

## EXECUTIVE SUMMARY

1. The Government of India has requested the Asian Development Bank (ADB) to finance a project with Power Department of Sikkim (PDS) Government of Sikkim (GoS) comprising strengthening of the power system network to meet future electricity demand growth and to improve the quality and reliability of the power supply to its consumers, while facilitating efficient utilization of the state's hydropower and renewable energy resources. The project seeks to improve power supply to consumers in Sikkim through three outputs (i) distribution system strengthened, modernized, and climate proofed; (ii) service delivery, institutional, and operational management capacity strengthened; and (iii) gender and socially inclusive energy-based livelihood activities promoted.

2. Under Output 1 of this project, to increase the capacity of substations and power lines, improve power quality, reliability, and climate and disaster resilience, and reduce aggregate technical and commercial (AT&C) losses, the project will (i) augment, modernize and renovate existing substations and feeder terminals; (ii) renew, reconstruct and augment 11kV distribution lines; (iii) improve power delivery capacity and reliability of the low voltage distribution network by replacing (a) distribution transformers, and (b) existing old bare low-tension lines with new overhead and underground distribution lines; (iv) use supervisory control and data acquisition (SCADA) for integrating all substations; and (v) add network devices such as auto-reclosers and fault passage indicators for reliability improvement. The project will also install public street lighting systems. Under Output 2, the project will establish centers for real-time monitoring of distribution system and improved power management whilst Output 3 will provide economic opportunities to rural women from women-led self-help groups through customized renewable energy systems and support 24 primary health centers by providing solar energy and energy efficient electrical equipment. The scope of the physical works and goods supplied includes: (i) augmentation, renovation and modernize of 1 existing substation of 132/66 kV and 25 existing substations of 66/11 kV (total 26 existing substations); (ii) renovation and modernization of 25 existing 11/11 kV feeder terminals and construction of 8 new ones; (iii) installation of 1,350 ckm of 11 kV distribution lines including reconductoring of 106.5 ckm bare to covered conductors, reconstruction of 580.7 ckm with bare overhead lines, reconstruction of 384.5 ckm with covered conductor overhead lines, and construction of 279 ckm of new underground cables in urban areas – if reconstructing or replacing existing overhead lines the old conductors and poles (as applicable) will be removed -- plus installation of 59 ring main units (RMU) associated with underground cabling works, fault passage indicators and auto reclosers; (iv) installation of about 1,325 ckm new low tension (0.4 kV) distribution lines (about 850 ckm bare overhead lines, 100 ckm aerial bunched cable, and 375 ckm underground cables) plus installation of 35 new compact (package) substations, 425 new oil cooled and dry type transformers including ground mounted ones, and, renovation of 2,325 existing transformers in-situ across the entire state; (v) construction of one backup state load dispatch center (SLDC) facility at the Lower Lagyap Hydropower (LLHP) substation complex near Gangtok in Lagyep; (vi) supply of testing and maintenance equipment for substations, conductors, and meters, equipment to be used within existing PDS premises; (vii) internal fit out of an existing premises for a customer care center; (viii) construction of one command-control center within the premises of the existing PDS head office in Gangtok, (ix) provision of 15,000 LED street lights to replace existing ones, and (x) provision of customized renewable energy systems to support rural women's livelihoods and 24 primary health subcenters with solar energy and energy efficient electrical equipment as part of a community-based intervention. Of these components (vi), (vii), (ix) and (x) are anticipated to have minimal or no environmental impacts with the other components needing to be subject to further environmental assessment.

3. ADB will finance these components through a project loan. Successful implementation of the project will improve the power supply to residential, agricultural, industrial, business/commercial and other customers in the state whilst ensuring the power system is climate and disaster resilient and renewable energy ready. The executing agency and implementing agency for the project will be PDS. It will be implemented over five years starting 2024 with a completion date by December 2029 although construction works are anticipated to complete within 36 months.

