Executive Summary

Introduction

1. This Initial Environmental Examination (IEE) is part of the process of compliance by Power Transmission Corporation of Uttarakhand Limited (PTCUL) and Uttarakhand Power Corporation Limited (UPCL) with the Asian Development Bank's (ADB) Safeguard Policy Statement (2009) in relation to the Uttarakhand Climate Resilient Power System Development Project or the "Project".

2. Safeguard requirements for all projects funded by ADB are defined under ADB's Safeguard Policy Statement (2009) which establishes an environmental screening, assessment and management process. All ADB projects must comply with its requirements and Operational Manual F1, 2013 to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process.

3. In accordance with its environmental assessment requirements, the IEE provides a road map to the environmental measures needed to avoid, minimize, and/or mitigate the adverse environmental impacts and risks associated with the Project on physical, biological, social, and physical-cultural resources in the project area of influence during the construction and operation and maintenance (O&M) phases of the Project. More specifically, the IEE:

   - Describes the project design, construction activities and operational parameters;
   - Describes the existing socio-environmental conditions within the project area of influence;
   - Describes the extent, duration and severity of potential direct, indirect, cumulative, and induced environmental impacts and risks;
   - Analyzes all significant environmental impacts and risks; and
   - Formulates the mitigation actions and presents them in the form of an Environmental Management Plan (EMP) for implementation following project approval.

Project Description

4. The Project is an electricity sector project and involves three outputs, under which there are several components involving physical works and several sub-activities under each component as follows:

Output 1 Power network strengthened, modernized and climate proofed

5. The Project will finance PTCUL and UPCL to provide: (i) climate and disaster resilient underground cable network in Dehradun, the capital city of Uttarakhand. This includes 381 kilometers (km) of underground cables, 354 11 kV ring main units, 99 compact substations and related low voltage lines; (ii) distribution investments in urban and suburban areas of Dehradun to improve distribution system reliability. This includes three distribution substations and approximately 24km 11 kV distribution lines including underground cables; (iii) grid investments to reduce network congestion and support the increasing electricity demand from industrial, commercial, and domestic consumers. To facilitate this, the project will construct 8 grid substations, about 70km (as currently routed approximately 64km) of related power lines,

and stringing of a second conductor of 39km on an existing power line; and (iv) renovation of distribution network in rural areas to enable grid connection of community energy projects and support gender inclusive income generation activities.

Component 1: High Voltage (HV) Power

- Sub-activity 1.1 - New overhead HV power lines 132kV, 220kV and 400kV (mainly line in – line out (LILO) connecting substations to existing power lines) – 59.78 km
- Sub-activity 1.2 - Construction of eight new substations.
- Sub-activity 1.3 - Second circuit stringing of an existing HV power line 132 kV – 39.33 km.
- Sub-activity 1.4 - Underground (UG) HV cabling (LILO) 132 kV and 220 kV – 4.3km.

Component 2: Medium and Low Voltage (MLV) Power

- Sub-activity 2.1 - New / Conversion of 33kV lines to UG cable. Conversion of 11kV line to UG cable. Conversion of 0.4kV Low Tension (LT) line to UG cable – 381 km 33/11kV + 150km 0.4kV.
- Sub-activity 2.2 - Capacity enhancement and upgradation of existing 33/11kV substations.
- Sub-activity 2.3 - Construction of three new 33/11kV substations.
- Sub-activity 2.4 - Construction of additional two 33 kV OHL and one 33 kV UG cable – 24km.

Output 2, Institutional capacity of implementing agencies enhanced.

6. This output involves institutional capacity building of the organizations involved in Output 1 and will have no adverse environmental and social impacts and so is not considered further in the IEE.

Output 3, Component 3: Gender equality and social inclusion awareness raising, and energy-based livelihood activities promoted

7. The project will engage at least 2500 local community members (50% women and 30% from poor and vulnerable communities) from 250 selected women self-help groups (SHGs) in seven hilly districts gaining access to renewable energy and energy efficient equipment to enhance their income. The envisaged activities also include (i) training for 400 local community members (at least 50% women) in renewable energy technology, energy conservation, management, business skills, marketing, and leadership; (ii) conducting awareness campaign and providing learning opportunities covering at least 600 university and higher secondary school students (at least 30% girls) in STEM streams on the energy sector career path; and (iii) engaging local nongovernmental organizations to support the implementation and monitoring for the intervention to SHGs. The activities under output 3 will be implemented by Uttarakhand Renewable Energy Development Agency (UREDA) and supported by a Japan Fund for Poverty Reduction grant.

