track in the corridor area.
5. Screens should be installed on both sides of the road bridge on the Song River to minimise the effect of vehicle headlights.
6. An animal friendly bridge with sufficient width has to be built on the Chilla power canal to facilitate animal movement.



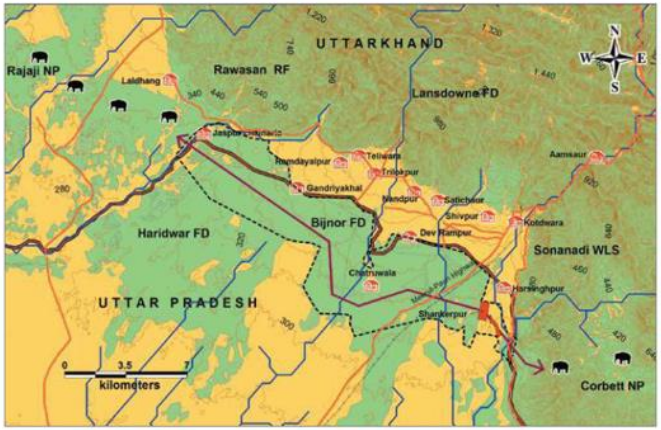
Map of Rawsan-Sonanadi (via Lansdowne) corridor

E5 - Rawasan-Sonanadi
(Via Lansdowne FD)
Ecological priority: High
Conservation feasibility: Medium

Estimated elephant numbers in the landscape
Lansdowne Division: 160
Rajaji National Park: 309
Corbett Tiger Reserve: 1035
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats
1. Settlements and anthropogenic pressure: A large number of settlements are located all along the corridor. People in these settlements depend on the corridor forest for fuelwood and grazing their livestock. The corridor has a large number of settlements towards its southern part and the biotic pressure from these villages (again mainly fuelwood extraction and cattle grazing) is a major threat to the corridor.
2. Heavy traffic on NH 119 (Lansdowne to Pauri) threatens elephant movement between the habitats. Pauri being the district headquarters, Kotdwar a major business destination and Lansdowne the headquarters of the Garhwal Rifles regiment, traffic volume is a major issue.
3. Encroachment in the Malan River area near Karalghati, Laldhang and Kotdwar areas is another problem.

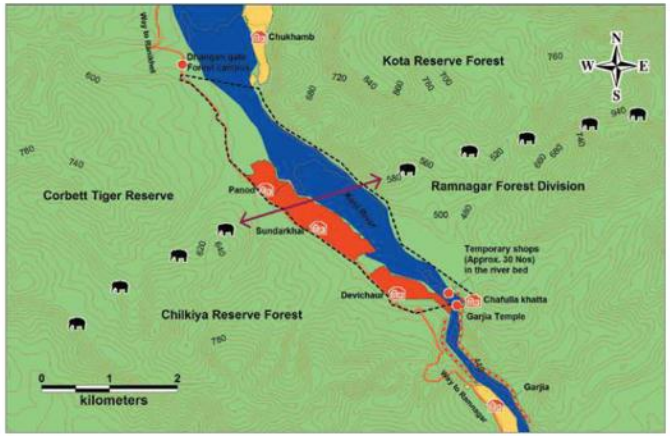
CONSERVATION PLAN
1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement.
2. Demarcation of the forest boundary on southern side of the corridor could be carried out. Power fences could also be provided in fringe villages in the southern part of the corridor to mitigate conflict.
3. Settlements from the Laldhang and Kotdwar Ranges within the corridor could be relocated near the southern periphery of the Chiriyapur Range of Haridwar Forest Division in consultation with the residents, many of whom have expressed their willingness to relocate.
4. Vehicular traffic needs to be regulated at night through suitable barriers. A flyover could also be constructed between Lal Pul and Aamsaur.



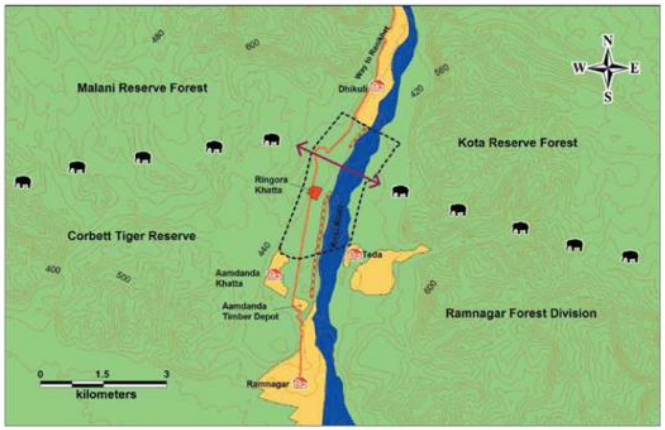
Map of Rawsan-Sonanadi (via Bijnor FD) corridor

Estimated elephant numbers in the landscape
Lansdowne Division: 160
Rajaji Tiger Reserve: 309
Corbett Tiger Reserve: 1035
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats
1. Human settlements and anthropogenic pressure: Gujjar settlements within the corridor as well at its periphery, especially Jaspurchamaria and Laldhang villages, exert biotic pressure (fuelwood extraction, cattle grazing) on the corridor forest. Boulder mining is also an issue in the area.
2. Highway Traffic: High traffic in the Najibabad-Kotdwar stretch of NH 119 severely affects elephant movement.
3. Proposed conversion of the Kotdwar-Laldhang forest road into a metalled road.
4. Najibabad-Kotdwar Railway Track: This railway track passes through the corridor and is a threat to elephants crossing from Zafrabad (mainly from Compartments 3, 2B, 2A and 9) in the Kauriya Range.
5. Shankerpur Farm: This farm is situated in the corridor near the Khoh River and is a barrier to elephant movement.

E6 - Rawasan-Sonanadi *(Via Bijnor Forest Division)* *Ecological priority: High* *Conservation feasibility: Medium*	**CONSERVATION PLAN** 1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent developmental activities affecting elephant movement. 2. Traffic on Nazibabad-Kotdwar road (NH 119) passing through the corridor needs to be regulated, especially at night. 3. Train speeds need to be regulated between 6 pm and 6 am. 4. A parcel of 127 acres of land in the Shankurpur Farm area and 61 acres of land in Sulema Shikopur could be secured to facilitate elephant movement. 5. The expansion of Chatruwala village and other fringe settlements within the corridor forest needs to be prevented, as does the spread of agricultural activities. 6. The forest boundary on both sides of the corridor, especially the southern side, should be demarcated.
 Map of the Chilkiya- Kota corridor showing the village to be relocated ***E7 - Chilkiya – Kota*** *Ecological priority: High* *Conservation feasibility: Medium*	**Estimated elephant numbers in the landscape:** Corbett Tiger Reserve: 1035 Ramnagar Forest Division: 84 (Source: Elephant Population Estimation, Uttarakhand, 2015) **Threats** 1. Settlement: Sunderkhal village, an encroachment, occupies about 92 ha of the corridor area and has considerably reduced the width of the corridor, affecting animal movement. 2. Biotic pressures: Cattle grazing and fodder and fuelwood collection by villagers has degraded the corridor habitat quality. 3. NTFP collection: Large numbers of people frequent the corridor to collect NTFP, especially curry leaves (Murraya koenigii). This has increased conflict between humans and elephants as well as tigers. 4. Garjiya Temple: The mass gathering of pilgrims at this temple, as well as associated developmental activities such as the construction of hotels and shops near the riverbank within the corridor hinders elephant movement throughout this area. 5. High-tension electric Line: A high-tension line passes through the Kosi Range in the corridor, posing a threat to elephants. 6. Traffic: NH 121, which runs through the corridor, is a busy road due to the presence of numerous hotels, resorts and other tourist spots. **CONSERVATION PLAN** 1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent encroachment and developmental activities affecting elephant movement. 2. All 310 families of Sunderkhal village (consisting of Panod, Sunderkhal, Devichaur and Garjia) have to be relocated to an alternate site. A majority of families are agreeable to relocation provided a suitable compensation package is provided. 3. All new developmental activities inside Sunderkhal village and in fringe areas of the corridor should be prohibited. Shops located on the riverbed near Garjiya Temple should be removed. 4. Cattle grazing and collection of fodder and fuelwood should be regulated inside the corridor area. Illicit felling of trees should be completely stopped. 5. Commercial exploitation of NTFP, especially curry leaves, sourced from the corridor area should be banned.

	6. Electric posts in the corridor should be strengthened and electric lines periodically monitored to prevent sagging or damage during floods.



Map of the Malani- Kota Corridor

E8 - Malani-Kota

Ecological priority: High
Conservation feasibility: Medium

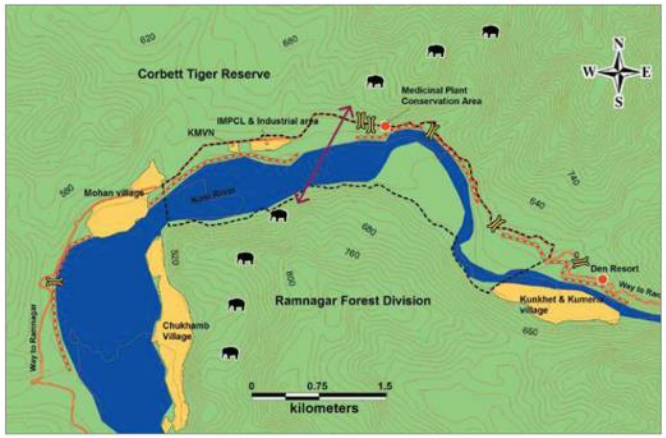
Estimated elephant numbers in the landscape:
Corbett Tiger Reserve: 1035
Ramnagar Forest Division: 84
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats

1. Settlement: Ringora village located within the corridor hinders elephant movement.
2. Fuelwood collection: Extraction of fuelwood from the corridor for personal and commercial use by people in and around Ramnagar town has affected the quality of the habitat.
3. Sand/boulder mining: Illegal boulder and sand mining is persistent in the Kosi riverbed near Ringora village, hindering animal movement.
4. Resorts: A large number of resorts in Dhikuli have increased traffic flow through the corridor, with tourists at times stopping by the road when animals are sighted.
5. Vehicular traffic: There is heavy traffic on NH 121 which runs through the corridor due to the aforementioned resorts and hotels in Dhikuli.
6. Forest fires: Man-made forest fires are another major problem in the corridor, affecting vegetation and the herbivore population.
7. A high-tension electric line passes through Compartment 1 and is a threat to elephants since the wires sag in places. One elephant was electrocuted and died when it came in contact with a sagging line recently.

CONSERVATION PLAN

1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent encroachment and developmental activities affecting elephant movement.
2. Commercial activity inside Ringora village and along the portion of NH 121 within and around the corridor should be strictly prohibited.
3. In consultation with the villagers, Ringora village should be relocated to an alternate site.
4. Sand/boulder mining in the Kosi riverbed, whether for personal or commercial purposes, should be strictly prohibited in the corridor area.
5. Electric posts in the corridor must be strengthened and the high-tension line periodically monitored to prevent sagging.
6. The speed of vehicles passing through the corridor area should be regulated through speed breakers.



Map of South Patlidun – Chilkiya corridor

E9 - South Patlidun – Chilkiya

Ecological priority: High
Conservation feasibility: Medium

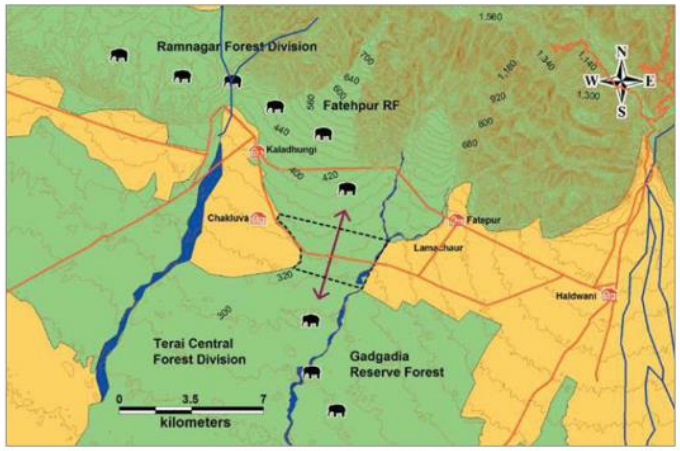
Estimated elephant numbers in the landscape:
Corbett Tiger Reserve: 1035
Ramnagar Forest Division: 84
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats

1. Mohan Industrial Area: 18.4 ha of this industrial park is situated in the middle of the corridor and has blocked the movement of elephants to a significant extent.
2. Biotic pressure: Cattle grazing and fodder and firewood collection by the villagers of Kunakhet, Kumeria, Mohan and Chukham have affected the quality of corridor habitat.
3. High-tension electric line: A high-tension line passes through the corridor and at certain places has sagged dangerously low.
4. Development activities in villages: The construction of the KMVN Resort and subsequent land conversion is a threat to the corridor, especially in the villages of Kunakhet and Kumeria, located two kilometres from the boundary of Corbett Tiger Reserve.

CONSERVATION PLAN

1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent encroachment and developmental activities affecting elephant movement.
2. Land use changes in the corridor's fringe villages, especially Kumeria and Kunakhet, should be prohibited.
3. Expansion of Mohan Industrial Area should be prohibited.
4. Relocation of Chukham forest village should be taken up on a priority basis. This will facilitate elephant and tiger movement in the region.
5. Relocation of the IMPCL factory and the chemical factory at Garjia is required.



Map of the Fatehpur-Gadgadia Corridor

E10 - Fatehpur- Gadgadia

Ecological priority: High

Estimated elephant numbers in the landscape
Ramnagar forest Division: 84
Terai Central Division: 10
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats

1. Anthropogenic pressure: Cattle grazing coupled with firewood and fodder extraction by inhabitants of fringe villages have threatened the habitat quality of the corridor forest. The eastern and western parts of the corridor have over 14 villages on the fringes.
2. Traffic on the state highway: Heavy traffic on SH 41 threatens elephant movement between the habitats.
3. Large-scale farming on encroached khatta and leased land in and around the corridor.

CONSERVATION PLAN

1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent encroachment and developmental activities affecting elephant movement.
2. Vehicular speeds on the state highway should be regulated in the corridor area by the placement of suitable physical barriers, especially between 6 pm and 6 am.

Conservation feasibility: High	3. Encroached land should be reclaimed and further encroachment of the corridor forest prevented.

E11- Kilpura-Khatima-Surai
Ecological priority: Medium
Conservation feasibility: Low

Estimated elephant numbers in the landscape
Terai East Forest Division: 21
(Source: Elephant Population Estimation, Uttarakhand, 2015)

Threats
1. Encroachments: Encroachments in the Gosukuan Beat, namely Banrawat Basti, Chakarpur Bilheri and Naya Basti along the Sharda canal, and Pachoria lie directly in the elephant path towards Nakatal forest.
2. Settlements: Banrawat Basti, Chakarpur Bilheri, Naya Basti and Majgaon settlements on either side of Sharda canal have narrowed the width of the corridor.
3. Anthropogenic pressure: Cattle grazing and fuelwood collection in the corridor forest by about 25 fringe villages has degraded the habitat quality.
4. Traffic: NH 125 connecting Khatima and Tanakpur (now four-laned) is a busy road due to its proximity and connectivity with Nepal and Uttar Pradesh.
5. Sharda canal: This canal passes through the corridor. A high water level and strong current near Lohiya Head obstruct elephant movement between the habitats.
6. Rail traffic: 18 trains run through the corridor of which four run between 6 pm and 6 am. The track is metre gauge and there is local demand to convert this to broad gauge, which will worsen the situation.

CONSERVATION PLAN
1. The corridor should be notified and legally protected by the state forest department under an appropriate law, and action should be taken to prevent encroachment and developmental activities affecting elephant movement.
2. Encroachments in the corridor area of Banrawat Basti, Chakarpur Bilheri and Naya Basti could be relocated in consultation with villagers. The corridor area should be monitored regularly to prevent further encroachment by fringe villages.

366. All the Project sites avoid elephant corridors. Khatima – Sitarganj LILO and Khatima-II SS are located close to a tiger corridor. Kaniya SS and OHL is more than 5km from the Tiger and Elephant corridors. Elephant electrocutions have been reported recently in Uttarakhand on MLV power lines.[60]

Table 46: Project Site Tiger Corridor Screening

		Tiger Corridor	Elephant Corridor
#	**PTCUL LILO**		
1	Roorkee - Nara		
2	Manglore-Asahi		
3	Kathgodam - Rudrapur		
4	Khatima - Sitarganj	Yes, adjacent	
5	Kashipur-Puhana		
6	Manglaur - Nara		
7	Kashipur - Mahuakheraganj		
#	**PTCUL OHL**		
1	Mahuakheraganj - Jaspur		
#	**PTCUL Substations**		
1	Dhaulkhera		
2	Sarvarkhera		
3	Selaqui		
4	Lohaghat		
5	Araghar		
6	Khatima-II	Yes, in close proximity	
7	Landhora		
8	Manglore		
#	**PTCUL Second Stringing Line**		
1	Pithrogarh – Champawat (Lohaghat) (39.33km)		
#	**PTCUL UG LILO**		
1	Khodri-Jhajra Line (700m)		
2	Majra-Laltappar Line (3.6km)		
3	Jhajra-Harrawala Line (400m)		
#	**UPLC UG**		
1	Dehradun		
#	**UPCL New Substations**		
3	NearCollectorate		
4	Bharauni		
5	Kaniya	Within 6-7km	Within 6-7km (E-8)
#	**UPCL OHL / UG**		
3	NearCollectorate		
4	Bharauni		
5	Kaniya	Within 4-5km	Within 4-5km (E-8)

6.3.5. Species - Avifauna

367. The Project is located within the Central Asian Flyway. Normally migratory birds fly at high altitudes but sometimes stop off temporarily enroute along flyways between their breeding and overwintering grounds. The pattern of migration of Demoiselle Crane which overwinters in India

[60] https://timesofindia.indiatimes.com/city/dehradun/uttarakhand-elephant-found-dead-in-kaladhungi-range/articleshow/95108883.cms
https://www.devdiscourse.com/article/headlines/2287014-elephant-dies-of-electrocution-in-uttarakhand

shows movements of the birds from the Siberian region crossing the Trans Himalayas and even the greater Himalaya. They and other Siberian birds enter the country through the northeastern Himalayan ranges and from the north west.

