Section 7. Terms of Reference

Project Supervision Consultant

Proposed Power Transmission and Distribution Efficiency Enhancement Project (Phase 2)

1. Background

1.1 The majority of the distribution networks in major urban centers including Kathmandu Valley were created decades ago and despite significant increase in electricity demand and the number of consumers, minimal reinforcement of the networks has been carried out. Despite the significant increase in electricity demand and the number of consumers, no systematic reinforcement of the distribution network has been carried out for more than a decade. Hence, a massive reinforcement and modernization of distribution networks is required to enhance the distribution capacity and improve reliability and quality of electric supply in the major urban centers including Kathmandu valley by reducing distribution system overloads and losses and by enhancing operational efficiency. In this backdrop, ADB has provided financing under for the Power Transmission and Distribution Efficiency Enhancement Project (PTDEEP). The project will contribute to Nepal's distribution system reinforcement in the Kathmandu Valley and other major urban centers by scaling up distribution system efficiency and reliability, facilitating adequate power supply to meet ever-growing energy needs of the valley, increasing service reliability of the utility and building capacity for the overall distribution system development.

1.2 Aimed at increasing reliability and distribution capacity of the grid and access to grid electricity, the loan under PTDEEP finances the following subprojects:

a. 220 kV Substation at Lapsiphedi and 132 kV Substation at Changunarayan

b. 132 kV Substations at Kathmandu Valley

c. Enhancement of Distribution Network in Kathmandu Valley:

c1. Enhancement of Distribution Networks in the Central and Northern Region of Kathmandu Valley

c2. Enhancement of Distribution Networks in the Eastern and Southern Region of Kathmandu Valley

1.3 Nepal Electricity Authority (NEA) is the Executing Agency (EA) for the project. The term "NEA", "EA" and "the Employer" have the same meaning and may be used interchangeably in this document depending on the context.

1.4 All subprojects listed in 1.4 shall be collectively referred to hereafter in this document as "the Project".

1.5 The engineering design, supply of plants and equipment, construction, installation, testing and commissioning of transmission lines and associated substations, communications and protection facilities for all subprojects of the Project is being completed through turn-key contracts awarded to contractors following ADB's Procurement Guidelines.

1.6 ADB is providing loan support for project supervision consulting services from November 2017 to December 2026 to above subprojects and Kathmandu Valley West Distribution System Enhancement Project, Lalitpur-Bhaktapur Distribution System Enhancement Project and Pokhara-Bharatpur Distribution System Enhancement Project. Due to various reasons the project completion has been delayed. Hence, Project supervision Consulting services (Phase 2) which is under loan support of ADB to assist and support NEA for the subprojects of the Project and prepare required supervision, monitoring and reporting documents for all subprojects listed above to complete the remaining consulting works from October 2025 onwards has been envisioned.

1.7 The project shall be handed over by the consultant of the first phase to the consultant of this phase from September 2025. The consultant of the second phase shall continue and enhance (if required) after diligent analysis to support projects to complete on time.

1.8 NEA seeks through this TOR to engage a team of Project Supervision Consultants (PSC) through a firm in accordance with ADB's Guidelines on the Use of Consultants by Asian Development Bank and Its Borrowers to supervise and implement the Project. The Project is implemented such that the efficiency of the distribution system is improved; distribution capacity is enhanced; reliability of the distribution system is enhanced and the overall operational efficiency and financial performance of the distribution centers is improved. This team will continue assignment for consulting works in cooperation (if required) and in continuation to the assignment works by the consultant for PTDEEP PSC.

1.9 The team of consultants is referred to hereafter as "the PSC" or "the Consultant". The term "PSC" and "Consultant" may be used interchangeably in this document depending on the context. The services of the PSC are hereafter referred to as "the Services".