8. Output 3 will have minimal or no adverse environmental and social impacts apart from some minimal waste management and occupational and community health and safety issues relating to roof-top solar installation, like a typical rooftop solar installation at a residential home. These issues can be managed via compliance with national regulations for waste management and health and safety. Accordingly, the IEE does not include Component 3 within the impact assessment itself but does provide standard good practice measures in a separate EMP for implementation by UREDA.

9. Three different organizations are responsible for project implementation under the umbrella of the Energy Department, Government of Uttarakhand who will be responsible for project execution.

Summary of Key Impacts

10. Key impacts identified and mitigation measures are summarized as follows:

Air Quality

11. Emissions from construction machinery and vehicles, e.g., diesel generation sets, could cause some localized short-term pollution, however, the main impacts to air quality will come from dust generated by vehicle movements and excavation works. Excavation will be required for tower footings and substation construction, but generally these works are undertaken away from residential areas. UG works in Dehradun will be completed within the town center and here dust will be an issue around the areas of open trenching. Where practical, horizontal directional drilling will be implemented, and this will help reduce dust impacts in Dehradun. Where this is not possible a range of good practice measures will be employed to manage dust, including the use of water bowsers and spraying of stockpiles with water, limiting the extent of work zones to avoid extensive areas of open trenching and timely reinstatement of roads by the Public Works Department. Sulphur hexafluoride (SF6), a potent greenhouse gas, will be used during the operational phase of the project. A range of design and operational mitigation measures have been proposed to manage the use of SF6 and identify any leaks from equipment.

Soil Contamination

12. 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. Potential soil contamination was also observed at Selaqui SS, Araghar SS and Daulakhera SS. A limited soil sampling exercise at these sites, and other project sites, did not reveal the presence of elevated levels of soil contamination, including polychlorinated biphenyls (PCBs). However, further investigation of this issue will be required during construction to confirm these results. It is possible that without adequate protection measures, soil contamination could occur during the construction and operational phases of the Project through leaks and spills of hazardous liquids. However, application of good practice mitigation measures will ensure that residual impacts are low during construction. Construction of containment measures around transformers and oil storage areas according to national requirements and Good International Industry Practice (GIIP) will further ensure that leaks and spills at substations do not result in highly significant impacts during operation.

Water Environment

13. Construction and operation of overhead power lines is unlikely to have any significant impacts to hydrology. The good practice mitigation measures applied to prevent impacts to soils should also limit any impacts to surface water and groundwater. Open trenches will be shallow and unlikely to impact groundwater, however, the use of oil or bentonite clay as a drilling fluid will be prohibited. A key potential impact identified by stakeholders was the potential for damage to water supply systems during construction of UG cables. During the design phase, the Engineering, Procurement and Construction (EPC) Contractor will identify all water supply systems and water pumps and ensure that alignments avoid any interference with them. However, it is possible that temporary disruptions could occur which will need to be immediately rectified. Permits for any boreholes at substations will need to be secured prior to their installation.

Noise and Vibration

14. Sub-activity sites are in both urban/semi-urban and rural locations. Noise will be generated from the removal and/or cutting of vegetation, during the movement of construction vehicles, the operation of plant, equipment, and machinery on-site, the presence of construction workers at the construction site, temporary worker camps and any overnight accommodation etc. Depending on ground conditions encountered piling could be required for overhead HV power line tower foundation construction (specifically near rivers and marshy areas), resulting in a large increase in noise compared to the background noise level as well as ground vibration. The project activities will create noise impacts and in the absence of mitigation, short term, localized exceedance of noise standards/guidelines may occur although impacts are readily mitigated and reversible with ease in the short term. Keeping work to short durations and the use of temporary mobile noise barriers should reduce the noise levels to acceptable levels during the working day. EPC Contractors will avoid soil compaction, piling, and other vibration inducing activities as much as possible. During the operational phase, corona and transformer hum are not anticipated to be significant, apart possibly from three new substations located close to residential areas. In these locations acoustic enclosures should be placed around the transformers.

Designated Sites of Ecological Importance

15. None of the proposed sub-activities are in notified or draft notified Environmentally Sensitive Zones (ESZ) except for portions of UPCL UG cable works in Dehradun which are in the Rajaji National Park 10km draft notified ESZ buffer and one existing substation. No sub-activities are located within the 10km buffer for non-notified sites except for Kaniya SS and UG cable and two existing substations. However, UG cable works are regulated (allowed) within the ESZ buffer per guidelines. UG cable works in Dehradun are also partially located within the Doon Valley Ecologically Sensitive Area (ESA). The Department of Forests and the Uttarakhand Pollution Control Board have confirmed that for MLV works within the Rajaji National Park ESZ buffer and Doon Valley ESA no official government clearance is required, but written permission to proceed will be obtained by the EPC Contractors prior to the commencement of work.

