Terms of Reference (ToR)

For

Consulting Service for technical backstopping, monitoring and quality control/assurance of Amadablam Mini Hydro Subproject (911 kW) and Monjo Khola Mini Hydro Subproject (942 kW) in Khumbhu Pasanglhamu Rural Municipality Ward No. 4 & 3, Solukhumbu District, Koshi Province

1. Background:

Alternative Energy Promotion Centre (AEPC) is the apex government body under the Ministry of Energy, Water Resources and Irrigation (MoWERI), Government of Nepal, established to promote the use of renewable energy technologies to meet the energy needs in Nepal.

The Nepal: Private Sector - Led Mini-Grid Energy Access Project (MGEAP) is supported by Government of Nepal and the World Bank, is implemented by AEPC from June 2019. The objective of the Project is to increase electricity access and delivery from renewable energy Mini-Grids (Micro/Mini Hydro, Solar, Wind and Solar/Wind Hybrid Subprojects) by mobilizing private Energy Service Companies (ESCOs). The Project will deliver financing support to the ESCOs to facilitate financial closure and enhance financial viability of the subprojects, provided in the form of loans through the Partner Banks (PBs), Class 'A' Commercial Banks with license from Nepal Rastra Bank (NRB).

Currently AEPC/MGEAP initiated two Mini Hydro Subprojects in Khumbhu Pasanglhamu Rural Municipality in Solukhumbu district through Energy Service Companies (ESCOs) as a business model through technical and financial support of Government of Nepal, the World Bank and Sustainable Energy Challenge Fund (SECF) of Nepal Renewable Energy Programme (NREP) through AEPC/MGEAP.

2. Energy Service Companies (ESCOs):

Energy Service Companies (ESCOs) is a private Commercial Entity / Private Developer (Private Public Partnership, Sole Trading and Cooperative) legally registered for developing mini grid subprojects (generation, transmission and distribution) to provide reliable electricity to the community and operating as a business model.

2.1 Amadablam Mini Hydro Ltd.

Amadablam Mini Hydro Ltd, Tilganga - 8, Kathamndu is an Energy Service Company (ESCO) intends to implement Amadablam Mini Hydro Subproject (911 kW) to provide electricity in 451 households of Khumbhu Pasanglhamu Rural Municipality, Ward No. 4, Solukhumbu district in Koshi Province. The Subproject located inside the Sagarmatha National Park and the gateway of Mount Everest, a touristic area of Nepal, which is very far from the National Grid.

2.2 Monjo Khola Mini Hydro Ltd.

Monjo Khola Mini Hydro Ltd, Tilganga - 8, Kathamndu, an Energy Service Company (ESCO) intends to implement Monjo Khola Mini Hydro Subproject (942 kW) to provide electricity in 582 households of Khumbhu Pasanglhamu Rural Municipality, Ward No. 3, Solukhumbu district in Koshi Province. The Subproject located in the buffer zone of the Sagarmatha

National Park and the gateway of Mount Everest, a touristic area of Nepal, which is very far from the National Grid.

3. Brief Introduction of Subprojects

3.1 Amadablam Mini Hydro Subproject

Amadablam Mini Hydro Ltd. (ESCO) has received Consent Letter from Department of National Parks and Wildlife Conservation (DNPWC) for Detailed Feasibility Study, Technical Clearance from Department of Electricity Development (DoED) and Approval Letter from Khumbhu Pasanglhamu Rural Municipality for construction of Amadablam Mini Hydro Subproject. After receiving all necessary documents/approvals from concerned authorities, ESCO hired a Consulting Firm, Communication & Energy Developers Pvt. Ltd. (CED) to prepare Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) report of the Subproject. ESCOs submitted the Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) report to AEPC for approval from Technical Review Committee (TRC). As requirement of the World Bank, AEPC/MGEAP hired an independent Consulting Firm, Environment and Resource Management Consultant (P.) Ltd., (ERMC) to review, verify and update the DFS-DED report. ERMC submitted updated DFS-DED report and Technical Review Committee (TRC) of AEPC approved the DFS-DED report.

The Subproject is conceived as a run-off-river scheme and uses water from Cholunche Khola (Nare Khola), which is a perennial river and is a tributary of Budhikoshi River. The Subproject is planned to generate 911 kW electricity to provide electricity facility to 451 households in Chukhung, Deboche, Dingboche, Dole, Phungi Thenga, Lawi Schyasa, Lobuche, Luza, Milingo, Machhermo, Pangboche, Pheriche, Phortse, Phostre Tenga, Shomare, Yhukla, Thyangboche and Worshyo villages of Khumbhu Pasanglhamu Rural Municipality, Ward No. 4 of Solukhumbu district. ESCO intends to provide electricity to households and other energy users such as Anchors/Business and Community. As electricity demand is very high, the Subproject considers to provide electricity of 1 kW to 5 kW as per household demand, capacity and requirement of the institutions i.e. Hospital, Social institutions, Big/Small Hotels, Restaurants, Cottage industries etc.

3.3 Monjo Khola Mini Hydro Subproject

Monjo Khola Mini Hydro Pvt. Ltd. (ESCO) has received Consent Letter from Department of National Park and Wildlife and Conservation (DNPWC) for Detailed Feasibility Study, Technical Clearance from Department of Electricity Development (DoED) and Approval Letter from Khumbhu Pasanglhamu Rural Municipality for construction of Monjo Khola Mini Hydro Subproject. After receiving all necessary documents/approvals from concerned authorities, ESCO hired a Consulting Firm, Communication & Energy Developers Pvt. Ltd. (CED) to prepare Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) report of the Subproject. ESCOs submitted the Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) report to AEPC for approval from Technical Review Committee (TRC). As requirement of the World Bank, AEPC/MGEAP hired an independent Consulting Firm, Environment and Resource Management Consultant (P.) Ltd., (ERMC) to review, verify and update the DFS-DED report. ERMC submitted updated DFS-DED report and Technical Review Committee (TRC) of AEPC approved the DFS-DED report.