4. This initial environmental examination (IEE) is prepared in compliance with ADB's Safeguard Policy Statement (2009), taking into account the environment, health and safety requirements of Government of India and GoS. As per ADB's Safeguard Policy Statement (2009), the project is categorized as B for environmental safeguards and therefore an IEE was required. The project is categorized B because its components are unlikely to cause significant adverse irreversible, diverse or unprecedented environmental impacts due to the facts that: (i) no components will be in, or pass through protected areas (PAs), ecologically sensitive zones (ESZ) of protected areas, the core zone and buffer of the Khangchendzonga UNESCO Man and Biosphere (MAB) reserve and World Heritage Site ('the UNESCO site'), or the protected or regulated zones of Archaeological Survey of India (ASI) monuments; (ii) only powerlines and their related equipment will be in, or pass through, Reserved Forests (RFs), and then only if a written no objection (NOC) and, if required, forest clearance has been granted by the Forest and Environment Department of Sikkim; (iii) for powerlines and their related equipment in, or passing through, Reserved Forests (RF) or Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs) only covered conductors or underground cables within pre-existing powerline or road Rights of Way (RoWs) will be laid, requiring no access track construction, and only as long as site-specific biodiversity assessment demonstrates that any significant adverse impacts can be avoided; (iv) powerlines and their related equipment in natural habitat will only be installed where significant conversion or degradation of natural habitat can be avoided, and in the UNESCO site transition zone where significant adverse cultural heritage impacts can be avoided; (v) new feeder terminals sited in KBA and IBA or on natural habitat will only be installed where critical habitat requirements are met, significant conversion or degradation of natural habitat can be avoided, and in the UNESCO site transition zone where significant adverse cultural heritage impacts can be avoided; and (vi) there will not be any major, large-scale civil or structural works involved (civil works include foundation installation, new building construction, new pole erection and mechanical or manual underground cable trenching), with most works electrical and mechanical. Construction of a new building of up to five floors for the SLDC and one of up to three floors for the command-control center will be the largest civil or structural works. Overall pre-construction, construction, operation and maintenance of the project is likely to give rise to direct, indirect, and, induced environmental impacts that are mostly moderate/medium to 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, as well as wildlife sensitive design features e.g., adequate spacing and insulation on distribution lines to prevent electrocution. The selection and design of new 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. This IEE has been prepared to document the environmental impacts of the project, define the measures required for the mitigation and monitoring of those impacts, and includes the environmental management plan (EMP) for implementation.

