Initial Environmental Examination

Project Number: 51308-008
September 2023

India: Uttarakhand Climate Resilient Power System Development Project

Appendices Part 6

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

Appendix K – Occupational Health and Safety Plan

OHS Plan will include:

1. Safety Training Program – to provide general and specialized training courses for all workers on the site and at all levels of supervision and management. General courses will consist of (i) an initial Safety Induction which all workers will be required to attend prior to being allowed to work on site, all visitors and project workers who have not attended the safety induction course must be always accompanied by inducted workers when within the working area. and (ii) periodic safety training refreshers covering similar topics to induction, conducted not less than once every six months. All subcontractor workers will be required to participate in relevant training courses appropriate to the nature, scale, and duration of the subcontract. Since they have heightened risk only trained workers must undertake certain activities e.g., working at height, working in confined spaces, working with electricity etc. Workers must have attended such training before they are involved in relevant works and the contractor must either offer an internal training course or organize for attendance on an external specialist training course. Workers must have a training record of attending a suitable training course. Untrained workers will not be permitted to work at height, enter confined spaces, work with live electricity etc.
2. Medical Check-Up/Health Surveillance – of workers fitness, eyesight, hearing, respiratory health, and communicable and noncommunicable diseases before work commences; and then repeated every six months by the contractor during construction. Only workers who have passed their fitness test and have the requisite medical clearance must undertake certain activities e.g., working with electricity etc.
3. Safety Meetings – will be conducted monthly during construction phase by PTCUL/UPCL. During construction the meetings will require attendance by the safety representatives of all contractors and subcontractors on-site. The minutes of all safety meetings including actions agreed will be taken and sent to PTCUL/UPCL within seven days of the meeting.
4. Safety Inspections – the contractor will regularly inspect, test, and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists and other lifting equipment, ladders and other means of access, lighting and signage, firefighting equipment, first aid kit, stock take and condition of PPE etc. Signs will be graphic and in the languages of workers, kept clear of obstructions and legible to read. Lighting will meet illumination guidelines for the working area as per IFC EHS Guidelines on OHS. Equipment, which is damaged, dirty, incorrectly positioned or not in working order will be immediately repaired, or replaced, by the contractor.
5. Site Audit - during construction the contractor's H&S officer and PTCUL/UPCL will undertake monthly audits of compliance with the health and safety plan.
6. Personal Protective Equipment (PPE) as a last resort where risks cannot be avoided – workers will be provided (before they start work) with appropriate PPE at no cost to the workers. PPE provided to workers (regardless formal and informal, directly contracted or subcontracted) in accordance with GoI legislation and Table 2.7.1. Summary of Recommended Personal Protective Equipment according to Hazard in IFC EHS Guidelines on OHS including safety shoes, helmets, goggles, earmuffs, and face masks and ensure that this is always worn by them with a strict disciplinary system (no work condition if not compliant) being enforced for any non-compliance.
7. Work Zone Noise Levels: during construction protective measures need to be provided and as per the WB-IFC EHS Guidelines on OHS, Table 2.3.1. sets the level at 85 dB (A) for 8 hours exposure this being more stringent than the GoI requirements will be adopted, as well as 140 dB(C) peak/instantaneous noise exposure for workers working near the high noise

generating machinery. High noise work areas must be adequately signposted. In these high noise work areas PPE in the form of sound reducing earmuffs/ear plugs to the workers are to be provided. In the first instance, however, reduction in noise levels to the lowest practical level must be achieved by adoption of suitable preventive measures, such as, use of enclosures with suitable absorption material, etc. Workers operating in the high noise work areas will be given auditory tests as part of health surveillance.

8. EMF levels at the construction site to be kept within international good practice levels as per ICNRP (reference and peak values) for the occupational exposure.
9. Electricity: IFC EHS Guideline on Electric Power Transmission and Distribution requirements for working with electricity will be observed with only licensed electricians that meet the requirements set out in them allowed to work on live electricity with strict adherence to safety standards including those listed in said guidelines. Live lines will be deactivated and properly grounded before work is performed on, or in proximity, to the lines and this will be checked and certified in writing by the contractor's Health and Safety Officer in advance. While working at heights personal safety measures such as harnesses, tool bags, ropes etc. will need to be provided.
10. Emergency Preparedness and Response Sub-Plan including communication systems and protocols to report an emergency e.g., health emergency, work-related accident including electrocution, traffic accident, accident involving the community, natural hazard including flooding, fire, virus outbreak etc. It will need to be developed in consultation with local emergency services with adequate fire and first aid first-responders will need to be based on the construction site to facilitate immediate response. Provide readily available first aid for workers as well as an ambulance for more serious cases. Make arrangements for a doctor on call and nearest Health Center and/or Hospital for emergency cares of workers. Regular drills will be required involving all workers to prepare for an incident.
11. International good practice measures provided in the IFC EHS Guidelines and ILO Safety and Health in Construction (2022): ILO Code of practice: Safety and health in construction (Revised edition)

Appendix L - General Project Health and Safety Requirements

The provision in Central Electricity Authority (Measures related to Safety and Power Supply) Regulations and Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Power Plants and Power Lines) Regulations should be followed along with the following safety guidelines:

a**. Preventive and protective measures should be introduced according to the following order of priority:**

- Eliminating the hazard by removing the activity from the work process.
- Controlling the hazard at its source through use of engineering controls.
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures.
- Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.

b. OHS Training

- Training should generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.
- Training should consist of basic hazard awareness, site- specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural hazard, as appropriate.
- Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

c. Basic OHS Training

- A basic occupational training program and specialty courses should be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training should generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Workers with rescue and first-aid duties should receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co- workers. Training would include the risks of becoming infected with blood–borne pathogens through contact with bodily fluids and tissue.
- Through appropriate contract specifications and monitoring, the employer should ensure that service providers, as well as contracted and subcontracted labor, are trained adequately before assignments begin.

d. Tool Box Meeting:

- Tool Box meetings to be conducted every day before starting of the work. Work Plan for the day along with hazards/risks involved in the activities and safe working practices for the same are to be discussed with the workers, these can be conducted by Contractor‘s Supervisory Staff as well.
- Record of the Tool Box Meeting to be generated and signature of all the workers/supervisor are to be taken on the meeting sheet. This activity will gradually enhance the safety awareness and will also help in operating in a planned manner.

e. Labeling

- All vessels that may contain substances that are hazardous as a result of chemical or toxicological properties, or temperature or pressure, should be labeled as to the contents and hazard, or appropriately color coded.

f. Noise

- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).
- Although hearing protection is preferred for any period of noise exposure in excess of 85 dB(A), an equivalent level of protection can be obtained, but less easily managed, by limiting the duration of noise exposure. For every 3 dB(A) increase in sound levels, the 'allowed' exposure period or duration should be reduced by 50 percent.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible

f. Electricity

- Marking all energized electrical devices and lines with warning signs
- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools
- Double insulating/grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits
- Appropriate labelling of service rooms housing high voltage equipment ('electrical hazard') and where entry is controlled or prohibited
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work

g. Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits

- Ensuring drivers undergo medical surveillance
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures, and control of traffic patterns or direction
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to 'one-way' circulation, where appropriate

h. Fall prevention and protection measures should be implemented whenever a worker is exposed to the hazard of falling more than two meters. Fall prevention may include:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area
- Proper use of ladders and scaffolds by trained employees
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction

with shock absorbing lanyards or self- retracting inertial fall arrest devices attached to fixed anchor point or horizontal lifelines
- Appropriate training in use, serviceability, and integrity of the necessary PPE
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall

i. Fires and or explosions resulting from ignition of flammable materials or gases can lead to loss of property as well as possible injury or fatalities to project workers. Prevention and control strategies include:

- Storing flammables away from ignition sources and oxidizing materials.
- Defining and labeling fire hazards areas to warn of special rules (e.g., prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment);
- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression

j. Personnel Protective Equipment

- Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. Personal protective equipment like safety gloves, helmet, mufflers etc. will be provided during the construction period and during the maintenance work. This will be included in the BOQ list. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment. The list of protective equipment is given in Table B-1.
- Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.
- All PPE must be of good quality with mark of quality standard certification.
- Safety belt shall be provided to workers working at heights for bridge construction, etc.
- Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
- Ear protecting/earmuffs/plugs shall be provided to all workers in high noise zones.
- Eye and face protection equipment shall be provided to all welders to protect against sparks.
- Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.
- The supervisor must ensure that appropriate personal protective equipment is available to workers; properly worn when required and properly cleaned, inspected, maintained and stored.
- A worker shall be responsible for using the items of personal protective equipment provided by the employer;
- A worker who is required to use personal protective equipment must-
    - Use the equipment in accordance with training and instruction.
    - Inspect the equipment before use.
    - Refrain from wearing protective equipment outside of the work area which if done so would constitute a hazard; and
    - Report any equipment malfunction to the supervisor or employer.
- A worker who is assigned responsibility for cleaning, maintaining or storing personal protective equipment must do so in accordance with training and instruction provided.
- A safety and emergency procedures manual will be kept.
- First aid facilities will be made available and doctors called in from nearby village/towns when necessary. Contents of the First aid box is given in Table 2.

Table 1 - Personnel Protection Equipment (PPE) for safety of different body parts

No.	Body Part to be protected	PPE
1	Head	Safety helmet, hard hat, Crash helmets
2	Eye	Eye protectors, eye protectors for radiations, shield and helmet, zero power goggles
3	Ear	Earplug, earmuffs
4	Noise-Mouth	Du respirator, gas mask, self-contained breathing apparatus, dust masks
5	Hand	Standard work gloves, cutting gloves, leather work gloves, heat protective gloves, anti-vibration gloves
6	Foot	Industrial safety boots, chemical-proof boots
7	Body	Standard work clothing, chemical-proof clothing, heat protective clothing, leather apron
8	Others	Safety belts, personal protective equipment for radiation protection, back support belts
9	COVID-19	Sanitizer, Masks, etc

Table 2 - Contents of first-aid box

Sr. No.	Description	Quantity
1	First aid leaflet	1 copy
2	Sterilized finger dressing	10 nos.
3	Sterilized hand or foot dressing	10 nos.
4	Sterilized body or large dressing	6 nos.
5	Sterilized burns dressing - small	4 nos.
6	Sterilized burns dressing - large	2 nos.
7	Sterilized burns dressing – extra large	6 nos.
8	Sterilized cotton wool (25g)	2 tubes
9	Cetavolon	2 tubes
10	Eye pads	6 nos.
11	Adhesive plaster	1 spool
12	Assorted roller bandage	6 nos.
13	Triangular bandages	6 nos.
14	Safety pins	6 nos.
15	Scissors, ordinary, 12.7cms, both sides sharp	1 pair
16	Antiseptic liquid, 150 ml, or equivalent	2 nos.
17	Cotton wool for padding, 100g	2 packets
18	Eye Ointment of sulphacetamide preparation	1 tube
19	Loose woven gauze (28”x8”), compressed pack	1 packet
20	Aspirin, 300 mg (10 tablets)	5 strips
21	Note Pad, with a pencil in a plastic cover	1 no.
22	Adhesive dressing strips	10 strips

Sr. No.	Description	Quantity
23	Field dressing of modified army pattern	3 nos.
24	Record cards in a plastic cover	1 set
25	Torch, medium size	1 no.
26	Eye wash	1 no.
27	Wooden splints, small	1 set
28	Wooden splints, big	1 set
29	Disinfectant, Spirt, 100ml	1 bottle

k. Proper demarcation & barricading

Safety barricading to be done around the working area from day one to safe guard against trespassing. —Men at work‖ board must be put to indicate work under progress in the vicinity. Barricading to be kept in place till the work is over, even if it takes few days to complete. No excavated pits / loose soil areas should be kept open without barricading the area.
Also, all storage area of materials near the working area has to be demarcated & barricaded properly.

l. Use of cranes

- Cranes with 20% factor of safety (i.e., cranes with a lifting capacity higher than the weight to be lifted) are to be used.
- The crane should be operated by a licensed operator only.
- Operational fitness of the crane has to be checked before hiring the crane.
- The lifting hooks must have a safety lock in place to avoid slipping of the clings.
- The lifting capacity of the clings to be checked before starting the work. The clings with 20% factor of safety in mechanical strength must be used for lifting.

m. Working near the existing power lines:

- No work to be taken up without proper shutdown while working in the existing power line **or** while working in the proximity of any existing power line.
- Work to be started only after the line (all the phases) is properly/securely earthed from both the ends and line clearance/work permit is issued by the concerned authority in writing with start & end time specifically mentioned.
- All the earthing points to be personally verified by Senior Engineer of contractor as EHS supervisor. Also secure against re-connection.
- No shutdown to be arranged over phone communication. Personal check is to be made for every shutdown and line clearance.
- The work under shutdown should be executed under direct supervision of a qualified supervisor/engineer of the PTCUL/UPCL or the owner (if not PTCUL/UPCL power line). The work group should not be left alone to execute the work.

n. Material handling & work process:

- Poles and accessories to be stored in proper demarcated area and should be away from the routes/places of public use.
- Ensure adequate ingress & egress around the work area.
- While lifting or shifting the equipment nobody should stay boarded.

- Correct tools and plant must be used for fixing and assembling to avoid accidents in the process. All the work must be supervised by Senior Engineer of contractor as EHS supervisor, who can guide the team in every activity.
- While lifting heavy items with multiple sections, proper support clings (along the length) are to be provided from the point of lifting cling to the bottom of the pole to avoid fall of sections due to malfunction of the slip joints.
- No persons under the influence of alcohol should be allowed to enter the work location nor should they help in the work from outside by any means.

o. Records and documentation

Reports prepared by the contractor will include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

p. Accidents and Diseases monitoring: The employer should establish procedures and systems for reporting and recording:

- Occupational accidents and diseases
- Dangerous occurrences and incidents

These systems should enable workers to report immediately to their immediate supervisor any situation they believe presents a danger to life or health. The systems and the employer should further enable and encourage workers to report to management all:

- Occupational injuries and near misses
- Suspected cases of occupational disease
- Dangerous occurrences and incidents

All reported occupational accidents, occupational diseases, dangerous occurrences, and incidents together with near misses should be investigated with the assistance of a person knowledgeable/competent in occupational safety. The investigation should: Establish what happened; Determine the cause of what happened, identify measures necessary to prevent a recurrence, Distinction is made between fatal and non-fatal injuries. The two main categories are divided into three sub-categories according to time of death or duration of the incapacity to work.

Appendix M – COVID Requirements

Contractors will provide adequate sanitation and welfare facilities including hand washing and clean PPE in sufficient quantity on-site and at temporary worker camps/overnight accommodation so workers can follow healthy hygiene practices; contractors will also consider the ability of communities to comply with protective measures such as regular handwashing and the local health care facilities' capacity to deal with any infections agreeing with the nearest Health Center and/or Hospital for emergency cares of workers. Particular attention must be paid to accommodation of the construction workforce to avoid spreading of the virus within the local communities. Include response flow chart and contact details to deal with any construction worker or community member being diagnosed with COVID-19 during the works. To limit contacts and hence contamination risk, the same workers should be grouped in accommodation, transport, and work teams. Practice physical distancing of >1m to lower the risk of disease spread and use a face mask in workplace if physical distancing cannot be maintained. Check health condition of workers on daily basis, for example, use of self-certification forms and temperature checks before being allowed on the construction site. Medical insurance will be provided by contractors for all workers with sick leave allowance to ensure symptomatic workers do not attend site; contractors will avoid no-work-no-pay policies, whereby by fear of not getting paid workers would be tempted to report to work and hide any symptoms.

Appendix N – Labor and Accommodation Camps

General living conditions, safety and security

- The camp site is adequately drained, and no water logging takes place.
- The camps are built using material of adequate quality and kept in good repair.
- The premise of the labor camp is kept clean and free from rubbish and other refuse/waste. Separate housekeeping staff shall be engaged in the labor camps for regular cleaning of the accommodation, kitchen and toilet premises.
- For each worker, a minimum floor surface area of 4 to 5.5 m^2 shall be provided with a minimum ceiling height of 2.10 m and about 15 - 20% additional area shall be provided for circulation.
- Security at worker's accommodation shall be ensured.
- Adequate and appropriate firefighting equipment's are available and routine maintenance and inspection is undertaken.
- Emergency evacuation plans are displayed at strategic areas in language understood by most workers.

Room facilities

- Rooms provided have adequate ventilation, lighting including emergency lighting.
- Rooms built with easily cleanable flooring material and are cleaned at regular intervals.
- The doors and windows are lockable and provided with mosquito screens where necessary.
- A separate bed provided for every worker with minimum space of 1m between beds.
- Rooms have provision of separate storage areas for work clothes, PPEs and personal belongings of workers.
- Separate rooms are provided for male and female workers.

Drinking Water

- Residents have easy access to a supply of clean/potable water meeting national drinking water standards in adequate quantities.
- Water tanks used for the storage of drinking water covered to prevent water stored therein from becoming polluted or contaminated.
- The quality of the drinking water is regularly monitored, and records maintained.

Sanitary and toilet facilities

- Adequate number of toilets shall be provided. A minimum of 1 unit to 6 persons (minimum of 1 unit to 6 males and 1 unit for 6 females) shall be provided.
- Separate sanitary and toilet facilities provided for men and women including private bathing area, showers, or baths in overnight accommodation.
- Sanitary and toilet facilities constructed from materials that are easily cleanable and shall have adequate (at least 80-100 litres per capita per day) supply of water.
- There are adequate facilities for washing and drying clothes.
- Disposal of sewage shall be made through a septic tank-soak pit arrangement.
- Separate enclosed (lidded) bins with proper markings in terms of recyclable or non-recyclable waste shall be provided in the labor camps and kitchen premises in sufficient numbers for collection of garbage. The solid waste shall be disposed through authorized waste collectors.

Canteen and cooking facilities

- The wall surfaces adjacent to cooking areas are made of fire-resistant materials.
- Food preparation tables equipped with a smooth, durable, non-corrosive, non-toxic, washable surface.
- If workers cook their own meals, kitchen space is provided separately from the sleeping areas.

- The refuse and food waste are frequently removed from the kitchen to avoid accumulation and attracting pests and rodents.
- Proper drainage system shall be provided for collection of wastewater from washing areas and kitchens, that shall be further disposed through the septic tank with soak away.
- Daily food served to workers shall have appropriate level of nutrition value.
- The religious and cultural background of workers shall be kept in mind for food selection, and they should have choice of food through their representatives.

Medical, leisure and social facilities

- First aid kits provided in adequate numbers considering the capacity of the camp.
- There are an adequate number of staff/workers trained to provide first aid.
- Residents are provided guidance on alcohol, drug and HIV/AIDS and other health risks.
- Basic social collective spaces and adequate recreational areas provided to workers.
- In addition, National/State guidelines on Covid-19 shall be followed.

Small labor camp/ fly camps for short duration (not to be used for overnight)

- The facilities are located within a reasonable distance (less than 10km) from base-camp or main labor camp.
- The temporary structures erected should be good enough to provide protection against the weather condition appropriate for the season.
- Either cooked food is supplied to them or a hygienic arrangement for cooking (separate from the living area) shall be provided.
- The cam should not be provided for overnight accommodation.
- If food is cooked at camp, appropriate fire precaution and fire-safety measures to be adopted.
- No labor shall be allowed to collect fuel wood/NTFP or purchase fuel wood/NTFP from unauthorized vendors.
- LPG cylinders or kerosene purchased from authorized vendors shall be provided.
- Adequate quantity of safe drinking water and container for their safe storage shall be provided.
- If public toilets are not available within 100m, temporary sanitation facilities for men and women workers shall be provided where the wastewater generated is enclosed in a container and will later be taken offsite for wastewater treatment and disposal.
- There shall be provisions for lighting in the night.
- After completion of the construction work the temporary structures shall be removed and the land will be restored to its earlier condition.

Source: IEE Consultant informed by national requirements and GIIP notably EBRD and ILO Worker Accommodation Guidance Documents which should be followed by the contractor in providing labor accommodation:
https://www.ebrd.com/downloads/about/sustainability/Workers_accomodation.pdf, and
https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_116344.pdf

Appendix O – Minimum Safety Guidelines

The provision in Central Electricity Authority (Measures Related to Safety and Power Supply) Regulations, Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Power Plants and Power Lines) Regulations and relevant Indian Standards should be followed during erection and stringing along with the following safety guidelines.

1. Use of Personal Protective Equipment (PPEs):
    1. (a) No work at site should be without proper PPEs in place for all concerned.
    2. (b) All workers are to wear Safety Helmets, Safety Shoes, Hand Gloves & Safety Jackets all the time while executing the work. Contractor's Supervisors will also have to wear Safety Shoes and Safety Helmets while in the field. Goggles & Masks to be used while working in dusty or highly polluted areas.
2. Working at height:
    1. (a) Full body harness with double lanyard Safety Belts are to be used during working at heights above 1.5 m and secured with safety lifeline or any other rigid object/structure safely before starting the work. Also, well-built ladders (properly secured at the base) can be used for working at height, where ladders can be used.
    2. (b) Efforts should be made to assemble the poles & accessories on the ground only so that working on height can be avoided later.
    3. (c) No work at height is to be carried out in case of inclement weather conditions such as rain, lightning, heavy winds, etc.
    4. (d) Ensure use of tool belts/backpack to properly secure hand tools at all times.
    5. (e) Ensure proper barricading of the drop zone to safeguard people at ground from any falling objects.
3. Proper demarcation & barricading:
    1. (a) Safety barricading to be done around the working area from day one to safeguard against trespassing. "Men at work" board must be put to indicate work under progress in the vicinity. Barricading to be kept in place till the work is over, even if it takes few days to complete.
    2. (b) No excavated pits/ loose soil areas should be kept open without barricading around the area.

(c) Also, all storage area of materials near the working area has to be demarcated & barricaded properly.

4. Use of cranes & clings:
    1. (a) Cranes with 20% factor of safety (i.e., cranes with a lifting capacity 20% higher than the weight to be lifted) are to be used.
    2. (b) The crane should be operated by a licensed operator only.
    3. (c) Operational fitness of the crane must be checked before hiring the crane.
    4. (d) The lifting hooks must have a safety lock in place to avoid slipping of the clings.
    5. (e) The lifting capacity of the clings to be checked before starting of the work. The clings with 20% factor of safety in mechanical strength must be used for lifting.
5. Working near the existing power lines:
    1. (a) No work to be taken up without proper shutdown while working in the existing power line or while working in the proximity of any existing power line.

2. (b) Work to be started only after the line (all the phases) is properly/securely earthed from both the ends and line clearance/work permit is issued by the concerned authority in writing.
3. (c) All the earthing points to be personally verified by Site Engineer of Contractor.
4. (d) No shutdown to be arranged over phone communication. Personal check is to be made for every shutdown and line clearance.
5. (e) The work under shutdown should be executed under direct supervision of a qualified supervisor/engineer of the Contractor only.

6. Material handling & work process:
    1. (a) Poles and accessories to be stored in proper demarcated area and should be away from the routes/places of public use. Ensure adequate ingress & egress around the work area.
    2. (b) While lifting or shifting the Poles/sections nobody should stay boarded on it.
    3. (c) Proper/suggested tools & plants must be used for fixing & assembling to avoid accidents in the process. All the work must be supervised by experienced supervisor(s), who can guide the team in every activity.

(d) While lifting heavy poles with multiple sections, proper support clings (along the length of the pole) are to be provided from the point of lifting cling to the bottom of the pole to avoid fall of sections due to malfunction of the slip joints.
(e) Any person under the influence of alcohol neither should be allowed to enter the work location nor should help in the work from outside by any means.

7. Working at night (After sun set):
    1. (a) No work should be taken up once the day light is over.
    2. (b) However, if there is need to execute the work at night, proper/sufficient lighting to be arranged to cover the working area and the work should be executed under direct supervision of responsible/qualified supervisor only and prior intimation to the Purchaser representative in writing. The work group shouldn't be left alone to execute the work.
8. Emergency Response Plan:
    1. (a) First aid boxes to be kept handy at sites. The Contractor's supervisor(s) must have the knowledge of first aid treatment to meet the exigency.
    2. (b) Contact numbers for emergency help (e.g. Doctors, Hospitals, Ambulance services, Fire services, Police, etc.) available in the nearby areas to be kept displayed in the work site at all times.
    3. (c) All incidents including the near misses to be noted down by the Contractor's supervisor(s) and reported to the concern authority. However, all major incidents/accidents causing "Lost Time Injuries" & "Medically Treated Injuries" should be intimated immediately and in no case more than half an hour of occurrence.
9. Toolbox Meeting:
    1. (a) Toolbox Meetings to be conducted every day before starting of the work. Work Plan for the day along with hazards/risks involved in the activities and safe working practices for the same are to be discussed with the workers.
    2. (b) Record of the Toolbox Meeting to be generated and signature of all the workers/supervisor are to be taken on the TBM sheet. This activity will gradually enhance the safety awareness and will also help in operating in a planned manner.

Appendix P – UPCL Audit

Environmental Audit

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TA-9813 IND: Enhancing Capacity to Design and Implement Energy Sector Projects

Uttarakhand Climate Resilient Power System Development Project

Uttarakhand Power Corporation Limited Component

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ABBREVIATIONS

ADB	Asian Development Bank
ASI	Archaeological Survey of India
BIS	Bureau of Indian Standards
CAP	corrective action plan
CEA	Central Electricity Authority
CGWA	Central Ground Water Authority
CPCB	Central Pollution Control Board
CTE	Consent to Establish
CTO	Consent to Operate
DPR	detailed project report
EHS	environmental, health and safety
EHSG	environmental, health safety guidelines
EMF	electromagnetic field
EMoP	environmental monitoring plan
EMP	environmental management plan
GHG	greenhouse gas
GIIP	good international industry practice
GRM	grievance redress mechanism
IBA	important bird area
IBAT	Integrated Biodiversity Assessment Tool
IEE	initial environmental examination
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
MOEF&CC	Ministry of Environment, Forest, and Climate Change
NGT	National Green Tribunal
O&M	operation and maintenance
PAI	project area of influence
PCB	polychlorinated biphenyl
PCR	physical cultural resources
PIA	project area of influence
PIU	project implementation unit
PMU	project management unit
PPE	personal protective equipment
SEAA	State Level Environmental Impact Assessment Authority
SPCB	state level pollution control board
UPCB	Uttarakhand Pollution Control Board
UPCL	Uttarakhand Power Corporation Limited
WHO	World Health Organization
WLS	wildlife sanctuary

WEIGHTS AND MEASURES

dB(A)	-	A-weighted decibel
km	-	kilometer (1000 meters)
kV	-	kilovolt (1000 volts)
m	-	meter
sqm	-	square meter

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EXECUTIVE SUMMARY

1. Under the project, Uttarakhand Power Corporation Limited (UPCL) will develop a more resilient power network, including the renovation and modernization of 25no. existing 33/11 kilovolts (kV) substations, including capacity enhancement (transformer replacement) and related upgradations. ADB will finance these components through a project loan. The executing agency for the ADB loan will be the Department of Power, Government of Uttarakhand. The implementing agency for the distribution component will be UPCL.

2. Overall construction, operation and maintenance of the renovated and modernized substations is likely to give rise to direct, indirect, and, induced environmental impacts that are mostly minor/low in magnitude, site-specific, generally reversible, temporary and of short duration, primarily during construction works. Potential impacts and risks can be easily mitigated through the adoption of international good practices for environmental management as set out in the International Finance Corporation (IFC) Environmental, Health, and Safety (EHS) Guidelines including the General Guidelines and those on Electric Power Transmission and Distribution dated 30 April 2007. The selection and design of new transformers and equipment will comply with national requirements as well as considering international good practice per the IFC EHS Guidelines particularly with respect to avoiding the use of polychlorinated biphenyl (PCB) oil in the purchase of new transformers (already banned in India) and the use of all asbestos containing materials in the new construction.

3. Within a 10 km project area of influence (PAI) around the 25 existing substations, Sairaghat 33/11 kV substation is the closest to a legally protected area (Binsar WLS) at 2.5km and within its Ecologically Sensitive Zone. Whilst the SS is existing written permission for the renovation and upgradation works should be obtained from Department of Forest. Within 10 km of the 25 existing substations the nearest notable Archaeological Survey of India (ASI) protected cultural resources are the excavated site at Dronasagar (Mauza Ujjan Kashipur) at Kashipur (Kashipur substation) – consultation with the ASI, Dehradun confirmed it is outside of the regulated zone for protected monuments. All renovation works are on modified habitat within the boundaries of existing substations and no critical habitat species, or chance finds are likely to be encountered within the sites.

4. Environmental audit of the 25 existing substations identified the presence of old equipment, particularly transformers that leak and which may contain PCB oil, depending on the date of manufacture and schedule of oil replacement. Based on assessment against United Nations Industrial Development Organization (UNIDO) guidance at least three substations were identified as being at risk of having transformers containing PCBs. Any removal, storage, and disposal of phased out transformers will be done in accordance with international good practice and the Government of India’s regulations. Outside of the scope of the distribution component, Government of India regulations already requires UPCL to complete the de-chlorination or the removal of all PCB-contaminated transformers before 31 December 2025.

5. Small informal group community consultations were conducted during substation auditing, for consultees to express any views on living near substations, environmental and social conditions, or concerns they had regarding the substation. In total 28 participants (42% female) were consulted. The consultations were conducted for people living within 50m of the substations, by invitation from UPCL. The consultations were held during audits in June 2022. Meaningful consultations were limited because, for most of the substations in rural and high-altitude areas, being in more isolated locations away from village centers, adjacent receptors were either absent or few, resulting in a lower rate of consultation participation. No significant environmental and social concerns were raised, although in Sahiya, severe flash flooding was reported during monsoon season, it was also requested to develop a storm water drain, improve the access road and build a high wall in between the substation and the private house. Further consultations are ongoing as part of the project.

6. A corrective action plan (CAP) of the 25no. audited substations was developed as part of the audit to mitigate existing impacts/risks and close the compliance gaps identified as part of the audit.

I. INTRODUCTION

A. Need for the Audit

1. Under ADB's Safeguard Policy Statement (2009) for projects involving facilities that already exist or are under construction before ADB's involvement, ADB requires relevant external experts to conduct an environment audit, including on site assessment. For a project involving an upgrade or expansion of existing facilities, as is the case for 25no. existing substations (SS) under the UPCL component of the Uttarakhand Climate Resilient Power System Development Project (the Project) the requirements for environmental assessment and EMP apply in addition to the environmental audit.

2. The environmental audit will determine the existence of any areas where the existing substations of Uttarakhand Power Corporation Limited (UPCL) may cause or are causing environmental impacts and risks. The existing facilities must comply with ADB's Safeguard Policy Statement (2009) and applicable national laws and regulations on environment, health, and safety. Where existing facilities are found not to be in accordance with the environment safeguard principles and requirements applicable to the Project, as detailed in Chapter II of the IEE, a Corrective Action Plan (CAP) is to be prepared, including implementation schedule and sufficient budget, to bring the existing facilities into compliance.

B. Objectives and Scope of Project Work

3. The environment audit also seeks to identify present inadequacies in environmental, health and safety management at UPCL corporate level with respect to existing facilities; and to recommend actions to be taken to improve and strengthen UPCL's environmental, health, and safety management.

C. Approach and Method

4. Desktop review (available information from UPCL, team discussions, Google Earth search of study area, internet searches/UPCL websites, etc.) of the substations were conducted to identify the environmental setting before undertaking site visits and audits. The environmental audit took place from 7th June to 25th June 2022. A work plan containing the auditing details and output as well as detailed schedules and plans were finalized and communicated/approved by UPCL before visits were conducted. It was undertaken by independent senior environmental expert, Dibyendu Banerjee, engaged by ADB under TA budget on behalf of UPCL. Ms. Anjali Semwal, National IEE Expert and TA consultant was also present during audits in the Dehradun District. Twenty-five existing substations, across Uttarakhand, were visited by the environmental expert together with UPCL officials. During the site visits to these substations, a visual inspection of the surroundings, compound including switch yard, control rooms/buildings, and road access condition was conducted. Photos and videography, measuring of coordinates, air temperature, noise and EMF using smartphone-based applications were taken and the critical environment, health and safety issues cross checked using an audit checklist to identify areas of strength in each substation, and areas that need corrective actions to meet the required standard. Interviews were also held with UPCL substation engineers and staff and at most locations with local communities in the vicinity of the substations. Locals were invited to the substation by UPCL for consultation. Details of consultations are provided in the section under Audit Findings (in this report) as well as in the IEE. The general conditions along with key

observations from these substations are discussed in this report. The Audit Checklist identifies critical issues as per the following criteria deduced from the standards and guidelines mentioned above:

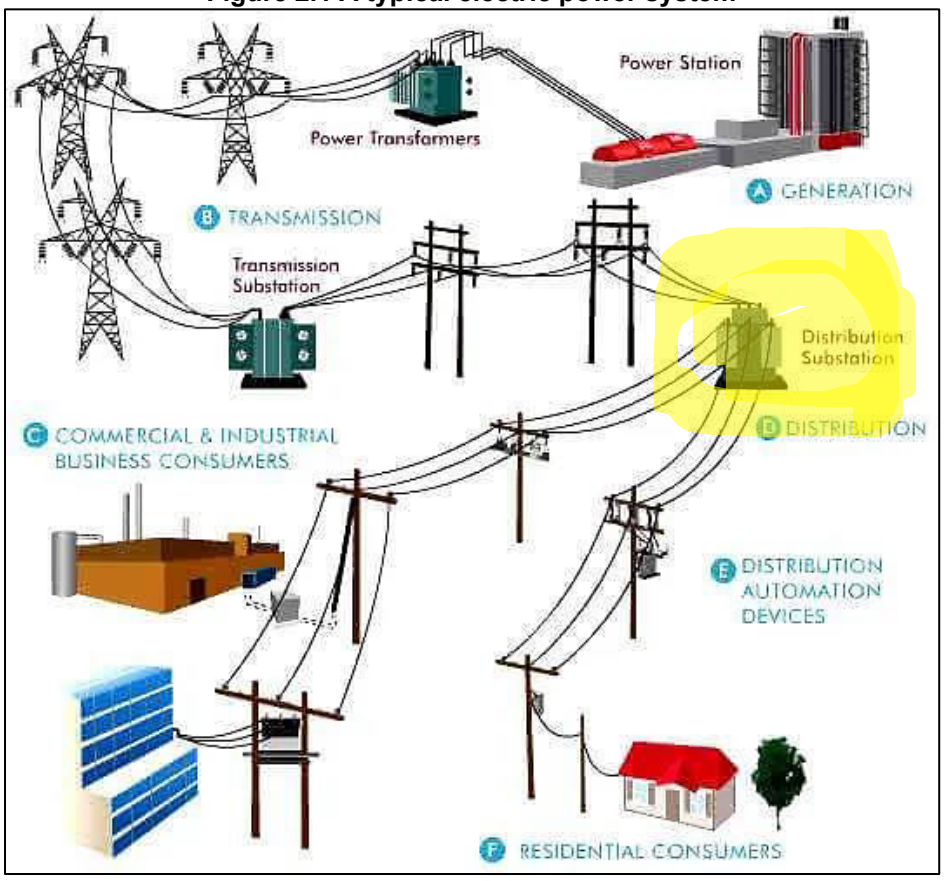
- General environmental management,
- Waste management practices,
- Hazardous material management,
- Occupational health and safety management, and
- Community health and safety management.

II. PROJECT DESCRIPTION

A. Power Systems

5. The electrical energy generated at the power stations is conveyed to the consumers through a network of power lines. In the power system, the electrical energy generated at the power stations is conveyed to major sub-stations. From the major substations, it is conveyed to the bulk power consumers by the high voltage power line system, and to the small and domestic consumers by the medium and low voltage power line system, through distribution substations. In general, the electrical power distribution system is that part of the power system which conveys electric power to the consumers via distribution substations as per their requirement. A typical electrical power flow showing the setting of distribution substations is shown in Figure 2.1.

Figure 2.1 A typical electric power system



Source: instrumentationtools.com

6. A typical 33/11 kV distribution substation can be defined as a network of electrical components comprising of

- Power transformer
- Circuit breaker
- Current transformer
- Potential transformer
- Lightning (surge) arresters
- 33 kV line isolators and earth switches
- Battery bank and battery chargers
- 11 kV Vacuum Circuit Breaker (VCB) panels
- 33 kV control and relay panels
- 33 kV outdoor bus
- 11 kV indoor bus
- Automatic Power Factor Control (APFC) panels
- Ac-distribution board (ACDB)
- Isolators
- Power and control cable, and
- Capacitor bank

7. The centre point of the substation is the power transformer. A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic. It constitutes the single most expensive item in a substation. The components are interconnected such that creating a sequence of a circuit capable to be switched OFF while running on normal operation through manual commands while in emergency situations it can be switched OFF automatically. The emergency situations may be a natural or and/or manmade disaster, or short circuit etc. The substation is composed of numerous outgoing and incoming circuits (through a Switch Yard) which are connected to a busbar i.e., common entity among circuits. The control system and panels are located inside a control room. A typical 33/11 kV substation comprises of the switch yard containing circuits, transformers, breakers, etc.: control room, open space and internal roads. The substation is located within a compound and gated with security, as this a high energy health and safety risk zone.

8. Operations:

- The substation receives electrical energy from generating stations through incoming power supply lines while it delivers electricity to the consumers through outgoing power supply lines.
- The high voltage is stepped down by a step-down transformer to the primary distribution level voltage. Primary distribution voltage is usually 11 kV but can range between 0.4 kV to 33 kV depending upon region or consumer.
- The stepped-down voltage from the substation is carried to distribution transformers (usually pole or ground mounted) via feeder conductors. Generally, no tappings are taken from the feeders so that the current remains same throughout.
- Output from a distribution transformer is carried by distributor conductor. Tappings are taken from a distributor conductor for power supply to the end consumers.
- Finally, the service mains, (a small cable) connects the distributor conductor at the nearest electrical pole to the consumer's end.

B. Description of the Existing UPCL Substations

Substation and Baseline Settings

9. As part of the project, 25 substations under UPCL are to be renovated and upgraded. There are a total of 295 substations of 33/11 kV with capacity – 3122 MVA; 66/33/11 kV -48 MVA; 4526 km 33 kV, 38204 km 11 KV and 59401 km LT power lines spread across the state, including 60298 distribution substations of 11/0.4 KV- 3602 MVA capacity with a Sub-Transmission and Distribution System Network of 211 km at 66 KV.

10. The 25 substations at which works are proposed are classified as existing facilities as per ADB's Safeguard Policy Statement (2009). An environmental audit of these substations (existing facilities) has been undertaken. The substation buildings should normally be designed to be earthquake proof although cracks have been noted during the environmental audit and thus the risk of building failure and level of risk to substation workers during an earthquake is heightened. A corrective action plan (CAP) has been provided that must be complied with by UPCL prior to contractors being allowed access to substation. Where UPCL will not address the actions itself, it is to include the CAP requirements in the contract for the works contractor.

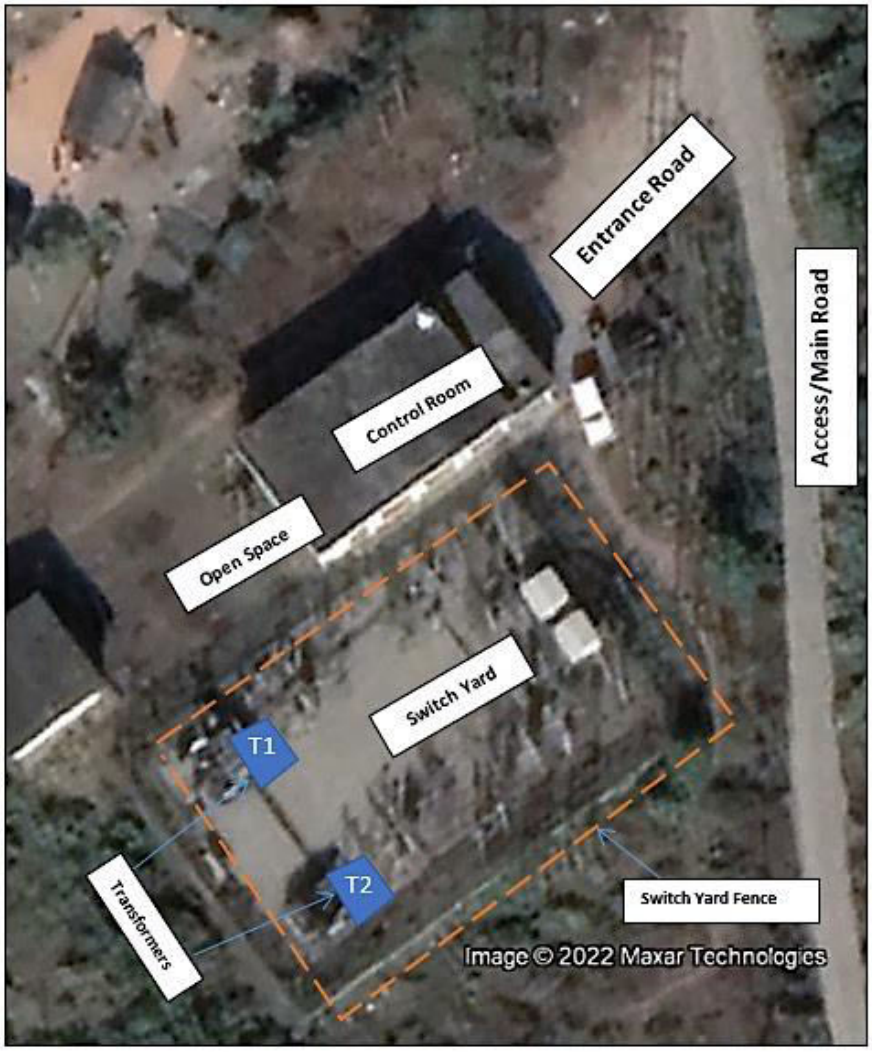
11. The 25 existing substations are spread all across the state and within 4 districts – Dehradun, Almora, Nainital and US Nagar and all located within modified habitat. The typical land use within the substations comprises control buildings, switch yards with electrical equipment, and open areas with exposed soil, grass, shrubs, and internal roads; the available open space within the substations varies from 5% (Hatibarakala,Tarikhet and Pines) to 70% (Ramnagar Danda).

12. Twelve of the substations are within or just on the outskirts of major city and urban areas (Dehradun, Nainital and US Nagar district). Another eight substations are within rural and semi builtup area; all the substations in rural areas are set in village areas where the surrounding habitats have been modified. Five of the susbtations are isolated (Dehradun and Almora district) and surrounded mostly by natural habitats. Three of the substations, Rudrapur, Garampani and Talla Ramgarh are within river valleys. Among the twenty five sustations, 9 are located in plain lands (4 in Dehradun and 5 in US Nagar District), whereas as the rest are located on steep

terrains and slopes. The layout and build of the substations varies across the state based on terrain.

13. A typical setting of the UPCL substation is provided in Figure 2.2, the elevation wise substation layout and description is shown in Figure 2.3. The details of substation settings are given in Table 2.1. The location map of the audited substations (state and district wise) is provided as Figure 2.4 and 2.5). Detailed photolog with 50m buffer around substation is provided in **Annexure 1**.

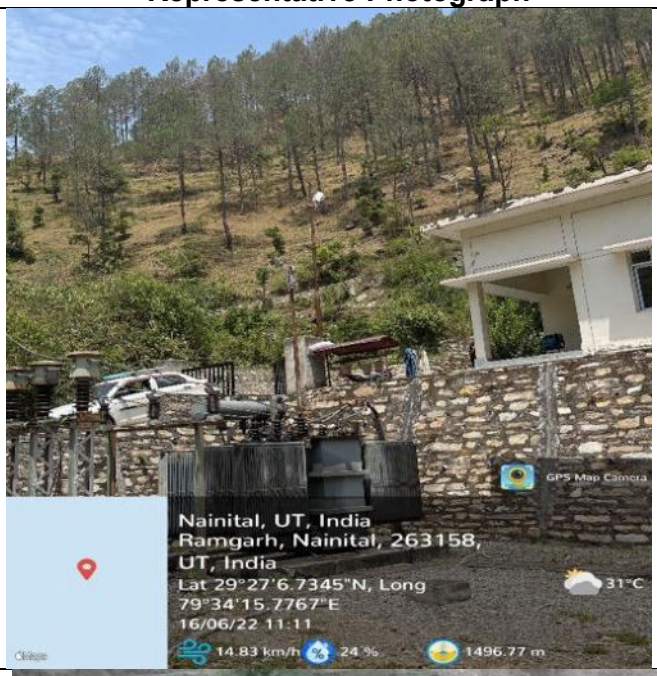
Figure 2.2 Typical substation layout (Lal Tappar)



Source: ADB TA Consultant

Figure 2.3 Elevation wise substation layout

No.	Type/setting	Substations	Representative Photograph
1	All units located in one level, on access road level	Hatibarakala, Shastradhara, Lal Tappar, Ramnagar Danda, Rudrapur, Tarikhet, Kamlwaganja, Transport Nagar, Phoolchaur, Garampani, Sarghakhet, Matkota, Badhaipura, Lalpur, Sitarganj, Jhankat, Kashipur, Doraha	 Ramnagar Danda substation
2	All units located in one level, but below the access road	Sahiya	 Photo taken from access road above
3	All units located in one level, but above the access road	Bajol, Lamgarah, Sairaghat	 Sairaghat substation

No.	Type/setting	Substations	Representative Photograph
4	All units located across two levels and below the access road Lower level -- houses switch yard, and top level – control room	Talla Ramgarh	
5	All units located across three levels and above the access road. Just above lower level -- transformers/control room Middle level – other switch yard components, CB, etc. Top level – control room and vaccant staff quarters (in case of Pines) and additional yard in case of Sawra substation	Pines, Sawra	

Source: ADB TA Consultant

Current Operations and Staffing

14. The history of UPCL can be traced back to erstwhile U.P. State Electricity Board (UPSEB). The erstwhile U.P. State Electricity Board was trifurcated pursuant to enactment of U.P. Electricity Reforms Act, 1999. U.P. State Electricity Reforms Transfer Scheme, 2000 was promulgated for execution of the trifurcation of erstwhile UPSEB into U.P. Power Corporation Limited (UPPCL), U.P. Jal Vidyut Nigam Limited (UPJVNL) and U.P. Rajya Vidyut Utpadan Nigam Limited.

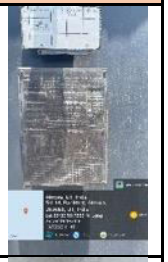
15. The audited substations are located mostly in rural areas of four administrative districts of Uttarakhand namely Dehradun, Almora, Nainital, and Udham Singh Nagar (US Nagar). The major power distribution divisions of UPCL are the electrical zones which are further divided into electricity distribution divisions (EDD) and electricity distribution sub-division (EDS). The substations are run by assistant and junior engineer (AE/JE) ranked staffs. They report to the sub-divisional officers. The sub-divisional officers report to superintending engineers (SE) and executive engineers (EE) who sits at the divisional headquarters. No women staff are recruited at the substations as observed from the audit. Average staff was 4 per substation, with a mix of 90% technical and 10% non-technical. Day to day operations in the substations are conducted by the site engineers, whereas major works, repairs, civil works, and renovations are done by locally hired contractors. Staffs are mostly local or from nearest town and travel to work daily. Staff quarters attached to some of the substations are mostly vacant (or used on daily basis for showering, etc) except for Garampani, Matkota, Kashipur SS.

16. The executing agency for the ADB loan will be the Uttarakhand Power Department, Government of Uttarakhand. The implementing agency for the existing substation component will be UPCL. The loan will be on-lent by Government of India through the Government of Uttarakhand to UPCL (as implementing agency).

Table 2.1 Details of UPCL's 33/11 kV substations audited

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
	District	**Dehradun**											
1	Sahastradhara	Sahastradhara, Dehradun (N)	30°19'54.50"N, 78°3'54.56"E	1986	Yes	33/11 kV GIS	2X10	Century Infrapower Pvt. Ltd (both) - 2015	No	2X12.5	8.6.2022	D.Banerjee & A.Semwal	
2	Hathibarakala	Hathibarakala, Dehradun (N)	30°20'55.46"N, 78° 3'43.99"E	2002	Yes	33/11 kV GIS	2X10	Century Infrapower Pvt. Ltd (both) - 2015	No	2X12.5	8.6.2022	D.Banerjee & A.Semwal	
3	Sahiya	Sahiya, Vikasnagar, Dehradun Rural	30°36'58.59"N, 77°52'19.64"E	1980	Yes	33/11 kV AIS	1X5 1X3	Century Infrapower Pvt. Ltd – 2015 Marsons Electricals - 1989	No	1X5	21.6.2022	D.Banerjee & A.Semwal	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
4	Sawra	Sawra, Vikasnagar, Dehradun Rural	30°48'47.87"N, 77°50'43.49"E	1970	Yes	33/11 kV AIS	1X3	Hackbridge-Hewttic and Easun Ltd -1980	**Yes**	1X5	21.6.2022	D.Banerjee & A.Semwal	
5	Rudrapur	Rudrapur, Vikasnagar, Dehradun Rural	30°26'40.61"N, 77°51'39.91"E	2014	Yes	33/11 kV GIS	1X5	Electra India Ltd-1989	No	1X3 + 1X5	21.6.2022	D.Banerjee & A.Semwal	
6	Ramnagar Danda	Ramnagar Danda, Doiwala, Dehradun Rural	30°13'54.79"N, 78°12'59.43"E	1980	Yes	33/11 kV AIS	1X3	Industrial Meters Pvt (IMP). Ltd.- 1980	No	2X3	9.6.2022	D.Banerjee & A.Semwal	
7	Lal Tappar	Lal Tappar, Doiwala, Dehradun Rural	30° 7'27.50"N, 78° 9'22.91"E	2009	Yes	33/11 kV AIS	2X5	GEC-1977 Swasthya Transformers-(repaired in 2013)	No	2X10	9.6.2022	D.Banerjee & A.Semwal	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
	District	**Almora**											
8	Tarikhet	Tarikhet, Ranikhet, Almora	29°36'59.78"N, 79°24'39.17"E	1972	Yes	33/11 kV AIS	1X3 + 1X5	GE – 1977 Marson's Electrical Industries-2005	No	1X5 + 1X3	13.6.2022	D.Banerjee	
9	Bajol	Bajol, Ranikhet, Almora	29°33'10.98"N, 79°28'40.21"E	2008	Yes	33/11 kV AIS	1X 3 + 1 X 3.15	Electrome c Engineerin g Enterprise s (EEE) – (2008 repaired & no plate) Accurate Transform er Ltd. - 2005	No	1X1.5 + 1X5	13.6.2022	D.Banerjee	
10	Lamgarah	Lamgarah, Almora, Ranikhet	29°31'38.98"N, 79°45'37.05"E	1995	Yes	33/11 kV GIS	2X3	GEC-1979 Other- No Plate/ Details available	Other - **Potential**	1X3 + 1X5	12.6.2022	D.Banerjee	
11	Sairaghat	Sairaghat, Almora, Ranikhet	29°42'2.33"N, 79°49'34.40"E	2010	Yes	33/11 kV GIS	1X5	Electro-mec Engineerin g Enterprise s (EEE)-2008	No	2X5	12.6.2022	D.Banerjee	

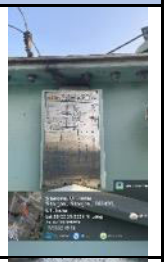
SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
	District	**Nainital**											
12	Kamalwaganja	Kamalwaganja, Haldwani Rural	29°12'37.58"N, 79°27'53.36"E	1999	Yes	33/11 kV AIS	2X12.5	Century Infrapower Pvt. Ltd (both) - 2018	No	2X12.5 + 1X10	17.6.2022	D.Banerjee	
13	Transport Nagar	Transport Nagar, Haldwani Rural	29°11'32.46"N, 79°30'52.69"E	2001	Yes	33/11 kV AIS	1 X10 + 1X 12.5	Century Infrapower Pvt. Ltd (both) – 2015 & 2019	No	2X12.5	17.6.2022	D.Banerjee	
14	Phoolchaur	Phoolchaur, Haldwani Rural	29°10'57.69"N, 79°29'14.47"E	2012	Yes	33/11 kV AIS	1X8 + 1X5	Marson's Electrical Industries-2006, Accurate Transformers Ltd.-2004	No	2X10	17.6.2022	D.Banerjee	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
15	Garampani	Garampani, Nainital, Haldwani	29°29'2.93"N, 79°28'41.09"E	1972	Yes	33/11 kV AIS	2X3	Transform ers & Electricals Ltd. Kerala (TELK) - 1971, Marson's Electrical Industries- 1981	TELK - **Yes**	2X5	13.6.2022	D.Banerjee	
16	Talla Ramgarh	Talla Ramgarh, Nainital, Haldwani	29°27'6.35"N, 79°34'15.59"E	2012	Yes	33/11 kV GIS	2X3	Marson's Electrical Industries- 1982, Electra India Ltd. – 1977	Electra - **Yes**	2X5	16.6.2022	D.Banerjee	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
17	Sarghakhet	Sarghakhet Mukteshwar, Nainital, Haldwani	29°26'21.63"N, 79°38'48.12"E	1976	Yes	33/11 kV AIS	1X5	PME Transformers Ltd. - 1999	No	2X5	16.6.2022	D.Banerjee	
18	Pines	Pines, Nainital, Haldwani	29°23'8.12"N, 79°28'58.90"E	1974	Yes	33/11 kV GIS	1X5 + 1X8	No Plates available (both serviced in 2012)	**Potential**	2X10	15.6.2022	D.Banerjee	Not Available
	District	**US Nagar**											
19	Matkota	Matkota, Rudraur-I	28°59'23.35"N, 79°24'2.65"E	2008	Yes	33/11 kV AIS	2X10 + 1X12.5	Svasca Industries India Ltd. – 2011 & 2014, Century Infrapower Pvt. Ltd – 2018	No	3X12.5	18.6.2022	D.Banerjee	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
20	Bhadaipura	Bhadaipura, Rudraur-I	28°57'48.81"N, 79°24'27.78"E	1974	Yes	33/11 kV AIS	1X5 + 2X10+ 1X8	Schneider Electric-2014, Century Infrapower Pvt. Ltd-2015, Rajasthan Trans-formers and Switch-gears - 2011 Marson's Electrical Industries - 2006	No	1X12.5 + 2X8 + 1X10	18.6.2022	D.Banerjee	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
21	Lalpur	Lalpur, Rudraur-I	28°55'41.74"N, 79°27'20.95"E	1980	Yes	33/11 kV AIS	1X12.5 + 1X10 + 1X8	Century Infrapower Pvt. Ltd-2021 & 2014, Marson's Electrical Industries - 2006	No	1X8 + 2X10	17.6.2022	D.Banerjee	
22	Sitarganj	Sitarganj, Rudraur	28°55'35.29"N, 79°42'40.19"E	1984	Yes	33/11 kV AIS	1X10 + 1X12.5	Century Infrapower Pvt. Ltd-2021 & 2014	No	2X12.5	17.6.2022	D.Banerjee	

SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
													
23	Jhankat	Jhankat, Khatima, Rudrapur	28°56'31.88"N, 79°54'11.67"E	2016	Yes	33/11 kV AIS	1X5	Electra India Ltd. – 1995	No	2X5	17.6.2022	D.Banerjee	
24	Kashipur	Kashipur,	29°12'23.86"N, 78°58'1.30"E	1970	Yes	33/11 kV AIS	3X10	Century Infrapower Pvt. Ltd-2015 & 2016, PME Transformers Ltd. - 2000	No	1X5 + 1X10	18.6.2022	D.Banerjee	

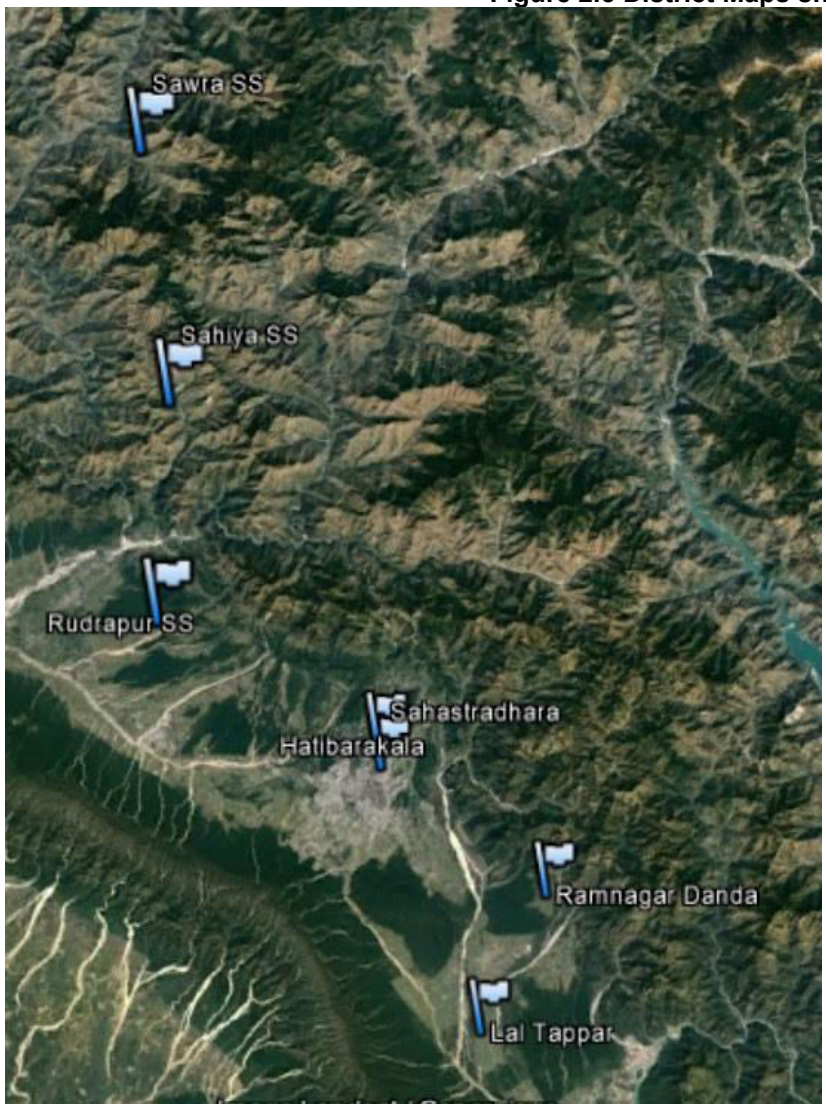
SN o.	SS Name	Division/Sub-Division	Grid Coordinates	Year Est.	Oper-ational	Type of SS	No. trans-formers and capacity (MVA)	Trans-former make and year	UNIDO Risk List for PCBs	Scope of enhan-cement (MVA)	Date of Audit	Audited by	Plate
													
25	Doraha	Doraha, Bazpur	29° 7'57.53"N, 79° 7'12.52"E	1952	Yes	33/11 kV AIS	1X5 + 2X8	Electra India Ltd. – 1986, Accurate Transformers Ltd.- 2000, Associated Electricals (GZB) Pvt. Ltd. - 2009	No	1X5 + 1X8 + 1X10	18.6.2022	D.Banerjee	 

Source: ADB TA Consultant

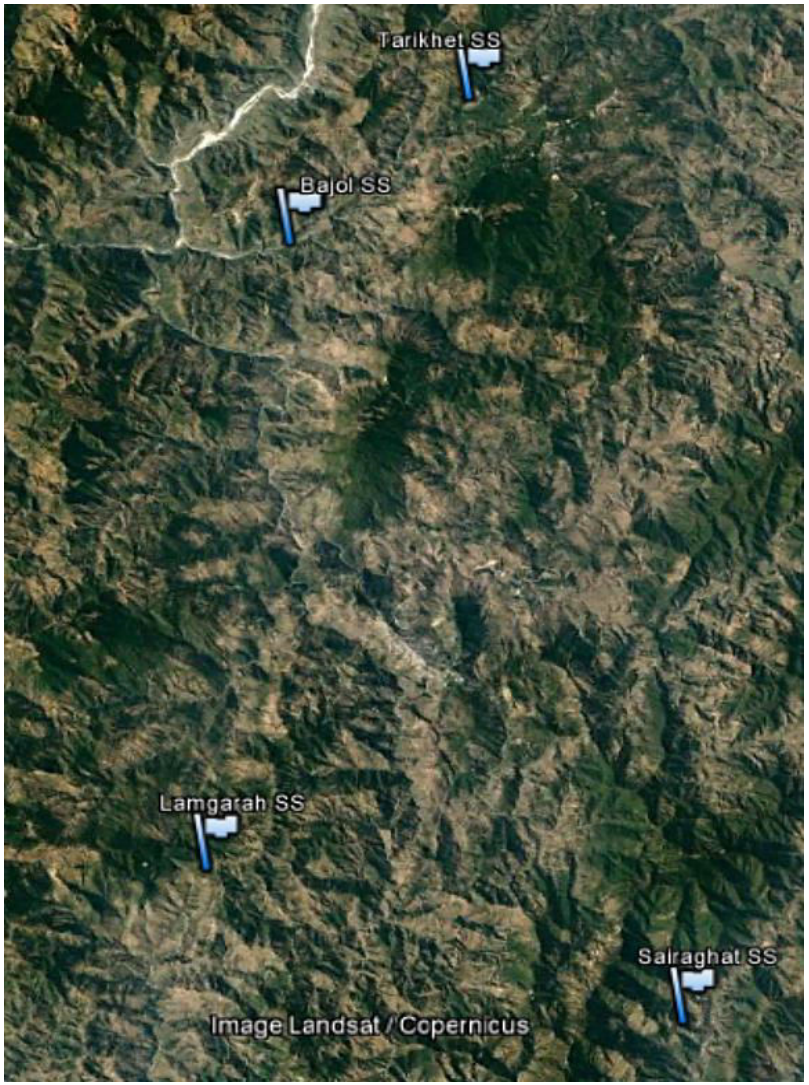
Figure 2.4 Uttarakhand Map showing locations of substations audited

Source: ADB TA Consultant

Figure 2.5 District Maps showing substations audited

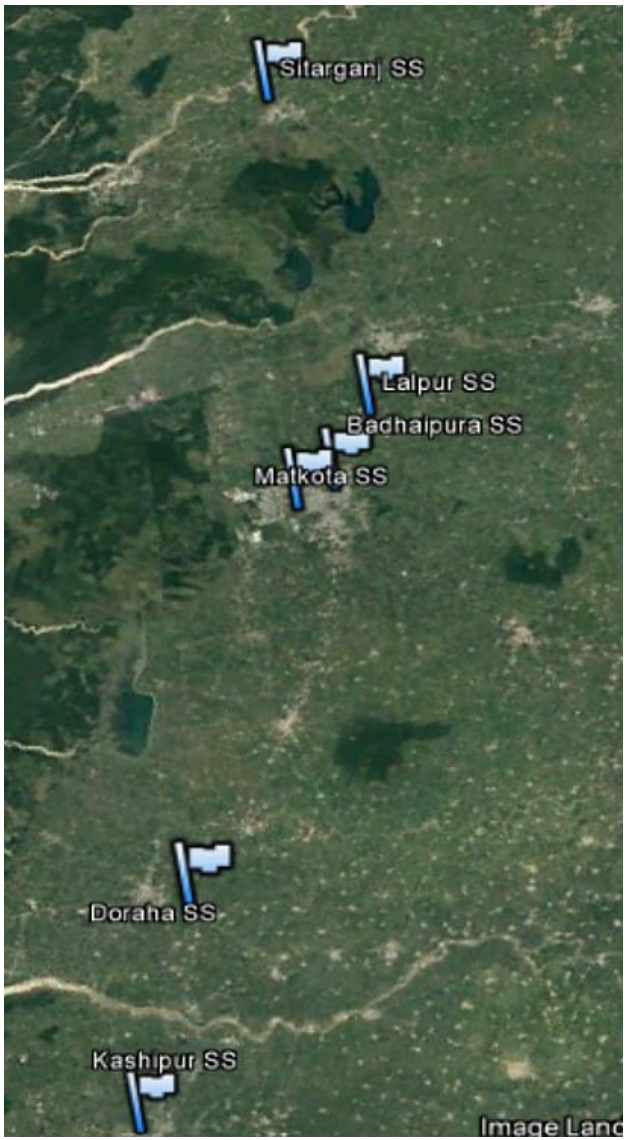


District: Dehradun



District: Almora

District: Nainital



District: US Nagar

Source: ADB TA Consultant

C. Scope of Substations Works

17. The augmentation work involves renovation and modernization of 25 existing 33/11 kV substations including replacement of power transformers and related components, as described in Chapter III of the IEE. The replaced equipment will be dismantled and handed over to UPCL.

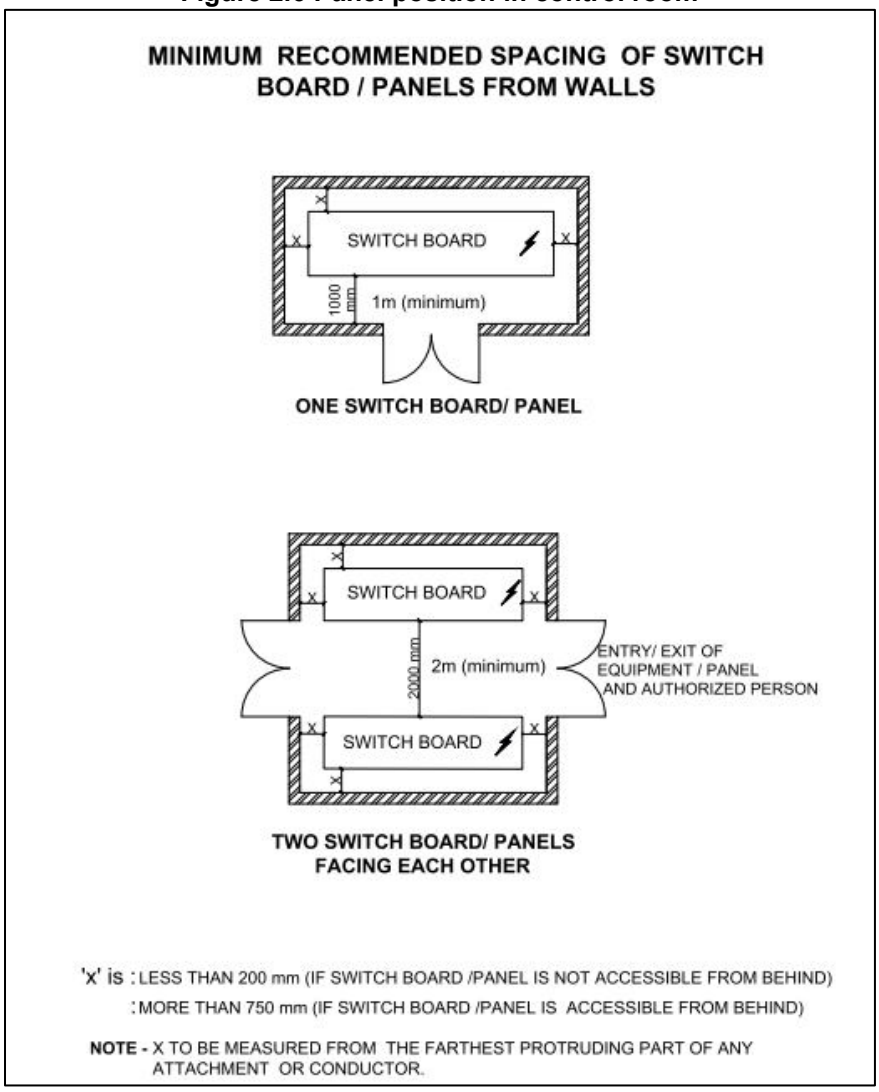
18. Summary features of the substation component involved with respect to construction are given in Table 2.2. Uttarakhand is in seismic zone IV and V and earthquakes (latest in 2017) are quite frequent, although all 25 substations are in the zone IV. New equipment installed in the substations shall be installed on foundations having proper seismic design conforming to IS 1893 for seismic analysis, IS:1893-84 for seismic zone and IS 2.2.4 for seismic acceleration. It will need to be confirmed that the existing control rooms of substations have been adequately constructed in the past to meet these requirements. Some of the structures are very old and with significant damage and cracks.

19. The substations shall be upgraded with completely new equipment involving the following construction activities within the existing boundary of the substations and on land owned by UPCL:

(i) Selection of contractor following International Competitive Bidding tender process,
(ii) Site survey and design,
(iii) Establishment of construction site, storage area, labor camp,
(iv) Sourcing and transportation of material and equipment,
(v) Site clearance including dismantling of old foundations and equipment (if required),
(vi) Site levelling and earthworks (if required),
(vii) Foundations with concrete (if required),
(viii) Installation of transformers and electrical equipment,
(ix) Upgradation and modernization of existing control rooms,
(x) First aid, PPE, and firefighting arrangements, and
(xi) Testing and commissioning prior to operation.

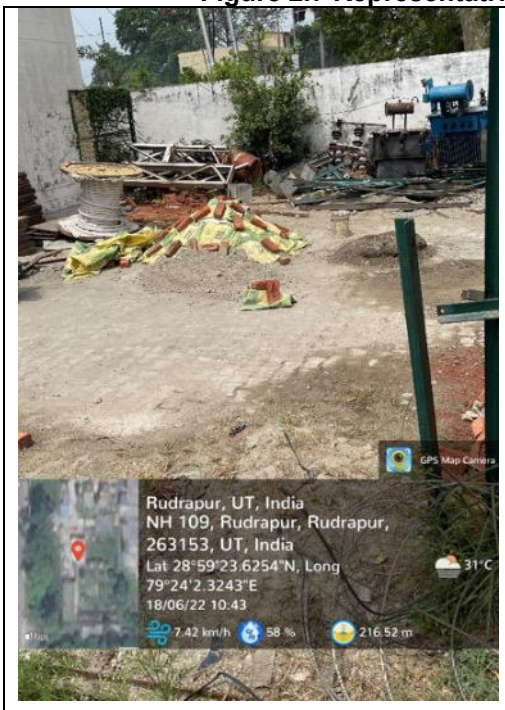
20. The design of the substation upgrades will be in accordance with Government of India requirements and international good practice regarding technical and environmental, health and safety performance standards as set out in the IFC EHS Guidelines. Figure 2.6 shows the panel setup guidance for the control room. Use of PCBs and all asbestos containing materials will be prohibited. Any temporary labor camps will be set up within the substation boundaries. In case land is not available within the substation, permissions shall be taken for establishing labor camps outside the substation at a suitable place following the measures provided in the IEE EMP. Time to be taken for construction will be about 6 months for electrical and mechanical upgrading and 12 months with civil works involved requiring about 7 skilled and 12 unskilled workers. Photographs of ongoing works observed during the audit (unrelated to the project) are provided in Figure 2.7.

Figure 2.6 Panel position in control room

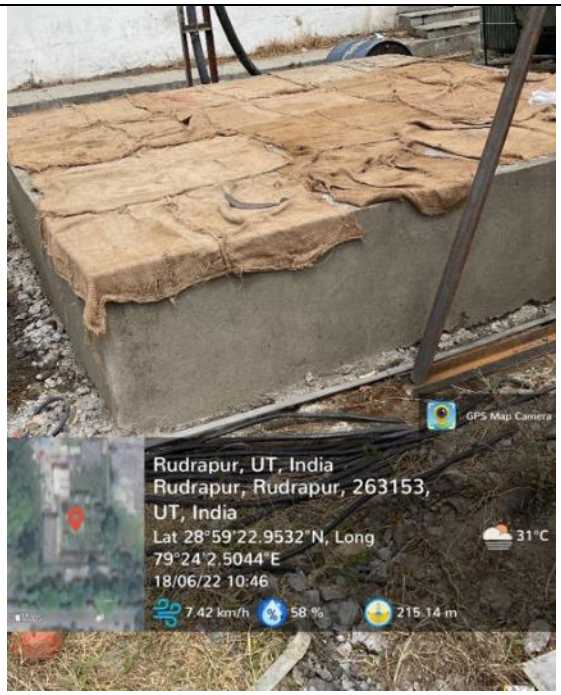


Source:
https://cpwd.gov.in/Publication/Guidelines_for_Substation_and_power_Distribution_Systems_of_Buildings_2019.pdf

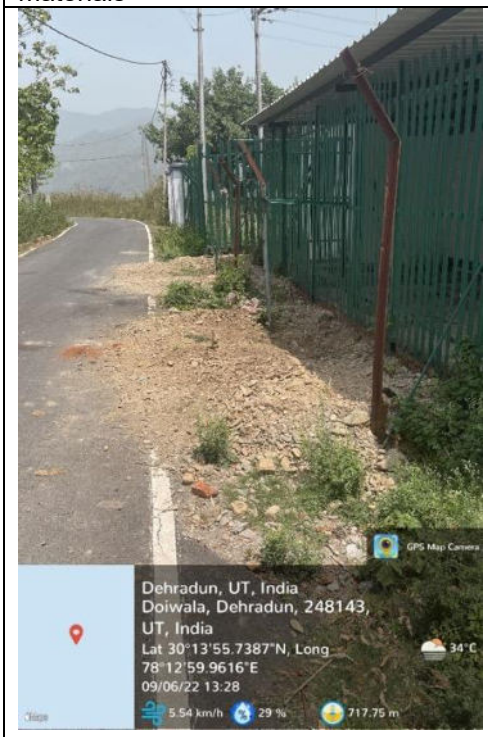
Figure 2.7 Representative Images of observed works at UPCL substations



Matkota Substation: ongoing renovation works. Photo showing cement mixing area and storage of materials



Matkota Substation, US Nagar: Construction of transformer platform



Ramnagar Danda Substation: Works outside substation

Sarghakhet Substation: Ongoing civil works for compound paving

Source: ADB TA Consultant

Table 2.2 Summary Features of Substation Works Involved

Key Features		Particulars
Land ownership and footprint	Permanent works	• UPCL land, within existing substations and sub-division offices, no civil and electrical works are required to take place outside of the existing UPCL boundaries. • No land acquisition involved
	Temporary works e.g., construction camp, material storage site	• UPCL land within the existing substations areas, except (<10% available space) for Hatibarakala, Tarikhet, Lamgarah, Sawra, Sairaghat, Pines, Transport Nagar, and Garampani substations which will need to find land outside. Hatibarakala is located with the Survey of India, GoI compound and will need permission as well as additional space elsewhere within or outside the premises. There is not much space outside the substation. Tarikhet, Lamgarah, Pines, Sawra and Sairaghat are located on elevated terrain and constrained by space. They will have to set up work camps below the substations mostly. Except for Sawra and Sairaghat, the others have abandoned staff quarters attached to control rooms, which can be utilized after repair and renovations.
Construction	Construction method	• Per the construction method statement of EPC contractor • Manual construction with the involvement of powered mechanical equipment • Piling and blasting is not envisaged
Access	Access for construction	• Existing road network available at most of the substations, but entry to the Lamgarah substation needs to be repaired and connected to the access road in front for entry of vehicles. Substations on high altitudes like Pines, Bajol, Sairaghat, Lamgarah, have elevated and sloping pathways, without steps to enter substation from the access/main road. Vehicle movement will not be possible for Pines substation as it is narrow, very steep and with sharp bends.
	Transportation of materials and equipment	• By existing roads, highways, railways, or combination as per the logistics plan of EPC contractor • High altitude, not well maintained, with sharp bends and turns, and landslide prone roads needs to be covered to reach Sahiya, Sawra, Pines, Tarikhet, Bajol, Lamgarah substations.

Key Features		Particulars
Construction	Batching Plants etc.	• Unlikely to be required given small scale of construction works, although it will be for final determination of EPC contractor if they wish to utilize. • Construction plant are only to be set up at site after obtaining Consent to Establish and Consent to Operate from the UPCB
	Equipment	• EPC Contractor would bring their own construction equipment and machineries including transport vehicles for workers and equipment, heavy materials handling facilities like mobile crane, forklift, (specially for high altitude substations) etc.
Materials	Cement and steel	• Direct from cement and steel plants (bulk quantity) with valid environmental clearance, CTE and CTO or (if the quantity is less) wholesale distributors in the nearest settlement, source/brand shall be approved by UPCL • Multiple cement plants are operational in Uttarakhand, and can be transported through road to the substation sites
	Sand	• Direct from local approved quarries with valid EC, CTE and CTO
	Stone Aggregates	• Direct from suppliers with valid EC, CTE and CTO for crusher, stone aggregates located in Uttarakhand.
	Electrical, Mechanical and Instrumentation Parts	• Direct from Original Equipment Manufacturers (OEM) or authorized distributors as per the Technical Specifications and as approved by UPCL • Transformers to be installed will all be certified as PCB free
Other Resources	Power	• Temporary diesel generator (DG) set will be required during substation renovation works
	Water	• EPC contractor will determine if they source canned drinking water from an existing supplier (as the preferred option) or provide treated water for workers; all drinking water provided will be regularly tested and confirmed to meet Government of India drinking water standards, if the contractor provides their own supply permissions shall be obtained from authorities (PWD) with the agreement of local communities/village councils. • Other construction water to be obtained from

Key Features		Particulars
		existing local ground / surface water sources depending on site conditions to be determined by the contractor, permissions for which shall be obtained from authorities with agreement of local communities/village council. • For new bore wells for operational water supply at substations, (if required) approvals shall be obtained from authorities before they are installed. Treatment system will be provided to ensure all drinking water meets Government of India drinking water standards
Labor	Workers camps	• Construction labor camps/existing vacant staff quarters, within substations / UPCL land to be determined by contractor (if such land is not available then the contractor to submit all necessary documents demonstrating agreement for temporary land use with a private landowner to UPCL, including land ownership papers etc.) • Per design approved by UPCL and to contain all basic requirements (beds and beddings, mosquito nets, artificial lights, natural lights, windows and ventilation, fans, emergency exits, firefighting equipment, kitchen and dining halls, mobile charging points, toilets and washing facilities, potable drinking water, recreational space). • Design of labor camps shall conform to IFC EHS guidelines, ILO's guidance on worker accommodation[4] and regulations of Government of India
	Construction staffing	• Most of the works required are manual labour intensive with the involvement of powered mechanical equipment • The exact size of the workforce including the number of unskilled, semiskilled, and skilled shall be determined by the EPC contractor based on the project scheduling which shall be approved by UPCL • For working with electricity and at height only suitably qualified and experience labor will be used • Both local and external laborer shall be utilized for which the contractor shall obtain labor licenses and Workmen Compensation

[4] https://www.ilo.org/wcmsp5/groups/public/@ed_emp/@emp_ent/@multi/documents/publication/wcms_116344.pdf

Key Features		Particulars
		Insurances
Wastes	Specific type of waste generated	• Non-hazardous waste includes all domestic and kitchen waste, packaging wastes including plastics, paper, cardboard, wood, etc. construction waste such as concrete, brick, rubble, iron scrap etc. • E-waste: broken or used electrical equipment • Hazardous waste: used transformer oil, empty metal or plastic fuel/oil/chemical containers, transformer oil or solvent-soaked rags, used batteries etc. • Removed electrical and mechanical equipment will be handed over to UPCL or transported to designated UPCL Zonal/Divisional warehouse as per the direction of UPCL • UPCL will reuse or recycle using UPCB authorized vendors as per the condition of the equipment, if fit for use they will be stored for reuse by UPCL or they will be auctioned off as scrap material • Disposal of old transformers and other hazardous wastes shall be as per the Hazardous and Other Wastes (management and transboundary movement) Rules, 2016, Government of India. • Other wastes will be recycled using UPCB authorized vendors or suitably engineered and licensed waste management facilities for inert or solid waste

CTE = Consent to Establish, CTO = Consent to Operate, EHS = environmental, health and safety, IFC = International Finance Corporation, OEM = Original Equipment Manufacturers, UPCB = Uttarakhand pollution control board, UPCL = Uttarakhand Power Corporation Limited
Source: ADB TA Consultant

21. UPCL is required to inventorize and remove all existing PCB containing transformers, as identified in the audit findings, in conformance to the Government of India's Regulation of Polychlorinated Biphenyls Order, 2016 by 31st December 2025. Even if there is no risk of the transformers containing PCBs UPCL must maintain its existing transformers in good condition. Further they must be retrofitted with 110% bunding to prevent oil leaking to soil, surface water, and groundwater and contaminating it.

O&M

22. General supervision requirements or 33/11kV power transformer:

- Dirt and Dust: The external transformer surfaces shall be inspected regularly; and when required cleaned of dust, insects and other air borne dirt etc.

- Rust and Treatment: A regular inspection is to be done on the external surface of the transformer tank and radiators.
- Mechanical Damage: Checks must be carried out for mechanical damage to the fabrications and associated equipment. Particular attention should be given to vulnerable areas such as radiators.
- Check out all Joints for Signs of Leakage: All joints, both welded and gasketed, must be checked for signs of oil leakage. If there is any doubt of a leak, the area must be cleaned of oil, using a suitable solvent (methyl alcohol) and sprayed with liquid chalk.
- Check for Oil Level: All oil levels associated with the equipment including oil conservator and all oil filled bushings shall be checked. Also, the oil in the oil seal should be maintained.
- After completing all the checks ensure that all materials or tools, used for maintenance work, have been removed. All debris must be disposed of. The transformer compound should be left in a clean and tidy condition.
- Silica Gel Breather: In open breathing transformer, the breather plays active role in maintaining the transformer dry by admitting dry air when the transformer breathes. In transformers having air cell or diaphragm, the breather ensures dry air inside the air cell or above the diaphragm. The silica gel inside the breather becomes pink from bottom to top over a period.

III. INSTITUTIONAL AND LEGAL FRAMEWORK

23. This section is about the applicability of national laws and regulations, international agreements, and ADB safeguards requirements to the existing substation component. The section also lays out the various permissions required for the existing substation component from national authorities. It considers the environmental, health and safety (EHS) policies and procedures that are presently available with UPCL as well as the existing environment safeguards capacity of UPCL with respect to environmental management plan (CAP/EMP) implementation. The environment audit has been conducted with the aim of assessing EHS compliance of the 25 existing substation with:

- Government of India and Government of Uttarakhand laws and regulations (details provided in Table 3.1) on environment, these include but are not limited to:
    - The Air (Prevention & Control of Pollution) Act, 1981 (amended 1987),
    - The Water (Preventions Control of Pollution) Act, 1974 (amended 1988),
    - Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008 (amended 2009, 2016); and
    - The Regulation of Polychlorinated Biphenyls Order, 2016 (S.O. 1327(E).
- Government of India and Government of Uttarakhand laws and regulations on health and safety measures at workplaces and in the community including the Occupational Safety, Health And Working Conditions Code, 2020 and the Electricity Act, 2003 (amended 2007);
- Environmental safeguards requirements according to ADB's Safeguard Policy Statement (2009); and
- International Finance Corporation (IFC), Environmental, Health, and Safety (EHS) Guidelines.

A. National and State EHS Regulatory Framework

24. The main laws and regulations pertinent to the existing substation component are:

Table 3.1: Substation renovation related applicable National and State EHS requirements

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
National Environment Policy (NEP), 2006	Applicable as both construction and operation must adhere to the NEP principles of conservation of environmental resources and abatement of pollution, the IEE (informed by SS audit) process and implementation of the EMP (including SS CAP) will enable this.	**Responsible Authorities:** MoEF&CC
National Water Policy, 2012	Applicable as there is a need to conserve and manage ground water as it is a community resources held by the state. Recognizes that water is required during construction activities (control room repairs, transformer sump, etc.) including cement mixing, curing of concrete structures and the utilization should be optimized and an awareness of water as a scarce resource should be fostered.	**Responsible Authorities:** Ministry of Jal Shakti

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
National Conservation Strategy and Policy Statement on Environment and Development, 1992	It provides the measures to be taken for prevention and control of pollution and energy efficient devices in the substations	**Responsible Authorities:** MoEF&CC
National Resettlement and Rehabilitation Policy, 2007	Not applicable as there is no land acquisition involved, all lands in substations are owned by UPCL.	**Responsible Authorities:** Ministry of Rural Development
The Environmental (Protection) Act, 1986 The Environmental (Protection) Rules, 1987 & its amendments	Both construction and operation of the substations must comply with the legislation issued under this act and rules, the IEE process and implementation of the EMP will enable this. Construction and operation must also comply with the environmental quality standards.	Umbrella act under which environmental notifications, rules, schedules, and standards are issued. **Responsible Authorities:** MoEF&CC, Uttarakhand DOF, CPCB and UPCB
The EIA Notification, 2006 as amended to 2016	Not applicable for the substation components as the EIA notification exempts these from obtaining prior environmental clearance. Prior environment clearance is applicable for direct sourcing of sand and stone during construction when mineral extraction exceeds the area specified in Schedule 1. However, no new borrow pits or quarries will be opened, instead materials will be sourced by the contractor from existing approved sources. The contractor will need to confirm existing sources used by third party vendors already obtained any Prior environment clearance required to operate.	Identifies projects and activities that require Prior environmental clearance and lays the procedure for obtaining the same. **Responsible Authorities:** MoEF&CC and SEIAA
The Right to Information Act, 2005 and its amendment of 2019	In relation to information disclosure during all stages of implementation, wherein any citizen of India may request information after paying a fee from a UPCL which is a government body and which UPCL is required to respond within thirty days.	**Responsible Authorities**: UPCL and, Uttarakhand Information Commission
The National Environmental Appellate Authority Act, 1997 National Green Tribunal Act, 2010	UPCL will need to comply with any NGT rulings in case of application against it.	NGT has dedicated jurisdiction in environmental matters to provide environmental justice and help reduce the burden of litigation in the higher courts. It is mandated to endeavor for disposal of applications or appeals within 6 months of them being filled. **Responsible Authorities:** NGT
Central Ground Water Authority (CGWA) Notification no. 21-4/Guidelines/CGWA/2009-832 dated 14 October 2009	Not applicable since no new bore wells are planned in any of the substations being upgraded	**Responsible Authorities**: CGWA

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
Comprehensive Environmental Pollution Index (CEPI) 2018	Not applicable as the project does not fall under any of the industrial clusters nor under the Critically Polluted Areas (CPAs) as per the CEPI	Industrial clusters are categorized under the CEPI as Polluted Industrial Areas giving weight to various pollutants, ambient pollutant concentrations, receptors (that is, the number of people affected) and additional high-risk elements; they are to be remediated seeking compensation from polluting industries, and any expansion or development of new sites in these areas will be rejected **Responsible Authorities**: CPCB, SPCB, enforced by NGT
The Water (Prevention and Control of Pollution) Act, 1974 The Water (Prevention and Control of Pollution) Rules, 1975 The Water (Prevention and Control of Pollution) Cess Act, 1977 & amendment in 2003	No CTE and CTO required for substation upgradation. However, need to adhere to the water quality standards for any wastewater generated during construction & O&M	Empowers central and state pollution control boards to establish and enforce water quality and effluent standards, monitor water quality, prosecute offenders, and issue licenses for construction and operation of certain facilities. **Responsible Authority:** UPCB
The Air (Prevention and Control of Pollution) Act, 1981 The Air (Prevention and Control of Pollution) Rules, 1982	No CTE and CTO required for substation upgradation. However, need to adhere to the air emission standards during renovation of SS	Empowers state pollution control boards to set and monitor air quality standards and to prosecute offenders, excluding vehicular air and noise emission. **Responsible Authority:** UPCB
Noise Pollution (Regulation and Control) Act, 2000 and 2010 as amended	Applicable during both renovation and operation, SS must adhere to the ambient noise emission standards; any diesel generator sets used by the contractor or UPCL must also be compliant to standards	Standards for noise emission for various land uses and equipment have been issued. **Responsible Authority:** UPCB
The Motor Vehicle Act. 1988 and its subsequent amendments	Applicable and all vehicles utilized during renovation and operation mandatorily require obtaining of a "*Pollution Under Control Certificate*" (PUC) for the duration of their use to manage the vehicular emissions.	Empowers the State Transport Authority to enforce standards for vehicular pollution and issuance of PUC certificates. **Responsible Authority:** State Motor Vehicles Department
Indian Forest Act, 1927 Forest (Conservation) Act, 1980 as amended Forest (Conservation) Rules, 2003 & its amendments	Not applicable as no forest land is required and all SSs stand on UPCL land	The act defines the various forest areas and lays down the procedure for diversion of forest land for non-forest activities. **Responsible Authorities:** MoEF&CC and Uttarakhand DoF

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
Forest Panchayat Act was enacted under Section 28(2) of the Indian Forest Act, 1927	Applicable as some SSs (Sairaghat, Tarikhet and Bajol) are part of such village council forest ranges and must adhere to village council requirements.	The Village Forest Council (Van Panchayats) implement the rules for accessing and distributing forest resources, monitoring them, imposing penalties on violators, and generating and judiciously using income for forest welfare. **Responsible Authorities**: Van Panchayats
The Uttarakhand Forest Transit Rules, 1952 & its amendments Uttar Pradesh Tree (Protection), Act 1976, as adopted in Uttarakhand	Not applicable. The rules provide for transit passes for forest products including timber. Since no existing substations are in forest land, no trees within forest land shall be felled	**Responsible Authorities:** Uttarakhand DOF
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Rules 2007	Not applicable as no land is being acquired from scheduled tribes and all the 25 SSs are owned by UPCL.	Provides rights related to title, usage, relief, development, and forest management including traditional and customary rights of forest-dwelling scheduled tribes. **Responsible Authorities:** Department of Forest, Department of Revenue and Department of Tribal Welfare
Biological Diversity Act, 1992 Biological Diversity Rules, 2004 Wildlife Protection Act, 1972 as amended	The existing substations are not situated within a Protected Area, such as, national park or wildlife sanctuaries, Sairaghat is located in the Ecologically Sensitive Zone (ESZ) of Binsar WLS. It may become applicable in the event workers encounter any scheduled plants and animals since the sale, trade, or commerce of them is prohibited.	Provides for protection of Protected Area from non-conservation activities. It also lists (schedules) plants and animals of which sale, trade, or commerce is prohibited. **Responsible Authorities:** National Board of Wildlife (NBWL), State Board of Wildlife (SBWL) and Chief Wildlife Warden of Uttarakhand
The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	Not applicable as there is no land acquisition involved	Provides directions related to fair compensation of any land acquired for public works purpose. **Responsible Authorities:** Revenue Department and District Administration
Indian Treasure Trove Act 1878 (as modified up to September 1949) The Antiquities and Art Treasures Act, 1972	Not applicable as all substations are existing and operational.	Deals with treasures and other artifacts which are of antique value and origin. **Responsible Authority:** Archaeological Survey of India (ASI)
Ancient Monuments Preservation Act 1904	None of the existing substations are situated within 300m of an ASI or	Deals with activities that may be permitted and prohibited near the protected

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
Ancient Monuments and Archaeological Sites and Remains Act 1958 and its amendments Ancient Monuments and Archaeological Sites and Remains (Framing of Heritage Bye laws and Other Functions of Competent Authority) Rules, 2011 National Monument Authority Rules, 2011 Heritage Conservation and Preservation Act, 2010	Government of Uttarakhand notified monument.	monuments. Construction works are prohibited within 100m of a protected monument (prohibited area) and another 200m from the prohibited area (so 300m total distance) is demarcated as the regulated area in which construction is regulated by the competent authority. In event of any chance finds being made they must be notified / surrendered to the competent authority. **Responsible Authorities:** ASI, Archaeology Survey of India, Dehradun Circle
The Explosives Act 1884 and its subsequent amendments. The Explosives Rules 1983	Applicable if explosives (including diesel or petrol) stored in the substations or need to be used, they must also be followed if petroleum products are stored beyond the permissible capacities	Sets out the regulations as regards the usage and storage of explosives including explosive fuel (diesel or petrol) at the project site and precautionary measures to be taken. **Responsible Authority:** Chief Controller of Explosives
The Petroleum Rules 2002	Applicable for the supply and storage of diesel for generator sets and for transformer oils etc.	Deals with the import, transport and storage of petroleum and petroleum products **Responsible Authorities:** Ministry of Petroleum and Natural Gas, Chief Controller of Explosives
Manufacture, Storage, and Import of Hazardous Chemicals Rules, 1989	Applicable as there shall be storage of hazardous chemicals including petroleum products (oils etc.) at the substations.	**Responsible Authorities**: UPCB
Regulation of Polychlorinated Biphenyls (PCBs) Order, 2016	New transformers provided for the substations must be PCB free and any existing PCB containing transformers at the existing substations and along distribution lines must be inventoried and removed by the cut of date of 31st December 2025. Disposal of PCB containing equipment must be done as per Hazardous and Other Wastes (Management, & Trans-boundary Movement) Rules.	Provides guidance on the usage of PCBs and prohibits the usage of PCBs in any form by 31 December 2025. **Responsible Authority:** UPCB
Ozone Depleting Substances (Regulation and Control) Rules, 2000 and its amendments	Prohibition on usage of ozone depleting substances during construction and operation period e.g., for servicing of fire extinguishers	Provide direction on the regulation of ozone depleting substances. **Responsible Authorities:** UPCB
Chemical Accidents (Emergency Planning,	Emergency response planning must involve the responsible authorities in case	Protection of the public against chemical accident while

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
Preparedness and Response) Rules, 1996	during construction and operation a chemical accident that could impact the public occurs while handling any hazardous chemicals (flammable, toxic and explosive).	handling any hazardous chemicals (flammable, toxic and explosive) **Responsible Authorities:** District and Local Crisis Group headed by the District Magistrate and Sub Divisional Magistrate
Construction and Demolition Waste Management Rules, 2016	Construction (control rooms, staff quarters, etc.) waste will be generated and will need to be managed and disposed of in accordance with these rules during construction.	Deals with safe disposal of construction wastes generated due to construction and demolition activities **Responsible Authorities:** UPCB
Solid Waste Management Rules 2016	Solid waste will be generated and will need to be managed and disposed of in accordance with these rules during construction and operation.	Deals with safe disposal of municipal solid wastes generated due to construction and operation **Responsible Authorities:** UPCB, Panchayats
The Plastic Waste Management Rules, 2016	Plastic will be generated for disposal in the wastes from packaging materials during both construction and operation period	The rules apply to "*every waste generator, local body, Gram Panchayat, manufacturer, Importers and producer*". Wastes to be segregated and disposed of as per Solid Waste Management Rules, 2016. **Responsible Authorities:** UPCB, Panchayats
Hazardous and Other Wastes (Management, & Trans-boundary Movement) Rules, 2016 as amended in 2019	Applicable in relation to the management and disposal of hazardous wastes (used transformer oils, batteries, solvent-soaked rags etc.) that are used during construction and operation in relation to operation of the substations.	Provides protection to the general public against improper handling and disposal of hazardous wastes. **Responsible Authority:** UPCB
Batteries (Management and Handling) Rules, 2001	Applicable as use and presence of batteries as back up in the in the substations. Used batteries must be properly disposed to UPCB authorized and registered recyclers.	The rules apply "*to every manufacturer, importer, re-conditioner, assembler, dealer, recycler, auctioneer, consumer, and bulk consumer involved in manufacture, processing, sale, purchase and use of batteries or components thereof*". Half-yearly returns using the required forms are to be filed and submitted to UPCB. **Responsible Authorities:** UPCB
E-Waste (Management) Rules, 2016 as amended in 2018	Applicable during construction and operation used e-waste must be properly disposed to UPCB authorized and registered recyclers.	**Responsible Authorities**: UPCB

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
National Policy on Safety, Health and Environment at Workplace, 2009	To strive for the objective of improving safety, health, and environment in the workplace during both the construction and operation	**Responsible Authorities:** Ministry of Labor and Employment
National Policy on HIV / AIDS and the World of Work	Applicable as influx of laborers for the construction works may lead to transmission of HIV/AIDS. Policy aims to prevent transmission amongst workers and protect the rights of the infected	**Responsible Authorities:** Ministry of Labor and Employment
Drinking Water Standard (IS 10500:2012)	Applicable as provides the standards of drinking water in India. The drinking water provided in construction of substations must adhere to the standards.	**Responsible Authorities:** Bureau of Indian Standards, CPCB, UPCB
The Occupational Safety, Health And Working Conditions Code, 2020 (Gazette notification dated 29th September 2020)	Follow the requirements during construction and operation.	This Act consolidates and amend the laws regulating the occupational safety, health and working conditions of the persons employed in an establishment and for matters connected therewith or incidental thereto. This includes the: Building & Other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 Contract Labour (Regulation & Abolition) Act, 1970 and The Contract Labour (Regulation & Abolition) Rules, 1971 Indian Factories Act, 1948 Code shall apply in case of contract labour employed through contractor in the offices of the Central Government or in the offices of the State Government, where the Central Government or, as the case may be, the State Government is the principal employer as in the case of UPCL **Responsible Authorities:** Ministry of Law and Justice
Uttarakhand Contract Labour (Regulation and Abolition) Rules 1978	It is applicable to construction and operation as more than 25 construction laborers will be hired for the renovation of substations	Deals with hiring of laborers by a licensed labor contractor. It also provides for provision of rest rooms, canteens, toilets (one for every 25 laborers), first aid facilities, wages etc. **Responsible Authorities:** Directorate of Labour, Government of Uttarakhand
Uttarakhand Occupational Safety,	Applicable as workers will be involved during construction and operation as health and safety risks are involved.	**Responsible Authorities:** Labor Commissioner

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
Health and Working Conditions Rules, 2021		
The Bonded Labour (Abolition) Act 1976	Applicable as it prevents use of bonded labor during construction phase	**Responsible Authorities:** District Magistrate as Inspector for the district or any officer delegated by him
The Child Labour (Prohibition and Regulation) Act, 1986 and its amendment	Applicable and it prohibits the employment of children below the age of 14 by the contractors or UPCL.	Prohibits employment of children below the age of 14 in the building and construction industry. **Responsible Authority:** Labor Inspector
The Trade Union Act, 1926	Applicable as it allows the formation of Trade Unions for the purpose of regulating the relations between workers and UPCL	**Responsible Authorities:** Registrar of Trade Unions, Uttarakhand
Interstate Migrant Workers Act, 1979	Applicable, if migrant workers are employed during construction or operation	This act along with 12 other central labor laws has been rationalized and will be replaced by The Occupational Safety, Health and Working Conditions Code, 2020. However, the code is yet to come into force through an official gazette notification. **Responsible Authority:** Department of Labor
The Code on Wages, 2019	Payment of minimum stipulated wages, avoiding inequality in payment of wages etc. to be ensured during the construction and operation phases	The code repealed and replaced Payment of Wages Act, 1936, the Minimum Wages Act, 1948, the Payment of Bonus Act, 1965, and the Equal Remuneration Act, 1976. The Code has consolidated all the provisions of these four labor laws that have been repealed regarding wage and bonus payments and makes it mandatory for payment of minimum wages and timely payment of wages for all workers in India. **Responsible Authority:** Labor Commissioner
The Code on Social Security, 2020	Applicable during construction and operation, comply with code in relation to provident funds, gratuities, compensation, employee insurance etc. which are to be paid to the workers employed by the labor contractors, employees of contractors and UPCL.	The code repeals and consolidated the Workmen's Compensation Act, 1923, The Employees' Provident Funds and Miscellaneous Provisions Act, 1952, The Payment of Gratuity Act, 1972, The Employees' State Insurance Act, 1948 and five other acts. The act brings generation, transmission and distribution of power works under the

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
		ambit of the act. Workmen Compensation Insurance, regular Provident Fund (PF), gratuity and other insurances have to be obtained by the contractors for the project. **Responsible Authorities:** Labor Commissioner, PF Commissioner
Employers' Liability Act no. 24 of 1938	Deals with injuries to workers and the responsibility of the employer to maintain machinery and work site in good and safe conditions	**Responsible Authorities:** Ministry of Labor and Employment
Public Liability and Insurance Act, 1991	The act is applicable to protect the public from any fortuitous accidents during construction or in the operation phases of the project's components. Liability Insurances are to be obtained by the works contractor and UPCL for construction and operation.	The act provides for protection to the public from accidents caused from hazardous materials resulting in continuous or intermittent or repeated exposure to death of, or injury to, any person or damage to any property **Responsible Authorities:** Labor Commissioner and District Magistrate
The Indian Electricity Act, 1910 and its amendments The Indian Telegraph Act, 1885	Not applicable for substations	Safety measures to be taken in laying electrical lines and connections. **Responsible Authorities:** Central Electricity Authority (CEA)
Electricity Act, 2003 and its amendments	Applicable as electric works will be carried out so the act must be complied with.	Guiding act related to electricity in India. Sections 53, 67, 73, 161 and 177 deal with safety related to electricity including power to make regulations. **Responsible Authorities:** CEA
Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2010 CEA (Measures Relating to Safety and Electricity Supply) Regulations, 2018 CEA (Measures relating to Safety and Electric Supply) Amendment Regulations 2015 CEA (Measures Relating to Safety and Electric Supply) Regulations, 2019	Applicable as the acts deals with distribution and transmission companies and mandates the provision for safety requirements including mandatory appointment of an Electrical Safety Officer and their qualifications	**Responsible Authorities:** CEA

Name of Policy / Law / Regulation	Applicability to Existing Substations	Remarks
CEA (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2010	Applicable as these pertain to the safety requirements for construction, operation, and maintenance procedures of electrical lines, including those incoming/outgoing from substations	**Responsible Authorities:** CEA

CPCB = Central Pollution Control Board, CEA = Central Electricity Authority, CEPI = Comprehensive Environmental Pollution Index, CTO = Consent to Operate, CGWA = Central Ground Water Authority, CPA = Critically Polluted Areas, DOF = Department of Forests, EIA = Environmental Impact Assessment, MoEF&CC = Ministry of Environment, Forest, and Climate Change, NEP = National Environment Policy, NGT = National Green Tribunal, SEIAA = State Level Environmental Impact Assessment Authority, SPCB = state level pollution control board, UPCB = Uttarakhand Pollution Control Board, UPCL = Uttarakhand Power Corporation Limited

Source: ADB TA Consultant

B. Applicable International Agreements

25. International agreements pertinent to the distribution component include multilateral environmental agreements (MEA) and conventions of the International Labor Organization (ILO) related to worker safety and welfare. India is a party and signatory to several international and regional environmental treaties, agreements, and conventions, to which the MoEF&CC is the national focal point. Table 3.2 provides the key international agreements that India is a signatory with potential applicability to the distribution component. Of note, in relation to the occupational health and safety of labour, India is not a signatory to Occupational Health and Safety Convention of the ILO and several other ILO conventions related to the health and safety of workers.[5]

Table 3.2. List of Relevant International Agreements

Sl. No.	Name	Date of Ratification	Applicability	Remarks
1	Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 1971	1 February 1982	No substation is within 10km of the Ramsar Asan Conservation Reserve site (located in Dehradun district). The nearest substation Rudrapur is 17.5 km	Deals with conservation and sustainable use of wetlands
2	Convention for the Protection of the World Cultural and Natural Heritage, 1972	14 December 1977	Two UNESCO World Heritage Site is present in Uttarakhand: i. Nanda Devi National Park (nearest substation Sairaghat is about 50km) and ii. Valley of Flowers (nearest substation Sairaghat is about 200km.	Addresses nature conservation and preservation of cultural properties
3	Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973	20 July 1976	Risk of illegal wildlife activities by workers outside of working hours.	Deals with protection of endangered species from illegal trade
4	Convention on the Conservation of Migratory Species of Wild Animals, 1979	1 November 1983	The risk of hunting or poaching of migratory	Aims to conserve migratory species in their range

[5] https://www.ilo.org/dyn/normlex/en/f?p=1000:11210:0::NO:11210:P11210_COUNTRY_ID:102691

Sl. No.	Name	Date of Ratification	Applicability	Remarks
			species by the workers to also be addressed.	
5	Basel Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989	24 June 1992	Not applicable as the treaty regulates the movement of hazardous waste between countries	India has hazardous waste facilities so transboundary movement is unlikely
6	Convention For the Protection of the Ozone Layer, 1985	18 March 1991	Servicing and refilling of fire extinguishers and air conditioning during construction and operation, ensure that use of ozone depleting substances is prohibited	Lists the various ozone depleting substances and steps for reducing their production
7	Montreal Protocol on Substances That Deplete the Ozone Layer, 1987	19 June 1992		
8	Rio de Janeiro Convention on Biological Diversity, 1992	18 February 1994	Not applicable as renovations will be limited to existing substation areas. No loss of natural flora due to tree felling is envisaged	Deals with biodiversity conservation, sustainable usage of natural resources and habitat preservation.
9	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998	24 May 2005	Transformers and other equipment procured must be PCB free. Usage of PCBs in transformers and other equipment procured will be prohibited as per the Regulation of Polychlorinated Biphenyls Order, 2016	Promotes the sharing of responsibilities related to import of hazardous chemicals including PCBs.
10	United Nations Framework Convention on Climate Change, 1992	1 November 1993	It is applicable as Sulphur Hexafluoride (SF6) is present in gas insulated circuit breakers in Sahastradhara, Hathibarakala, Rudrapur, Lamgarah, Sairaghat, Pines and Talla Ramgarh substations. The gas has possibly escaped at the Pines substation. It stands in the yard of the substation for the last 10 years. New circuit breakers may also contain SF6 although solid dielectric (Hydrophobic Cycloaliphatic Epoxy (HCEP)) can be used in place of SF6 gas as an insulating medium.	Deals with reductions of greenhouse gases (GHG) to achieve 1.5°C target.
11	Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997	19 August 2002		
12	Paris Agreement under the United Nations Framework Convention on Climate Change, 2015	2 October 2016		

Sl. No.	Name	Date of Ratification	Applicability	Remarks
13	Stockholm Convention on Persistent Organic Pollutants, 2001	13 January 2006	Transformers and other equipment procured must be PCB free. Existing transformers and other oil containing equipment may be contaminated with PCBs which must be removed by 31st December 2025 to comply with the Stockholm Convention	Lists PCBs as one of the pollutants. Implemented in India in part by the Regulation of PCBs Order, 2016.
14	International Labor Organization (ILO) Fundamental Conventions:[6] Forced Labor, Equal Renumeration, Abolition of Forced Labor, Minimum Age, Worst Forms of Child Labor	30 November 1954 25 September 1958 18 May 2000 13 June 2017	Construction and operation will involve workers whose fundamental rights per the ILO need to be protected.	Labor laws of India are compliant to the ILO conventions that India is a signatory of.

GHG = greenhouse gas, ILO = International Labor Organization, PCB = polychlorinated biphenyl
Source: ADB TA Consultant

C. Borrower's Environment and Social Policies

26. UPCL have limited exposure to and experience with the implementation of multilateral bank safeguard requirements. UPCL do not have an environmental and social policy. Presently UPCL does not have a designated safeguard unit or health and safety division or staff. It does have a company safety manual. The engineers responsible for the substations at the sites perform addtional duties of Safety Officers required by the CEA regulations.

D. Asian Development Bank's Safeguards Policies

27. The ADB Safeguard Policy Statement, 2009 (SPS 2009)[7] broadly consists of three policy components: (i) Environment Safeguards, (ii) Involuntary Resettlement Safeguards, and (iii) Indigenous People Safeguards. The objectives of Environment Safeguards principle are to (i) avoid adverse impacts of projects on the environment and affected people, where possible; (ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

28. Under SPS 2009 projects are categorized A, B, C according to the likely significance of impacts:

(i) Category A: Projects with potential for significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

(ii) Category B: Project with some adverse impacts, but of lesser degree and / or significance than category A. These impacts are site-specific, few if any of them

[6] https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102691
[7] https://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf

are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

(iii) Category C: Projects that are likely to have minimal or no adverse impacts. No EIA or IEE required, although environmental implications are still reviewed.

29. The upgradation and modernization of the 25 substations, included under the distribution component will follow national as well as international good practice guidelines related to environment, health and safety including those set out in the:

(i) IFC Environmental, Health, and Safety General Guidelines, 30 April 2007
(ii) IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, April 2007
(iii) International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for Limiting Exposure to time-varying Electric, Magnetic, and Electromagnetic Fields (UP TO 300 GHz)

30. Section 4 on Construction and Decommissioning of the IFC EHS General Guidelines (30 April 2007) will be applicable for the substation renovations under distribution component. In addition, the IFC EHS Guidelines for Electric Power Transmission and Distribution (30 April 2007) also needs to be considered while designing the substations and undertaking the environmental assessment. It requires consideration of terrestrial and aquatic habitat alteration, electric and magnetic fields, hazardous materials, occupational health and safety and community health and safety. The project is required to comply with these guidelines regarding assessment of potential impacts and management measures, performance indicators and monitoring guidelines. UPCL shall follow the IFC EHS Guidelines for this project and shall also ensure that all appointed contractors and their subcontractors follow them.

31. The applicable international good practice standards and guidelines from the above-mentioned guidelines are set out in IEE**.** Where international good practice standards or guidelines are more stringent than national, it is the most stringent that applies unless otherwise justified in the IEE report.

32. ADB's prohibited investment activities list will also apply. Thus, any use of CFCs, PCBs, and asbestos containing materials will be prohibited. In relation to child labor, considering capacity for supervision, no workers under 18s will be permitted to work on the construction site or operational areas due to the hazardous nature of work involved.

IV. AUDIT FINDINGS

33. The environmental audit focused on the 25 existing 33/11kV substations earmarked under the project. Since it is proposed to upgrade the existing substations as per ADB Safeguard Policy Statement (2009) these qualify as existing facilities requiring an environmental audit. The Audit Checklist template is provided in **Annexure 2** along with a sample filled in.

A. Substation Baseline Setting

i. Biological

34. Twelve percent of total geographical area in the Uttarakhand state are protected areas which includes 6 National Park, 7 Wildlife Sanctuary, 4 Conservation Reserve and 1 Biosphere Reserve[8]. National Parks (NP) in Uttarakhand include the Corbett National Park in Nainital District, and Valley of Flowers National Park and Nanda Devi National Park in Chamoli District, which together are a UNESCO World Heritage Site. Several plant species in the valley are threatened, including several endemic species not recorded from elsewhere in Uttarakhand. Rajaji National Park in Haridwar District and Govind Pashu Vihar National Park and Sanctuary and Gangotri National Park in Uttarkashi District are some other protected areas in the state.

35. According to scientific studies in the state 102 mammals, 600 of birds, 19 amphibians, 70 reptiles and 124 species of fish are found. In these above-mentioned species, there are globally endangered species which consists of Leopard (Panth*era pardus*), Asian elephant (*Elephus maximus*), tiger (*Panthera tigers*), snow leopard (*Panthera uncial*), Musk deer (*Moschus chrysogaster*), Monal (*Lophophorus impejanus*) etc.

36. Details of the protected areas in reference to substation baseline is provided in the Table 4.1.

[8] https://www.forest.uk.gov.in/wildlife-management

Table 4.1 Summary of Protected Areas

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Corbett National Park	Kashipur - 9km (SS is in ESZ buffer zone of 10km since this is not yet notified)	Protected Areas as National Park	Category II as per IUCN criteria[14]	A1 Sociable Lapwing *Vanellus gregarious* (CR); White-rumped Vulture *Gyps bengalensis* (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	A1 KBA due to IBA status	Yes, as this fulfils IUCN category II protected area criterion	*Panthera tigris*, *Panthera pardus*, *Elephas maximus*, *Cervus unicolor*, *Axis axis*, *Axis porcinus*, *Muntiacus muntjak*, *Sus scrofa*, *Canis aureus*
Nanda Devi National	None within 10km	Protected Areas	Category II as National Park and Category	-	A1	Yes, as this fulfils IUCN category II	*Panthera uncia*, *Ursus thibetanus*, *Ursus arctos*,

- [9] The IBAs serve as conservation areas for protection of birds at the global, regional or sub-regional level. According to Birdlife International, designation of IBAs is based on standardized criteria, namely (i) hold significant numbers of one or more globally threatened bird species, (ii) be one of a set of sites that together hold a suite of restricted-range species or biome-restricted species and (iii) have exceptionally large numbers of migratory or congregatory birds.
- [10] IBA Criteria: A1. Globally threatened species; A2. Restricted-range species-Criterion: The site is known or thought to hold a significant population of at least two range-restricted species; A3. Biome-restricted species- Criterion: The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome-realm; A4. Congregations- Criterion: The site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis.
- [11] The KBAs is an umbrella term commonly used to include areas that contribute to the global persistence of biodiversity, including vital habitat for threatened plant and animal species in terrestrial, freshwater and marine ecosystems.
- [12] KBA Criteria: A1. Threatened species; A2. Threatened ecosystem types; B1: Individual geographically restricted species; B2: Co-occurring geographically restricted species ; B3: Geographically restricted assemblages ; B4: Geographically restricted ecosystem types.; C. Ecological integrity; D1: Demographic aggregations; D2: Ecological refugia; D3: Recruitment sources; E. Irreplaceability through quantitative analysis
- [13] http://www.wiienvis.nic.in/Database/Key_Biodiversity_Areas_8647.aspx
- [14] IUCN. 1990. IUCN Directory of South Asian Protected Areas. IUCN, Gland, Switzerland and Cambridge, U.K. xxiv + 294 pp.
- https://wedocs.unep.org/bitstream/handle/20.500.11822/8084/IUCN_directory_South_Asian_Protected_Areas.pdf?sequence=3&isAllowed=y

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[910]	Key Biodiversity Areas (KBA)[11] [1213]	Critical Habitat as a Protected Area	Key/Threatened Species
Park and ESZ		as National Park	X as per IUCN criteria as World Heritage Site			protected area criterion and as internationally or nationally recognized areas of high biodiversity value that are explicitly mentioned within GN6, such as UNESCO natural World Heritage sites and Wetlands of International Importance under the Ramsar Convention	*Moschus chrysogaster*, *Pseudois nayaur*, *Hemitragus jemlahicus*
Valley of Flowers National Park	None within 10km	Protected Areas as National Park	Category II as per IUCN criteria	A1 Yellow-rumped Honeyguide *Indicator xanthonotus*	A1 KBA due to IBA status	Yes, as this fulfils IUCN category II protected area criterion and as i nternationally	*Moschus chrysogaster*, *Nemorhaedus sumatraensis*, *Hemitragus jemlahicus*, *Ursus thibetanus*, *Pseudois nayaur*,

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
						or nationally recognized areas of high biodiversity value that are explicitly mentioned within GN6, such as UNESCO natural World Heritage sites and Wetlands of International Importance under the Ramsar Convention	*Ochotona roylei*, *Mustela sibirica*.
Rajaji National Park	Lal Tappar – 3.5km (SS is in ESZ buffer zone of 10km since this is not yet notified)	Protected Areas as National Park	Category II as per IUCN criteria	A1 White-rumped Vulture *Gyps bengalensis* (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	A1 KBA due to IBA status	Yes, as this fulfils IUCN category II protected area criterion	*Elephas maximus*, *Panthera tigris, Panthera pardus*, *Axis axis*, *Cervus unicol Boselaphus tragocamelus*, *Nemorhaedus goral*.
Gangotri National	None within 10km	Protected Areas	Not categorized	A1, A2	A1	No	*Moschus chrysogaster, Pseudois nayaur,*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Park and ESZ		as National Park	yet but considered as Category II as per IUCN criteria	Common Hill Partridge *Arborophila torqueola*, Kaleej Pheasant *Lophura leucomelanos*, Koklass Pheasant *Pucrasia macrolopha*, Monal Pheasant, and Himalayan Snowcock *Tetraogallus himalayensis*	KBA due to IBA status		*Naemorhedus goral*, *Cervus unicolor*, *Capricornis sumatraensis*, *Hemitragus jemlahicus*.
Govind National Park	None within 10km	Protected Areas as National Park	Not categorized yet but considered as Category II as per IUCN criteria	A1	A1 KBA due to IBA status	No	*Panthera uncia*
Govind Pashu Vihar WLS		Protected Areas as WLS	Not Category IV as per IUCN criteria	A1	A1 KBA due to IBA status	No	*Panthera uncia*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Kedarnath WLS	None within 10km	Protected Areas as WLS	Category IV as per IUCN criteria	A1, A2, A3 Cheer pheasant *Catreus wallichii*, (VU)	KBA due to IBA status	No	*Moschus chrysogaster*
Askot Musk Deer WLS	None within 10km	Protected Areas as WLS	Category IV as per IUCN criteria	A1, A2 globally threatened Cheer pheasant *Catreus wallichii*	KBA due to IBA status	Yes	*Moschus chrysogaster*, *Uncia uncia*, *Hemitragus jemlahicus*, *Pseudois nayaur*, *Nemorhaedus goral*, *Nemorhaedus sumatraensis*, *Ursus thibetanus*, *Ursus arctos*.
Sonanadi WLS	None within 10km	Protected Areas as WLS	Category IV as per IUCN criteria	A1 White-rumped Vulture *Gyps bengalensis* (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	KBA due to IBA status		*Elephas maximus*, *Panthera tigris*, *Panthera pardus*, *Cervus unicolor*, *Axis axis*, *Muntiacus muntjak*, *Boselaphus tragocamelus*, *Sus scrofa*, *Melursus ursinus*
Binsar WLS	Sairaghat - 2.5km (SS in notified ESZ)	Protected Areas as WLS	Category IV as per IUCN criteria	A3 Fork-tail *Surniculus dicruroides*	KBA due to IBA status	No	*Panthera pardus*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Mussoorie WLS	None within 10km	Protected Areas as WLS	Not categorized yet but considered as Category IV as per IUCN criteria	-	-	No	*Panthera pardus*
Nandhaur/Nandhour WLS and ESZ	None within 10km	Protected Areas as WLS	Not categorized yet but considered as Category IV as per IUCN criteria	A1 Red-headed Vulture *Sarcogyps calvus* (CR); White-rumped Vulture *Gyps bengalensis* (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	KBA due to IBA status	No	*Panthera tigris*, *Panthera pardus*
Jhilmil Jheel Conservation Reserve	None within 10km	Protected Areas as Conservation Reserve	Not categorized yet but considered as Category VI as per IUCN criteria	A1 White-rumped Vulture *Gyps bengalensis*	KBA due to IBA status	Yes due to presence of White-rumped Vulture *Gyps bengalensis* (CR)	*Rucervus duvaucelii*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Aasan Wetland Conservation Reserve	None within 10km	Protected Areas as Conservation Reserve	Ramsar wetland as Wetland of International Importance	A1, A4 nesting site of the Vulnerable Pallas's Fishing Eagle *Haliaeetus leucoryphus*	KBA due to IBA status	Yes as Internationally or nationally recognized areas of high biodiversity value that are explicitly mentioned within GN6, such as UNESCO natural World Heritage sites and Wetlands of International Importance under the Ramsar Convention	*Gyps bengalensis, Aythya baeri; Neophron percnopterus, Aquila nipalensis, Sterna acuticauda, Marmaronetta angustirostris, Aythya ferina, Clanga hastata*
Pawalgarh Conservation Reserve	None within 10km	Protected Areas as Conservation Reserve	Not categorized yet but considered as Category VI as per IUCN criteria	A1 Red-headed Vulture *Sarcogyps calvus* (CR); (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	KBA due to IBA status		*Panthera tigris*, *Panthera pardus*, *Elephas maximus*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[9][10]	Key Biodiversity Areas (KBA)[11] [12][13]	Critical Habitat as a Protected Area	Key/Threatened Species
Naina Devi Himalayan Bird Conservation Reserve	None within 10km	Protected Areas as Conservation Reserve	Not categorized yet but considered as Category VI as per IUCN criteria	A1 Himalayan Quail *Ophrysia superciliosa* (CR); Red-headed Vulture *Sarcogyps calvus* (CR); White-rumped Vulture *Gyps bengalensis* (CR); Slender-billed Vulture *Gyps tenuirostris* (CR)	KBA due to IBA status		*Catreus wallichii*, *Neophron percnopterus*, *Clanga clanga*, *Aquila heliaca*, *Prinia cinereocapilla*
Nanda Devi Biosphere Reserve	None within 10km	Protected Areas as Biosphere Reserve	Not categorized yet but considered as Category IX as per IUCN criteria	A1, A2 Cheer Pheasant *Catreus wallichii* (VU)	KBA due to IBA status	No	*Uncia uncia*, *Pseudois nayaur*, *Moschus Hemitragus jemlahicus*
Upper Pindar Catchment	None within 10km	Protected as	Not categorized yet but	A1, A2, A3 Cheer Pheasant *Catr*	KBA due to IBA status	No	*Lophophorus impejanus,*

Name	Nearest Substations from PA	National Status	IUCN Protected Area Level/ Ramsar Criteria	Important Bird Areas (IBA) Criteria[910]	Key Biodiversity Areas (KBA)[11] [1213]	Critical Habitat as a Protected Area	Key/Threatened Species
in East Almora Forest Division		recognised KBA	considered as Category VI as per IUCN criteria	*eus wallichii* (VU)			*Ophrysia superciliosa, Sarcogyps calvus*

WLS = Wildlife Sanctuary.
Source: ADB TA Consultant

37. In Uttarakhand a total of 42 wetlands have been prioritized at state level for conservation based on set parameters. They are as follows - Bara-Dhara Sem, Basuki Tal, Bharadhsar, Devtal, Dodital, Kana Tal, Kanasar, Kedar Tal, Khera Tal (West), Kush Kalyan Kund, Maldaru Tal, Manera Tal, Miali Tal, Nandi Kund, Parvati Kund, Rwesara Tal (Runisara), Satopanth Tal, Thamri Tal, Vasundhara Tal, Tehri Dam, Nanak Sagar, Tumaria, Bagul Dam, Bour Dam, Dhora Dam, Haripura Dam, Sharda Barrage, Jhilmil Jheel, Asan Barrage, Virbhadra Barrage, Dakpathar, Banbasa Barrage, Tadag Tal, Nainital, Bhim Tal, Naukuchia Tal, Sat Tal, Kosi Barrage, Khurpatal, Asan near Kunja Village, Garud Tal and Shymla Tal.

38. As per IUCN Red List of Threatened Species, Uttarakhand supports definite critical habitat for one plant species, *Nardostachys jatamansi* (Indian Nard) and ten animal species - *Batagur dhongoka* (Three-striped Roofed Turtle), *Indotestudo elongate* (Elongated Tortise), *Emberiza aureola* (Yellow-breasted Bunting), *Ophrysia superciliosa* (Himalayn Quail), *Houbaropsis bengalensis* (Bengal Florican), *Vanellus gregarious* (Sociable Lapwing), *Gyps bengalensis* (White-rumped Vulture), *Sarcogyps calvus* (Red-headed Vulture) and *Gyps tenuirostris* (Slender-billed Vulture).

39. No critical habitat species are likely to be encountered at the substations, all of which are on modified habitat. The wildlife that will be disturbed within the substations will mostly be common, small fauna none of which are threatened species. The check for presence and absence of species is included on a precautionary basis as individuals of these threatened species may occasionally be encountered (especially vultures) in modified habitat near or inside the substation as informed by staff.

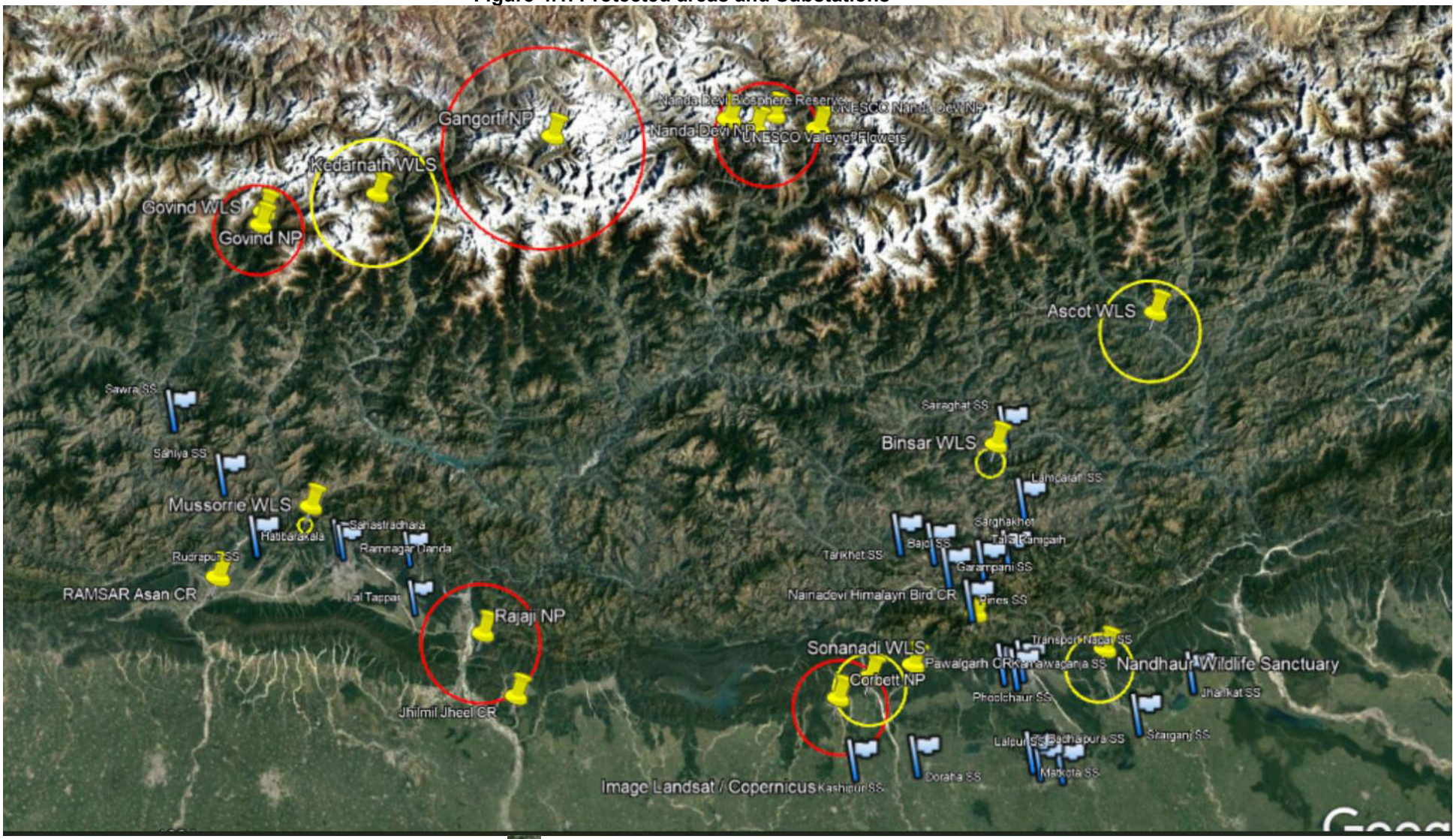
40. The ADB TA consultant had visited 25 substations, spanning four districts. IBAT analysis was undertaken for each of the substations besides undertaking a survey of the flora and fauna within these sites during audit.[15] IBAT analysis has captured the floral and faunal species potentially found within a 50 km radius of the substations IBAT has recorded the presence of 1 CR, 1 EN and 3 VU floral species, and 11 CR, 21 EN and 38 VU faunal species in the 50 km radius of the substations. Some of the species listed by the IBAT assessment are also protected and covered under the schedules of Indian Wildlife Act. Some of the endemic species found in the neighbouring states of Himachal Pradesh and Uttar Pradesh and in the People's Republic of China and Nepal or species not normally observed in the state may also have been recorded. Thus, the data cannot be presumed to be entirely correct, and the species found within the radius may not be implied to be found within the state.

41. Within a 10 km project area of influence (PAI) around the 25 existing substations, Sairaghat is the closest to a legally protected area Binjar WLS at 2.5km, whereas the Lal Tappar substation is 3.5km from Rajani National Park. Hatibarakal substation is 1.5 km away from state protected Forest Research Institute (FRI) Key Biodiversity Area (FRI KBA) and Sahastradhara substation is 2km from the FRI KBA. The protected area (PA) along with audited substations is

[15] IBAT is a multi-institutional programme of work involving BirdLife International, Conservation International, IUCN and UNEP-WCMC. IBAT provides a basic risk screening on biodiversity. It draws together information on globally recognised biodiversity information drawn from a number of IUCN's Knowledge Products: IUCN Red List of Threatened Species, Key Biodiversity Areas (priority sites for conservation) and Protected Planet / The World Database on Protected Areas (covering nationally and internationally recognised sites, including IUCN management categories I–VI, Ramsar Wetlands of International Importance and World Heritage sites).

shown in Figure 4.1, while the IBAT run maps of the substations closest to notified protected areas are given in Figure 4.2.

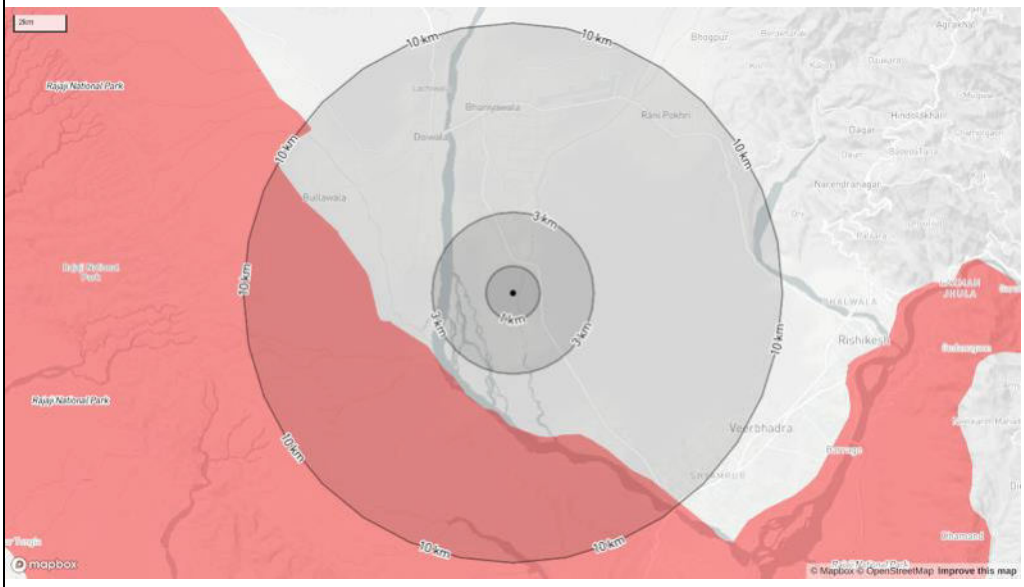
Figure 4.1. Protected areas and Substations

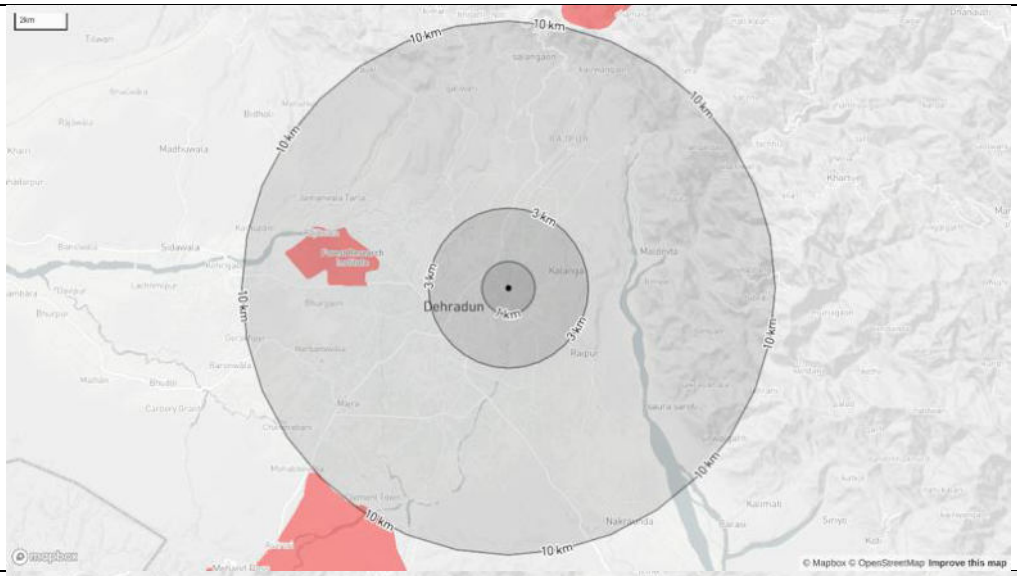
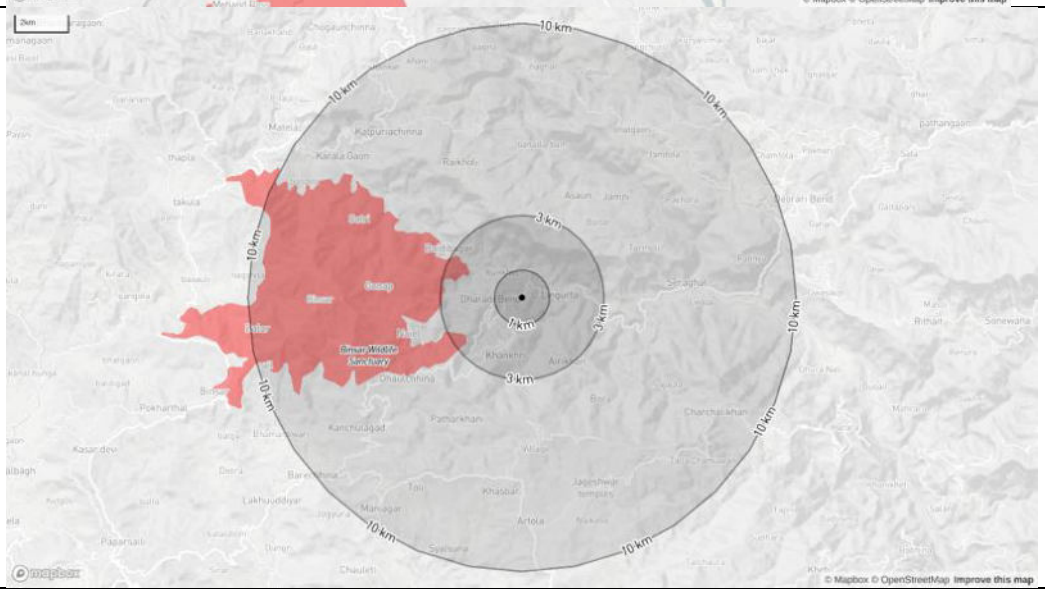


National Park Wildlife Sanctuary Substations

NP: National Park; WLS: Wildlife Sanctuary; CR: Conservation Reserve; SS: Substations; UNESCO: United Nations Educational, Scientific and Cultural Organisation
Source: ADB TA Consultant

Figure 4.2. IBAT Screening Map of Substations near Protected Areas

Substation	Proximity Map	PA
Lal Tappar		Rajaji National Park, Dehradun at 3.5km
Hatibarakala		Forest Research Institute (KBA), Dehradun at 1.5km

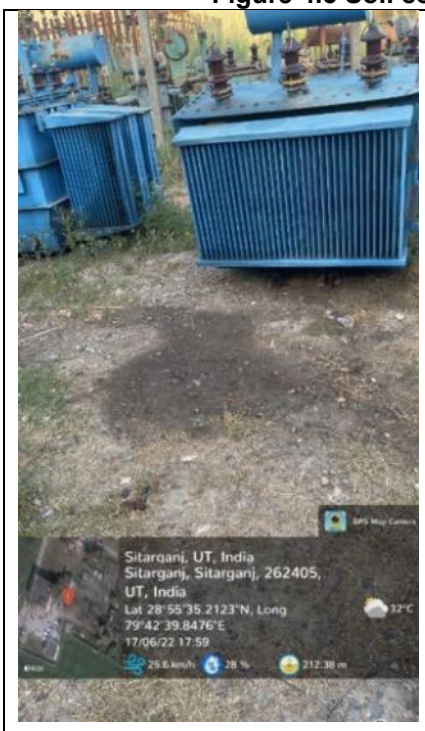
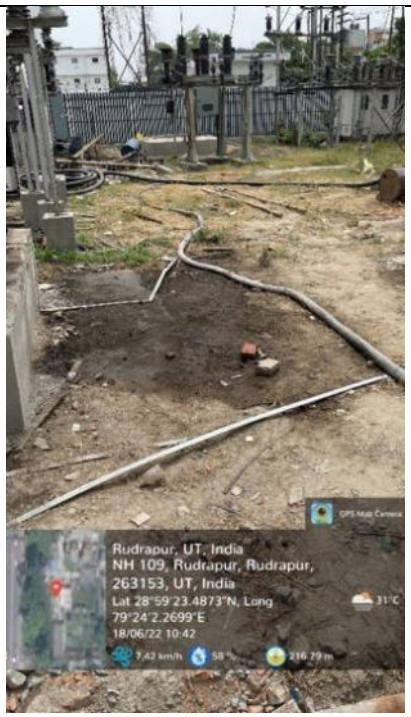
Sahastradhara		Forest Research Institute (KBA), Dehradun at 2km
Sairaghat		Binsar Wildlife Sanctuary (KBA), Almora at 2.5km
No PA with 50km were recorded by IBAT for the remining 21 substation		

Source: ADB TA Consultant

ii. Physical

42. Soil conditions at the 25 existing substations were similar with some degree of contamination of oil from spillage/leaks in one or more spots, mostly under the transformers. Maximum contamination was observed at Lalpur and Sitargang substations. Defunct, to be repaired, old and new equipment, meters, cables and parts were scattered inside the compounds of most of the substations. The Ramnagar Danda substation is recently repair and renovated and was the one with minimal soil contamination and waste/materail storage. Representative images provded in Figure 4.3.

Figure 4.3 Soil contamination in substations

	
Sitarganj substation	Matkota substation

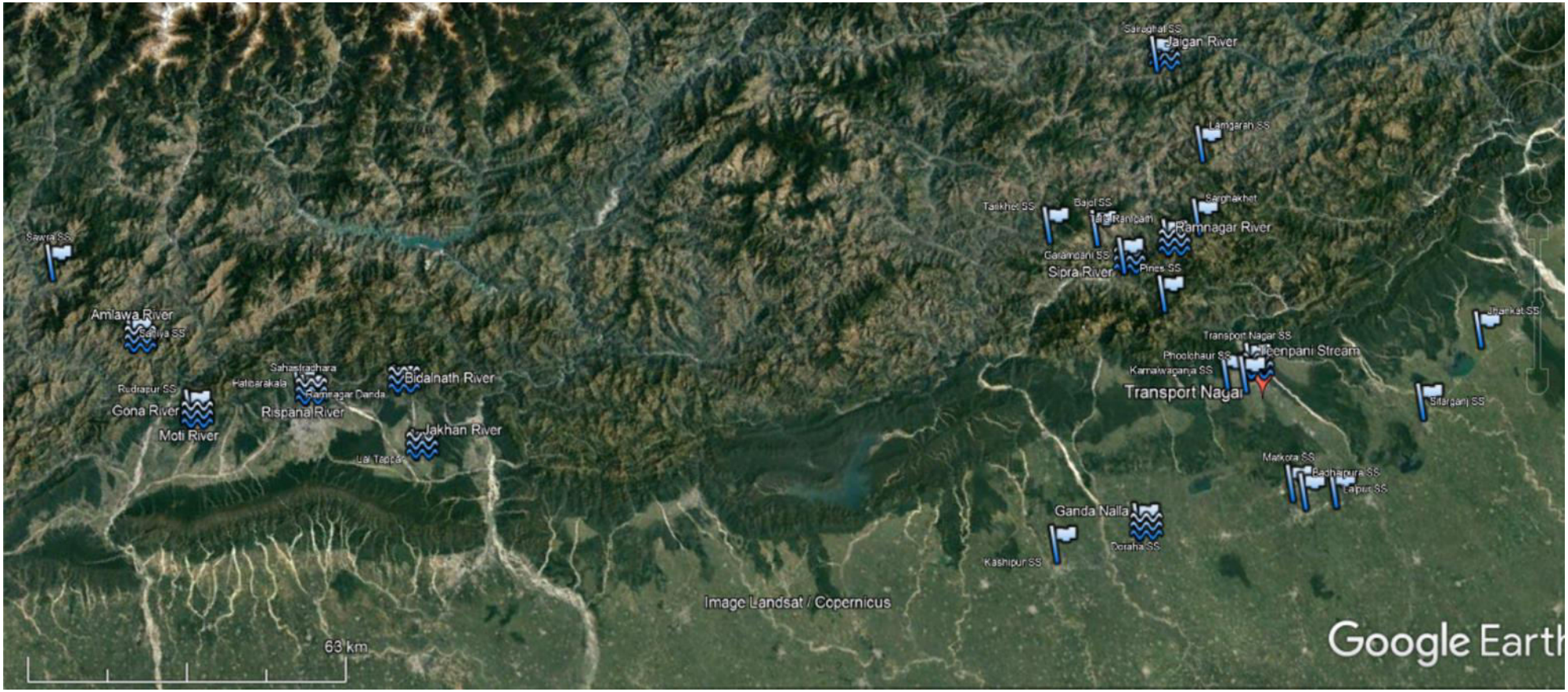
Source: ADB TA Consultant

43. Standing water was not observed in any of the substations.

44. No ponds are located within the 500m of Shashtradhara, Hatibarakala, Sahiya, Sawra, Rudrapur, Ramnagar Danda, Lal Thappar, Tarikhet, Bajol, Lamgarah, Sairaghat, Kamalwaganja, Transport Nagar, Phoolchaur, Talla Ramgarh, Sarghakhet, Pines, Matkota, Jhankat, substations. Ponds are located 140m from Badhaipura substation; 200m from Lalpur substation; 180m, 330m and 420m from Sitarganj substation; 55m, 100m (Drona Sagar Lake), 400m from Kashipur substation; and 410m from Doraha substation.

45. Rivers / streams are located close to 13 substations. Sahastradhara substation has Rispana River at 70m. Amlawa River is 60m from the Sahiya substation. Rudrapur substation is 0m (flood plain) to Gona River and 100m to Moti River. Ramnagar Danda substation is 400m to Bidalnath River. Lal Tappar substation is 140m to Jakhan River. Patli River is 300m from Bajol substation. Sairaghat substation is 500m from Jaigan River. Teenpani Stream is flowing adjacent (0m) to Transport Nagar substation. Garampani substation is 0m to Sipra River. Talla Ramnarh is 10m from the Ramnagar River The Ganda Nalla (stream) is at 100m from the Doraha substation. Rainfed streams passes along the boundary of Matkota, Jhankat and Lalpur substation. Nearest major rivers/streams are shown in Figure 4.4 and Figure 4.5.

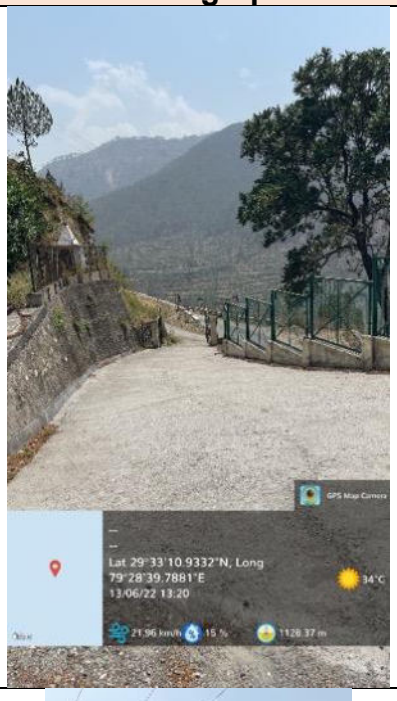
Figure 4.4 Map showing substation and water bodies

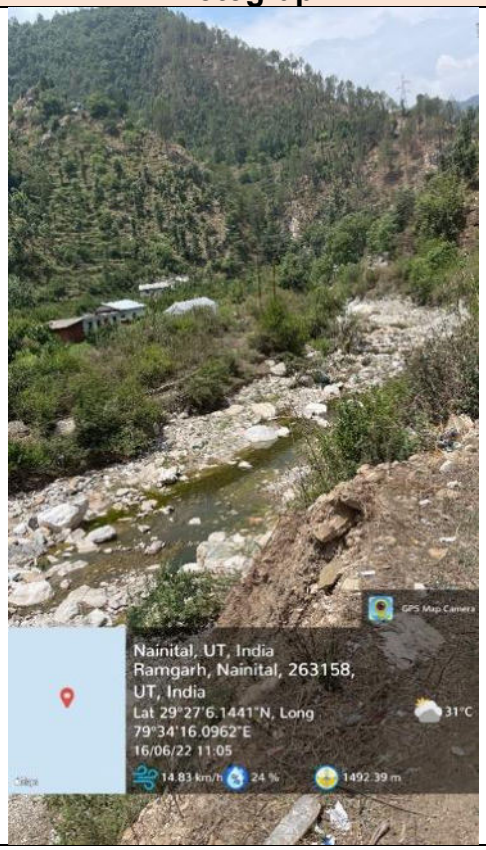


Source: ADB TA Consultant

Figure 4.5 Representative Substations in River Valley

Substation	Map	Photograph
Sahiya		
Rudrapur		

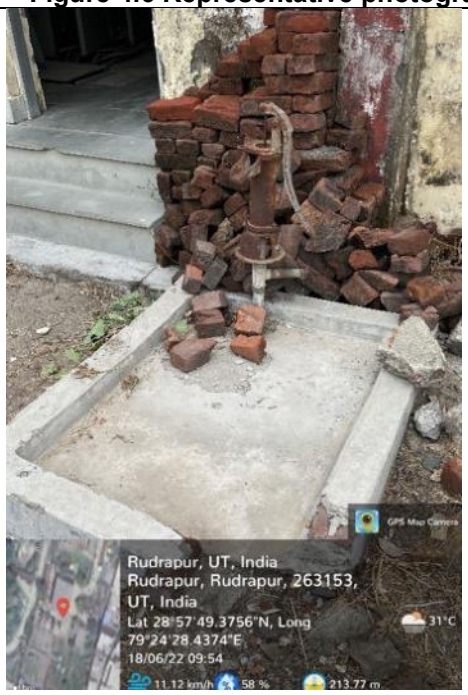
Substation	Map	Photograph
Bajol		
Garampani		

Substation	Map	Photograph
Talla Ramgarh		

Source: ADB TA Consultant

46. Bore wells are located within the substation compound of Matkota, Badhaipura, Lalpur, Jhankat, Kashipur and Doraha substation. Bore wells and handpumps are available in most of the rural areas around the substations in the plain areas. Handpumps are located in common areas such near residential colonies, schools, etc. Handpumps are also available in many of the individual houses in the Nainital district plan lands and US Nagar district. Status of ground water sources inside substations is shown in Figure 4.6.

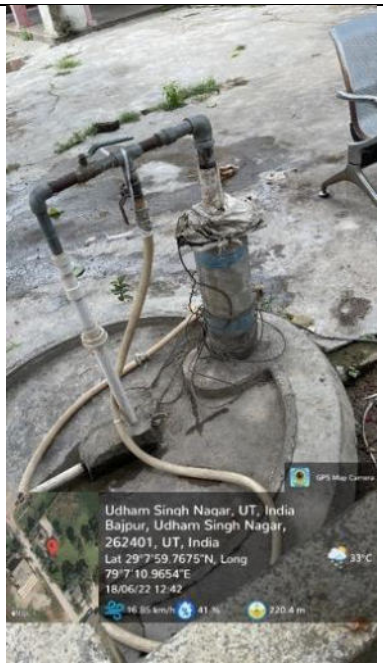
Figure 4.6 Representative photographs of ground water source within substation



Badhaipura substation

Lalpur substation

Kashipur substation



Doraha substation

Source: ADB TA Consultant

47. Neglibible to low magnitude of dust suspension was observed in most of the susbations and on access roads in rural and hilly areas, mainly due to wind blown open soil. In the urban areas, suspended dust, noise and vehicle emissions were observed to be moderate to high along access roads and within Kamalwaganja, Badhaipura, Transport Nagar and Kashipur substations. Transformer hum was audible (monitored during environmental audit using mobile app) in some cases from nearly 3 meters and ranged between 43 dB(A) to 67 dB(A).

iii. Socio-Economic

48. Uttarakhand is one of the most recent states on the political map of India (November 2000) and due to its geographic and strategic location, it has been given 'Special Category Status' by 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 namely, Almora, Bageshwar, Chamoli, Champawat, Dehradun, Haridwar, Nainital, Pauri Garhwal, Pithoragarh, Rudraprayag, Tehri Garhwal, Udham Singh Nagar and Uttarkashi. Summary features are provided below and detailed in the IEE (Chapter IV).

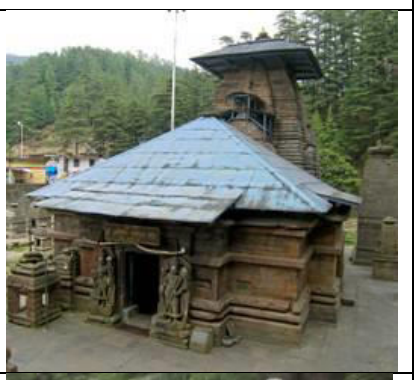
- Geographically Uttarakhand is situated between 770 34' to 810 2' East longitude and 280 4' to 310 27' North latitude.
- Uttarakhand is predominantly a hilly state with 88% of hilly area.
- Total area of Uttarakhand is 53,483 sq. km, which is 1.73% of the total area of India.

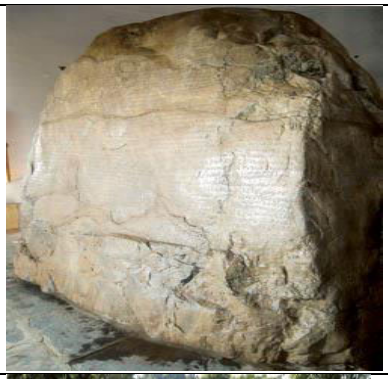
- The state is very rich in natural resources specially forest and water, as it has many glaciers, dense forests, mountain peaks and a network of mighty rivers viz., Ganga, Yamuna, Ramganga, Kosi etc.
- A total of 64.6% of the area is under forest cover.
- The population of Uttarakhand as per Census 2011, is of 1.01 Crores, an increase from figure of 84.89 Lakh in 2001 census.
- Total population of Uttarakhand as per 2011 census is 10,086,292 of which male and female are 5,137,773 and 4,948,519 respectively.
- Total area of Uttarakhand is 53,483 sq. km. Density of Uttarakhand is 189 per sq km which is lower than national average 382 per sq. km. In 2001, density of Uttarakhand was 159 per sq km, while nation average in 2001 was 324 per sq. km
- Sex Ratio in Uttarakhand is 963 i.e. for each 1000 male, which is below national average of 943 as per census 2011. In 2001, the sex ratio of female was 962 per 1000 males in Uttarakhand.
- As per Census 2011, Uttarakhand has slight increase in the literacy rate of 78.82 % compared to that of Census 2001. Male literacy rate is 87.40 % and that of Female is 70.01 %.
- The work participation (WPR) rate in Uttarakhand is 38.39%. The WPR of males (49.67%) are higher than women (26.68%).
- The Census 2011 further classifies the workers (both main and marginal) into four categories namely cultivators, agricultural laborers, household industries and other workers. The categorisation of the workers revealed that there was a declining share of the cultivators and agricultural labour but increasing share of other type of worker.

iv. Physical-Cultural Resources (PCR)

- Temples are located within the substation compound of Tarikhet, Bajol, Garampani, Sitarganj, Kashipur and Doraha substation. These are built by UPCL and seldom used by locals, although that inside the Kashipur substation is regularly visited by locals.
- Temples are located within 0m of Lamgarah, 2m of Badhaipura, 3m of Ramnagar Danda and Kamlwaganja, 50m of Matkota, 80m of Jhankat, 100m of Garmpani, 125m of Transport Nagar and 250m of Rudrapur substation.
- A mosque is located at 100m from Lalpur substation.
- A Hindu Crematorium is located adjacent (2m) to the Sahastradhara substation.
- The Drona Sagar Historical Area, consisting of a Lake, palace and temple is near Kashipur substation. The important paleotological and excavted sites are summarized below in Table 4.2. The location of Drona Sagar and Kashipur substation is provided in Figure 4.6, wheras as the other important physicial-cultural resouces are mapped in the Figure 4.7.

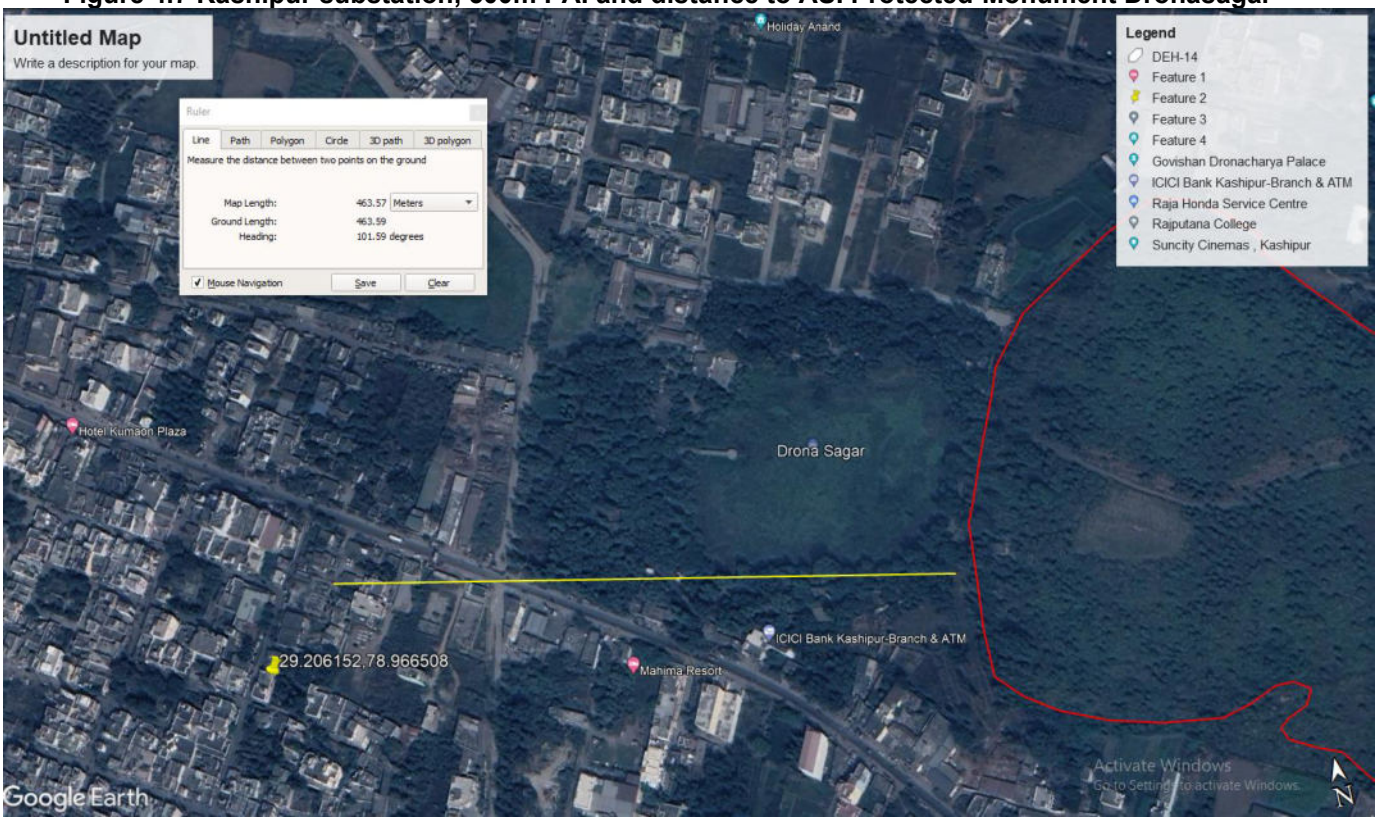
Table 4.2 Substations and ASI Notified sites (upto 10km)

Name	Location	Nearest Substation	Distance	Photograph
Excavated Site At Dronasagar (Mauza Ujjan Kashipur) NOTIFICATION NO.: F.04/1/70-CAI (1), 1970 (Preliminary)/-/31.10.1970	29°12'24.85"N 78°58'13.62"E	Kasipur	450m as confirmed by ASI during consultations	
KALINGA MONUMENTS (KARANPUR), SHASTRADHARA ROAD Notification No & Date; UP-1645-M/1133:22-12-192	30°20'12.08"N 78° 4'3.45"E	Sahastradhara	500m	
PHULAI GUNTH Multiple Temples NOTIFICATION NO.: 896-M/367-28:20/28-05-1915	29°39'18.27"N 79°51'20.65"E	Sairaghat	5.5 Km	
NANDA DEVI OR NAU DURGA NOTIFICATION NO.: 896-M/367-28:20/28-05-1915	29°38'26.80"N 79°51'16.13"E	Sairaghat	7km	

THE INSCRIBED ROCK EDICT OF ASOKA (KALSI NOTIFICATION NO.: UP-3119-M/367 :23-11-1909	30°31'4.51"N 77°50'53.44"E	Rudrapur	8km	
ANCIENT SITE (JAGATGRAM), BADHWALA	30°29'45.30"N 77°49'34.49"E	Rudrapur	6.4km	

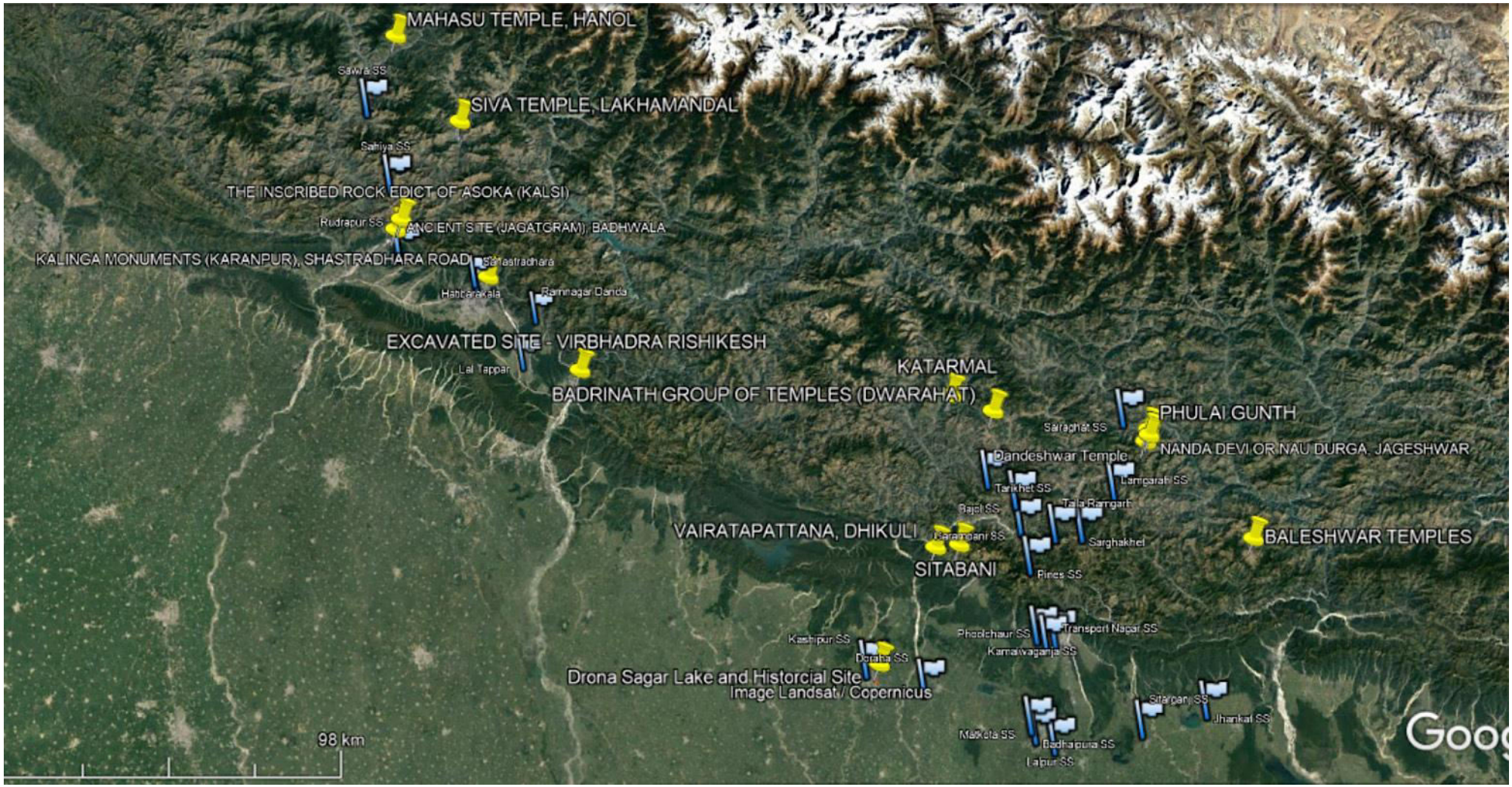
Source: ASI and ADB TA Consultant

Figure 4.7 Kashipur substation, 500m PAI and distance to ASI Protected Monument Dronasagar



Source: ADB TA Consultant

Figure 4.8 PCR and Substations



Source: ADB TA Consultant

B. Substation EHS Compliance Audit findings

49. Positives identified based on the environmental audit include:

- All substations being are located on UPCL land
- Most of the substations are adequately fenced and gated
- No asbestos containing materials (ACMs) were recorded in the audited substations based on visual inspection. UPCL officials informed that they were not aware of ACMs being used either as insulating material or in other equipment in the SS. However, there is no documentary evidence to confirm if asbestos is present or not.
- Majority of the substations have available area within the existing compound for renovation/upgradation works.
- Overall, most of the SS were kept clean with good housekeeping
- None of the substations were affected by noise or air pollution.
- Records of breakdown and maintenance, transformer oil changes are available in the substations.
- Well maintained garden and green belt is present in Doraha SS

50. The summary baseline conditions (detailed in the IEE Chapter IV) of the substations are provided in Table 4.3, Table 4.4, and Table 4.5, whereas the audit findings listed in Table 4.6.

Table 4.3 UPCL substation baseline – Physical, Social and Cultural Resources

Sl. No.	Audited substation	Topography	Ele-vation	Area of SS (m^2) / available area	Noise Level dB(A)	EMF Level uT	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	46	Within city, Settlement, Roads, vegetation	Private houses (3), crematorium (SS boundary) UPCL staff quarter	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 quarter	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 & 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	45	Cropland, open lands, roads,	One school-3m,	Isolated house – 175m	300m	Bidalnath River – 400m	None	One temple – 3m (opposite SS)

Sl. No.	Audited substation	Topography	Ele-vation	Area of SS (m^2) / available area	Noise Level dB(A)	EMF Level uT	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
							settlement, vegetation	Village Panchayat Office- 3m (Located opposite SS, across access road)					
7	Lal Tappar	Flat	430m	2000 (60%)	53	45	Barren/open land, sparce vegetation, small scale industries, isolated houses, river, croplands	Five houses/huts – labour & family working in the industries	Labour hut - 3m	450m	Jakhan River- 140m	None	None
8	Tarikhet	Flat	1554m	6000 (5%)	50	**198**	Village forest, road, scattered settlement	Vacant UPCL staff quarter, private houses & shops, temple, hospital	0m	0m	None	None	Temple inside SS
9	Bajol	Steep Terrain	1134m	5000 (20%)	47	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	45	Cropland, residents, open land, vegetation, roads	Vacant UPCL staff quarter, 2 houses, 1 Monk's hut	40m	40m	None	Spring – 50m, handpump in Temple	Temple – 0m

Sl. No.	Audited substation	Topography	Elevation	Area of SS (m^2) / available area	Noise Level dB(A)	EMF Level uT	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
								being built – 45m					
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	43	Within town, cropland, vegetation, settlement	UPCL staff quarters, private house, shop, temple	0m	0m	None	None	Temple – 3m
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	71	With River valley, sparce 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	1489m	613 (20%)	47	44	With River valley, sparce settlement,	Private residence, School – 30m	0m	1km	Ramgarh River-10m	Defunct Handpump -5m	None

Sl. No.	Audited substation	Topography	Ele-vation	Area of SS (m^2) / available area	Noise Level dB(A)	EMF Level uT	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
		river valley)					cropland, open areas, vegetation						
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	49	Within famous tourist/cultural destination area, open areas, roads, college, vegetation.	Vacant UPCL staff quarter, one technical college – 20m	200m	1.4km	None	None	None
19	Matkota	Flat	215m	4042 (25%)	53	50	With town, settlement, open lands, vegetation	Private house, UPCL staff quarter, community hall, temple, medical college & hospital (under construction)	UPCL staff quarter with SS area, private residence - 60m	0m	Rainfed stream - along SS boundary	Borewell inside SS	Temple- 50m
20	Bhadaipura	Flat	211m	6046 40%)	55	68	With town, settlement, markets, shops,	Private house -4 nos, Hospital - 60m	Adjacent to SS	0m	None	Handpump – inside SS	Temple- 2m

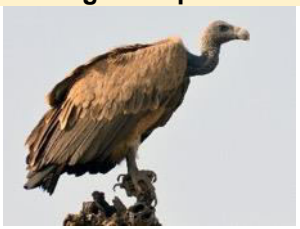
Sl. No.	Audited substation	Topography	Ele-vation	Area of SS (m^2) / available area	Noise Level dB(A)	EMF Level uT	Land Use within 500m	Buildings in 50m, including community facilities	Distance to Nearest Residential Property	Distance to Habitation	Distance to Surface Water in 500m	Ground Water source in 50m	PCR
							cropland, open lands, vegetation						
21	Lalpur	Flat	205m	11292 (60%)	49	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	43	Cropland, settlement, vegetation	UPCL staff quarters, private houses- 2nos	50m	0m	None	None	Temple inside SS
23	Jhankat	Flat	211m	3387 (40%)	45	50	Cropland, settlement, vegetation	UPCL staff quarter, private residence-03, school-10m, health centre-30m	0m	0m	Stream-along SS boundary	Handpump – inside SS	Temple-80m
24	Kashipur	Flat	238m	3035 (15%)	56	43	Settlement	UPCL staff quarter, private residence, Govt. office-0m, Hospital-5m	0m	0m	Drona Sagar Lake - 100m	Two Submerssible pump in SS, handpumps in 3 residences (0-10m range)	Temple inside SS, Drona Sagar Lake/palace//temple area-100m (ASI protected monument is >400m distance)
25	Doraha	Flat	220m	12140 (40%)	49	56	Cropland, settlement, market, open areas	UPCL staff quarters, private house 4	5m	0m	Ganda Nalla/Stream – 100m	2 submersible pumps in SS	Temple inside SS

Source: ADB TA Consultant

Table 4.4 UPCL substation baseline – Biological (Fauna) Environment

Audited substation	Nearest PA, including state/local importance	Wildlife observation by SS staff/locals					Observations site	Representative Photograph of observed/reported endangered species
		Scientific Name	Common name	Class	IUCN Status	WPA Status		
Hatibarakala & Sashatradhara	Forest Research Institute – KBA : 1.5-2 km	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Outside	1. *Ophiophagus Hannah*  Source: ABP News
		Gallus gallus	Red Junglefowl	Aves	LC	Sch IV	Outside	
Rudrapur	Sashapur RF – 500m	*Ophiophagus hannah*	King Cobra	Reptile	VC	Sch II	Inside	2. *Panthera Pardus* - entered private house in Nainital district (Haldawi)  *Source: haldwanitimes*
		Hottenttota tamulus	Scorpion	Insect	LC	Sch IV	Inside	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Outside	
		Vulpes vulpes	Red Fox	Mammal	LC	Sch II	Outside	
		Species not identified	Eagle	Aves	-	-	Outside	
		Pavo cristatus	Indian Peafowl	Aves	LC	Sch I	Outside	
		Gallus gallus	Red Junglefowl	Aves	LC	Sch IV	Inside	
		Gyps indicus	Vultures	Aves	EN	Sch I	Outside	
Ramnagar Danda	None	*Elephas maximus*	Asian Elephant	Mammal	EN	Sch I	Movement along Bidalnath River -400m	
Lal Tappar	Rajaji NP: 2.5 km	*Elephas maximus*	Asian Elephant	Mammal	EN	Sch I	Latest 2021: movement on access road of SS towards monsoon feed Jakhan River	*3. Elephas maximus*  Source: hindusthantimes.com
Tarikhet	Within /village council recognised Billaria Forest	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Inside	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Inside substation; major cause of concern in the area & district	4. *Gyps indicus*
Bajol	SS is with Unnamed-forest range	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Outside substation compound	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Outside substation compound	

Audited substation	Nearest PA, including state/local importance	Wildlife observation by SS staff/locals					Observations site	Representative Photograph of observed/reported endangered species
		Scientific Name	Common name	Class	IUCN Status	WPA Status		
		Sus scrofa	Wild boar[16]	Mammal	LC	Sch III	Inside substation	
		Ursus thibetanus	Himalayan Black Bear	Mammal	VU	Sch II	Outside substation compound	
		Psittacula krameri	Rose Ringed Parakeet	Aves	LC	Sch IV	Inside and outside substation	
Lamgarah	None	*Lepus nigricollis*	Indian hare	Mammal	LC	Sch IV	Inside	
		Macaca mullata	Rhesus Monkey	Mammal	LC	Sch II	Outside	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Outside	
		Ophiophagus Hannah	King Cobra	Reptile	VC	Sch II	Inside	
		Vulpes vulpes	Red Fox	Mammal	LC	Sch II	Outside	
		Psittacula krameri	Rose Ringed Parakeet	Aves	LC	Sch IV	Inside & outside	
		Species not identified	Eagle	Aves			Outside	
		Gyps indicus	Vultures	Aves	EN	Sch I	Outside	
		Blue Rock Dove/Pigeon	*Columbia livia*	Aves	LC	Sch IV	Inside	
Sairaghat	Kanarichina Forest Range	*Panthera Pardus*	Leopard	Mammal	VU	Sch I	Outside	
Kamalwaganja	Bakra Forest Range 4.5km	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Outside	
Transport Nagar	Tanda Forest Range-200m	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Outside	
Phoolchaur	Tanda Forest Range-400m	*Macaca mullata*	Rhesus Monkey	Mammal	LC	Sch II	Inside	
Garampani	None	*Panthera Pardus*	Leopard	Mammal	VU	Sch I	reported at 100m from SS	
		Macaca mullata	Rhesus Monkey	Mammal	LC	Sch II	Outside	
Talla Ramgarh	None	*Ursus thibetanus*	Himalayan Black Bear	Mammal	VU	Sch II	Outside	
		Tyto alba	Common owl	Aves	LC	Sch IV	Inside	



Source: eBird

5. *Ursus thibetanus*

Source: Pinterest

[16] *On February 3, 2016, the MoEF&CC had declared wild boar as 'vermin' in all 13 districts (71 of 79 sub-divisions) of Uttarakhand following a request of the forest department. For this purpose, the ministry had put the wild boar - a protected species under Schedule III of the Wildlife (Protection) Act - in Schedule V for a one-year period ending in February 2017.*

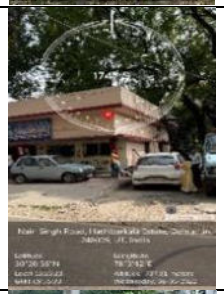
Audited substation	Nearest PA, including state/local importance	Wildlife observation by SS staff/locals					Observations site	Representative Photograph of observed/reported endangered species
		Scientific Name	Common name	Class	IUCN Status	WPA Status		
		Urocissa erythroryncha	Red-billed Blue Magpie	Aves	LC	Sch IV	Inside	
		Macaca mullata	Rhesus Monkey	Mammal	LC	Sch II	Inside	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Outside	
		Ophiophagus Hannah	King Cobra	Reptile	VC	Sch II	Inside	
		Psittacula krameri	Rose Ringed Parakeet	Aves	LC	Sch IV	Inside	
Sarghakhet	Sunkia Forest Range-60m	*Urocissa erythroryncha*	Red-billed Blue Magpie	Aves	LC	Sch IV	Inside	
		Petaurista petaurista	Red giant flying squirrel	Mammal	LC	Sch II	Electrocuted in substation	
		Macaca mullata	Rhesus Monkey	Mammal	LC	Sch II	Inside	
		Panthera Pardus	Leopard	Mammal	VU	Sch I	Outside	
		Lepus nigricollis	Indian hare	Mammal	LC	Sch IV	Inside	
Pines	None	*Panthera Pardus*	Leopard	Mammal	VU	Sch I	Encounters reported on access road	
Matkota	Tanda Forest range- 3km	None						
Bhadaipura	Matkota Forest Range-5km	None						
Sitarganj	Bikul Forest Range – 5km	None						
Sawra, Jhankat Sahiya, Kashipur, Doraha, Lalpur,	None							

IUCN: International Union for Conservation of Nature; CR: Critically Endangered; VU: Vulnerable; LC: Least Concern; EN: Endangered; WPA: Wildlife Protection Act 1972, Govt. of India; UPCL: Uttarakhand Power Corporation Limited; SS: substation; EMF: electromagnetic field, uT: micro-Tesla; Sch: Schedule under WPA 1972.

Animals listed in schedule I and parts II of schedule II have absolute protection - offences under these are prescribed the highest penalties; Animals listed in schedule III and schedules IV are also protected, but the penalties are lower compared to schedule I and part II of schedule II; Animals listed in schedule V are called “vermin” which can be hunted; Cultivation, Collection, extraction, trade, etc. of Plants and its derivatives listed in schedule VI are prohibited.

Source: ADB TA Consultant

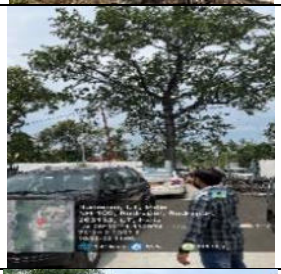
Table 4.5 UPCL substation baseline – Biological (Flora)

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Sahastradhara	*Tamarindus indica*	1	*Oxalis corniculate,* *Poaceae sp,* *Leucas aspera*	
Hatibarakala	*Azadirachta indica,* *Delonix regia* *Roystonea regia*	2 1 3	*Oxalis corniculate,* *Poaceae sp*	
Sahiya	-	-	*Poaceae sp*, *Leucas aspera*	
Sawra	-	-	*Ixora coccinea* *Leucas aspera* *Poaceae sp,*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Rudrapur	*Anthocephalus cadamba* *Calotropis procera* *Tectona grandis*	2 2 1	*Poaceae sp,* *Catharanthus roseus*	
Ramnagar Danda	*Psidium guajava*	1	*Catharanthus roseus*	
Lal Tappar	*Azadirachta indica,* *Psidium guajava* *Mangifera indica*	1 1 2	*Poaceae sp,* *Catharanthus roseus,* *Oxalis corniculate*	
Tarikhet	-	-	*Poaceae sp,*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Bajol	*Mangifera indica* *Punica granatum* *Syzygium cumini*	1 2 2	*Poaceae sp,* *Catharanthus roseus*	
Lamgarah	*Toona ciliate* *Pinus roxburghii*	3 5	*Poaceae sp,* *Leucas aspera* *Tabernaemontana divaricate* *Catharanthus roseus*	
Sairaghat	*Ficus benghalensis (sapling)*	1	*Hypochaeris radicata,* *Tribe andropogoneae,*	
Kamalwaganja	*Azadirachta indica,* *Psidium guajava* *Mangifera indica* *Eucalyptus tereticornis*	2 4 2 2	*Poaceae sp,*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Transport Nagar	-	-	*Tabernaemontana divaricata*	
Phoolchaur	*Psidium guajava* *Mangifera indica* *Calotropis procera* *Tectona grandis* *Terminalia catappa*	2 2 1 1 2	*Oxalis corniculate,* *Poaceae sp,* *Leucas aspera* *Tabernaemontana divaricate* *Catharanthus roseus*	
Garampani	*Mangifera indica* *Psidium guajava* *Ficus religiosa*	2 2 1	*Parthenium hysterophorus* *Poaceae sp,*	
Talla Ramgarh	-	-	*Cynodon* sp. *Chromolaena odorata* *Hibiscus rosa sinensis*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Sarghakhet	-	-	*Cynodon* sp. *Lantana camera* *Tabernaemontana divaricate* *Leucus aspera* *Rumex dentatus* *Clerodendrum infortunatum*	
Pines	*Pinus roxburghii* *Quercus rotundifolia*	11 3	*Rumex dentatus* *Clerodendrum infortunatum*	
Matkota	*Bombax ceiba*	1	*Poaceae sp,* *Catharanthus roseus,* *Oxalis corniculate*	
Bhadaipura	*Monoon longifolium* *Roystonea regia* *Ficus religiosa* *Carica papaya* *Psidium guajava* *Azadirachta indica*	2 3 4 1 2 2	*Poaceae sp,* *Melastoma malabathricum* *Hibiscus rosa sinensis* *Leucas aspera* *Catharanthus roseus,* *Cynodon* sp. *Parthenium hysterophorus* *Serissa japonica*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Lalpur	*Azadirachta indica,* *Psidium guajava* *Mangifera indica* *Eucalyptus tereticornis* *Populus alba* *Dalbergia sissoo* *Syzygium cumini* *Artocarpus heterophyllus* *Tamarindus indica*	2 4 4 3 2 4 9 20 3	*Poaceae sp,* *Cynodon* sp. *Serissa jaonica* *Hibiscus rosa sinensis* *Leucas aspera* *Parthenium hysterophorus*	
Sitarganj	*Roystonea regia* *Ficus religiosa* *Psidium guajava* *Mangifera indica* *Alstonia scholaris* *Polyalthia longifolia* *Syzygium cumini*	2 3 3 3 4 3 4	*Poaceae sp,* *Cynodon* sp. *Parthenium hysterophorus* *Hibiscus rosa sinensis*	
Jhankat	-	-	*Parthenium hysterophorus* *Poaceae sp* *Vigna unguiculata*	
Kashipur	*Polyalthia longifolia* *Mangifera indica*		*Poaceae sp,* *Cynodon* sp. *Parthenium hysterophorus* *Hibiscus rosa sinensis*	

Substation	Tree enumeration		Others notable flora	Representative photos
	Species	Nos.		
Doraha	*Ficus religiosa* *Ficus benghalensis* *Psidium guajava* *Alstonia scholaris* *Polyalthia longifolia* *Azadirachta indica,* *Mangifera indica*	3 4 2 3 4 2 5	*Poaceae sp,* *Cynodon sp.* *Hibiscus rosa sinensis* *Rosa rubiginosa* *Parthenium hysterophorus* *Hibiscus rosa sinensis*	

Source: ADB TA Consultant

Table 4.6 Environmental Compliance Audit findings of UPCL Substations

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
General	• UPCL has not developed any EHS policy or manuals/procedures for substation operation (other than its company safety manual) • SS staff are not aware of EHS management systems and procedures • Records of EHS permits are not available at any of the SSs	• Applicable to all SSs
Housekeeping/ Waste Management	• No guidelines for pollution prevention or waste management, including hazardous wastes management, were available at the substations • Some SSs are not having good housekeeping • No waste storage areas were observed in any of the SS. • Solid waste handling was not observed to be undertaken as per statutory requirements of segregation, storage, transport, and disposal. • Empty and filled drums are stored in the yards with no impermeable floor or bund. • Storage was mostly in the open due to lack of dedicated storage area. • End of life batteries are stored at site and then replaced by the vendors. • Trash (municipal waste) stored / dumped inside some SS yards. • Some signs of burning trash/garbage were also observed in couple of SSs. • In some SSs, end of life equipment including redundant transformers are kept at site and in the open for long term. • In some of the SSs, defunct/to be repaired transformers and other electrical systems were observed to be significantly rusted, broken, leaking oil and posing significant health and safety hazards to staff as well as locals including risk of soil contamination. As reported by UPCL, some of the units are taken away to other substations, and some others are scrapped or auctioned.	• Open drum storage in yard/SS compound were observed in – Shashtradhara SS, Badhaipura SS, Lalpur SS, Lamgarah SS, Matkota SS, Phoolchaur SS, Pines SS, Ramnagar Danda SS, Sargakhet SS, Sitarganj SS and Transport Nagar SS. • Large scale material, poles, cable wheels, and transformers/equipment and municipal waste debris storage was observed all over the SS compounds including yards in – Badhaipura SS, Lalpur SS, Matkota SS, Sargakhet SS, Sitarganj SS and Transport Nagar SS • Open burning in SS was observed at – Doraha SS, Ramangar Danda SS, Rudrapur SS, Sargakhet SS • Electric meters are stored in heaps inside Phoolchaur SS control room
Transformers and Oil Leakage	• Capacitors were not installed in any of the SS • All transformers were oil insulated • Transformer and other oils – there are no dedicated, labelled storage areas for drums, oil storage • Drums are kept in an unorganised manner all over the SS and are a significant health and safety risk. • Drums are not labelled, and content is not provided/disclosed.	• Low to Medium (up to 10) quantity transformer storage inside compound was observed at: Badhaipura SS, Bajol SS, Tarikhet SS • Large scale (more than 10) storage of defunct/to be repaired transformers and soil contamination were observed at – Lalpur SS and Sitarganj SS

Audit Item	Audit Findings and Observations	
	Generic	**Specific**

	• Material Safety Data Sheets were not available at any of the SS
	• Transformer test report not available at any of the SS
	• Transformer bunds, containment bund / tanks for oil spillage management of 110% capacity are not available in any of the SS. Some have concrete platforms; others have bunds but not up to capacity of 110% and they are not extending beyond the transformer area.
	• Leaks and oil spills were observed in varying degrees across all SS.
	• No specific management or handling procedures were observed for hazardous wastes, oil spills, spillage, runoff from leaks of equipment in any of the SS.
	• Spill management materials like sand, cloth was not available or mostly inadequate.
	• Spills were left as it is to be soaked in ground resulting in soil contamination.
	• No PCB labelling in transformers and capacitors, documentations like certifications PCB free are not available onsite
	• Records of transformer oil change dates were available at SS
	• Maintenance records are available for most of the SS
		• As per UNIDO guidelines, one 1980 make HHEL Transformer in Sawra SS, 1971 make TELK Transformer in Garampani SS and 1977 make Electra Transformer in Talla Ramgarh SS were at risk of containing PCBs and another one at Lamgarah SS and two at Pines SS can be at potential risk as the date labels/information are not available; others whilst not listed by UNIDO in their guidance may still be at risk of containing PCBs due to oil changes etc.
		• In Pines SS defunct transformers were observed to be stored along the main road (outside SS) with significant oil leakage and oil seepage along the road as the site is on steep terrain. The SS has inadequate available space for storage.
		• Oil leaks from transformers:
		  ○ Moderate: Hatiberakala, Bajol, Doraha, Garampani, Kashipur, Phoolchaur
		  ○ High – Badhaipura, Jhankat, Lalpur, Pines, Matkota, Siratganj

Escape of SF_6 (sulphur hexafluoride) and other greenhouse/ hazardous gases	• Among those visited, six SS had a Gas Circuit Breaker that are operational and housed in the switch yard. The SF6 labels are visible. • No leakage / breakdown was reported, although no SF6 leakage detectors are available to check the leakage. • No SF6 leakage detectors are installed in any of the SSs • Record of SF6 leakage and other information not kept/available at any of the SS	• Gas Circuit Breakers are operational in Sahastradhara SS, Hathibarakala SS, Rudrapur SS, Lamgarah SS, Sairaghat SS and Talla Ramgarh SS. • In the Pines SS, potential release from Circuit Breaker which is defunct and broken and internal systems exposed and stands in the SS since the last 10 years.
Noise, EMF, Lighting and Ventilation	• Ambient noise levels were observed to be low with most SS not exposed to traffic or other noise sources. • Spot noise levels near gates, yards, transformer area and inside office using smartphone-based app were mostly in the 34 dB(A) to 64 dB (A) range and within safe limits for OHS	• Higher noise levels were observed at Kamalwaganja, Badhaipura, Transport Nagar and Kashipur SS located on main roads in built up areas • Dust levels were high in Transport Nagar, Badhaipura and Kamalwaganja SS area • EMF shield was observed in Lalpur SS

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
	• Transformer hum was audible in some cases from nearly 3 meters and spot levels ranged between 43 dB(A) to 67 dB(A) using a smartphone-based app • No high level of air pollution was observed in any of the SS, although moderate to high levels were observed in the SS within built-up areas and on roads • Air and noise monitoring was not conducted by SS (baseline monitoring will be conducted at some SS for IEE purposes) • There were no sources of vibrations observed • No EMF warnings were present in any SS • No EMF shields were installed in 24 of the SS. • No EMF monitoring is conducted by SS. • Spot EMF reading using smartphone-based app were mostly low at all locations, inside office and near gates, varying between 21 uT – 52 uT. In one case the EMF levels were recorded to exceed 190 uT near the transformer and are likely in mid to high range. However, this is compared to ICNIRP exposure limits for occupational exposure of 415-500 uT. • Ventilation was mostly adequate, and vents were not blocked as they are located high up near the ceiling. • Control panels were placed along the walls/windows, and this reduces ventilation and lighting to a degree. • Natural light was mostly adequate across all SS, except three. • Artificial lighting working condition inside control rooms varied between 35% to 90%. • Faulty bulbs / tubes were observed in all SS. • Lighting in the SS compound including the switch yard was not adequate, with some SS reporting that the yard remains completely dark as bulbs are not working / not being replaced. • Entry gates and inside paths mostly had no lighting system or were not working	• Highest EMF level of 198 uT near transformer was recorded at Tarikhet SS • Inadequate ventilation and lightening were observed at – Lamgarah SS, Transport Nagar SS, Pines SS
First Aid Equipment	• First Aid box was not available in 24 of the SS visited. Some SSs had first aid kits, which were expired and inadequate.	• First aid box was available in Badhaipura SS, although it was observed that it was recently procured.
Fire Safety Equipment	• Fire safety equipment was not adequate in all the SSs • Sand buckets were limited, with many of them either empty, not available, or not having adequate sand content.	• The extinguisher at Sahiya SS was used up and not replaced since 2020 after a fire broke out in the control room.

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
	• All SS have CO_2 based fire extinguisher, although all were expired and not replaced. • No automatic alarm and fire suppressions system was found in any of the SS. • No firewalls in any of the SS	
Community Health and Safety	• Overall, the security of the SS areas is not adequate, and locals can easily access the SS area, control room, as well as the switch yards. • Most SS have moderately adequate fencing apart from some SSs. • Fencing although provided in all the SS has gaps where humans, wild animals, etc. can easily enter. • SS gates remain open 24 hours • Doors to control rooms are reported to be closed only late at night, except those in areas of leopard observation/conflict areas. In these cases, control room doors/gate is closed around dusk. • Caution / danger signage were not observed at any of the SS entry points or on the boundary / fence and on the electrical equipment • Sensitive receptors / settlement near SS were observed in some cases. (refer next column and baseline table) • Some SS are also housing divisional offices and locals come to pay energy bills/other works. They have easy access to the SS and possibly exposed to health risks without any signage or caution boards.	• SSs located within densely populated settlements- Kamalwaganja, Badhaipura, Transport Nagar and Kashipur. • Residences adjacent to SS are present in – Badhaipura, Tarikhet, Phoolchaur, Doraha, Garampani, Jhankat, Kashipur and Talla Ramgarh • Sarghakhet SS is located within tourist destination and surrounded by hotels in steep terrain. The access road is narrow and difficult for heavy vehicle movements. • Meters, defunct units/electrical equipment, cables stored in SS area, which is not gated and beside main road in Hatibarakala SS and Pines SS. • The transformers at Pines SS can be easily assessed by locals as they are located at a lower level than the control room and beside the road. • One side of the fencing missing/broken observed in Bajol SS, Kamlwagunja SS • In Garampani SS, the access road passes along one private residence and on this road are stored with defunct/broken electric poles and other small units • Hospital is adjacent to Kashipur SS • A temple and primary school are located across the access road (5m) from the Ramnagar Danda SS compound • Labour camps adjacent to Lal Tappar SS reported transformer fire two years back with no casualty. Fire was controlled by SS • Pines SS is located on the main road to Nainital hill station, a national important tourist and cultural town. Cranes are used to move transformers and traffic is stopped for long periods when work is ongoing. • In Lamgarah SS, the access road is step sloped and not paved/broken. Since this road pass along a local temple,

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
		the community has objected to any construction work on the road, as they anticipate this may damage the temple. • The access road to the Sahiya SS and that used by the only private resident adjacent to the SS is washed out and high-volume storm water flow during the monsoon season every year, which possess high H&S risks both for the residents and the SS. The flooding water meets the Amlawa River downstream located at 60m from the SS. • In Sahiya SS a wall between the housing and SS was requested. • The Tarikhet SS and entrance is located on sharp bend in steep terrain • A new hospital-medical college is under construction (almost ready) adjacent to Matkota SS compound • A school is present adjacent to the yard and close to the transformers in the Phoolchaur SS • Technical Institute is located adjacent to Pines SS • Construction materials stored on main road outside Phoolchaur SS, including road tar, narrowing the road in front of the SS • SSs which also double as sub-division offices, where local consumers come for bill payments/related works/applications include- Transport Nagar, Matkota, Shashtradhara
Handling Emergencies	• No emergency preparedness plan available in any of the SS • Some of the SSs have been subjected to low to moderate earthquake and/or moderate to high flooding during monsoon, although no major impacts reported. • One reported landslide issues and one heavy snowing incident • Emergency exit signage was not observed in any of the SSs. • No emergency response training provided to staff • No staff are trained in first aid in any of the SSs • Posters on medical revival, prevention / fire safety was observed in some cases. • No doctors/emergency health contacts list in case of any emergency was observed in any of the SS • No trainings / workshops on fire safety, first aid or other emergency situations are conducted	• Earthquake reported (low/moderate) at – Tarikhet, Garampani, Sairakhet, Lamgarah and Sahiya • Forest fire reported at Pines SS every year. The presence of the dry pine needles accelerates the spread of fire. Multiple brunt trees were observed inside the SS compound. • Flooding risk/SS inundation reported at – Garampani SS. This SS is in a river valley. SS staffs reported complete washing away of the SS if retaining wall in proper orientation is not provided in the river flood plain near the SS. • The Rudrapur SS is in the river valley of the flood prone Gona River. Flash floods are recorded every year along the SS compound. • Sairaghat SS is prone to landslide during monsoon.

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
	• Some staff reported they had fire safety training, but documentation / records / certificates were not available • Fire drills and alarm tests are not conducted • Fire safety posters were present in many of the SS • No incident logbook available	• Snow fall and cease work reported at Sarghakhet SS. • Fire broke out in the control room of the Sahiya SS in 2020, majorly damaging the walls and control panel.
Health and Safety of Staff	• No OHS inductions were received • No medical tests / health check-up records of staff are available at any of the SS • Working at height training/permits not available for SS staff or for contractors who they call in if required • No OHS training for staffs, no safety, calibration report and records available. No training materials are available • Staff are aware of PPE although not adequately supplied with them, they were mostly worn out and old. • PPE were in short supplies across all the SSs in relation to staffing power. • Across all SSs, staff were not wearing any PPE including safety boots. • Exposure assessment equipment are not available. • Trip hazards, cracks, holes, cracked tiles are observed across all SS both inside the control room and in the compound • Gaps, cracks, faulty tiles, missing floor panels in the control buildings. • Storage of defunct panels, small parts, units, meters, cables, wires were recorded inside the control rooms, some restricting movement and posing trip and fall hazards risk. • In the switch yard and open areas, hazards were recorded in the form of trip hazards like open cable channels, broken and unstable drain/channel covers, broken and defunct equipment, drums, rods, cables, broken meter boxes and streetlights and trash. • No air conditioning and / or heating systems have been installed in any of the SS • Communication problem/no network is potential risk during accidents to report event and call for medical/other help for the high-altitude SSs. • Building structural status – most of the SS are adequately managed, and some repair work is required although they were structurally sound except one in which is severely damaged.	• High altitude and steep terrain SSs with difficult access/manoeuvring, included- Bajol, Pines, Lamgarah, Sahiya, Sawra, Sairaghat and Sarghakhet, • Pines SS was observed to be most difficult to access and high chances of trip and fall from the steep terrain • Movement was difficult in Pines SS, as it being in steep terrain with the Control room, Yard (Circuit Breakers and Others) and transformers located at different steps/height. • Major trip/fall hazards, cracks in the yard were observed at – Badhaipura SS, Lalpur SS, Phoolchaur SS, Pines SS, Transport Nagar SS, Sahiya SS, Sawra SS and Sitarganj SS • In Badhaipura SS underage causal labour was observed, hired for yard grass cutting. No induction and/or PPE were provided to labours • In Lalpur SS, contract workers were observed working atop transformers and handling cables connections without any PPE, boots, etc. • Ongoing O&M and civil works observed at Matkota SS with no PPE, safety equipment • Crack in control room wall was observed in Bajol SS and Transport Nagar SS. • The control building at Lamgarah SS is severely damaged and old and will need complete repair and re-development.

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
	• Cracks were observed in many of the SS walls. Moisture / damp walls, plaster and paints stripped off were observed. • No ACM survey done but asbestos containing materials not observed • Most maintenance works and civil works/maintenance are done by hired labors/contractors • No pest problems were reported in any of the SS. Pest control measures are not conducted. • Regarding COVID-19 although they reported that guidelines were followed, observation during the audit was that they did not adequately meet the requirements of masks, hand sanitizers, liquid soaps, etc.	
Drainage	• Drainage and wastewater – in most cases storm drains were absent from the SS area. • The wastewater from toilets (bathing, basin, urinals) other than WC is moved through internal drains and either directed into open main drains or dumped in the open ground outside the compound. • Standing water was not observed in any SS.	• Flash flooding from storm water runoff was reported at Sahiya SS with a requirement for storm drainage observed.
Sanitation and Welfare Facilities	• Toilets are available on site and inside the buildings of all SS • Separate toilets for women are not available in any of the SS. No women staff were recorded in any of the SSs. • Overall, the toilets were observed to be clean and hygienic. • Lights were working and doors were adequate with locks working. • Septic tanks are available for all the SS although the septic tanks overflow drains off in open areas / fields outside the SS. No soak pits available. Septic tanks are mostly below ground and were observed to be inadequately maintained. • Potable water is available on site. Quality of drinking water, as reported by staff was mostly potable and agreeable. The source of water is mostly municipal / piped water, while some used bore well water. The storage of the water inside the SS was mostly hygienic and stored adequately. Testing reports are not available and no periodic potability testing was reported. • No dedicated accommodation / rest rooms are available in any of the SS. The staff, including night shift staff stay within the control rooms and have temporary mats/beds within the control room area.	• Bore well water used by Rudrapur SS, Lamgarah SS, Sarghakhet SS, Matkota SS, Badhaipura SS, Lalpur SS, Jhankat SS, and Doraha SS and Kashipur SS • Cooking inside SS using faulty electric heater were observed at – Phoolchaur SS

Audit Item	Audit Findings and Observations	
	Generic	**Specific**
	• Cooking is mostly not practiced, but in some SS a temporary cooking set up, using electric heaters was observed inside the control/office rooms, which may pose a fire hazard. • Dedicated accommodations, TV/Internet connection AC/heating area not available.	
Other	• Birds' common to the locality are sometimes sited in the SS areas, a few rare cases of electrocution of birds were reported from some SS • **Wildlife conflicts were not reported from any of the SS, although sightings were recorded by SS staff in some of the SSs.** • Grasses of different heights, shrubs and herbs were observed in many of the SS, they are not maintained or trimmed / managed. • No medium/large trees are present in the SS yards.	• Parthenium sp, a weed and allergic plant was observed at – Doraha SS, Sitarganj, Matkota, Matkota, Lalpur and Badhaipura SS. • Leopard (*Panthera pardus*) sightings in and around SS were reported at – Pines, Bajol, Tarikhet, Garampani and Sairaghat • Leopard sighted in the 132 kV Chilkiya Ramnagar Substation (see Section 7.8 below for details of this substation). • Elephant movement along access road of Lal Tappar SS. The fencing is missing in the front of the SS. • Electrocution of Red Flying squirrel report within Sarghakhet SS

Source: ADB TA Consultant