368. A range of special status bird species have been identified by IBAT within 50km of the sub-activities (however the Demoiselle Crane was not identified). Many of these species are unlikely to be impacted by this type of project and are not discussed further in this report. However, larger birds, such as raptors and vultures are more likely to be impacted by electricity infrastructure through both electrocutions on the power lines and MLV poles and collisions with HV power lines. IBAT identified several species that are specifically at risk in the Project area and could be triggers for critical habitat at state level. They include:

- Steppe Eagle - *Aquila nipalensis* (IUCN EN)
- Pallas Fish Eagle - *Haliaeetus leucoryphus* (IUCN EN)
- Egyptian Vulture - *Neophron percnopterus* (IUCN EN)
- Saker Falcon - *Falco cherrug* (IUCN EN)
- White Rumped Vulture - *Gyps bengalensis* (IUCN CR)
- Red-headed Vulture - *Sarcogyps calvus* (IUCN CR)
- Slender billed Vulture - *Gyps tenuirostris* (IUCN CR)
- Indian Vulture - *Gyps indicus* (IUCN CR)

369. All these species have been identified in large numbers within the 50km of the sub-activity sites, except for Saker Falcon which has not been observed and the Steppe eagle which was observed in small numbers.

370. Research undertaken in 2018 as part of the Conservation Leadership Program (funded by Birdlife International, World Conservation Society and Fauna & Flora International) and Doon University (under the supervision of Wildlife Institute of India and RSPB) assessed the population status of vulture species in Uttarakhand. The focus of the study was around carcass dumping sites in Dehradun, Haridwar, US Nagar, Nainital and Champawat, with the main area around Rajaji NP and Corbett Tiger Reserve. During the study a total of six vulture species were observed:

- Egyptian Vulture - *Neophron percnopterus* (IUCN EN). Identified year round.
- Himalayan Vulture - *Gyps himalayensis* (IUCN NT)
- Eurasian Griffon Vulture - *Gyps fulvus* (IUCN LC)
- Cinereous Vulture - *Aegypius monachus* (IUCN NT)
- Red-headed Vulture - *Sarcogyps calvus* (IUCN CR). Identified year round.
- White Rumped Vulture - *Gyps bengalensis* (IUCN CR). Identified year round

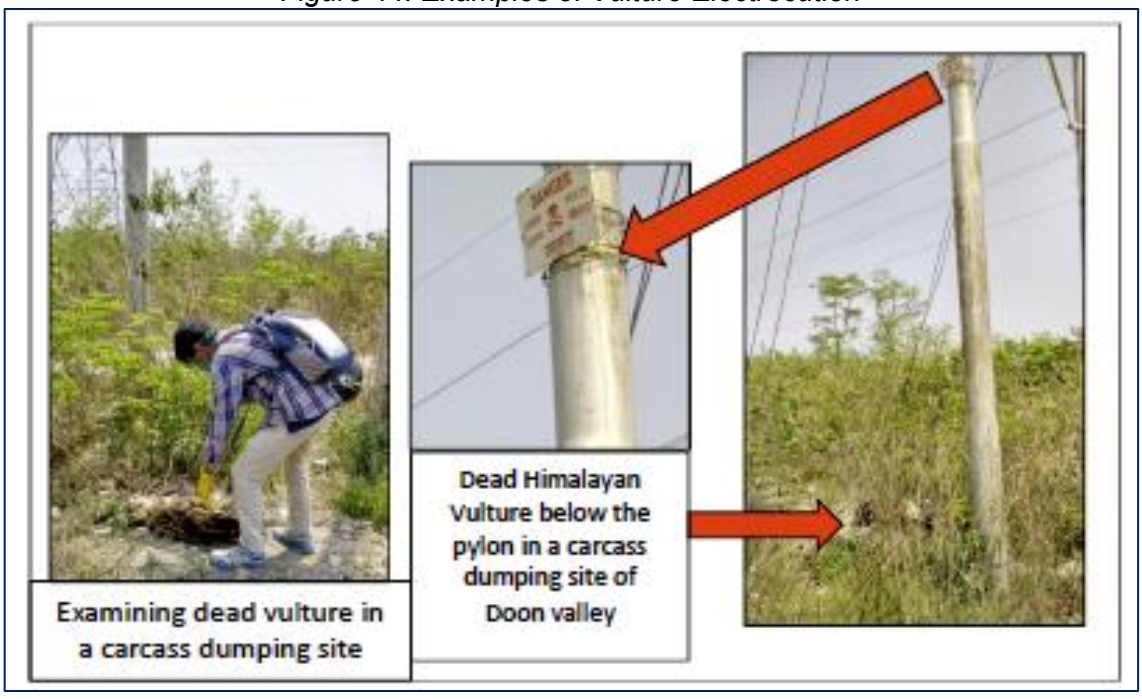
371. Steppe Eagles were also observed during the study. Given the above information it can be assumed that Saker Falcons are not present in the Project area in significant numbers, if at all.

372. The study concluded that electrocution mortality was a major threat to both vultures and the Steppe Eagle. More than 49 Himalayan Vultures, one Egyptian Vulture and 21 Steppe Eagles were reported to have died due to electrocution. The study indicates that most of the birds were electrocuted on MLV lines (33kV / 66kV type) and not on HV towers as shown in Figure 44 extracted from the study. Further, most of the electrocutions appear to have occurred on and poles close to carcass dumping grounds, which are a main feeding point for the vultures.

373. Consultation with PTCUL staff responsible for the maintenance of HV lines passing adjacent to Rajaji National Park indicated that no dead birds had been observed in the areas beneath these lines close to the forests in the past 15 years, except for one kite which was electrocuted. PTCUL staff noted that they complete regular inspections of the lines, including after power outages on the lines and that during these inspections no dead birds were found. However, they did note that electrocutions of birds had occurred on lines close to the slum areas around Dehradun – locations where animal carcass dumps may be located.

374. In summary, special status vultures and raptors can be found year-round close to sub-activity sites and potentially trigger critical habitat at state level. However, they appear to be at most risk from electrocution on MLV power lines located close to carcass dumps and not from collisions or electrocutions on HV power lines.

Figure 44: Examples of Vulture Electrocution



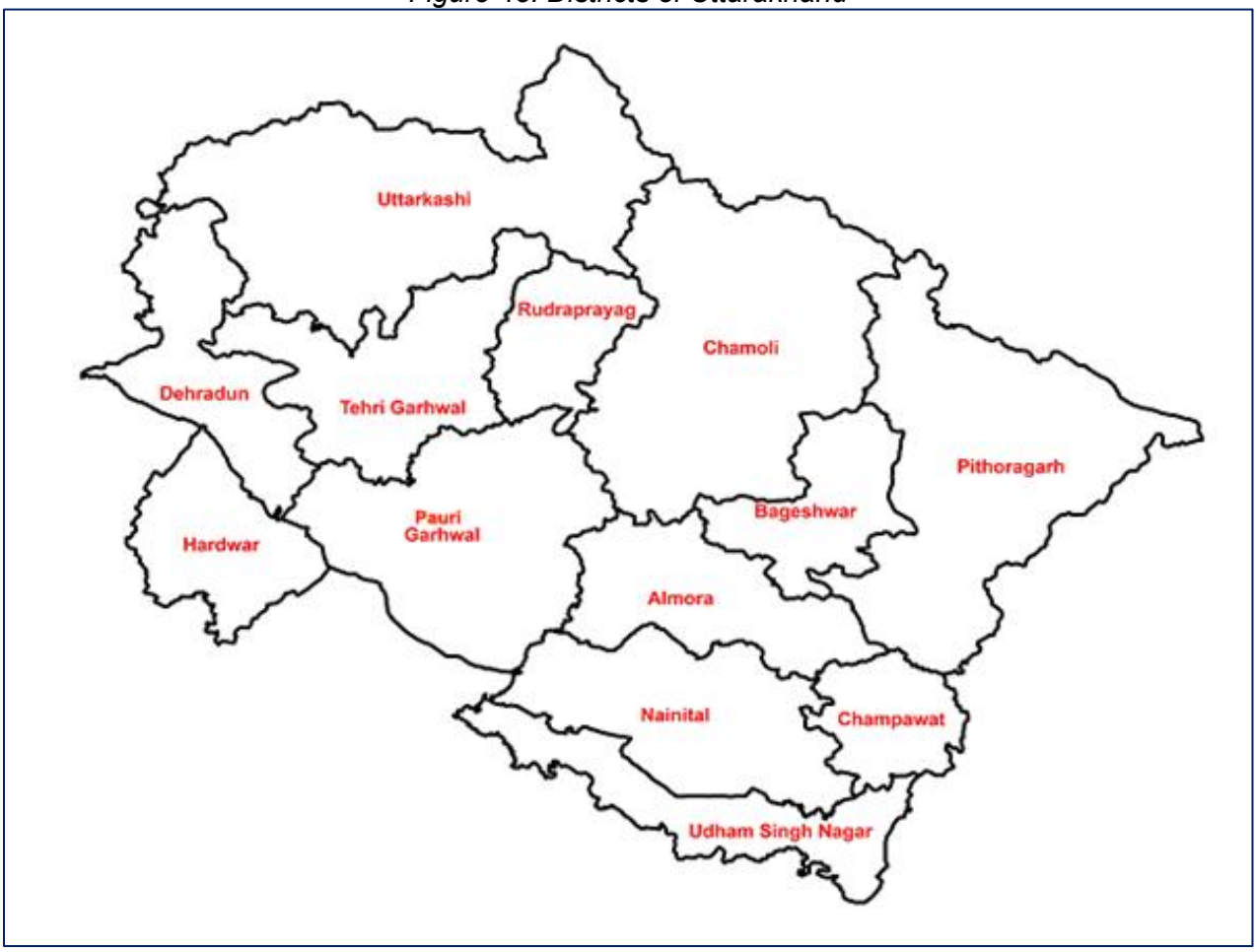
Source: *Population status and threat assessment of vulture species in Uttarakhand, India. CLP, 2018*

6.4. Uttarakhand Socio-economic Environment

6.4.1. Administrative Set Up

375. Formerly a part of Uttar Pradesh (UP), Uttarakhand (formerly called Uttaranchal) was created as the 27th state of the Indian Union on 9 November 2000 by carving out the 13 hill districts of UP. Due to its geographic and strategic location, it has been given 'Special Category Status' by the Union of India. Uttarakhand borders the People's Republic of China in the north-east and Nepal to the south-east, while its neighbouring states are Himachal Pradesh and Uttar Pradesh. Uttarakhand has traditionally been divided into two parts, the western half known as Garhwal Mandal and the eastern region going by the name of Kumaon Mandal. The state comprises of 13 districts (Figure 45) namely, Almora, Bageshwar, Chamoli, Champawat, Dehradun, Haridwar, Nainital, Pauri Garhwal, Pithoragarh, Rudraprayag, Tehri Garhwal, Udham Singh Nagar and Uttarkashi. The Project and its subactivities are located in seven of the thirteen districts as shown in Table 47.

Figure 45: Districts of Uttarakhand



Source: https://wiki.meramaal.com/2018/06/29/uttarakhand-districts/

Table 47: Component Breakdown by District

District	Component 1: HV				Component 2: MLV			
	New OHL	Second Circuit	UG LILO	New SS	33kV UG	11kV UG	New SS and Lines	SS Upgrades
Dehradun			X	X	X	X	X	X
Nainital	X			X			X	X
US Nagar	X			X			X	
Champawat		X		X				
Hardwar	X			X				
Pithoragarh		X						
Almora								X
Uttarkashi								
Tehri Garwal								
Pauri Garwal								
Rudraprayag								
Chamoli								
Bageshwar								

376. Hindi, Garhwali and Kumaoni are commonly spoken in the state. English is the medium of education in many of its schools.

6.4.2. Demographics

377. Uttarakhand has a total area of 53,483 km^2, of which 65% is covered by forest and 86% is mountainous region. Uttarakhand borders the People's Republic of China to the north; the Sudurpashchim Province of Nepal to the east; the Indian states of Uttar Pradesh to the south and Himachal Pradesh to the west and north-west. The state is divided into two divisions, Garhwal and Kumaon, with a total of 13 districts. Uttarakhand's name is derived from the Sanskrit words uttara meaning 'north', and khaṇḍa meaning 'land', altogether simply meaning 'Northern Land'. The name finds mention in early Hindu scriptures as the combined region of "Kedarkhand" (present day Garhwal) and "Manaskhand" (present day Kumaon). Uttarakhand was also the ancient Puranic term for the central stretch of the Indian Himalayas.

378. As per Census of India 2011, total population of Uttarakhand is 10,086,292 comprising 5,137,773 males and 4,948,519 females with a gender ratio of 1.04 females to males and 69.77% of the population living in rural areas. At the 2011 census the literacy rate of the state was 78.82% with 87.4% literacy for males and 70% literacy for females. Uttarakhand is the 20th most populous out of 28 states of the country having 0.83% of the population on 1.63% of the land. Its population density is 189 persons per square kilometer having a 2001–2011 decadal growth rate of 18.81%. The gender ratio is 963 females per 1,000 males. The crude birth rate in the state is 16.6 (SRS-2020) with the total fertility rate being 1.8 (SRS-2020). The state has an infant mortality rate of 24 (SRS-2020), a maternal mortality rate of 103 (SRS-2018-19) and a crude death rate of 6.3 (SRS-2020).

6.4.3. Ethnic Groups

379. Uttarakhand has a multi-ethnic population spread across two geo-cultural regions: the Garhwal, and the Kumaon. Around 60.05% of the population belongs to General Category, 18.3% of the population is classified as Other Backward Classes (OBCs), 18.76% of the population belongs to the Scheduled Castes (SC) Scheduled Tribes (ST)[61] such as the Jaunsari, Bhotiya, Tharu, Buksa, Raji, Jad and Banrawat constitute 2.89% of the state population. Religion wise, 82.97% of the population belongs to Hindu, 13.95% Islam, 2.34% Sikhism and rest 0.74% belongs to Christianity, Buddhism, Jains and others.

6.4.4. Economy

380. Uttarakhand derives its income from activities relating to agriculture, horticulture, animal husbandry, forest, mining, manufacturing, construction, tourism, hotel and restaurants. Uttarakhand has witnessed massive growth in capital investments due to a conducive industrial policy and generous tax benefits[62]. Therefore, Uttarakhand is one of the fastest growing states in India. The state's GSDP (Gross State Domestic Product) increased at a CAGR (compounded annual growth rate) of 7.8% between FY2016 and FY2022. As per the economic survey 2022-23, the estimated growth rate for the financial year 2020-2021 was 5.38%. In 2022-2023 GSDP of the state is estimated to increase at a CAGR of 6.54%. At current prices, Uttarakhand's GSDP is projected to be Rs. 2.76 trillion (US$ 33.61 billion) in FY23.

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[61] The Scheduled Castes (SCs) and Scheduled Indian Tribes (STs) are officially designated groups of people and among the most disadvantaged socio-economic groups in India. The terms are recognized in the Constitution of India and the groups are designated in one or other of the categories. As per Article 366 (25) of the Constitution of India the Scheduled Tribe is defined as "Such tribes or tribal communities or part of or groups within such tribes or tribal communities as are deemed under Article 342 to the Scheduled Tribes (STs) for the purposes of this [Indian] Constitution"

[62] According to Department for Promotion of Industry and Internal Trade (DPIIT), the cumulative foreign direct investment (FDI) inflow stood at around US$ 710 million from April 2000 to June 2020. Between October 2019-June 2022, FDI inflow in Uttarakhand stood at US$ 126.68 million. As of May 2020, 11 Industrial Entrepreneur's Memorandums (IEMs) worth Rs. 288 crore (US$ 39.10 million) have been filed in Uttarakhand.(Source: Indian Brand Equity Foundation)

381. The state's natural resources, policy incentives, and infrastructure favors investments in the tourism, hydroelectric power, manufacturing and agriculture sectors. The tourism sector contributed around 52%, service sector contributes 38% and agriculture sector contributed 10% to the state's GSDP in 2021-22. As per 2022-2023 Economic Survey, there were 329 registered large factories in the state provided employment to 111,452 persons. The state had 77,997 small scale industries which provided employment to 3,98,911 people. According to the latest Human Development Report (HRD) published by the UNDP the unemployment rate in Uttarakhand has doubled from 2.1% in 20024 to 4.2% in 2017. [63]

6.4.5. Transportation

382. Transport in the state is largely based on road. Uttarakhand had a total road length of 31,596 km, as of March 2022. It has 5,755 km of state highways, 3,547 km district roads, 20,147 rural roads, and 79 km light vehicle roads. Out of 16,792 villages of Uttarakhand, 13,585 villages have been connected to the roads despite the tough Himalayans terrain.[64] As of March 2022, Uttarakhand has national highways of around 3,449 km in length. The state is well connected to its neighbouring states and other parts of India through several National Highways (NH), notably: NH-9, NH-58, NH-72, NH-72A, NH-72B, NH-73, NH-74, NH-87, NH-94, NH-107, NH-107A, NH-108, NH-109, NH-119, NH-121, NH-123, NH-125, NH-307, NH-309A, NH-309B, NH-334A, NH-707A.