5. The State of Sikkim supports very high biodiversity values, including many PAs, associated ESZs, RFs, KBAs including IBAs most of which, though not all, fall within PAs or RFs, three ecoregions which hold unique assemblages of species, and a very large number of restricted-range/endemic species. Overall, the State of Sikkim therefore qualifies as critical habitat. Direct habitat loss and degradation, especially the loss of forest habitat, is the main concern with respect to potential impacts on these high biodiversity values. None of the existing substations, existing or new feeder terminals, the SLDC or the command-control center are located inside the PAs, their ESZ, the UNESCO core/buffer zone, or RFs. The existing Perbing substation is the closest substation to a protected area at 310m but is situated outside of its ESZ. However, the existing Melli substations (132/66 kV and 66/11 kV with a new transformer/bay) is inside the Lowland forests of South Sikkim KBA and the existing Maltin and Lachung substations are inside the Dombang valley-Laching-Lema-Tsungthang KBA. Among the existing feeder terminals, Temi, Rimbi and Legship are inside KBAs. However, all works at these existing sites including for the new transformer/bay to be installed at Melli 66/11 kV substation will be undertaken inside their boundaries such that no significant habitat loss will result. For the new feeder terminals, Chungthang, Turuk Sadam, and Pangthang are inside KBAs but outside of PAs or RFs. Both Chungthang and Turak Sadam are in modified habitat, some vegetation needs to be cleared but no trees will be cut, and no significant habitat loss will result. Panthang (a 1200 sqm compound, requiring landfilling and cutting of about 7no. trees, a defunct park area with park benches and sheds between trees) as well as the new feeder terminals at Rumbak (a 4000 sqm compound, requiring cutting of about 15no. trees, in-between trees cardamom is being cultivated) and Darap (a 1000 sqm compound, requiring landfilling and cutting of about 15no. trees, in-between trees cardamom is being cultivated) are sited in natural forest habitat, albeit degraded to varying extents. Site walkovers and consultations did not identify any flora or fauna species of high biodiversity value, and, although 6200 sqm of natural, forest habitat will be lost, as it is all degraded, this is not considered significant in the context of Sikkim where forest covers 44% of the land. The SLDC and command-control center are both on modified habitat, supporting no vegetation, such that no habitat loss will result. Works at all sites in and within 500m of areas of high biodiversity value (PAs and their ESZ, the UNESCO core/buffer zones, RFs and KBAs) and supporting natural habitat will be carried out following ecological survey to reconfirm no species of high biodiversity value are supported, and under ecological supervision to minimize disturbance. Compensatory reforestation will be provided per government norms for any trees cut. In total across the substations, feeder terminals, the SLDC or command-control center sites about 50 trees (none of which will be private trees) are anticipated to be felled for construction of the new feeder terminals; the replacement ratio of 1:10 trees cut means about 500 trees will be planted, to ensure no net loss of biodiversity by the project.

6. Sikkim also supports many sites of cultural importance including the Khangchendzonga National Park UNESCO site which is designated for both its biodiversity and cultural heritage value. No ASI monuments are located within 1km of any substations, feeder terminals, the SLDC or command-control center sites and all these components are located out of the UNESCO World Heritage Site core and buffer zone as well. The nearest nationally protected ASI monument to these components is the Radbentse ASI monument of the ancient capital of Sikkim, this is in Gyalshing at 1.1 km from Gyalshing substation. The existing feeder terminal sites at Reedang, Rimbi and Lingmoo are located inside the transition zone of the UNESCO site, as is the new feeder terminal at Darap. However, all works at the existing sites will be undertaken inside their boundaries whilst no physical cultural resources have been identified at Darap during the site walkover or consultations such that no significant adverse cultural heritage impact will result. A written no objection will be obtained from the Forest and Environment Department of Sikkim as the UNESCO site manager for all feeder terminals in the UNESCO transition zone. During

construction, chance find procedures will be adopted. Once constructed, the substations, feeder terminals, SLDC, command-control center will have minimal impact on both biodiversity and cultural heritage resources.