16. None of the sub-activity sites are located within any other Protected Areas. UPCL UG cable works in Dehradun are located within 1km of Rajaji National Park, but not within it. None of the sub-activities are in critical habitat (as mapped by the UNEP) except for Kaniya SS and UG cable which are in 'likely' critical habitat. No sub-activities are located within a Key

Biodiversity Area (KBA) or Important Bird Area (IBA). UPCL UG cable works in Dehradun are to be excluded from the New Forest Campus KBA and Kaniya SS and UG cable are 250m outside of the Corbet Tiger Reserve KBA/IBA. Three other sub-activities are located within 10km of KBAs. Two of these sites are substations and they are not considered to represent a significant risk to the KBAs. The remaining site is the 1.0km Khatima - Sitarganj LILO. This very short section of OHL is not considered to represent a significant risk to the KBA, or species within it. No sub-activities are located within tiger corridors or elephant corridors. Khatima-II SS and Khatima - Sitarganj LILO are located within 1km of a tiger corridor. Construction and operation of the SS and LILO in this area is not considered to represent a significant risk to tiger movements as the facilities will be in a semi-rural environment dominated by agriculture and residential properties. No projects are in forest areas (Reserve Forest (RF)) requiring forest clearances. One activity (second circuit stringing) is partially located in a RF. Forest clearances were obtained by PTCUL for the existing overhead line and Department of Forests has provided their written approval for the second stringing works. Several other sub-activities are located close to Reserve Forests (closest at 120m) but are not within the RF themselves.

17. To ensure there are no impacts to designated sites of ecological importance UPCL UG cable works in Dehradun must avoid impacts to Rajaji NP and New Forest Campus KBA. To achieve this the following mitigation measures will be applied:

    - A project buffer zone of 100m from Rajaji National Park to be applied by UPCL in approving detailed designs to ensure no encroachment into the protected area from UG cabling works.

    - UPCL cabling works shall not be permitted within 100m of the New Forest Campus KBA.

18. Kaniya SS and UG cable will be permitted within 250m of the Corbett Tiger Reserve KBA/IBA due to the fact the MLV line will be UG.

19. Awareness training for workers will help limit potential construction phase impacts to the Corbett Tiger Reserve KBA/IBA close to Kaniya SS and UG cable, and the tiger corridor and RF close to Khatima-II SS and Khatima - Sitarganj LILO but it is still possible that workers could stray into these sensitive areas due to its proximity to the proposed SS, UG cables and OHL.

Flora and Fauna

20. Habitat loss will occur as land is cleared for site works. For OHL works most of the power lines traverse agricultural and modified habitat and no highly significant impacts are anticipated in these areas. Pithrogarh – Champawat OHL involves installation of an additional conductor on an existing OHL (also referred to as 'second stringing'). As mentioned above, second stringing is permitted in this area with the following conditions applied by the Champawat Divisional Forest Officer (DFO) of the Forest Department of Uttarakhand: a) No new forest land will be utilized, b) No new poles, towers will be constructed other than the approved, c) Stringing of the 2nd circuit line will be done on the double circuit towers already erected, and d) No new tree felling will be done. As part of the original single circuit project a requirement to replant cleared areas within the RoW plantation of dwarf conifers and install bird divertors was specified. PTCUL has paid the Forest Department the required compensation money for the plantation activity and is awaiting the Forest Department to commence the planting whilst the bird divertors are still to be installed. Retrofitting of bird divertors on the existing power line

passing through forest land will be undertaken as part of the Project, to comply with the forest clearance requirement.

21. UG cable alignments (both PTCUL and UPCL) are located within urban areas and follow road alignments. Discussions with UPCL indicate that tree felling is not required during UG cabling works in either Dehradun or Kaniya, although this risk cannot be entirely ruled out. PTCUL have not confirmed this is also the case for UG cabling in Dehradun, although site surveys indicate that tree felling is not likely to be needed. Site survey of routes will be completed by the EPC Contractor during the design phase and adaptive management measures will be applied according to the findings of the surveys, e.g., realignment of route towards road center to avoid tree roots, etc. For the overhead power lines, the only tree cutting anticipated is for trees that are grown as commercial plantation. Most substations are sites on open land. However, some trees are present on substation sites and about 113 trees will need to be cleared for construction. The most trees will be cut at Ladhora SS where up to 90 trees may be affected. Trees will be surveyed to determine the presence of any birds nesting before cutting. Cutting of trees in non-forest land requires a tree cutting permit from the Department of Forests and compensatory plantation to be provided. To ensure no net loss of biodiversity this requirement will be complied with by PTCUL and UPCL.