383. Uttarakhand has poor train transport infrastructure, primarily due to the tough Himalayan terrain. Till 2022, the State has only 344.91 km of rail line. The State government has requested central government to develop 125.2 KM Rishikesh-Karnprayag (out of which 104 KM will be underground rail line) rail project, 27.45 KM Devvand-Roorkee rail line and connecting char-dham to rail route.

6.4.6. District Socio-economic Data

384. The following section summarizes the socio-economic situation for all the relevant Project districts.

Table 48: Socio-economic data for Uttarakhand [65]

District	Summary
Dehradun	According to 2011 census the district has a population of 16,96,694 out of which 8,92,199 are males and 8,04,495 are females. The district has a sex ratio of 902 (females for every 1000 males). During the year 2001-2011 the population growth rate in the district was 32.33% including 31.29% were males and 33.51% were females. As per 2011 census the major religion in the district is Hindu with 83.98% of the total population. The population density in the district is 549 persons per sq. km. According to 2011 census the principal language in the district is Hindi with 87.06%. In the year 2018 the number of live births in the district was 31,447 including 16,358 were males and 15,089 were females. In the same year the number of deaths in the district was 8,167 including 5,140 were males and 3,027 were females. The economy of the district is mainly dependent on agriculture. The chief agricultural products in the district are sugarcane, mango, guava, peach, grape, strawberry, barley, mustard, potato, wheat, maize, potato, etc. The adoption of the new agricultural technologies amongst the famers of the district helps to increase the production of various agricultural items. Industrially, also the district is quite well developed. From the last 20 years the place, Dehradun is enjoying a strong economic growth. Dehradun is flourished in both the fields of commerce and information technology after the establishment of software technology parks of India (STPI) and SEZS (special economic zones) throughout it. Dehradun is as well famous as a center for national defense production. The principal defense production factories in the district which manufactures the products for the Indian Armed Forces are the Ordnance

[63] https://timesofindia.indiatimes.com/city/dehradun/unemployment-rate-doubles-in-12-years-in-uttarakhand-hdr-report/articleshow/70480533.cms
[64] 2022-23 Economic Survey
[65] https://www.indiastatdistricts.com/uttarakhand-state

District	Summary
	Factory, the Opto Electronics Factory of the Ordnance Factories Board, Defense Electronics Application Laboratory and Instruments Research and Development Establishment of the Defense Research and Development Organization. Every year a huge chunk of revenue comes from these factories in the district helps in its economy to a great extent. In the year 2016-17 the gross domestic product in the district was Rs. 40,57,583 lakh at current price and Rs. 32,91,255 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 36,32,604 lakh at current price and Rs. 29,36,417 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 1,95,925 at current price and Rs. 1,58,376 at constant prices in the year 2011-2012.
Nainital	According to the national census 2011, Nainital has a total population of 954,605 with 4,93,666 are males and 4,60,939 are females. The urban population is 38.94% of the total population while 61.06% of the population is rural. The district has a sex ratio of 934 (females per 1000 males). In the year 2001-2011 the population growth rate in the district was 25.13% including 23.34% were males and 27.10% were females. As per 2011 census the major religions in the district are Hindu and Muslim with 84.82% and 12.65% of the total population. The population density in the district is 225 persons per sq. km. According to 2011 census the principal language in the district is Hindi with 89.74%. In the year 2018 the number of live births in the district was 18,827 out of which 8,904 were males and 9,923 were females. In the same year the number of deaths in the district was 6,014 out of which 3,348 were males and 2,666 were females. Tourism is important in Nainital district. Trading in goods and merchandise has been the major source of income for the people of Nainital district for the past many decades. This includes trade in the field of baked goods, flour mill, jam, pickle and spices. Agriculture has traditionally been an integral means of livelihood for the people of this district. Crops in the highland areas such as wheat, maize, etc. are grown by the farmers and most of them are exported outside the state. Every year the apples from Nainital are export to the different parts of the country. There are many industries throughout Nainital. Mostly, they are in the paper and candle works. But there are also industries in the field of fiberglass, steel. industries and leather works. The large-scale industries in this district are: Indane bottling plant, Jalpack India Ltd, Century Pulp & Paper; HMT Ltd, Biolife foods Pvt Ltd. The items being exported from this region are phytochemicals, herbal concentrate, barberin hydrochloride JP, metallic polyester film, water filters and paper, decorative candles and pulp and paper. Processed fruits, candles and handicrafts items are exported from this district. In the year 2016-17 the gross domestic product in the district was Rs. 13,45,261 lakh at current price and Rs. 11,16,974 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 2,57,050 lakh at current price and Rs. 2,08,136 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 1,15,117 at current price and Rs. 94,937 at constant prices in the year 2011- 2012.
US Nagar	According to the national census 2011, Udham Singh Nagar district has a total population of 1,648,902 with 790,119 are females and 858,783 are males. The urban population is 35.58% and 64.42 % of the population is rural. As per 2011 census the major religions in the district are Hindu and Muslim with 66.98% and 22.58% of the total population. During the year 2001-2011, the population growth rate in the district was 33.45% including 32.23% were males and 34.80% were females. The population density in the district is 649 persons per sq. km. According to 2011 census the principal languages in the district are Hindi and Punjabi with 72.18% and 10.09%. In the year 2018 the number of live births in the district was 42,873 including 21,113 were males and 21,760 were females. In the same year the number of deaths in the district was 7,431 including 4,812 were males and 2,619 were females. Udham Singh Nagar district is popular as the land of agriculture and industries and widely known as the district of industries. G. B. Pant University producing technical experts and agricultural scientists confirms the value and standard of technology and agriculture in this district. Large automobile industries such as TATA motor, Bajaj, Ashok Leyland, Mahindra and Mahindra have their units in Udham Singh Nagar district. Automobile parts or vehicles,

District	Summary
	paper and paper products, sugar, rice, electrical items, food product based industries and packaging materials are the major manufacturing industries prominently running in Udham Singh Nagar district. This district is famous for its agriculture and irrigation and is the food bowl of Uttarakhand State. It is also lovingly called as 'Chawal ki Nagari' for its popular paddy around India. Potential areas for economic industries are AC and IT related fields, electrical sector, hotel, restaurant, human resource suppliers and tool rooms can flourish. In the year 2016-17 the gross domestic product in the district was Rs. 37,59,811 lakh at current price and Rs. 32,07,441 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 12,00,847 lakh at current price and Rs. 9,90,342 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 1,87,313 at current price and Rs. 1,59,255 at constant prices in the year 2011-2012.
Champawat	As per 2011 census, out of the total Champawat population, 14.77% lives in urban regions of district and 85.23% population lives in rural areas of villages. In total 38,343 people lives in urban areas of which males are 20,283 and females are 18,060 and in rural areas is 221,305 of which males and females are 110,842 and 110,463, respectively. The sex ratio in urban region of Champawat district is 890 as per 2011 census data and in rural areas it is 997 females per 1000 males. Similarly, child sex ratio in Champawat district is 873 (females per 1000 males). During the year 2001-2011 the population growth rate in the district was 15.63% including 18.04% were males and 13.28% were females. Average literacy rate in Champawat district as per census 2011 is 79.83% (persons), 91.61% (males), 68.05% (females). The religion-wise data as per 2011 census in Champawat district are as follows: Hindu 249,563 (96.12%), Muslims 8,693 (3.35%), Christian 870 (0.34%), Sikh 336 (0.13%), Buddhist 24 (0.01%), Jain 28 (0.01%), and others 6 (0.00%) . According to 2011 census the principal language in the district is Hindi with 98.18%. In the year 2018 the number of live births in the district was 3,788 including 2,035 were males and 1,753 were females. In the same year the number of deaths in the district was 917 including 580 were males and 337 were females. In the year 2006, the Ministry of Panchayati Raj named Champawat one of the country's 250 most backward districts. It is one of the three districts in the state of Uttarakhand which currently receives funds from the Backward Regions Grant Fund Programme. Even though it is rich in mineral resources such as many ores, minerals, soils and rocks are available in the hills of Champawat. According to geological survey of India this region have ample of lime, magnexide, soapstone, and gypsum. The district is rich with natural perennial rivers and rivulets. Due to Lohawati, Jagbura, Ramganga, Kali and other rivers the scarcity of water has never been felt, but uneven geographical condition is the major reason that the portion of water drains off through small rivers and rivulets. Only about 9% of total land is termed as agricultural irrigated land of the region. In this district, 65% of the area is under forest and net sown area is less than 10%. Lack of agricultural land and resources has always been a reason for the poor economic status of this region. A large number of males are serving in the armed forces of the country. Few villagers are also involved in animal husbandry. There are no small or medium scale industry in the region. As a result, majority of population of the youth are unemployed. The region is well connected with hills and the plains through highways which has given rise to small shops and dhabas. Many people are engaged in this business. Although 68% of the villages have been electrified. The nearest rail head is Tanakpur a distance of 75 km. One bank branch is available for more than 8000 population. There are total 27 bank branches available. In the year 2016-17 the gross domestic product in the district was Rs. 2,87,786 lakh at current price and Rs. 2,34,374 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 5,88,052 lakh at current price and Rs. 4,82,932 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 90,596 at current price and Rs. 73,356 at constant prices in the year 2011-2012.
Haridwar	As per 2011 census, Haridwar had population of 1,890,422 of which male and female were 1,005,295 and 885,127, respectively. With regards to sex ratio in Haridwar, it stood at 880 females per 1000 males. During the year 2001-2011, the population growth rate in the district was 30.63% out of which 29.54 were males and 31.88% were females. As per 2011 census

District	Summary
	the major religions in the district are Hindu and Muslim with 64.27% and 34.28% of the total population. The population density in the district is 801 persons per sq. km. According to 2011 census the principal languages in the district are Hindi and Urdu with 88.51% and 9.66%. In the year 2018 the number of live births in the district was 39,241 out of which 20,944 were males and 18,297 were females. In the same year the number of deaths in the district was 10,593 out of which 6,937 were males and 3,656 were females. Agriculture is the mainstay of this well irrigated district. Industrial estates State Industrial Development Corporation of Uttarakhand (SIDCUL) and Bharat Heavy Electricals Limited (BHEL) have turned Haridwar into industrial district which contributes highly to the district's economy. The SIDCUL has now established 'industrial development zone' in the district, adjacent to Shivalik Nagar near Haridwar, to encourage industrialization, with industrial giants like Hindustan Lever, Dabur, Mahendra & Mahendra and Havells having moved in. Hindu pilgrims who visit the holy places and attend the religious fairs in large numbers contribute to district's economy. In Haridwar district major minerals available are sand, stone and gypsum. In the year 2016-17 the gross domestic product in the district was Rs. 58,16,824 lakh at current price and Rs. 49,66,149 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 33,75,110 lakh at current price and Rs. 28,69,545 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 2,54,050 at current price and Rs. 2,16,143 at constant prices in the year 2011-2012.
Pithoragarh	According to 2011 census the district has a population of 4,83,439 out of which 2,39,306 are males and 2,44,133 are females. The district has a sex ratio of 1020 (females for every 1000 males). During the year 2001-2011 the population growth rate in the district was 4.58% including 5.14% were males and 4.03% were females. As per 2011 census the major religion in the district is Hindu with 98.28% of the total population. The population density in the district is 68 (persons per sq. km.). According to 2011 census the principal language in the district is Hindi with 96.08%. In the year 2018 the number of live births in the district was 10,968 out of which 5,707 were males and 5,261 were females. In the same year the number of deaths in the district was 2,238 out of which 1,360 were males and 878 were females. Agriculture is the backbone of the economy of the district. Most of the lands in the district are use for agricultural purposes. More than half of its population are engaged in agriculture in order to earn their livelihood. The chief agricultural products in the district are green apples, Himalayan pears, yellow plums, oranges, mulberry, red lentils, green lentils, etc. The adoption of the new agricultural technologies amongst the famers of the district helps to increase the production of various agricultural items. The district is rich in mineral resources as well. Magnesium ore, copper ore, limestone, slate stone, etc. are the foremost mineral resources found in the district. In the year 2016-17 the gross domestic product in the district was Rs. 6,03,799 lakh at current price and Rs. 4,92,677 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 52,48,108 lakh at current price and Rs. 44,65,033 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 1,01,734 at current price and Rs. 82,386 at constant prices in the year 2011-2012.
Almora	According to 2011 census the district has a population of 6,22,506 out of which 2,91,081 are males and 3,31,425 are females. The district has a sex ratio of 1139 (females for every 1000 males). During the year 2001-2011 the population growth rate in the district was -1.28% including -0.94% were males and -1.57% were females. As per 2011 census the major religion in the district is Hindu with 98.19% of the total population. The population density in the district is 198 persons per sq. km. According to 2011 census the principal language in the district is Hindi with 98.74%. In the year 2018 the number of live births in the district was 15,506 including 7,759 were males and 7,747 were females. In the same year the number of deaths in the district was 3,889 including 2,059 were males and 1,830 were females. Agriculture is the backbone of the economy of the district. Most of the lands in the district are use for agricultural purposes. More than half of its population are engaged in agriculture in order to earn their livelihood. The chief agricultural products in the district are rice, wheat, millet, tea, apples, peaches, apricots, plums, etc. The adoption of the new agricultural

District	Summary
	technologies amongst the famers of the district helps to increase the production of various agricultural items. Every year a huge chunk of revenue comes from the agricultural products in the district helps in its economy to a great extent. The district is scantily industrialized, only a few small scale industries of handicraft are present over there. The district is also rich in mineral resources. Copper, Magnetite, etc. are the commonly found mineral resources in the district. Forestry is the extra source of income for the rural people of the district. In the year 2016-17 the gross domestic product in the district was Rs. 6,60,378 lakh at current price and Rs. 5,45,139 lakh at constant prices in the year 2011-2012. The net domestic product in the district during the period 2016-17 was Rs. 2,84,339 lakh at current price and Rs. 2,23,077 lakh at constant prices in the year 2011-2012. The Per Capita Income or NDDP, At Factor Cost in the district during the period 2016-17 was Rs. 96,786 at current price and Rs. 79,484 at constant prices in the year 2011-2012.

6.4.7. Electricity Supply

385. As of December 2022, Uttarakhand has installed capacity for power generation is 1,420.6 MW. Overall, Uttarakhand is producing 4,637.73 MU (Million Units) against the electricity demand of 11,801 MU. Uttarakhand is producing only around 40% of the electricity consumption in the state. Around 45% of the demand is supplied by the central government and 12% from IEX drawl (IEX-India Energy Exchange is an India's power trading platform).[66] As per Saubhagya.gov.in (a dashboard for Indian government project to provide electricity to each household), 100% households of Uttarakhand have been electrified under Prime Minister electricity to every home scheme. Details are provided in Table 49.

Table 49: Household electrification in Uttarakhand across districts

District	Total Households	Total Connections (Electrified Households) (March 2019)	Total Connections/ Household Electrification (%)
Dehradun	371135	374238	101%
Haridwar	365950	368636	101%
Udham Singh Nagar	351751	355094	101%
Nainital	205288	206844	101%
Garhwal	148997	150014	101%
Almora	135290	136374	101%
Tehri Garhwal	124821	125609	101%
Pithoragarh	101060	101633	101%
Chamoli	73485	73996	101%
Bageshwar	52921	53156	100%
Champawat	51081	51561	101%
Uttarkashi	49005	49679	101%
Rudraprayag	45829	46222	101%
Uttarakhand	**20,76,613**	**20,93,056**	**101%**

Source: Prime Minister electricity to every home scheme. https://saubhagya.gov.in/ dated 8th May 2023

386. As per PTCUL official website dated 15th May 2023, the State has 422.1 circuit km of 400 kV power line, 795.3 circuit km of 220 kV power line, 1673.272 circuit km of 132 kV poewr line, and 107 circuit km of 66 kV power line. PTCUL has 3no. 400 kV Substations, 10no. 220 kV substations and 28 132 kV substations. PTCUL has average 0.971 of transmission loss during the financial year 2022-23.[67]

[66] Uttarakhand Economic Survey 2022-23
[67] https://ptcul.org/transmission-lines

387. Out of 10,758,985 thousand kV hours units of electricity consumption in 7 districts during the financial year 2021, US Nagar (4,763,502 thousand kV hours) and Haridwar (3,318,733 thousand kV hours) consumed around 75% of the electricity and in these two districts majority (more than 75%) in commercial and industrial activities. Electricity consumption in Champawat (75%), Pithoragarh (55%) and Dehradun (42%) was from household consumption. Details are provided in Table 50.