The Subproject is conceived as a run-off-river scheme and uses water from Monjo Khola, which flows from Kyasar glacier at the south-east side of Thamserku Himalaya and it is a tributary of Dudh Koshi River which is the biggest River of Solukhumbu district. The subproject is planned to generate 942 kW electricity to provide electricity facility to 582 households in Jorsalle, Chyuma, Byankar, Tok, Thulo Gamela, Phakding, Sano Gamela, Chermading, Ghat, Thadakoshi, Chheplung, Muse and Chaurikharka villages of Ward No. 3, Solukhumbu district where majority of residents are indigenous people. ESCO intended to provide electricity to households and other energy users such as Anchors/Business and Community. As electricity demand is very high, so the Subproject consider to provide electricity 1 kW to 4 kW as per household demand, capacity and requirement of the institutions i.e. Hospital, Social institutions, Big/Small Hotels, Restaurants Cottage industries etc.

4. Objectives

The main objective of the selection of Consultant/Firm is to provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam Mini Hydro Subproject and Monjo Khola Mini Hydro Subproject during construction and completion of Subprojects on time.

5. Scope of Work/Task of Consultant/Firm

The scope of work of the Consultant/Firm is to provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam and Monjo Khola Mini Hydro Subprojects during construction/implementation of Subprojects and completion of Subprojects on time.

The major scopes of the Task (but not limited to) are as below-

- Provide human resources (Key Experts) as and when needed.
- Work as instruction provided by AEPC/MGEAP.
- Review Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) Reports of Subprojects
- Review Environmental Initial Assessment (EIA), Brief Environmental Study (BES) and Environmental & Social Impact Assessment (ESIA) reports of Subproject.
- Familiarize with AEPC and MGEAP Norms, Guidelines and procedures.
- Provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam Mini Hydro and Monjo Khola Mini Hydro Subprojects during construction / implementation of Subprojects.
- Assurance of quality of procured/used goods, works and services provided by ESCO, suppliers and contractors.
- Advice for rectification of any deficits during construction and inform AEPC/MGEAP.
- Support for Preparation of Measurement Book (MB).
- Check Bill of Quantity (BOQ) submitted by the ESCO for payments.
- Recommend to AEPC for Subsidy and VGF support payment.
- Recommend to AEPC/PB for loan disbursement.
- Prepare periodic Progress reports.
- Maintain record of any type of incident at the site and immediately inform to the AEPC/MGEAP.

- Support ESCOs for timely completion of Subprojects.
- Coordinate with Stakeholders ESCOs, Rural Municipality/Wards, Sagarmatha National Park (SNP), Buffer Zone, local institutions etc.

Detail scope of works of the Consulting Service is given below.

A) Study Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) Reports of Amadablam Mini Hydro Subproject and Monjo Khola Mini Hydro Subproject

DFS-DED Reports consists of:

a) Volume I - Main Report

b) Volume II - Cost Estimates, Design Sheets and Annexes

c) Volume III - Drawings

The responsibility and scope of the work of shall include following, but not necessarily be limited to:

a) Volume I – DFS-DED Main Report –
Study and review detailed design of Detailed Feasibility Study Reports of Amadablam and Monjo Khola Mini Hydro Subproject.

- **Topographic Survey and Mapping –** Review and verify the detailed topographic maps plotting in required scales.

- **Hydrology –** The Subproject lies in the Sagarmatha National Park. Review and verify discharge measurement and design discharge as per prevailing GoN Policy and requirements. Review and verify hydrological analysis.

- **Geology –** Review and verify Geological analysis of subproject area and components.

- **Civil Component –** Review and verify detail design of head works, diversion weir, under sluice, intake, approach canal, gravel trap/desilting basin, forebay, anchor blocks & support piers, Power house, foundation, tailrace canal and landslide protection structure etc.

- **Structural Design** - Review and verify structural design of all component.

- **Hydro Mechanical Component -** Review and verify detail design of all hydro mechanical equipment / Component.
  - Gates (Under sluice, flushing gate) – Size and materials of all gates used in hydro mechanical component.
  - Trash rack – Size, material, spacing and specification of coarse & fine trash rack.
  - Penstock Pipe – Size, material, specification of penstock pipe and accessories i.e.: bell mouth, expansion joint, bends, saddle support, joint, welding etc.

- **Electro Mechanical Component –** Review and verify detail design of all electro mechanical equipment.

- Turbine - Selection of turbine, components of turbine, material and specification etc.
- Governor - Selection of Governor, technical requirements and specifications.
- Generator - Selection of Generator, technical requirements and specifications.
- Control, Protection and Switchgear – Selection, technical requirements, specifications, electricity supply system etc.
- Transformer – Selection, rating, specification
- Switchgear – Design, synchronization, circuit breaker, disconnecting switch, lightning arrester, protection system etc. and its technical details.
- Transmission & Distribution Line – The Subproject lies in the Sagarmatha National Park and protected zone. T&D line must be underground fulfilling all technical requirement. Design of T&D line, underground and overhead, voltage drop calculation, power allotted, conductor size, material, transformer, river/stream crossings, poles, distribution box, service wire, protection systems, insulator, fittings etc. T&D line shall be protected against earth fault and over current faults.