7. The detailed route alignments of the various distribution lines will be determined by the contractors, upon mobilization but in principle the PDS and their contractors will adopt to: (i) avoid completely Government of India PAs, ESZs of PAs, the core and buffer zone of the UNESCO site, and the protected and regulated zones of Archaeological Survey of India (ASI) monuments; (ii) in, or passing through RFs, power lines and related equipment will only be installed if a written no objection and, if required, forest clearance has been granted by the Forest and Environment Department of Sikkim (iii) in, or passing through, RFs, KBAs and IBAs only covered conductors or underground cables within pre-existing powerline or road RoWs will be laid, requiring no access track construction, and only as long as site-specific biodiversity studies demonstrate that any significant adverse impacts can be avoided; (iv) in natural habitat new power lines and their related equipment will only be installed where significant conversion or degradation of natural habitat can be avoided; (v) in all other locations, existing alignments and/or the road ROW will be used wherever available; and (v) avoid or minimize damage to existing trees, especially private trees, locally important physical cultural resources, properties and public utilities encroaching into existing RoWs, ensuring safety clearances are maintained, rerouting/micro-siting as needed, and avoiding passing over school compounds or playgrounds. Installing underground (UG) cables and conversion of existing bare conductors to covered conductors (CC) and aerial bundled conductors (ABC) shall be helpful in reducing existing electrocution risks to wild animals; undergrounding will also avoid collision risks for birds and bats; on the contrary new bare conductors will increase electrocution and collision risks especially if they are in proximity to areas of high biodiversity values (PAs, ESZ of PAs, the UNESCO site core/buffer zones, RFs, KBAs, and IBAs) or unprotected forest habitat. Screening has confirmed that none of the new and existing 11kV route alignments are passing (or will pass) through PAs, or their ESZ, although some are in close proximity to the ESZ. Those 11kV powerlines that were in original scope but found to pass through PAs or their ESZ were removed from the scope. Screening also confirmed the new and existing 11kV route alignments do not pass through the UNESCO site core/buffer zone or within 300m of ASI monuments. Since they have not been mapped yet, most LT lines, RMUs, CSS, and DTRs, cannot be screened but PDS will ensure they are taken out of the Project scope if any are found to be in, or passing through, PAs, ESZs of PAs, the core or buffer zone of the UNESCO site, or the protected and regulated zone of ASI monuments during implementation. Some 11kV and LT lines, however, pass through RFs, KBAs, the UNESCO transition zone, and natural habitat. For powerlines confirmed by route survey to pass through RFs and KBAs, only covered conductors or underground cables will be used and those in RFs will only be taken up once a no objection/forest clearance has been granted by the Forest and Environment Department of Sikkim. If bare conductor is the only economically feasible option, or clearances or permissions are not forthcoming, they will be dropped. Once the distribution lines have been mapped by the contractors those not meeting criterion (i) and (ii) will be immediately dropped. For those power lines found to fall in or within 500m of areas of high biodiversity value or in natural habitat, per criterion (iii) and (iv) site-specific biodiversity assessment and management planning with ecological survey and full time ecological supervision, by an ecologist experienced in taxonomy/botany of Sikkim, will be undertaken with rerouting outside the high biodiversity value area/natural habitat, placing the power lines underground or using covered or in place of bare conductors to avoid significant adverse impacts. All storage areas and any labor camps will be located inside existing substations or outside of the high biodiversity value area/natural habitat. For those in the UNESCO site transition zone, per criterion (v) site-specific cultural heritage assessment and management planning in consultation with local communities and Forest and Environment Department of Sikkim will be undertaken, a written no objection will be obtained from

the Forest and Environment Department of Sikkim as the UNESCO site manager for all power lines in the UNESCO transition zone. During construction, chance find procedures will be adopted.

8. Since the distribution routes assessed are only indicative and will not be finalized until the contractors are on board, during project implementation site-specific assessment checklist and consultation proformas will be completed by the contractors, then this IEE and EMP will need to be updated and cleared by ADB with any government clearances or permissions obtained before routings are approved by PDS and works commence. For the IEE, site visits (reconnaissance surveys) to sample 11kV and LT distribution lines were conducted based on a district environmental sensitivity matrix developed for the project. Approximately 229 ckm (17%) or 57 number (8%) of 11 kV lines (including bare conductor, covered conductor, and underground cable routes) out of a total 1,350 km and 120 ckm (9%) of 0.4 kV LT lines out of a total of 1,325 km of low-tension lines (including bare conductors, ABC, and underground cables) were surveyed. Critical habitat-qualifying flora and fauna species may occur along the distribution lines. The key mitigation measure will be pre-construction ecological checks along all routes for Critical Habitat-qualifying species by an ecological team including a skilled taxonomist/botanist familiar with the endemic species of Sikkim, followed by re-routing/micro-siting of all infrastructure to avoid such species, prior to tree cutting or earthwork. These checks will also involve consultation with local communities since there are many individual trees of cultural heritage value to the local communities/Indigenous Peoples that must not be cut or damaged. In addition, mitigation will include prohibiting poaching and firewood collection by construction workers and the adoption of engineering designs that minimize wildlife electrocution risks. For all distribution lines, the District Forest/Range/Block Officers will be actively engaged by PDS and the contractors throughout project implementation. A wildlife identification and rescue protocol will be adopted by the contractors, to be further developed in consultation with forest and wildlife officials as per site-specific requirements with all vegetation clearance and earthworks undertaken under ecological supervision. In total about 1450 trees (all public, no private trees) are estimated to be felled for the distribution line components of the project. The replacement ratio of 1:10 trees cut means about 14,500 trees will be planted, to ensure no net loss of biodiversity by the project. PDS has confirmed that no private trees will be felled, unless unavoidable, and those felled will be compensated as per the RIPP/entitlement matrix. Though local physical cultural resources were identified along the sample distribution lines, none were observed that would be directly impacted. However, the works will be supervised with fencing used, if required, to avoid damage to those adjacent to the route alignment. Many existing distribution lines to be reconducted, especially LT lines, were observed to be passing over houses/hotels/shops with poles located in private compounds whilst some were seen to cross/run near school compounds. Many poles were also located on steep land on hillsides. To uphold safety clearances and minimize community health and safety risks during operation, rerouting is required as part of reconductoring works with great care taken and appropriate health and safety measures implemented in dismantling the existing conductors.