1.10 This document sets forth terms of reference (TOR) for the Services.

2. Objective of the Assignment

2.1 The services aim at providing high quality professional services to assist NEA in supervising and implementing the Project and to ensure that the Project will be completed according to the schedule and that the completed Project will deliver the quality, capacity, performance, reliability and economic life as required by the Employer's requirement defined in the turnkey contracts with the contractors.

3. Scope of the Services, Tasks (Components) and Expected Deliverables

3.1 Scope of the Services

The PSC is expected to deliver the Services for:

a) Project supervision of subprojects in 1.4;

In addition to the above subprojects, PSC is to deliver services for

i. Kathmandu Valley West Distribution System Enhancement Project
ii. Lalitpur Bhaktapur Distribution System Enhancement Project
iii. Pokhara-Bharatpur Distribution System Enhancement Project

However, local supervision is not required for Lalitpur Bhaktapur Distribution System Enhancement Project and Pokhara-Bharatpur Distribution System Enhancement Project

3.2 Detailed Tasks

The PSC's detailed tasks are as follows:

3.2.1 Project supervision

3.2.1.1 For each and all turn-key contracts for the Project, the PSC shall review and advise the NEA on approval of the contractor's detailed design in accordance with the Employer's requirements and technical specifications in the contract.

3.2.1.2 For each and all turn-key contracts for the Project, the PSC shall provide oversight of all aspects of the construction in order to ensure that it is conducted properly in accordance with the contract.

3.2.1.3 To ensure quality in project implementation, the PSC shall develop and implement a Quality Assurance Program (QAP). The QAP shall ensure that the plants and equipment supplied and installed meet the performance standards and technical characteristics of the technical specifications. The QAP shall cover all aspects of the project implementation including review and approval of design; quality of works during construction; monitoring schedule; inspection of materials before shipment, upon arrival and upon erection; review of documents to assure quality of delivered goods and comparison of as-built drawings to design. Furthermore, shortcomings in any of the aforementioned areas shall be addressed adequately by QAP.

3.2.1.4 For each and all turn-key contracts for the Project, the PSC shall supervise the testing and commissioning. All components of the lines, substations, SCADA, communications and protection will be subject to an acceptance test to demonstrate their capability to meet warranted design criteria. For each component subject to test, the Consultant will review the contractor's test procedures for compliance with manufacturers' requirements and design criteria. The Consultant shall witness the tests and review the test results. If test results

are not satisfactory, the consultant shall ensure that any lack of compliance is addressed and that the equipment and overall systems shall be re- tested until compliant results are achieved. During the commissioning phase, the Consultant shall provide training on the testing and commissioning of all aspects of the project. The Consultant shall assist NEA in this phase of the project and coordinate with the Contractor in addressing any issues with the project components that are unsatisfactory. At the end of this period, and when all acceptance tests have been completed to the Consultant's satisfaction, the Consultant will advise NEA that the construction is complete, and all the project components are ready to be declared fully operational. The Consultant shall also prepare and recommend a provisional taking over certificate whenever due for the works or part of the works and alert NEA of work deficiencies and outstanding items, if any. The Consultant shall also confirm the remedial measures taken by the contractor and recommend a final taking over certificate after expiry of the warranty period.

3.2.1.5 The PSC shall hand over the completed Project including issuance of completion certificates, provisional acceptance and final acceptance certificates to NEA.

4. Team Composition &Qualification/ Experience Requirements for the Experts and their Responsibilities

4.1Team Composition

It is estimated that in total 144 person-months of services are required with 52 person months from international experts and 92 person months by national non-key experts. Details on expertise and person month requirements are in Table 1. The international expertise should be provided by a consulting firm specializing in designing the transmission and distribution networks reinforcement and expansion in partnership with national firm(s) and/or individual national consultants in Nepal.

The experts are expected to be intermittent or stationed on the field as per the requirement of the sub-projects.