- **Tests and Certifications –** Experts shall check tests and certifications provided by ESCO and supplier companies of all equipment hydro mechanical, electro mechanical, transmission & distribution line and civil materials.

b) Volume II - Cost Estimates, Design Sheets and Annexes

Study and review Bill of Quantities (BoQ), detailed subproject cost, financial analysis etc.

c) Volume III - Drawings

Study and review drawings of all component to implement subproject as per design and drawings

B) Study the Environmental and Social Safeguard (E&SS) reports of Amadablam and Monjo Khola Mini Hydro Subproject

- ESIA and EIA of Amadablam Mini Hydro Subproject.
- ESIA and BES of Monjo Khola Mini Hydro subproject.

C) Others

Review Construction Planning and Schedule of both Subproject.

6. Report Preparation, Certification and Recommendation

- Based on progress at site Consultant/Firm will prepare monthly, quarterly and final Subproject completion report of both Subprojects separately.
- Support ESCOs to prepare Measurement Book (MB), Bill of Quantity (BOQ) as actual work done.
- Check and verify Bill of Quantity (BOQ) and all documents prepared and submitted by the ESCO as per actual equipment/materials supplied and work done at site.
- Keep photographs of all activity and work done at site.
- Certify and recommend AEPC/MGEAP for the payment as per actual work done at the site.
- Support ESCOs to prepare Progress reports

7. Inputs from AEPC/MGEAP

- Provide DFS-DED reports (Volume I, II and III).
- Provide ESIA/EIA/BES reports.
- Provide the required and available information, documents.
- Inputs from relevant AEPC/MGEAP Experts.
- Can receive technical support from ESCO/Consulting Firm.

8. Required Human Resource (Key Experts):

A team of technical Senior Experts should carry out the assignment of both Subprojects. Civil Engineer, Electrical Engineer, Mechanical Engineer and Environment & Social Safeguard Expert will be site-based human resources. The Consultant shall provide required human resources to support ESCOs during construction/implementation of Subprojects as per site requirement and recommendation of AEPC/MGEAP.

The Summary of HR Requirements are as follows:

S. No.	Human Resources	Required Person	Input Duration
1	Team Leader (Intermittent Input)	1	100 Days in 6 months
2	Civil Engineer (Full Time, Site-Based)	2	6 Months
3	Electrical Engineer (Full Time, Site-Based)	1	5 Months
4	Mechanical Engineer (Full Time, Site-Based)	1	5 Months
5	Social & Environmental Expert (Full Time, Site-Based)	1	4 Months

a) Team Leader - 1 (One)

Qualification and Experience

The team leader should have at least Master's degree in civil/ hydropower engineering with at least 10 years of experience in Hydropower sector. S/he will be responsible for overall coordination and quality control as mentioned in the Scope of work and ToR. S/he should possess a strong working knowledge in Hydropower sector, quality management system and also should have experience of review & preparation of at least 3 DFS reports of Mini /Small Hydropower Projects. The team leader shall be the focal point for communication between AEPC/MGEAP and ESCO.

Specific scope of work / task of Team Leader

The Team Leader is Focal Person and will take overall responsibility for providing required human resources for the implementation of the Mini Hydro Subprojects. The Team Leader will manage all required logistic, insurance and remuneration of human resources. Duties and responsibility of Team Leader will be following (but not limited to) are as below-

- Focal Person for AEPC/MGEAP from the Consultant/Firm.
- Closely work with Project Manager of AEPC/MGEAP.
- Work as instruction provided by AEPC/MGEAP.
- Closely work with ESCOs (Amadablam Mini Hydro Ltd. and Monjo Khola Mini Hydro Ltd.) for implementation of Subprojects.

- Provide required human resources (Key Experts) as and when needed as requested by AEPC/MGEAP.
- Manage all required logistic, insurance, safety equipment and remuneration of human resources provided by the Consultant/Firm.
- Support/assist human resources provided by Consultant/Firm.
- Under take site visit of both Amadablam Mini Hydro Subproject and Monjo Khola Mini Hydro Subproject as and when needed.
- Submit progress reports bimonthly, monthly, quarterly and Subproject completion report of both Subprojects separately.
- Claim required expenses along with proof documents as per the contract agreement.
- Settle all GoN VAT, Tax and duties as per the contract agreement.
- Prepare a detailed field activity/action plan of provided human resources.
- Monitor and instruct to maintain code of conduct human resources provided by the Consultant/Firm during construction and installation at site.
- Maintain record of any type of incident at the site and immediately inform to the AEPC/MGEAP.
- Any other requested by AEPC/MGEAO.

b) Civil Engineer- 2 (Two), Site based

Qualification and Experience of Civil Engineer

The expert should have a minimum Bachelor's Degree in Civil engineering with at least 5 years of experience in the Mini/Small Hydro sector. S/he should have knowledge of technical parameters of civil works, guidelines and standards of Mini/Small Hydro as well as quality assurance of the sector having very good field based experience in the civil works of Mini/Small Hydro Projects.

Specific scope of work / task of Civil Engineer

The specific scope of work of the Civil Engineer is to provide consulting service, technical backstopping, quality control/assurance and monitoring of civil works of both Amadablam and Monjo Khola Mini Hydro Subprojects during construction/implementation of Subprojects.

The major scopes of the Task (but not limited to) are as below-

- Civil Engineer is site based position and main responsibilities for construction of civil component works i:e head works, intake, headrace canal, desalting basin, excavation in penstock alignment, saddle support, support pier, anchor block, power house, tailrace, trench excavation for transmission & distribution line etc. .
- Closely work with Project Management Team (PMT) of AEPC/MGEAP and as instruction provided by PMT.
- Closely work with ESCOs, Amadablam Mini Hydro Ltd. and Monjo Khola Mini Hydro Ltd. during construction of civil works of the Subprojects.
- Review Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) Reports of Subprojects
- Review Environmental Initial Assessment (EIA), Brief Environmental Study (BES) and Environmental & Social Impact Assessment (ESIA) reports of Subproject.
- Familiarize with AEPC and MGEAP Norms, Guidelines and procedures.

- Provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam Mini Hydro and Monjo Khola Mini Hydro Subprojects during construction / implementation of Subprojects.
- Assurance of quality of procured/used goods, works and services provided by ESCO, suppliers and contractors.
- Advice for rectification of any deficits during construction and inform to the AEPC/MGEAP.
- Assist ESCOs for preparation of Measurement Book (MB) and Bill of Quantity (BOQ) of civil works.
- Check Bill of Quantity (BOQ) submitted by the ESCOs for payments.
- Recommend to AEPC/MGEAP for payment.
- Recommend to AEPC/PB for loan disbursement.
- Prepare periodic Progress reports.
- Maintain record of any type of incident at the site and immediately inform to the AEPC/MGEAP.
- Support ESCOs for timely completion of Subprojects.
- Coordinate with Stakeholders ESCOs, Rural Municipality/Wards, Sagarmatha National Park (SNP), Buffer Zone, local institutions etc.
- Any others tasks instructed by AEPC/MGEAP.

c) Electrical Engineer – 1 (One), Site based

Qualification and Experience

The expert should have a minimum Bachelor's Degree in electrical engineering with at least 5 years of experience in the Mini/Small Hydro sector. S/he should have knowledge of technical parameters of electrical works, guidelines and standards of Mini/Small Hydro as well as quality assurance of the sector having very good field based experience in the electrical component of Mini/Small Hydro Projects.

Specific scope of work / task of Electrical Engineer

The specific scope of work of the Electrical Engineer is to provide consulting service, technical backstopping, quality control/assurance and monitoring of electrical component works of both Amadablam and Monjo Khola Mini Hydro Subprojects during construction/implementation of Subprojects.

The major scopes of the Task (but not limited to) are as below-

- Electrical Engineer is site based position and main responsibilities for electrical component works i:e installation of generator, governor, control panel, switchyard, transformer, electric equipment in power house, transmission & distribution line, house connection, synchronization etc. .
- Closely work with Project Management Team (PMT) of AEPC/MGEAP and as instruction provided by PMT.
- Closely work with ESCOs, Amadablam Mini Hydro Ltd. and Monjo Khola Mini Hydro Ltd. during construction of civil works of the Subprojects.
- Review Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) Reports of Subprojects

- Familiarize with AEPC and MGEAP Norms, Guidelines and procedures.
- Provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam Mini Hydro and Monjo Khola Mini Hydro Subprojects during construction / implementation of Subprojects.
- Assurance of quality of procured/used electric equipment and services provided by ESCO, suppliers and contractors.
- Advice for rectification of any deficits during installation and erection of electric equipment and inform to the AEPC/MGEAP.
- Assist ESCOs for preparation of Measurement Book (MB) and Bill of Quantity (BOQ) of electric equipment.
- Check Bill of Quantity (BOQ) submitted by the ESCOs for payments.
- Recommend to AEPC/MGEAP for payment.
- Recommend to AEPC/PB for loan disbursement.
- Prepare periodic Progress reports.
- Maintain record of any type of incident at the site and immediately inform to the AEPC/MGEAP.
- Support ESCOs for timely completion of Subprojects.
- Coordinate with Stakeholders ESCOs, Rural Municipality/Wards, Sagarmatha National Park (SNP), Buffer Zone, local institutions etc.
- Any others tasks instructed by AEPC/MGEAP.

d) Mechanical Engineer – 1 (One), Site based

Qualification and Experience

The expert should have a minimum Bachelor's Degree in mechanical engineering with at least 5 years of experience in Mini/Small hydro sector. S/he should have knowledge of technical parameters in mechanical works, guidelines and standards of mini hydro as well as quality assurance of the sector having very good field based experience in the mechanical components of Mini/Small Hydro Projects.

Specific scope of work / task of Mechanical Engineer

The specific scope of work of the Mechanical Engineer is to provide consulting service, technical backstopping, quality control/assurance and monitoring of mechanical component/works of both Amadablam and Monjo Khola Mini Hydro Subprojects during construction/implementation of Subprojects.

The major scopes of the Task (but not limited to) are as below-

- Mechanical Engineer is site based position and main responsibilities for installation of mechanical equipment and works i:e Turbine, governor, gate, trace rack, gate, penstock pipe, pipe joint, valves in different component i:e head works, intake, headrace canal, desalting basin, penstock, saddle support, support pier, anchor block, all mechanical equipment in power house etc. .
- Closely work with Project Management Team (PMT) of AEPC/MGEAP and as instruction provided by PMT.
- Closely work with ESCOs, Amadablam Mini Hydro Ltd. and Monjo Khola Mini Hydro Ltd. during construction of civil works of the Subprojects.

- Review Detailed Feasibility Study including Detailed Engineering Design (DFS-DED) Reports of Subprojects
- Familiarize with AEPC and MGEAP Norms, Guidelines and procedures.
- Provide consulting service, technical backstopping, quality control/assurance and monitoring of both Amadablam Mini Hydro and Monjo Khola Mini Hydro Subprojects during construction / implementation of Subprojects.
- Assurance of quality of procured/used goods, works and services provided by ESCO, suppliers and contractors.
- Advice for rectification of any deficits during installation and inform to the AEPC/MGEAP.
- Assist ESCOs for preparation of Measurement Book (MB) and Bill of Quantity (BOQ) of mechanical component.
- Check Bill of Quantity (BOQ) submitted by the ESCOs for payments.
- Recommend to AEPC/MGEAP for payment.
- Recommend to AEPC/PB for loan disbursement.
- Prepare periodic Progress reports.
- Maintain record of any type of incident at the site and immediately inform to the AEPC/MGEAP.
- Support ESCOs for timely completion of Subprojects.
- Coordinate with Stakeholders ESCOs, Rural Municipality/Wards, Sagarmatha National Park (SNP), Buffer Zone, local institutions etc.
- Any others tasks instructed by AEPC/MGEAP.

e) Environment & Social Safeguard (E&SS) Expert - 1 (One), Site based

Qualification and Experience

An environmental & social safeguard expert knowledgeable in related to Mini/Small hydro sector with a minimum Bachelor's Degree in environmental science / environmental management / environmental engineering with 5 years of experience in relevant field. S/he should have knowledge of the GoN ESS Policy, Guideline related to Mini/Small hydro projects having very good field based experience.