Table 50: Distribution of electricity consumption across project districts

District	Villages electrified	Households (%)	Commercial (%)	Industry (%)	Public Lights (%)	Agriculture (%)	Public Services (%)
Dehradun	635	52.4	26.1	8.7	5.8	1.1	5.8
Pithoragarh	1536	55.4	18.4	1.7	3.1	0.2	21.3
Almora	2137	45.2	21.3	2.1	0.8	0.0	30.7
Champawat	632	75.3	16.7	4.7	1.2	1.6	0.5
Nainital	1014	48.7	16.1	22.6	0.6	1.8	10.4
U.S. Nagar	620	17.7	5.2	73.3	0.5	2.5	0.8
Haridwar	500	21.9	8.1	67.2	0.2	0.3	2.2

Source: District Statistics 2021

6.4.8. Community Health, Sanitation, and Accidents

388. Uttarakhand has a good network of hospitals and health centers. According to 2022-2023 Economic Survey report, the state has 13 District Hospitals, 21, Sub-District Hospitals, 25 others district hospitals, 79 Community Health Centers, 577 Primary health centers, and 1,896 Health Sub-centers. Majority of the population of Uttarakhand has access to health services provided by government and private players. As per 2022-2023 Economic Survey report, Uttarakhand has 14,226 government primary schools and 4,090 private schools, 3,852 middle schools, 119 government colleges, 21 private colleges, 72 government polytechnics, 69 private polytechnics, and 4 medical colleges. Additionally, the State government is opening 3 new medical colleges in Uttarakhand.

389. Out of 38,681 rural habitations, 38,678 (99%) habitations have been connected to drinking water supply system (19,549 partial and 19,129 fully). Till December 2022, out of 1,494,414 identified rural households around 70% of the households have been connected to a Functional Household Tap Connection for drinking water supply.

390. UPCL have indicated that worksite accidents including fatalities do occur mainly during the maintenance of OHL lines. PTCUL have indicated that accidents involving their workers and high voltage equipment are rare. However, accidents statistics have not been provided for review by either.

391. Details on the availability of various health infrastructures especially various health centers at project villages are provided in Table 51.

Table 51: Health services in the project villages

Districts	No. of villages	Primary Health Centre	Health sub-center	Maternity And Child Welfare Centre	Hospital Alternative Medicine
Dehradun	6	33.3%	50.0%	16.7%	16.7%
Pithoragarh	13	0.0%	15.4%	7.7%	0.0%

Almora	7	0.0%	28.6%	0.0%	0.0%
Champawat	7	0.0%	28.6%	0.0%	0.0%
Nainital	13	7.7%	23.1%	23.1%	0.0%
Udham Singh Nagar	25	0.0%	16.0%	4.0%	0.0%
Hardwar	19	0.0%	31.6%	31.6%	0.0%
Total	90	3.3%	24.4%	13.3%	1.1%

Source: Village Census 2011

392. Status and condition of Water facilities such as treated water, tap water, tube well, borehole in the project villages is described in Table 52.

Table 52: Water facilities in the project villages

Districts	No. of villages	Tap Water-Treated	Tap Water-Treated Functioning all-round the year	Tube Wells / Borehole	No Drainage
Dehradun	6	100.0%	100.0%	33.3%	16.7%
Pithoragarh	13	100.0%	100.0%	30.8%	76.9%
Almora	7	100.0%	100.0%	0.0%	100.0%
Champawat	7	85.7%	85.7%	0.0%	0.0%
Nainital	13	92.3%	92.3%	30.8%	0.0%
Udham Singh Nagar	25	68.0%	68.0%	100.0%	8.0%
Hardwar	19	26.3%	26.3%	63.2%	10.5%
Total	90	73.3%	73.3%	52.2%	24.4%

Source: Village Census 2011

6.4.9. Waste Management

393. According to the latest State of Environment Report (2018) released by Uttarakhand Environment Protection and Pollution Control Board, "It is estimated that about 900 metric tons/day solid waste is being generated from the urban local bodies in Uttarakhand. Currently, two waste management plants are working in Haridwar (Sarai) out of which about 50% of waste is being lifted and dumped at unidentified locations." The report further states that "No urban local body has defined collection, segregation, transportation and disposal mechanisms to comply with the Municipal Solid Wastes Rules, 2000."[68]

394. Regarding hazardous waste, according to the National Inventory Report on Hazardous Waste Generation and Its Management (2016-17) [69] there are 3,671 hazardous waste generating industries in Uttarakhand which generates about 24,264 MT of hazardous wastes (as per the annual returns) during 2016-17. About 73% of hazardous waste generated in the state is contributed by US Nagar district followed by Haridwar 25%.

395. In Uttarakhand, there are 12 numbers of authorized Schedule-IV recyclers for the recycling of commonly recyclable hazardous wastes like used/waste oil, lead bearing wastes, brass dross, zinc bearing wastes, etc. having authorized capacity of about 161,948 metric tons (MT) per annum, however, the quantity of hazardous waste recycled is 23,151 MT. There is no co-processing unit for

[68] Source: https://www.hindustantimes.com/dehradun/uttarakhand-to-start-disposing-of-over-28-lakh-metric-tonnes-of-legacy-waste/story-B7jiU7gzN3PHbUSYkaHNwK.html

[69] https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2016-17.pdf

the utilization of hazardous waste in cement kiln, therefore, hazardous waste is sent to other states for co-processing. There is only one common integrated Treatment, Storage and Disposal Facilities - TSDF (having both secured landfill and incinerator) in Uttarakhand for treatment and disposal of hazardous wastes. About 4,662 MT of landfillable (direct landfill and landfill after treatment) and 2,211 MT of incinerable hazardous wastes has been disposed during 2016-17. Further, about 102 MT of hazardous wastes are disposed in captive secured landfill in Haridwar district and 163 MT through captive incinerators in two districts i.e., US Nagar and Haridwar. No specific facilities responsible for the management of waste containing polychlorinated biphenyls (PCBs) or SF6 have been identified.

396. Uttarakhand Pollution Control Board has authorized 23 recyclers for collection/transportation/disposal of hazardous waste, of which 10 are in Uttarakhand and remaining in neighbouring states of Uttar Pradesh, Himachal Pradesh and other states of Rajasthan and Haryana. No specific facilities responsible for the management of waste containing polychlorinated biphenyls (PCBs) or SF6 has been identified.

6.4.10. Physical Cultural Resources and Cultural Landscape

397. There are no physical cultural UNESCO sites in Uttarakhand.

398. The Ancient Monuments and Archaeological Sites and Remains Act 1958 define an 'Ancient Monument' as follows: Ancient Monument means any structure, erection or monument, or any tumulus or place of interment, or any cave, rock-sculpture, inscription or monolith which is of historical, archaeological or artistic interest and which has been in existence for not less than 100 years and includes:

a. Remains of an ancient monument.

b. Site of an ancient monument.

c. Such portion of land adjoining the site of an ancient monument as may be required for fencing or covering in or otherwise preserving such monument.

d. The means of access to, and convenient inspection of, an ancient monument.

399. Section 2(d) defines archaeological site and remains as follows: Archaeological sites and Remains means any area which contains or is reasonably believed to contain ruins or relics of historical or archaeological importance which have been in existence for not less than one hundred years, and includes:

a. Such portion of land adjoining the area as may be required for fencing or covering in or otherwise preserving it, and

b. The means of access to and convenient inspection of the area.

400. The Archaeological Survey of India (ASI) under the provisions of the AMASR Act, 1958 protects monuments, sites, and remains of national importance. There are at present more than 3,676 ancient monuments and archaeological sites and remains of national importance. These monuments belong to different periods, ranging from the prehistoric period to the colonial period and are in different geographical settings. They include temples, mosques, tombs, churches, cemeteries, forts, palaces, stepwells, rock-cut caves and secular architecture as well as ancient mounds and sites which represent the remains of ancient habitation. These monuments and sites are maintained and preserved through various Circles of the ASI spread all over the country. The Circles look after the research on these monuments and conservation activities, while the Science Branch with its

headquarters at Dehradun carries out chemical preservation and the Horticulture Branch with its headquarters at Agra is entrusted with the laying out gardens and environmental development.

401. List of Centrally protected monuments of Dehradun Circle, ASI listed district wise are shown in Table 53.

Table 53: ASI Sites by Project Districts

Site	Coordinates and Notification
Almora	
JAGESHWAR TEMPLE (PHULAI GUNTH)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
MRITUNJAYA TEMPLE (PHULAI GUNTH)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
DANDESHWAR TEMPLE (KOTULI AND CHANDHOK GUNTH)	Lat. 29° 38' 5" N; Long. 79° 50'35" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
KUBER TEMPLE (PHULAI GUNTH)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
CHANDIKA TEMPLE (PHULAI GUNTH)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
NANDA DEVI OR NAU DURGA, JAGESHWAR	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
NAVA GRAHA SHRINE, (PHULAI GUNTH, JAGESHWAR)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
PYRAMIDAL SHRINE (PHULAI GUNTH)	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
SHRINE DEDICATED TO SURYA (PHULAI GUNTH), JAGESHWAR	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: 896-M/367-28:20/28-05-1915
A LARGE TEMPLE DEDICATED TO SUN (KATARMAL)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E NOTIFICATION NO.: UP-1669/1133-M:27-12-1920
BADRINATH GROUP OF TEMPLES (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/10/15.05.1915
+BANDEO TEMPLE (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/10/15.05.1915
GUJAR DEO TEMPLE (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/ 10/15.05.1915
KACHERI GROUP OF TEMPLE (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/10/15.05.1915
KUTUMBARI TEMPLE (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/ 10/15.05.1915
MANIYAN GROUP OF TEMPLES (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/ 10/15.05.1915
MRITUNJAYA GROUP (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/ 10/15.05.1915
RATAN DEO SHRINES (DWARAHAT)	Lat. 29° 46' 32' N; Long. 79° 25' 49'E Notification No. U.P, 830-M/367-28/-/10/15.05.1915
Champawat	
GROUP OF BALESHWAR TEMPLES	Lat. 29° 20'11" N Long. 80° 05'31" E NOTIFICATION NO.: UP-1233-M/367-36:1916/-/13.10.1916
KOTWALI CHABUTRA	Lat. 29° 20'11" N Long. 80° 05'31" E NOTIFICATION NO.: UP-1233-M/367-36:1916/-/13.10.1916

Site	Coordinates and Notification
NAULA OR COVERED SPRING ATTACHED OF THE BALESHWAR TEMPLE	Lat. 29° 38'19" N; Long. 79° 51'16" E NOTIFICATION NO.: UP-1233-M/367-36:1916/-/13.10.1916
Dehradun	
HE INSCRIBED ROCK EDICT OF ASOKA (KALSI)	Lat. 30 ° 32' N: Long 77° 53' E NOTIFICATION NO.: UP-3119-M/367 :23-11-1909
SIVA TEMPLE, LAKHAMANDAL	Lat. 30° 43' 55" N: Long 78° 04' 42"E NOTIFICATION NO & DATE-NO-3123-M/367/-/23/11/1909
MAHASU TEMPLE, HANOL	Lat. 30° 58' 16" N: Long 77° 55' 45" E Notification No & Date;1669/1133 - M dated 27.12.1920
ANCIENT SITE (JAGATGRAM), BADHWALA	Lat. 30° 28' 08"N: Long 77° 48' E
EXCAVATED SITE - VIRBHADRA RISHIKESH	N 30° 04'00" and E 78° 16'47"
KALINGA MONUMENTS (KARANPUR), SHASTRADHARA ROAD	Lat. 30° 22' 31" N: Long 77° 6' 21" E Notification No & Date;UP-1645-M/1133:22-12-1920
Hardiwar	
BRITISH CEMETERY (SHEKHPURI AND GANESHPUR), ROORKEE	Lat. 29° 51' 54' N; Long. 77° 52' 41' E Notification No & Date-1645-M/1133/-/22/12/1920
Naintal	
REMAINS OF ANCIENT BUILDINGS LOCALLY IDENTIFIED WITH VAIRATAPATTANA, DHIKULI	Lat. 29° 28' 5" N; Long. 79° 11' 30" E NOTIFICATION NO.: UP-1669-M/1133:1920/-/27.12.1920
OLD TEMPLE SACRED TO SITA, SITABANI	Lat. 29° 28' 5" N; Long. 79° 11' 30" E NOTIFICATION NO.: UP-1669-M/1133:1920/-/27.12.1920
Pithgorath	
REMAINS OF A FEW OLD TEMPLES AND AN INSCRIBED MASONRY WELL, GANGOLI HAT	Lat. 29° 39'23" N Long. 80° 05'24" E NOTIFICATION NO.: UP-1669/1133M:1920 NOTIFICATION DATE: 27.12. 1920
PATALBHUBNESHWAR CAVE, DIDIHAT	Lat. 29° 39'23" N Long. 80° 05'24" E NOTIFICATION NO.: SO.-254(A)/-/03.03.2003
Kashirpur	
EXCAVATED SITE AT DRONASAGAR (MAUZA UJJAN KASHIPUR)	Lat. 28° 09' N; Long. 78° 59' E NOTIFICATION NO.: F.04/1/70-CAI (1), 1970 (Preliminary)/-/31.10.1970

Source: https://www.asidehraduncircle.in/monuments.html#top

402. All the sites have been mapped against Project sub-activities using the coordinates provided by ASI. None of the sub-activities is within the regulated 300m of any ASI. The closest ASI protected area to the new sites is Khalanga War memorial in Dehradun. The distance between this ASI site and the nearest UG line in Dehradun is 768 m. For existing substations, the Protected Monument of excavations at Dronasagar are closest to Kashinpur SS at a distance of 463m. It has been confirmed through consultations with ASI, Dehradun that Kashinpur SS is outside of the regulated zone.

403. There are 21 state protected monuments in Uttarakhand, none of which are located in sub-activity districts.

6.5. Sub-activity Environment – Components 1 and 2, Substations (PTCUL / UPCL)

404. The following table presents a summary of the environmental conditions at PTCUL and UPCL new substations and UPCL existing substations. Aerial images of the new PTCUL and UPCL sites are also provided for context (refer to Environmental Audit for site photos and maps of existing UPCL substations). Site photos are presented in **Appendix E**.

Table 54: PTCUL Substations Data

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
1	Selaqui SS	UPCL owned site already transferred to PTCUL. Existing UPCL substation and office in an industrial area surrounded by urban settlement.	Dehradun	• Modified habitat • PAI is densely built-up area with urban vegetation patches. • Site available in SS is open space vegetated with tall grasses. • Trees observed – Mango, Banyan, Neem, Jamun • Fauna observed: Crows, Sparrows, Parrot, Pigeon	• Flat area, average elevation: 510m • Climate: Mix of Sub-tropical Monson and Tropical upland type. High thunderstorm activity in monsoon season • Geohazards: Seismic Zone IV • Soil: Fine silty and loamy • River Aswa at 260m • Bore well present on site • Moderate dust levels and emissions from vehicle movement along main road • Noise mostly from nearby road • Some scattered debris on the site. • Municipal wastes observed along road.	• In an industrial area surrounded by urban settlement. • Industrial Area- 0m • Nearest houses and settlement, residential and market – 70m • Joshi Multispecialty Hospital- 190m • Site not in Silence Zone[70] • Chakrata Road – 0m from main gate of SS • Existing site access is available	• Local Hindu Temple: 110m • No ASI within 300m

[70] *As per The Noise Pollution (Regulation and Control) Rules, 2000: An area comprising not less than 100 metres around hospitals, educational institutions and courts may be declared as silence area / zone for the purpose of these rules.*

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
2	Araghar SS	UPCL owned site to be transferred to PTCUL. Existing substation and office surrounded by dense urban settlement.	Dehradun	• Modified habitat • PAI is densely built-up area with urban vegetation patches. • Site is vegetated with grass; but used by UPCL as a storage area. • Trees observed – guava, neem, mango. • Fauna observed: None	• Flat area, average elevation: 650m • Climate: Mix of Sub-tropical Monson and Tropical upland type. High thunderstorm activity in monsoon season • Geohazards: Seismic Zone IV • Soil: Fine silty and loamy • Canal at 1km • No borehole within 500m • Moderate dust levels. • Noise mostly from adjacent settlement • Severe buildup and storage of electrical goods, equipment, transformers on site with potential for oil contamination. • Municipal wastes observed along road.	• Dense urban settlement, nearest house: adjacent to the site • Jeewala-Dehradun Main Road: 240m • Param Hospital: 290m • CMI Hospital: 300m • In Silence Zone due to temple in 10m • Doon Defense Academy: 285m • Existing site access is available	• Local Hindu Temple: 10m • No ASI within 300m
3	Dhaulkhera SS	• UPCL owned site to be transferred to PTCUL. • Within existing UPCL substation area surrounded by industrial	Haldwani, Nainital District	• Modified Habitat • Gola Forest Range: 1.9km • Nandadur WLS: 8km • Site is mostly dry open space with limited	• Flat land: 325m elevation • Climate: Sub-tropical Monson type. High thunderstorm activity in monsoon season • Geohazards: Seismic Zone IV; Flood prone • Soil: Fine loamy • No surface water or borehole	• Industrial land use in rural landscape, open spaces. • Bilaspur-Rudrapur-Haldwani Road-255m • IOCL Bottling and Gas Plant	• Asthabhuja Mahalaxmi Temple: 550m • No ASI within 300m