9. Potential environmental impacts were identified in relation to the design, location, construction, operation and maintenance of the distribution infrastructure and mitigation measures have been developed in respect of all temporary environment impacts identified. Potential construction impacts relate to disturbance of land in the new feeder terminals, the SLDC, and command-control center footprints and the ROWs of new distribution lines as well as adjacent communities, with pollution, health and safety risks to workers and the community if the construction activities are not well managed by PDS and their contractors. The most significant impacts are traffic congestion, noise, and dust in urban areas, and at sites with new building construction and occupied properties adjacent. For underground cabling in roadways rolling

construction method including traffic controls and prompt restoration (under the scope of PDS contractors) will minimize disruption. Pollution, health and safety risks to workers and the community will remain during operation and maintenance works. It was identified that occupational and community accident records are not kept, there was at least one non-fatal electrocution in the past year, and the standard operating procedures of PDS for health and safety are basic. The environmental audit for 26 existing substations did not identify any transformers containing PCB oil, based on assessment against United Nations Industrial Development Organization (UNIDO) guidance. However, the project includes renovation of 2,325 existing transformers in-situ which may contain PCBs. Transformer oil will be tested for PCBs and any handling, temporary removal, packaging, labelling, storage, transport, and reinstatement on fenced, banded plinths of 110% capacity for ground-mounted transformers will be done by the contractor in accordance with international good practice and the Government of India's regulations with any PCB containing transformers dechlorinated or disposed of in an environmentally sound manner. The Government of India regulations require PDS to complete the de-chlorination or the removal of all PCB-contaminated transformers before 31 December 2025.

10. Small informal group community consultations (related to environmental and social concerns) were conducted during preparation of this IEE report at existing substations, feeder terminals, SLDC, command-control center site and along sample distribution line routes under the project. In total 316 participants (42% female and 58% male) were consulted. The consultations were held in February 2023, May 2023, and November 2023 and included Dzumsa/IP areas. Consultations were not possible for some rural substations, being in more isolated locations away from village centers. No significant environmental and social concerns were raised, although in rural areas existing unemployment, major power cuts, no power in some remote areas, surface water runoff into private land and water availability issues were reported. Indigenous Peoples also raised the presence of individual trees of cultural heritage value that needed to be avoided. Overall, all consulted were looking forward to the benefits of improved electricity services. This IEE report will be made available by PDS to the public and will be disclosed to a wider audience locally (with executive summary translated into Nepali and other Sikkimese languages) via the PDS website, PDS offices (Headquarters, Circle and Division), all 26 existing substations and 25 feeder terminals, and new construction site offices. The consultation will be continued during implementation to ensure all interested stakeholders and affected local communities are fully engaged, have an opportunity to raise any concerns to PDS and the contractors, and can be informed of the development and implementation of final routings of distribution lines, etc. To address project specific issues from affected persons, a Grievance Redress Mechanism (GRM) will be established by PDS starting at site level, the details of which will be disseminated to local communities.