Specific scope of work /task of E&SS Expert

The specific scope of work of the environmental & social safeguard expert is to provide consulting service, technical backstopping, quality control/assurance and monitoring of environmental and social safeguard activities. E&SS expert will be stationed at subprojects site to work for both the Amadablam and Monjo Khola Mini Hydro Subprojects during their construction/implementation.

The major scopes of the Task (but not limited to) are as below-

- Environmental & Social Safeguard Expert is site based position and main responsibilities for Environmental & Social Safeguard related activities.
- Closely work with Project Management Team (PMT) of AEPC/MGEAP and as instruction provided by PMT.
- Closely work with ESCOs, Amadablam Mini Hydro Ltd. and Monjo Khola Mini Hydro Ltd. during construction of civil works and installation of the Subprojects.

- Review Environmental Initial Assessment (EIA), Brief Environmental Study (BES) and Environmental & Social Impact Assessment (ESIA) reports of Subproject.
- Familiarize with AEPC and MGEAP Norms, Guidelines and procedures.
- Knowledge on gender and social inclusion (GESI), SEA/SH
- Prior working experiences with donor funded project
- Familiar with the WB ESF
- Prepare periodic Progress reports.
- Support the ESCOs in implementation of Environmental and Social Management Plan (ESMP)
- Support the ESCOs in making Grievance Redress Mechanism functional at subproject level
- Support the ESCOs in implementation of occupational health and safety measures and community health and safety measures as provisioned in ESIA, EIA, and BES.
- Maintain record of any type of incident at the site and immediately report to the AEPC/MGEAP.
- Support ESCOs for timely completion of E&SS activities.
- Coordinate with Stakeholders ESCOs, Rural Municipality/Wards, Sagarmatha National Park (SNP), Buffer Zone, local institutions etc.
- Environmental and Social Compliance monitoring of subprojects and reporting to AEPC/MGEAP
- Any others tasks instructed by AEPC/MGEAP.

9. Duration of contract

The duration of the contract will be Six months from the date of signing of the contract. The initial duration will not exceed until 30 March 2025. The duration of the contract may be extended upon satisfactory performance, requirement of the services and upon extension of contract between AEPC and ESCO. The contract for the proposed task will be Time Based.

Annex - I

A) Information related to DFS-DED Reports

1	**Topographical Survey and Mapping**	
1.1	Topographical Survey	Please refer to "Guidelines for Detailed Feasibility Studies of Mini Hydro Projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter - 2 confirming to clauses [2.3, 2.3.2, , 2.3.4, 2.3.5]
1.1	Mapping and Plotting	As per Chapter- 2 confirming to clauses [2.3.3 and Table 2.1]
2	**Hydrological Investigation**	
2.1	Hydrology	a) Collect the long term historical rainfall data and climatological data pertinent to the study area. b) Collect the long term historical flow data and sediment data of the river under study, if available; if not, collect the data from other river with similar hydrological characteristics in the vicinity. c) Assess the mean monthly flows. d) Develop a flow duration curve. e) Establish a Gauge station at the intake site. f) Carry out discharge measurements at the intake site. Minimum of 3 sets of measurement should be carried out at a space of 2 months. g) Estimate the design floods for the structures for the return periods of 50, 100 and 200 years. h) Conduct flood frequency analysis for the period October to May for ascertaining diversion flood. The frequency of diversion flood should be 1 in 20 years. i) Carry out three cross-section surveys at the headwork site and three at the tailrace site covering the highest flood marks. j) Compute the peak flood discharge corresponding to the flood marks at the intake site and tailrace site. k) Develop rating curves for the intake site and tailrace site. l) Assess the potentiality of Glacial Lake Outburst Flood (GLOF) in the catchment, if any. As per Chapter- 2 confirming to clauses [2.4]
3	**Geological and Construction material**	
3.1	Geological, Geophysical Study, Geotechnical Study and Mapping	a) Review available geological, geophysical and geotechnical data b) carry out geological and geo-technical studies necessary for design point of view at feasibility study level study of the project c) interpretation of findings of studies and synopsis of all the findings of geological, engineering geological, geophysical and geo-technical investigations, tests As per Chapter- 2 confirming to clauses [2.5, 2.5.1, 2.5.2, 2.5.3]
3.2	Construction	Please refer to "Guidelines for Detailed Feasibility Studies of mini