Table 1: Expertise and person month inputs

Expertise	No of PM	Total REM	Total REM
		Field	Home
A. International Consultants (Key Experts)			
1. Team Leader/ Substation Engineer- Electrical	12	11.5	0.5
2. Distribution Automation/Smart Grid Expert	12	12	0
3. SCADA/Communications Engineer	4	4	0
4. Civil Engineer	12	11.5	0.5
5. Environmental Safeguard Specialist	6	0.5	5.5
6. Social Safeguards Specialist	6	0.5	5.5
Sub Total- A	**52**	**40**	**12**

B. National Consultant (Non-key)			
1. Substation Engineer (3 number)- Electrical	36	36	
2. Distribution Engineer - Electrical (2 nos)	24	24	
3. Civil Engineer (3 number)	24	24	
4. Environmental Safeguard Specialist	4	4	
5. Social Safeguards Specialist	4	4	
Sub Total-B	**92**	**92**	**0.00**
Total (A+ B)	**144**	**130**	**12**

4.2 Qualification/Experience Requirements for the Experts

4.2.1 International Experts

a) **Team Leader and Substation Engineer-Electrical** shall have preferably Master's Degree in Electrical Engineering/High Voltage Engineering, preferably with more than 15 years of experience in design/construction supervision of transmission and distribution substations. The expert shall also have experience in designing GIS substations of 132kV or higher voltage class. The expert shall have previous experience in detail design, preparation of technical specifications, cost estimate and construction supervision of transmission and distribution substations of different voltage levels.

b) **Distribution Automation/ Smart Grid Engineer** shall have preferably Master's Degree in Electrical/Communications Engineering or other relevant discipline with preferably over 10 years of experience in the designing automation of distribution networks for urban centers. The experience in the designing of distribution automation shall cover multiple substations and service area involving consumer not less than one million. The expert shall also have experience in designing smart grid system for distribution and transmission networks.

c) SCADA/Communications Engineer shall have preferably Master's Degree in Electrical/Communications Engineering or other relevant discipline with preferably over 10 years of experience in the design, selection and preparation of specification of SCADA and communication systems for transmission lines, substations and control center interfacing. The expert shall have previous experience in designing/planning SCADA/communication system for interconnected/integrated power grid system.

d) Environmental Safeguard Specialist shall have preferably Master's Degree in Environmental Science, Environment Management, Environmental Engineering or closely related discipline with more than 10 years of professional experience. The expert shall have experience in conducting environmental impact analysis (EIA), initial environmental examinations (IEE) of 132 kV or above voltage class substation as per international standard and practice as well as well as latest ADB or other

donor agencies guidelines regarding environmental protection and resettlement. The specialist should be conversant with national laws relating to Initial Environment Examination (IEE)/Environmental Impact Assessment (EIA) and ADB's Safeguard Policy Statement 2009.

e) Social Safeguard Specialist shall have preferably Master's Degree in Sociology/Social Science/Anthropological Science with more than 10 years of professional experience. The Specialist shall have experience in preparation of

resettlement plan and indigenous peoples plan (IPP)etc., in 132 kV or above voltage class substation projects in accordance with the international practices as well as latest donor agencies' guidelines, preferably ADB Guidelines with regard to environmental protection and resettlement. The Specialist should be conversant with national laws relating to land acquisition and resettlement and ADB's Safeguard policy Statement 2009.

f) Civil Engineer- shall have preferably Master's Degree in Structural Engineering, with preferably more than 10 years of experience in design of 132 kV and above voltage level substation structures. The expert shall have previous experience in design and construction supervision of 132 kV and above voltage level substation projects.