22. Electrocutions from HV power lines are rare. Nonetheless the project will take a precautionary approach to this issue and will ensure OHL tower designs are adapted to provide additional clearances between live wires and grounded surfaces to accommodate the largest at-risk species identified – the White Rumped Vulture. Electrocutions are more likely on overhead MLV power lines, and two UPCL OHL represent a risk of bird electrocutions (Bharauni SS and Near Collectorate SS). These OHL must be designed to prevent electrocutions using the design measures provided in the Project design phase EMP – these include covered conductors and ensuring that all energized parts at the poles are adequately spaced or insulated.

23. To further reduce the potential for electrocutions on both overhead HV and MLV power lines, it is recommended to identify, and if possible, move carcass dumps away from Project alignments (but not closer to other lines). A two-step approach to this task is required as follows:

    a) UPCL consult with local village heads and any 'skinners' in Bharauni and Near Collectorate to identify the presence of any carcass dumps in relation to the proposed alignments.

    b) If carcass dumps are identified in close proximity (within 500m) of the OHL recommend to the village heads / skinners that the dumps be moved away from the line, but not closer to other lines. It is noted that these recommendations may not be actioned by village heads, or the skinners that use the dumps.

24. In addition, the Project, through UPCL, will provide community awareness raising with the support of an NGO in relation to vulture conservation and the need to avoid carcass dumps near power lines.

25. Diurnal bird species, including vultures and raptors, identified in the project area of influence are at low collision risk. However, certain locations close to overhead HV power lines are more likely to see bird activity, including areas around surface waters, carcass dumps, communal roosts and historic nests. In these areas, the risk of collisions with overhead HV power lines

is greater. Here bird divertors (markers which make the OHL more visible) are recommended. The assessment has identified all locations on overhead HV power lines over 3km where bird divertors are required due to their locations close to or above surface water. They shall be spaced at 10m intervals and designed and installed according to Central Electricity Authority (CEA) guidelines. It is vitally important that the bird divertors are placed on the earth line on the top of the tower. According to some reports, this can reduce collision accidents by 50-85%. Bird diverters shall also be included in all RF land through which the Pithrogarh – Champawat line (second stringing) passes to comply with the original forest clearance. During the detailed design phase, the EPC Contractor shall also complete a survey of the lines to identify any carcass dumps, communal roosts and historic nests close to the site. In these areas bird divertors will also be added.

Occupational and Community Health and Safety

26. A range of hazards can affect occupational and community health and safety, including electrocution at sub-activity sites, substations, OHL, etc., accidents at worksites, e.g., falling into excavated areas, pedestrian – vehicle accidents, etc. There is also potential for electromagnetic field (EMF) exposure to impact people living and working to close to live electrical equipment, especially high voltage substations and OHL. A range of mitigation measures have been provided to help manage the risk of accidents occurring and the impacts of EMF. However, despite these measures it is still possible that accidents could occur due to unforeseen circumstances. Training of workers and communication with the local community will be a key activity in the pre-construction and construction phases to ensure that they are informed about the risks relating to worksites and live electrical equipment. Ensuring safety clearances are respected around project infrastructure should ensure that EMF impacts are not significant.

Removal of Streetlights and Impacts to Sidewalks/Roads

27. Removal of streetlights and impacts to sidewalks during construction was identified as a key issue by stakeholders in Dehradun. Many streetlights are attached to UPCL poles which will eventually be removed by UPCL once UG cable works are completed. Stakeholders also noted that on-going open trenching works in Dehradun were often poorly managed with open trenches in sidewalks/roads being left open for long periods, and final rehabilitation of the sidewalks/roads after closing of the trenches taking months to complete. Keeping poles in-situ for at least six months should help the city transition to new streetlights, but it is still possible that streetlights may not be replaced after this time without the cooperation of the high-level committee to ensure reinstatement of utilities etc. High-level committee coordination and agreements on the timely reinstatement of sidewalks/roads with the Public Works Department are required to ensure there is no more than a 15-day period after construction works are completed to complete final rehabilitation.