	Material	hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [2.5.4]
4	**Socio-economic Aspects**	
4.1	Socio-economic Aspects	Please refer to "Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [2.6, 2.6.1, 2.6.2, 2.6.3,]
5	**Environmental Considerations**	
5.1	Environmental Considerations	Please refer to "Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [2.7, 2.7.1, 2.7.2, 2.7.3,]
5	**Selection of project configuration**	a) Topographical and geological conditions of the alternative sites should be studied in the field in order to select the proper locations of the following structures: Weir, Desander, Conveyance system (Headrace Canal, Pipe) Forebay, penstock and Powerhouse. The locations and types of the structures should be selected after comparison of alternatives. b) General layout of the project should be prepared using the topo map plotted after field survey. c) All comparison of alternative schemes of the project, based on the various locations of the structures, should be carried out in order to select the optimum alternative scheme. The criteria should be the maximum energy benefit at minimum cost
6	**Optimization Studies**	
6.1	Optimization	1) General Approach a. Selection of parameters to be optimized, identify their range and establish a series of alternatives. b. Carry out the conceptual design, and estimate its cost for each alternative. c. Estimation of benefits for each alternative. d. Comparison of Cost and Benefits 2) Assumptions a. Price of firm energy b. Price of secondary energy c. Capacity benefit 3) Selected Alternatives a. Determine number of alternatives within the range of installed capacities. 4) Energy Production a. For ROR projects calculate energy production for all alternatives with following consideration: - **80% exceedance** flow and average monthly flows to be used. - Firm and Secondary energy to be calculated. 5) Project Layout

		a) Optimize project structures individually for the given installed capacity. b) As the installed capacity increases, design of weir and under sluice to be kept constant. c) Size of desander to be adjusted. e.) Surge chamber dimension and penstock dimension to be optimized for a given installed capacity. f) Powerhouse and unit sizes to be obtained from empirical formula. 6) Cost Estimate a) Preliminary quantity and cost estimates should be developed for all the cases considered. b) Only the major items should be computed in detail, while minor items may be estimated based on curves and data of similar structures of other projects. c) Unit rates should be estimated based on the data of recent projects undertaken by NEA and private sector with some modifications. d) Electro-mechanical equipment costs should be calculated using empirical relations. f) Technical contingencies should be taken into account for obtaining the implementation cost of the alternative. 7) Economic Comparison a) Economic comparison of the different alternatives should be carried out considering the implementation cost and operation cost with occurred benefits due to energy production for each case. b) The economic analysis should be carried out to determine the basic economic parameters like Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (B/C), etc. c) The case with maximum B/C ratio and rate of return should be selected for optimum installed capacity. 8) Number of Units a) Minimum possible number of units should be adopted. b) Limitation of transport capabilities should be taken into consideration.
7	**Technical Design and Analysis (Project Description and Design)**	
7.1	General Layout and civil structures	**1. General Layout:** The general layout of the selected scheme of the project comprising head works, headrace tunnel, penstock, powerhouse and tailrace should be described. **2) Civil Structures** I) River Diversion a. An upstream coffer dam should be designed in order to protect the working area at weir site, to divert the river flow. A downstream cofferdam should also be provided to protect the weir construction site from entering the river flow after out flow from diversion channel (tunnel).

		The diversion channel (tunnel) should be designed to pass the flood of 1 in 20 years return period. ii) Headwork's a) Design and description of the head works comprising weir, under sluice spillway, intake, desander, etc. should be provided. b) The weir should be designed to divert the river flow to the power channel through desander according to topographical and geological conditions. It should be capable of passing the maximum flood of 1 in 100 years return period. Stability analysis of the weir should be done 1 in 200 year. c) A under sluice structure of head works should be designed to pass a portion of the high flood discharge. However, during the low flow season, the design discharge should be allowed to flow through the intake by closing the sluice gates. d) Side Intake –Head Regulator: The hydraulic design of side intake should ensure the entry of the required design flow into the headrace canal. e) Desilting basin: Desilting basin should be designed for continuous supply of required design flow in the power canal and continuous flushing of permissible deposited suspended sediments of size greater than 0.2 mm in diameter. An emergency automatic spillway should be provided for the desilting basin. iii) Power Canal /Pipe a) The power canal / pipe including all hydraulic and cross-drainage structures from intake to forebay/powerhouse should be designed to convey the required design flow. iv) Forebay a) The forebay basin should be designed to create pressure flow in the penstock leading to turbines. The forebay levels should be determined is such a way that it will be possible to avoid entrance of air into the penstock during maximum drop of water level at sudden opening of turbine valves. v) Penstock a) Optimum diameter of penstock pipe should be determined. The thickness of the steel pipe should be able to with stand any variable load conditions to be encountered during operation of the plant. Anchor blocks for supporting penstock pipe should also be designed at appropriate places. The bifurcation of the penstock should also be designed. Surface type or cut and cover type should be decided on the basis of the topographic and

		environmental considerations. vi) Power Station Powerhouse a) A brief description of power station should be provided with the types and number of equipment, and power execution facilities b) The dimension of the powerhouse should be planned to accommodate all electro-mechanical equipment. c.) The dimensions of spiral casing and the draft tube should also be determined. 3. Stability Analysis for Hydraulic size to the civil Structures. Please refer to "Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [3, 3.3]
7.2	Hydro Mechanical and Electro Mechanical Equipment	i) Mechanical Equipment a) Selection of the type and determination of main parameters of the following essential and main mechanical equipment should be carried out: - Hydraulic Turbine; - Inlet valve; - Governor; - Lubricating system; - Pressure oil system; - Compressed air system; - Cooling system; - Control system. b) The description of the equipment mentioned above should be provided. ii) Electrical Equipment a) Following electrical equipment for the generation and evacuation of the power should be described with the determination of the main Parameters: - Generator; - Excitation system; - Switch gears; - Control panel; - Switchyard; - Transmission & Distribution line b) A single line electrical diagram depicting the inter connection of all electrical equipment should be prepared. iii) Auxiliaries a. For the smooth operation of the power station, following auxiliaries should be provided: - Grease Lubricating system. - Firefighting system - Station supply - Lifting arrangement. Please refer to "Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [3, 3.4, 3.5 3.6]
8	**Power and Energy**	
8	Estimation of Power Potential and Determination of Installed Capacity	Please refer to "Guidelines for Detailed Feasibility Studies of mini hydro projects, June 2014" Published by AEPC. All standards and quality shall be as per Chapter-2 confirming to clauses [4, 4.1, 4.2, 4.3, 4.4, 4.5]
9	**Energy computation and benefit Assessment**	
9.1		1**. Energy Computation**