11. An EMP has been prepared which includes: (i) corrective actions for existing facilities i.e. 26 existing substations and 25 feeder terminals; (ii) mitigation measures for environmental impacts during design/pre-construction, construction and operation stages under the project. It also take into account biodiversity and physical cultural resource measures, the high seismic, landslide and flood risk of the state, and climate change adaptation measures; upholding safety clearances especially where existing lines pass over houses rerouting as needed, and avoiding passing over school compounds or playgrounds; adhering to electromagnetic field (EMF) exposure, dust and noise guideline levels; ensuring drinking water quality for workers; approving contractor's wildlife identification and rescue protocol, pollution prevention, solid and hazardous waste management, and health and safety management plans prior to works; prohibiting PCB use in new transformers and asbestos containing materials in construction; and, community awareness raising activities by PDS and the contractors on the health and safety risks of

distribution infrastructure; (iii) an environmental monitoring plan, including monitoring of health and safety incidents; (iv) institutional arrangements including capacity building; and (v) the EMP budget required during implementation of the Project. The responsible entity for mitigation, monitoring, and reporting is PDS. Mitigation measures will be assured by a program of environmental supervision and monitoring to be conducted during the construction and operation stages. Any unanticipated impacts or requirements for corrective action during implementation of the project will be reported by PDS to ADB.

12. PDS will establish an environment and social management unit initially as part of the project management unit to support EMP implementation, supervision, and monitoring during both construction and operation. This will be staffed with two staff for environment, and two staff for health and safety with the project implementation unit (PIU) having adequate numbers of field staff acting as environment, health and safety supervisors to undertake day-to-day supervision. Given the limited capacity of PDS, to assist with site-specific assessment and provide on-site support, as well as capacity building and trainings a Project Implementation Consultant (PIC) will include an environmental specialist, ecologist, health and safety experts with professional certification, labor officer and adequate numbers of residential EHS supervisors. The PIC will also provide expert capacity building and support in relation to specialist topics such as critical and natural habitat assessment, wildlife sensitive design features, PCB management etc. Further, the Engineering, Procurement and Construction (EPC) Contractors will be required to have suitably qualified and experienced, dedicated full time on-site counterpart staff including an (a) Environment Manager; (b) Health and Safety Manager with professional certification supported by several health and safety stewards on-site; (c) Labor Manager; and (d) Ecologist since commencement to closure of the Project. Given the biodiversity and cultural heritage values involved and the large transformer rehabilitation component they will need to adequately budget for and ensure they have sufficient environmental expertise available to be able to address all of the EMP requirements. The PIC will help PDS to develop standard operating procedures (SOP) addressing the environment, health and safety impacts and risks of its operational substations, feeder terminals, SLDC, command-control center, and maintenance of these facilities and the distribution lines, including recording of any occupational and community health and safety incidents.

13. This IEE including the EMP are considered sufficient to meet the environmental assessment requirements of ADB for the project. However, as it is based on an indicative route alignments for only a sample of the new and existing 11kV and LT distribution lines with locations of RMU, DTR, and CSS still to be determined; it will need to be updated after mobilization of EPC contractors and finalization of the route alignments. Following detailed route surveys of distribution lines, updating can be done in a phased manner during implementation of the project. The commencement of works in respective sections of distribution lines shall only be taken up upon clearance of updated IEE / addendum to IEE report by ADB. Further, the IEE and EMP will also be updated and revised, if necessary, if there are any unanticipated impacts including a scope or design change. Any changes to the IEE and EMP will be subject to ADB review, clearance, and disclosure.