Geohazards

28. Uttarakhand is seismically active and all physical components are located in Seismic Zone IV, a high risk for earthquakes. Flood risks were identified at several existing UPCL substations however, landslide risk is generally low for most of the sub-activities which are located in flat areas. Exceptions are the second stringing line and its connecting substation, Lohaghat SS and one existing UPCL substation located at higher elevations in steep terrain. Forest fires are reported at Pines SS, an existing UPCL substation. Other sub-activities close to forest areas could also be at risk. Design measures have been included to account for these

potential issues, however, floods, landslides and forest fires are all potential issues which, despite adoption of good practice mitigation measures, may continue to occur and affect the project infrastructure in the future mainly due to climate change, e.g., increased temperatures, drought and extreme rainfall events.

Consultations

29. Stakeholder engagement has been undertaken throughout the development of the Project, with the view to determining and responding to the views of interested stakeholders and persons potentially affected by the Project, and to ensure open and transparent, two-way communication between UPCL, PTCUL and their stakeholders. To date for environment and social safeguards over 75 different consultation sessions, held in 39 locations (*Gram Panchayat*) with 560 people. These consultations have been undertaken in 2022 and 2023 for components 1 and 2 as follows:

    - PTCUL HV Substation Consultations: 10 sessions comprising 105 people
    - PTCUL HV OHL Power Line Consultations: 11 sessions comprising 180 people
    - PTCUL HV OHL Power Line Consultations with *Gram Panchayats*: 8 sessions comprising 85 people
    - UPCL Existing Substations: 17 sessions comprising 30 people
    - UPCL UG cables, Dehradun: 23 sessions comprising 27 ward members as representatives of affected people
    - UPCL UG cables, Dehradun Multi-stakeholder Consultation: 1 session comprising 40 people mostly Ward member representatives of affected people (Each ward member representing an average of 5,000 people).
    - UPCL UG cables, Dehradun: One site walkover session consulting with 35 residents and business owners.
    - UPCL New Substations: 3 sessions comprising 36 locals.
    - Divisional Forest Officer (DFO) Champawat (12 December 2022) and Dehradun (25th November 2022) as well as the Wildlife Institute of India and the Archaeological Survey of India.
    - No record is available of the balance of persons who have been consulted per the total.

30. Out of the 560 people consulted 303 or 54% were women.

31. Key issues raised during the consultation sessions relate to management of community health and safety issues, project employment opportunities, consultation with utilities prior to the start of works, ensuring footpaths are rehabilitated in a timely manner, providing streetlights where poles are removed in Dehradun, requirement for a coordination committee to keep the local community in the loop, ensuring that the GRM is established and communicated with stakeholders, and implementing works when they are less likely to affect receptors, e.g. works outside schools undertaken during holidays. Stakeholders also requested that consultation

continues throughout the project implementation phase. These concerns raised by stakeholders have been incorporated into the mitigation measures included as part of the Project EMP.

Conclusions and Recommendations

32. This IEE has established that, except for the residual impacts mentioned above, there are no significant environmental issues that cannot be either totally prevented or adequately mitigated to levels acceptable to the national standards and international guidelines for project activities. Mitigation and monitoring measures have been included in the Project Environmental Management Plan (EMP) incorporated into the IEE. PTCUL, UPCL and UREDA will implement the EMP measures ensuring adequate budget and human resources are allocated to this. UPCL and PTCUL will also complete the activities outlined in the Corrective Action Plan (CAP) for existing substations, per the timetable included in the CAP.

33. The Project EMP, its mitigation and monitoring programs, will be included within the bidding documents for project works for all Project components of PTCUL, UPCL and UREDA with physical works involved. The bid documents will state that the EPC Contractor will be responsible for the implementation of the requirements of the EMP allocated to them (including specific design phase actions) and preparing their own Construction Specific EMP (CSEMP) which will adopt all the conditions of the EMP and add in site specific elements that are not currently known, such as the EPC Contractor's storage and camp locations. This ensures that all potential bidders are aware of the environmental requirements of the Project and its associated environmental costs. The EMP and all its requirements will then be added to the EPC Contractor's Contract, thereby making implementation of the EMP a legal requirement according to the Contract.

34. The EPC contractors will then prepare their detailed designs and CSEMP which will be approved and their works supervised and monitored. Before the detailed designs are approved the IEE will need to be updated to reflect the final cable routes, reviewed and cleared by ADB for disclosure on the ADB website and locally. Should PTCUL, UPCL or UREDA note any non-conformance with the EMP (and CSEMP) the EPC Contractor can be held liable for breach of the contractual obligations of the EMP. To ensure compliance with the CSEMP the EPC Contractor is required to employ an Environmental and Social Officer and team of safeguards experts to monitor and report Project activities throughout the construction phase. Project implementation supervision consultants will also include environment, health and safety experts to support supervision and monitoring of Project EMP implementation and to build the capacity of PTCUL and UPCL.