		a) Energy computation should be based on: - Reference hydrology (average flow) for average annual energy 80% reliable average monthly flow in the lowest flow month for firm energy. - Assumed design parameters (net head, turbine discharge, installed, consideration of compensation flow, installed capacity). b) Secondary energy is computed as average annual energy minus firm energy. Secondary energy available on monthly basis should also be presented. **2. Benefit Assessment** a) There are two kinds of benefits accruable capacity and energy. Energy benefit could further be splited into firm energy and secondary energy benefits. Values for power and firm energy benefits should be based either on generation costs of other potential similar size hydropower projects in Nepal considering hydropower in the cheaper alternative than others (i.e., LRMC of hydro-generation in Nepal) or on perverting selling price to NEA under Power Purchase Agreement. For Secondary energy at the most thermal, fuel displacement value could be taken. In no case, the values for capacity benefit should exceed the value of dry season peaking capacity
10	**Estimation Methodology**	
10.1	For Civil Works	**a) For Civil Works:** The cost estimates should be based on unit rates developed from prevailing labour rate, construction equipment rate and materials taking also into account the local situation and bill of quantities derived from design drawings. The cost estimate should be done by breaking down major structures into number of distinct construction activities or measurable pay items Due consideration should be given to local labors. The rates for locally available labors can be obtained from 'District rates' of concerned districts and can be used after appropriate adjustments. The rates of skilled labors available around project area or within Nepal can be obtained from general inquiries and references of other projects. The rates of construction equipment can be taken from regularly updated cost data, quotation from the suppliers/ manufacturers. The construction material to be used for construction work should be divided into - Materials locally available - Materials to be imported from India - Materials to be imported from Overseas The rates of construction materials should be derived accordingly as their source of supply. While calculating the

		construction materials rate, sufficient attention should also be given to mode of transportation and their corresponding costs should also be included. When access roads for the project is not built (generally for small hydropower projects) the cost of air transportation for transporting heavy equipment from nearest town to the project area should also be included. From labor cost, material cost and equipment cost the direct cost per unit of construction activity can be calculated The estimate should be of contractor's type and, therefore, should also include all other indirect costs such as office overhead, contractor's financing cost, insurance, bonds, profit and risk margin. A suitable percentage for contractor's expenses should be allocated. The total percentage should be used as a bid factor on direct cost. Thus calculated direct cost can be used to derive unit bid costs which in turn, be used to determine the total civil works cost. **b. For Generating Equipment:** The cost estimate for generating equipment should either be based on quotations obtained from suppliers or in-house estimate using established current international prices/ relationships. The cost should include cost of control devices/ system, auxiliary etc. transportation and erection. **c. Hydraulic Steel Works:** The cost of hydraulic steel works should be based on quotation of suppliers or on market price if they are locally available. Transportation cost should also be added. **d. Transformers, Switchyard and Transmission Line:** The cost of transformer and switchyard could be based on capacity, while for estimate of cost of transmission line can be calculated from per km rates of transmission line. References of cost can be taken from current rates used by Nepal Electricity Authority for same type/ voltage of transmission lines taking into account different types of towers required, the conductors and types of terrains being crossed. **e. Land Acquisition and Access Road:** Due attention should be given to costing of land acquisition and construction of access road as well. The length and type of access roads to be constructed or to be improved can be determined from preliminary design. Cost per km of different types of roads can be used to determine the cost of access road. **f. Camp and Other Facilities:** The costs of construction camps and permanent buildings required for operation and also of construction power facilities required should be included in cost estimation. A lump sum amount for this can be allocated depending upon magnitude of project.

10.2	Base Cost and Total Project Cost	At feasibility level, due to use of more detailed information collected and minor items included and designs concretized, level of uncertainties will decrease particularly in civil work component. Hence a maximum of 15% contingency for this item would be reasonable. Reference Contingency: Electro-mechanical, hydro-steel structure, and transmission line : 10% of construction work Coverage of general item and preparatory works including establishment of diesel plant : 8% of construction work Coverage for administration and engineering construction including detailed design and investigation of the project : 10% of construction work Coverage for land acquisition and compensation 1% (of the direct cost)
11	**Construction and Planning Schedule**	
		1) Transportation a. Access road to the project site should be described with various alternatives. Most economical combination of transport should be selected. b. A description of the transportation through India covering the nearest sea port and railway or road transport should be analyzed for import of plant equipment and construction material. **2) Construction Power** a. Various means of construction power supply should be studied consisting the electric power supply from NEA grid and individual diesel generating sets. Most reliable and feasible option should be selected. **3) Construction Camps and Telecommunication** a. Sites for temporary conveys for the labours, fetching and crushing plants, workshops, fuel depots and permanent camps for operators' village and site office should be selected and described. b. Power line communicant facilities should be provided for communication with Load Dispatch Centre (LDC) of NEA. Local telecommunication network should also be extended to project site. **4) River Diversion During Construction** a. A plan for diversion of the river during construction should prepare. It will consist the construction of cofferdams and diversion channel. The sequence of the construction of diversion structures should be inter related to the construction of head works structures like weir, spillway, intake and desander. **5) Project Implementation Schedule** a. Project implementation schedule should be prepared. It should

		consist all the major construction activities in sequence with inter linkage between them. Significant milestones should be indicated in the bar chart of schedule.
12	**Project Evaluation**	
12.1	Financial Analysis	a) In performing financial analysis, the financial internal rate of return (FIRR) and the loan reputability are examined based on financing conditions. The financial cost should include, besides economic cost, duties, taxes, price escalation and interest during construction. The benefits will comprise the revenue generation from the sales of energy. As a result of the financial analysis, the financial cash flow showing operating expenses, debt service (loan repayment), royalty and tax payments is required to be presented. All assumptions including finalizing conditions made for the analysis need to be clearly stated and FIRR determined.
12.2	Sensitivity Analysis	a. Sensitivity analysis are required to be performed in general, for the following cases: - Varied discounted rates (say 8% to 14%), - Capital cost decreased/ increased by 20% - Wet season available energy gets market. - Delay in commissioning (say 1 yr., 2 yr., effect of cost and time overruns
13	**Risk Assessment**	
13.1	Risk Assessment of the Subproject	Subproject shall be re-examined under reasonable range of alternative assumptions with regard to the underlying uncertainties of variables as listed under: • Financial Risk • Hydrological Risk • Market Risk • Construction Risk • Other Risk