4.2.2 National Experts

a) **Distribution System Engineer** shall have preferably Master's Degree in Electrical Engineering/High Voltage Engineering/Power System Engineering and preferably more than 10 years' experience in planning and developing distribution system designs, planning distribution reinforcements, expansion of 33 kV, 11 kV and 400 V distribution systems.

b) **Substation Engineer-Electrical** shall have preferably Master's Degree in Electrical Engineering/High Voltage Engineering, preferably with more than 10 years of experience in design/construction supervision of transmission and distribution substations. The expert shall have previous experience in detail design, preparation of technical specifications, cost estimate and construction supervision of transmission and distribution substations of different voltage levels.

c) Environmental Safeguard Specialist shall have preferably Master's Degree in Environmental Science, Environment Management, Environmental Engineering or closely related discipline with more than 10 years of professional experience. The expert shall have experience in conducting environmental impact analysis (EIA), initial environmental examinations (IEE) of 132 kV or above voltage class transmission line projects as per international standard and practice as well as well as latest ADB or other donor agencies guidelines with regard to environmental protection and resettlement. The specialist should be conversant with national laws relating to Initial Environment Examination (IEE)/Environmental Impact Assessment (EIA) and ADB's Safeguard Policy Statement 2009.

d) Social Safeguard Specialist shall have preferably Master's Degree in Sociology/Social Science/Anthropological Science with more than 10 years of professional experience. The Specialist shall have experience in preparation of resettlement plan and indigenous peoples plan (IPP)etc., in 132 kV or above voltage class transmission line projects in accordance with the international practices as well as latest donor agencies' guidelines, preferably ADB Guidelines with regard to environmental protection and resettlement. The Specialist should be conversant with national laws relating to land acquisition and resettlement and ADB's Safeguard policy Statement 2009.

e) Civil Engineer- Transmission and Substations shall have preferably Master's Degree in Structural Engineering, with preferably more than 10 years of

experience in design of 132 kV and above voltage level transmission line towers and substation structures.

4.3 Responsibilities of the Experts

4.3.1 International Experts

All international experts indicated in Table 1 are considered as key experts. The main responsibilities of each international experts are highlighted, but not limited to, as follows:

(a) Team Leader and Substation Engineer

(i) As the Team Leader, the expert is responsible for:

- Leading and managing the entire team including both international and national experts and act as the team's point of contact with NEA and ADB.
- Preparing or leading the team to prepare all the reports as listed in the Reporting Requirements in 10.
- Handling contract administration matters related to the PSC contract.
- Assisting PMD/NEA in administration of all turn-key contracts for the Project.
- Reviewing the turn-key contractors' health and safety plans.
- Monitoring project progress against plan, report on progress, and propose remedial measures as necessary.
- Reviewing the contractor's claims for extension of time or additional costs; and preparing variation instructions and cost review; certifying invoices/volume of works completed and recommend for payment.
- Providing technical support to NEA in settlement of claims and disputes arising from the turn-key contracts.

The Team Leader as a Substation Engineer-Electrical shall perform the following:

- Make necessary inputs and advice to the project team and to NEA on related subject matters.
- Assist NEA in review and approval of contractor's drawings and technical information.
- Witness and certify main equipment shop inspections and assist NEA with inspections and certifications of manufactured items prior to shipment and upon receipt.
- Supervise site construction and installation works in conjunction with NEA and other team members.
- Review and certify the contractor's testing and commissioning plans.
- Supervise testing and commissioning of substations in conjunction with NEA and other team members.
- Review, check and certify suppliers' equipment design, and approve the technical documents.
- Assist with the review of contractor's claims for extension of time or additional costs; and prepare variation instructions and cost review; certify volume of works completed withdrawal applications and issue of monthly and final payment certificates.

- Assist with the certification of substantial completion and/or completion of main project components as defined in the contract documents.
- Develop and finalize the design parameters for the transmission and distribution substations keeping in view the best practices and advance technology in consultation with NEA.
- Perform other functions as may be assigned or delegated by Team Leader from time to time during the time of assignment.

b) Distribution Automation / Smart grid Expert

- Make necessary inputs and advice to the project team and to NEA on distribution automation system and smart grid technology.
- Assess the transmission and distribution networks of major urban centers excluding Kathmandu valley and recommend the suitable distribution automation system.
- Prepare conceptual designs and layouts for the distribution automation system and smart grid technology for implementation in major urban centers.
- Assist NEA in review and approval of contractor's drawings and technical information related to automation/smart grid technology.
- Supervise site construction and installation works in conjunction with NEA and other team members.
- Review and certify the contractor's testing and commissioning plans.
- Supervise testing and commissioning in conjunction with NEA and other team members.
- Review, check and certify suppliers' equipment design, and assist NEA in approving the technical documents.
- Supervise installation, testing and commissioning of the automation system.
- Perform other functions as may be assigned or delegated by Team Leader from time to time during the time of assignment.

c) SCADA/Communications Engineer

- Make necessary inputs and advice to the project team and to NEA on transmission line and substation communication matters.
- Assess NEA's existing SCADA and communications systems and prepare design concepts for interfacing with the transmission line and substations.
- Assist NEA in review and approval of contractor's drawings and technical information with regard to communication/SCADA system.
- Supervise site construction and installation works in conjunction with NEA and other team members.
- Review and certify the contractor's testing and commissioning plans.
- Supervise testing and commissioning in conjunction with NEA and other team members.
- Review, check and certify suppliers' equipment design, and assist NEA in approving the technical documents.
- Supervise installation, testing and commissioning of the transmission line and substations SCADA and communication systems. Monitor project progress against

plan, report on progress, and propose remedial measures as necessary.

- Perform other functions as may be assigned or delegated by Team Leader from time to time during the time of assignment.

d) Environmental Safeguard Specialist

- Make necessary inputs and advice to the project team and to NEA on environmental distribution networks and distribution substation technical matters.
- Support NEA in incorporating comments from approving agencies approved.
- Prepare EMP for the transmission reinforcement component.
- Prepare construction contractors' environmental health and safety plan (EHS).
- Prepare Detailed Monitoring Framework to effectively monitor the implementation of various plans during construction and operation phase
- Assist NEA as necessary to complete the IEEs and/or EIAs if necessary.
- Conduct a detailed qualitative and quantitative analysis of the anticipated changes to the baseline to determine the direct, indirect, induced and cumulative impacts of the project in construction, phase. These impacts may include, but not limited to, loss of habitat and ecosystems, loss of flora and fauna, impacts on wildlife, food supply chain and migration patterns of wild life, water quality, emission of greenhouse gases, erosion and sedimentation, loss of physical and cultural resources, impacts associated with construction etc.
- Update the Social Impact Assessment (SIA) for each subproject.
- Update/ Review construction contractors' environmental health and safety plan (EHS) and recommend revisions as necessary.
- Conduct routine inspections of construction/installation activities including visual survey of ROW clearance, construction equipment storage areas, waste disposal areas and construction camps.
- Prepare semiannual safeguard monitoring report.
- Prepare an annual report on reforestation for each project component and sub-component requiring a reforestation program.
- Perform other functions as may be assigned or delegated by Team Leader from time to time.

e) Social Safeguard Specialist

- Update existing resettlement plan (RP)based selected transmission route alignment in accordance with the national laws, regulations and ADB's SPS 2009.
- Make necessary inputs and advice to the project team and to NEA on social safeguard issues as required by the national laws, regulations and ADB's SPS 2009.
- Prepare and /or update land acquisition and resettlement impact assessment based on selected route alignment and substation details.
- Prepare/review the entitlement matrix for each subproject listing all likely effects, such as permanent and or temporary land acquisition, and a study to determine the replacement costs of all categories of losses based on the asset valuation process, withparticularattentiontovulnerablegroupsincludingindigenouspeoples,

women, children and the poor and socially excluded.

- Update/Prepare the implementation schedule consistent with all the resettlement plan requirements, making sure that major components are carried out before the civil works
- Establish dialogue with affected people for incorporating their suggestions.
- Ensure compliance with all government rules and regulations and ensure that the RPs are in compliance with ADB's SPS 2009.
- Provide guidance to the national environmental safeguard specialist and NEA's concerned staff responsible for social safeguard in data collection and census surveys of affected persons.
- Submit all finalized/updated RPs to ADB for review and clearance for ADB review and clearance.
- Perform other functions as assigned or delegated by Team Leader from time to time during the time of assignment

f) Civil Engineer

- Make necessary inputs and advice to the project team and to NEA on transmission line and transmission substation structural matters.
- Prepare structure designs for tower sand tower foundations (if required) and substation equipment structures.
- Prepare structure designs for underground cabling and other civil works
- Check the tower, tower foundation, pole foundation and substation structure designs including control buildings and other civil structures submitted by the contractors and assist in approval of contractor's designs, drawings and technical information.
- Perform other functions as may be assigned or delegated by Team Leader from time to time during the time of assignment.

4.3.2National Experts

Although national consultants are classified as non-key in the proposal evaluation, they play an important role in the PSC team with local knowledge of dealing with social, technical and geographical issues arising from the Project. Each national expert will perform the same or similar duties as his/her counterpart in the international team in his/her respective field.

5. Reporting Requirements, Time Schedule for Deliverables and Implementation Arrangement

5.1 The Consultant shall prepare various reports and maintain records documenting decisions made at meetings, progress on project implementation, financial records and changes to the contract plans. All documents and reports would be made available on electronic format to ADB. The reporting shall, in general, comprise of the following:

(i) Formats for site supervision and site supervision reports
(ii) At NEA's request, all necessary reports concerning special matters related to the project (installation, work methodology, safety, claims, checklist for equipment testing and commissioning etc.)

(iii) Monthly reports concerning physical progress/status of works, expenditures, delivery of materials etc. in formats acceptable to NEA and ADB.
(iv) Quarterly progress report giving the progress status, schedules, costs, budgets etc. in the formats acceptable to NEA and ADB.
(v) Semi -annual and annual environmental report.
(vi) Project Completion Report (PCR) as per the requirements of NEA and ADB.
(vii) Report on a suitable distribution management system or SCADA system which shall include and not be limited to fault detection, localization, isolation, and load restoration (FDIR). These sequences will detect a fault, localize it to a segment of feeder, open the switches around the fault, and restore un-faulted sources via the substation as available. This shall result in safely minimizing the fault duration and significantly improving the SAIDI (system average interruption duration index) and SAIFI (system average interruption frequency Index) performance metric for the customers on those feeders.

5.2 All documents and reports would be made available on electronic format to ADB. All reports will be in English language.

5.3 The PSC shall report to the Project Management Directorate (PMD) of NEA and headed by the Deputy Managing Director who reports directly to the Managing Director of NEA. The PSC shall work closely with subproject managers, Distribution Centers' Chiefs and their engineers, and NEA's specialized departments if necessary.

5.4 The Consultant is expected to commence the service in November 2025, and the duration of the service will be twelve (12) months.

6. Client's Input and Counterpart Personnel

6.1 Administrative support for Consultant Team: If required by local regulations, NEA will provide Consultant with the necessary support letters for obtaining visas and permits for its experts. The cost and timing of obtaining the above is entirely the responsibility of the consultants.

6.2 Office Space, Office Equipment, Transportation and Accommodation: NEA shall arrange office space, necessary furniture and office equipment (computers, printers, telephone etc.) in Kathmandu. The Consultant shall make his own arrangements for transportation and accommodation for its personnel in Nepal. The Consultant shall arrange itself any other equipment and planning software required during execution of work.

6.3 NEA Project Team: The subprojects have its own contract management team comprising of project manager, engineer and other support staff. The subproject team shall provide contract documents, survey and other reports available to the Consultant. The subproject team shall work in close collaboration with the Consultant's team and be fully involved in all aspects of the consulting services. Both NEA and Consultant's teams shall work together as one single team in all matters related to the Project.