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
		land use in rural landscape, open space.		vegetation, some scattered trees and bushes • Trees observed- neem, jamun, sal, banyan • Fauna observed: None	• Dusty area; suspended soil due to truck/vehicle movements • Noise levels low • No major wastes/dumps observed	at 0m adjacent boundary • Scattered houses, no major settlements in 500m • Site not in Silence Zone • Nearest houses – 70m • Croplands: 50m • Existing site access is available	
4	Khatima-II SS	• GoU Land (however, some issues relating to existing land users and infrastructure on the site need to be resolved) • Present land use: agricultural • Standing crop on site • No site boundary/ demarcation was observed during site visit	US Nagar	• Modified habitat • Standing crop on site • Eucalyptus trees along site boundary • Fauna observed: crow and sparrow	• Flat Land: 209m elevation • Climate: Sub-tropical Monson type • Geohazards: Seismic Zone IV • Soil: Fine loamy and rock outcrop • Site boundary attached to natural water channel. • Borehole present on site and used for irrigation • Air quality moderate. Main sources traffic movement along main road • Noise levels low • Adjacent water body being used for dumping wastes	• Rural area • Croplands: 0m • Meghalaya Road: 0m • Main settlement (Khatima): 1.1km • Nearest house: 0m (existing landowners/farmers) ~10 houses in total on site boundary • Site not in Silence Zone • Bore well: on site used for irrigation • Telephone Tower on site	• Saraswati Mandir: 380m • Radha krishna Mandir: 300m • Tridev Mandir: 415m • No ASI within 300m

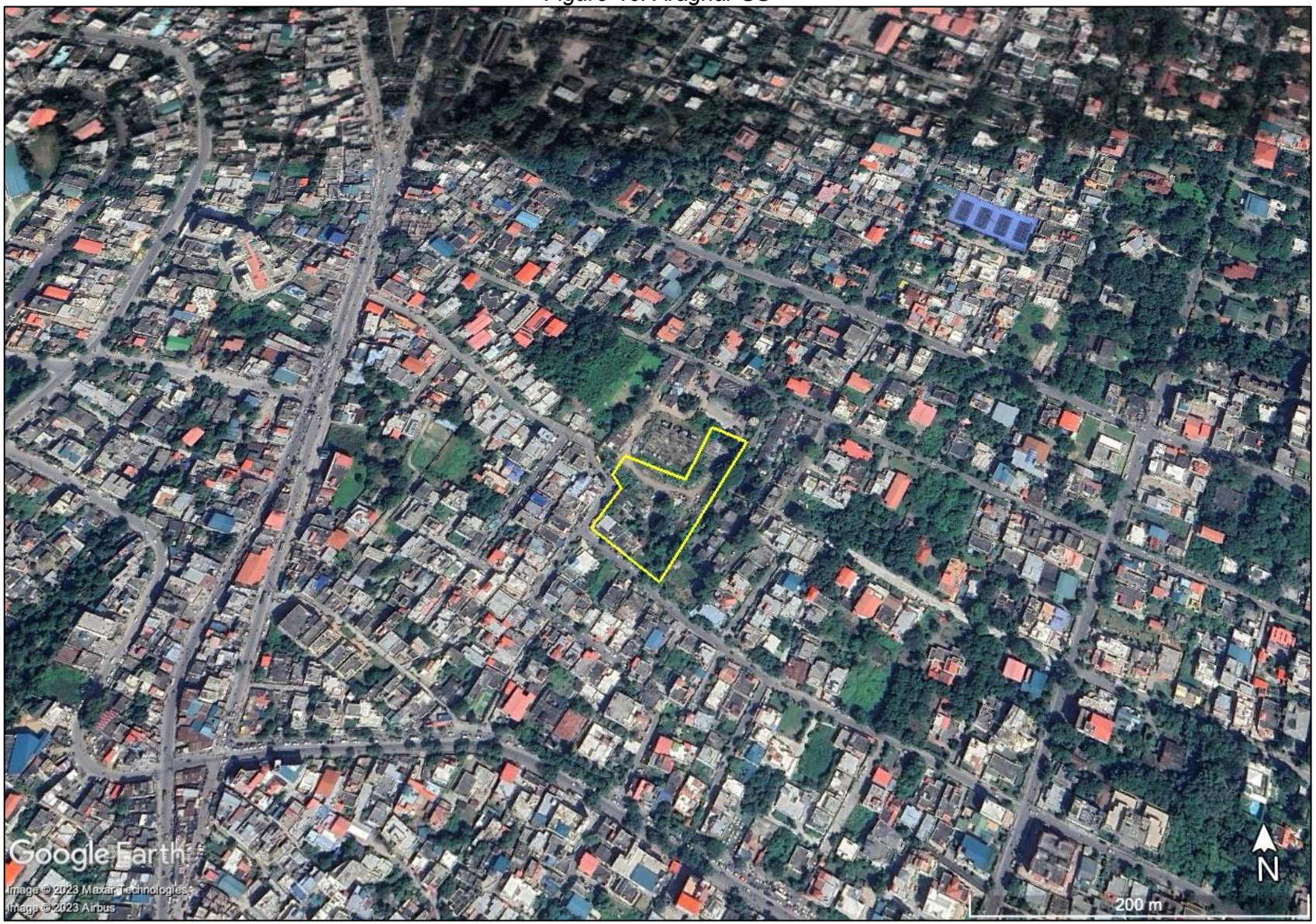
Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
						• Primary school: 750m • Existing site access is available by footpath. New access road from main road needs to be developed.	
5	Landora SS	• Vacant land • Land owned by GoU and in possession of PTCUL	Haridwar	• Modified habitat • Mostly vacant with soil quarries and soil cut land, with scattered shrubs, grassy patches, and trees • 105 trees: Guava – 78, Mango – 5, Lemon – 1, Mulberry – 1, Semal – 1, Shisham – 14, Siris - 1 • Fauna observed: birds (possibly Green Magpie) nestling	• Mostly flat: 250m elevation • Climate: Sub-tropical Monson type. High thunderstorm activity in monsoon season • Geohazards: Seismic Zone IV; Flood prone • Soil: Loamy • Site has deep ravines and undulation due to mining of soil from site. Monsoon waters have created deep ravines which meet the main river downstream • Nearest waterbody: Solani River: 280m • Bore well at 690m • Low dust levels – mostly suspended soil • No noise, except natural background • No waste observed other than couple of	• Rural area • Croplands: 0m • Main road Delhi-Haridwar Highway: 490m. • No connecting road from main road to site but walking track present • Nearest settlement: 550m • Nearest house: 550m • Local women observed collecting woods and fodder • Site not in Silence Zone • Himachal sports academy: 1km	• Durga Mata Temple: 590m • No ASI within 300m

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
				within mud crevices/holes of the small hillocks created by cutting of the soil – large population	bottles/polythene bags		
6	Manglore SS	• Former private land already owned by PTCUL • Present land use: agricultural • No site boundary/demarcation was observed during site visit	Haridwar	• Modified habitat • Former cropland • 3 Syzygium jambos (jamoya) at the entry of the site • Social forestry (Sal) 20m from site • Fauna observed: None	• Site is flat: 260m elevation • Climate: Sub-tropical Monson type. High thunderstorm activity in monsoon season • Geohazards: Seismic Zone IV; Flood prone • Soil: Loamy • Nearest waterbody: Upper Ganges Canal:1.6 km • GW: None • Low dust levels – mostly suspended soil and some dust from main road • Moderate noise due to traffic movement • No waste observed	• Rural Area • Cropland: 0m • Main Road:0m • Nearest settlement: 650m • Nearest house: 450m • Site not in Silence Zone • Pharmaceutical Factory (Aagya Biotech): 360m • Steel factory (Kumar Ispat Pvt l): 100m • MK Children's School: 950m Site on main road, access to be developed	• Nearest Temple: 700m • No ASI within 300m
7	Lohaghat SS	• Vacant site under ownership of PICUL	Champawat	• Modified habitat • Land devoid of trees with limited grassy areas and bushes	• High elevation site: 1725m • Undulating site, steep terrain • Soil: Loamy to sandy loam • Climate/Hazard: Tropical upland, Frost	• Rural, isolated high-altitude zone • Nearest settlement/houses: 400m • Swami Vivekananda	• Maheswar Temple: 315m • Aidi Devta Temple: 305m • No ASI within 300m

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
				• Fauna observed: None	and hailstorms are common. Sometimes snow is also observed in winter season (December to March) • Geohazard: Seismic Zone V; Landslide vulnerable • Nearest Waterbody: None • GW: None • Air: Suspended dust – low level • Noise: Minimal from road • Waste None recorded	PG government college: 450m • Degree College road: 10m (to access site) • Maharshi Vidya Mandir High School: 230m • Site beside main road, access developed and gated • Site not in Silence Zone	
8	Sarvarkhera SS	• Private land being purchased by PTCUL. • Located at 7 km stone Moradabad-Kashipur road at Village Hariyawala Tehsil Jaspur. • Land is vacant except a Guard's room. • Industrial area.	TBC	• Site is vacant with a few trees of Royal Palm (*Roystonea regia*), 1 tree of Ficus, Mango and few ornamental trees. • Commercial plantation of poplar and other timber trees are found in the nearby agricultural fields. • Fauna observed:	• Flat topography, site elevation 245 m, • Soils of the region are Terai soils rich, clayey loams, mixed to varying degrees with fine sand and humus; well suited to the cultivation of rice and sugarcane. Due to the surrounding industrial land use growth of plants at the site is not good. (Informed by the Local) • Nearest Waterbody: Dhandi river 1.10 km • GW: Borewell at the site • Air: within permissible levels as per NAAQS	• Industrial area with industries and few houses • Access to the site is through Moradabad Kashipur road on the southern boundary. • Nearest house: 100 m across the road, workers of the factories live nearby in rented houses. • East, Pashupati Laminators Pvt. Ltd. • West, Surya Roshni Ltd.	• Nearest Temple: 200m • No ASI within 300m

Sl. No.	Name	Land ownership/land use/landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
				Being industrial land, no specific fauna has been reported at the site.	• Noise: within permissible levels for commercial areas • Waste: Some waste was seen at site. (in gunny bags probably packaging waste from earlier use) • Water: Water from borewell at site was tested and found within permissible levels for drinking water (IS: 10500-2012)	• North, vacant land of Pragati paper mill • Not in silent zone.	

Figure 46: Araghar SS



Source: Google Earth / PTCUL

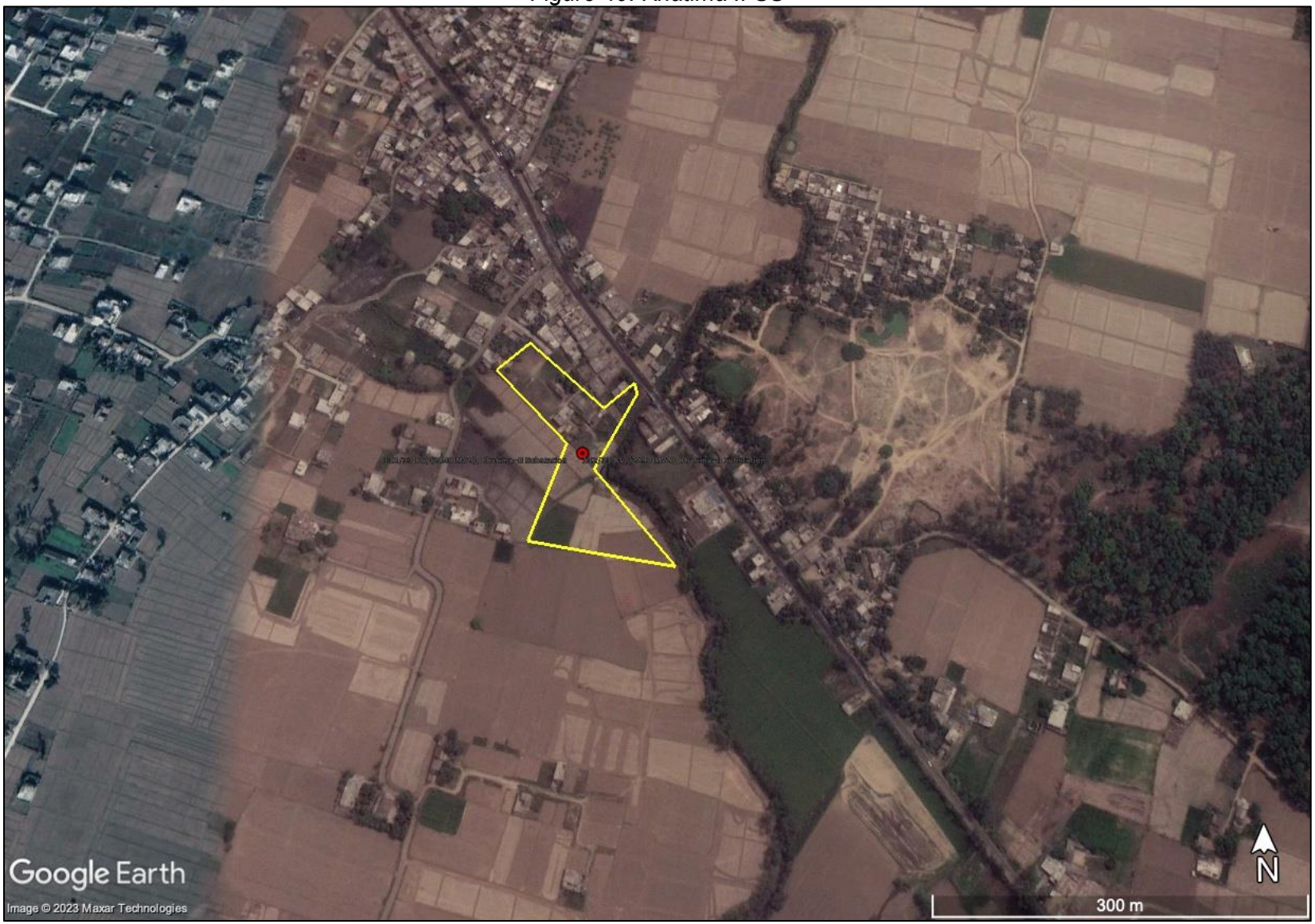
Figure 47: Selaqui SS

Source: Google Earth / PTCUL

Figure 48: Dhaulakhera SS

Source: Google Earth / PTCUL

Figure 49: Khatima II SS



Source: Google Earth / PTCUL

Figure 50: Landhora SS

Source: Google Earth / PTCUL

Figure 51: Lohoghat SS

Source: Google Earth / PTCUL

Figure 52: Manglore SS

Source: Google Earth / PTCUL

Figure 53: Saverkhera SS

Source: Google Earth / PTCUL

Table 55: UPCL New Substations

Substation	Existing Conditions		
	132/11 kV, (2x5 MVA), Kaniya, Ramnagar, Haldwani	33/11 kV, (2 X 10 MVA), Near Collectorate, Rudrapur	33/11 kV, (2 X 5 MVA), Bharauni, Sitarganj, Rudrapur
Location and Land Ownership	Near Sawaldya, Kaniya, Rammagar Government land (Khata 96, Khasra-72/3)	Behind Mandi Parishad Residential Complex, Rudrapur Government land (UPCL has not received the allotment letter from District Magistrate.)	Lamakhera, Bhaurauni, Nanakmatta Road, Sitarganj Government Land (as informed during consultation it was earlier Tribal-Tharu women land acquired by the government)
Climate	Climatically, the town enjoys sub-tropical climatic conditions. The mean annual rainfall is 205 cm, and the mean annual temperature varies from 15 to 35 °C.	Area has a sub-tropical climate with very hot summers and cold winters. The warmest month annually is June, where the average temperature exceeds 40 °C. January is the coldest month. The place experiences an average annual rainfall of 1302 mm per year with very high ground water levels.	Area has a sub-tropical climate with very hot summers and cold winters. The warmest month annually is June, where the average temperature exceeds 40 °C. January is the coldest month. The place experiences an average annual rainfall of 1302 mm per year with very high ground water levels.
Soil and Topography	Ramnagar is on a foothill region (locally called Bhabhar) made-up of quaternary deposits, i.e., coarse alluvium where the mountain rivers debauch and re-emerge in the adjacent Indo-Gangetic plain. 349 masl. Topography is Flat	Rudrapur is in the fertile Terai plains in the southern part of Kumaon division over an area of 27.65 km^2. 244masl. Topography is Flat	Located in the fertile Terai plains. Rich and fertile alluvial soil very suitable for growth of rice, wheat, maize sugarcane, vegetables, etc. 251 masl. Topography is Flat
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.
Hydrology	1 irrigation canal passing through the site (it was informed that it is temporarily diverted). There are tube wells in vicinity for agriculture. (50 m)	No waterbody in proximity. Borewell and OHT at Mandi Parishad Colony (150 m). Water quality tested and found within permissible levels for drinking water.	River at 1.3 km from proposed site. Tubewell at 25 m of the site used for irrigation. Water quality has been tested and found within permissible levels for drinking water.
Key Socio-economic Setting in PAI	Tourism location. People are engaged in hospitality and service sector catering to the Corbett National Park. (Hotels, resorts, restaurants, etc.). People are also engaged in agriculture. Nearest houses 12 m opposite to the SS. (north) Scattered settlements 100 m on the SW side. Private orchards on the eastern and southern side.	Rudrapur is the district headquarters. Industrial and agricultural area, the district is known as rice bowl of Uttarakhand. Being the HQ of the district, it also houses major offices of the district. People are engaged in service and agriculture. Pantnagar Industrial Estate is on the Northeast direction of the proposed site. Tapping is to be done from 220 KV Pantnagar line at the North east. (LILO from this line), Government staff quarters 10 m. Quarters are not fully occupied. Approach Road from 2 sides. Houses at 10 m Mandi parishad colony 25m. Pantnagar Industrial estate 200 m.	Lamba Khera village is in Sitarganj tehsil of Udham Singh Nagar district. It is situated 15km away from sub-district headquarter Sitarganjand 63km away from district headquarter Rudrapur. Bharauni is the gram panchayat of Lamba Khera village.Lambakhera is an agricultural village located in fertile terai plains with rich fertile alluvial soil. Main occupation is agriculture. Rice, wheat, maize and sugarcane is grown. Ground water is used for irrigation. People have big land holdings and are prosperous. Dairy farming is also done. Nearest house 160 m. Settlement of bharauni within 500 m.

Substation	Existing Conditions		
	132/11 kV, (2x5 MVA), Kaniya, Ramnagar, Haldwani	33/11 kV, (2 X 10 MVA), Near Collectorate, Rudrapur	33/11 kV, (2 X 5 MVA), Bharauni, Sitarganj, Rudrapur
Notable Species	Surrounded by agricultural land and built-up area. Modified Habitat. Semal (*Bombax ceiba*), Sheesham, 7-8 tree cutting may be required for which permission from DFO needs to be taken. Deer, sambar, nilgai sometimes spotted by locals. Other than that monkey, birds like pigeon, myna, magpie, bulbul, drongo	No trees. Grass and shrubs at site. Vegetation clearance needed. Crows, sparrow observed.	Surrounded by agricultural land. No trees on site. Monkey, nilgai, common birds - sparrow, cuckoo, whistling thrush, crow.
Land Use and Population	Barren land with vegetation growth.	Barren land.	Agricultural
Landscape and Tourism	The Dhela Gate of Jim Corbett National Park within 2km. Hill town of Nainital is around 60 km by road.	Rudrapur is known as the 'Gateway to Kumaon. It is in proximity to tourist destinations of Nainital, Corbett National Park, Bhimtal and Almora and famous Sikh pilgrimage Nanak Matta Gurudwara, Sitarganj. The city itself has few tourist attractions like Atariya Devi Temple.	Famous Pilgrimage of Nanak Matta Gurudwara is 15 km from the site. Other attractions include Purnagiri temple near Tanakpur.
PCR	Small Temple 120 m. No ASI site within 500 m	No PCR in 500m. Atariya devi temple at 1 km. No ASI site within 500 m	A Gurudwara is within 200 m. Famous pilgrim Nanak Matta Gurudwara is 15 km from the site. No ASI site within 500 m
Ambient Air Quality	Visibly no major source of air pollution, other than vehicles leading to Dhela zone of Corbett NP, the frequency of vehicles is limited. No industries or other source of pollution in vicinity.	Pantnagar Industrial area is at the north east side. Mandi parishad colony on the eastern side. Connectivity through internal road, quite far from the highway. No major source of air pollution was observed.	Visibly no major source of air pollution, other than vehicles and smoke from burning of crop waste and DG sets, occasionally. Vehicle frequency is very limited as it is internal village road. No industries in vicinity.
Noise	No major source of noise pollution, other than vehicles, the frequency of which is limited. No industries or other source of noise pollution in vicinity.	No major source of noise pollution, other than vehicles, the frequency of which is very limited. Noise pollution from industrial area was not observed.	No major source of noise pollution, other than vehicles, motors/ pumps used for irrigation and DG sets used during power cuts. No industries in vicinity.

Figure 54: Bharauni SS

Source: Google Earth / PTCUL

Figure 55: Kaniya SS

Source: Google Earth / PTCUL

Figure 56: Near Collectorate SS

Source: Google Earth / PTCUL

Table 56: Existing UPCL Substations

#	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)[71]	EMF Level uT[72]	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
1	Sahastradhara	Flat	701m	2500 (40%)	53 (site silence zone for noise for crematory)	46	Within city, Settlement, Roads, vegetation	Private houses (3), crematorium (SS boundary), UPCL staff quarters	3m	0m	Rispana River – 70m	None	Crematorium 2m to SS boundary
2	Hatibarakala	Flat	739m	1100 (5%)	54	52	Within city, Settlement, Roads, vegetation	Two hotels adjacent to SS boundary	500m – staff residences of Survey of India	0m	None 500m	None	None
3	Sahiya	Steep Terrain	1060m	5016 (30%)	46	52	Cropland, Houses, vegetation	Two private houses and UPCL staff quarters	2m	300m	Amlawa River – 60m	None	None
4	Sawra	Steep Terrain	1437m	3000 (10%)	-	-	Open land, cropland, houses, vegetation	None	500m	500m	None	None	None
5	Rudrapur	Flat (within river valley)	600m	6232 (50%)	54	40	Cropland, river valley, vegetation, houses	One shop and one poultry farm	25m	250m	Gona River - SS located in flood plain zone Moti River – 100m	Nearest house – 25m has tube well, which is also tapped by SS	Temple - 250m
6	Ramnagar Danda	Flat	710m	13000 (70%)	46 (site silence zone	45	Cropland, open lands, roads, settlement, vegetation	One school- 3m, Village Panchayat Office- 3m	Isolated house – 175m	300m	Bidalnath River – 400m	None	One temple – 3m (opposite SS)

[71] Background noise levels measured using IOS Mobile app 'Decibel X' (v 9.5.0)

[72] Background EMF levels measured using IOS Mobile app 'EMF Detector.'

#	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)[71]	EMF Level uT[72]	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
					for noise)			(Located opposite SS, across access road)					
7	Lal Tappar	Flat	430m	2000 (60%)	53	45	Barren/open land, sparse vegetation, small scale industries, isolated houses, river, croplands	Five houses/huts – for labour and family working in the industries	Labour hut - 3m	450m	Jakhan River- 140m	None	None
8	Tarikhet	Flat	1554m	6000 (5%)	50 (site silence zone for noise)	198	Village forest, road, scattered settlement	Vacant UPCL staff quarters, private houses and shops, temple, hospital	0m	0m	None	None	Temple inside SS
9	Bajol	Steep Terrain	1134m	5000 (20%)	47 (site silence zone for noise)	19	Cropland, Deciduous Forest, roads, open lands	None	950 m	950 m	Patli River - 300m	None	Temple inside SS
10	Lamgarah	Steep Slope	1863m	6000 (60%)	56 (site silence zone for noise)	45	Cropland, residential, open land, vegetation, roads	Vacant UPCL staff quarters, 2 houses, 1 Monk's hut being built – 45m	40m	40m	None	Spring – 50m, handpump in Temple	Temple – 0m
11	Sairaghat	Steep Terrain	1107m	1500 (10%)	34	49	Forest Range, open tracts, intermittent houses	None	100m	200m	Jaigan River – 500m	None	None
12	Kamalwaganja	Flat	381m	3344 (40%)	58 (site silence zone for noise)	43	Within town, cropland, vegetation, settlement	UPCL staff quarters, private house, shop, temple	0m	0m	None	None	Temple – 3m

#	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)[71]	EMF Level uT[72]	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
13	Transport Nagar	Flat	401m	836 (10%)	64	25	Within town, cropland, forest range, settlement, open areas, roads	Commercial offices, private house, shops	30m	0m	Teenpani Stream – 0m	None	Temple - 125m
14	Phoolchaur	Flat	376m	7500 (60%)	59	43	Cropland, settlement, open areas, vegetation, roads	Private houses, shops, school – adjacent to SS	20m	0m	None	None	None
15	Garampani	Sloped (within river valley)	924m	5000 (10%)	57 (site silence zone for noise)	71	Within river valley, sparse settlement, cropland	Private houses, UPCL staff quarters, primary school	2m	0m	Sipra River – 0m	Handpump -50m	One temple – in SS, one temple- 100m
16	Talla Ramgarh	Steep Slope (within river valley)	1489m	613 (20%)	47 (site silence zone for noise)	44	Within river valley, sparse settlement, cropland, open areas, vegetation	Private residence, School – 30m	0m	1km	Ramgarh River- 10m	Defunct Handpump -5m	None
17	Sarghakhet	Steep terrain	2211m	900 (45%)	52	52	Tourist area, hotels, private /UPCL residence, vegetation, roads, croplands	UPCL staff quarters, one private residence and multiple hotels	10m	0m	None	Bore well in hotel – 15m	None
18	Pines	Steep terrain	1904m	850 (5%)	48 (site silence zone	49	Within famous tourist/cultural	Vacant UPCL staff quarters, one technical college – 20m	200m	1.4km	None	None	None

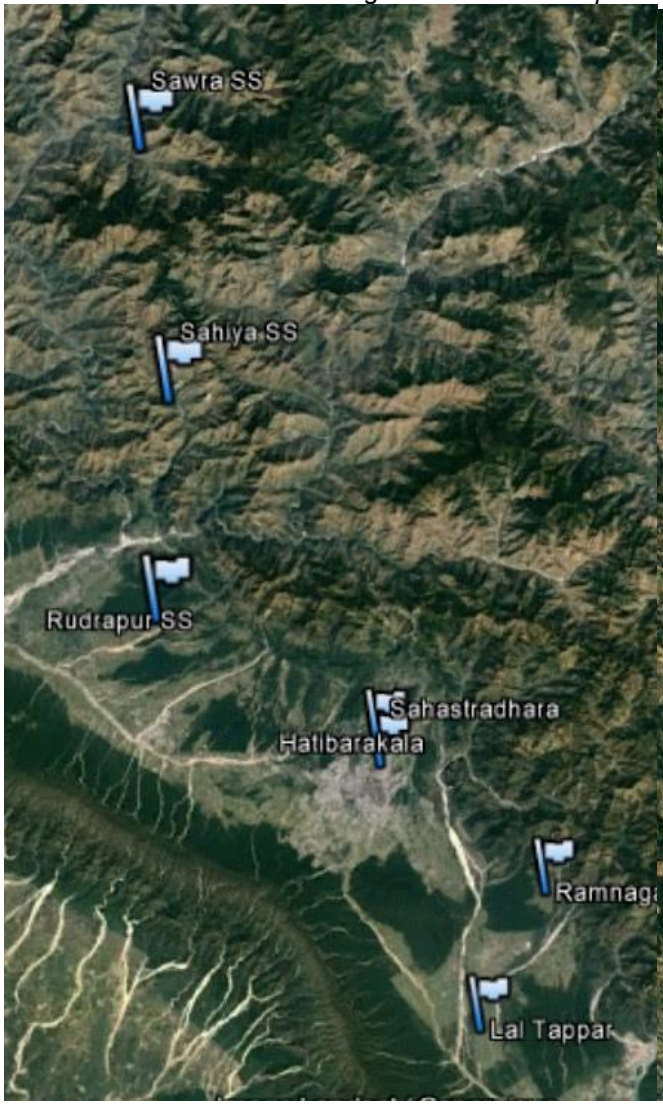
#	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)[71]	EMF Level uT[72]	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
					for noise)		destination area- Nainital Lake area, open areas, roads, college, vegetation.						
19	Matkota	Flat	215m	4042 (25%)	53 (site silence zone for noise)	50	Within town, settlement, open lands, vegetation	Private house, UPCL staff quarters, community hall, temple, medical college and hospital (under construction)	UPCL staff quarter within SS area, private residence- 60m	0m	Rainfed stream - along SS boundary	Borewell inside SS	Temple- 50m
20	Bhadaipura	Flat	211m	6046 40%)	55 (site silence zone for noise)	68	Within town, settlement, markets, shops, cropland, open lands, vegetation	Private houses-4 nos., Hospital - 60m	Adjacent to SS	0m	None	Handpump – inside SS	Temple- 2m
21	Lalpur	Flat	205m	11292 (60%)	49 (site silence zone for noise)	51	Cropland, private houses, vegetation, open lands	School compound- adjacent to SS, private house- 2nos.	45m	0m	Pond- 200m, Stream – adjacent to SS	Handpump – inside SS and in school	Mosque – 100m
22	Sitarganj	Flat	210m	3011 (30%)	47 (site silence zone for noise)	43	Cropland, settlement, vegetation	UPCL staff quarters, private houses- 2nos.	50m	0m	None	None	Temple inside SS
23	Jhankat	Flat	211m	3387 (40%)	45 (site silence zone	50	Cropland, settlement, vegetation	UPCL staff quarters, private residence-03 nos., school-10m, health centre-30m	0m	0m	Stream- along SS boundary	Handpump – inside SS	Temple-80m

#	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)[71]	EMF Level uT[72]	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
					for noise)								
24	Kashipur	Flat	238m	3035 (15%)	56 (site silence zone for noise)	43	Settlement	UPCL staff quarters, private residence, Government office-0m, Hospital-5m	0m	0m	Drona Sagar Lake - 100m	Two submersible pumps in SS, handpumps in 3 residences (0-10m range)	Temple inside SS, Drona Sagar Lake. Palace and temple area-100m (ASI protected monument is >400m distance)
25	Doraha	Flat	220m	12140 (40%)	49 (site silence zone for noise)	56	Cropland, settlement, market, open areas	UPCL staff quarters, private house 4nos	5m	0m	Ganda Nalla/Stream – 100m	2 submersible pumps in SS	Temple inside SS

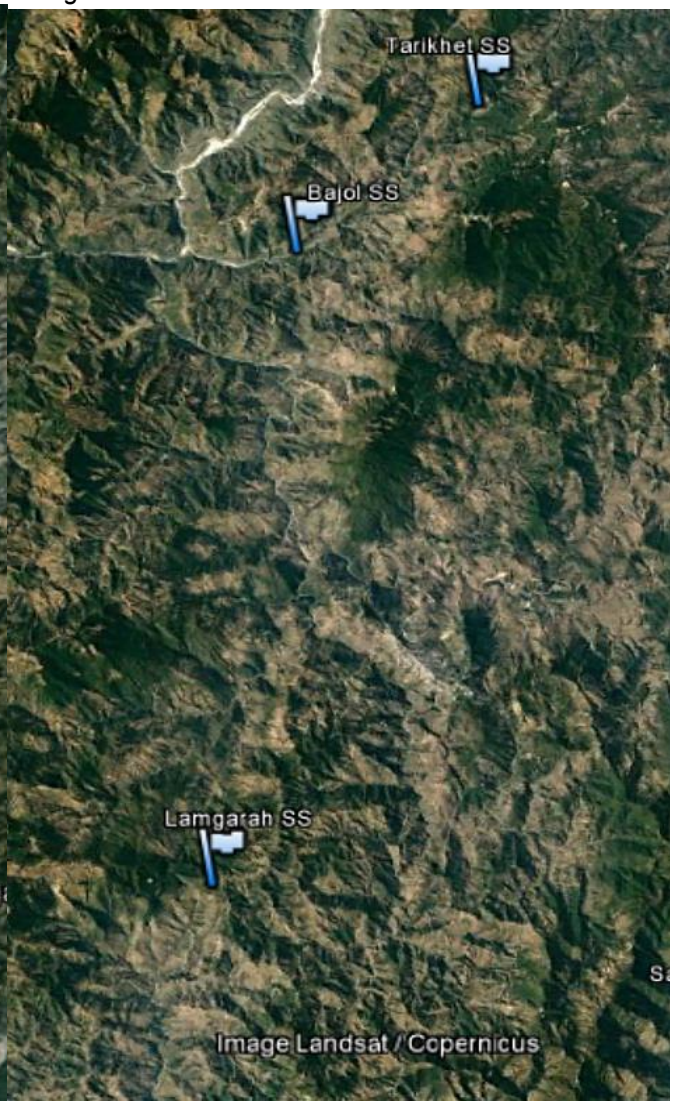
Figure 57: Uttarakhand Map showing UPCL Substations to be Upgraded

Source: ADB UPCL EHS Audit

Figure 58: District Maps showing substations audited



District: Dehradun (Source: ADB UPCL EHS Audit)



District: Almora (Source: ADB UPCL EHS Audit)

District: Nainital (Source: ADB UPCL EHS Audit)

District: US Nagar (Source: ADB UPCL EHS Audit)

6.6. Sub-activity Environment – Component 1 PTCUL Overhead LILO and HV Power Lines, Second Stringing

400 kV Kashipur-Puhana	
Climate	Moderate tropical climate. In the months of summer, the temperature in Haridwar varies from 35°C to 45°C. Summer season is mild and moderate followed by a good rainfall in monsoon. In winters the temperature ranges from 10°C to 30°C. Heavy to medium rainfall in monsoon season ranging from July to September.
Soil and Topography	Topography is flat, elevation 260m. Alluvium soil containing 20-30% clay and is suitable for making bricks. Soil also suitable for agriculture. The most important crops in the district are sugarcane, wheat and paddy. The crops grown among the cereals are rice, maize, sorghum, pearl millet in Kharif, wheat and Barley in Rabi and maize in Zaid season.
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes. No landslide risks identified.
Hydrology	Line crosses 1 water body Solani river, 40m in width

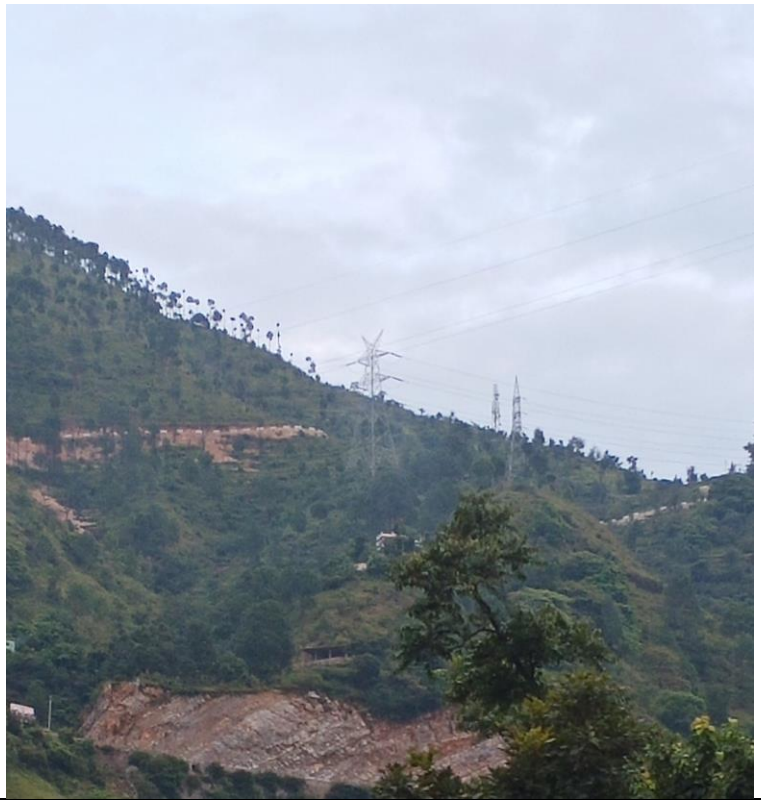
Socio-economics	Agricultural area, agriculture is the mainstay of economy. Other than that people work in industrial areas nearby or in brick kilns and sugar mill.
Flora and Fauna	Line passes through agricultural area (crops are planted as per season) Near the Solani river crossing flora is riverine, scrubland grassland type which changes with season and flood level of the river. **No trees in the alignment.**
Land Use	Agricultural land use beneath the line and ROW. No properties/ structures in the ROW.
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include the holy city of Haridwar 36 km and historic city of Roorkee within 10 km.
PCR	No PCR on the line route
Ambient Air	Air quality is good. The only source of pollution is from vehicles, agriculture activities.
Noise	The only source of noise pollution is from vehicles and agriculture activities.
Key Observations and Risks	No ecological sensitivity envisaged. Community health and safety due to line passing through private lands (agriculture plots)
220 KV Manglaur - Nara	
Climate	The area experiences moderate tropical climate with maximum temperature in summers reaching up to 45 degrees C. Summer season is moderate to severe hot followed by a good rainfall in monsoon. In winters the temperature ranges from 10°C to 30°C. Heavy to medium rainfall in monsoon season ranging from July to September.
Soil & Topography	Flat terrain, elevation 260 – 280m. Alluvium soil containing 20-30% clay and is suitable for making bricks. Soil also suitable for agriculture.
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes
Hydrology	The line crosses 2 water bodies; Saloni river and Gandhi Nahar near Mohammadpur. Despite of canals, bore wells in fields are major sources for irrigation. The water level is quite deep in tube wells. In general, the water table in this unit ranges between 3.98 to 9.67 m bgl.
Socio-economics	Agricultural area, agriculture is the mainstay of economy. Other than that people work in industrial areas nearby or in brick kilns and sugar mills. Line passes through agricultural land in Villages of Jhabiran, Nagla Aimad, Thasaka, Mundet, Kulchandi, Kundi, Libbarhedi, Nagala Cheena, Mundalana, Aamkheri, Naqibpur Ghosipura, Bheekar Gospur, Sikhar, Gopalpur, Bukkanpur, Abdul Hasanpur Urf Ghisarpadi M, Mohd Pur Bazurg Aht, Khempur, Majri Akbarpur, Hazzarpur Ah, Shikarpur, Zaurasi Mu, Zabardast Pur, Sundhari. The most important crops in the district are sugarcane, wheat and paddy. The crops grown among the cereals are rice, maize, sorghum, pearl millet in Kharif, wheat and Barley in Rabi and maize in Zaid season. In oilseeds, the major crops are soybean, groundnut, until and sunflower in kharif, mustard in Rabi and sunflower in Zaid. Among pulses, pigeon pea, urd, moong and cowpea in kharif, gram, pea and lentil in Rabi and urd/moong in Zaid season.
Flora and Fauna	Around 500 trees of Poplar and Eucalyptus, planted at the periphery of agricultural plots and cultivated by farmers, are noted between the Tower 1-3, 36-37 and 60-63. These trees are commercially cultivated by the farmers and sold for timber to paper industries, furniture, sports, boards, matchsticks, etc. No tree felling permission is needed for these trees. The trees have a life span of 7-8 years. 

Land Use	Agriculture is the mainstay of economy of this area, other than that people work in the surrounding industrial areas of Roorkee and Haridwar. brick kilns, sugar mills are also seen
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include the holy city of Haridwar 40 km and historic city of Roorkee within 10 km
PCR	Line does not cross any PCR. Few temples within 500 m of AP4 but no impact is envisaged. (Valmiki temple 300 m, Guru Ravidas temple 200 m).
Ambient Air	The line crosses 1 National Highway and 1 State Highway. Air quality is good. The source is from vehicles plying on main road, agricultural practices and brick kilns.
Noise	Noise levels low to moderate. The only source is from vehicles plying on main road.
Key Observations and Risks	Land needs to be acquired from private owners (farmers) Standing crops on fields, Lopping/ felling of around 500 Trees of Poplar and Eucalyptus, planted at the periphery of agricultural plots by farmers. Public health and safety
220 kV Roorkee - Nara	
Climate	Moderate tropical climate with maximum temperature in summers reaching up to 45 degrees C. Summer season is moderate to severe hot followed by a good rainfall in monsoon. In winters the temperature ranges from 10°C to 30°. Heavy to medium rainfall in monsoon season ranging from July to September.
Soil & Topography	Flat terrain, elevation 280m. Alluvium soil containing 20-30% clay and is suitable for making bricks.
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.
Hydrology	Line does not cross any water body.
Socio-economics	Rural Area - village Jhabiran. Agricultural land
Flora and Fauna	No special status flora or fauna observed. Around 50 poplar trees planted alongside neighboring agricultural plots may need to be cut. Number may vary as this is commercial cultivation and may be cut and sold anytime by the farmers. 
Land Use	Agriculture
Landscape and Tourism	Not a tourist place, the nearby tourist attractions include the holy city of Haridwar 40 km and historic city of Roorkee within 10 km.
PCR	Not crossing any PCR. No PCR in 100 m, No ASI in 300 m.
Ambient Air	Air quality good. The only source is from vehicles plying on main road or brick kilns situated in the area.
Noise	Noise levels low. The only source is from occasional vehicles plying on main road.

Key Observations and Risks	No major risks envisaged, Line passing through agricultural fields, community health and safety measures to be considered
132 kV Manglore-Asahi	
Climate	Moderate tropical climate with maximum temperature in summers reaching up to 45 degrees C. Summer season is moderate to severe hot followed by a good rainfall in monsoon. In winters the temperature ranges from 10°C to 30°C. Heavy to medium rainfall in monsoon season ranging from July to September.
Soil & Topography	Flat terrain, elevation 280m. Alluvium soil containing 20-30% clay and is suitable for making bricks
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.
Hydrology	Line does not cross any water body.
Socio-economics	Rural Area village Jhabiran. Agricultural land.
Flora and Fauna	No special status flora or fauna observed. Few poplar trees planted alongside neighbouring agricultural plot may need to be cut. Exact number may not be assessed since this is commercial cultivation and may be cut and sold anytime by the farmers.
Land Use	Agriculture
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include the holy city of Haridwar 40 km and historic city of Roorkee within 10 km.
PCR	Not crossing any PCR
Ambient Air	Air quality good. The only source is from vehicles plying on main road or brick kilns situated in the area.
Noise	Noise levels low. The only source is from vehicles plying on main road.
Key Observations and Risks	No major risks envisaged Line passing through agricultural fields, community health and safety measures to be considered
132 kV Khatima - Sitarganj	
Climate	Khatima's climate is hot and humid in summers and cold during winters. Khatima comes under the terai region of the Himalayas and was previously known as Tharwat which means home of the Tharu tribe. Khatima experiences a hot summer where temperature touches mid 40 degrees Celsius. Receives rainfall from SW monsoon during July-September. Episodes of high intensity erratic rains also witnessed during last few years
Soil & Topography	Flat Land: 209m elevation. Terai soils, clayey loams, mixed to varying degrees with fine sand and humus; soil is suitable for the cultivation of rice and sugarcane
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes
Hydrology	1 agricultural drain adjacent to the proposed Khatima SS and tower 1-2. Borewells on agricultural fields used for irrigation.
Socio-economics	Jhan Kaieya, Unchi Mahuwar villages, Rural agricultural
Flora and Fauna	Trees of Mango, Neem, jackfruit, Eucalyptus along RoW boundary. None within the RoW.
Land Use	Agriculture
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include Nanak Matta (Sikh Pilgrimage site) 20 km, Purnagiri temple (30 km) etc.
PCR	Line does not pass through any PCR. No PCR in 100 m.
Ambient Air	Main sources traffic movement along main road and agriculture activities. Air quality good. All parameters of air quality are much below the permissible levels as per the air quality monitoring results.
Noise	Noise levels low.
Key Observations and Risks	Health and safety risks since the line passes through private land (agricultural plots)
132 kV Kashipur - Mahuakheraganj	
Climate	The climate is humid, sub-tropical. Summer temperatures may reach 43ºC. Three distinct seasons i.e., summer, monsoon (rainy season) and winter. The rainy season starts from the middle of June to September end, and followed by the winter season, which starts

	from the end of October and goes up to February. December and January are the coldest months in the district. The summer season starts from March and it goes up to June. The hottest months of the year are May and June.
Soil & Topography	Flat topography, elevation 250m. Soils are Terai soils rich, clayey loams, mixed to varying degrees with fine sand and humus; well suited to the cultivation of rice and sugarcane.
Geohazards	As per Seismic Zoning Map of India, the area lies in Earthquake zone IV with risk of high intensity earthquakes
Hydrology	HV line crosses 2 water bodies, 1. Dhala River and 2. Dhandhi canal. There are borewells on agricultural fields for irrigation.
Socio-economics	Kataiya, Berkhera Pandey, Gir Dhyai, Banskhera Khurd, Gularia, Basai, Farid Nagar MST, Shahganj Rural Area. Line also passes through a railway crossing (Mauhakheraganj-Kashipur railway line) Crosses 2 roads 1. National Highway Ramnagar-Moradabad and 2. a district road.
Flora and Fauna	Agricultural area with pockets of dense settlements and commercial plantation of poplar and other timber trees and eucalyptus at the boundary of agricultural fields. Species present are commonly found in such areas where habitations and agricultural activities exist. No trees within RoW.
Land Use	Agricultural land use. Community is generally affluent with big land holdings.
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include Kashipur within 10 km and the Ramnagar town (gateway to Corbett National Park) at 32 km.
PCR	Does not pass through any PCR. 2 Gurudwara and 1 mosque within 500 m
Ambient Air	Low dust levels – mostly suspended soil. Presence of rice mills in vicinity and agricultural activities, vehicles account for pollution.
Noise	Moderate noise levels due to agricultural, religious activities in nearby settlements and vehicles plying on the Highway and road.
Key Observations and Risks	Line passes though agricultural lands. Ecological sensitivity not envisaged. Community health and safety needs to be considered.
132 kV Kathgodam - Rudrapur	
Climate	Mild temperate climate with pronounced temperature variations in different seasons. The summer season lasts from April to July with an average daily high temperature above 32ºC. The hottest month of the year is June. Extreme weather heat condition observed during May-July. The winter season lasts from December to February. The coldest month of the year is January and the month with the most rain in Dhaulakhera is July, with an average rainfall of 27 cm.
Soil & Topography	Flat land, elevation 350m. It is a part of Bhabhar zone (piedmont grade). Soil strata includes clay mixed with bajri and boulders. Rich fertile alluvial soil.
Geohazards	Falls in Earthquake zone IV with sensitive to high intensity earthquakes.
Hydrology	Line passes parallel to an irrigation canal
Socio-economics	Rural landscape. Open spaces. Mostly dry and open area with scattered trees and shrubs. Near Bilaspur-Rudrapur-Haldwani Road, IOCL Bottling and Gas Plant in vicinity. Shri Balaji Stone crusher 15 m.
Flora and Fauna	Common trees observed- neem, jamun, sal, banyan. None present within the RoW.
Land Use	Industrial land use in rural landscape, open space. .
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include the famous hill station Nainital at 49 km and Jim Corbett National Park 55 km.
PCR	0.6 km line. Does not pass through any PCR. A small temple inside the Stone crusher premises.
Ambient Air	Dusty area; suspended soil due to truck/vehicle movements (NH 84 is 250 m from the site)
Noise	Low noise levels. Only source is vehicles
Key Observations and Risks	No major ecological sensitivity envisaged

132 kV D/C HV line from 220 kV S/s Mahuakheraganj to 132 kV S/s Jaspur	
Climate	The climate is humid, sub-tropical. Summer temperatures may reach 43ºC. Three distinct seasons i.e., summer, monsoon (rainy season) and winter. The rainy season starts from the middle of June to September end, and followed by the winter season, which starts from the end of October and goes up to February. December and January are the coldest months in the district. The summer season starts from March and it goes up to June. The hottest months of the year are May and June
Soil & Topography	Flat topography, elevation 250 – 260m. Soils are Terai soils rich, clayey loams, mixed to varying degrees with fine sand and humus; well suited to the cultivation of rice and sugarcane.
Geohazards	As per Seismic Zoning Map of India, the area lies in Earthquake zone IV with risk of high intensity earthquakes.
Hydrology	HV line crosses 2 water bodies, 1. Dhala River and 2. Dhandhi canal. There are borewells on agricultural fields for irrigation.
Socio-economics	Line passes through agricultural area in Villages of Kataiya, Berkhera Pandey, Gir Dhyai, Banskhera Khurd, Gularia, Basai, Farid Nagar MST, Mohammad Gang, Ramnawala, Malpura Lakshmipur, Gaura, Jagatpur Patti, Bhawanipur, Narainpur, Garhi Husain Rural Area. Line also passes through a railway crossing (Mauhakheraganj-Kashipur railway line) Crosses 2 roads 1. National Highway Ramnagar-Moradabad and 2. 1 district road.
Flora and Fauna	Agricultural area with pockets of dense settlements and trees of mango, guava, commercial plantation of poplar and other timber trees and eucalyptus at the boundary of agricultural fields. Around 700 trees of Poplar and Eucalyptus, planted at the periphery of agricultural plots and cultivated by farmers as cash crop, are noted in the RoW. These trees are commercially cultivated by the farmers and sold for timber to paper industries, furniture, sports, boards, matchsticks, etc. The trees have a life span of 7-8 years. The market value of poplar tree depends on the girth of the tree. No tree felling permission is needed for these trees. Compensation/payment for trees will need to be done to the farmers. 
Land Use	Agricultural and residential with few rice mills, brick kilns, etc.
Landscape and Tourism	Not a tourist place in itself, the nearby tourist attractions include Kashipur within 10 km and the Ramnagar town (gateway to Corbett National Park) at 32 km.
PCR	Line does not pass through any PCR. No PCR in 100 m, No ASI site in 300 m.
Ambient Air	Low dust levels – mostly suspended soil and from vehicles plying on roads.
Noise	Moderate noise levels due to vehicles plying on road and agricultural activities.
Key Observations and Risks	Ecological sensitivity not envisaged. Community health and safety risks due to line passing through agricultural land. Work needs to be planned in view of cropping season.

132 kV D/C HV power line Second Stringing Pithrogarh - Champawat	
Climate	The Project area witnesses severe winter, short warm summer and heavy rainfall. The summer season from April to mid-June is moderately warm with occasional thunderstorms, whilst the monsoon season from mid-June to mid-September is humid with heavy showers almost daily. The winter season is severe and spells of frontal rain accompanied by sparse snowfall. The year may be divided into four seasons viz. the cold winter season, (December to February), the summer season (April to mid-June), southwest monsoon season (June to September) followed by post monsoon season (October to November).
Soil & Topography	Uneven topography. Elevation ranging from 466 m – 1985 at tower location 142. The average elevation is 1423 m. Rocky, mountain soil. 
Geohazards	As per Seismic Zoning Map of India, the area lies in Earthquake zone IV and V with risk of high- Very High intensity earthquakes. As per the landslide zonation map of Uttarakhand the sensitivity of Project area for landslides varies from high in Champawat to very high in Pithoragarh
Hydrology	HV line crosses river at 1 point (Tower 96-97, 70 m wide)
Flora and Fauna	The line traverses RF area and involves 26.43 ha. Of land in Pithoragarh division and 10.85 ha. Of land in Champawat division. Common flora of the region includes Pine, Deodar, Banj, Kafal, Jamun, etc. Felling of Around 777 (521(P) + 256 (C) trees was done for development of the single circuit line. The trees included Pine, Banj, Kaphal, Poplar, Jamun, Padam, Mahua, Sanan, Tun, Falyat, Khatig, Reetha, Mango, Chura, Surai, Mehal, and Deodar. The line does not pass through any protected area. Based on the based on the desk research the forests of the area include Langoor, Kaakr, Ghoral, deer, cheetal, leopard, etc. Birds include Titar, whistling thrush, Pheasant, etc. Based on the discussion with villagers common wild animals spotted are deer, wild boar, monkeys, porcupines, etc. Incidents of leopard attacks are also reported in the area.
Land Use	The line traverses forest area and villages. There are pockets of sparse settlements. Line is not passing over any structures/ houses in the villages. Passes through agriculture fields/ barren lands in the villages. Fruit trees of guava, pomegranate, pear, plum, lemon and oranges was noted. In crops the people grow finger millets, wheat rice, Soybean and potato. Agriculture is subsistence only. Due to the increase in number of monkeys and wild

	boar, the yield from agriculture has further decreased. Farmers are quitting agriculture because of the destruction by wild animals. Many people have migrated from the villages to nearby towns of Berinag, Pithoragarh and Champawat, or to Dehradun and Delhi for jobs. The line crosses roads at several points. Schools, small temples and few houses within 500 m.
Landscape and Tourism	Lohaghat and Pithoragarh are small hill stations attracting tourists for excellent views of Himalayan Mountain peaks and paragliding opportunities. Also, a gateway to many trek routes including the Kailash Mansarovar Yatra.
PCR	Line does not pass through any PCR Few temples within 100-500 m including Most Manu temple near Tower 1, Hanuman temple, Gurna Devi temple, Gangnath Baba temple, Bhagwati temple.
Ambient Air	Air quality good due to no point sources of pollution.
Noise	Low noise levels.
Key Observations and Risks	Human animal encounter risks and risks to forest flora and fauna during 2nd stringing works. Community health and safety risks due to line passing through agricultural land.

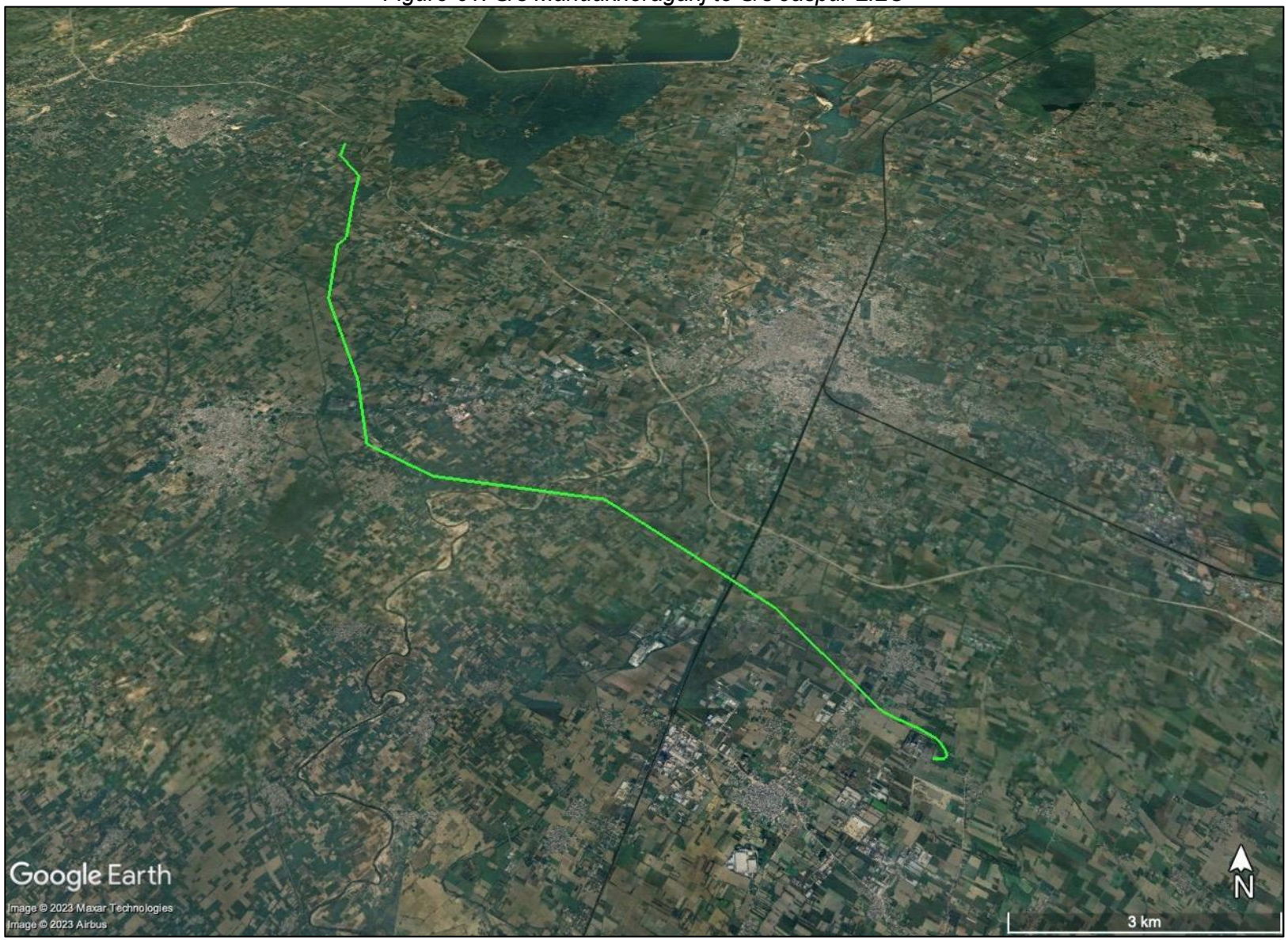
Figure 59: Champawat Second Stringing Line

Source: Google Earth / PTCUL

Figure 60: Kashipur – Mahuakheraganj LILO

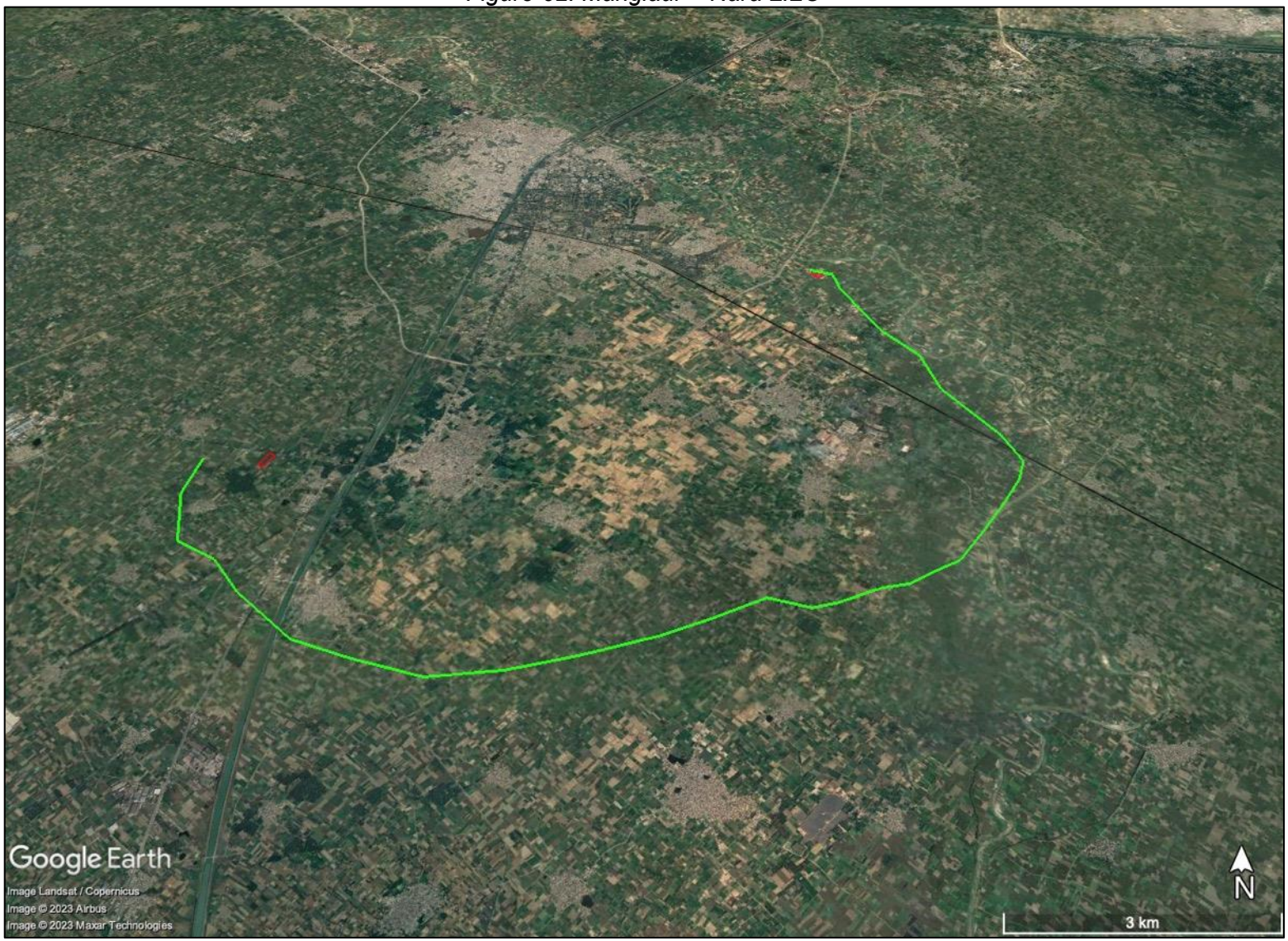
Source: Google Earth / PTCUL

Figure 61: S/s Mahuakheraganj to S/s Jaspur LILO



Source: Google Earth / PTCUL

Figure 62: Manglaur – Nara LILO



Source: Google Earth / PTCUL

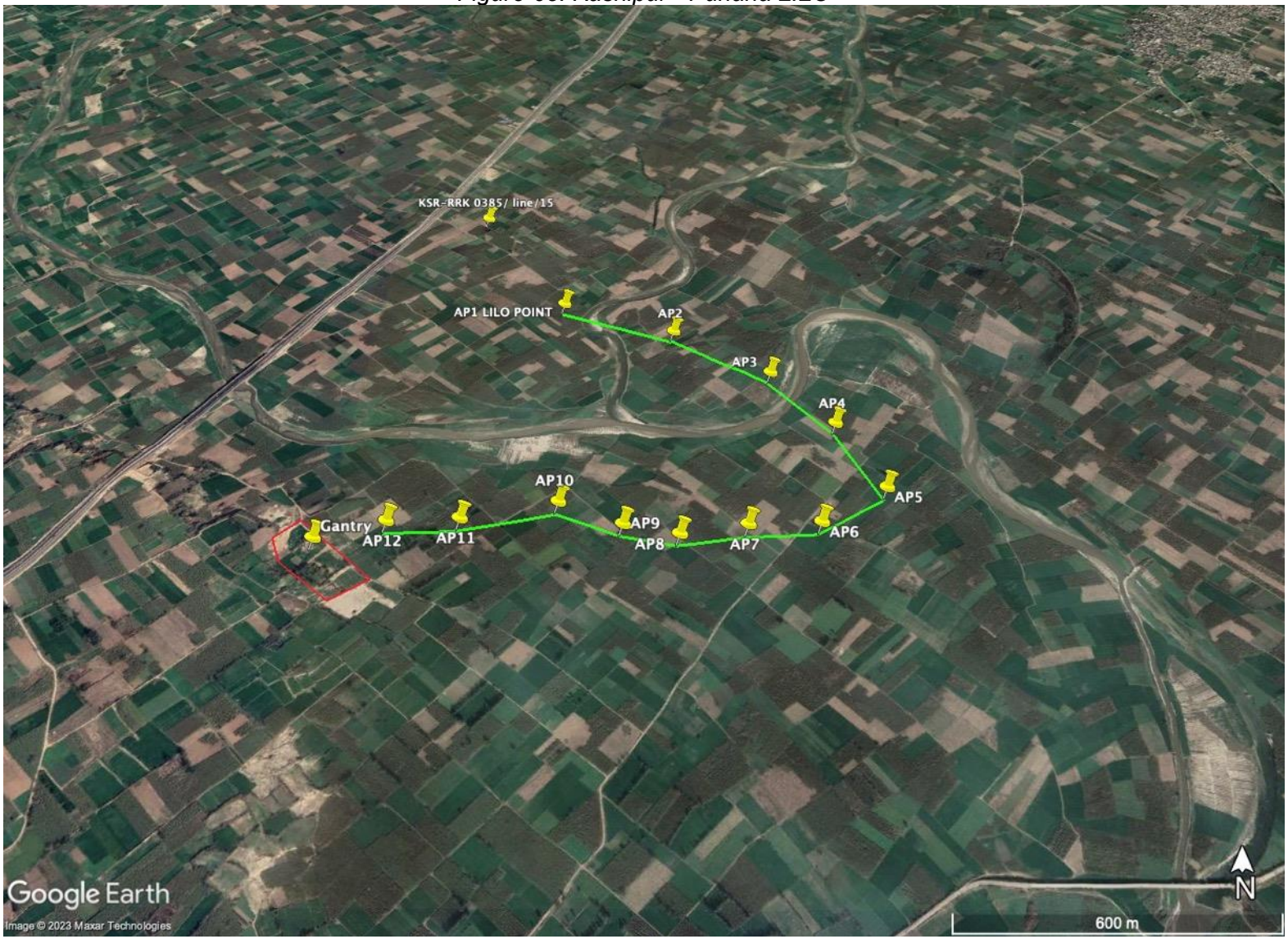
Figure 63: Khatima-Sitarganj LILO

Source: Google Earth / PTCUL

Figure 64: Manglore-Asahi LILO (two short green lines) & Roorkee – Nara LILO (Longer Green Line)

Source: Google Earth / PTCUL

Figure 65: Kashipur - Puhana LILO



Source: Google Earth / PTCUL

Figure 66: Kathgodam – Rudrapur LILO

Source: Google Earth / PTCUL

Table 58: PTCUL UG LILO Data

Sl. No.	Name	Landuse/ landcover	Location/ Circle	Key Biological features in PAI	Key Physical features in PAI	Key Socio-economic Setting in PAI	Key physical cultural resource features in PAI
1	220 kV Khodri-Jhajra	Industrial area	Dehradun	• Few ornamental trees on the road	• Flat area, average elevation: 510m • River Aswa at 260m • 1Borewell 30 m • Moderate dust levels and emissions from vehicle movement along main road • Noise mostly from nearby road • Municipal wastes observed along road.	• Industrial Area -0m • Nearest settlement- residential and market – 70m • Joshi Multispecialty Hospital- 200m	• Local Hindu Temple – 110m • No ASI within 300m
2	132 kV Majra-Laltappar	Route located adjacent to roadway in urban area	Dehradun	• Ornamental trees along the road (Bottle brush, plumeria, Lagerstroemia)	• Flat area, average elevation 650 m • Crosses one canal • Rispana river at 200m • 2 borewells and OHTs (20 m and 30 m) • Moderate dust levels and emissions from vehicle movement along main road • Noise mostly from nearby road • Municipal wastes observed along road.	• Mix of residential and commercial properties on both sides of the proposed alignment (UG along the road) in the area. • There are offices, shops and businesses, showrooms, hotels and restaurants, hospitals (4), offices, motor service shops, Doordarshan Kendra (30m), Sherwood Public school (10 m)	• No ASI within 300m, • 5 temples and 1 Gurudwara within 30 m

Figure 67: 132 kV Majra-Laltappar

Source: Google Earth / PTCUL

Figure 68: 220 kV Khodri-Jhajra

Source: Google Earth / PTCUL

6.7. Sub-activity Environment – Component 2 UPCL OHL / UG

405. The following table summarizes the key issues at each of the three UPCL OHL / UG sites.

Table 59: UPCL OHL Existing Conditions

#	UPCL OHL	Hydrology	Geohazards	ESZ Buffer	PA (5km)	Forest (100m)	IBA / KBA (10km)	CH (5km)	Tiger Corridor (10km)	Elephant Corridor (10km)	Residential / Schools / PCR (within 100m)	ASI (300m)
1	Near Collectorate	Close to ponds and irrigation channel	Potential floods / earthquakes	No	No	No	No	No	No	No	Residential properties (Mandi Parishad Colony and few government quarters are at a distance of 10-13 m of the alignment near the proposed New Collectorate SS.	No
2	Bharauni	Crosses a river	Possible floods / earthquakes	N0	No	No	No	No	No	No	Yes, Within 12 m to 100 m, there are few houses of (Dohari village, and Barauni).	No
3	Kaniya	Crosses a river	Possible floods / Forest fires / earthquakes	Yes	200m	No	250m	Likely	Approximately 4-5km	Approximately 4-5km	Yes, Hotels and Resorts catering to tourists visiting Corbett National Park, residences and commercial structures are located within 50 m of the alignment on both sides. Governement Inter College Goujani (15 m on the NE) Garden Valley Public School (180 m on the South), Mount Sinal School (20 m), Shemrock Public School (20 m near Chilkya SS). 2-3 temples within 50 m of the alignment	No

PA – Protected Area, CH – Critical Habitat