Information to the Consultants/Firm for preparation and Submission of EOI

The interested consultants/Firms are requested to submit the Expression of Interest (EOI) for the **"Consulting Service for technical backstopping, monitoring and quality control / assurance of implementing Subprojects".** This expression of interest is open to all eligible Consulting firm/Company/Organization.

1. A letter of interest duly signed by the authorized representative and shall be addressed to:

Project Manager
Private Sector-Led Mini-Grid Energy Access Project (MGEAP)
Alternative Energy Promotion Centre (AEPC),
Tahachal, Kathmandu, Nepal

2. Eligibility criteria of the Consulting Firm

Eligibility of Consulting Firm will be as below:

i) A Copy of Company/Firm Registration Certificate with updated renewal

ii) A Copy of PAN/VAT Registration Certificate (Only for National Firm)

iii) A Copy of Tax Clearance Certificate of F.Y. 2079/80 (Only for National Firm)

iv) Self-Declaration (Regarding not blacklisted, not ineligible to participate in the contract and has not been punished in the business offence)

EOI Forms & Formats

1. Letter of Application

(Letterhead paper of the Applicant or partner responsible for a joint venture, including full postal address, telephone no., fax and email address)

Date: .....

To,
Full Name of Client: _____
Full Address of Client: _____
Telephone No.: _____ Email Address: _____
Sir/Madam,

1. Being duly authorized to represent and act on behalf of (hereinafter "the Applicant"), and having reviewed and fully understood all the short-listing information provided, the undersigned hereby apply to be short-listed by ***[Insert name** of Client)* as Consultant for ***{Insert brief description** of Work/Services}*.

2. Attached to this letter are photocopies of original documents defining:
   a) the Applicant's legal status;
   b) the principal place of business;

3. ***[Insert name of Client]*** and its authorized representatives are hereby authorized to verify the statements, documents, and information submitted in connection with this application. This Letter of Application will also serve as authorization to any individual or authorized representative of any institution referred to in the supporting information, to provide such information deemed necessary and requested by yourselves to verify statements and information provided in this application, or with regard to the resources, experience, and competence of the Applicant.

4. ***[Insert name** of Client)* and its authorized representatives are authorized to contact any of the signatories to this letter for any further information.[1]

5. All further communication concerning this Application should be addressed to the following person,
   [Person]
   [Company]
   [Address, Phone, Fax, Email]

6. We declare that, we have no conflict of interest in the proposed procurement proceedings and we have not been punished for an offense relating to the concerned profession or business and our Company/firm has not been declared ineligible.

7. We further confirm that, if any of our experts is engaged to prepare the TOR for any ensuing assignment resulting from our work product under this assignment, our firm, JV member or sub-consultant, and the expert(s) will be disqualified from short-listing and participation in the assignment.

8. The undersigned declares that the statements made and the information provided in the duly completed application are complete, true and correct in every detail.

Signed :
Name :

For and on behalf of (name of Applicant or partner of a joint venture):

[1] Applications by joint ventures should provide on a separate sheet, relevant information for each party to the Application.

2. Applicant's Information Form

(In case of joint venture of two or more firms to be filled separately for each constituent member)

1. Name of Firm/Company:

2. Type of Constitution (*Partnership/ Pvt. Ltd/Public Ltd/ Public Sector)*

3. Date of Registration / Commencement of Business *(Please specify):*

4. Country of Registration:

5. Registered Office/Place of Business:

6. Telephone No; Fax No; E-Mail Address

7. Name of Authorized Contact Person / Designation/ Address/Telephone:

8. Name of Authorized Local Agent /Address/Telephone:

9. Consultant's Organization:

10. Total number of staff:

11. Number of regular professional staff:

(Provide Company Profile with description of the background and organization of the Consultant and, if applicable, for each joint venture partner for this assignment.)

3. Experience:

3(A). General Work Experience:

(Details of assignments undertaken. Each consultant or member of a JV must fill in this form.)

S. N.	Name of assignment	Location	Value of Contract	Year Completed	Client	Description of work carried out
1.						
2.						
3.						
4.						
5.						
6.						
7.						

3(B). Specific Experience:

Details of similar assignments undertaken in the previous Ten years
(In case of joint venture of two or more firms to be filled separately for each constituent member)

Assignment name:	Approx. value of the contract (in current NRs; US$ or Euro)[2]:
Country: Location within country:	Duration of assignment (months):
Name of Client:	Total No. of person-months of the assignment:
Address:	Approx. value of the services provided by your firm under the contract (in current NRs; US$ or Euro):
Start date (month/year): Completion date (month/year):	No. of professional person-months provided by the joint venture partners or the Sub-Consultants:
Name of joint venture partner or sub-Consultants, if any:	Narrative description of Project:
Description of actual services provided in the assignment:	

Firm's Name: _____

[2] Consultant should state value in the currency as mentioned in the contract

4. Technical and Managerial Capacity: