GRID SOLAR AND ENERGY EFFICIENCY PROJECT

Environmental and Social Management Framework

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EXECUTIVE SUMMARY

1.0 Introduction

Nepal is a land-locked country facing major development challenges. It is among the poorest countries in the world, with per capita GDP of US$ 619 (2011 prices) and an estimated 25 percent of Nepalese falling below the international poverty line (US$ 1.25 per day). Despite a decade-long armed insurgency and protracted political transition, Nepal has made exemplary progress in poverty reduction and human development. One of the key inputs for the accelerated economic growth is Power. Nepal is endowed with huge hydropower potential. Estimated theoretical power potential from its water resources is about 84,000 MW of which recent studies estimates 43,000 MW economically exploitable. But the installed hydropower generation capacity as of July 2013 is merely 746 MW, of which 704 MW is grid-connected. The power cut/ load shedding in the peak dry season reaches up to 18 hours a day. This gap between power supply and demand needs immediate attention with economically viable short term options.

Average solar radiation varies from 3.6 to 6.2 kWh/m^2 per day in Nepal; while the total sun shines days is about 300 per year. According to July 2008 assessment of solar and wind energy in Nepal, the commercial potential of solar power for grid connection is about 2,100 MW. Since solar electricity generation systems are easy and quick to install, are very attractive option in many locations in the county. Keeping in line with the GON strategies, the proposed pilot projects of grid-connected solar power generation as a short term opting is being considered for financing by the World Bank. As of the date NEA has selected few potential sites in the surroundings of the Kathmandu valley and these are Kulekhani, (1 and 2), Sunkoshi, Panauti, Sundarijal, Pharping, Trishuli and Devighat. The lands and properties within the sites are owned by NEA. Some of the sites, however, are encroached by outsiders due to poor property management by the concerned NEA management.

The Grid Solar and Energy Efficiency Project (GSEEP) development objectives (PDOs) are to: (i) increase generation capacity to supply the NEA grid through grid-connected solar farms; and (ii) reduce NEA's distribution losses in pilot distribution centers. The implementing agency for the GSEEP will be NEA. A project management Unit (PMU) will be established at NEA. A project manager has already been appointed and the PMU will be staffed with necessary technical and procurement officials. Detailed organization structure will be finalized during the project preparation.

Based on the identified sample sites, the expected site specific environmental, social and cultural impacts are of limited nature. Since specific project activities are yet to be defined the exact nature and scale of their impacts will be known only later. Apart from the site specifics of the solar farm, the project area would include communities and settlements in its surroundings. A safeguard framework document will serve as a 'guiding document' the planning, design and construction elements of the project activities. Such a guidance document or a framework would help in integrating and harmonizing the environment and social management principles at the various stages of project preparation and execution. In this context, this Environment and Social Management Framework (ESMF) has been prepared for the GSEEP.

2.0 Overview of Project Area

Potential candidate project sites for the solar farm are identified by NEA and have been jointly inspected by the team of NEA and World Bank. These candidate sites were also subject to preliminary environmental and social assessment prior to the preparation of this ESMF. The identified sites for solar farm are located in the Kathmandu valley and its surroundings in the districts of Kathmandu, Makawanpur, Nuwakot, Kavrepalachouk and Sindhupalanchok in the Central Development Region of Nepal. All of the candidate sites are within the land property boundaries owned by NEA. The NEA land survey report (2014) has covered only flat or south facing areas in the candidate sites, however, the preliminary field survey for the preparation of this ESMF reveals larger NEA owned land areas within the candidate sites.

The candidate sites are located in the rural setting except for the Trishuli and Sundarijal, which are within the well-developed area of urban or peri-urban setting. All sites lie outside the protected National Parks, Wildlife Reserves or Conservation areas. The Sundarijal site lies within 5 km distance of the protected site i.e. Shivapuri- Nagarjun National Park, while the other sites are more than 30 km from the nearest National Parks. The Google Images depicts the overall landscape, land use, access, built structures, settlements etc. within and outside the proposal sites. The above features depicted in the images fairly capture the proposal site's physical environments with some level of information on the biological (particularly forest and vegetation cover and their distribution) and social (settlement pattern, agro-economic practices) environments.

3.0 Regulatory and Legal Framework

All investments under the GSEEP must be consistent with the applicable laws, regulations, and notifications of the GoN that are relevant in the context of the proposed interventions/activities. The NEA and the concerned line departments/agencies will ensure that the GSEEP investments proposed and executed under GSEEP are consistent with the regulatory and/or legal framework, whether national, districts or municipal/VDCs. Additionally, it is also to be ensured that activities are consistent with the World Bank's operational policies and guidelines. This section is not a legal opinion on the applicability of the law but serves as guidance in the application of the various laws and regulations to the current project context.

Environmental Assessment format of WB is used to identify, avoid, and mitigate the potential negative environmental impacts associated with the Bank's operations early on in the project cycle. The policy states that Environment Assessment (EA) and mitigation plans are required for all projects having significant adverse environmental impacts or involuntary resettlement. This assessment has included analysis of alternative designs and sites, including the "no project option" and also conducted series of public consultations and information disseminations at all project sites. It is obvious that for World Bank-funded operations, and believes that Environmental Assessment will improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns are addressed.

4.0 Potential Environmental and Social Impacts and their Management

The GSEEP project is classified category B for environment due to limited adverse environmental impacts which are site specific, largely reversible and can be readily addressed through mitigation measures. The GSEEP sites do not locate in a sensitive ecosystem, and has avoided areas of historical and cultural significance. The land to be used for the Solar Farm development is the unused lands owned by NEA. The location of the project site coupled with the clean nature of solar power generation ensures that the GSEEP will not cause any significant adverse environmental and social impacts during construction and operation. The main project impacts are associated with clearing of shrub vegetation, waste management and management of labor camps at the site. Moreover, most of the associated impacts are limited to the construction phase and are temporary in nature. Except for the visual quality, operational phase GSEEP impact has negligible footprint.

Environmental and economic benefits of adding renewable energy to the national electrical grid can include: (i) Generating energy that produces no greenhouse gas emissions from fossil fuels and reduces some types of air pollution; (ii) Diversifying energy supply and reducing dependence on imported fuels; (ii) Creating economic development and jobs in manufacturing, installation, and more.

The potential adverse impacts and generic mitigation measures are discussed under three broad headings for environmental and social impacts as impact related to Design-Preconstruction Phase, Construction Phase, and Operation and Maintenance Phase. The Design-Preconstruction Phase is, the period before the actual project implementation when designs are being prepared. This allows the designers to avoid potential impacts in the project design, technical specifications and contract documentations. The Construction Phase is the period since the "Notice to Proceed" is given to the

Contractor until the issuing of the "Certificate of Completion". The Contractor will implement the project following the design and technical specifications of the EMP. The Operation and Maintenance Phase is the period starting with the issuing of the "Certificate of Completion" issued by the MPWU until the end of the 20 year lifetime of the project.

The specific interventions planned for GSEEP may have some limited adverse environmental impacts in the short term. The adverse or negative impacts related environmental issues and the potential mitigation measures are required for Design-Preconstruction Phase, Construction Phase, and Operation and Maintenance Phase. Highly significant impacts are unlikely given the type of activities and locations within NEA's own premises. High risks activity or locations are avoided through ineligibility criteria / negative list like PCBs are banned in transformers, energy efficient conducts are recommended. The tree clearance even within the NEA premises shall be obtained through district forest office to establish record that tress are cut/chopped from such premises. Each subproject was subjected to detailed environmental screening and specific Environmental Management Plan will be prepared, for site specific baseline status. The project construction will generate noise, dust, and exhaust gases and small quantities of construction waste, solid waste, and sewage. However, these impacts will not be significant as the construction and erection works involves a small number of construction workers. A large scale solar farm could be a visual obstacle, and thus this aspect will be considered during preparation of detailed site plan of the solar farm, which has been considered in this ESMF. The candidate project sites visited by the team are neither in visual impact sensitive areas nor overlooked by significantly populated area.

The social impacts would not be significant and are mostly restricted to the project area and its immediate surroundings. There will be no land acquisition and no impacts on the present land use, including natural habitats. The solar farms will be installed on NEA property and to the extent possible encroached area will be avoided to minimize adverse social impacts. Social screening however will be carried out in the project sites to identify any adverse social impact and presence of indigenous community.

5.0 Environmental and Social Screening and Management

Environmental and social considerations were envisioned right from the stage of project identification. In general, projects are identified on peoples' demand which is a good practice but when environmental and social consequences of implementation of a project are not well thought through, project implementation may lead to serious environmental and social problems. While identifying and designing sub-projects under GSEEP, all possible alternatives were examined and assessed. The Project Management Unit (PMU) has collected information on the environmental and social setting; identify possible beneficiaries and assess potential environmental and social impacts of different alternatives. The general public should be made aware of the environmental and social consequences of project implementation at later stages in GSEEP.

Each of the investments to be funded under the GSEEP will be subject to an environmental and social screening process before it is selected for inclusion in the project. The screening process establishes the level of environmental and social assessment required and will apply the exclusion criteria. The screening process intends to identify relevant possible environmental and social concerns as well as suggest any further investigation and assessment as necessary. The PMU will fill in a screening form with assistance of the consultants, if so required, for activities funded under the GSEEP. The PMU will carry out the environmental and social screening for the investments implemented under the GSEEP.

Primarily, the environmental screening exercise will be undertaken to determine the key environmental issues/concerns and the nature and magnitude of the potential impacts that are likely to arise on account of the proposed investments interventions. The major or key environmental and social issues to be identified will be determined by the type, location, sensitivity and scale of the investment intervention. Every candidate site will be subjected to social screening process before it is selected for inclusion in the project. The screening process will establish the degree of adverse impact (if any) and also the level of social assessment required and application of exclusion criteria. The Project will make best use of its

social planning approaches and fully ensure that the potential social issues are avoided or minimized to the extent possible. This would require deploying stringent measures for site selection at the early stage of project design and planning by undertaking environmental and social screening. Ideally, the possibility of avoiding or minimizing the issues related to involuntary resettlement would be possible by taking into account the following considerations while selecting the subproject site.

Gender analysis will be an integral part of the initial social assessment carried out as part of the safeguard screening of the GSEEP investments interventions. The issues identified at the screening stage will be assessed during the preparation of the GSEEP investments interventions and adequately addressed during implementation. Since the actual project cost for each site is not known at the ESMF preparation stage, the financial criteria for conducting EA (whether IEE or EIA) is written based on the EPA/EPR ceiling.

6.0 Information and Consultation Framework

The information and consultation framework is intended to lay out the way in which information will be provided to the project implementers and beneficiaries and also how consultations will be held during GSEEP implementation. Its purpose is to ensure that social and environmental issues are effectively addressed by the project in a transparent and participatory manner. The primary responsibility for the implementation of information and communication strategies lies with the PMU.

Public consultations in each candidate sites were initiated during the survey i.e from the earliest (planning) stages of the project. Relevant stakeholders will be essential especially during the identification of GSEEP investments, proposal preparation, and implementation phases. Each stakeholders group plays a distinct role in the planning and implementation of the GSEEP. Outcomes of public consultations will help to identify all potential project stakeholders along with their specific interests and needs. Stakeholders' identification, consultation and analysis will be continued throughout the project cycle and remain dynamic. Consultations were held with special emphasis on vulnerable groups. Encouraging public participation in consultations informs the public and serves as a venue for the public to express their opinion on priorities which the Project should address.

7.0 Grievance Redress Mechanism

Through a participatory process, grievances are expected to be minimized. However, it is necessary to establish an effective grievance redress mechanism to address complaints/grievances that may arise related to the project in general including but not limited to environmental and social issues. Any grievances and objections will be referred to the project Grievances Redress Committee (GRC).

The GRC needs to be established as soon as the Project is effective. A complaint cell is designed under the site management office and at central PMU office to collect complaints and transmit them to the GRC. Any affected family or person can approach the GRC directly regarding environmental and social issues including temporary impacts and impacts during construction.

The functions of the GRC which is envisaged in this document which includes: (i) to redress grievances of project affected persons (PAPs) in all respects; (ii) rehabilitation and resettlement assistance and related activities; (iii) GRC will only deal/hear the issues related to R&R and individual grievances; (iv) GRC will give its decision/verdict within 15 days after hearing the aggrieved PAPs; (v) final verdict of the GRC will be given by the Chairman/Head of GRC in consultation with other members of the GRC and will be binding to all other members.

8.0 Monitoring And Evaluation

A Monitoring & Evaluation (M&E) system is planned and will be established for the project, and safeguard compliance will be integral part of the project M&E. Both an internal and periodic external monitoring is proposed to ensure ESMF implementation. Internal monitoring will be carried out by the candidate site Management Office regularly and periodically by central PMU office, focusing on outcomes, outputs and

implementation progress for each GSEEP candidate sites and components. The candidate site management office will submit to central PMU office NEA and World Bank regular bimonthly (once in two months) reports during implementation. Similarly, periodic external monitoring will be carried out by independent consultant or agency using quantitative and qualitative methods and review of information and site visit. The ESMF evaluation will be mid-term and end term and both have to be third party evaluation.

9.0 Capacity Building

NEA has its own Environmental and Social Studies Department (ESSD) and has experience with the implementation of World Bank-funded projects. However, due to large numbers of sub-projects within NEA, ESSD often falls short of required human resource capacity to design and implement ESMF. It is therefore, the ESMF has included capacity strengthening measures to the members of PMU and Manager of Candidate Site as installing a solar farm is a new intervention for NEA.

Training is an important component for developing capacities. Appropriate and timely training to the officials with regard to various issues can bring a positive change in the functioning of the staff. Apart from training in generic areas such as human resource management, information management, government functionaries require training in handling certain specialized tasks pertaining to environmental and social issues. The Project's consultant will identify the training need assessment for PMU and staff of Candidate Sites and suggest the training packages including their modality of operation.

LIST OF ACRONYMS

BP	Bank Procedures
BS	BikramSambat
CDG	Captive Diesel Power Generator
CDM	Cleaner Development Mechanism
CEO	Chief Executive Officer
DDC	District Development Committee
DLRMP	Distribution Loss Reduction Management Plan
DoED	Department of Electricity Development
EA	Environmental Assessment
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Regulation
ESMF	Environmental and Social Management Framework
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
GIS	Geographical Information System
GoN	Government of Nepal
GRC	Grievances Redress Committee
GSEEP	Grid Solar and Energy Efficiency Project
IDA	International Development Association
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labor Organization
IPPs	Independent Power Producers
IPs	Indigenous People
IP-VCDF	Indigenous Peoples and Vulnerable Community Development Framework
kg	Kilogram
kV	Kilo Volt
kWh	Kilowatt Hours
MoE	Ministry of Energy
MV	Medium Voltage
MW	Mega Watt
NEA	Nepal Electricity Authority
NGO	Non-Government Organization
OP	Operation Policy
PCB	Polychlorinated biphenyl
PMU	Project Management Unit
PPAs	Power Purchase Agreement
RAP	Resettlement Action Plan
SAP	Social Action Plan
SIA	Social Impact Assessment
TL	Transmission Line
TYIP	Three Year Interim Plans
UN	United Nations
UNESCO	United Nation's Organization for Education, Science and Culture
VCs	Vulnerable Communities
VDC	Village Development Committee

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CHAPTER I: INTRODUCTION

1.1 Background

Nepal is a land-locked country facing major development challenges. It is among the poorest countries in the world, with per capita GDP of US$619 (2011 prices) and an estimated 25 percent of Nepalese falling below the international poverty line (US$1.25 per day). Despite a decade-long armed insurgency and protracted political transition, Nepal has made exemplary progress in poverty reduction and human development. In addition, Nepal has achieved gender parity in education and sharp reductions in infant and maternal mortality. While the country has achieved good growth rates of over the past years despite its fragile environment, the economy is yet to move towards its full growth potential. Going forward and in the absence of new endogenous sources of growth, economic activity will remain dependent on consumption (supported by remittances), and attributed to weather conditions and external developments.

One of the key inputs for the accelerated economic growth is Power. Nepal is endowed with huge hydropower potential. Estimated theoretical power potential from its water resources is about 84,000 MW of which recent studies estimates 43,000 MW economically exploitable. But the installed hydropower generation capacity as of July 2013 is merely 746 MW, of which 704 MW is grid-connected. Predominance of run off the river type hydropower projects, resulted low available energy output in the dry season, when the system demand is high, which is nearly 40 to 45% of the installed capacity. It is to be noted that 80 percent of rainfall in this Himalayan country occurs in the wet season (or the monsoon months of July, August and September), while the dry season (October through June) rainfall contribution is limited to only 20%. This variation in the rainfall in monsoon and non-monsoon months, with a hydropower generation schemes based on run off the river types, has resulted in acute power shortages in dry months with wide ranging economic implications. The power cut/ load shedding in the peak dry season reaches upto 18 hours a day. For instances, in November 2012, early post monsoon month, shortfall of nearly 470MW1 was recorded.

The other factor contributing to the gap between the power demand and supply in Nepal is also due to high power losses in the system. In 2012, accounted net energy loss was 26.4 percent of net generation nearly 15% higher than the loss accounted in the developed countries. Such high system loss is largely due to the poor quality of the power distribution system managed by NEA. Major causes of the system losses include: (i) overloading of distribution transformers; (ii) long distance and overloading (due to wrong sizes) of distribution feeder lines; (iii) high voltage drop of the distribution system due to lack of reactive power compensations; and (iv) commercial losses (poor metering, electricity theft, etc.). Owing to the high system losses, not only there is gap in the demand and supply, but also on the cost of energy supplied. This has resulted in the poor financial performance of NEA with increasing debts. It is to be noted that NEA incurs a loss of about 2 cents for every kilowatt-hour of electricity it sells. As a consequence, NEA is neither able to service its debts, nor generate funds required to invest in generation, transmission, and distribution infrastructures.

This gap between power supply and demand needs immediate attention with economically viable short term options. Accordingly Government of Nepal (GoN), to deal with the energy crises and eventually achieve sustainable, reliable and affordable electricity supply, has given priority to the strategies such as (i) reduce the load shedding by adding generation capacity that can be installed in a short term; (ii) reach supply and demand balance in a medium term through commissioning of hydropower under construction and power import from India; and (iii) develop its huge hydropower resources to sustain domestic growth and earn export revenues in a long term. In line with the strategy are actions including: (a) pilot projects

1*In November 2012, the available capacity was only 625 MW including 53MW thermal and about 100 MW import from India (hydro contributed only 472 MW); while, the peak demand was 1,095 MW.*

of grid-connected solar power generation for the short term; (b) high voltage cross-border transmission line under construction for up to 1,000 MW power import from India (expected to be completed by 2016); and (c) development of large hydropower and cross-border transmission line for power export to India (about 4,000 MW in the pipeline with feasibility studies completed and the second cross-border high voltage transmission line to India (under feasibility study).

Keeping in line with the GON strategies, the proposed pilot projects of grid-connected solar power generation as a short term opting is being considered for financing by the World Bank.

1.2 Sectoral and Institutional Context

Average solar radiation varies from 3.6 to 6.2 kWh/m^2 per day in Nepal, while the total sun shines days is about 300 per year. According to July 2008 assessment of solar and wind energy in Nepal, the commercial potential of solar power for grid connection is about 2,100 MW2. Since solar electricity generation systems are easy and quick to install, are very attractive option in many locations in the county. Further as solar radiation are strongest during winter season, when the electricity demand is high and hydropower-based power generation is low, this option for short term measure is considered more attractive. It is therefore, solar power is considered as one of the ideal power generation sources to complement the hydropower dominated electricity generation in Nepal. Grid-connected solar power generation is technically proven, however, is nearly two times costlier than the current retail tariff.

The electricity sector in Nepal is under the responsibility of the Ministry of Energy (MoE), which is responsible for formulating sector policies, and regulations, and overseeing planning, investment and development of the power sector. The MoE is also responsible for issuing licenses for electricity generation, transmission and distribution. In addition, the Investment Board established in November 2011 was entrusted with the responsibility of facilitating the development of large infrastructure projects including hydropower projects above 500 MW. NEA was formed in August 1985, under the Nepal Electricity Authority Act of 1984, as a vertically-integrated government-owned utility responsible for generation, transmission, and distribution of electricity in Nepal. Independent Power Producers (IPPs) also invest, own, and operate power generation facilities, mostly based on hydro resources. For domestic grid-based electricity supply, NEA serves as the single buyer for the electricity generated by IPPs. NEA being the sole agency for power generation, transmission and distribution in Nepal has the obligation to meet the power demand complying with the GON strategies to fill the gap between supply and demand in short, mid and long term. Considering the escalating power crisis, NEA has keen interest for the potential short term options of power supply such as grid connected solar power generation to minimize the gap between generation and supply

Given the power crisis, availability of strongest sunshine radiation in the critical power shortage periods, and interest of concerned institutions of GoN and NEA, the proposed project is the best option among alternatives that can deal with the energy crisis in the short term.

1.3 Project Description

1.3.1 Broader Project Objectives

The GSEEP broad objective is to reducing gap between demand and supply of gird power and contributing to the economic and social development of Nepal.

2*UNEP/ GEF, 2008. Solar and Wind Energy Resource Assessment in Nepal (SWERA), July 2008*.

1.3.2 Development Objectives

The project development objectives (PDOs) are to: (i) increase generation capacity to supply the NEA grid through grid-connected solar farms; and (ii) reduce NEA's distribution losses in pilot distribution centers.

1.3.3 Project Beneficiaries

The project beneficiaries are grid-connected electricity consumers throughout the country, who will benefit from increased power supply to the grid. The NEA is also expected to benefit from the Project mainly with increased revenue from electricity sales, improved operational efficiency and gained experience in large-sized grid-connected solar farms.

1.3.4 GSEEP Components

The GSEEP consists of two components: (1) Grid-connected Solar Farm Development and (2) Distribution System Loss Reduction.

1.3.4.1 Component 1: Grid-connected Solar Farm Development

This component will support (a) design, supply, construction, commissioning, operation and maintenance (O&M) of grid connected solar farms, in a total capacity of 25 MWp, to supply electricity directly to NEA's distribution network, through an engineering, procurement, and construction (EPC) contract; (b) hiring of an Owner's Engineer (OE) to support NEA to procure the EPC contract and supervise its execution; and (c) incremental operating cost and capacity building. The solar farms will be built in conventional solar photovoltaic (PV) technology nearby the Kathmandu valley. Electricity generated will be supplied directly without electricity storage facilities, at 11kV medium voltage (MV) level, to the existing substations of the NEA

As of the date NEA has selected few potential sites in the surroundings of the Kathmandu valley and these are Kulekhani, (1 and 2), Sunkoshi, Panauti, Sundarijal, Pharping, Trishuli Devighat. The lands and properties within the sites are owned by NEA. Some of the sites, however, are encroached by outsiders due to poor property management by the concerned NEA management. NEA has conducted initial load flow and system stability studies, fault level analysis, connection concept design, facility protection design, optimal site selection, environmental and social impact assessments, and bid documents preparation. Technical assistance will be provided to NEA to finalize these technical studies and the bidding document for design, supply, installation and commissioning of the solar farm. O&M services for 5 years from the date of commission, including supply of spare parts, preparation of an O&M manual and training of NEA's engineers will also be included. An Owner's Engineer (or individual consultants) will be hired by NEA to assist in construction supervision, acceptance test, commissioning, and reviewing the O&M Manuals.

1.3.4.2 Component 2: Distribution System Loss Reduction

This component will support: (a) preparing the Distribution Master Plan (DMP); (b) preparing the Distribution Loss Reduction Master Plan (DLRMP); (c) preparation and implementation of pilot loss reduction projects in selected distribution centers of NEA following recommendations of the DLRMP; and (d) capacity building for distribution system planning at both NEA's distribution center and corporate levels. The component will help redress the high system losses in the country, enhancing NEA's capacity in distribution system planning and management, and enhancing on-grid and off-grid planning coordination for rural electrification.

Following recommendations of the DLRMP, investment for system loss reduction will be piloted in two selected distribution centers of the NEA, which may include: (i) replacing conductors of distribution feeders or building new distributions lines to reduce line losses; (ii) adding or replacing distribution transformers to maintain voltage levels and reduce transformer losses; and (iii) adding capacitor banks to compensate reactive power to manage voltage levels.

The capacity building programs may include: (i) provision of instruments and proven software and training for distribution system loss identification and reduction planning; and (ii) development of a Geographic Information System (GIS) database with information/data of locations and details regarding the NEA's existing generation, transmission, and distribution facilities (including specifications); grid connected customers (households, industries, commercials, institutional customers, etc.); potential customers in grid-covered areas; potential demands in areas not covered by national grid; among others, for distribution system / rural electrification master planning. The GIS database is critical for on-grid and off-grid rural electrification planning, loss reduction planning, and distribution system and customer management.

1.4 Project Institutional and Implementation Arrangement

The implementing agency for the GSEEP will be NEA. A project management Team (PMU) will be established at NEA. A project manager has already been appointed and the PMU will be staffed with necessary technical and procurement officials. Detailed organization structure will be finalized during the project preparation.

1.5 Type and Nature of Civil Works Supported Under the GSEEP

The component 1 is to construct a grid-connected 20MW solar farm (without having electricity storage facility). The construction works of grid connected solar project involves little civil works, such as clearing of vegetation, leveling of ground, construction of control buildings, and installation of solar panels and electro-mechanical equipment. In addition, the component also constitute establishment of short distance 11 kV transmission lines from the solar farm to the nearest sub-station. Construction works for the transmission line involves clearing of standing trees, structures along the alignment, preparation of 11 kV pole foundations and stringing of conductors.

The component 2 activities are to replace the conductors in the existing distribution feeders, add or replace the existing distribution transformers and add capacitor banks in the existing substations. This component, in actuality does not involve any civil construction works, however, entail management of the hazardous waste of the replaced transformer in case they are PCB based.

The allocated budget for component 1 is US$50 million, while component 2 is US$ 33 respectively. The total budget estimated is US$ 83 million of which GON will contribute US$ 3 million and remaining US$ 80 million will be IDA soft loan.

1.6 Activities Excluded from GSEEP

The following lists the activities that cannot be supported under the GSEEP.

1. Any activity within the protected area/UNESCO declared heritage site;
2. Protected area or critical natural habitat is excluded.

3. Any activity that requires the physical relocation of households through involuntary acquisition of land and property excluding encroachers occupying the land and property of NEA
4. Any activity that requires dismantling of the cultural resources such as temples, shrines historical and archeological objects
5. Transformers and capacitor banks based on PCBs

1.7 Need for Environment and Social Management Framework

The general thrust and broad project interventions are well understood as outlined above. Based on the identified sample sites, the expected site specific environmental, social and cultural impacts are of limited nature. Since specific project activities are yet to be defined the exact nature and scale of their impacts will be known only later. Apart from the site specifics of the solar farm, the project area would include

communities and settlements in its surroundings. Besides, the 11kV medium voltage alignments to conduit the power from solar farm to sub-station and vice versa has potentials of diverse impacts, though of localized nature, which are largely unknown at this stage of planning. The component 2 including replacement of conductors, addition and or replacement of transformers and addition of capacitor banks could have issues related to community discomfort, community and occupational health and safety etc., depending upon the areas where such activities will be carried out. As these component activity sites are yet to be finalized, the nature and gravity of the impacts could only be assessed once the sites are identified and project activity foot prints are fixed.

In the above context, a safeguard framework document is needed to 'guide' the planning, design and construction elements of the project activities. Such a guidance document or a framework would help in integrating and harmonizing the environment and social management principles at the various stages of project preparation and execution. In this context, this Environment and Social Management Framework (ESMF) has been prepared for the GSEEP.

This ESMF forms part of the comprehensive environmental and social management approach that has been adopted for addressing the potential environmental and social impacts from GSEEP, even when these are considered minor in nature.

Since specific GSEEP activities will only be identified in the course of project implementation, a mechanism for screening and assessing possible adverse short-term environmental and social impacts during the project preparation is required. This ESMF defines (a) the approach for identifying the environmental and social issues associated with the GSEEP activities, (b) the requirements for conducting environmental and social screening and environment and social assessment studies, and (c) measures to prevent, mitigate and manage adverse impacts and enhance positive ones. This ESMF includes an exclusion list and a simplified screening checklist, which will be used to determine what types of environmental and social assessment are required for the proposed initiatives. Environmental Management Plans/Social Action Plans (EMP/SAP) for specific initiatives will be prepared if required. This ESMF includes a resettlement policy framework describing mechanisms for addressing the possible temporary disruption of services and income (e.g., temporary displacement of informal vendors), and temporary restrictions on access to facilities while the construction work is ongoing in the project area. The ESMF includes a vulnerable community development plan, a gender development framework, and capacity building measures and a monitoring mechanism. This ESMF specifies norms and procedures for the conservation and restoration of historic and archeological objects for dealing with chance finds during small works.

1.8 Process Adopted for Preparing the ESMF

The process adopted for the preparation of this ESMF includes: review of relevant environmental and social policies, acts, regulations and guidelines of GON, safeguard policies of World Bank, and interactions and consultations with all concerned stakeholders. Therefore, this ESMF is primarily based on the reviews of available relevant literatures and consultations with the sample project level stakeholders.

1.9 Purpose and Objectives of the ESMF

The ESMF seeks to:

1. Establish clear procedures and methodologies for screening, reviewing and managing environmental and social safeguards for the components to be financed under the GSEEP.
2. Consolidate and facilitate understanding of all essential policies and regulations of the GoN as well as the World Bank's environmental and social safeguards regime that are applicable to the Project
3. Provide practical guidance on the implementation of the environmental and social management measures.

4. Specify norms and procedures for the conservation and restoration of historic and archeological objects for dealing with chance finds during works.
5. Specify institutional arrangements, including appropriate roles and responsibilities for managing, reporting and monitoring environmental and social concerns of the GSEEP component investments.
6. Provide a framework for consultation and information disclosure.
7. Determine the other institutional requirements, including those related to training and capacity building, needed to successfully implement the provisions of the ESMF.

The application and implementation of the ESMF therefore, will:

1. Support the integration of environmental aspects into the decision making process at all stages related to planning, design, execution, operation and maintenance of GSEEP investments, by identifying, avoiding and/or minimizing adverse environmental impacts early-on in the project cycle.
2. Minimize environmental degradation to the extent possible resulting from either directly GSEEP component activities or through indirect, induced and cumulative effects of project activities.
3. Enhance the positive/sustainable environmental and social outcomes through improved/appropriate planning, design and implementation of sub-activities of the project components.
4. Consider the level of environmental and social risk of each type of GSEEP component activates in allocating time and resources to be dedicated for stakeholder consultation.
5. Build the capacity of the NEA to take-up and coordinate responsibilities related to the application and implementation of the ESMF, including the preparation of the GSEEP Component specific Environmental Assessment and Management Plans (if required).
6. Provide guidelines and procedures for further consultations during project implementation, in particular in defining and designing GSEEP component specific works.
7. Provide a systematic guidance to address potential risks and to enhance quality, targeting, and benefits to the surrounding communities.
8. Ensure that those stakeholders, irrespective of whether they benefit from or are adversely affected by the project interventions, are well informed and are able participate in the decision-making process.
9. Support compliance with applicable legal/regulatory requirements of GoN as well as with the requirements set forth in the relevant Bank policies.
10. Protect human health.
11. Minimize adverse impacts on cultural property.

1.10 Revision/Modification of the ESMF

The ESMF will be an 'up-to-date' or 'live document' enabling revision, when and where necessary. Unexpected situations and/or changes in the project or components design would therefore be assessed and appropriate management measures will be incorporated by updating this ESMF. Such revisions will also cover and update any change/modification introduced in the legal/regulatory regime of the country. Also, based on the experience of application and implementation of this framework, the provisions and procedures would be updated, as appropriate, in agreement with the World Bank and the NEA.

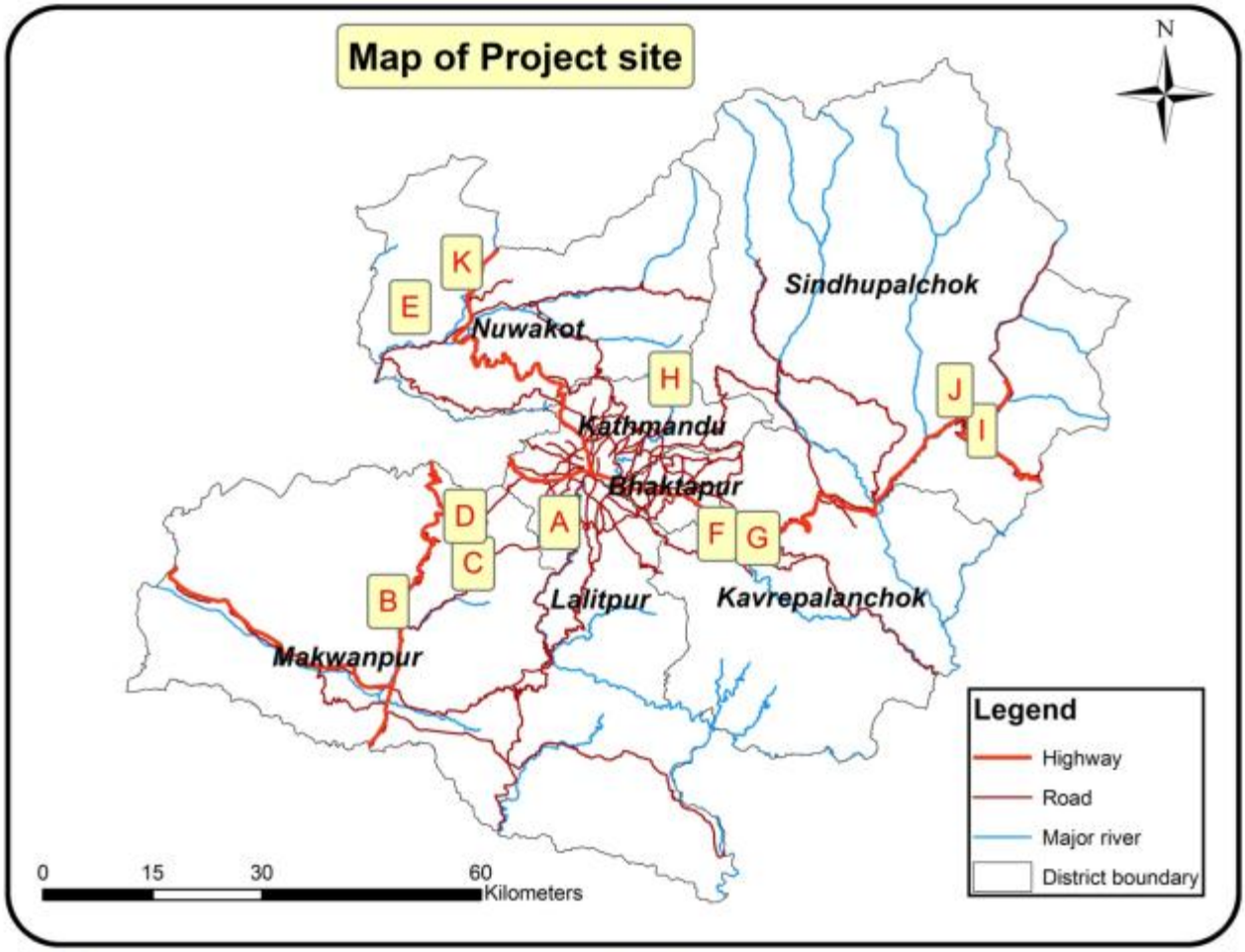
1.11 Limitations of the ESMF

This ESMF has been developed in line with World Bank's Operational Policies (OPs) and is based on GoN laws and regulations, as applicable at the time of preparation of this document. Any proposed modifications in the laws, regulations or guidelines that were notified as 'draft' at the time of preparation of this document have not been considered.

CHAPTER II: OVERVIEW OF THE PROJECT AREA

Potential candidate project sites for the solar farm related to component 1 investments are identified by NEA and have been jointly inspected by the team of NEA and World Bank. However, for the component 2 of the project site are still not known. Therefore, the study does not includes any site specific study for the component 2 of the project. These candidate sites were also subject to preliminary environmental and social assessment prior to the preparation of this ESMF. The identified sites for solar farm are located in the Kathmandu valley and its surroundings in the districts of Kathmandu, Makawanpur, Nuwakot, Kavrepalachouk and Sindhupalanchok in the Central Development Region of Nepal (***Figure 1***). Candidate sites for the component 2 investments are not yet identified but are envisaged to be within the geographical boundaries of the candidate solar farm districts.

Figure 1: Location Map of the Candidate GSEEP Solar Farm Sites



A	Pharping power house	G	Panauti 2
B	Kulekhani Power House	H	Sundarijal
C	Kulekhani Reservoir area 1	I	Sunkoshi 1
D	Kulekhani Reservoir area 2	J	Sunkoshi 2
E	Debighat	K	Trishuli
F	Panauti 1		

2.1 Geographical Location

Geographical locations of the candidate solar farm sites are presented in ***Table 1***.

Table 1: Geographical Locations of the Candidate Solar Farm Sites

SN	Project Site	VDC and Ward No and District	GPS Location	Land Area (m^2)*
1	Pharping Powerhouse	Setidevi VDC ward no 6,4,5; Kathmandu	Lat: 27°36'49.18'' N Long: 85°17'19.74'' E	17862.65
2	Kulekhani 2 Powerhouse	Bhainse VDC ward no.3 Makwanpur	Lat: 27°31'6.99'' N Long: 85°2'57.2'' E	6004.45
	Kulekhani 1 Reservoir area	Markhu VDC ward no 8 ; Makwanpur	Lat: 27°37'8.51'' N Long: 85°9'3.12'' E	59450.31
	Kulekhani 1B, Reservoir Area	Markhu VDC Ward no 8; Makwanpur	Lat: 27°36'40.27'' N Long: 85°9'21.65'' E	6254.07
3	Devighat	Charghare VDC ward no.2 ; Nuwakot	Lat: 27°52'56.51'' N Long: 85°7'30.65"E	23570.977
4	Panauti	Panauti municipality ward no 12, Kavre	Lat: 27°33'50.57'' N Long: 85°32'0.28E	1721.21
	Panauti 2	Panauti Municipality ward no 12, Kavre	Lat: 27°33'49.46'' N Long: 85°32'9.72"E	1575.43
5	Sundarijal	Sundarijal VDC ward no 9 ; Kathmandu	Lat: 27°45'33.74'' N Long: 85°25'12.99"E	2533.19
6	Sunkoshi 1	Pangretar VDC ward no-5, Sindhupalanchok	Lat: 27°45'14.02'' N Long: 85°50'36.82"E	11217.02
	Sunkoshi 2	Mangka VDC ward no. 6 Sindhupalanchok	Lat: 27°45'18.71'' N Long: 85°50'6.82"E	17862.65
7	Trishuli	Bidur Municipality ward no 10, Nuwakot	Lat: 27°55'19.89'' N Long: 85°8'48.26"E	2815.73

*Note: * Land area of candidate site as per NEA 2014 survey.*

All of the candidate sites are within the land property boundaries owned by NEA. The NEA land survey report (2014) has covered only flat or south facing areas in the candidate sites, however, the preliminary field survey for the preparation of this ESMF reveals larger NEA owned land areas within the candidate sites. In some of the candidate sites, parts of the NEA owned land areas are encroached by the outsiders.

Figure 2 to 9 depicts the locations of the candidate sites in the recent Google Images. White line is the approximate boundary of the candidate sites, while the yellow notation with site name is marked on the central part of the candidate site location.

Figure 2: Pharping Powerhouse site

Figure 3: Kulekhani 2 Powerhouse Site

Figure 4: Kulekhani 1 and 1B sites Kulekhani Reservoir Sites

Figure 5: Devighat Powerhouse site

Figure 6: Panauti and Panauti 2 Site

Figure 7: Sundarijal Powerhouse site

Figure 8: Sunkoshi 1 and 2SunkoshiPowerhouse Sites

Figure 9: Trishuli Powerhouse Site

2.1.2 Environmental Baseline

The candidate sites are located in the rural setting except for the Trishuli and Sundarijal, which are within the well-developed area of urban or peri-urban setting.

All sites lie outside the protected National Parks, Wildlife Reserves or Conservation areas. The Sundarijal site lies within 5 km distance of the protected site i.e. Shivapuri- Nagarjun National Park, while the other sites are more than 30 km from the nearest National Parks.

The Google Images depicts the overall landscape, land use, access, built structures, settlements etc within and outside the proposal sites. The above features depicted in the images fairly capture the proposal site's physical environments with some level of information on the biological (particularly forest and vegetation cover and their distribution) and social (settlement pattern, agro-economic practices) environments. ***Table 2*** presents the environmental baseline summary of the proposal sites based on the Google image interpretation, reconnaissance field visits and available secondary literatures of the respective areas.

Table 2: Summary Environment and Social Baseline

SN	Project Site	Accessibility	Environmental and Social Baseline	Development needs
1	Pharping Powerhouse	Motorable access along the southern boundary	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface run off erosion. ▪ Land unit is sloping at 20 degree towards south. ▪ The land is terraced. Open agricultural land. No tree obstruction. ▪ Four built structures within the site along the southern boundary. ▪ Nearest settlement is about 5 m of the southern border. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Demolition of built structure; ▪ Land to be planed for flat panel PV ▪ Need 12 km of 11 kV line evacuate power or has to free or add conductor on existing 11 kV distribution line
2	Kulekhani 2 Powerhouse	Motorable access along the southwestern boundary line	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. Lies above flood plain. ▪ Lower part of the site shows landslide scars, erosion prone with Moderate to high surface run off. ▪ Open land barren. Upper part represents terraced agricultural land sloping at angle greater than 20 degrees. ▪ No tree obstruction. ▪ No built structures within the site. ▪ Nearest settlement about 75 m to the northwest and about 25 m to the	▪ Land slide potential, and need protection against landslide, ▪ Land to be planned for flat panel PV, ▪ Need a 11 kV TL line to evacuate power length not known; or has to free or add conductor on existing 11 kV distribution line

SN	Project Site	Accessibility	Environmental and Social Baseline	Development needs
			southwest of the site boundary. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	
	Kulekhani 1 Reservoir area	Motorable access along the eastern boundary of the site	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface run off erosion. ▪ Southwest facing slope (<20 degree), terraced land. More than 30 trees along the border line on the south and east. ▪ 53 structures within the site. ▪ Nearest settlements and built structures from the site boundary on the north, and east within 5 to 20 m distance. ▪ Not a historical and religious site and i ▪ Devoid of built temples within the site boundary.	▪ Demolition of structures, ▪ clearance of vegetation, ▪ Land to be planned for flat PV panel, ▪ Need a 11 kV TL line length unknown or has to free or add conductor on existing 11 kV distribution line
	Kulekhani 1B, Reservoir Area	No motorable access, about 200m access road will have to be developed through the sparsely vegetated slope from the north east side from the main access road.	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface run off erosion. ▪ Terraced agricultural land mostly open. ▪ Three bamboo clumps on the northern boundary and few bushy types of vegetation on the southern side. ▪ One structure within the site. ▪ Nearest structures from the site boundary locates at the western (4 nos) and eastern boarders (2 nos). ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Need Motorable access, ▪ Demolition of structure, ▪ Clearance of vegetation, ▪ Need a TL line length not known or has to free or add conductor on existing 11 kV distribution line
3	Devighat	Motorable access along the northern boarder	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas.	▪ Landslide protection, Land to be planned for flat PV panel, ▪ Need a TL line length unknown or has to free or add conductor on existing 11 kV distribution line

SN	Project Site	Accessibility	Environmental and Social Baseline	Development needs
			▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface run off erosion. Small landslide on the eastern boundary facing to Trishuliriver. ▪ A deep gully (vegetated) marks the western boundary. ▪ Site is open terraced land sloping due south at angle about 20 degree. ▪ No vegetation and trees within the site. ▪ No structures within the site. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	
4	Panauti	No motorable access to the site. About 100m access to be developed along the western embankment of the reservoir.	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. Lies above flood plain. ▪ It forms the part south facing slope of the reservoir embankment, approximately 15m wide and about 115 long. ▪ The site sloping about 12 degree to the south. ▪ No tree vegetation within the site. ▪ No built structures within site. ▪ A foot trail pass along the site. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Development of motorable access, ▪ Need provision of access trail, ▪ Site too narrow ▪ Need a TL line length unknown or has to free or add conductor on existing 11 kV distribution line
	Panauti 2	Motorable access to be improved (approximate length 90m, trail exists need to be developed).	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Open barren land. ▪ Moderate Surface runoff erosion. ▪ Two trees on the northern boundary line and few bushy vegetation on the east. ▪ One structure within the site. ▪ Nearest structures are within 15 m distance to the north and about 35 m to the east of the site boundary. ▪ A foot trail pass through the site. 1. Not a historical and religious site and	▪ Development of motorable access, ▪ vegetation clearance, ▪ provision of alternative access trail ▪ Site very small by area ▪ Need a TL line length unknown or has to free or add conductor on existing 11 kV distribution line ▪ Potential of NEA owned additional area

SN	Project Site	Accessibility	Environmental and Social Baseline	Development needs
			▪ Devoid of built temples within the site boundary.	
5	Sundarijal	Motorable access from the northern side	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain ▪ . Agricultural open land of flat nature. ▪ No tree vegetation. ▪ Four built structures within site. ▪ Sitesurrounded by built structures on three sides. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Demolition of structure.
6	Sunkoshi 1	Motorable access along the southern border.	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface runoff erosion ▪ A rolling spur forming the embankment of the reservoir on the northern and northeastern side of the reservoir. ▪ Partly afforested land with a number of small trees. ▪ The land unit slope both to the north and south at gentle angle. ▪ No built structure within the site. ▪ The nearest built structure is about 60 m to the east of the site boundary. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Vegetation clearance, ▪ Land to be developed for flat PV panel , Need 3-3.5 km of new 11 kV line or has to free or add conductor on existing 11 kV distribution line ▪ Potential of additional NEA owned land area
	Sunkoshi 2	Motorable access from the northwestern corner.	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. Lies above flood plain. ▪ Limited surface runoff erosion. ▪ Open land sloping due south at gentler angle, terraced agricultural land.	▪ Clearance of vegetation , ▪ Need 3-3.5 km of new 11 kV line or has to free or add conductor on existing 11 kV distribution line

SN	Project Site	Accessibility	Environmental and Social Baseline	Development needs
			▪ No built structure within the site ▪ Nearest building is about 5 m from the eastern border. ▪ One tree on the northern border. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	
7	Trishuli	Motorable access all along the northern border	▪ Sub-tropical climate, influenced by monsoon rains (June to September) ▪ Summer months (March to May) hazy with high suspended dusts in the atmosphere ▪ Sites not important from water resource point of view ▪ Lies outside national Park & conservation areas. ▪ No natural forest within the site. ▪ Lies above flood plain. ▪ Limited surface runoff erosion. ▪ More than 30 trees covering the site. ▪ Two built structure within the site. ▪ Dense settlement to the north and east of the site boundary. ▪ Not a historical and religious site and ▪ Devoid of built temples within the site boundary.	▪ Demolition of structure, ▪ clearance of vegetation, ▪ Need a TL line length unknown or has to free or add conductor on existing 11 kV distribution line

Source: Google Image 2009/2011.

All of the structures within the candidate sites surveyed by NEA 2014 are under the ownership of NEA. All of these structures are abandoned structures while some structures are being occupied by the NEA's local staff. Similarly, some land plots are also under cultivation by the NEA's local staff.

2.1.3 Social Baseline

Table 3 presents summary of the VDC level social baseline data of the candidate project sites.

Table 3: Summary of VDC Level Social Baseline

VDC Area and Demography											
SN	**Project Site**	**VDC and Ward No**	**Area***	**HH**	**Total**	**M**	**F**	**HH size**	**M/F**	**Pop. Density****	**Caste/Ethnic Group**
1	Pharping Powerhouse	Setidevi VDC ward no 6,4,5; Kathmandu	5.87	1039	4248	2117	2131	4.09	0.99	724	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Magar, Gurung, Dalit, Rai, and Tharu. Chetri is dominant (48%) followed by Newar (22%). Janajati group constitute 36.85% while upper caste make up 54.83% and Dalit 8.32%

VDC Area and Demography											
SN	**Project Site**	**VDC and Ward No**	**Area***	**HH**	**Total**	**M**	**F**	**HH size**	**M/F**	**Pop. Density** **	**Caste/Ethnic Group**
2	Kulekhani 2 Powerhouse	Bhainse VDC ward no.3 Makwanpur	63.01	1388	6717	3228	3489	4.84	0.93	107	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Magar, Gurung, Dalit, Chepang, Rai, and Thakuri. Tamang is dominant (66%) followed by Magar (11%). Janajati group constitute 82.64% while upper caste make up 11.86% and Dalit 5.31%
	Kulekhani 1 Reservoir area	Markhu VDC ward no 8 ; Makwanpur	15.87	634	3071	1452	1619	4.84	0.90	194	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Magar, and Dalit,.Tamang is dominant (52%) followed by Newar (25%). Janajati group constitute 83.48% while upper caste make up 15.50% and Dalit 1.02%
	Kulekhani 1B, Reservoir Area	Markhu VDC Ward no 8; Makwanpur	15.87	634	3071	1452	1619	4.84	0.90	194	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Magar, and Dalit,.Tamang is dominant (52%) followed by Newar (25%). Janajati group constitute 83.48% while upper caste make up 15.50% and Dalit 1.02%
3	Devighat	Charghare VDC ward no.2 ; Nuwakot	18.39	1190	5419	2478	2941	4.55	0.84	295	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Dalit, Magar, Rai, Gharti/Bhujel and Thakuri. Bahun is dominant (45%) followed by Tamang (16%). Janajati group constitute 27.49% while upper caste make up 57.31% and Dalit 15.2%.
4	Panauti	Panauti municipality ward no 12, Kavre	31.73	5943	27358	13091	14267	4.60	0.92	862	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Rai, Dalit, Magar,

VDC Area and Demography											
SN	**Project Site**	**VDC and Ward No**	**Area***	**HH**	**Total**	**M**	**F**	**HH size**	**M/F**	**Pop. Density** **	**Caste/Ethnic Group**
											Shanyashi, Thakuri, Pahari, Gharti/Bhujel, Majhi, and Sherpa. Chetri is dominant (47%) followed by Newar (29%). Janajati group constitute 55.91% while upper caste make up 60.50% and Dalit 5.47%.
	Panauti 2	Panauti Municipality ward no 12, Kavre	31.73	5943	27358	13091	14267	4.60	0.92	862	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Rai, Dalit, Magar, Shanyashi, Thakuri, Pahari, Gharti/Bhujel, Majhi, and Sherpa. Chetri is dominant (47%) followed by Newar (29%). Janajati group constitute 55.91% while upper caste make up 60.50% and Dalit 5.47%.
5	Sundarijal	Sundarijal VDC ward no 9 ; Kathmandu	35.31	547	2552	1252	1300	4.67	0.96	72	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamamng, Gurung, Dalit, and Shanayshi. Tamang is dominant (64%) followed by Newar (11%). Janajati group constitute 79.51% while upper caste make up 20.05% and Dalit 0.4%.
6	Sunkoshi 1	Pangretar VDC ward no-5, Sindhupalanchok	9.62	762	2952	1428	1524	3.87	0.94	307	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Dalit, Magar, Gharti/Bhujel, Majhi, and Thami. Chetri is dominant (35%) followed by Bahun (23%). Janajati group constitute 19.54% while upper caste make up 60.50% and Dalit 19.96%.

VDC Area and Demography											
SN	**Project Site**	**VDC and Ward No**	**Area***	**HH**	**Total**	**M**	**F**	**HH size**	**M/F**	**Pop. Density** ***	**Caste/Ethnic Group**
	Sunkoshi 2	Mangka VDC ward no. 6 Sindhupalanchok	15.46	1860	7752	3698	4054	4.17	0.91	501	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Dalit, Magar, Gharti/Bhujel, and Sherpa,.Tamang is dominant (37%) followed by Bahun (27%). Janajati group constitute 47.39% while upper caste make up 46.14% and Dalit 6.15%
7	Trishuli	Bidur Municipality ward no 10, Nuwakot	33.48	6270	26750	12712	14038	4.27	0.91	799	The caste ethnic groups in the VDC are Newar, Bahun. Chetri, Tamang, Gurung, Dalit, Magar, Rai, Gharti/Bhujel, Kumal, Sherpa, Bhote, Shanayshi and Thakuri. Newar is dominant (24%) followed by chhetri (22%). Janajati group constitute 45.13% while upper caste make up 46.24% and Dalit 8.63%.

Source: CBS 2012, and CBS 2001
Note: HH = Household, M= Male, F = Female, M/F – Male/Female ratio,
** = Area in Km^2, ** Population Density – Persons/km^2.*

Candidate site level detailed baseline database are presented in the ***Annex 1***, while the summary is presented in Table 4, 5, 6, and 7

Table 4: Access conditions of the candidate Solar Farm Sites

SN	Name of the Project Site	Number of Access to the site	Remarks
1	Pharping Powerhouse	2 motor able road and 1 small road from where only bikes are accessed	1 motor able road from north region (graveled) one from western region (graveled) and one small road from southern part.
2	Kulekhani 2 Powerhouse	One motor able access road from west	The site is at distance of 2 km toward Daman from Bhaise
	Kulekhani 1 Reservoir area	One motor able access road from north east	The graveled road extends 5km along the eastern side of the Kulekhani Hydropower Reservoir up to the Markhu village. Around 20m motor able graveled access road extends from main road up to the site.
	Kulekhani 1B, Reservoir Area	One motor able access road from north	The site is at distance of 500m from the simlangbazartar, where the kulekhhaniMarkhu

			road passes
3	Debighat	One motor able access road from North	The access road to site is gravel road from Trishuli to the project site
4	Panauti 1	1 foot trail	The access road to the site is foot trail that extends 150m south from main road
	Panauti 2	1 foot trail	From the access road, the sitelies at the south- western side about 200 m in distance
5	Sundarijal	One motor able access road from East	Site is near Sundarijal bus park at about 10 meter distance
6	Sunkoshi 1	One motor able access road from North east	About 1 kilometer far from PasangLhamu highway
	Sunkoshi 2	One motor able access road from North	About 40 meter far from Araniko highway
7	Trishuli	One motor able access road from East	About 1.5km from the Trishuli Bridge, 70m above the microbus park.

Source: Field Survey 2014

Table 5: Land Use of the Candidate Solar Farm Sites

SN	**Name of the Project Site**	**Specific Land Use**	**Remarks**
1	Pharping Powerhouse	Barren land	Majority portion of land is barren and covered by grasses
2	Kulekhani 2 Powerhouse	Barrenl land	Majority portion of land is barren and covered by grasses
	Kulekhani 1 Reservoir area	Residential area (for staff of NEA)	It is basically designed as a NEA staff colony that consists of staff quarters, NEA office, planted area with several variety of tree species, kitchen garden developed by NEA staffs and fallow land covered with grasses.
	Kulekhani 1B, Reservoir Area	Agricultural land	The proposed project site is the nursery of Nepal Electricity Authority, used for growing sapling of tree.
3	Debighat	Agricultural land	Five Rai family of vultar village have been practicing agriculture on the project site
4	Panauti 1	Barren land	Majority portion of land is barren and covered by grasses
	Panauti 2	Barren land	The site is devoid of forest & natural vegetation and other infrastructures
5	Sundarijal	Residential & agricultural land	Utilized by NEA staff member
6	Sunkoshi 1	Forest land	Planted by NEA in 2046 B.S
	Sunkoshi 2	Agricultural land	Utilized by Bhakta BahadurKhadka
7	Trishuli	Barren land	Site being used as store of worn out machineries.

Source: Field Survey 2014

Table 6: Nearest Settlement and Communities Candidate Solar Farm Sites

SN	Name of the Project Site	Distance from Nearest settlement	Name of the Nearest Settlements	Total HH	Population		Community Characteristics
					Male	Female	
1	Pharping Powerhouse	250 m towards south west from south western corner of site	Setidevi VDC, ward number 4	5	23	18	Majority of Newar community
		250 m towards east and south from eastern and southern corner of site respectively	Setidevi VDC, ward number 6	5	29	16	Settlement is mostly dominated by Chettri community
2	Kulekhani 2 Powerhouse	200 m north west from the site	Aapchaur	51	103	112	Settlement is mostly dominated by Magar community
	Kulekhani 1 Reservoir area	Adjacent to northern side	Markhu	48	113	123	Majority of Tamang community
	Kulekhani 1B, Reservoir Area	100 m west from the project site	Simlang	18	25	31	Majority of Newar community
		115 m north west of the site	Bazartar	16	21	23	Majority of Newar community
		130 m north of the site	Dhakyu	2	4	5	Majority of Newar community
3	Debighat	25 m north of the site	Manthala	56	178	178	Settlement dominated by Brahmin community
		200 m far north west of the site	Vultar	15	32	34	Settlement dominated by Rai community
4	Panauti 1	100 m far towards western side	Satyal Dada	50	100	90	Mainly Chhetri and Brahmin community
	Panauti 2	100 m far towards western side	Satyal Dada	50	100	90	Mainly Chhetri and Brahmin community
5	Sundarijal	Adjacent to South east of the site	Sundarijal	61	178	178	Settlement is mostly dominated by ethnic groups of Tamang.
6	Sunkoshi 1	Adjacent to East of the site	LapsiKhola	5	13	15	Settlement is mostly dominated by Chettri community
	Sunkoshi 2	Adjacent to East of the site	Aakar	3	9	10	Mixed type of settlement with ethnic groups of Chhetri, Brahmin, Tamang
7	Trishuli	200 m east from the site	Trishuli bazar	250	483	585	Majority of Tamnag community

Source: Field Survey 2014

Table 7: Built Infrastructures in the Candidate Solar Farm Sites

SN	Project Sites	Electric lines	Storm water drains and drainage	Water supply pipes through the sites	Wells, tube wells & tap	Other Structures	Religious structures
1	Pharping Powerhouse	-	-	-	-	1 cow shed 14 retaining wall	-
2	Kulekhani 2 Powerhouse	-	-	-	-	1 cowshed for cattle	-
	Kulekhani 1 Reservoir area	23 pole	-	-	-	46 house	-
	Kulekhani 1B, Reservoir Area	1 pole	-	-	-	1 house	-
3	Debighat	2 pole	-	-	-	-	-
4	Panauti 1	-	-	-	-	-	-
	Panauti 2	5 pole	-	-	-	-	1 krishna temple
5	Sundarijal	2 pole	-	-	1 tap	6 residential buildings 1 toilet 1 Building Block	-
6	Sunkoshi 1	3 pole	-	-	-	-	-
	Sunkoshi 2	1 pole	-	-	-	1 temporary stall	-
7	Trishuli	2 pole and 1 transmission pole	-	-	-	2 store building	-

Source: Field Survey 2014

Table 8: Numbers of Trees inside the Candidate Solar Farm Sites

SN	Name of the Project Site	Local Name of Tree species	Scientific name	Number
1	Pharping Powerhouse	Bakaino	Meliaazederach	4
		Uttis	Alnusnepalensis	5
		Painyu	Prunuscerasoides	1
		Aangari	Melastomamelabathricum	1
		Hadibayer	Zizyphusincurva	1
2	Kulekhani 2 Powerhouse	Chilaune	SchimaWalichi	7
		Kutmero	LitseaMonopetala	2
		Sal	Shorea Robusta	3
	Kulekhani 1 Reservoir area	Kainyo	Wendlandiapuberula	132
		Kalki	Callistemon citrinus	112
		Salla	Pinusruxburghii	18
		Kapur	Cinnamomumcamphora	13
		Naspati	Pyruscommunis	21
		LaharePeepal	Populusdeltoides	7
		Uttis	Alnusnepalensis	14
		Dhupi	Cryptomeriajoponica	66
	Kulekhani 1B, Reservoir Area	Naspati	Pyruscommunis	27
		Kaiyo	Wendlandiapuberula	5
		Khari	Celtisaustralis	2
		Kafal	Myricaesculenta	1

SN	Name of the Project Site	Local Name of Tree species	Scientific name	Number
		Salla	*Pinusruxburghii*	2
		Utis	*Alnusnepalensis*	3
		Laharepipal	*Populusdeltoides*	2
3	Debighat	Jamun	*Syzygiumcumini*	1
		Khayer	*Acacia catechu*	1
		Pipal	*Ficusreligiosa*	1
		Katahar	*Artocarpusheterophyllus*	1
		Sal	*Shorearobusta*	1
		Aap	*Mangiferaindica*	1
4	Panauti 1	Nil		
	Panauti 2	Lapsi	*Choerospondiasaxillaris*	1
		Paiyu	*Betulaalnoides*	1
5	Sundarijal	Aru tree	*Prunuspersica*	3
		Naspati tree	*Pyruscommunis*	2
		Lapsi tree	*Choerospondiasaxillaris*	1
6	Sunkoshi 1	Sissau Tree	*DalbergiaSisso*	109
		Mauwa tree	*Madhucalongifolia*	4
		Amba tree	*Psidiumguajava*	1
		Chilaune tree	*Schimawallichii*	4
		Salla	*Pinusroxburghi*	1
		Swami tree	*Ficusbenjamina*	1
	Sunkoshi 2	Pipal	*Ficusreligiosa*	2
		Kutmero	*Litseamonopelata*	5
		Aru	*Prunuspersica*	2
		bamboo	*Bambusavulgare*	1 clump (around 30 in number)
7	Trishuli	Aap	*Mangiferaindica*	3
		Sisso	*DalbergiaSisso*	8
		Chuwa	*Phlogacanthusthyrsiflorus*	1
		Bhogote	*Maesamacrophylla*	1

Source: Field Survey 2014

Table 9: Nearest Educational and Health Institutions of the Candidate Solar Farm sites

SN	Project Sites	Educational Institution	Distance from site (m)	Health Institution	Distance from site (m)
1	Pharping Powerhouse	Setidevi Lower Secondary School	500 m	Setidevi health post	1000 m
2	Kulekhani 2 Powerhouse	primary care teaching center	10 m	Health post	1500 m
	Kulekhani 1 Reservoir area	Shree SaraswotiBalbodhini High School	200 m	Health post	700 m
	Kulekhani 1B, Reservoir Area	Shree Chandra primary school	200 m	Health post	500 m
3	Debighat	Mandredhunga Primary school	1000 m	Health post	3000 m
4	Panauti 1	Shree BalAdarsha High School	60 m	Primary Health Post	50 m
	Panauti 2	Shree BalAdarsha High School	70 m	Primary Health Post	60 m
5	Sundarijal	Okhareni Higher Secondary School	400 m	Nepal Medical Hospital	2000 m
6	Sunkoshi 1	Shree	600 m	Pangretar sub	800 m

SN	Project Sites	Educational Institution	Distance from site (m)	Health Institution	Distance from site (m)
		SetideviSharda Higher Secondary School		- health post	
	Sunkoshi 2	Shree SetideviSharda Higher Secondary School	800 m	Mankha Health post	600 m
7	Trishuli	TribhuvanTrishuli Higher secondary school	300 m	Private clinic	100 m

Source: Field Survey 2014

CHAPTER III: REGULATORY AND LEGAL FRAMEWORK

All investments under the GSEEP must be consistent with the applicable laws, regulations, and notifications of the GoN that are relevant in the context of the proposed interventions/activities. The NEA and the concerned line departments/agencies will ensure that the GSEEP investments proposed and executed under GSEEP are consistent with the regulatory and/or legal framework, whether national, districts or municipal/VDCs. Additionally, it is also to be ensured that activities are consistent with the World Bank's operational policies and guidelines. This section is not a legal opinion on the applicability of the law but serves as guidance in the application of the various laws and regulations to the current project context.

3.1 Key Applicable National Environmental and Social Laws and Regulations

3.1.1 Key Applicable National Environmental Laws and Regulations

This section highlights the salient features of selected laws that may have a bearing on the GSEEP design and implementation. A summary of such applicable policy, plan, guideline, standard and rules and regulations are furnished in the ***Table 10***:

Table 10: Applicable Environmental Policies, Acts, and Regulations

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
Three Years Interim Plan 2007 (2064 BS)	Chapter 2, section 2.6, sub-section 2.6.2 (related to electricity development) and sub-section 2.6.6 (related to integration of environment with development works, environmental standards, CDM, environmental pollution); Chapter 4, section 4.7 (related to priority on electricity development), Chapter 31, section 8 (related to IEE/EIA process on electricity and energy development); Chapter 35, section 5 (related to sustainable development objective) and section 7 (related to IEE/EIA and pollution prevention);	Yes
Forest Sector Policy 2000 (2056 BS)	Section 7, sub-section 7.1 (related to land use planning and change in land use categories), sub-section 7.2 (related to conservation of bio-diversity, eco-systems and genetic resources).	The candidate project sites are located outside forest areas and are not likely to attract this policy, The new 11 kV transmission line may attract this policy
Nepal Biodiversity Strategy 2002 (2059 BS)	Chapter 5, section 5.1, sub-section 5.1.1 (relating to landscape planning), sub-section 5.1.4 (relating to in-situ conservation of habitat and species), sub-section 5.1.8 (relating to cross-sectoral co-ordination for bio-diversity conservation), sub-section 5.1.13 (relating to IEE/EIA of development projects to avoid significant impacts on bio-diversity and implement the provisions to minimize the impacts), and Section 5.2, sub-section 5.2.1 (5.2.1.2) (related to cross-sectoral co-ordination for Protected Area conservation).	The candidate project sites are located outside forest areas, National Parks and conservation are not likely to attract this policy. The new 11 kV transmission line may attract this policy in case they pass through the forest areas.
Nepal Environmental Policy and Action Plan, 1993	The five policy principles: a) to manage efficiently and sustainably natural and physical resources; b) to balance development efforts and environmental conservation for sustainable fulfilment of the basic needs of the people; c) to safeguard natural heritage; d) to mitigate the adverse environmental impacts of the	Yes

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
	development projects and human actions; and e) to integrate environment and development through appropriate institutions, and adequate legislation and economic incentives, and sufficient public resources.	
National Conservation Strategy, Nepal, 1988	The policy principles a) to ensure the sustainable use of Nepal's land and renewable resources; b) to preserve the biological diversity of Nepal in order to maintain and improve the variety and quality of crops and livestock and to maintain the variety of wild species both plant and animal; and c) to maintain the essential ecological and life-support systems such as soil regeneration, nutrient recycling and the protection and cleansing of water and air.	Yes
Climate Change Policy GoN, 2001	Addresses the issues of climate adaption and disaster risk reduction. Forecasting water-induced disasters, reducing vulnerabilities and providing early warning information for disaster management are some of the key points of the policy. The policy provides some guidelines to address the issues of vulnerable infrastructure in the context of reducing their risk to climate related disasters.	Yes.
National EIA Guidelines 1993 (2049 BS)	Generic EIA guidelines related to procedures for EIA Scoping, and ToR preparation, baseline environmental studies, information disclosure, public consultation, prediction and evaluation of impacts, mitigation prescriptions, monitoring and EIA report preparation.	Yes
Department of Electricity Development Manuals	These are specific environmental manuals for hydropower development studies. All together 7 manuals have been prepared by DoED to cover different environmental aspects as under: Manual for preparing Scoping Document for Environmental Impact Assessment (EIA) of Hydropower Projects, (2001). Manual for Public Involvement in the Environmental Impact Assessment (EIA) Process of Hydropower Projects, (2001). Manual for Preparing Terms of References (ToR) for Environmental Impact Assessment (EIA) of Hydropower Projects, with Notes on EIA Report Preparation, (2001) Manual for Preparing Environmental Management Plan (EMP) for Hydropower Projects, (2002) Manual for Developing and Reviewing Water Quality Monitoring Plans and Results for Hydropower Projects, (2002) Manual for Conducting Public Hearings in the Environmental Impact Assessment Process for Hydropower Projects, 2004 Manual for Addressing Gender Issues in Environmental impact Assessment/Initial Environmental Examination for Hydropower Projects, (2005)	These guidelines are specific to Hydropower projects but are also applicable GSEEP investment particularly for Public Involvement, Preparing Terms of References (ToR), Conducting Public Hearings, and Addressing Gender Issues National Electricity Crisis Resolution Work Plan 2065 clause 5.2 highlights as follows Alternative sources Energy in Nepal has been envisaged as hydropower due to its potentiality and coverage. Till date, alternative sources of energy are taken as for rural setting where national grid takes years to connect. Harvest of solar power help even the urban dwellers to meet their household demand.

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
	National electricity Crisis Resolution Work plan, 2065	
Guidelines on Land Use of Forest Area for other Purposes (**"वन क्षेत्रको जग्गाअन्यप्रयोजनको लागिउपलब्ध गराउने कार्यविधि, २०६३"**) 2006	The guideline addresses the conditions to make forest land avail to the development project and required compensatory measures for the loss of forest land use and forest products	Yes, in case new TL lines pass through forest areas
Forest Produces Collection, Sale and Distribution Guidelines 2000 (2057 BS)	The guidelines specifies various procedure and formats for getting approval for vegetation clearance, delineation of lands for vegetation clearance, evaluation of wood volume etc.	Yes, in case new TL lines pass through forest areas
Generic Standard Part I: Tolerance Limits for Industrial Effluents to be ddischarged into Inland Surface Waters, 2058	Tolerance limits of the effluent discharged into inland surface waters.	Yes for the construction camps effluents of GSEEP investments
Nepal Ambient Air Quality Standards 2060	Limits of the ambient air quality parameters around the construction sites	Yes
Vehicle Emission Standards, 2057 for in use Vehicles	Tolerance limits for the project vehicular emissions	Yes
Drinking Water Quality Standards 2063	Quality of the drinking water supply in the project camps and construction sites.	Yes
The Interim Constitution of Nepal, 2063 (2007)	It has provisions of rights regarding environment and health. Every person shall have the right to live in a clean environment; every citizen shall have the right to get basic environmental services free of cost from the State as provided for in the law.	Yes
Environment Protection Act 1997 (2053 BS),	Article 3 mandates IEE/EIA study for development projects; Article 4 prohibits implementation of projects without approval; Article 5, and 6 describes the approval procedures; Article 7 prohibits emission of pollutants beyond the prescribed standards; Article 9 and 10 stipulates provisions for the protection of natural heritage and Environmental Protection Area; Article 17 stipulates compensation provisions arising from the discharge of waste and pollution; Article 18 has provision of punishment for actions against the Act and rules, guidelines and standards formulated under the Act; Article 19 stipulates the rights to appeal to the concerned Appellate court against the decision of concerned authority.	Yes
Environment Protection Rule 1997 (2054 BS) as amended	Rule 3 stipulates environmental screening criteria for undertaking IEE/EIA study; Rule 4, 5 and 6 stipulates procedures for determining scope for IEE/EIA including public notification and approval of IEE/EIA scope of works;Rule 7, and 10 stipulates provisions for conducting IEE/EIA assessment including public notification and public hearing for IEE/EIA works and requirement of recommendation letters from the project development VDCs/Municipalities; Rule 11 stipulates approval procedures including	Energy Sector criteria (EPR Schedule 1 and 2) excludes GSEEP including 11 kV transmission line for IEE or EIA assessment. But cross-sector provisions related to investment between 10 to 25 million Nepali Rupees attracts IEE level assessment, while investments over 25 million attracts EIA

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
	disclosure of IEE/EIA report; Rule 12 mandates developer to comply with the approved IEE/EIA provisions to avoid, mitigate, and monitoring of the impacts, Rule 13 stipulates the responsibility of the concerned body to monitor the project implementation; Rule 14 stipulates the responsibility of the Ministry to conduct Environmental examination of the project after 2 years of construction completion; Rule 15, 16, 17, 18, 19 and 20 stipulates provisions to prohibition and control of pollution; Rule 26, 27, 28, 29, 30, 31, 32 and 33 stipulates procedures and provisions for the conservation of Natural Heritage and Environmental Conservation Zones; Rule 45. 46 and 47 stipulates procedures and provisions for compensation to the affected.	
Soil and Watershed Conservation Act 1982 (2039 BS)	Article 10 stipulates provisions to prohibit actions within any protected watershed area decelerated pursuant to Article 3 of this Act; Article 24 stipulates provision of no obstacle to use and developing of waters resources by the government of Nepal.	Yes
Forest Act 1993 (2049 BS)	Article17 stipulate provision of lease and permit from the government to establish right on the facilities on the national forest; Article 18 prohibits transfer of facility or any other rights on the national forest to the others; Article 22 establish government rights on the forest product of the national forest; Article 25 empower government to handover the national Forest as Community forest to develop, conserve, use and manage the Forest and sell and distribute the Forest Products independently by fixing their prices according to Work Plan; Article 31 empowers government of Nepal to grant any part of the National Forest in the form of Leasehold Forest for the forest conservation purpose; Article 49 prohibits any actions causing harm to the forest other than specified in the Act and Rules under the Act; Article 67 stipulates land rights of the government on the Community Forest, Leasehold Forest and Religious Forest; Article 68 empowers Government to give assent to use any part of the Government Managed Forest, Community Forest, Lease hold Forest or Religious Forest for the implementation of national priority plan/project if there is no alternative for the plan/project implementation.	Yes, in case new TL lines pass through forest areas
Forest Rules 1995 (2051 BS)	Rule 7 prohibit forest cutting without obtaining license; Rule 8 stipulates the procedures of licensing for forest products; Rule 65 make the national priority project developer using national forest area responsible for the compensation of the loss or harm to any local individual or community due to the project and also make the developer responsible to meet the entire expenses required for the cutting, making in to pieces and transporting the Forest Products in a	Yes, in case new TL lines pass through forest areas

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
	Forest Area to be used.	
National Parks and Wildlife Conservation Act 1973 (2029 BS)	Article 5, stipulates provisions of restriction on damage to forest product and to block, divert any river or stream flowing through national park or reserve, or any other source of water, or use any harmful or explosive materials without obtaining a written permission; Article 9 lists the protected wildlife prohibited for hunting; Article 13 prohibits collection of samples from National parks and Reserves without obtaining license.	GSEEP investment are excluded in National parks and wild life reserves
Wildlife Reserve Rules 1977 (2034 BS)	Rule 4 stipulates provision of entry pass to enter into the Parks or Reserve, Rule 6 stipulates restricted activities within the Parks and Reserves, Rule 11 stipulates prior approval for any research activities or study within the parks or reserves.	GSEEP investment are excluded in National Parks and Wildlife Reserves
Electricity Act 2049 (1992)	Article 24 related to environmental impacts; Article 25 pursuant to technical standards; Article 26 related to security standards; Article 29 related to property acquisition and compensation; Article 33 relating to government assistance and support on the matter related to property acquisition for the project and compensation to affected property; Article 38 related to penalties; Article 39 on rights to appeal to the concerned Appellate court against the decision of concerned authority.	Yes
Electricity Regulations 2050 (1993)	Rule 13 related to environmental and social safeguard information requirements to submit the application for license; Rule 16 relating public notification to obtain license; Rule 40 to 47 related to the standards for power voltage, frequency, and power factors of electricity; Rule 48 to 60 safety measures to be maintained, Rule 66 regarding restriction on the utilization of house and land under transmission line; Rule 68 to 74 relating to safety measures to electric works; Rule 87 related to compensation of the affected property; and Rule 88 related to compensation fixation committee.	yes
Ancient Monument Protection Act 1956 (2013 BS)	Section 2 defines the ancient monuments; Section 3, and 17 empowers government to declare any place or area as monument site/area; Section 13 restricts transfer, transaction, export or collection of ancient monument and archaeological object or curio without prior approval of the government;	Applicable only for chance find
Local Self Governance Act 1999 (2055 BS)	Section 28 and 96 relating to functions, duties, and power of the VDCs/Municipalities on forest, sanitation and environment, soil erosion and river control, Physical development, Section 33 and 101 related to judicial power on compensation for damage crops, labour wages etc; Section 47 and 115 relating to co-ordination with the governmental and non-governmental institutions; Section 55 relating to natural resource utilization tax; section 70 and 165	Yes

Policy/Plans/ Guidelines/standards Act/Regulation	Key Requirement/s or Salient Features	Applicability
	relating to punishment against the act provisions.	
Local Self Governance Rules 1999 (2056 BS)	Rule 49 relating to approval of construction works; Rule 68 and 138 relating to approval and clearance of the project; Rule 69 and 139 relating to supervision and monitoring of the project; Rule 149 relating to application for permission.	Yes
Solid Waste Management Act 2011	Solid Waste Management Act aims to manage solid waste and mobilize resources related thereto and ensure the health convenience of the common people by controlling the adverse impact on pollution from solid waste. The commercial or industrial establishments should adhere to the clauses mentioned in the act during the construction and operation phases of the projects.	May apply – depends on type of waste generated during construction and operation of facilities supported by the project.
Information and Communication Policy, 2059 BS	The policy has developed long-term requirements for information and communication.	Yes.

3.1.2 Key Applicable National Social Laws and Regulations

There are a several laws addressing social issues in Nepal. The policies and legislative instruments relevant to the GSEEP are briefly highlighted in ***Table 11***.

Table11: Applicable Social Policies, Acts, and Regulations

Act / Regulation	Salient Feature/s	Applicability
The Interim Constitution of Nepal 2063 BS (2007)	The interim constitution of Nepal, 2007 focuses on raising the standards of living of the general public. The Article 35 (1) asserts that; The State shall pursue a policy of raising the standards of living of the general public through the development of infrastructures such as education, health, housing and employment of the people of all regions, by equitably distributing investment of economic investment for the balanced development of the country.	Yes
Labor Act 1991 (2048 BS)	Section 3 relating to classification of the posts; section 4 relating to appointment letter; Section 5 prohibition on child labour and restriction on minor and women; Section 10 on job security; section 12 related to retrenchment and reemployment, section 16, 17, 18 and 19 relating to working hours; section 20, 21, 22, 23, 25 and 26 related to remuneration; section 27 to 36 relating to occupational health and safety; section 37 to 44 relating to welfare arrangements; section 46 related to special arrangement is the construction sites; Section 50 to 60 related to conduct and penalties; section 72 to 82 related to settlements of labour disputes.	Yes
Land Acquisition Act 1977 (2034 BS)	Article 3 stipulates power to the government to acquire any land anywhere for public purpose subject to compensation under this Act; Rule 4 empower government to acquire land upon request by institutions subject to the payment of compensation and all other expenses under this Act; Rule 5, 6, 7 and 8 stipulates provisions and procedures for initiating initial land acquisition process and estimating compensation rates; Rule 9 and 8 stipulates procedures and provisions for notification to land acquisition; Rule 11 stipulates provision of right to file complain	The candidate sites are within NEA property, but may be applicable in case access to candidate project sites and footing of new 11 kV transmission line in private land is needed. If TL passes through

Act / Regulation	Salient Feature/s	Applicability
	by the affected on the public notice with regard to the land right; Rule 13, 14, 15 stipulates procedures and provisions of Compensation Fixation; Rule 16 and 17 stipulates criteria for compensation fixation; Rule 19 stipulates discloser of the compensation entitlement through public notification; Rule 25 stipulates provision of Complain against the compensation rates to the Ministry of Home affairs. The decision of the Ministry of Home affairs on the complaint is final.	structures and agricultural field land use restrictions may apply.
National Foundation for Upliftment of Adivasi/Janjati Act, 2058 (2002)	Government of Nepal has identified and legally recognized 59 indigenous communities. They are officially referred to as ***AdivasiJanajati*** in Nepali and **Indigenous Nationalities** in English as per the National Foundation for Upliftment of Adivasi/Janjati Act, 2058 (2002). One can find vast disparities in terms of socio-economic standing among the Adivasi *and Janajati* groups. According to Nepal Federation of *AdivasiJanajati* (NEFIN) 10 of the 59 *AdivasiJanajati* are "endangered", 12 "highly marginalized", 20 "marginalized", 15 "disadvantaged" and 2 are "advanced" or better off on the basis of a composite index consisting of literacy, housing, landholdings, occupation, language, graduate and above education, and population size.	Yes
ILO Convention on Indigenous and Tribal Peoples, 1989 (No.169)	In 2007, the UN Declaration on the Rights of Indigenous Peoples was adopted by the General Assembly. Nepal ratified ILO Convention No. 169 on September 14, 2007 (BS 2064/05/28). Article 1 of the convention provides a definition of tribal and indigenous peoples. Article 6 requires consultation with the peoples concerned through appropriate procedures and, in particular, through their representative institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly. In Article 15, it states that indigenous and tribal peoples shall, wherever possible, participate in the benefits of natural resource utilization activities and shall receive fair compensation for any damages which they may sustain as a result of such activities. Article 16(2) clearly mentions that where the relocation of these peoples is considered necessary, such exceptional measures and such relocation shall take place only with their free and informed consent. Where their consent cannot be obtained, such relocation shall take place only following appropriate procedures established by national laws and regulations, including public inquiries where appropriate, which provide the opportunity for effective representation of the peoples concerned. Article 16(3) mentions that, whenever possible, these peoples shall have the right to return to their traditional land as soon as the grounds for relocation cease to exist. Article 16(5) specifies the persons thus relocated shall be fully compensated for any resulting loss or injury.	Yes. IAs indigenous peoples are present in the sub- project area, the convention requirements are applicable to the proposed project.

Act / Regulation	Salient Feature/s	Applicability
Right to Information Act, 2064 (2007)	The aim of this act is to make the functions of the state open and transparent in accordance with the democratic system and to make it responsible and accountable to the citizens. It intends to make the access of citizens to the information of public importance held in public bodies simple and easy and to protect sensitive information that could have an adverse impact on the interest of the nation and citizens. Clause 3 of the act ensures the Right to Information. It says that every citizen shall, subject to this Act, have the right to information and they shall have access to the information held in the public Bodies unless confidentiality has been maintained by laws. Clause 4 of the act describes the Responsibility of a Public Body to disseminate information. It mentions that each Public Body has to respect and protect the right to information of citizens. Public Bodies shall have the following responsibilities for the purpose of protecting the right to information of citizens: to classify and update information and make them public, publish and broadcast to make the citizens' access to information simple and easy to conduct its functions openly and transparently, to provide appropriate training and orientation to its staffs, Public Bodies may use different national languages and mass media while publishing, broadcasting or making information public. A Public Body shall arrange for an Information Officer for the purpose of disseminating information held in its office. The clause 7 of the act prescribes the Procedures of Acquiring Information. It states that a Nepali Citizen, who is interested to obtain any information under this Act, shall submit an application before a concerned Information Officer by stating the reason to receive such information. United Nations Declaration on the Rights of Indigenous Peoples shall be followed (as applicable)	Yes

3.2 Applicable World Bank Policies

The World Bank's environmental and social safeguard policies (ten of them) are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and the environment in the development process. These policies provide guidelines for the identification, preparation, and implementation of programs and projects.

The following operational policies of the World Bank are relevant for GSEEP from an environmental and social viewpoint:

Table12: Safeguard Policies Triggered in GSEEP

Safeguard Policies Triggered by the GSEEP	Yes	Potential	No
Environmental Assessment OP/BP 4.01	X		
Natural Habitats OP/BP 4.04			X
Forests OP/BP 4.36		X	
Pest Management OP 4.09			X
Physical Cultural Resources OP/BP 4.11		X	
Indigenous Peoples OP/BP 4.10	X		
Involuntary Resettlement OP/BP 4.12		X	

Safeguard Policies Triggered by the GSEEP	Yes	Potential	No
Safety of Dams OP/BP 4.37			X
Projects on International Waters OP/BP 7.50			X
Projects in Disputed Areas OP/BP 7.60			X

3.2.1 Environmental Assessment (OP/BP 4.01)

OP/BP 4.01 is triggered because the activities/interventions proposed under GSEEP may have low impacts on the natural environment and human health. As the project during construction requires clearing up of sites, excavations, which have impacts (though minimal) to physical and biological environment within NEA premises.

Environmental Assessment is used by the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with the Bank's operations early on in the project cycle. The policy states that Environment Assessment (EA) and mitigation plans are required for all projects having significant adverse environmental impacts or involuntary resettlement. Assessment should include analysis of alternative designs and sites, including the "no project option" and require public participation and information disclosure before the Bank approves the project.

In World Bank-funded operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment.

3.2.2 Physical Cultural Resources (OP/BP 4.11)

Physical Cultural Resources (OP/BP 4.11) is triggered because there are cultural sites in the project area In Panauti-1 sites. At Panauti-1 site, the small Hindu temple (Krishna Mandir) might fall within the project areas. Though the project doesn't fall in to UNESCO or GoN registered archeological and cultural sites, all the procedures for chance find and other protocols shall be followed.

The World Bank Policy OP/BP 4.11 defines physical cultural resources as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from the development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process. The World Bank will also follow compliance with Nepal's chance find policy.

Norms and procedures for the conservation and restoration of historic buildings and for dealing with chance finds during small works will be specified. The conservation and restoration of historic buildings will use traditional materials and construction techniques as per the specifications of the Department of Archeology. A protocol for use by the construction contractors in conducting any excavation work will be developed, to ensure that any chance finds are recognized and measures are taken for their protection and conservation. As per the agreed protocol, all excavation work at the site would need to stop when

there are chance finds of archaeological material until the Department of Archeology determines if the site needs to be documented or scientifically excavated. The protocols and protective measures will be included in the EMPs that will be prepared for specific initiatives, with a focus on consultations and participation of the local stakeholders.

3.2.3 Indigenous People (OP/BP 4.10)

Indigenous People (OP/BP 4.10) is triggered because of the presence of janajati in the project area (See section 3.1.2 for explanation).Dalits and other vulnerable groups are also present in the project area.

This policy states that any development process under World Bank financing should fully respect the dignity, human rights, economies, and cultures of Indigenous Peoples (IPs). The project should engage in a process of free, prior, and informed consultation with IPs that should result in broad community support to the project by the affected Indigenous Peoples.

Projects should include measures to avoid potentially adverse effects on the IP's communities or when avoidance is not feasible, minimize, mitigate, or compensate for such effects. They should ensure that the IPs receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.

3.2.4 Involuntary Resettlement (OP/BP 4.12)

As per World Bank policy, Involuntary Resettlement (OP/BP 4.12) is triggered in case the project results into loss of private properties such as land, houses, structures and commercial places or disruption of formal /informal sources of income and livelihoods happens due to project interventions. The GSEEP interventions are, however, not likely to involve physical displacement through involuntary land taking as the required land area for the project will be managed from NEA owned land. Nevertheless, the Project will require to comply fully with the mitigation measures specified in Table 8 to address the adverse social impacts in case the involuntary resettlement issue is triggered as a result of project's interventions.
.
OP/BP 4.12 recognizes that involuntary land-taking resulting in loss of shelter, assets or access and income or sources of income should be addressed in World Bank-financed projects. Displaced persons should be meaningfully consulted, given opportunities to participate in planning and implementing resettlement programs and assisted in their efforts to improve their livelihoods and standards of living. Absence of legal title to land should not be a bar for compensation, resettlement, and rehabilitation assistance. Vulnerable groups such as IPs, women-headed households, and senior citizens should be entitled to special benefit packages in addition to compensation and resettlement. The Operational Policy is applicable whenever there is involuntary land taking resulting in displacement of people and / or loss of livelihood or source of livelihood.

3.2.5 Forestry (OP 4.36)

There is no community or GoN forest in within the candidate site of GSEEP. However, the alignment of the TL has not been fixed or spelled out in the project document: it is uncertain which site would need new TL and what would be the route. Hence possibility of TL passing through forest may not be ruled out (this may be confirmed only during detailing of each sites after selection. Besides, NEA has planted trees such as Mango and Sissoo within the premises of several of the candidate sites. These trees need to be felled for which permits is needed from the forest authority. Hence, this policy is triggered.. In each case, EMP prepared under OP 4.01 will have mitigation measures if impact on forest is likely.

3.3 Comparison of Government of Nepal and World Bank Policies

Table 13 presents a comparison of Government of Nepal and World Bank policies, and recommendations to bridge identified gaps.

Table 13: Comparison of GoN and World Bank Policies Gaps and Recommendations

Category	GON Policy	World Bank Policy	The GAP	Recommendations to Bridge Gaps
A. Environment (Natural Habitat , & Forest including terrestrial and aquatic	Development Project falling under EPR criteria should be subjected to IEE/EIA. According to EPR sectoral provision Solar projects are not required IEE/EIA. But cross sector provision: Forest sector and investment limits may attract IEE/EIA assessment, particularly for solar farm and 11 kV new transmission line of Component 1. In case the forest areas affected by 11 kV transmission line, which is very unlikely for the component 1, Forest regulation requires permission from related authorities (DFO, CFUGetc.) for any intervention in forested area. Compensatory re-plantation ratio is defined for commercial projects. National Park and Wildlife Conservation Act, demands permission from Ministry of Forest and Soil Conservation besides Ministry of Environment. The GSEEP is not affecting the national parks and conservation areas	Environmental Assessment has to be carried out for identifying potential risks and adverse impacts, mitigation measures and environmental management plan. When natural habitat and forest policies are triggered Environmental assessment and environmental management plan (EMP) will adequately address the relevant issues.	Activities listed in EPR Schedule I, particularly cross sectoral provisions related forest and investment limits is likely to requires an IEE, and those listed in Schedule II requires EIA. The Schedule I and II is based on activity type, Potential risk is not formally considered for screening.	In order to fill the gap between WB and GON requirements/approach, environmental screening is must for each subproject, and consider potential environmental risk : project Environmental Screening Format includes this. An Environmental Management Plan (EMP) shall be prepared for each contract during detail engineering design phase. The plan aims to address adverse environmental impacts arising due to project intervention. The project will strictly follow re-plantation as per the ratio of plantation in the forest guideline 2006..
B. Physical-Cultural Resources	Clause 28 of EPR states that physical and cultural resources shall not be disturbed or damaged without the prior approval of concerned authority.	Environmental assessment has to be carried out in case such resources are found to be affected by the subproject.	“Chance find’ is not covered by the EPR requirements but is stipulated in Ancient Monument Protection Act.	ESMP shall address such issues following GoN and WB policy.
C. Land and Structures	Clause 3 of this Land Acquisition Act states that any asset that is required for public purposes shall be acquired by providing compensation. Compensation Fixation Committee will establish the Compensation rates. Guthi Corporation Act, 2033 (1976). Section 42 of this Act states that Guthi (religious trust land) acquired for a development must be replaced with other land, rather than	Full compensation at replacement cost for lost assets shall be provided according to asset types and location. Resettlement and Rehabilitation assistance to affected people to enable them to improve their living standard. As per OP 4.12 community	The Land Acquisition Act of Nepal only provides for cash compensation based on degree of loss. It does not take into account vulnerability of the land affected person.	The proposed solar farm is to be developed within NEA owned property. Though chances are minimal, in some cases areas accessto the project site may entail land acquisition for component 1. Similarly for 11 kV transmissions line may also have to be passed through private property. In such instances full compensation as

Category	GON Policy	World Bank Policy	The GAP	Recommendations to Bridge Gaps
	compensated in cash Land Reform Act (LRA) 2021 (1964). This Act establishes the tiller's right on the land, which he is tilling. The LRA additionally specifies the compensation entitlements of registered tenants on land sold by the owner or acquired for the development purposes	assets needs to be replaced in consultation with the community. As per OP 4.12, all those who are affected needs to be assisted including, tenants and sharecroppers. Squatters and encroachers will be provided compensation at replacement value for their structures as well as other assistances.		per the type of loss will be provided in line with WB policy, though to the extent possible roads right of way will be used for transmission line.
D. Indigenous Community	The Interim plan encourages each development program to incorporate infrastructure and income generation program targeted to indigenous community. NFDIN Act 2002, Local Self-Governance Act, 1999 and Tenth Plan (2007-10) and Three Year Interim Plan (2011-13)	Ensures free, prior, and informed consultation (FPIC) with the affected indigenous people to obtain broad community support to the project. Social Assessment will be carried out to identity potential effect and prepare plan to ensure that indigenous peoples receive social and economic benefits that are culturally appropriate. Nepal does not have a standalone policy on Indigenous Peoples and other vulnerable communities. These acts have been placed significant emphasis on delivering basic services to the disadvantaged and indigenous people, Dalits, women, disabled and other vulnerable groups These acts and plans include policies for the development of Adivasi/Janajati and other	Though GoN's interim plan encourages development programs to incorporate income generation schemes for IPs, there is no mention of broad consent from the IPs. At the same time GoN has also ratified ILO 169 and United Nations Declaration of Rights of Indigenous People (UNDRIP), and is in the process of preparing National Action Plan for implementation of these international commitments	Project will carry out free prior informed consultations with the indigenous community and other vulnerable communities to obtain broad consent for the project. Project will prepare Vulnerable Community Development Plan (VCDP) based on community needs of indigenous as well as other vulnerable communities.

Category	GON Policy	World Bank Policy	The GAP	Recommendations to Bridge Gaps
		disadvantaged groups: creating an environment for social inclusion; participation of disadvantaged groups in policy and decision making; developing special programs for disadvantaged groups; positive discrimination or reservation in education, employment, etc.; protection of their culture, language and knowledge; proportional representation in development process; and making the country's entire economic framework socially		
E. Loss of Crops and Income Source	Compensation shall be provided for loss of crop damage/income source.	Full compensation shall be provided		Livelihood assistance shall be provided for business losses (if any, land or access required during implementation shall be fully compensated.

CHAPTER IV: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MANAGEMENT

The GSEEP project is classified category B for environment due to limited adverse environmental impacts which are site specific, largely reversible and can be readily addressed through mitigation measures. The GSEEP sites do not locate in a sensitive ecosystem, and has avoided areas of historical and cultural significance. The land to be used for the Solar Farm development is the unused lands owned by NEA. The location of the project site coupled with the clean nature of solar power generation ensures that the GSEEP will not cause any significant adverse environmental and social impacts during construction and operation. The main project impacts are associated with clearing of shrub vegetation, waste management and management of labor camps at the site. Moreover, most of the associated impacts are limited to the construction phase and are temporary in nature. Except for the visual quality, operational phase GSEEP impact has negligible footprint. The details of site specific environmental (physical, biological, and socio-economic) baseline status is included in ***Annex 1.***

Potential impacts of the solar farm component are described in the sections below. Similarly, for the component 2 of the project related to loss reduction and rural electrification potential impacts are unlikely to be significant as it is a small scale activity. Basically the nature of work involved is rehabilitation of the existing distribution network such as replacing conductors, adding/replacing distribution transformers, replacing capacitor banks and well as extension of distribution lines to connect new households. Specific issues related to Component 2 are PCB in the transformer and dismantling of the existing conductors. PCB based transformer and capacitor bank are not permitted. The construction as well as operational phase impacts can be mitigated/ offset by good housekeeping measures, a site specific environment management plan (EMP) that contains clearly defined, contractually agreed mitigation measures and implementation arrangements, linked with construction supervisions are deemed sufficient to address related impacts. These activities are unlikely to have social and environmental impacts as it excludes any sensitive activities that are mentioned in section 1.6 of this report. However, each of the components of the project will be subjected to environmental and social screening and other required steps as described in the framework (**Annex 2** contains checklist and approach to be used in rural electrification and loss reduction for addressing environmental aspects during planning and design).

4.1 Likely Beneficial Impacts

The beneficial impacts of the GSEEP project are discussed below:
Environmental and economic benefits of adding renewable energy to the national electrical grid can include:

1. Generating energy that produces no greenhouse gas emissions from fossil fuels and reduces some types of air pollution
2. Diversifying energy supply and reducing dependence on imported fuels
3. Creating economic development and jobs in manufacturing, installation, and more

The proposed solar farm is expected to generate on average 101,470kWh/day or 30.44 GWh/year of electricity. Without the project, it was assumed that electricity generated by the grid connected solar farm would be alternatively provided by captive diesel power generators (total assumed generation capacity of 400MW) existing in the country for the first 3 years and then by import from India through newly completed Nepal-India cross-border transmission line after 4^{th} year until 30^{th} year.

By assuming that (a) average unit generation capacity of captive diesel power generator (CDG) is 2.7kW; (b) each CDG needs to be operated additional 0.25 hours (or 15 minutes) per day; and (c) fuel cost for

each CDG is US$ 0.52/kWh (= US$1.0/litter x 1.4litter/hr/2.7kW), annual cost required to the CDGs comes to US$15.8 million. Additional generation of 30.44 GWh per year by the CDGs will result in 24,353 tons of additional CO_2 emission annually, based on the average CO_2emission factor of 0.80kg/kWh applicable to CDGs. Therefore, the global environmental benefit of CO_2 reduction not using the CDGs will be US$0.37 million per year with the unit benefit of US$15 per ton of CO_2 reduction.

It costs US$3.0 million per year to import 30.4GWh of electricity from India, with power purchase agreement cost of US$0.10 per kWh. As India's energy sector heavily relies on the coal based thermal power plants, additional generation of 30.4GWh in India will result in 24,962 tons of additional CO_2 emission annually, based on the average emission factor of 0.82kg CO_2/kWh in India. The global environmental benefit of CO_2 reduction not using the coal based thermal power plants in India will be US$0.37 million per year with the unit benefit of US$15 per ton of CO_2 reduction.

Apart from this The PV Solar plant will save needed fuel for diesel generators during a maximum period of 30 years. It is expected to reduce fuel transport on road, and risk of road accidents with fuel trucks.

4.2 Likely Adverse Impacts and Generic Mitigation Prescriptions

The potential adverse impacts and generic mitigation measures are discussed under three broad headings for environmental and social impacts as impact related to Design-Preconstruction Phase, Construction Phase, and Operation and Maintenance Phase.

The Design-Preconstruction Phase is, the period before the actual project implementation when designs are being prepared. This allows the designers to avoid potential impacts in the project design, technical specifications and contract documentations;

The Construction Phase is the period since the "Notice to Proceed" is given to the Contractor until the issuing of the "Certificate of Completion". The Contractor will implement the project following the design and technical specifications of the EMP; and

The Operation and Maintenance Phase is the period starting with the issuing of the "Certificate of Completion" issued by the MPWU until the end of the 20 year lifetime of the project.

4.2.1 Environmental

The specific interventions planned for GSEEP may have some limited adverse environmental impacts in the short term. The adverse or negative impacts related environmental issues and the potential mitigation measures required are presented in ***Table 8*** for Design-Preconstruction Phase, Construction Phase, and Operation and Maintenance Phase. Highly significant impacts are unlikely given the type of activities (refer ***Annex 1***) and locations within NEA's own premises. High risks activity or locations are avoided through ineligibility criteria / negative list (refer section 1.6 above).Each subproject will be subjected to detailed environmental screening and specific Environmental Management Plan will be prepared, for site specific baseline status (refer ***Annex 1***).The project construction will generate noise, dust, and exhaust gases and small quantities of construction waste, solid waste, and sewage. However, these impacts will not be significant as the construction and erection works involves a small number of construction workers. A large scale solar farm could be a visual obstacle, and thus this aspect will be considered during preparation of detailed site plan of the solar farm. The candidate project sites visited by the team are neither in visual impact sensitive areas nor overlooked by significantly populated area. The environmental code of practices mentioned in chapter V of this report shall be an integral part of environmental mitigation aspects highlighted in ***Table 14*** and ***15***.

Potential environmental issue and likely level and type of assessment required for each of the visited candidate site are summarized below. Environmental baselines of the visited sites are summarized in Table 2.

Site	Potential environmental and issues	Additional specific assessment required.
Pharping	Historically this site is significant because it is the first hydropower plant of Nepal and second in Asia. So There may have some impact on historical value There is tap inside the site boundary providing the drinking water facility for the local people. Dislocation of the water source may hamper the local community Loss of some trees planted by NEA Impact in the slope stability and environment due to Dismantling of retaining walls	An IEE may be required as per GoN requirements because of project cost. Need permission from forest authority to fell trees planted. Need to understand restrictions impose due to first hydropower site (heritage) and comply with the restrictions. Need to inform district forest office regarding number of tress to be felled (though it is not in GoN land, prior notification before felling is required). If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE If the project doesn't fall in IEE/EIA category, EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project
Kulekhani Powerhouse	Impacts of dismantling of the old cow shed The site is in sloppy land containing loose soft soil therefore prone to erosion, therefore there is erosion risk Loss of trees may accelerate erosion	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE If the project doesn't fall in IEE/EIA category, EMP is required
Kulekhani Reservoir Area 1	There are altogether 46 built structures present within the site which include staff quarters, NEA office, garage, store house and guest house. So likely Impacts due to dismantling of those structures are expected. Loss of trees planted around the site boundary may support soil erosion and landslide	Need to inform district forest office regarding number of tress to be felled (though it is not in GoN land, prior notification before felling is required). If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE If the project doesn't fall in IEE/EIA category, EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project
Kulekhani Reservoir Area 2	The proposed project site is the nursery of Nepal Electricity Authority, used for growing sapling of tree, The implementation of the proposed project may impact the regular support provided by the nursery to the local people by providing the trees saplings for promoting greenery. There is a small house used for the hydrological station in the project site. Removing the structure may impact daily activities of the station.	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Best environmental practices and environmental enhancement measures shall be followed
Debighat	Erosion risks along the stream located within the site and adjacent slopes Felling of some trees located along the stream bank may enhance soil erosion	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE If the project doesn't fall in IEE/EIA category, EMP is required
Panauti 1	No such impacts comparatively	If the project cost is above 250 million

Site	Potential environmental and issues	Additional specific assessment required.
		Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Best code of practices in environmental and social aspects shall be followed
Panauti 2	The site is sloppy land at the southern side therefore prone to erosion. There is a small Krishna Mandir (temple) inside the site boundary. The local people's feelings and aesthetic value may attached with this temple	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Site specific EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project For relocation of temple, guidelines of department of archeology (GoN) shall be followed which talks about chance find procedures etc.
Sundarijal	Impacts of dismantling of the old buildings Loss of few trees	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Site specific EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project
Sunkoshi 1	Loss of trees planted by NEA The site is sloppy land at the Northern side therefore prone to erosion and landslide	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Site specific EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project Need permission from forest authority for felling trees (even trees in NEA land)
Sunkoshi 2	Loss of few trees	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Site specific EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project. Need to inform district forest office regarding number of tress to be felled (though it is not in GoN land, prior notification before felling is required).
Trishuli	Trishuli 1: impacts of dismantling of the workshop/ stores, felling of planted mango and/ or Sissoo trees Trishuli 2: erosion risks in the slopes between the site and reservoir Trishuli 3: felling of planted and/ or naturally grown trees (sal, simal, sissoo etc)	If the project cost is above 250 million Nepali rupees requires conducting EIA. If the cost is within 50-250 million Nepali Rupee the project requires IEE Site specific EMP is required, site specific sensitive issues (if any) shall be assessed during the time of actual implementation of the project.

Site	Potential environmental and issues	Additional specific assessment required.
		Need to inform district forest office regarding number of tress to be felled (though it is not in GoN land, prior notification before felling is required).

4.2.2 Social

The social impacts would not be significant and are mostly restricted to the project area and its immediate surroundings. There will be no land acquisition and no impacts on the present land use, including natural habitats. The solar farms will be installed on NEA property and to the extent possible encroached area will be avoided to minimize adverse social impacts. Social screening however will be carried out in the project sites to identify any adverse social impact and presence of indigenous community. A Resettlement Action Plan (RAP) or an abbreviated RAP will be prepared as appropriate. Since there is presence of vulnerable community in the periphery of potential sites, a Vulnerable Community Development Plan (VCDP) will be prepared.

The specific interventions planned for GSEEP may lead to some loss of property (11 kV TL-component 1), component 1 and 2 upgrading works of TL such as replacing transformer, conductors etc is potential to have impacts on physical access and electricity services impairing trade/commerce/industries The adverse or negative impacts related social issues and the potential mitigation measures required are presented in ***Table 14 and 15***for Design-Preconstruction Phase, Construction Phase, and Operation and Maintenance Phase.

Table 14: Potential Environmental Impacts and Suggested Avoidance or Minimizing or Compensatory Mitigation Measures

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures
Design/Pre-Construction Phase	Impact to Sensitive and Ecologically Important Areas	Identify environmentally sensitive or ecologically fragile areas (if any); The candidate sites identified by NEA has avoided the environmentally sensitive and ecologically fragile area.
		If the proposed construction is located close to these areas, take necessary measures to avoid/minimize disturbance The exact position of the solar PV array layout should be determined by the environmental specialist, and from specifications and design to avoid all sensitive areas in the positioning of the facility.
	Impact due to poor design and work planning	No use of gravel or sand from the onsite or surrounding areas. Consider possible alternatives for construction materials (aggregates) from the certified suppliers. The use of concrete for stabilization is to be avoided as far as possible.
		Choice of the location that gives the best economy in terms of excavation and fill in order to avoid or minimize soil erosion during excavation works for the construction of the stand-alone PV Structures
		In case of usage of free standing structure, a proper structural design that is environmental friendly and requires less maintenance is suggested. Driven piers and screws are recommended in order to minimize the environmental impact of the facility. Driven piers and screws are recommended in order to minimize the environmental impact of the facility.
	Impacts to Cultural Heritage	Avoid the sites which have a cultural or heritage value. The NEA candidate sites have avoided sites of cultural heritage.
	Impacts to Aesthetics	Avoid the sites which have a tourism value. During site selection and

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures
		site detailing, consider ways to minimize visual intrusion and improving aesthetic qualities (including landscaping and plantation to compensate visual and aesthetic impacts).
	Impact on existing land use	The project would change the existing land use to restricted industrial use although the land will be in NEA premises
Construction Phase	Soil Erosion Impacts(clearing and grading during construction activities would disturb on-sitesoils and increase the potential for erosion)	Minimize work areas;
		Keep vegetation clearing at the necessary minimum
		Keep vehicles on defined tracks (internal road tracks to be determined before the construction commences)
		Construct the necessary temporary/permanent control structures
		Encourage re-vegetation as soon as the construction activities finish, or plan to immediately rehabilitate the disturbed sites after use. Implementation of a storm water management plan developed as part of the permitting process would minimize impacts.
	Change in topography	Installing silt traps or other control structures at the outset of the construction
		Phasing and limiting ground disturbance to areas of a workable size
		Scheduling construction to limit disturbance of large areas of soil during wet seasons
		Avoid discharging of contaminated water to the nearby streams
	Impairment to existing land use changes	If there is no natural drains arrange to dispose storm water run-off from construction areas through rocks or hay traps to remove soil and petroleum-based organic pollutants before disposal
		Store oil and bituminous products at a contained location away from drainage ditches
		Provision of a good technical designed storm drainage system to be provided to capture the run-off farm to avoid scouring of the soil etc. (a good storm water management plan has to be designed)Provision of a good technical designed storm drainage system to be provided to capture the run-off farm to avoid scouring of the soil etc. (a good storm water management plan has to be designed)
	Storage of materials in sloppy , unstable areas and erosion	Discuss dumping locations with the government officials and local landowners including plans for future use of the spoil materials
		Include all drainage provisions for construction sites in the site plans
		Choose the locations of waste spoil piles to avoid blocking surface run-off or drainage ditches
		Cover all spoil heaps or stockpiles during rainy season to prevent erosion and sediment run-off
	Construction related air quality changes	Spray water on spoil-heaps if there are dust generating materials accumulated during dry periods especially near schools, hospitals, rural communities, etc
		Cover all dust generating loads carried in open trucks.
	Construction associated impacts on noise quality	Use modern and well-maintained equipment (with mufflers where appropriate)
		Use noise screens or mounds near residential areas, when appropriate
		Carry out noise construction activities and transports during normal working hours, never at night time or Saturdays
		Negotiate with schools/hospitals a schedule of noisy work, taking into account the needs of students/patients
		Inform previously, when there will be unusual or unavoidable noise
	Construction related transportation and hauling of materials	Avoid overloading trucks and cover trucks to minimize dust and loss of load from trucks during Transportation
		Use water sprays or covered chutes to reduce dust emission during loading and unloading of materials from barges

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures
		Maintain crushing and mixing plants in good working condition so as to reduce emission from the plant
		As far as possible, plan truck trips during low traffic hours
		Implement safety procedures during transport to reduce the potential for road accidents
	Off-site and on –site construction waste during project construction.	Store wastes with respect for health and environment and being responsible for their recycling
		Contain all stored wastes within construction sites, avoid littering and runoff
		Use recycled or renewable building materials (e.g. timber) where possible
		Optimize and reduce waste production. Segregate waste into hazardous and non hazardous waste. Minimize waste disposal by promoting re-use and recycle.
		The solar is not expected to generate large amount of hazardous waste , however waste like metal parts, paints, lubricants, grease, glasses, oil from transformers will be generated. In all cases, hazardous materials would be stored and handled in accordance with standard practice.
		The old transformers to be replaced are likely to have PCB (Component 2).Therefore the transformer oil should be stored at designated location of NEA. Decontamination of distribution transformers of NEA has been recently done however the distribution transformers outside Kathmandu may contain PCB. NEA stores used oil in drums and stores at identified locations for oxen. However, now NEA has agreed not to oxen these oil which has health related implications on the users. Store hazardous waste to permitted hazardous waste management sites in compliance with the Hazardous waste management protocol of the Bank.
	Energy	Sort waste according to its type and origin. Store selected materials in safe place in order to avoid contamination,
		Encourage the recycling of waste. Follow the hierarchy: Prefer local recycling or reuse before waste disposal in the safe site
		Properly dispose of all used fuel and lubricant oils in environmentally sound manner,
		Crush and bury all inorganic solid waste in an approved solid waste disposal area
		After construction has finished, remove all disabled machinery and waste from the project area
		Compost all green or organic wastes or use as animal food
	Equipment transportation, storage and erection stages issues related to health and safety of employees	Ensure all occupational health and safety requirements are in place on construction sites
		Ensure enforcement of use of (PPE), provide PPEs and conduct training, if necessary
		Install lights and cautionary signs in hazardous areas and key locations(at the four corner of the farm)
		Ensure safety and inspection procedures
		Fencing of the construction sites with sign boards required
		Safe handling of toxic materials and other hazardous substances
		Implement a system of penalties for violation of rules and regulations (include n the EMP)
		Introduction to health and safety issues in construction sites by the Contractor (include in the EMP)
		Education on basic hygienic practices to minimize spread of tropical diseases, including information on methods of transmission and protection (include in EMP)

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures
		Prohibition of drugs, kava and alcohol on construction sites
		Assure availability of medical assistance in emergency or non-emergency situations and availability of other health-related assistance
		Maintenance and service personnel would be trained to handle hazardous materials especially transformer oil which may contain PCB
	Loss of standing trees and vegetation	Restrict vegetation clearance to the required area
		In case trees from forest land require clearing take approval from the District Forest Office and Community Forest User Groups. Tree felling within NEA premises may also require permission from the forest authority. Carry out compensatory plantation as required.
		In case the forest areas are affected by 11kV new transmission line Component 1, reforest the lost trees in ration as guided by Forest guideline 2006.
Site De-commissioning	Waste, Erosion and visual Impacts	Assure all waste and remaining material for recycling has been removed from the construction
		Rake or loosen all compacted ground surfaces
		If necessary, implement re-vegetation / rehabilitation of the construction sites involving, where possible, local women's and community group
Operation and Maintenance Phase	Dust coating on the solar panel	Regularly clean the panel surface with water jet to remove the collected dusts over the solar panel. Particularly dry season, there is potential of high dust accumulation on the panel
	Trespassing of personnel and animals	Trespassing of person should be strictly banned. Free movement of wild animals on the solar panel site may destruct the installation particularly terrestrial animals and specifically monkeys. The access to the Solar Farm array would be restricted and controlled through the use of fencing or other measures.
	Occupational Health and safety	Ensure all occupational health and safety requirements are in place on sites in the operation period
		Make sure all operational staff understand the use of (PPE) and make sure that it is used properly;
		Install lights and cautionary signs in hazardous areas
		Ensure safety and inspection procedures
		Ensure the operation staff get O/M advice and training from the Post Commissioning Services experts contracted
		Ensure Operational Manual and professional training manual at all time in the facility
		Ensure sufficient funding available to carry out periodic maintenance and repairs of the PV installations
	Change in the aesthetic value	The long-term presence of the solar field would result in an unmitigable visual impact because it would create a change to the existing landscape. It would introduce blockage and glare. Site selection and site detailing would consider ways to minimize visual intrusion and aesthetic consideration including landscaping and plantation to compensate visual and aesthetic impacts.

Table 15: Potential Social Impacts and Suggested Avoidance or Minimizing or Compensatory Mitigation Measures

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures
Design/Pre-Construction Phase	Social or Community Concerns (Pre-Construction)- lack of project	The communities surrounding the Component 1 and 2 activities will be informed during the design preparation works and prior to the actual start of construction. The information on the project actions and the likely potential impacts in the construction operation phases explained to give a general understanding of the project

	information; lack of participation in project design and finalization of project sites	Sample sites though are a part of the NEA owned land, there are residences near the sites. The community will be consulted before finalizing sites. Any NEA land if encroached will not be considered. Private land acquisition will be discouraged..
		If the project sites are the sites of the Advsashi/Janajati and disadvantageous groups, support program in the form of Indigenous and Vulnerable Community Development Plan shall be prepared in consultation with these groups to comply with the Banks policy
Construction Phase	Noise and dust issue Employment to the local population Contractor's camp near residences	Inform local neighborhood community before construction activities start about planned civil works how they could be affected by them
		Avoid or minimize disturbances by construction activities in near living areas, e.g. avoiding works at nighttime, minimizing transports of material, noise control
		Apply adequate waste management and avoid run-off of waste, e.g. littering off packaging Material
		Offer employment and training opportunities for local people. (Include in EMP that the contractor has to maximize the local employment)
		Include women and other community groups in project activities whenever there is any Opportunity
		Since all the candidate sites are within the NEA owned lands, the surrounding communities will not be directly affected. In case the surrounding community constitute sizable numbers of adivashi/Janajati and disadvantageous groups, implement the VCDP as designed in the Pre-construction phase)
Operation Phase	Community Safety Benefit sharing	Inhibit unauthorized access to the PV modules on roof-top or at the free-standing structures by construction design and eventually necessary technical protection measures (fences, gates, locks)
		Cover inverters with a locked metal cage firmly attached to the wall in order to avoid unauthorized manipulation (especially by playing children with the risk of accidents) or theft
		Mark sites with comprehensive and visible signs (pictograms) indicating danger and no-go-areas
		Put the wiring underground in order to avoid accidents and damage (accidentally or intentioned by vandalism)
		Give preference to the eligible locals for employment during operations
		Provide free electricity to vulnerable houses in the immediate periphery of the project sites
		Advice to the public institutions where the PV installations are implemented about special risks and security needs (security fence, safeguard at nighttime)
		Inform the administration of the public institutions where the PV installations are implemented that they should report immediately to the concerned authority in case of damage of any component of the PV system.

Table 16 presents the environmental issues and identified mitigation measures for the candidate solar farm sites, while ***Table 17*** presents the social issues and identified mitigation measures.

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures	Potential Candidate Solar Farm Sites										
			1	2	3	4	5	6	7	8	9	10	11
Design/Pre-Construction Phase	Impact to Sensitive and Ecologically Important Areas	Identify environmentally sensitive or ecologically fragile areas (if any); The candidate sites identified by NEA has avoided the environmentally sensitive and ecologically fragile area.											
		If the proposed construction is located close to these areas, take necessary measures to avoid/minimize disturbance											
		The exact position of the solar PV array layout should be determined by the environmental specialist, and from specifications and design to avoid all sensitive areas in the positioning of the facility.											
	Impact due to poor design and work planning	No use of gravel or sand from the onsite or surrounding areas. Consider possible alternatives for construction materials (aggregates) from the certified suppliers. The use of concrete for stabilization is to be Avoided as far as possible.	√	√	√	√	√	√	√	√	√	√	√
		Choice of the location that gives the best economy in terms of excavation and fill in order to avoid or minimize soil erosion during excavation works for the construction of the stand-alone PV Structures	√	√	√	√	√	√	√	√	√	√	√
		In case of usage of free standing structure, a proper structural design that is environmental friendly and requires less maintenance is suggested. Driven piers and screws are recommended in order to minimize the environmental impact of the facility.	√	√	√	√	√	√	√	√	√	√	√
	Impacts to Cultural Heritage	Avoid the sites which have a cultural or heritage value. The NEA candidate sites have avoided sites of cultural heritage.											
	Impacts to Aesthetics	Avoid the sites which have a tourism value. Site selection and site detailing would consider ways to minimize visual intrusion and aesthetic consideration including landscaping and plantation to compensate visual and aesthetic impacts.											
Construction Phase	Impact on existing land use	The project would change the existing land use to restricted industrial use although the land will be in NEA premises.	√	√	√	√	√	√	√	√	√	√	√
	Soil Erosion Impacts(clearing and grading during construction activities would disturb on-site soils and increase the potential for erosion)	Minimize work areas;	√	√	√	√	√	√	√	√	√	√	√
		Keep vegetation clearing at the necessary minimum	√	√	√	√	√	√	√	√	√	√	√
		Keep vehicles on defined tracks (internal road tracks to be determined before the construction commences)	√	√	√	√	√	√	√	√	√	√	√
		Construct the necessary temporary/permanent control structures	√	√	√	√	√	√	√	√	√	√	√
		Protect the landslide and degraded areas within and adjacent to the site		√			√						

		Encourage re-vegetation as soon as the construction activities finish, or plan to immediately rehabilitate the disturbed sites after use. Implementation of a storm water management plan developed as part of the permitting process would minimize impacts.	√	√	√	√	√	√	√	√	√	√	√
	Change in topography	Installing silt traps or other control structures at the outset of the construction	√	√	√	√	√	√	√	√	√	√	√
		Phasing and limiting ground disturbance to areas of a workable size	√	√	√	√	√	√	√	√	√	√	√
		Scheduling construction to limit disturbance of large areas of soil during wet seasons	√	√	√	√	√	√	√	√	√	√	√
		Avoid discharging of contaminated water to the nearby streams	√	√	√	√	√	√	√	√	√	√	√
	Impairment to existing land use changes	If there is no natural drains arrange to dispose storm water run-off from construction areas through rocks or hay traps to remove soil and petroleum-based organic pollutants before disposal	√	√	√	√	√	√	√	√	√	√	√
		Store oil and bituminous products at a contained location away from drainage ditches	√	√	√	√	√	√	√	√	√	√	√
		Provision of a good technical designed storm drainage system to be provided to capture the run-off farm to avoid scouring of the soil etc. (a good storm water management plan has to be designed)Provision of a good technical designed storm drainage system to be provided to capture the run-off farm to avoid scouring of the soil etc. (a good storm water management plan has to be designed)	√	√	√	√	√	√	√	√	√	√	√
	Storage of materials in sloppy , unstable areas and erosion	Discuss dumping locations with the government officials and local landowners including plans for future use of the spoil materials	√	√	√	√	√	√	√	√	√	√	√
		Include all drainage provisions for construction sites in the site plans	√	√	√	√	√	√	√	√	√	√	√
		Choose the locations of waste spoil piles to avoid blocking surface run-off or drainage ditches	√	√	√	√	√	√	√	√	√	√	√
		Cover all spoil heaps or stockpiles during rainy season to prevent erosion and sediment run-off	√	√	√	√	√	√	√	√	√	√	√
	Construction related air quality changes	Spray water on spoil-heaps if there are dust generating materials accumulated during dry periods especially near schools, hospitals, rural communities, etc.	√	√	√	√	√	√	√	√	√	√	√
		Cover all dust generating loads carried in open trucks.	√	√	√	√	√	√	√	√	√	√	√
	Construction associated impacts on noise quality	Use modern and well-maintained equipment (with mufflers where appropriate)	√	√	√	√	√	√	√	√	√	√	√
		Use noise screens or mounds near residential areas, when appropriate	√	√	√	√	√	√	√	√	√	√	√
		Carry out noise construction activities and transports during normal working hours, never at night time or Saturdays	√	√	√	√	√	√	√	√	√	√	√

		Negotiate with schools/hospitals a schedule of noisy work, taking into account the needs of students/patients											
		Inform previously, when there will be unusual or unavoidable noise	√	√	√	√	√	√	√	√	√	√	√
	Construction related transportation and hauling of materials	Avoid overloading trucks and cover trucks to minimize dust and loss of load from trucks during Transportation	√	√	√	√	√	√	√	√	√	√	√
		Use water sprays or covered chutes to reduce dust emission during loading and unloading of materials from barges	√	√	√	√	√	√	√	√	√	√	√
		Maintain crushing and mixing plants in good working condition so as to reduce emission from the plant	√	√	√	√	√	√	√	√	√	√	√
		As far as possible, plan truck trips during low traffic hours	√	√	√	√	√	√	√	√	√	√	√
		Implement safety procedures during transport to reduce the potential for road accidents	√	√	√	√	√	√	√	√	√	√	√
	Off-site and on –site construction waste during project construction.	Store wastes with respect for health and environment and being responsible for their recycling	√	√	√	√	√	√	√	√	√	√	√
		Contain all stored wastes within construction sites, avoid littering and runoff	√	√	√	√	√	√	√	√	√	√	√
		Use recycled or renewable building materials (e.g. timber) where possible	√	√	√	√	√	√	√	√	√	√	√
		Optimize and reduce waste production. Segregate waste into hazardous and non-hazardous waste. Minimize waste disposal by promoting re-use and recycle.	√	√	√	√	√	√	√	√	√	√	√
		The solar is not expected to generate large amount of hazardous waste, however waste like metal parts, paints, lubricants, grease, glasses, oil from transformers will be generated. In all cases, hazardous materials would be stored and handled in accordance with standard practice.	√	√	√	√	√	√	√	√	√	√	√
		The old transformers to be replaced are likely to have PCB (Component 2).Therefore the transformer oil should be stored at designated location of NEA. Decontamination of distribution transformers of NEA has been recently done however the distribution transformers outside Kathmandu may contain PCB. NEA stores used oil in drums and stores at identified locations for oxen. However, now NEA has agreed not to oxen these oil which has health related implications on the users.											
		Store hazardous waste to permitted hazardous waste management sites in compliance with the Hazardous waste management protocol of the Bank.	√	√	√	√	√	√	√	√	√	√	√
		Sort waste according to its type and origin. Store selected materials in safe place in order to avoid contamination,	√	√	√	√	√	√	√	√	√	√	√

		Encourage the recycling of waste. Follow the hierarchy: Prefer local recycling or reuse before waste disposal in the safe site	√	√	√	√	√	√	√	√	√	√	√
		Properly dispose of all used fuel and lubricant oils in environmentally sound manner,	√	√	√	√	√	√	√	√	√	√	√
		Crush and bury all inorganic solid waste in an approved solid waste disposal area	√	√	√	√	√	√	√	√	√	√	√
		After construction has finished, remove all disabled machinery and waste from the project area	√	√	√	√	√	√	√	√	√	√	√
		Compost all green or organic wastes or use as animal food	√	√	√	√	√	√	√	√	√	√	√
	Equipment transportation, storage and erection stages issues related to health and safety of employees	Ensure all occupational health and safety requirements are in place on construction sites	√	√	√	√	√	√	√	√	√	√	√
		Ensure enforcement of use of (PPE), provide PPEs and conduct training, if necessary	√	√	√	√	√	√	√	√	√	√	√
		Install lights and cautionary signs in hazardous areas and key locations(at the four corner of the farm)	√	√	√	√	√	√	√	√	√	√	√
		Ensure safety and inspection procedures	√	√	√	√	√	√	√	√	√	√	√
		Fencing of the construction sites with sign boards required	√	√	√	√	√	√	√	√	√	√	√
		Safe handling of toxic materials and other hazardous substances	√	√	√	√	√	√	√	√	√	√	√
		Implement a system of penalties for violation of rules and regulations (include n the EMP)	√	√	√	√	√	√	√	√	√	√	√
		Introduction to health and safety issues in construction sites by the Contractor (include in the EMP)	√	√	√	√	√	√	√	√	√	√	√
		Education on basic hygienic practices to minimize spread of tropical diseases, including information on methods of transmission and protection (include in EMP)	√	√	√	√	√	√	√	√	√	√	√
		Prohibition of drugs, kava and alcohol on construction sites	√	√	√	√	√	√	√	√	√	√	√
		Assure availability of medical assistance in emergency or non-emergency situations and availability of other health-related assistance	√	√	√	√	√	√	√	√	√	√	√
		Maintenance and service personnel would be trained to handle hazardous materials especially transformer oil which may contain PCB											
	Loss of standing trees and vegetation	Restrict vegetation clearance to the required area.	√	√	√	√	√	√	√	√	√	√	√
		In case trees from forest land require clearing take approval from the District Forest Office and Community Forest User Groups											
		In case the forest areas are affected by 11kV new transmission line Component 1, reforest the lost trees in ration as guided by Forest guideline 2006.											

		Ensure that necessary permit is obtained for tree felling. Felling of tree planted by NEA within the premises may also need to obtain permission from the forest authority.										
		Compensatory plantation for the lost tree/ vegetation. This may be done within the existing NEA premises for the loss of tree/vegetation planted within the NEA premises.										
Site De-commissioning	Waste, Erosion and visual Impacts	Assure all waste and remaining material for recycling has been removed from the construction Site	√	√	√	√	√	√	√	√	√	√	√
		Rake or loosen all compacted ground surfaces	√	√	√	√	√	√	√	√	√	√	√
		If necessary, implement re-vegetation / rehabilitation of the construction sites involving local women's and community group, where possible	√	√	√	√	√	√	√	√	√	√	√
Operation and Maintenance Phase	Dust coating on the solar panel	Regularly clean the panel surface with water jet to remove the collected dusts over the solar panel. Particularly dry season, there is potential of high dust accumulation on the panel	√	√	√	√	√	√	√	√	√	√	√
	Trespassing of personnel and animals	Trespassing of person should be strictly banned. Free movement of wild animals on the solar panel site may destruct the installation particularly terrestrial animals and specifically monkeys. The access to the Solar Farm array would be restricted and controlled through the use of fencing or other measures.	√	√	√	√	√	√	√	√	√	√	√
	Occupational Health and safety	Ensure all occupational health and safety requirements are in place on sites in the operation period	√	√	√	√	√	√	√	√	√	√	√
		Make sure all operational staff understand the use of (PPE) and make sure that it is used properly;	√	√	√	√	√	√	√	√	√	√	√
		Install lights and cautionary signs in hazardous areas	√	√	√	√	√	√	√	√	√	√	√
		Ensure safety and inspection procedures	√	√	√	√	√	√	√	√	√	√	√
		Ensure the operation staff get O/M advice and training from the Post Commissioning Services experts contracted	√	√	√	√	√	√	√	√	√	√	√
		Ensure Operational Manual and professional training manual at all time in the facility	√	√	√	√	√	√	√	√	√	√	√
		Ensure sufficient funding available to carry out periodic maintenance and repairs of the PV installations	√	√	√	√	√	√	√	√	√	√	√
	Change in the aesthetic value	The long unmitigable visual impact because it would create a change to the existing landscape . It would introduce blockage and glare.	√	√	√	√	√	√	√	√	√	√	√

Note: 1: Pharping; 2: Kulekhani Powerhouse , 3: Kulekhani Reservoir

Area 1; 4: Kulekhani Reservoir Area 2; 5: Debighat; 6: Paauti 1; 7: Panauti 2; 8: Sundarijal; 9: Sunkoshi 1; 10: Sunkoshi 2; and 11: Trishuli

Table 16: Environmental Impacts and Suggested Avoidance or Minimizing or Compensatory Mitigation Measures For the Candidate Solar Farm Sites

Table 17: Social Impacts and Suggested Avoidance or Minimizing or Compensatory Mitigation Measures for the Candidate Solar Farm Sites

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures	Potential Candidate Solar Farm Sites										
			1	2	3	4	5	6	7	8	9	10	11
Design/Pre-Construction Phase	Social or Community Concerns (Pre-Construction)- lack of project information; lack of participation in project design and finalization of project sites	The communities surrounding the candidate solar farm activities will be informed during the design preparation works and prior to the actual start of construction. The information on the project actions and the likely potential impacts in the construction operation phases explained to give a general understanding of the project	√	√	√	√	√	√	√	√	√	√	√
		Sample sites though are a part of the NEA owned land, there are residences near the sites. The community will be consulted before finalizing sites. Any NEA land if encroached will not be considered. Private land acquisition will be discouraged..	√	√	√	√	√	√	√	√	√	√	√
		Encroachers of land will be consulted and mechanism of compensation to the lost built structures will be negotiated. Similarly agricultural occupants will be given compensation for standing crops and assisted for livelihood restoration.	√	√					√			√	
		If the project sites are the sites of the Advsashi/Janajati and Disadvantageous groups, support program in the form of Indigenous and Vulnerable Community Development Plan shall be prepared in consultation with these groups to comply with the Banks policy	√	√	√	√	√			√			√
Construction Phase	Noise and dust issue	Inform local neighborhood community before construction activities start about planned civil works how they could be affected by them	√	√	√	√	√	√	√	√	√	√	√

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures	Potential Candidate Solar Farm Sites										
			1	2	3	4	5	6	7	8	9	10	11
	Employment to the local population	Avoid or minimize disturbances by construction activities in near living areas, e.g. avoiding works at nighttime, minimizing transports of material, noise control	√	√	√	√	√	√	√	√	√	√	√
	Contractor's camp near residences	Apply adequate waste management and avoid run-off of waste, e.g. littering off packaging Material	√	√	√	√	√	√	√	√	√	√	√
		Offer employment and training opportunities for local people. (Include in EMP that the contractor has to maximize the local employment)	√	√	√	√	√	√	√	√	√	√	√
		Include women and other community groups in project activities whenever there is any opportunity	√	√	√	√	√	√	√	√	√	√	√
		Since all candidate sites are within the NEA owned lands, the surrounding communities will not be directly affected. In case the surrounding community constitute sizable numbers of adivashi/Janajati and disadvantageous groups, implement the VCDP as designed in the Pre-construction phase)	√	√	√	√	√			√			√
Operation Phase	Community Safety	Inhibit unauthorized access to the PV modules on roof-top or at the free-standing structures by	√	√	√	√	√	√	√	√	√	√	√
	Benefit sharing	construction design and eventually necessary technical protection measures (fences, gates, locks)	√	√	√	√	√	√	√	√	√	√	√
		Cover inverters with a locked metal cage firmly attached to the wall in order to avoid	√	√	√	√	√	√	√	√	√	√	√
		unauthorized manipulation (especially by playing children with the risk of accidents) or theft											
		Mark sites with comprehensive and visible signs (pictograms) indicating danger and no-go-areas	√	√	√	√	√	√	√	√	√	√	√
		Put the wiring underground in order to avoid accidents and damage (accidentally or intentioned by vandalism)	√	√	√	√	√	√	√	√	√	√	√
		Give preference to the eligible locals for employment during operations	√	√	√	√	√	√	√	√	√	√	√
		Provide free electricity to vulnerable houses in the immediate periphery of the project sites	√	√	√	√	√	√	√	√	√	√	√
		Advice to the public institutions where the PV installations are implemented about special risks and security needs (security fence, safeguard at nighttime)	√	√	√	√	√	√	√	√	√	√	√

Phase of Development	Potential Issues and Impacts	Suggested Avoidance or Minimizing or compensatory Mitigation Measures	Potential Candidate Solar Farm Sites										
			1	2	3	4	5	6	7	8	9	10	11
		Inform the administration of the public institutions where the PV installations are implemented that they should report immediately to the concerned authority in case of damage of any component of the PV system.	√	√	√	√	√	√	√	√	√	√	√

CHAPTER V: ENVIRONMENTAL AND SOCIAL SCREENING AND MANAGEMENT

Environmental and social considerations should be envisioned right from the stage of project identification. In general, projects are identified on peoples' demand which is a good practice but when environmental and social consequences of implementation of a project are not well thought through, project implementation may lead to serious environmental and social problems. While identifying and designing sub-projects under GSEEP, all possible alternatives will be examined and assessed. The Project Management Team (PMU) will collect information on the environmental and social setting; identify possible beneficiaries and assess potential environmental and social impacts of different alternatives. The general public should be made aware of the environmental and social consequences of project implementation at later stages in GSEEP.

5.1 Environmental& Social Screening

Each of the investments to be funded under the GSEEP will be subject to an environmental and social screening process before it is selected for inclusion in the project. The screening process establishes the level of environmental and social assessment required and will apply the exclusion criteria presented in Section 1.6. The screening process intends to identify relevant possible environmental and social concerns as well as suggest any further investigation and assessment as necessary. The PMU will fill in a screening form with assistance of the consultants, if so required, for activities funded under the GSEEP. The PMU will carry out the environmental and social screening for the investments implemented under the *GSEEP.*

5.2 Environmental Safeguard Categorization of GSEEP Investments

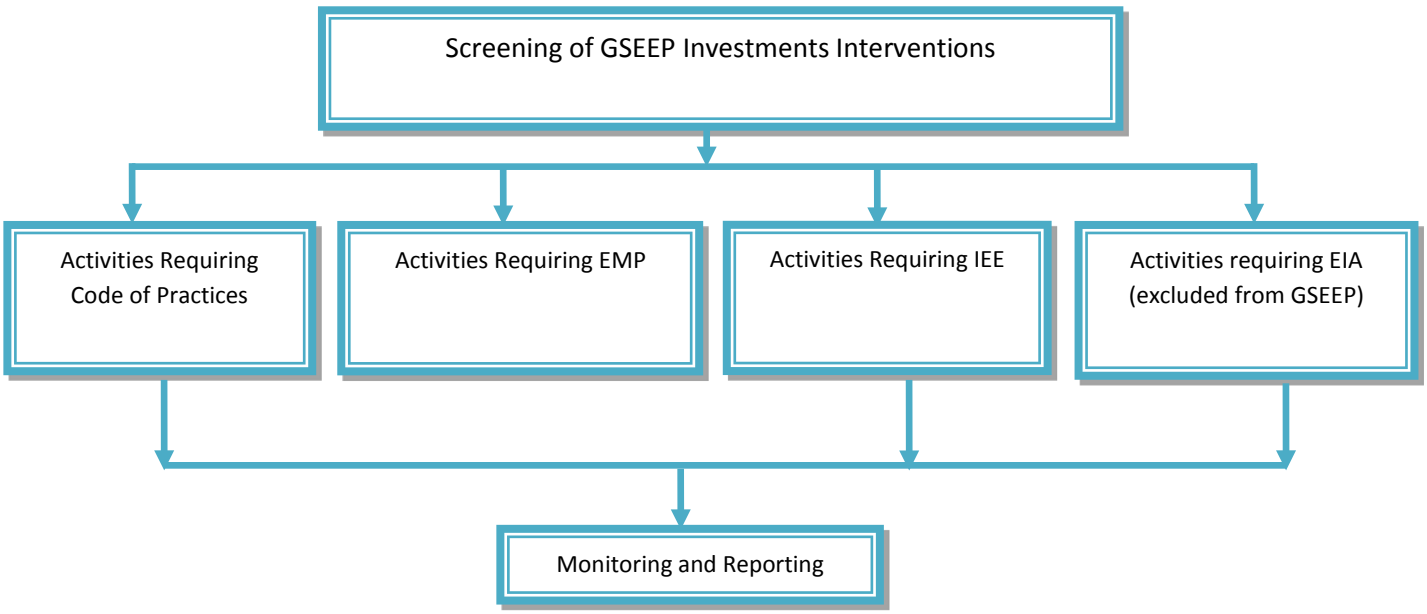
Primarily, the environmental screening exercise will be undertaken to determine the key environmental issues/concerns and the nature and magnitude of the potential impacts that are likely to arise on account of the proposed investments interventions. The major or key environmental and social issues to be identified will be determined by the type, location, sensitivity and scale of the investment intervention. The results/findings from this exercise are/will be used to determine:

1. The need for detailed assessment
2. Extent and type of Environmental Assessment (EA) required
3. The possibility of exclusion

The screening result will also be an important input for analyzing the ‘feasibility’ of the investments interventions along with engineering/economics.

Screening of the investments interventions will be done based on the prevailing legal requirements to determine whether the activities are subject to, with respect to environmental issues,(a) GoN's IEE (Initial Environmental Examination), (b) EIA (Environmental Impact Assessment),(c) No-EA (Environmental Assessment) processes, or require (d) only EMP or the code of practices. Environmental screening also determines whether investments proposals should not be included at all for funding under GSEEP should they be found to fall under the ‘negative’ list or ‘exclusion’ criteria set forth in this ESMF (section 1.6).

Flow of Safeguard Categorization for GSEEP Activities



The Environmental Protection Act (EPA)/Environmental Protection Regulations EPR), 1997 of Government of Nepal defines the projects which falls under IEE and EIA category as per schedule 1, and 2 of EPA. ***Annex 2*** outlines the environmental screening format to evaluate the GSEEP project with respect to provisions of EPA/EPR and World Bank Policies.

5.2.1 Category I: GSEEP Intervention Requiring IEE

Activities requiring IEE based on legal requirements and potential environmental and social risks (basis as per Environmental Protection Act/Regulations 1997 of GoN) or limited Environmental Assessment (EA) as per World Bank policy.

Initial environmental screening of the candidate sites indicate that the activity to be supported under the project do not have highly significant environmental risk. Hence, activities to be supported are unlikely to require full EA as per World Bank Policy or EIA as per GoN requirement. Further, as described in section 1.6 of the ESMF, activity with potential of high environmental risk are not-eligible for funding under the proposed project.

Threshold environmental criteria for investments requiring IEE are identified on the basis of the Environment Protection Act, 1996 and Environment Protection Regulations 1997 as well as based on potential short-to-long-term adverse environmental and social impacts and their sensitivity. Such GSEEP interventions should follow the schedules of EPA/EPR 1997. The potential GSEEP interventions requiring IEE or limited EA are Component 1 activities with work boundaries expanding outside NEA owned land and properties and/or investment amounts exceeding the threshold limits of 10 million. Each project requiring IEE or EA should have the respective assessment done prior finalizing Detailed Project Report (DPR). Such GSEEP investments should prepare Environment Management Plan (EMP) for approval. An IEE report will be prepared. In addition to thresholds defined by government regulation, potential adverse impacts and environmental sensitivity will be duly considered while conducting the IEE study and writing IEE report. The TOR for the IEE as well as the IEE report needs approval by the concerned ministry (MoE)3. The IEE report will have a built-in EMP which will fully describe appropriate preventive and curative mitigation measures and their implementation procedures. The environment experts of the PMU or consultant appointed by NEA will be responsible to ensure that safeguard

3 The Initial Environmental Examination (IEE) shall be approved by the concerned ministry,i.e the project related to energy is approved by the Ministry of Energy.

requirements are met. The process for conducting IEE is shown in a flow diagram (***Annex3***). For GSEEP investments requiring IEEs, construction work will start only after the approval of IEE by the concerned ministry. The preparation of IEE and its approval from the concerned ministry normally requires 3-4 months.

5.2.2 Category II: GSEEP Intervention Requiring EMP

GSEEP investments which don't require IEE, but may involve civil construction works with some minor to moderate degree of environmental and social issues.

Such GSEP investments require EMP. The format and table of content for preparing EMP is included in ***Annex 4***. The following process will be followed to prepare the EMP:

Phase I: Preparation of EMP. The EMP is an overall plan, which addresses the minor to moderate safeguard issues arising from implementation of the GSEEP investments and suggests a strategy and action plan to mitigate the adverse environmental and social impacts and enhance the beneficial impacts of the interventions. The EMP for a GSEEP investment consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures. An EMP is required for the following activities of component 1 investments interventions.

1. Solar farm development exclusively within the NEA owned land
2. Individual Solar Farm investment within 10 million rupees
3. Power evacuation through existing 11kV transmission line

The EMP includes:

1. Site Specific EMP Activity Schedule, including cost for implementation of mitigation measures.
2. Site Specific EMP Monitoring Schedule, including monitoring responsibility delineation.
3. Cost Estimate for EMP Monitoring. This can include cost required for capacity building and training activities basis as required or stated in activity

The PMU or the appointed consultant of NEA will prepare the EMP for category II in the prescribed EMP format incorporating all information and data.

Phase II: Approval of site specific EMP and Inclusion of site specific EMP Provisions in Designs/Estimates After preparation of the EMP report, it has to be endorsed by PMU (subject to review and clearance from the World Bank). After its approval the provisions of the EMP need to be included in the GSEEP investments interventions' designs and estimates before final approval..

Phase III: EMP Implementation Phase. After approval, EMP provisions along with the GSEEP investments interventions 'designs/estimates shall be implemented along with construction works. The responsibility of overall EMP implementation as well monitoring implementation for the category 2 interventions shall lie with PMU or appointed consultant.

5.2.3 Category III: GSEEP Interventions Requiring Code of Practice

GSEEP investments interventions which don't fall into categories I and II shall follow environmental Codes of Practices during the implementation and operation phases.

Environmental codes of practices provide technically specified solutions illustrating the general principles of environmentally sound and sustainable planning, design and construction. This will help to enhance positive impacts and to avoid or lessen adverse or negative impacts. This environmental code of

practices should be applied in conjunction with the standard technical standards for preparation of designs of civil works and during implementation. The GSEEP interventions requiring application of best practice code of conducts are component 2 activities such as:

a) Replacing conductors of distribution feeders to reduce line losses;
b) Adding or replacing distribution transformers to reduce over-load of transformers; and
c) Adding capacitor banks to compensate reactive power to manage voltage levels.

The generic environmental best practices to be followed for GSEEP investments and interventions are elaborated below:

1. Solid Waste Management should be based on Reduce, Reuse, and Recycle (3R) principles: Generation of solid, semi-solid and liquid waste requires proper on site management and scientific disposal.
2. Hazardous waste Management, particularly PCB waste in the replaced transformers, should be based on the IFCs General Environmental Health and Safety Guidelines section 2.3 (Occupational Health and Safety ; Physical Hazards), IFCs General Environmental Health and Safety Guidelines section 2.3 (Occupational Health and Safety ; Chemical Hazards
3. New transformers shall not be based on banned hazardous chemicals
4. As there may be settlements around the component 2 activities, no or few nuisances to the community should be produced. Examples: use of less noisy equipment and no work during night hours as well as adoption of Environmentally Sound Technologies (energy efficient system design, selection of less polluting technology) in civil construction.
5. Health and Safety Standards (e.g., use of personal protective equipment, use of safety signs) should be adopted in replacement activities,
6. Environment, Health, and Safety (EHS) related orientation and job specific training should be provided to employees; IFCs General Environmental Health and Safety Guidelines section 2.2 (Occupational Health and Safety ; Communication and Training shall be followed
7. Adherence to GoN Rules, Regulations, Policies and World Bank policies, and compliance with formats and checklists developed by ministries
8. Correction of shortcomings, periodic review meetings, clear assignment of roles and responsibilities
9. Environmentally friendly technologies and awareness rising in environmental (including cultural and archeological) should be promoted.
10. Information dissemination and public consultations prior, during and concomitant to the garner understanding and consensus should be an integral part of all activities under GSEEP.

5.2.4 The Roles and Responsibilities of the World Bank

The role of World Bank is to ensure that the GSEEP is in compliance with GoN and World Bank requirements. For this purpose, Initial Environmental Examination (IEE) reports and EMPs of each sub-project/activity and EMP will be reviewed and “no objection letter” shall be provided by the World Bank prior to start implementation. For activities, which require code of best practices, PMU can directly approve.

5.3 Management of Social Safeguards

The key steps are the same as for dealing with the environmental issues – screening, assessment and preparation of mitigation plans. These steps are necessary to identify and address the potential social concerns or impacts of a project right from the planning stage to its implementation and post-implementation operations. ***Annex 5*** presents the social screening format in relation to GON EPA/EPR and WB policy requirements.

5.3.1 Social Screening (Including Resettlement Policy Framework, Indigenous People (IP) and Vulnerable Community Development Plan, and Gender Development Plan)

The envisaged activities and scope of GSEEP are not expected to require SIA (Social Impact Assessment) or RAP (Resettlement Action Plan). However, as part of ESMF a resettlement policy framework has been developed In case some adverse impacts are identified at a later stage. Small and limited land area required for any project component limiting to less than 200 people in some of the candidate sites will be covered by the abbreviated RAP to be developed as per the policy provisions outlined in the entitlement matrix of the ESMF. The short-term impact on access to facilities and properties of households and energy services is very likely for component 1 and 2. Such impacts (if any) shall be well documented. In case more than 200 persons are impacted, a detailed RAP will be prepared. The above issues including the temporary land occupation for camps and facilities will be addressed by the application of the following, policy/entitlement frameworks in the ESMF (Table 10).

Screening

Every candidate site will be subjected to social screening process before it is selected for inclusion in the project. The screening process will establish the degree of adverse impact (if any) and also the level of social assessment required and application of exclusion criteria as given under:

Avoidance and/ or Minimizing Adverse Social Impacts

The Project will make best use of its social planning approaches and fully ensure that the potential social issues are avoided or minimized to the extent possible. This would require deploying stringent measures for site selection at the early stage of project design and planning by undertaking environmental and social screening. Ideally, the possibility of avoiding or minimizing the issues related to involuntary resettlement would be possible by taking into account the following considerations while selecting the subproject site.

Considerations for the Selection of GESEEP Subprojects

1. No private land or property will be used to develop the GESEEP subprojects;
2. No land with any kind of disputes/ conflicts will be used for the subprojects;
3. No land without legal title of NEA (ownership certificate of land) will be used for the subprojects;
4. No land under protected forests/ national parks will be used; and
5. No private land donated by the owners will be accepted and used.

Based on the criteria suggested above, the screening process will:

1. Determine potential impacts of selected sub-components as to whether they are likely to cause negative social impacts
2. Determine the scope and focus of detailed social assessment
3. Helps in making appropriate decision about inclusion or exclusion of the site/ location under consideration.

5.3.2 Social Impact Assessment (SIA)

In case screening result shows adverse social impacts, the project will undertake a survey for identification of the persons and their families likely to be affected by the project. Every survey shall contain the following municipality or ward / village-wise information of, the project affected families:

1. Members of families who are residing, practicing any trade, occupation or vocation in the project affected area;
2. Project affected families who are likely to lose their house, commercial establishment, agricultural land, employment or are alienated wholly or substantially from the main source of their trade occupation or vocation or losing any other immovable property.
3. Agricultural labors and non-agriculture labors.
4. Losing access to private property or common property resources or natural resources
5. Information on socio-cultural and political situation in the project area

The project on completion of the survey will disseminate the survey results among the affected community.

5.3.3 Resettlement Action Plan

Based on the social impact assessment survey, project will prepare an action plan to mitigate or minimize the adverse impacts as identified during the survey. The draft mitigation plan in form of resettlement action plan (RAP) will be again disseminated among the affected individuals / community. The feedback received from the affected groups will be incorporated to the extent possible before finalization of the RAP.

Every-draft Resettlement Action Plan (RAP) prepared shall contain the following particulars namely:

1. The extent of area to be acquired for the project, the name(s) of the corresponding village(s) / municipality area and the method employed for acquiring land with the relevant documentation.
2. Village wise or municipality wise list of project affected families and likely number of displaced persons by impact category
3. Family-wise and the extent and nature of land and immovable property in their possession indicating the survey numbers thereof held by such persons in the affected zone;
4. Socio-economic survey of affected people including income/asset survey of PAPs.
5. A list of agricultural labourers in such area and the names of such persons whose livelihood depend on agricultural activities;
6. A list of persons who have lost or are likely to lose their employment or livelihood or who have been alienated wholly and substantially from their main sources of occupation or vocation consequent to the acquisition of land and / or structure for the project;
7. Information on vulnerable groups or persons for whom special provisions may have to be made;
8. A list of occupiers, if any
9. A list of public utilities and government buildings which are likely to be affected
10. A comprehensive list of benefits and packages which are to be provided to project affected families by impact category;
11. Details of the extent of land available which may be acquired in settlement area for resettling and allotting of land to the project affected families;
12. Details of the basic amenities and infrastructure facilities which are-to be provided for resettlement;
13. Entitlement matrix
14. Time schedule for shifting and resettling the displaced families in resettlement zones
15. Grievance redressal mechanism
16. Institutional mechanism for RAP implementation;
17. Monitoring and evaluation indicators and mechanism; and
18. Budget

5.3.4 Preparation of Resettlement Action Plan (RAP)

Having identified the potential impacts of the relevant sub-projects, the next step is to develop action plan to mitigate the impacts. The RAPs provides a link between the impacts identified and proposed mitigation measures to realize the objectives of involuntary resettlement. The RAPs will take into account magnitude of impacts and accordingly prepare a resettlement plan that is consistent with this framework for Bank approval before the sub-project is accepted for Bank financing.

1. Sub-projects that will affect more than 200 people due to land acquisition and/or physical relocation and where a full Resettlement Action Plan (RAP) must be produced.
2. Sub-projects that will affect less than 200 people will require an abbreviated RAP.
3. The above plans will be prepared as soon as subproject is finalized, prior to Bank's approval of corresponding civil works bid document.

4. Projects that are not expected to have any land acquisition or any other significant adverse social impacts; on the contrary, significant positive social impact and improved livelihoods are exempted from such interventions.

5.3.5 Sub-Project Approval

In the event that a sub-project involves land acquisition against compensation or loss of livelihood or shelter, the project shall:

1. Not approve the subproject until a satisfactory RAP has been prepared and shared with the affected person and the local community; and
2. Not allow works to start until the compensation and assistance has been made available in accordance with the framework.

Resettlement Policy Framework guidelines are prepared for addressing the issues limited to this project for resettlement and rehabilitation of the PAPs. The framework is based on the GON's legal frameworks and the World Bank OPs 4.12 on involuntary resettlement.

5.3.6 Broad Principles

The RPF aims to resettle and rehabilitate the affected persons on account of its sub projects in a manner that they do not suffer from adverse impacts and shall improve or at the minimum retain their previous standard of living, earning capacity and production levels. It is also the endeavor of the project that the resettlement shall minimize dependency and be sustainable socially, economically and institutionally. Special attention will be paid for the improvement of living standards of marginalized and vulnerable groups. The broad principles of the policy are as below:

1. The adverse impacts on persons affected by the project would be avoided to the extent possible.
2. Where the adverse impacts are unavoidable, the project-affected persons will be assisted in improving or regaining their standard of living. Vulnerable groups will be identified and assisted to improve their standard of living.
3. All information related to resettlement preparation and implementation will be disclosed to all concerned, and community participation will be ensured in planning and implementation.
4. Private negotiations will also be used for land acquisition as required.
5. The persons affected by the project who does not own land or other properties but who have economic interest or lose their livelihoods will be assisted as per the broad principles brought out in this policy.
6. Before taking possession of the acquired lands and properties, compensation and R&R assistance will be made to those who are available and willing to receive the entitlements in accordance with this policy.
7. There would be no/or minimum adverse social, economic and environmental effects of displacement on the host communities but if needed specific measures would be provided.
8. Broad entitlement framework of different categories of project-affected people has been assessed and is given in the entitlement matrix. Provision will be kept in the budget. However, anyone moving into the project area after the cut-off date will not be entitled to assistance.
9. Three tier appropriate grievance redress mechanism has been established at project level to ensure speedy resolution of disputes.
10. All activities related to resettlement planning, implementation, and monitoring would ensure involvement of women. Efforts will also be made to ensure that vulnerable groups are included.
11. All consultations with PAPs shall be documented. Consultations will continue during the implementation of resettlement and rehabilitation works.
12. As required, a Resettlement Action Plan will be prepared including a fully itemized budget and an implementation schedule.

5.3.7 Definitions

The following definitions are used in the documents:

Cut-off date: In the cases of land acquisition affecting legal titleholders, the cut-off date would be the date of issuing the preliminary notice under the Land Acquisition Act 2034. In cases where people lack title, the cut-off-date shall be the date of start of the Census survey undertaken by the project authority.

Project Affected Person: Affected persons are those who stand to lose all or part of their physical and non-physical assets including homes, productive land, community resources, commercial properties; livelihood; and socio-cultural network.

Project Displaced person: A displaced person is a person who is compelled to change his/her place of residence and/or work place or place of business, due to the project.

Affected family: A family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land for a project or involuntary displacement for any other reason

Wage Earner: A person who is working with a commercial establishment or working as a labour in an agriculture land, which is being affected by the project.

Encroacher: A person, who has trespassed Government land, adjacent to his/her own land or asset, to which he/she is not entitled, and deriving his/her livelihood prior to the cut-off date.

Squatter: Squatter is a person who is land less and has settled on publicly owned land without permission and has been occupying publicly owned building without authority prior to the cut-off date.

Vulnerable Person: The vulnerable person includes both socially as well as economically disadvantaged persons such as janjatis, dalits, disabled/handicapped, woman headed households, destitute, orphans, widows, unmarried girls, abandoned women ,or persons above sixty years of age; who are not provided or cannot immediately be provided with alternative livelihood, small and marginal farmers, and landless wage earners.

Entitled Person: person adversely impacted by the project and is entitled to some kind of assistance as per the project entitlement framework

Titleholders (THs): Persons who possess legal documents in support of claims made towards ownership of structure or land are titleholder.

5.3.8 R&R Benefits for Project Affected Families

The resettlement and rehabilitation (R&R) benefits shall be extended to all the Project Affected Families (PAF). The details are provided in the entitlement matrix (Table 18).

Table 18: Entitlement Matrix

Types of Lost	Application	Entitled Persons/family	Policy/ Entitlement
1. Acquisition of private, tenancy, or Guthi land	Entire or part of land to be acquired from owner of the land as recorded at cut-off date	▪ Titleholder ▪ Tenants	▪ Direct purchase of land by the Municipality through negotiation with the land owner having the Ward Committee as witness. ▪ Land of equivalent size and category (if available), or cash compensation at replacement cost, ▪ In case of vulnerable group (IPs, Dalits, socio-economically poor, women headed families), preference will be in replacing land for land, ▪ Any transfer costs, registration fees or charges to be borne by the project, ▪ In case there are legal Tenant (mohi), the land owner will have to produce consent of tenant or the purchase price or compensation as described in clauses 1 & 2 above shall be apportioned 50: 50 between the owner and the legal tenant as per the Land Reforms Act, 1964, ▪ Land compensation/registration shall be paid/done in favor of both the land owner and spouse, ▪ If remaining land becomes unviable as a result of land acquisition, land owner will have an option to relinquish unviable remaining portion of land and receive similar benefits to those losing all their land parcel(s), ▪ For loss of income due to land loss, one year of minimum agricultural wages as assistance towards loss of income shall be provisioned. ▪ Training for skill upgradation to encourage for self-employment
2. Temporary loss of land	Temporary land taken by the sub-project	▪ Titleholder ▪ Tenants	▪ One month Prior notice before civil works allowing the owners to salvage their assets and crops; ▪ Compensation for any damage caused to structure/assets or standing crops (The contractor will be responsible for compensating for any temporary damage to property business, assets, crops and trees during civil works which will be reflected in the contract agreement. ▪ Three month of minimum agricultural wages as assistance towards loss of income shall be provisioned. ▪ Training for skill upgradation to encourage for self-employment
3. Loss of residential, commercial, and other structure	Structures, buildings including cattle shed, walls, toilets etc. affected by the sub-project	▪ Owner ▪ Tenants ▪ Non-titled (encroachers and squatters)	▪ Direct purchase of structure and land by the NEA through negotiation with the land owner having the VDC representatives as witness. ▪ Compensation for full or partial loss at replacement cost of the affected structure(s) without depreciation or deduction for salvaged material, ▪ Transportation allowance of Rs. 10000.00 for residential and commercial structures to cover cost of transportation. ▪ Subsistence allowance equivalent to six months of agriculture income as one time grant will be provided to AP, ▪ Prior notice of 35 days delivered to the affected family (tenants). One time grant of 3 month's rent for tenants who have to relocate from tented building ▪ Non-titled (squatters and encroachers) persons will receive compensation for structures at replacement cost without depreciation or deduction for salvaged

Types of Lost	Application	Entitled Persons/family	Policy/ Entitlement
			material. ▪ Encroachers and squatters will not be provided any compensation for land, but will be provided replacement value for the structure. ▪ Relocation assistance to all fully displaced households i.e additional support for vulnerable households including all titleholders as well as non titleholders in both the categories (residential as well as commercial) in form of preferential employment at project site and one time grant equivalent to three months of minimum wages.
4. Loss of community structures and/or resources	Community facilities (e.g. irrigation, water, etc.) affected by the sub-project	▪ The users of the ▪ facility or ▪ community or ▪ group	▪ Reconstruction by the sub-project leaving such facilities in an equal or better condition than they were before, or ▪ Cash compensation to the legal/community custodians at full replacement cost without depreciation of deduction for salvaged material; or ▪ Negotiated relocation in consultation with the community
5. Loss of trees and crops	Affected fruit/nut trees	▪ Owner of the ▪ affected timber and ▪ fodder trees	▪ Cash compensation based on annual value of the produce and calculated according to Department of Agriculture (DOA) norms, ▪ Resettlement Plans to confirm that the DOA norms and techniques are sufficient and are updated regularly ▪ Three months of minimum wages as assistance towards loss of income
	Affected timber and fodder trees	▪ Owner of the ▪ affected timber and ▪ fodder trees	▪ Cash compensation based on calculation of the production and calculated according to the district norms as decided by the Department of Forestry. ▪ Three months of minimum wages as assistance towards loss of income.
	Affected crops	▪ Owners and ▪ sharecroppers of ▪ affected crops	▪ Cash compensation based on local market prices for the produce of one year and calculated as per the norms of District Agriculture Development Office, ▪ 50% cash compensation of the lost crop for the sharecroppers/legal tenant (Mohi) ▪ Non-titled persons will be informed 6 months prior to construction or provide compensation for crops. ▪ Three months of minimum wages as assistance towards loss of income.
6. Loss of economic opportunity	Economic opportunity lost as result of loss of livelihood base	▪ Persons in the subproject ▪ vicinity who may be ▪ adversely affected, ▪ although they do ▪ not lose assets as such	▪ Preferential involvement in project construction works, ▪ Skills training support for economic restoration, ▪ One time grant equivalent to three months of minimum wages in case of loss of livelihood
7. Loss of time and travel expenses	Expenses incurred in traveling to fill application and making claims and time lost	▪ All sub-project ▪ affected persons ▪ eligible for ▪ compensation	▪ Program facilitates transportation in official process, ▪ Payment on the same day as other compensation
9. Additional Assistance			
9.1 Preferential treatment in		▪ All APs	▪ Construction contracts include provision that APs will

Types of Lost	Application	Entitled Persons/family	Policy/ Entitlement
employment in project activities			have priority in wage labor/employment on sub-project construction during implementation, ▪ APs shall be given priority after construction for work as maintenance workers, mandated in local body agreement
9.2 Skill training and income generation support		▪ One member of ▪ each project affected ▪ family belonging to ▪ vulnerable group/below ▪ poverty line	▪ Skills training and income generation support financed by subproject with special focus on women, dalits and IPs ▪ Resettlement Plan to include a need assessment and skills training program for APs.
9.3 Priority in Poverty reduction/social development programs		▪ All Aps	▪ Participation of APs, especially women, dalits, and IPs, with priority in saving credit scheme facilitated by the sub-project, ▪ Participation of APs with priority in life skills, income generation, and other entrepreneurship opportunities
9.4 Business disruption losses compensation		▪ Permanent business	▪ For permanent business it has been assumed that there will be no full closure of the shops during construction, although road closures restricting vehicle access is expected in some places. ▪ Pedestrian access should be maintained at all times ▪ As a result only partial disruption to some businesses is expected. There should be no need to close shops and retail outlets. However the resettlement policy makes provision for compensation for business losses during construction. A onetime grant equivalent to one week's earning (Rs. 1000.00 X 7 days) = Rs. 7000.00 shall be compensated.
9.5 Loss of permanent assets		▪ Severely affected families	▪ Severely affected families will be given 25% of the total compensation as additional assistance.

In case due to change in the scope of the land area occupancy outside NEA owned land in future date, with potential higher risk on societies involving social disruptions and/or impacts a full SIA and RAP will be carried out in compliance to the Banks policy requirements.

5.3.9 Indigenous Peoples and Vulnerable Communities Development Framework (IP-VCDF)

This Indigenous Peoples and Vulnerable Community Development Framework (IP-VCDF) is developed to guide the preparation of GSEEP investments to ensure better distribution of the benefits of the project activities with a focus on the *adivasi/janajatis* and other disadvantaged social groups located in areas in which GSEEP civil works take place. The IP-VCDF is developed based on the national policies/strategies as well as the World Bank's Indigenous Peoples Policy. The principal objectives of the IP-VCDF are to:

1. Ensure that the project engages in free, prior, and informed consultation with affected communities, leading to broad community support for the project, with particular attention to vulnerable groups;
2. Ensure that project benefits are accessible to the vulnerable communities living in the project area;
3. Avoid any kind of adverse impact on vulnerable communities to the extent possible and if unavoidable ensure that adverse impacts are minimized and mitigated;
4. Ensure vulnerable peoples' participation in the entire process of preparation; implementation and monitoring of the sub-project activities;
5. Minimize further social and economic imbalances within communities; and

6. Develop appropriate training / income generation activities in accordance to their own defined needs and priorities.

5.3.9.1 Relevant Policies on Indigenous People and other Vulnerable Communities

Nepal is a signatory to ILO convention on Indigenous and Tribal Peoples, 1989 (No.169). Besides that Nepal does not have a standalone policy on Indigenous Peoples. However in the Three Year Interim Plan (TYIP) (2007-2010), or the Tenth Plan, significant emphasis has been placed on delivering basic services to the disadvantaged and Indigenous People (IPs), women, disabled and vulnerable communities (VCs) such as *Dalits* and *Adhibasi / Janajati*. One of the main objectives of the Tenth Plan is the implementation of targeted programs for the uplifting, employment and basic security of *Dalits*, indigenous people and disabled peoples. The policy provision also outlines that the Government should pilot strong and separate packages of programsfor the basic security of the vulnerable sections of society. The Three Year Interim Plan (TYIP) (2007- 2010) includes the following policies for inclusive development of *Dalits, Adivasi/Janajatis* and other vulnerable groups*:*

1. Creating an environment for social inclusion;
2. Participation of disadvantaged groups in policy and decision making;
3. Developing special programs for disadvantaged groups;
4. Positive discrimination or reservation in education, employment, etc.;
5. Protection of their culture, language, and knowledge;
6. Proportional representation in development; and
7. Making the country's entire economic framework socially inclusive.

The National Foundation for the Upliftment of *Adivasi/Janajatis* Act, 2058 (2002), the National Human Rights Action Plan 2005, the Environmental Act 1997, and the Forest Act 1993 have emphasized protection and promotion of vulnerable groups in general, IPs' knowledge, and cultural heritage in particular. In 1999, the Local Self-Governance Act was amended to give more power to the local political bodies, including authority to promote, preserve, and protect the IPs' language, religion, culture, and their welfare.

The World Bank policy on indigenous peoples emphasizes the need to design and implement projects in a way that fosters full respect for indigenous peoples' dignity, human rights, and cultural uniqueness and so that they:

1. Receive culturally compatible social and economic benefits, and
2. Do not suffer adverse effects during the development process.

5.3.9.2 Screening and Categorization of Impacts on IPs and VCs

These steps will be followed to assess impacts on IPs and VCs:

1. A social assessment will be carried out for the entire project at the beginning of the activities as part of the pro-poor participatory planning process (only for component 1)
2. Then a social screening will be carried out to determine whether IPs and VCs will be affected by the activities as part of the environmental and social screening for the GSEEP investments carried out at the identification stage

The screening will involve identifying IPs and VCs belonging to the area where the GSEEP investments interventions for component 1 activities will be undertaken, their population (number and ratio), and their characteristics as compared to the main population in the project area through primary and secondary data collection.

The social screening will provides the necessary information to determine impact including: (i) the beneficiary population living within the impact zone of the GSEEP component 1 investments (ii) the extent of land required (even temporary) and number of land owners affected (if applicable); (iii) impacts on poor and vulnerable groups including needs and priorities for social and economic betterment; (iv) other social impacts.

The screening report for each subproject will provide adequate information about the potential losses and damages to the vulnerable peoples and communities which will be crucial to decide whether further works regarding impact assessment and mitigation plans including preparation of abbreviated RAP are required or not,

GSEEP investments Component 1 will be categorized according to the level of impacts on IPs and VCs. The categorization will be determined by the type, location, scale, nature, and presumed magnitude of potential impacts on IPs and VCs. The GSEEP investments will be categorized as per the following table (***Table 19***) using the information in the IPs & Vulnerable Groups Impact Screening & Categorization Form presented in ***Annex 6***.

Table 19: Categorization of Impact on IPs and VCs for GSEEP

Category	Determination of the type of Social Assessment Needed
Category A	GSEEP component 1 investments expected to have significant impacts4 that require an Indigenous People (IP)/Vulnerable Group Development Program (VCDP)
Category B	GSEEP investments expected to have limited impacts that require specific action for IP/ Vulnerable Groups in the form of social action plans
Category C	GSEEP investments expected to have impacts on IP/ Vulnerable Groups and, therefore, do not require special provision for IP/ Vulnerable Groups

In case of significant impacts (falling in categories A and B) on IPs and VCs, the PMU by itself or through the appointed consultant will submit the IP-VCDP to the World Bank for clearance. The Outline Structure of an IP - Vulnerable Community Development Plan is presented in ***Annex 7***.Short IP-VCDPs prepared as a part of 'less impact' or 'no impact' category will be internally evaluated. The World Bank will periodically review and do random review of these documents.

5.3.9.3 Specific Measures to be followed while Dealing with Vulnerable Groups

Specific measures for vulnerable groups including indigenous peoples, *Dalits*, minor ethnic communities, women, and powerless communities are outlined below:

1. Ensure awareness raising, active participation and capacity building of the vulnerable communities
2. Ensure participation in awareness campaigns, project implementation and monitoring of vulnerable groups
3. Ensure equal wages for similar work during implementation
4. Launch project information campaign to inform the target groups about the key features of the project and the GSEEP investments interventions implemented.

The impacts on IP/ Vulnerable Group will be considered 'significant' or Category A if the GSEEP affects positively or negatively:

1. Affects their customary rights of use and access to land and natural resources,
2. Changes their socio-economic status,
3. Affects their cultural and communal integrity,
4. Affects their health, education, livelihood, and social security status, and/or
5. Alters or undermines the recognition of indigenous knowledge.

5. Asses and analyze the presence of indigenous and Dalits in the areas where GSEEP component 1 investments are implemented
6. Treat and support indigenous people, Dalits and other vulnerable communities preferentially
7. Involve IPs and Dalits in beneficiary groups as needed to increase their participation.
8. Ensure the identified needs and priorities of vulnerable people are taken into account in the GSEEP investments interventions
9. Conduct project related meetings in indigenous and vulnerable community areas to encourage their participation. Ensure a quorum which includes representation from IP groups.
10. Encourage interventions providing targeted assistance/training aimed at vulnerable groups to enhance livelihoods and participation
11. Build capacity of indigenous peoples, Dalits and other vulnerable communities to enhance their knowledge and skills to participate in the project activities
12. Encourage capacity development through trainings on skill enhancement (agriculture, veterinary, vocational training in different fields) of local people as part of the GSEEP interventions.

5.3.9.4 Framework for Developing Gender Action Plan

The Gender Development Plan (GDP) framework outlines the specific gender issues and point of corresponding strategies and identify need based activities which will be given due consideration under GSEEP. This will ensure increased women's participation and gain optimal benefits from project activities both during construction and post construction. The major tools used to identify and deal with gender issues are: gender analysis, incorporation of gender issues in project design, and gender-sensitive consultations.

Gender analysis will be an integral part of the initial social assessment carried out as part of the safeguard screening of the GSEEP investments interventions. The issues identified at the screening stage will be assessed during the preparation of the GSEEP investments interventions and adequately addressed during implementation.

The project activities should be gender responsive based on the findings of the gender analysis, and agreed actions should be included in the design of the GSEEP investments interventions. The findings and recommendations from the gender analysis carried out at the screening stage and feedback on gender issues from beneficiaries during implementation must be assessed to determine the need for further action. The key action points are mentioned in ***Annex 8*** of this report.

5.3.9.5 GON Policies on Gender Mainstreaming

GON, in its national level policies and plans, has duly emphasized the importance of women in all spheres ranging from household to community and national level. Realizing the increased potentiality of women in the socio-economic and political sectors, the government has increasingly provided more space for increased participation of women. In addition, GON has established the National Women Commission, a national level well empowered body to look after the issues of women and take protective and defensive measures to address the issues and problems encountered by the women at all levels and in any forms viz domestic violence, women's right to properties and representation in the key positions with fair proportions.

The Government of Nepal (GON), since the early 1990s, has been making important commitments to gender equity, equality and the empowerment of women in its policies, plans and programs. The GON introduced a Gender Approach to Development (GAD) in 1990 to enable women and men to participate equally in public and private life and realize their full potential in development. The Tenth Plan (2002-2007) as a Poverty Reduction Strategy Paper (PRSP) identified gender and inclusion as its main strategies for reducing poverty. 'Social inclusion and targeted programs' was one of the four major pillars of the Tenth Plan/PRSP. The Plan, instead of relying only on targeted programs, tried to address gender and caste related issues by mainstreaming all of the four pillars of PRSP along with envisaged strategies

to achieve gender equality and empowerment of women. The Three Year Interim Plan (TYIP) during 2008-2010, which emphasizes post conflict reconstruction, rehabilitation and reconciliation, continued the long-term goal of poverty reduction through gender mainstreaming and social inclusion.

Similarly, Nepal is signatory of number of international human rights related conventions and declarations, which call for the elimination of all forms of gender based discrimination, including those related to access to education, health and other services. The Convention on the Elimination of all forms of Discrimination against Women (CEDAW), signed by the GoN in 1991, commits Nepal to constitutional and legal equality, particularly in the fields of education, health, citizenship, property and employment. It also guarantees freedom from all kinds of violence and sexual exploitation

5.3.9.6 Gender Inclusive Design and Preparation of GAP

The gender inclusive design criteria emphasizes on the initiatives and promotion of women focused and women friendly activities through which their potentiality could be utilized in the action. This will require targeting the women in providing the project supports that match well with their needs, interest and abilities in the following ways.

1. Targets for women's participation and / or access to project benefits viz education, skill training, forming/ strengthening beneficiary groups;
2. Women representation in different forums and local development activities inclusive working opportunities in project supported works;
3. Hiring / recruitment of females in the project both at central and field level such as local social mobilizers, trainers and facilitators;
4. Special or separate facilities for women or girls to facilitate their participation in project activities;
5. Design of gender sensitive physical facilities i.e separate sanitation facilities in school, construction site if women are employed; public places like markets, etc, and
6. Provision for women or joint ownership of assets viz land and houses
7. The cost of GAP will be included in Resettlement Action Plan.

5.3.2.4.1 Gender Development Plan

The suggested Gender Development Plan for the project is presented below (***Table 20***).

Table 20: Suggested Gender Development Plan

Gender Issues	Strategy	Proposed Activities
Lack of awareness	Awareness campaign about the project for the communities focusing on the vulnerable groups including women.	Formation of women's groups around specific interventions as required. Share information about the project benefits in Nepali language.
Excluded from Opportunities	Gender sensitization to all stakeholders including PMU. Ensure Women's participation during meetings, project implementation and monitoring.	Carry out meetings and interaction program with and orientation to women in the project area. Ensure representation of women in the grievance redress committee. Prepare clause to be included in civil work contract documents to prevent discrimination in employment on the basis of sex, caste, religion and ethnicity. Conduct leadership training for women members of commodity groups in the project area.
Disparity in Wages	Accord priority employment to women in construction activities under the project. Promote equal wages for equal work	Inform women groups regarding proposed construction works. Identify women interested to work; assess their skills and involve them as per their capabilities. Monitor women's wage rate and do the needful to ensure wage equality for similar type of construction works.

Gender Issues	Strategy	Proposed Activities
		Inclusion of the above elements in the contractors' documents.

The details of action points for the preparation of Gender Action Plan are presented in ***Annex 8***.

Table 21: General Framework for the Preparation and Monitoring of GAP

Activities	Indicators and Target	Responsible Agencies
Group formation /strengthening PAF or other groups already in existence	No. of groups	ESSD/SM
Engage women in economic activities – in project construction activities and other sources	No. of women employed against set target	Project incharge; contractor; ESSS/ SM
Skill training to women in vocational fields and support for IGAs in farm and off-farm sector	No. of women trained and engaged in different IGAs	Project; ESSS/ SM
Inputs and technologies distributed to women groups that are culturally appropriate and economically viable	Quantity of inputs/ technologies provided to the groups	Project; ESSS/ SM
Distribution of seed money by the Project and resource generation, mobilization and utilization by the groups	Savings generated and utilized by different groups by purpose (Rs)	Project; ESSS/ SM
Conduct health related trainings (Awareness on HIV/AIDS, child nutrition etc)	No. of programs launched and targeted beneficiaries covered	Project; local health functionaries; local NGOs; ESSS/ SM
Awareness raising to reduce domestic violence	No. of cases reported in the community/ police	Project; local NGOs; ESSS/ SM

5.4 Process for Managing Environmental and Social Impacts

This ESMF proposes measures to minimize and mitigate adverse environment and social impacts of the project activities. Proper integration of the findings from the safeguard studies and public consultations into the planning/decision-making process and engineering outputs (design and bidding documents) will be essential to avoid/reduce the environmental and social issues that may arise due to the project. To ensure that GSEEP investment do not cause any significant adverse impacts, a safeguard screening process will be established and made mandatory for each subproject. In case significant impacts are likely to occur, the GSEEP will require environmental and social assessment and preparation of mitigation/management plans. The key steps for managing any potential adverse impacts are outlined in the ***Table 22*** for civil works carried out under the project.

Table22: Key Steps for Managing Environmental and Social Issues

Stages in GSEEP Cycle	Steps in the Assessment Process
Sub-project Identification	PMU or appointed consultant to carry out Environmental and Social Screening to determine key potential safeguard issues. PMU to carry out field verification to determine whether exclusion criteria have been adhered to.
Project Design (for works that only require EMP)	PMU and/or appointed consultant to consult with key stakeholders PMU and or appointed consultant to prepare Environment Management Plan for sub-projects not requiring detailed assessment design alternative (Category II projects) in parallel with detailed engineering design phase PMU to ensure integration of the EMP into the Bidding Documents (if works are carried out by contractors)
(for works that require detailed assessment, i.e IEE)	PMU and/or appointed consultant to prepare ToR to carry out Initial Environmental Examination (IEE)to determine level and scope of EA. ToR for IEE and IEE should be approved by relevant line ministry (MoE). Preparation of IEE to include steps listed below
Since works requiring EIA are included in the exclusion criteria	Baseline Data Collection: Identification of environmental and socio-economic conditions.

Stages in GSEEP Cycle	Steps in the Assessment Process
for GSEEP, EIA details are not mentioned here.	*Environmental Impact Prediction/Assessment*: Assessment of impacts in terms of characteristics such as magnitude, extent, duration and significance in quantitative terms as far as possible; describing all reasonable alternatives, including preferred and 'no project' options.
	Mitigation Measures Design: Design to avoid, reduce and minimize adverse environmental impacts and enhance beneficial impacts
	Public Consultation and Participation: At various stages in the assessment process to ensure quality, comprehensiveness and effectiveness of the stakeholders' participation and to adequately reflect/address their concerns.
	Preparation of Environmental Management Plan (EMP): Determination of specific actions to be taken during engineering design and construction stages to minimize or mitigate negative impacts and enhance the positive impacts.
Project Design	Report Preparation: Summary of all information obtained, analyzed and interpreted in a report form; also include a non-technical summary including methods used, results, interpretations and conclusions made. IEE should incorporate physical, chemical, biological, social, economic and cultural aspects/environment and alternative designs/studies to reduce the impacts.
Sub-project approval	PMU to review and approve Technical and Safeguard Report/s (for IEE review and approval will be through MoE; IEEs also need to be submitted to the Bank for No Objection). The Review of report/s to assess whether potential issues have been adequately addressed to facilitate the decision-making process- decides if project should proceed, or if further-alternatives must be examined or totally abandoned. Integrate EMP or IEE into engineering design and bidding documents if works are to be carried out by contractors.
Implementation	PMU to orient / train the Contractor/Users Committee and other field staff on EMP/IEE requirements. PMU to supervise, monitor EMP and IEE compliance (if contractor is used, environmental and social clauses should be part of bidding documents. Monitoring by the supervising engineer/or by other related entity should be mentioned) PMU to take corrective actions, as and if necessary
Post-Construction	NEA staff to carry out post-construction operations and maintenance in line with EMP/IEE

The primary responsibility of coordinating work related to social and environmental safeguards will rest with the Project assisted by the Environment and Social Studies Department (ESSD). The project will establish an Environmental and Social Management Unit (ESMU). The ESMU will be staffed with specialized social and environment professionals either hired from the marked or on deputation from ESSD. ESSD is staffed with subject specialists and ESSD also hire specialist from market as per the need. ESSD, though, operates from central office; it establishes field offices at every project site headed by senior professional as part of ESMU. ESMU model will be followed as this functioned well for the effective implementation of safeguard measures. ESSD over a period of time has acquired skill and experience to address social and environmental safeguard issues. Currently ESSD is working on several Bank funded projects. An Environmental and Social Specialist each from ESSD will be posted at the project site to monitor the implementation of environmental and social safeguards mitigation measures. The specialists will be responsible for generating monthly progress reports. The midterm and end term evaluation of implementation process will be carried out by an independent agency.

CHAPTER VI: INFORMATION AND CONSULTATION FRAMEWORK

The information and consultation framework is intended to lay out the way in which information will be provided to the project implementers and beneficiaries and also how consultations will be held during GSEEP implementation. Its purpose is to ensure social and environmental issues are effectively addressed by the project in a transparent and participatory manner. The primary responsibility for the implementation of information and communication strategies lies with the PMU. The details are elaborated below.

6.1 Information and Consultation Framework for GSEEP

Effective public consultation will be needed from the earliest (planning) stages of the project. Input from relevant stakeholders will be essential especially during the identification of GSEEP investments, proposal preparation, and implementation phases.

6.1.1 Identify and Analyze Potential Stakeholders to Understand their Interest and Needs

Each stakeholders group plays a distinct role in the planning and implementation of the GSEEP. A comprehensive participatory consultation process will be an integral part of the Project and undertaken at the start of subproject planning and design to identify all potential project stakeholders along with their specific interests and needs. Stakeholders' identification, consultation and analysis will be continued throughout the project cycle and remain dynamic. The relevant types of stakeholders are the following:

1. Users and beneficiaries of the GSEEP;
2. People likely to be adversely affected by the GSEEP investments, directly or indirectly;;
3. Poor and vulnerable groups, women groups, and professional/occupational groups;
4. Government agencies, and government officials at national, regional, and ward level; and
5. National and international non-government organizations and donor agencies, community based organizations and community leaders.

6.1.2 Engage Stakeholders Systematically Throughout the Design and Implementation Stages

Communication and consultations should include, but not limited to, the identification and record of the following:

1. Identification of stakeholder groups to be engaged in participatory processes;
2. Specific decisions being made through participation, and consultation;
3. Anticipated roles and interests of stakeholder engagement at each stage of the project cycle;
4. How will participation be linked to social and gender strategy, management plans, resettlement planning and other National/Bank and safeguard requirements;
5. How will participation be used during implementation;
6. What participation methods will be used, including timeline, sequence and roles and responsibilities for participatory activities

Important aspects of the communication strategy include communication objectives; challenges and obstacles to achieving these objectives; target audiences; nature of communication messages; communication channels; and aspects required for successful implementation of the strategy such as timelines, responsibilities and resources.

All communication products targeting communities and their representatives including civil society groups and ward officials should be available in languages appropriate and understandable by the target audience.

6.1.3 Inform Stakeholders and Accountability Mechanism

Participation is central to the safeguard policy statements and will be facilitated, as and if required, in the project sites by PMU. Specific participation requirements related to the IPs such as broad-base indigenous consent (OP 4.10) need to be observed. Participation needs to be gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups.

6.2 Present Status of Consultations Completed at GSEEP

6.2.1 Consultations during Prefeasibility Study and Preparation of ESMF

Consultations with key stakeholders have been an integral part of the ESMF preparation. During the preparation of ESMF, a series of consultations was held at the candidate sites. The details are as follows:

GSEEP Site Identifier	Location	Date of Consultation
Pharping Powerhouse	Setidevi VDC ward no 6,4,5; Kathmandu	25/02/2014
Kulekhani 2 Powerhouse	Bhainse VDC ward no.3 Makwanpur	2/04/2014
Kulekhani 1 Reservoir area	Markhu VDC ward no 8 ; Makwanpur	2/04/2014
Kulekhani 1B, Reservoir Area	Markhu VDC Ward no 8; Makwanpur	3/04/2014
Debighat	Charghare VDC ward no.2 ; Nuwakot	5/04/2014
Panauti	Panauti municipality ward no 12, Kavre	24/03/2014
Panauti 2	Panauti Municipality ward no 12, Kavre	23/03/2014
Sundarijal	Sundarijal VDC ward no 9 ; Kathmandu	25/02/2014
Sunkoshi 1	Pangretar VDC ward no-5, Sindhupalanchok	27/03/2014
Sunkoshi 2	Mangka VDC ward no. 6 Sindhupalanchok	27/03/2014
Trishuli	Bidur Municipality ward no 10, Nuwakot	5/04/2014

The list of participants and outcomes of above consultation meetings are elaborated in Candidate site level baseline database in ***Annex 1*** of this ESMF. Such type of consultations, workshops, and interactions shall be continued during the GSEEP implementation cycle. This type of consultations will be the forum for sharing information about the project's objectives, scope, alternative design options, and stakeholders' perspectives regarding GSEEP.

6.2.2 Modes of Future Consultations

A range of formal and informal consultative methods will be carried out for component 1 and 2GSEEP investments including, but not limited to: focus group discussions (FGDs), public meetings, community discussions, and in-depth and key informant interviews; in addition to the socio-economic surveys required as part of the project M&E framework. Consultations will be held with special emphasis on vulnerable groups. Encouraging public participation in consultations informs the public and serves as a venue for the public to express their opinion on priorities which the Project should address.

The key stakeholders to be consulted during GSEEP investments, RP/IP&VCDP implementation, and program implementation include:

1. all Affected Persons (APs,) including vulnerable households (AdivashiJanajati and disadvantageous groups);
2. project beneficiaries;
3. political party representatives, community leaders, and representatives of community based organizations; representatives from recipient wards
4. local NGOs;
5. Officials of NEA and relevant government agency representatives.

In the local cultural and social set up women do not play an active part in decision-making regarding energy services and their standards, although women with relatively higher awareness level (e.g., social mobilizers, GoN employees, health workers, teachers, etc.) manage to express their concerns. Ideally separate meetings will be held for women.

The PMU will ensure that views of stakeholders, particularly those who are vulnerable, related to the project are looked into and addressed. The PMU will ensure that stakeholders consulted are informed of the outcome of the decision-making process, and will confirm how their views were incorporated.

6.3 Information Disclosure and Dissemination

This ESMF will be made available in Nepali language to GSEEP component 1 and 2 candidate sites. Copies of these documents will be provided to the stakeholders upon their request and payment of minimum charge for producing the document... The draft and final ESMF will be disclosed in the websites of NEA and made available to concerned DDC/VDCs/Municipality. Information dissemination and consultation will continue throughout program implementation.

For component 1 and 2 GSEEP investments, information will be disseminated to local candidate sites at various stages. In the initial stage, the NEA will be responsible for informing potential candidate sites and the general public of the project about the components of the project through leaflets and publication in local media outlets and newspapers. The PMU will conduct consultations and disseminate information to all stakeholders during these initial stages to create awareness of the project.

CHAPTER VII: GRIEVANCE REDRESS MECHANISM

Through a participatory process, grievances are expected to be minimized. However, it is necessary to establish an effective grievance redress mechanism to address complaints/grievances that may arise related to the project in general including but not limited to environmental and social issues. Any grievances and objections will be referred to the project Grievances Redress Committee (GRC).

The structure of GRC shall be as follows:

1. Project Manager, PMU; Chairperson of GRC
2. Candidate Site manager: Member secretary of GRC
3. Representative from candidate site , member of GRC
4. Representative from VDC/Municipality of the candidate project site, member of GRC

The GRC needs to be established as soon as the Project is effective. A complaint cell will be established under the site management office and at central PMU office to collect complaints and transmit them to the GRC. The affected persons/communities can register their grievances through multiple ways including locked complaint boxes at the site project office or at central PMU office that can only be opened by a designated person, an email address, a designated telephone number, and submission of complaints in the VDCs etc. Any affected family or person can approach the GRC directly regarding environmental and social issues including temporary impacts and impacts during construction. Handouts providing details of - grievance filing and redressing mechanism will be distributed through the candidate project office. All cases will be registered, categorized and prioritized by the complaint cell. The GRC will meet in a monthly basis to discuss the petitions submitted by the people/community. If any member (including PMU manager) is concerned, then the grievances will be forwarded to the NEA CEO for needed action. The GRC will be regularly supervised by the project, including reviews of documentation.

GRC will have its own bye-laws.

The functions of the GRC will include: (i) to redress grievances of project affected persons (PAPs) in all respects; (ii) rehabilitation and resettlement assistance and related activities; (iii) GRC will only deal/hear the issues related to R&R and individual grievances; (iv) GRC will give its decision/verdict within 15 days after hearing the aggrieved PAPs; (v) final verdict of the GRC will be given by the Chairman/Head of GRC in consultation with other members of the GRC and will be binding to all other members.

CHAPTER VIII: MONITORING AND EVALUATION

8.1 Monitoring and Evaluation

A Monitoring & Evaluation (M&E) system will be established for the project, and safeguard compliance will be integral part of the project M&E. Both an internal and periodic external monitoring is proposed to ensure ESMF implementation. Internal monitoring will be carried out by the candidate site Management Office regularly and periodically by central PMU office, focusing on outcomes, outputs and implementation progress for each GSEEP candidate sites and components. The candidate site management office will submit to central PMU office NEA and World Bank regular bimonthly (once in two months) reports during implementation.

Similarly, periodic external monitoring will be carried out by independent consultant or agency using quantitative and qualitative methods and review of information and site visit.. The ESMF evaluation will be mid-term and end term and both have to be third party evaluation.

The table showing indicators, methods, and responsibilities for social and environmental safeguard monitoring in GSEEP is highlighted in ***Table 23***.

Table 23: Indicators, Methods, and Responsibilities for Social and Environmental Safeguard Monitoring

Indicators	Methods	Responsibility
Number of land and property owners affected by subprojects	Review report, on the group field verification	Candidate site Management Office
Adherence to ESMF requirements including number of screening carried out for subproject selection	Review of report, direct observation	Candidate site Management Office
Adherence to mitigation measures (social and environmental) during planning and design (preparation of documents)	Review of report, field verification	Candidate site Management Office
ESMF requirements incorporated in tender and bidding documents as needed	Review of tender/contract document	PMU/ Consultant
No. of complaints filed and grievances handled/ managed	Review periodic reports	PMU/ Consultant
Mitigation measures deployed to address the adverse impacts and enhance beneficial impacts including compensation payment, R&R assistances, skill training and livelihood restoration of APs	Review periodic reports, site visit and consultations	PMU/ Consultant
Use of internal and external/ independent experts/ agency for monitoring and reporting	Review of contract documents and published/ unpublished reports	PMU/ Consultant

Responsibility of Monitoring: The environmental and social expert of PMU is responsible for central level periodic internal monitoring of ESMF. The mid-term and end term monitoring shall be done by external experts.

CHAPTER IX: CAPACITY BUILDING

NEA has its own Environmental and Social Studies Department (ESSD) and has experience with the implementation of World Bank-funded projects. However, due to large numbers of sub-projects within NEA, ESSD often falls short of required human resource capacity to design and implement ESMF. It is therefore, the ESMF has included capacity strengthening measures to the members of PMU and Manager of Candidate Site as installing a solar farm is a new intervention for NEA.

9.1 Training

Training is an important component for developing capacities. Appropriate and timely training to the officials with regard to various issues can bring a positive change in the functioning of the staff. Apart from training in generic areas such as human resource management, information management, government functionaries require training in handling certain specialized tasks pertaining to environmental and social issues. The Project's consultant will identify the training need assessment for PMU and staff of Candidate Sites and suggest the training packages including their modality of operation.

Potential training areas are:

1. General Introduction to EA and adverse social and environmental impacts;
2. Orientations on ESMF and awareness raising about Project and management/ mitigation of impacts;
3. Orientations on legal requirements including grievance filing by APs;
4. Preparing EMPs/Social Action Plans through participatory approach;
5. Hazardous waste management, including handling, storage and disposal, and
6. Construction related hazards in GSEEP and related occupational and safety issues and their management.

9.2 Training on Preparing Communication Strategies

A well-developed communication strategy needs to be in place to realize better results and outcomes with effective implementation of the project activities. The PMU will have to develop and effectively implement their own consultation and communication strategy. Successful implementation of GSEEP components would depend, to a large extent, on the ability to maintain close contact with the APs, communities and other stakeholders in the candidate project sites. For this purpose, the PMU central office and site office needs to develop consultation and communication strategies and materials to help improve better communication and understanding of social problems, awareness raising about project impacts and, , effective conflict resolution and grievance redressing. Training modules may be developed to help PMU central and site office draft and implement appropriate consultation strategies. Project's Experts will assist the PMU in preparing and imparting training.

9.3 Information Dissemination and ESMF Trainings

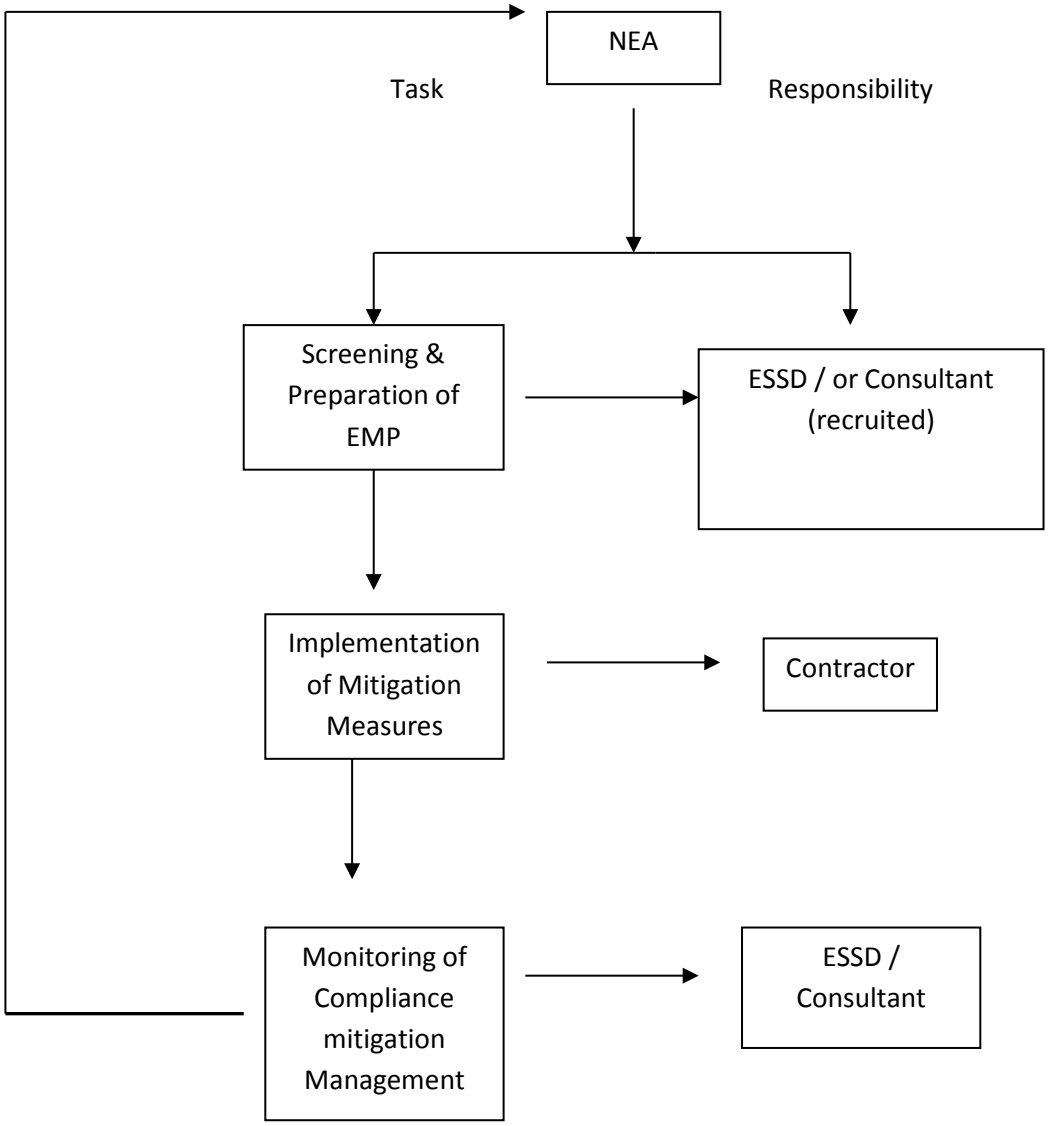
Prior the beginning of the work, ESSD/NEA will develop an ESMF information packages and disseminated in the stakeholders of project sites. The packages include the ESMF requirements, roles and responsibilities of implementing agencies, contractors. The ESMF training will be provided to ESSD/NEA staff and contractors prior the beginning of the construction. The details of dissemination and trainings are highlighted below (***Table 24***):

Table 24: ESMF Training Package and Orientation Training Responsibility and Costs

S.N	Particulars	No of training	Responsibility	Tentative Cost	Remarks
1	ESMF information package preparation and information dissemination	10	ESSD/or consultant	100000.00 100000.00/training	
2	ESMF orientation training	2 nos	ESSD/or consultant	300000.00 (Rs 150000.00 each training)	Participants includes site mangers and contract's representative

9.4 Institutional Arrangement for ESMF Implementation

Envisaged institutional arrangements for ESMF implementation is presented in the flow diagram below.



Annex 1: Candidate site level Baseline Environment

Devighat

Site location

The proposed solar power farm at Devighat is located in ward no 2 of charghare VDC of Nuwakot district (Figure 1, 2 and 3).

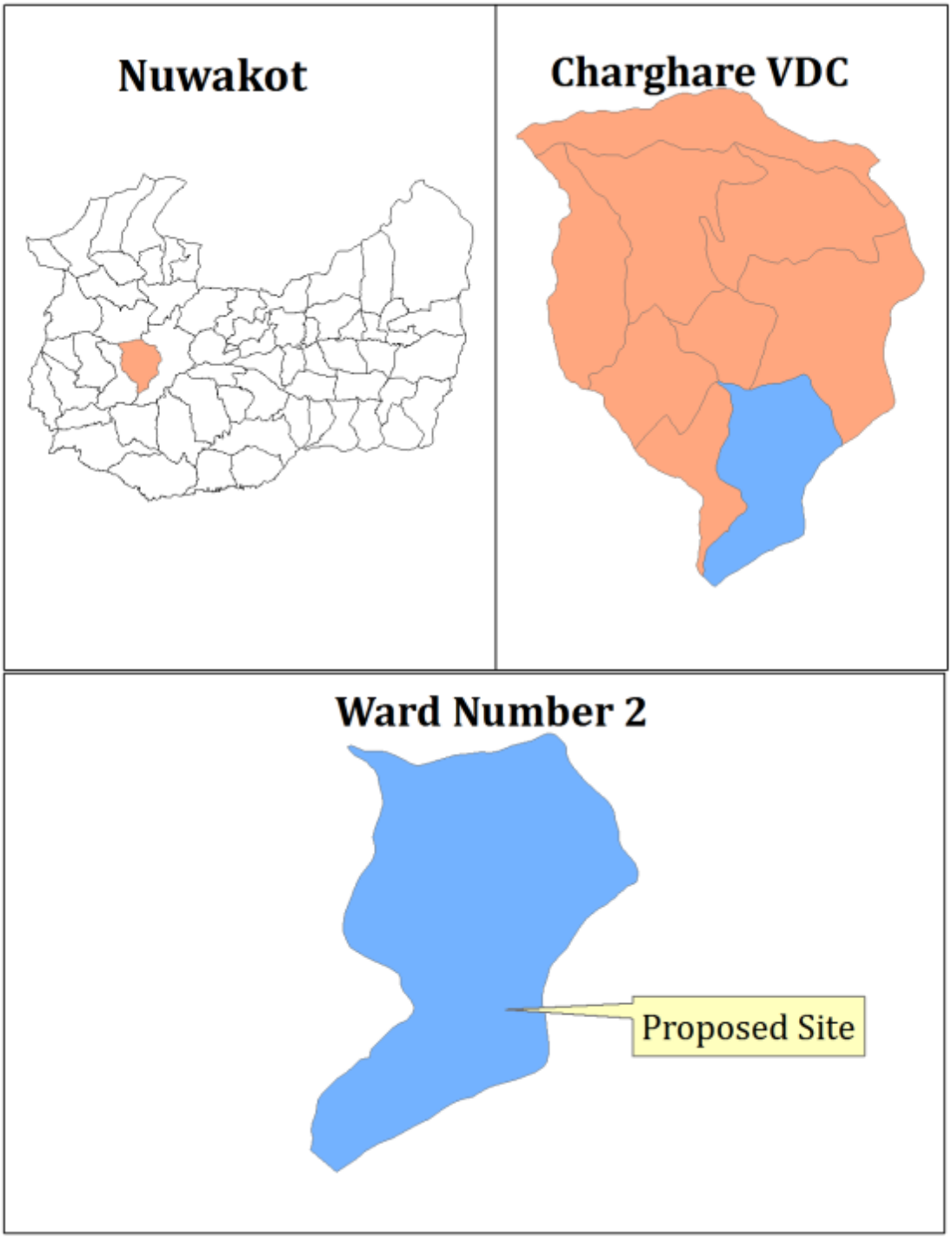


Fig 1: Location Map of Project Site.

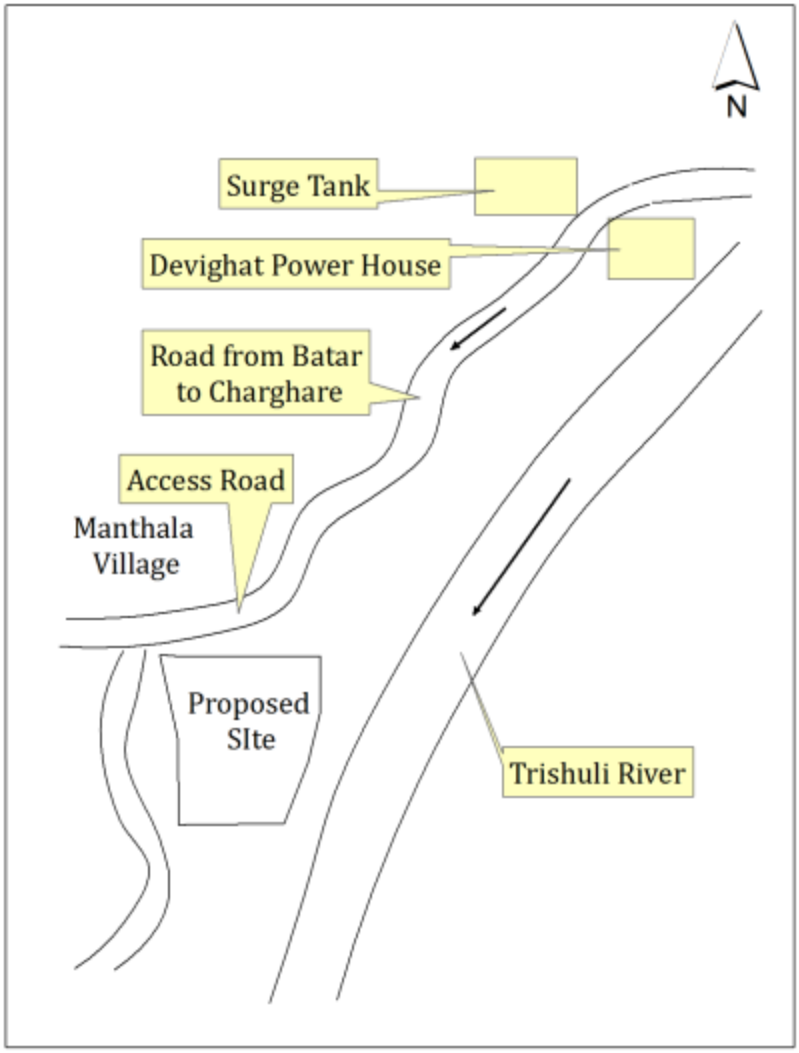


Fig 2: sketch map of project site showing access road.

Fig 2: Google Map of Project Site

The site is within distance of 63 km from Kathmandu and located on the south facing slope at an elevation of 496 mamsl. The site is easily accessible through black top motorable road up to Trishuli and by gravel access road to the site. The proposed site is 1Km west to the existing Devighat Powerhouse along the Trishuli river. The general view on four directions from **GPS point $22^0$32'52.1 N", $85^0$7'27.6"E** is as under:

Figure 4: Facing North

Figure 5: Facing East

Figure 6: Facing West

Figure 7: Facing South

Picture to four direction of project site standing at GPS point $22^0$32'52.1 N", $85^0$7'27.6"E)

1. Physical environment

Land use

The propose site is on land of NEA which is under agriculture practice by local people through encroachment. The surrounding of the project site have complex physical environment. The northern and western sides of the site have agricultural land with scattered settlement. The western side is marked by natural drainage with some tall trees t. The eastern and southern side of project is steep slope with some bushy vegetation and trees (Fig 8).

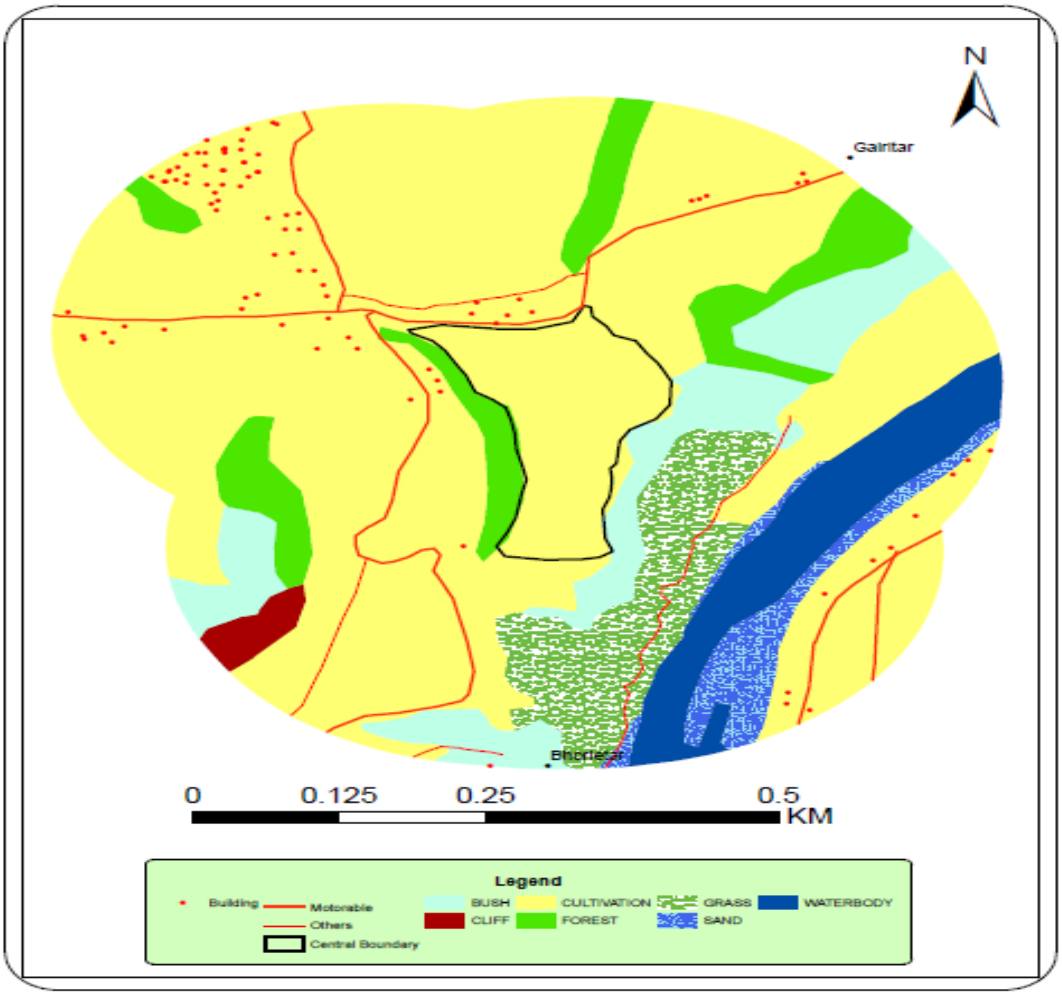


Figure 8: Land use map around the project site

Built structure

There is no built structure within the site. It is a fellow land of NEA but encroached by local people for agriculture.Two electric poles used for distribution of electricity to the locality are within the project site. The GPS location of individual pole is given below:

	
Pole no 1	**. Pole no 2**
GPS coordinate: 27˚52'56.3'' N 85˚7'29.6'' E Direction: Facing south	GPS coordinate: 27˚52' 57.9'' N 85˚07'31.2'' E Direction: Facing west

(Fig 9: poles in the project site)

Morphology

The proposed project site is gently sloping land with angle about 15^0. The surrounding environment is complex morphologically. The south and south east side of the project is comprised of steep slope with slope angle above 60^o. This steep slope extends up to the bank of the Trishuli River. The south east side shows toppling type landslide, eroding project site every year. The east side is a terrace break 15 to 20 m height and slopes at angle 45^0. The northern and western side is flat agriculture land with gentle slope of about 15^0. The agricultural land on the western side is disconnected to the project site by gully with tall trees. The Length of the site from different direction is given below:

Table 1. Length of Site

N/S Eastern Section	95.5m
N/W Western Section	239.5m
E/W Northern Section	95.5m
E/W Southern Section	178.9m

Approach Road

The project site is connected by road network. It is at distance of 63 Km from Kathmandu including black top main road and 3 km gravel access road. The condition of access road is shown in the photo below.

(Fig 10: access road to the project site)

Erosion type

Sheet, rill and gully erosion are common in the project site because of slopping land and erosional soil. The south-east boarder of the site is prone to landslide as a result the site is losing considerable area annually.

Fig 11: landslide on the eastern corner of the site

Direction: Facing south

Fig 12: the gully form within the site

Direction: Facing East

The morphologically the periphery of the site is complex. Rill and gullies are distinct erosional features in the periphery as it is dominated by steep slope and soft soil as that of the project site. The steep slope of eastern and southern side is prone to landslide.

Drainage

Trishuli is the nearest water body of the project site which receives natural drainage and runoff of the project site and surrounding area. The run off of the project site drained into Trishuli on the southern side through gully. Gully in the western boarder of the site is the major drainage of project. The gullies are wide up to 12 m.

(Fig 13: natural drainage in the western side of project)

The project site is on the elevated land located at the base of a hill and shows no possibility of flooding. The site is sloping land and chance of water logging is very low as the rain water is drained directly by the gullies to Tishuli River. The top soil of the project site is a limonitic red earth.

Flood

The site lies above the flood plain. Potential of water logging even in the monsoon season is least.

Climate

Climate of the solar farm site is sub-tropical. The region is moderately cold in winter (December to February) whereas the summers are humid and hot (April to may). Precipitation in the area is characterized by low rainfall in winter and long and heavy rainfall in monsoon (June to September). The wind is calm in winter and high in summer (April and may). The general wind direction is west to east (winter) east to west (monsoon). The sunshine hour on the site is 9:30 hours for winter and 13 hrs in summer.

2. Biological environment.

The site lies outside the National Park and conservation Area. There are no natural forest within the solar farm site.

Flora

A major part of the project site is a fallow land with no standing trees A part of the land is under agricultural practice and has few tree species within the site.

(Fig 11: Fellow land in project site)

Six species of plants such as sal, aap, khanayo, katahar, jamun and bar hayeru are identified within the project site. The details of the tree are given below.

S.N.	Local Name	Scientific Name	DBH (cm)	Height (M)	GPS co-ordinator
1	Jamun	*Syzygium cumini*	32	12	N27^{0}52'58.7",E85^{0}7'31.6".
2	khayer	*Acacia catechu*	38	11	N27^{0}52'59.1", E85^{0}7'31.6"
3	Pipal	*Ficus religiosa*	28	8	N27^{0}52'59.4', E85^{0}7'31.7"
4	Katahar	*Artocarpus heterophyllus*	72	17	N27^{0}53'5'', E85^{0}7'27.2"
5	Sal	*Shorea robusta*	39	17	N27^{0}53'01.06'', E85^{0}7'25.7"
5	Sal	*Shorea robusta*	38	16	N27^{0}53'01.06'', E85^{0}7'25.7"
6	Sal	*Shorea robusta*	40	20	N27^{0}53'01.06'', E85^{0}7'25.7"
7	Aap	*Mangifera indica*	42	21	N27^{0}53'01.06'', E85^{0}7'25.7"
8	Sal	*Shorea robusta*	43	14	N27^{0}53'01.01'', E85^{0}7'25.1"

Fauna

The project site is a degraded area with no suitable habitat for terrestrial wildlife. It also does not fall in route of migratory animal. Some occasional mammalian wildlife reported in the periphery of the site are. Leopard (*Panthera pardus)*, jackal (*Canis aureus)*, wild cat (*Felis chaus*). Crow, owl, eagle, sparrow, parrot, dove and vulture (*Neophron Percnopterus)* are common birds in the project area. Lizard is also common in the region.

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species in the project vicinity areas the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

List of Endangered/Threatened/Rare/Indigenous Species

SN	Species	Threat Category

	Common name	Scientific name	GoN	IUCN	CITEs
A	**Floral Species**				
1	Sal tree	*Shorea rubsta*	Protected	-	-
2	Khayer	*Acacia catechu*	Protected		
B	**Faunal Species**				
1	Chituwa	*Panthera pardus*			I
2	Jackal	*Canis aureus*			III
c	**Aves species**				
1	Egyptian vulture	*Neophron Percnopterus*			II

Note:
IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GOV Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

3. Socio-economic and cultural environment

Manthala and Vultar are two settlement close to project periphery. Manthala was dominated by Brahmin whereas Vultar by Rai ethnic communities. Agriculture is main occupation of local people. The socio-economic status of the nearby settlement is as given below:

SN	Name of the VDC	Ward No of the Site	Name of the Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Charghare	2	Manthala	25m	Brahmin	56	178	178	90%	10%
2	Charghare	2	Vultar	2oom	Rai	15	32	34	95%	5%

Five Rai family of Vultar village have been practicing agriculture on the project site. Maize and Til are common agricultural product grown in the project site.

Site Ownership

Nepal Electricity Authority (NEA) is the owner of the land of the proposed project site. The site has been encroached by local people for farming. Project development at the site is potential to bring economic losses to the people encroaching the land and could be a subject of conflict.

Mahadevsthan temple on the northern side of the project site at a distance of 500m and is the only religious site in the surrounding and is not affected by the project.

Public consultation

District: Nuwakot
Name of VDC: Charghare
Date: 5/04/2014
Number of participant: 5

- The proposed site is the sole property of Nepal Electricity Authority. However, the land is being used by the local people for agricultural purpose. Project development, thus, is likely to bring some conflict during the time of installation of solar power farm.

List of the consulted person during field visit

S.N.	Name of consult person	Contact person	Remarks
1	Shyam rimal	9841833651	
2	Keshab rimal	9841 546784	
3	Narayan lamsal	9841642672	
4	Shiva raj panthi	9841658346	
5	Bishnu chalise	9841262483	

Pharping Powerhouse

Site location and Accessibility

Nepal's first and Asia's second hydropower plant Chandrajyoti Jalvidyut, the project site, is located in the southern part of the Kathmandu valley within the Kathmandu district at ward no. 4, 5, and 6 of Setidevi VDC. The site is located at the uphill side of powerhouse area within the administrative boundary of Setidevi VDC - 5 facing south-east direction adjacent to the Bagmati River. Setidevi VDC is bordered by Chalnakhel VDC to north, Dakshinkali VDC to South, Seshnarayan VDC to West and Bugmati VDC of Lalitpur district to East.

Main Entrance to Chandrajyoti Jalvidhyut

The proposed site can be accessed from the Balkhu Chowk to the Bhanjyang area along the blacktopped Dakshinkali road which is about 8 km. The Dakshinkali road bifurcates at Bhanjyang market to left leading to the power house area. The road is about 5 km of which first 1km is blacktopped and remaining portions is graveled and dusty. It runs along the agriculture land, settlement, small hillocks and finally leads to the main entrance of Chandrajyoti Jalvidyut Centenary Gate. The site is right to the uphill side and entrance is the Centenary gate. The location of the proposed site is presented in Figure 1.

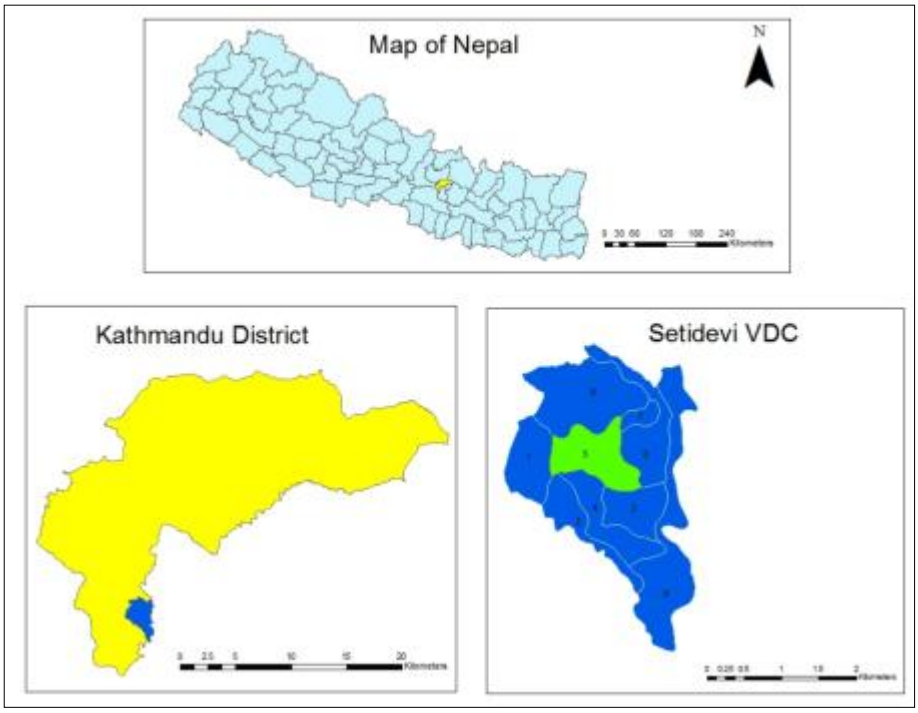


Figure 1: Location Map of Proposed Site

Physical Environment

Land Use

The proposed site is an agricultural land currently left barren with grasses covering the majority portion of land (Figure 2). The northern and north-eastern part has some trees. As per discussions with the NEA officials, the northwestern part is encroached and the land is currently under wheat and mustard crop. At the northern boundary, a cowshed is built encroaching the NEA land.

Photo 1 Proposed site *(Facing North)*

Co-ordinates: 27º36'44.4"N 85º17'17.9"E Altitude: 1285m

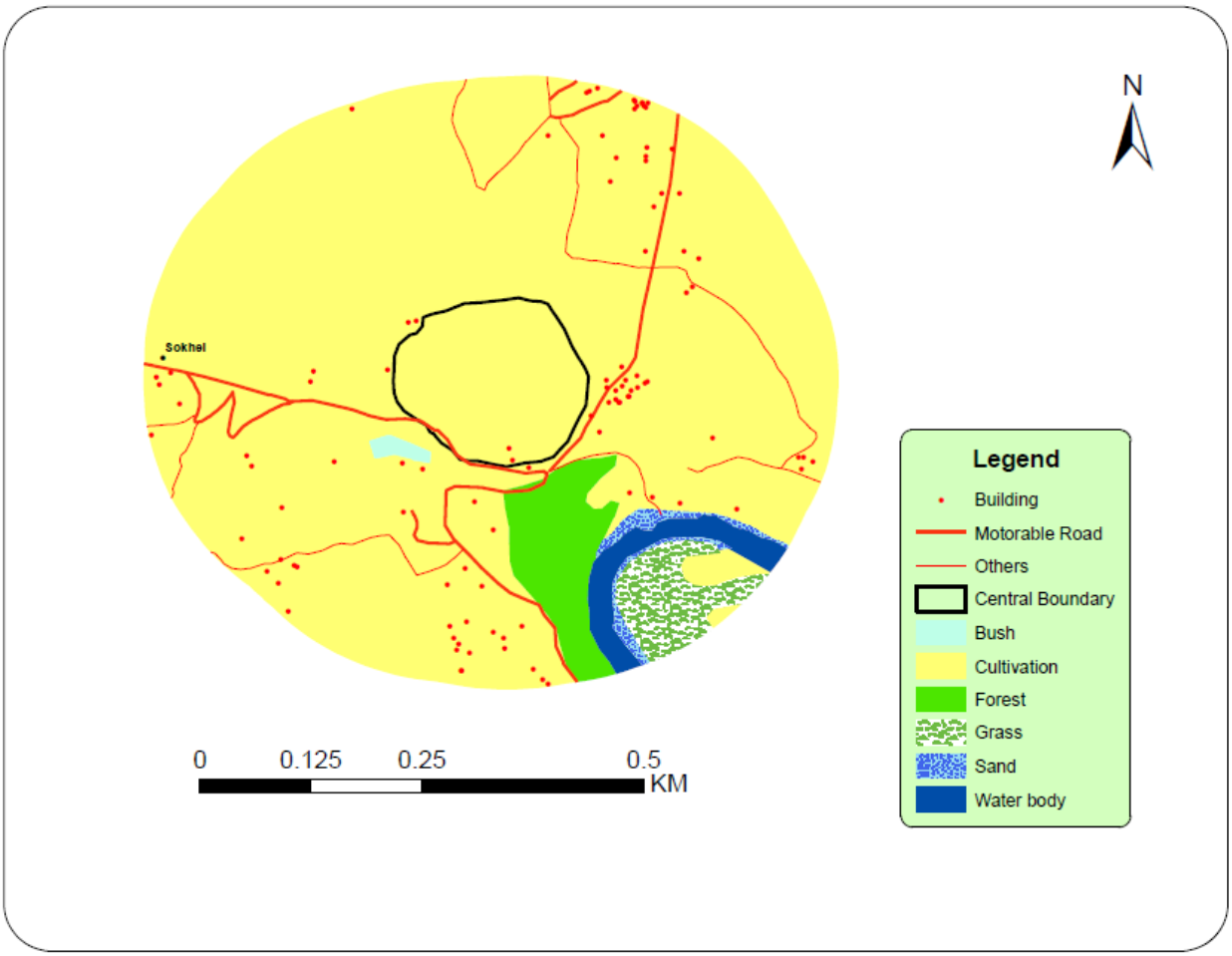


Figure 2. Land use map around site

Built structures

There is one cowshed on the northern boundary at the upper side of the proposed site. The structure is about 10*4m.

Photo 2: Cowshed at the upper end of the site *(Facing West)*

Co-ordinates: 27º36'51.49"N 85º17'17.60"E Altitude: 1305 m

The proposed site is represented by slopping terraces throughout. As protection measure to the terraces retaining walls were built at different places within the site. The retaining walls are of stone and masonry. There are 14 stone masonry retaining walls. The details are presented below:

Table1: Details of Retaining Walls within the Site

SN	Number of walls	Length (m)	Height (m)
1	1	25	1.5
2	1	15	1.5
3	1	12	1.5
4	4	6	1.5
5	2	8	1.5
6	2	3	1.5
7	2	4	1.5
8	1	5	1.5
Total	**14**		

Within the 250 m radius at **eastern boundary** side the land use is dominated by agricultural land with some built structures. There are 7 residential buildings, 1 temple, 1 public tap stand, concrete storm water drain and pump station of KUKL water supply outside the site boundary.

Outside the site boundary on the southern side, there are 3 NEA owned structures, one of them is powerhouse right at the site boundary. Besides there are 3 residential buildings outside the southern boundary of which 2 are built on encroached land and one is in private land. The other built structures on the southern side within 250 m radius are memorial tower and Buddhist temple. At the south-eastern corner of the site, on the north facing slope is forest land use dominated by the Pine and Uttis tress. Total number of the trees accounted is 300 and were planted in 2058 B.S.

Within the radius of 250 m from the site boundary on the **western** and **northern** side the dominant land use is agriculture.

Length of the Site

Length from E/W in Northern side of the site is 220 m

Length from E/W in Southern side of the site is 190 m

Length from N/S in Western side of the site is 145 m

Length from N/S in Eastern side of the site is 80 m

Nearest settlement/other land marks

Northern side: Chalnakhel VDC, 3 kM

Southern side: Dakshinkali VDC, 2 km

Eastern side: Powerhouse area,

Western Side; Seshnarayan VDC, 5 kM (Reseroir of hydropower)

Approach Road

There are 3 access road to the site. One from Bhanjyang area, the road which bifurcates at the Dakshinkali road and is about 5 km and takes 50 minutes walk. The second road is from Dakshinkali road through dam site which is about 2 km and takes about 20 minutes. The third road is from Dakshinakali which is about 10 km and takes 2 hour walk. All the access road leading to the powerhouse area are graveled and partially earthen roads.

Photo 3: Access from Reservior Area From Dakshinkali Road *(Facing West)*

Photo 4: Access from Dakshinkali (*Facing East)*

Co-ordinates: 27º36'44.4"N 85º17'17.9"E Altitude:1285m

Photo 5: Access from Bhanjyang (*Facing East)*

Co-ordinates: 27º36'44.4"N 85º17'17.9"E Altitude:1285m

Morphological Conditions

The site is slopping terrain of gradient approximately 20^{o}. The area within 250 m radius also represented by sloppy terraces terrace land on all sides.

Erosion

The proposed site is devoid of erosion and landslides. Retaining walls and drainages developed at the toe slope and western boundary of the site makes the site safer from landslide. The small drainage trenches within the site has made the site well drained.

Landslides and erosion are not observed within the 250 m radius from the boundary of the site. Near the Bagmati River the toe cutting action of river at the time of higher discharge during monsoon season is observed. The Bagmati River is the boundary between the district of Lalitpur and Kathmandu.

Drainage Characteristics

Water logging phenomenon can be barely expected within the site as the proposed site locates high above the flood plain of Bagmati River. The natural drainages at the site leads the surface runoff to the downhill side to the Bagmati river to the east about 300 m from the proposed site.

Ground Geology

The ground geology of the area is represented by the lacustrine quaternary deposit of the Kathmandu valley.

Climate

The climate of the area is subtropical with distinct four seasons .

Spring (between March – May): The temperature is mildly warm to moderate in the area and is characterized by flowering of vegetation with various colors and beauty.

Summer (between June – August): The weather is hot and rainy. It rains almost everyday with occasional thunderstorms in the evening.

Autumn (between September – November): Pleasant time during day but feeling cold at morning and night time but not chilling.

Winter (between December – February): The weather is cool and the sky is clear with occasional foggy and misty mornings.The morning and night is cold and chilly and the days are warm and sunny.

Pollution Sources:

Winter season was usually foggy and misty in the morning. During summer the entire area is covered by haze. Nearest air polluting sources are 2 brick kilns close to the area. One of the brick klin is within the 400 m from the north-eastern boundary of the site (Photo 6) and other is in Bugmati area which is about 1 km aerial distance on the eastern side from the proposed site (Photo 7). According to local people, the contract of brick klin at the northern side will expire and is likely to be removed from this area.

Photo 6: Brick Klin at the North-East Boundary Site (Facing North)
Facing North Co-ordinates: 27º36'44.4"N 85º17'17.9"E
Altitude: 1285m

Photo 7:Brick Klin at Bungmati (Facing East)
Facing North Co-ordinates: 27º36'44.4"N 85º17'17.9"E
Altitude: 1285m

Biological Environment

Floral Diversity

The proposed site lies outside the national park, conservation area and ecologically sensitive area or protected area.

Vegetation within the Proposed Site

The proposed site is devoid of standing tree vegetation except at the northern side on the encroached area. The details of the trees at Northern boundary line are presented below (Table 2):

Table 2: Details of Trees at the Northern Boundary of the Proposed Site

S.N	Local Name	Scientific Name	DBH (m)	Height (m)
1	Bakaino	*Melia azederach*	25	6
2	Bakaino	*Melia azederach*	20	5.5
3	Bakaino	*Melia azederach*	15	4.5
4	Bakaino	*Melia azederach*	12	4
5	Uttis	*Alnus nepalensis*	15	5
6	Uttis	*Alnus nepalensis*	12	4
7	Uttis	*Alnus nepalensis*	10	3.5
8	Uttis	*Alnus nepalensis*	12	4.2
9	Uttis	*Alnus nepalensis*	15	5
10	Painyu	*Prunus cerasoides*	10	3
11	Aangari	*Melastoma melabathricum*	7	2.5

12	Hadibayer	*Zizyphus incurva*	18	4.5

Vegetation Outside the Site Boundary

Planted forest comprising of pinus and uttis lies some 50m on the southeastern side along the Bagmati river. Rest of the land outside the site boundary is represented by agricultural land.

Faunal Diversity

The project is devoid of habitats for wildlife as it is represented by agricultural land. In the surrounding landscape and forest areas reported diversity of faunal species is presented in Table 4 based on the outcome of public consultation.

Table 3: Presence of Faunal species in and around the Proposed Site

S.N	Local Name	Scientific Name	Remarks
	Mammals		
	Syal	*Canis aureus*	
	Rato Bandar	*Macaca mulata*	
	Nyauri Musa	*Herpestes nyula*	
	Birds		
	Sarun	*Athene brama*	
	Bhangera	*Passer domesticus*	
	Piegon	*Columbia livia*	
	Lampuchare	*Urocissa erythrorhyncha*	
	Kag	*Corvus splendens*	
	Bakulla	*Bubulus ibis*	
	Dhukur	*Streptopelia chinensis*	
	Chibe	*Dicrurus adsimilis*	
	Jureli	*Pycnonotus cafer*	
	Reptiles		

	Cheparo	*Calotes versicolor versicolor*	
	Mausuli	*Hemidactylus brokki*	

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix (Table 4)

Table 4: List of Endangered/Threatened/Rare/Indigenous Species

SN	Species		Threat Category		
	Common name	**Scientific name**	**GoN**	**IUCN**	**CITEs**
A	**Floral Species**				
B	**Faunal Species**				
1	Syal	*Canis aureus*			III

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

Socio economic and Cultural Environment

The site is free from the settlement except for a small cowshed built on the northern edge of the site. The nearest village/settlement from the site are that of ward No 4, 5 and 6 of Setidevi VDC represented by approximately 25 households comprising of Chettri, Magar and Newar ethnic communities (Table 5).

Table 5: Socio-economic information of the site

SN	Name of VDC and Ward No of the site	Name of nearby settlements	Direction and distance from site	Major ethnic / caste groups of settlements	Total HH	Population		Major Occupation %	
						Male	Female	Farmer	Others
1	Setidevi VDC,	Power House	100 m towards south	Chhetri, Magar	15	35	30	60	40

	ward number 5		from the southern border of site						
2	Setidevi VDC, ward number 4	Power House	250 m towards south west from south western corner of site	Newar	5	23	18	65	35
3	Setidevi VDC, ward number 6	Power House	250 m towards east and south from eastern and southern corner of site respectively	Chhetri	5	29	16	60	40

The nearest school from the site is Setidevi Lower Secondary School which is some 500 m far from the site in ward No 4. The nearest health facilities is Setidevi health post which is about a km far from the site.

The northern side of the site encroached by the local community. The details of the people encroaching the land are presented in Table 6. A total of 45.5 Ropani or approximately 2.1 ha of land is encroached by 19 households.

Table 6: Encroachment Details on NEA Owned Land

SN	Name	Ward	Male	Female	Total	Encroachment	Area	Occupation
1	Gokul Raut	5	3	2	5	Land	1.5 Ropani	Government / Private Employee
2	Balram Adhikari	5	1	1	2	Land	2 Ropani	Agriculture
3	Gandiv KC	5	2	2	4	Land	2 Ropani	Teacher
4	Pradhunna KC	5	2	2	4	Cow Shed	5 Ropani	Animal Farming
5	Hari Khatri	5	7	6	13	Land	2 Ropani	Government / Private Employee and Vehicle Owner
6	Ram Bahadur Raut	5	5	2	7	Land	1.5 Ropani	Government / Private Employee
7	Shri Krishna	5	2	2	4	Land	2 Ropani	Travel Agency

	Raut							
8	Bhagwati Raut	5	4	3	7	Land	2 Ropani	Agriculture
9	Lt. Bagar Singh	5	1	-	1	Land	2 Ropani	Son of Owner is not Local Residence
10	Nakul Magar	5	7	4	11	Land	1 Ropani	Government / Private Employee
11	3 Magar Brothers	6	4	2	6	Land	10 Ropani	Government / Private Employee
12	Ram Kumar Basnet	6	3	3	6	House	7 Ropani	Government Employee and Politics
13	Surje Shrestha	4	7	4	11	House and Land	1 Ropani	Government / Private Employee
14	Chakra Bahadur Shrestha	4	7	6	13	House and Land	1 Ropani	Government / Private Employee
15	Saila Shrestha	4	6	4	10	House and Land	1 Ropani	Government / Private Employee and Sports Player
16	Kaila Shrestha	4	2	2	4	House and Land	1 Ropani	Government Employee
17	Kancha Shrestha	4	3	1	4	Land	0.5 Ropani	Government Employee
18	Nani Kaji Basnet	6	7	5	11	Land and Cow Shed	1 Ropani	Government Employee
19	Shiva Basnet	6	4	2	6	Land	4 Anna	Bus Owner and Agriculture

Historical importance of site

Historically this site is significant because it is the first hydropower plant of Nepal and second in Asia. It was built in 1911 AD by Chandra Samsher, the then Rana Prime Minister of Nepal. This plant has a capacity of 500 KW and was built to electrify the palace of the Rana ruler. Today the plant is operating partially and is connected to national grid but it has more historical significance compared to its energy value. The water from the reservoir is being used for drinking purpose and partially for electricity generation. The site has buildings older than 100 years and holds archaeological significance too. Being the first hydro power plant of Nepal, which displays the glimpse of Rana time architecture, holds great historical value which if developed properly can be a decent and informative tourism site in coming days. The powerhouse and the buildings of historical and archeological significance lie outside the boundary limit of the proposed solar farm.

Public Concerns

During the field visit public consultation were performed within the 250 m boundary of site with the aim of seeking the views and suggestions of installing solar farm on the proposed site. The consulted locals were found prior informed of installing solar farm on the area. The public consultation was carried out with NEA officials, KUKL officials and local inhabitants of the periphery site. The summary of the public concerns outcome is presented below.

It is appreciated plan with innovative idea of using unused land to install solar farm to reduce overwhelming daily load shedding.

The area is not fenced so the human intervention in the area is prominent, it could be made safe for further encroachment in the area by the solar farm.

Lots of local tourist, students, family picnic, history lovers arrives this place but the lack of black topped road and information dissemination the visitors are less. So the area should be made one of the tourist destination of Kathmandu Valley.

The GoN should preferred to renovate these historical buildings of the site and promote the area for declaring historical museum.

Many people in the tea stall have the hot topic about installing solar farm on the area. Those people mostly discuss about the aesthetics degradation of the area. The major settlement is in the upper side of the site facing east which could result visual impairment. Some people has a myth about the solar farm as of radiation which can cause cancer and DNA malfunction to their off springs.

List of Participants

Name of Site: Pharping power house Date Visited: 13/11/2070

Location: Satidevi VDC

S.N.	Name	Address	Phone Number	Signature
1	Shyam Basnet	Satidevi VDC Ward-4	9841913700	
2	Nanikaji Basnet	Satidevi-4		
3	Madhusudan Basnet	Satidevi-6		
4	Thulikanchi Basnet	Satidevi-4		
5	Suryaman Shrestha	" -4		
6	Lila Acharya	" 4		
7	Kuman Moktan	" -4		
8	Kumar Acharya	" -4		
9	uddav Raut	Satidevi-3	9849392906	
10	Dinesh K.C.	-6.	9841351934	

Photographs of Public Consultation

Pictorial Highlights of the Proposed Site and Vicinity

General view of the Site

Co-ordinates: 27º36'44.4"N 85º17'17.9"E Altitude: 1285m

Facing North

Facing East

Facing North east

Structures within the NEA boundary

Co-ordinates: 27º36'41"N 85º17'19"E Altitude:1270m

Facing North-West

Facing East

Facing West

Facing South

Facing West

Facing East

27º36'41"N 85º17'19"E Altitude:1270m

27º36'40"N 85º17'20"E Altitude:1271m

Beyond 250 m From the Site

Co-ordinates: 27º36'41"N 85º17'22"E Altitude:1280m

Landslide Facing North

Cremation Site, Facing North

View of site and 250m Periphery

Co-ordinates: 27º36'41"N 85º17'22"E Altitude:1280m

Facing West

Memorial Towers on the occasion of 100 years celebration of powerhouse

Facing East

Facing North

Co-ordinates: 27º36'48"N 85º17'14"E Altitude: 1232m

Facing West

Facing West

Co-ordinates: 27º36'51.49"N 85º17'17.60"E Altitude: 1305 m

	
Facing West	**Facing East**

Kulekhani Reservoir area 1

1 Site Location

The proposed site for the installation of solar power plant is located at Markhu VDC, Ward number 8 of Makwanpur district (Figure 1,2 and 3) Geographically the site is enclosed within $85^0$9'8.212"E; $27^0$37'1.548"N, $85^0$9'9.102"E; $27^0$37'3.454"N, $85^0$8'58.098"E; $27^0$37'14.204"N and $85^0$8'56.903"E; $27^0$37'12.095"N.

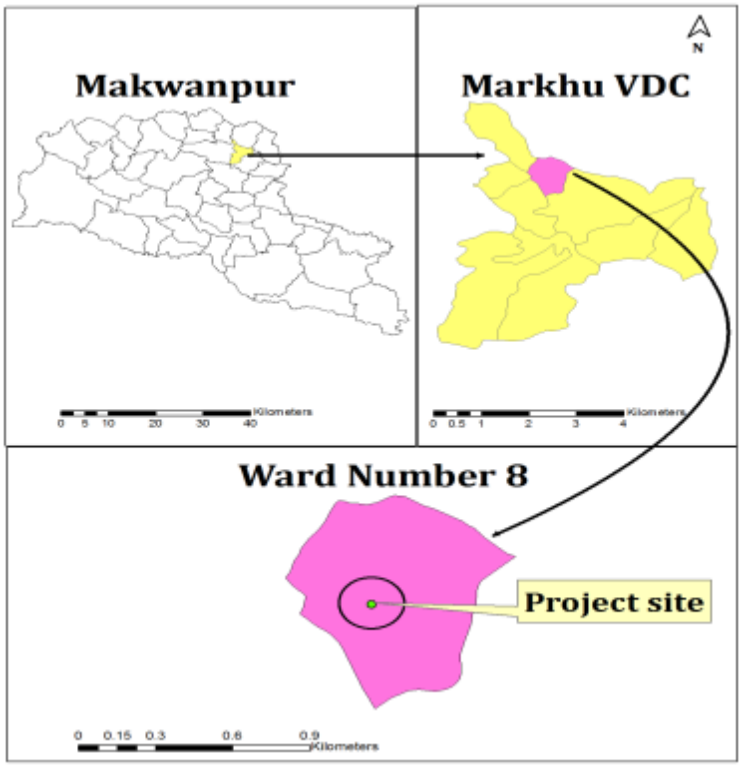


Figure 1: Location map of the site

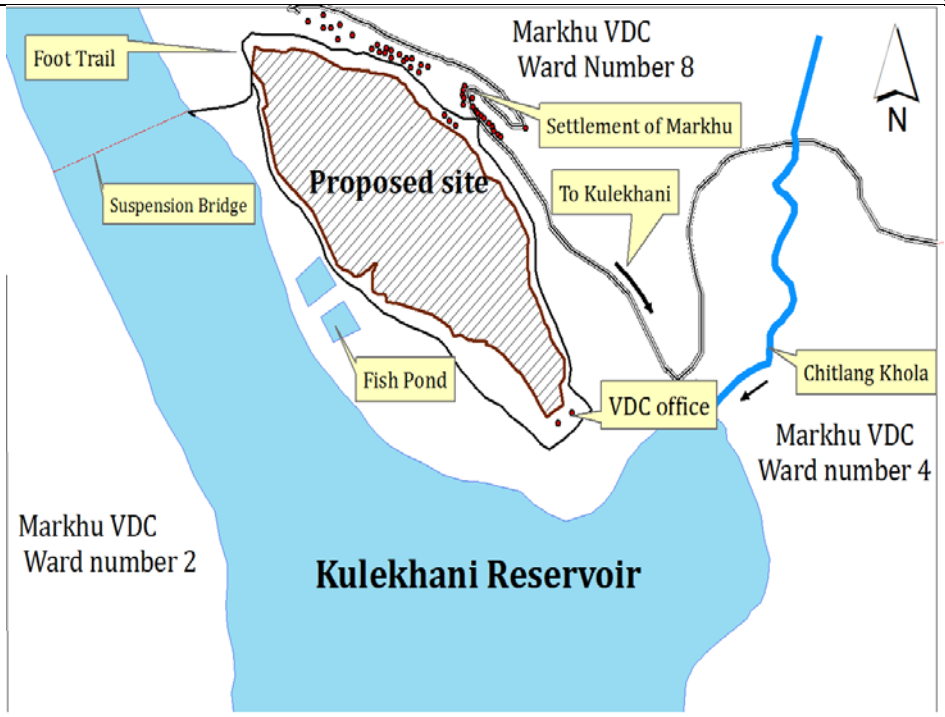


Figure 2: Sketch map of the site

Figure 3: Google image of the site

The general view of the site from different direction taken from $27^0$37'03.42"N and $85^0$09'07.53"E is presented below:

Figure 4.Facing North

Figure 5.Facing East

Figure 6. Facing West

Figure 7. Facing South

2 Physical Environment

Land use

Land use within the proposed site is dominated by agriculture/settlment. It is basically designated as a NEA staff colony that consists of staff quarters, NEA office, planted area with several variety of tree species, kitchen garden developed by NEA staffs and fallow land covered with grasses.

Within the 250m periphery around the site, Eastern, Western and Northern side shows settlement and agricultural land. Settlement of Markhu village is adjacent to the site in the northern face. Similarly, beyond Markhu village up the hill there is a pine dominated forest in both northern and north-eastern side. Likewise, Indrasaowar (reservoir of Kulekhani Hydropower) lies south to the site at a distance of 15m from its south and western boundary..

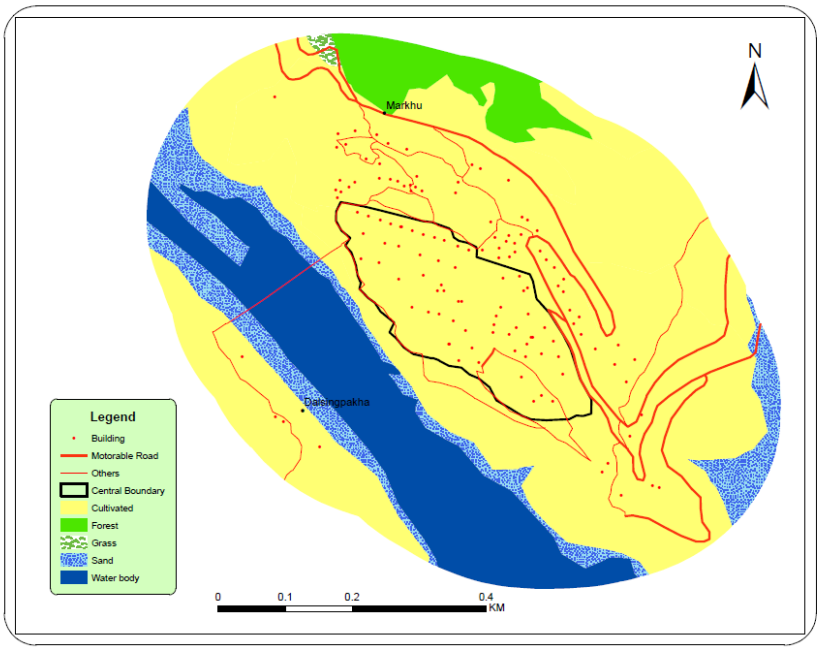


Figure 8. Land use map around the project site

Built Structures

There are altogether 46 built structures present within the site which include staff quarters, NEA office, garage, store house and guest house. Though much of the houses are used by NEA staffs as their quarter, some are still empty.

Out of total 46 houses, 43 of them have relatively equal dimension, but guest house, office and store has varying dimensions. Wall of all the houses are cemented and roofed with corrugated sheet (jasta). Similarly there are altogether 23 electrical poles with the site. Details of the built structures are presented below:

Table 1: Built structures within the site

S.N	Type	Length (m)	Breadth (m)	Area (m^2)	Number	Total Coverage (m^2)
1	Guest House	16	12	192	1	192
2	Office + store	50	12	600	2	1200
3	Resident quarters	16	10	160	43	6880
4	Garage	12	10	120	1	120
Total Coverage						8392

Figure 9: Quarters (top left), guest house (top right), office (bottom left) and garage bottom right)

The GPS locations of each of the built structures are presented in the table below:

Table 2: GPS Location of Built Structures

Structure	Latitude	Longitude
House 1	27°37'4.60"N	85° 9'6.43"E
House 2	27°37'5.47"N	85° 9'5.37"E
Office	27°37'5.26"N	85° 9'4.55"E
Store	27°37'6.53"N	85° 9'5.45"E
House 5	27°37'7.03"N	85° 9'4.73"E
House 6	27°37'6.74"N	85° 9'6.12"E
House 7	27°37'7.29"N	85° 9'5.49"E
House 8	27°37'7.69"N	85° 9'4.76"E
House 9	27°37'5.79"N	85° 9'7.08"E
House 10	27°37'6.64"N	85° 9'6.98"E
House 11	27°37'7.38"N	85° 9'6.74"E

House 12	27°37'8.07"N	85° 9'6.17"E
House 13	27°37'8.76"N	85° 9'5.57"E
House 14	27°37'9.01"N	85° 9'4.11"E
House 15	27°37'7.84"N	85° 9'3.75"E
House 16	27°37'6.28"N	85° 9'3.16"E
House 17	27°37'7.02"N	85° 9'2.80"E
House 18	27°37'7.18"N	85° 9'1.69"E
House 19	27°37'8.25"N	85° 9'1.91"E
Guest House	27°37'9.22"N	85° 9'2.09"E
Garage	27°37'9.75"N	85° 9'1.39"E
House 22	27°37'9.78"N	85° 9'1.15"E
House 23	27°37'10.50"N	85° 9'0.48"E
House 24	27°37'10.39"N	85° 8'59.36"E
House 25	27°37'11.00"N	85° 8'58.35"E
House 26	27°37'11.47"N	85° 8'57.48"E
House 27	27°37'12.38"N	85° 8'57.58"E
House 28	27°37'12.11"N	85° 8'58.58"E
House 29	27°37'11.74"N	85° 8'59.56"E
House 30	27°37'11.55"N	85° 9'0.24"E
House 31	27°37'11.10"N	85° 9'1.18"E
House 32	27°37'10.92"N	85° 9'2.04"E
House 33	27°37'11.80"N	85° 9'2.52"E
House 34	27°37'11.88"N	85° 9'2.05"E
House 35	27°37'12.23"N	85° 9'1.50"E
House 36	27°37'12.29"N	85° 9'0.99"E
House 37	27°37'12.53"N	85° 9'0.46"E
House 38	27°37'12.63"N	85° 8'59.83"E
House 39	27°37'12.80"N	85° 8'59.32"E
House 40	27°37'13.08"N	85° 8'58.81"E
House 41	27°37'13.22"N	85° 8'58.31"E
House 42	27°37'13.42"N	85° 8'57.84"E

Within 250m from the site in the northern direction built structures include private houses at Markhu village, School building (Shree Saraswoti Balbodhini High School), Health Post and Temple. Similarly, there is VDC office adjacent to the eastern wall of the site. On the western side at a distance of 25m there is a suspension bridge that connects ward number 2 and 8 of Markhu VDC. Kulekhani Hydropower Reservoir is present along the western and southern side of the site.

Length of the site

Length of the site from different direction is presented in the table below:

Table 3: Length of the site from different direction

N/S Eastern Section	55m
N/S Western Section	77m
E/W Northern Section	300m
E/W Southern Section	492m

Nearest settlement/other Land Mark and Distance from Site

Northern Side: Markhu village is located in the northern side of the proposed site which is at a distance of about 20m. Similarly, other landmarks on the northern side include Natweswor Temple, Shree Saraswoti Balbodhini High School and Health Post.

Southern Side: Landmark on the southern side is the reservoir of Kulekhani Hydropower which is at a distance of about 25m from the proposed site.

Eastern Side: VDC office is situated east to the proposed site adjacent to the wall of the site.

Western Side: Suspension bridge that connects between ward number 2 and 8 of Markhu VDC is situated at about a distance of 15m from the site in the western side. Similarly, part of Markhu village is also located on the western side of the proposed site.

Approach to the Site

The site lies south to Kathmandu at about a distance of 60 km. There are two approach roads to the site, one through Pharping, Kathmandu (much section graveled) and another through Dakshinkali (black topped), both of which meet at a marketplace called Kalanki (which is about one kilometer north east from Kulekhani dam). The site is about 5 kilometers north to Kalanki along the eastern face of Kulekhani reservoir through graveled road There is well developed motorable road to the site.. Around 20m motorable graveled access road extends from main road up to the site.

Figure 10: Main road and access road

Figure 11: Access road (view from inside the site)

Morphology

Morphologically the proposed site shows gentle slope (slope angle 20^0). Several terraces like structures can be observed in the eastern and south eastern part of the site.

Around the 250m periphery on the northern side, the morphology of the land is slopping area with steep slope at the northern part which is forested area with slope angle $>40^0$. Below the forested area is a settlement (Markhu village) with relatively low slope angle (30^0). Several terraces are made throughout the village where agricultural activities are carried out. Slope that extends from north on both eastern and western part of the proposed site continues up to the Indrasarowar on the southern side of the site.

Erosion

Most prominent erosion occurring on the gentle slope includes sheet erosion. However, due to thick vegetation cover over the entire surface none of the erosional features are observed around the site.

The northern face within 250m periphery of the site is a steep slope where small rill erosion is observed. Similarly, around the agricultural land of Markhu village on east, west and northern site, sheet erosion is prevalent as no major erosion control approach has been undertaken (except terracing the land). On the southern part of the site, along the bank of reservoir, there is the possibility of bank cutting, but no such distinct features are observed, which might be possibly due to stagnant water of the reservoir.

Drainage

Though the site itself is not located on the flood plain it is very close to the bank of Indrasarowar (Reservoir of Kulekhani Hydropower). As the proposed site has been designed into several terrace like structures lower part is likely to experience water logging in the heavy monsoon. This fact can be justified by the presence of swampy condition even during spring season.

The closest waterway from the site is the Indrasarowar which is at a distance of about 75m in the eastern side and 20m in the western side and all of the rainfall occurring over the site drains down to the Indrasarowar. Though the site is located above the strong rocky foundation, river cutting is not visible.

On the northern side of the site within the distance of 250m several natural gullies are visible. All of the rainfall occurring around the 250m periphery drains down to the reservoir. Similarly, Chitlang Khola is situated within 250m on the eastern side of the site, which drains water to the Indrasarowar.

Ground Geology

Soft soil covered with grasses is present all over the site. Soil is silty followed by clay and sand. Besides, hard rocks exposed on the south western boundary of the site.

Climate

Based on the experience of local people, climate around the site is characterized by very cold winter and hot summer. During monsoon season very heavy rainfall occurs, but rainfall is occasional during winter. There is occasional wind storm during summer season while it is very calm during winter. The dominant wind direction is south to north. Average sunshine hour during winter is 9 hours; while in summer it is 11 hours.

3. Biological Environment

The proposed site for the installation of solar farm lies outside the National Park/conservation area. The site is devoid of important biodiversity. All the trees within the sites are planted trees when the colony was built.

Flora

Tree species within the site is dominated by Kainyo, followed by Kalki, Pine, Uttis, Kapur, Naspati (Pear), and Lahare peepal. Around 383 trees of different species are present within the site. The details of which are presented in the table below:

Table 4: Name of tree species occurring within the site

S.N.	Local Name	Scientific Name	Number
1	Kainyo	*Wendlandia puberula*	132
2	Kalki	*Callistemon citrinus*	112
3	salla	*Pinus ruxburghii*	18
4	Kapur	*Cinnamomum camphora*	13
5	Naspati	*Pyrus communis*	21
7	Lahare Peepal	*Populus deltoides*	7
8	Uttis	*Alnus nepalensis*	14
9	Dhupi	*Cryptomeria joponica*	66

Figure 12: Vegetation cover within site (site enclosed within black line)

Plant species outside the site include Pine (*Pinus ruxburghii*), Rhododendron, Lahare peepal, Khari, Kapur, Uttis (*Alnus nepalensis*), Naspati and Kainyo. These tree species are distributed within the premises of Indreshwor Community Forest in the north, Chitlang Khola Community Forest in the north east and Narayanthan Community Forest in the south east.

Fauna

Commonly observed animals species in the forest areas close to the site are presented in the table below:

Table 5: Reported Wildlife from the Site Surroundigs

Mammals

S.N.	Name of Species	Scientific Name
1	Deer	*Axis axis*
2	Leopard	*Panthera pardus*
3	Jackal	*Canis aureus*
4	Wild Cat	*Felis chaus*
5	Nyauli Musho	*Herpetes edwardsi*
6	Rato Badar	*Macaca mulatta*

Birds

S.N	Local Name	Scientific Name
1	Kaliz	*Catreus wallichii*
2	Crow	*Crovus splendens*
3	Dhukur	*Streptopelia chinensis*
4	Suga	*Psittacula krameri*
5	Jureli	*Pycnonotus leucogenys*
6	Nyaluli	*Megalaima australis*

7	Fiste	*Phylloscopus collybita*

Reptiles

S.N	Local Name	Scientific Name
1	Lizard	*Calotes versicolor*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species in the nearby forest areas, the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 6: List of Endangered/Threatened/Rare/Indigenous Species from Site Surroundings

SN	Species		Threat Category		
	Common name	Scientific name	GoN	IUCN	CITEs
A	**Floral Species**				
B	**Faunal Species**				
1	Jackal	*Canis aureus*			III
2	Leopard	*Panthera pardus*			I
c	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:
IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Scoio-economic and Cultural Environment

On north and north east side of the project site lies Markhu village at the ward no.8 of Markhu VDC in Makawanpur disctrict. The village is dominated by Tamang community and agriculture is the main occupation of local people. Maize and soybean are major crops grown.

Figure 13: Nearby settlement (Markhu village) to the site

The details of the socio-economic status of the project periphery are as follows;

Table 8: socio-economic status of periphery.

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Markhu	8	Markhu	Adjacent	Tamang	48	113	123	90%	10%

Land Ownership

The proposed land for the project is the property of NEA (Nepal Electricity Authority). The land is not encroached by local people and is used as residential camp by NEA staff.

Sites of Cultural Religious and Historical/archeological Significance

The project is not a site of religious or cultural significance. Nateshwor Temple adjacent to the northern side is the only religious site on the periphery of project site. Maruni nach celebrated on month of Bhadra in the Markhu village is a cultural event observed by the community in the area apart from the common Hindus festivals.

Figure 14: Natweswori temple

Saraswoti Balbodini secondary school, health post and indrasarovar fish farming association adjacent to the northern side of project site and VDC office adjacent to the eastern side are the public institution in the 250m periphery of the project.

Secondary school in the periphery

Fish farming association office

Figure 15: Public structures outside the site

Public consultation

District: Makwanpur
Name of VDC: Markhu
Date: 2/04/2014
Number of participant: 3

- The proposed site is the staff quarter of Kulekhani hydropower project. It contains 46 houses and several other infrastructures. Besides, Markhu is one of the popular tourist destinations. Thus, installation of solar panels over the entire site is likely to hamper the tourist business as it might affect the natural beauty of the area.

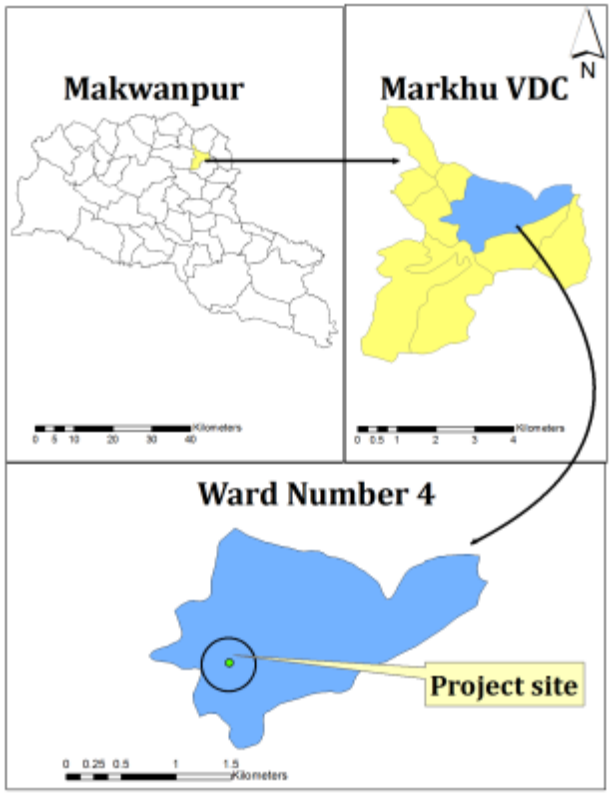
Consulted Person

S.N	Name	Number
1	Bhojraj Shrestha	9841563279
2	Ram K. Rimal	9845070907
3	Shiva Gurung	9851095575

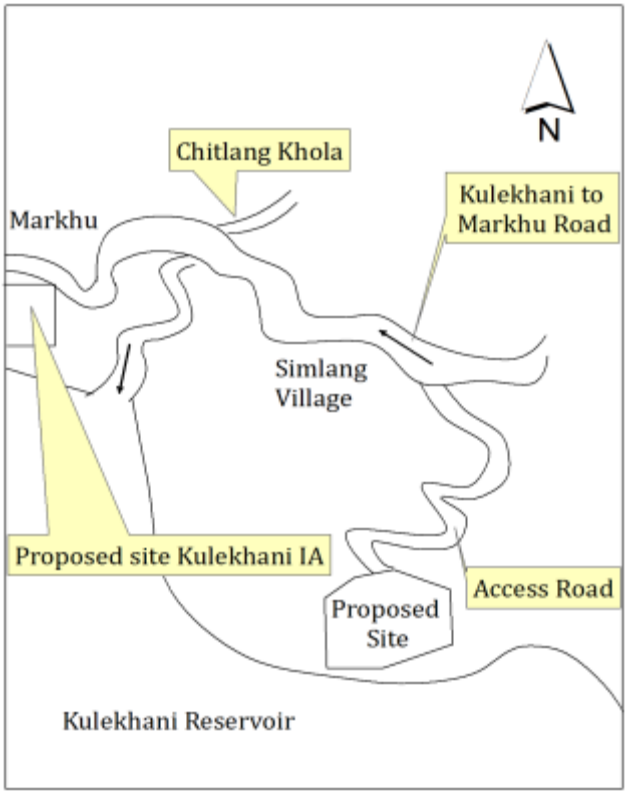
Kulekhani Reservoir area 1B

1. Site location

The proposed site for the installation of solar power plant is located at Markhu VDC, Ward number 4 of Makwanpur district (Figure 1, 2 and 3). The site lies south to Kathmandu at a distance of 60 km.. Geographically the site is enclosed within 85^0 9' 21.9"E; $27^0$36'37.7"N, $85^0$9'24.49"E; $27^0$37'39.54"N, $85^0$9'21.7"E; $27^0$36' 41.87"N and $85^0$9'18.23"E; 27^0 36'39.38"N.



(Fig 1: location map of project site)



(Fig 2: Sketch map of project site)

Fig 3:The google image of the site.

The general view on four direction from GPG point 27^0 36' 40.7'' N 85 ˚09' 23.8'' E is presented in Figure 4 to 7 below.

Figure 4. Facing North

Figure 5. Facing West

Figure 6. Facing South

Figure 7. Facing East

2. Physical environment

Land use

The proposed project site is the nursery area of Nepal Electricity Authority, used for growing tree saplings for plantation. The lower section of the area is barren with some trees.

The project site is surrounded by forest from eastern and northern side whereas reservoir of Kulekhani is within distance of 50M on the southern side. The western side consists of agricultural land within 250 m periphery with some forest patch. The road to Markhu goes through the forest from the northern side of the project site. The Simlang on the western side and bazartar on the north-west side are nearest settlements in the periphery of the project.

Built structure

A small house used for the hydrological station is the only built structure within project site. There are three houses, two on the west and one on the northern side just outside of project site boarder.

S.N	Purpose of building structure	Length (m)	Width (m)	Area	Wall Type	Roof type	GPS location
1	Hydrological station	7	4	28 m^2	Brick & cement	RCC	$27^0$36'40.7'' N $85^0$09'23.8'' E

(Fig 8: Hydro-meterological station in the project site)

There is a electric pole in the project site . The GPS co-ordinate and photos of the pole is given below;

(Fig 9: Pole in the project site at 27)

Morphology

The project site is slopping land of slope angle less tha 10^0 with some terrace development. The eastern and northern side to the project is slopping land with slope angle of about 35^0. The eastern side is terrace for cultivation. The western side have gentle slope with slope angle 20^0. The southern side of the project is reservoir of kulekhani within a distance of 20m.

(Fig 10: The general view of the project site)

Length of the site

The Length of the site from different direction is given below:

Table 2. Length of Site

N/S Eastern Section	82.3m
N/S Western Section	115m
E/W Northern Section	104m
E/W Southern Section	102m

Appraoch Road

The project site is connected with the national road network. There are two approach roads to the site, one through Pharping, Kathmandu (much section graveled) and another through Dakshinkali (black topped), both of which meet at a marketplace called Kalanki (which is about one kilometer north east from Kulekhani dam). The site is about 5 kilometers north to Kalanki along the eastern face of Kulekhani reservoir through graveled road

(Fig 11: access road to the project site facing south-west)

Erosion

The project site does not show any distinct erosional features as most of the land is covered by grasses and trees whereas sheet and rill erosion were observed in plough land. Outside the project boundary as well no distinct erosional features were observed.. Altthough the reservoir is lies close to the site on the south do not show mass wasting features.

Drainage

Natural drainage lines do not passes through the project site. The rain off from the site is drained to the indrasarowor on the southern side as sheetflow. Three gully, two on the eastern and one on the western side are the natural drainage of the project periphery that drains into indrasarowor toward south west direction.

(Fig 12: natural drainage in the north west side)

The site does not lies on any flood plain. The evidence of river cuting were not observed in the periphery despite the presence of reservoir within 20 meter and just below 15 meter vertical distance from the project boundary, this may be due to low water level in the reservoir. Project area contain soft clay soli.

Climate

The project site on the footslope of the hill at an elevation of 1670m amsl. It experience a cold and the frosty weather in winter and moderately hot and warm weather in summer. The area receive little rainfal in winter and heavy rainfal in summer especially on monsoon season. According to local people gusty winds in the early summer. The direction of wind is south to north. The sunshine hours for the site is 9 hours for winter and 11 hours for summer.

3. Biological environment

The site lies outside the boundary of national park or conservation areas recognised by the government of Nepal. The area is not important for biodiversity even locally.

Flora

There are total 45 trees or saplings of seven different species of plant within the proposed solar farm site.

Table 1: Number of plant species on site

S. N	Local Name	Scientific Name	No. of trees
1	Naspati	*Pyrus communis*	27
2	Kaiyo	*Wendlandia puberula*	5
3	Khari	*Celtis australis*	2
4	Kafal	*Myrica esculenta*	1
5	Salla	*Pinus ruxburghii*	2
6	Utis	*Alnus nepalensis*	3
7	Lahare pipal	*Populus deltoides*	2
Total			**42**

The details of individual trees are given below;

Table 2: Details of Tree.

S. N.	Name of species	DBH (cm)	Height(M)
1	Kaiyo	26	12
2	Khari	30	16
3	Khari	17	10
4	Naspati	19	17
5	Naspati	12	8
6	Naspati	10	6
7	Naspati	24	7
8	Naspati	27	12
9	Naspati	22	12
10	Naspati	24	13
11	Kaiyo	22	14
12	Kaiyo	9	8
13	Naspati	23	13
14	Naspati	27	13
15	Naspati	18	14
16	Naspati	20	12
17	Naspati	28	13
18	Naspati	23	12
19	Naspati	20	12
20	Naspati	21	12
21	Naspati	20	12
22	Naspati	17	12
23	Kaiyo	12	7
24	Naspati	21	12
25	Naspati	20	11
26	Naspati	9	10
27	Naspati	14	12
28	Naspati	17	9
29	Naspati	19	11
30	Naspati	24	12
31	Naspati	19	13
32	Naspati	18	11
33	Naspati	16	12
34	Kafal	10	7
35	Utis	20	17
36	Salla	42	25
37	Salla	32	25
38	Kaiyo	12	8
39	Lahare pipal	50	17
40	Utis	38	17
41	Khari	19	13
42	Khari	20	13
43	Khari	21	13
44	Lahare pipal	38	14
45	Utis	35	16

Plant species outside the project are Utis (*Alnus nepalenses*), salla (*Pinus walichiana)*, Khair and Rodendron (*Rododendron* sp) are common plant species in the local community forest of Bhalayo Bhir Community Forest, Indrasarovar cummunity Forest and Narayansthan Community Forest.

Fauna

The site is not the habitat of any terestrial wildlife. Although the project site is not the habitat or route of migratory animal some animals are reported from the surrounding forests areas of the project site.

Table 3: Wildlife of the project periphery

Mammals:

S.N	Local Name	Scientific Name
1	Syal	*Canis aureus*
2	Rato Bandar	*Macaca Mulata*
3	Lokharke	*Ratufa indica*
4	Langoor	*Semnopithecus entellus*
5	Ban Biralo	*Felis chaus*
6	Chituwa	*Panthera pardus*
Birds		
1	Kaliz	*Catreus wallichii*
2	Crow	*Crovus splendens*
3	Dhukur	*Streptopelia chinensis*
4	Suga	*Psittacula krameri*
5	Jureli	*Pycnonotus leucogenys*
6	Nyaluli	*Megalaima australis*
7	Fiste	*Phylloscopus collybita*
Reptiles		
1	Cheparo	*Calotes versicolor*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 4: List of Endangered/Threatened/Rare/Indigenous Species of Site Surroundigs

SN	Species		Threat Category		
	Common name	Scientific name	GoN	IUCN	CITEs
A	**Floral Species**				
B	**Faunal Species**				
1	Jackal	*Canis aureus*			III
2	Leopard	*Panthera pardus*			I
c	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4 Socio-economic environment

Simlang , Bazartar and Dakyu are the local settlements in the 250 meter periphery of the project site. Ethnically Newar are the dominant caste in the community and most of the people are engaged on agriculture for living. Maize, Simi, Soyabean and Vegetable are common agricultural products grown by the locals for livelihood.

Simlang on the west of project site
Direction: Facing west

Bazartar on the North-west side of project side
Direction: facing west

Fig 13: Nearest settlement in the project site periphery.

The details of the local settlement in the periphery are given below;

Table 5: socio-economic status of local community

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Markhu	4	Simlang	100	Newar	18	25	31	90	10
2	Markhu	4	Bazartar	115	Newar	16	21	23	70	30
3	Markhu	4	Dhakyu	130	Newar	2	4	5	100	0

(Source: field survey, April 2014)

Land Ownership

The allocated land is the property of NEA. The site is not encroached by local communities. The project does not disturb any public and community structures.

Cultural, Religious, Historical and Archeological Significance

There are no religious place within the site. Narayani Temple at a distance of 100m on the north-west side is nearest religious site from the project site. Mahalaxmi and Mahachandi Jatra is the important cultural festival celebrated by the local communities.

(Fig 14 : Narayani Temple on the western side of project site)

Other Land Marks

Shree Chandra primary school is the only public institution within 250 meter distance from the project boundary. The school located at Bazartar on the north-west side of site lies at a distance of 200 meter from the site.

(Fig 15: Shree Chandra primary school)

Public consultation

District: Makwanpur
Name of VDC: Markhu
Date: 3/04/2014
Number of participant: 3

The proposed site is the property of Nepal Electricity Authority. At present it has been used by private sector as a nursery to grow the saplings of several tree species. Thus, the installation of solar farm requires prior notification to the private party ahead of the project construction works.

Consulted Person

S.N	Name	Number
1	Bhojraj Shrestha	9841563279
2	Ram K. Rimal	9845070907
3	Shiva Gurung	9851095575

Kulekhani Power house (Bhaise)

1. Location

The proposed site lies at Aapchaur, ward no. 2 of Bhaise VDC in Makawanpur district in central Nepal (Figure 1,2 and 3). The site is barren land in south-west facing slope at an elevation of 775 m amsl. The site is easily accessible as it is adjacent to the Tribhuvan Highway at a distance of 105 km from Kathmandu.

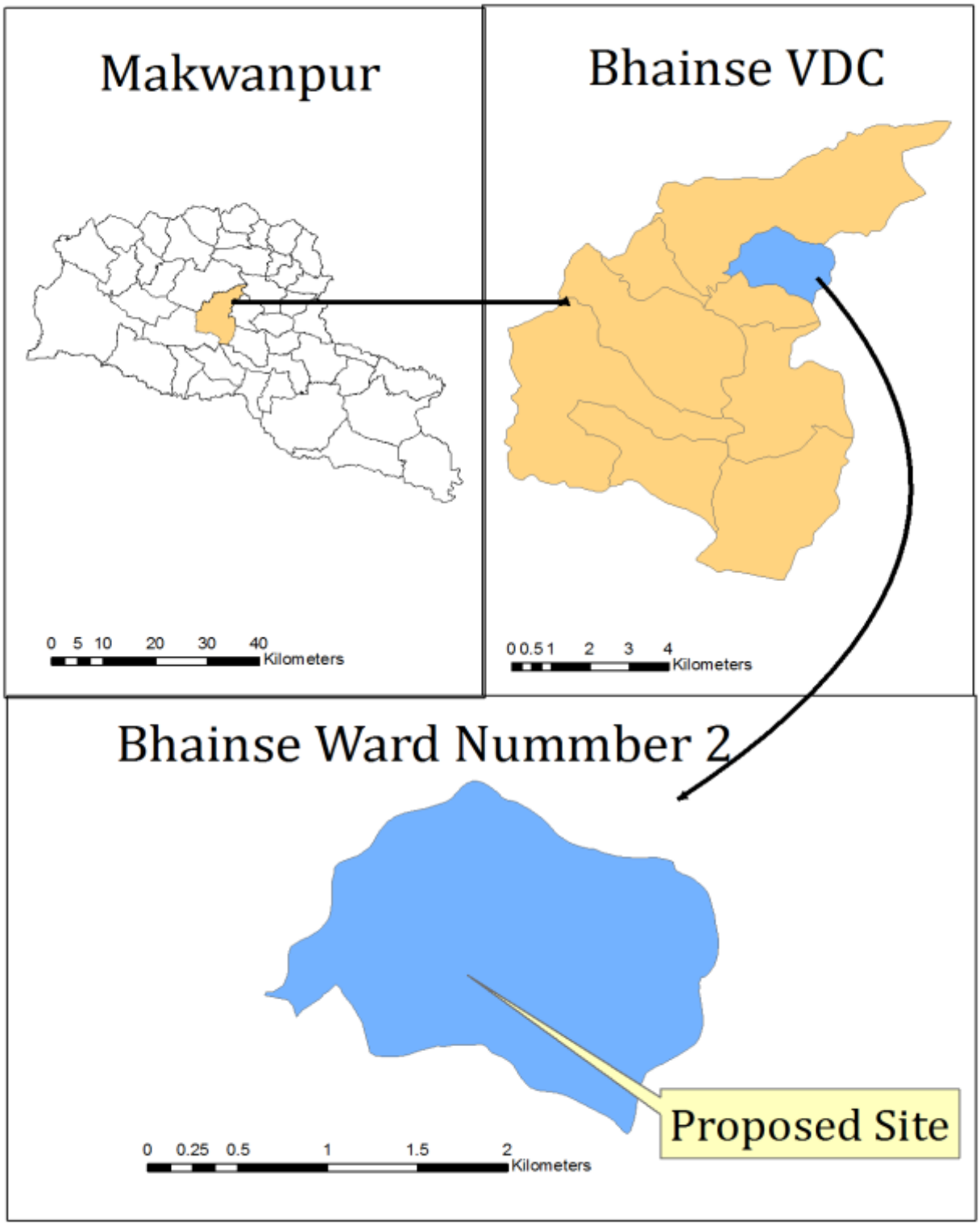


Fig 1: location map

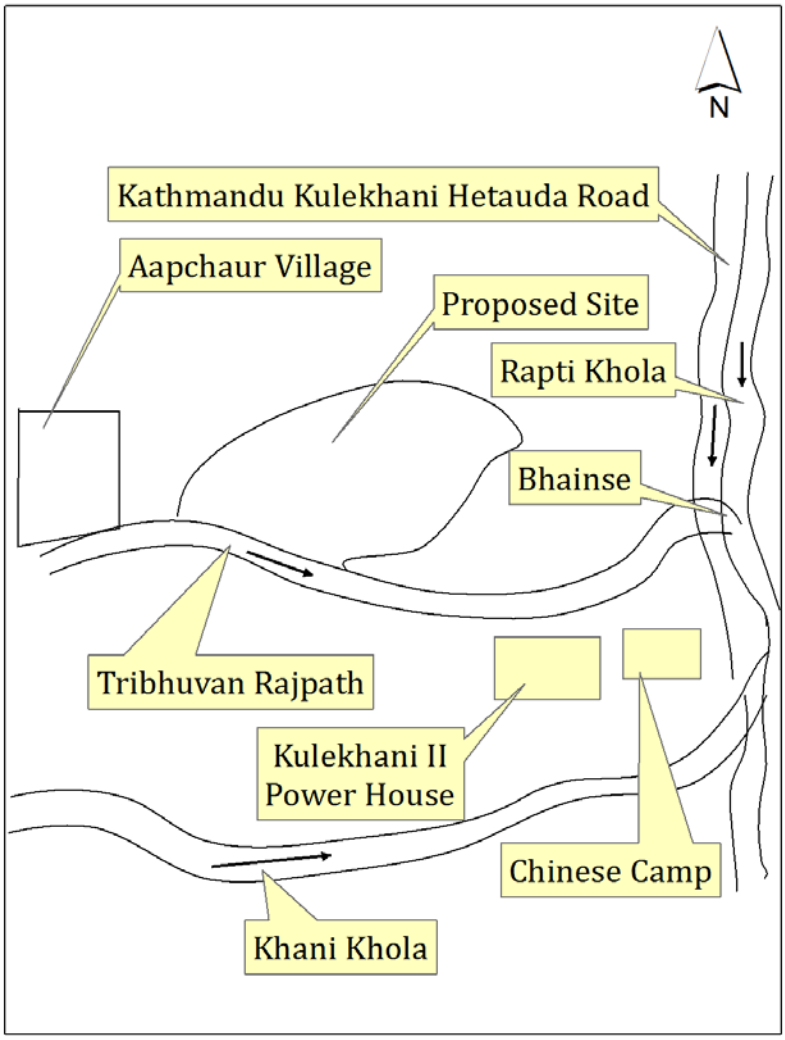


Fig 2: sketch map

Fig 3: Google image of the site.

The site is slopping land with slope angle of approximately 45^0 as continuous slope in both northern and southern side which decreases gradually toward base of the hill. The site is above 30m from the bank of khani khola.

The site is embedded within GPS coordinate of 27 ˚ 31' 06.16''N ; 85 ˚ 02' 56.89''E , 27 ˚ 31' 07.16''N ; 85 ˚ 02' 55.64''E, 27 ˚ 31' 07.37''N ; 85 ˚ 02' 56.89''E and 27 ˚ 31' 06.16''N ; 85 ˚ 02' 58.25''. The overall view on four direction from the project site at GPS point 27 ˚31' 6.75'' N 85 ˚ 02' 56.25'' E is presented below:

Figure 4. Facing North

Figure 5. Facing West

Figure 6. Facing South

Figure 7. Facing East

2. Physical environment

Land used

The site is barren land with some trees in the east-north corner. The land is devoid of any settlement or agricultural practice (Figure 8).

The surrounding environment have complex land used pattern. The eastern side is forest from the boundary of project whereas north, north-east and south-west side of the project are agriculture land in 250m periphery. The western side of the site has settlement called Aapcahur. The Tribhuwan Highway is adjacent to southern border of the project site. There are some houses in the southern side of site along Highway.

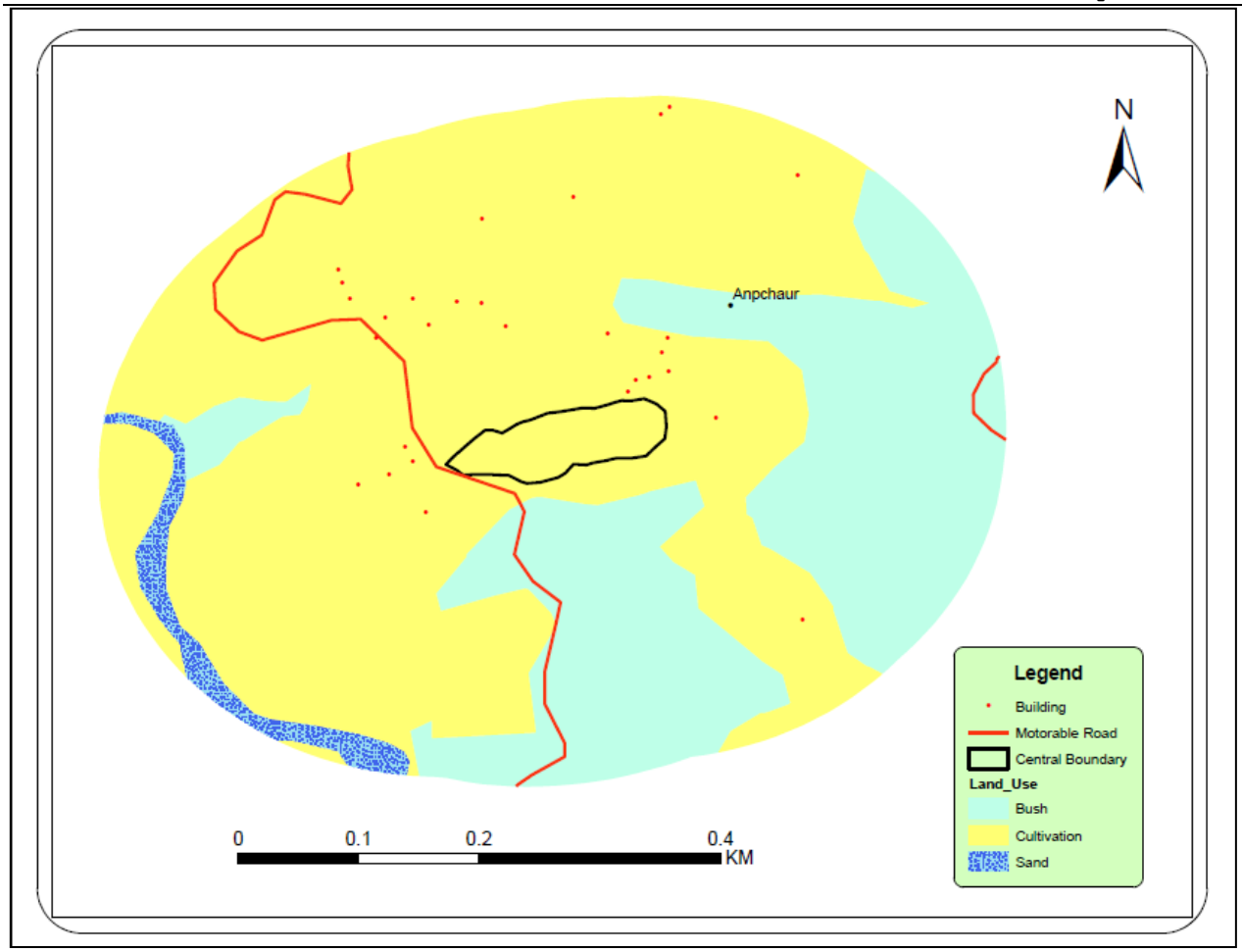


Figure 8. Land use map around the project site

Built structure

The site does not have any settlement within its boundary as it is property of NEA but there is a house called '*goth* ' in eastern corner used by local family to raise cattle.

Table 1: Details of built structure

S.N	Purpose of building structure	Length (m)	Width (m)	Area (m^2)	Wall Type	Roof type
1	Grow cattle	8	6	48	Non- timber forest product	Khar

(Fig 9: Goth within project site)

There are some built structures in 250 m periphery of the project site. There are houses in the north-east direction at distance of 50 and some house used as shop at distance of 15 meter from the project site on southern side. There is also a house used by primary care teaching center on the western boarder of the project. There are no other built physical structures like electric and telephone poles within the site.

Morphology

The site is slopping land with slope angle of approximately 45^0 as continuous slope. The slope gradient gradually decreases toward the base of hill. The eastern side outside of the boarder have steep slope with slope angle of about 60^0 whereas the western side have gentle slope of about 30^0. The bank of the khani khola is within distance of 210 m and vertically below 30m from the southern border of the project site.

(Fig 10: General view of the site)

Length of the site:

The Length of the site from different direction is given below:

Table 2. Length of Site

N/S Eastern Section	79.5m
N/S Western Section	76m
E/W Northern Section	39m
E/W Southern Section	35.5m

Approach Road

The project site is adjacent to the Bhaise-Daman section of Tribhuvan Rajpath at Aapchaur. It is at distance of 110 km from Kathmandu through Tribhuvan Highway. The site can also be approach through Balkhu-Kulekhani- Hetauda road. The site is at distance of 2km toward Daman from Bhainse, the point where Kulekhani Hatuada and Daman-Hetauda road meet.

(Fig 11: site showing adjacent Tribhuvan Raj path as access road.)

Erosion

The site is slopping land containing loose soft soil therefore prone to erosion. Rill erosion is common feature in the site. There are also small debris flow landslides on the southern section of the site. Small landslide was also observed in the upper section of the site.

Fig 12: Erosional feature in the site

Drainage

The site lies above the flood plain and at vertical height of 30m from flood plain. The chance of water logging is very limited as it is slope land. Khani khola on the southern side at distance of 210m is the nearest water recipient body of region. The surface runoff of the site is drained into khani khola through gullies and natural drainage. Natural drainage at distance of 10m east from the project site drained surface runoff of the area into Khani Khola.

(Fig 13: natural drainage on west side of propose site)

Climate

The climate of the area is sub-tropical. The area experience very warm and hot summer (April through August) and mild winter (December through February). Rainfall of the area is characterized by very heavy rainfall in monsoon (June through September and rarely in winter. In the area wind is calm in winter but in the pre-monsoon is affected high velocity gusting winds (April/May).

3. Biological Environment

The project site lies outside the sensitive areas such as national park. The site also lies outside the natural forest area.

Flora

It is barren land with some fodder trees in the north-east corner of the site. There are 12 trees of three plant species within project boundary. The trees were planted by local people to use as feeder for animal husbandry. The details of individual trees are given below:

Table 3: Details of individual trees in the site

S.N.	Local Name	Scientific name	DBH (cm)	Height (M)
1	Chilaune	*Schima Walichi*	19	17
2	Chilaune	*Schima Walichi*	17	9
3	Chilaune	*Schima Walichi*	15	12
4	Kutmiro	*Litsea Monopetala*	14	11
5	Chilaune	*Schima Walichi*	19	8
6	Kutmiro	*Litsea Monopetala*	25	10
7	Sal	*Shorea Robusta*	13	18
8	Chilaune	*Schima Walichi*	28	19
9	Sal	*Shorea Robusta*	11	16
10	Sal	*Shorea Robusta*	12	17
11	Chilaune	*Schima Walichi*	14	15
12	Chilaune	*Schima Walichi*	8	8

Photographs of trees

Figure 14 cluster of trees

GPS coordinate:
27˚31' 6.41'' N 85˚ 02' 59.6'' E

Figure 15. cluster of Trees

GPS coordinate:
27˚31' 6.75'' N 85˚ 02' 56.25'' E

Observed tree species outside the project designated site at Kalika-Chandika Community Forest adjacent to the northern boarders of the site and Sundarmai Community Forest in the southern side are sal, chilaune, sallo , saj and harro-barro. The site does not possess plant species of conservation significance.

Fauna

The site is neither the habitat nor the migratory route of terrestrial wildlife. Reported wildlife by the local people in the adjacent community forests are:

Table 4: Wildlife in the periphery of project

Mammals

S.N	Local Name	Scientific Name
1	Syal	*Canis aureus*
2	Rato Bandar	*Macaca Mulata*
3	Lokharke	*Ratufa indica*
4	Langoor	*Semnopithecus entellus*
5	Ban Biralo	*Felis chaus*

Birds

S.N	Local Name	Scientific Name
1	Kaliz	*Catreus wallichii*
2	Crow	*Crovus splendens*
3	Dhukur	*Streptopelia chinensis*
4	Suga	*Psittacula krameri*
5	Fiste	*Phylloscopus collybita*
6	Chibe	*Dicrurus macrocercus*

Reptiles

S.N	Local Name	Scientific Name

1	Lizards	*Calotes versicolor*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species in the adjoining areas, the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 5: List of Endangered/Threatened/Rare/Indigenous Species in the surrounding areas

SN	Species		Threat Category		
	Common name	Scientific name	GoN	IUCN	CITEs
A	**Floral Species**				
1	Sal tree	*Shorea rubsta*	Protected	-	-
B	**Faunal Species**				
1	Jackal	*Canis aureus*			III
c	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GOV Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Socio-economic and cultural environment

Aapchaur is the nearest settlement on the north-west side of the project at distance of 200 m. The community is dominated by Magar ethinic group . Agriculture is the main occupation of the local people. The details of socio-economic status of local people are given below;

Table 6: socio-economic of local people.

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Bhainse	3	Aapchaur	200m	Magar	51	103	112	95%	5%

Site Ownership:

The site land is the property of NEA and project does not need to acquire any private property. A small cowshed has been built within the site by local encroacher.

Cultural, historical and Archeological significance

The site has no objects of religious or cultural importance. The nearest shrine of local significance from the site is Kudaleshwor Mahadev Temple at a distance of about 300m on the northern boundary of the site.

Land Mark

There is a newly establish primary care teaching center on the north-east boarder of the project. There are also some co-operative for financial activities of local people.

Public consultation

District: Makwanpur
Name of VDC: Bhaise
Date: 2/04/2014
Number of participant: 5

- The proposed site is the sole property of Nepal Electricity Authority. Land around the site is much vulnerable to mass wasting and even local people are also worried due to the vulnerability of the site. They strongly demand for the proper stabilization of the site and are positive towards the installation of the solar power farm.

Name of person consulted

S.N.	Name of consult person	Contact No.	Remarks
1	Ram Krishna Rana	9845457947	
2	Subash Rana	9845158187	
3	Samir Rana	9807319157	
4	Bhakta Bd Thapa	9845485124	
5	Jhit bd Bal	9845299730	

Sunkoshi 1

1. Site location

The purposed project site lies in South-Eastern part of the Sindhupalchowk district, ward no. 5 of Pangretar VDC (**Figure 1**). The site can be accessed through Black topped Araniko Highway to the renowned market place khadichaur Bazar which is about 3 hrs drive from Kathmandu Valley. From the Khadichaur Bazaar crossing bridge over Sunkoshi River, at about 1 Km distance along Pasang Lhamu Highway there is a small settlement called 1 kilo from where the site is accessed through 1 km gravel road **(figure 2).** Figure depicts the project site in Google Image.

Figure 1. Location map of the site

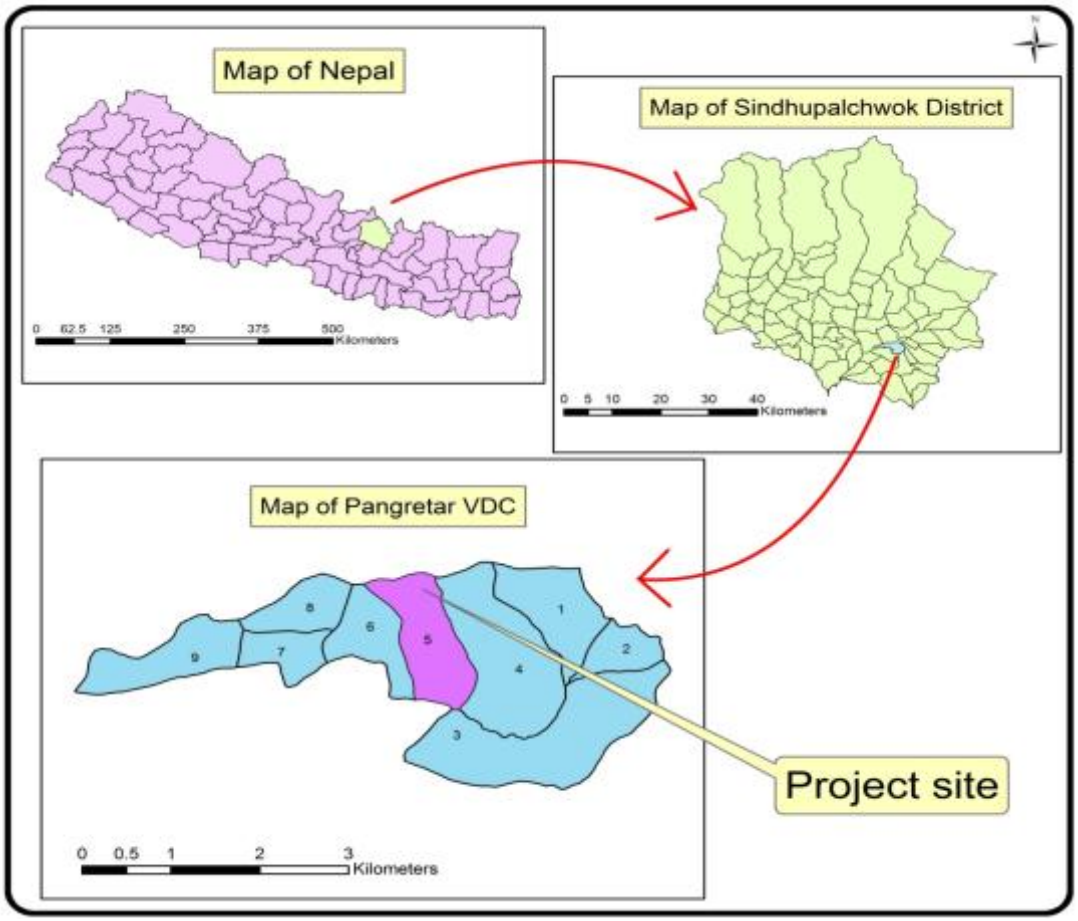


Figure 2. Sketch map of the project site

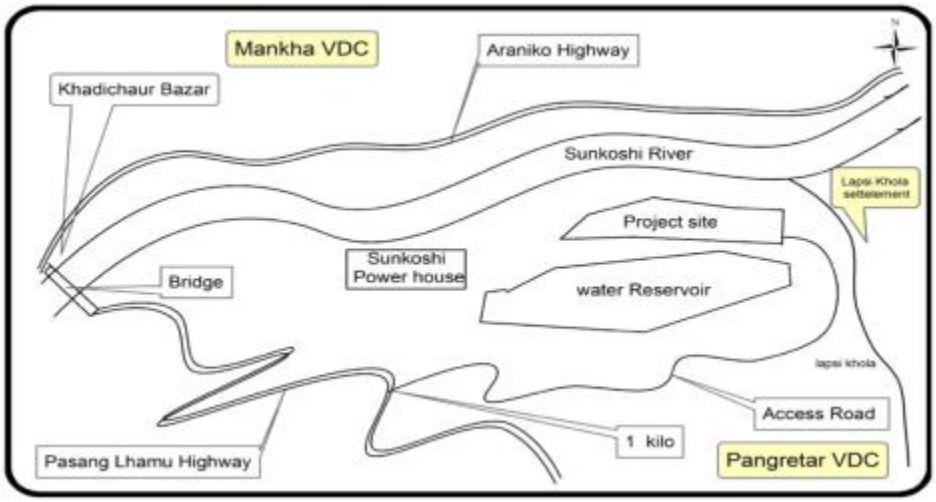


Figure 3. Google image of the Site

The site is flat land with some undulating surface, covered with trees dominated by Sisau species. The site is devoid of any infrastructures except one small house for watchman at eastern boundary. The site lies about 50 meters far from the Sunkoshi River in the left bank.

The GPS coordinate of the eastern border of the site is N 27 ˚ 45’ 12.7’’ & E 85 ˚ 50’ 39.2’’ and the western border is N 27 ˚ 45’ 13.95’’ & E 85 ˚ 50’ 29.27’’. The GPS coordinate of photography point and the general view from this point on different direction is presented in figures below.

1. GPS coordinate of photography point (Eastern border of the site)

27˚45' 12.7'' N 85 ˚50' 39.2'' E Altitude: 774 m

Figure 2. Facing North

Figure 3. Facing West

Figure 4. Facing South

Figure 5. Facing East

2. Physical Environment

Land use

The proposed project site is devoid of settlements and agricultural land. The site is partially covered by forest mainly dominated by Sisau trees. The trees were planted by NEA Officials in 2046 B.S.

Within the 250 m radius from the site boundary no major settlements were observed, except Small settlement Lapsi Khola by the side of eastern boundary at the distance of about 25 m. Northern side is the Sunkoshi River at the distance of about 50 m where as the Western side is the reservoir & the powerhouse of Sunkoshi Hydropower. Small patches of the forest area were observed at the southern part of the site.

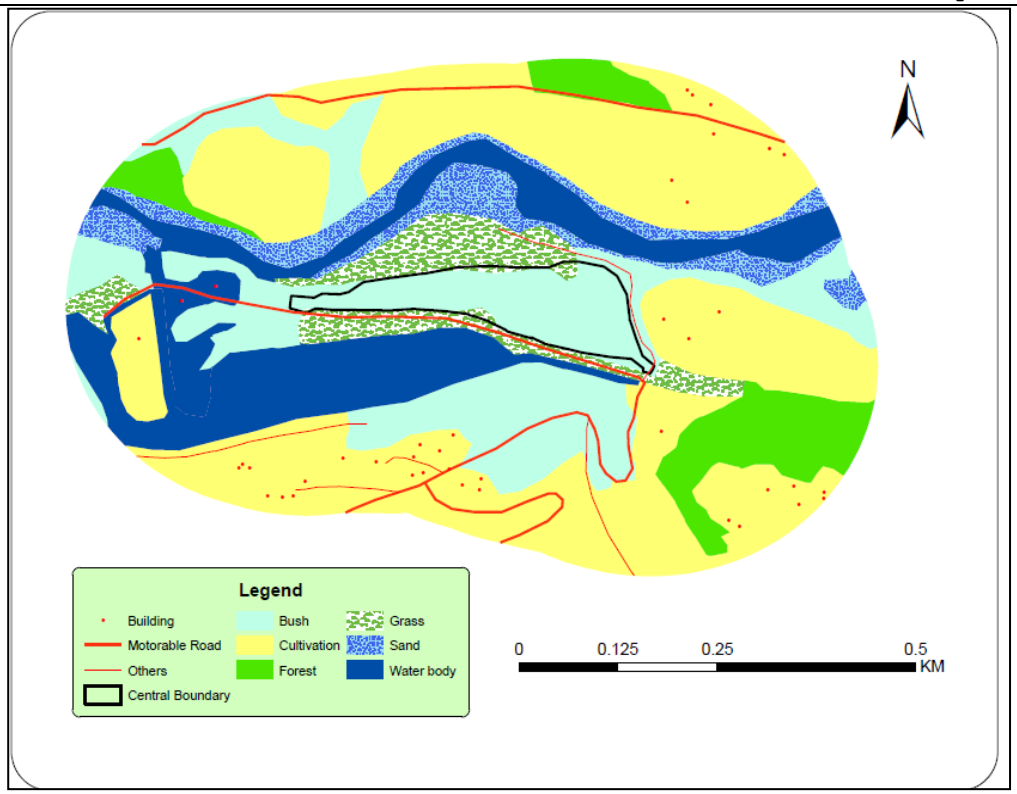


Figure 6. Land use map around project site

Built structure:

No settlement & built structure inside the site, except one small house for watchman. There is small settlement to eastern border of the site.

Table no. 1 Details of structure

S.N	Purpose of building structure	Length (ft)	Width (ft)	Area	Wall Type	Roof type
1	For watchman	9	7	63 ft^2	Brick & cement	Tin (Jasta)

Figure 7. Small house for watchman

GPS coordinate of the structure: 27˚ 45’ 11.89’’ N 85 ˚50’ 39.25’’ E

There are 3 electric poles inside the boundary of the site along the northern and Southern edge of the site. The GPS location of individual pole is given below:

1. Pole no 1: 27˚45’ 14.07’’ N 85˚ 50’ 37.32’’ E
2. Pole no 2: 27˚ 45’ 14.16’’ N 85 ˚50’ 31.56’’ E
3. Pole no 3: 27˚ 45’ 12.04’’ N 85 ˚50’ 37.31’’ E

Photographs of Individual pole

Figure 8. Pole no 1

GPS coordinate of the Pole
27˚45’ 14.07’’ N 85˚ 50’ 37.32’’ E
Direction: Facing North

Figure 9. Pole no 2

GPS coordinate of the Pole
27˚ 45’ 14.16’’ N 85 ˚50’ 31.56’’ E
Direction: Facing East

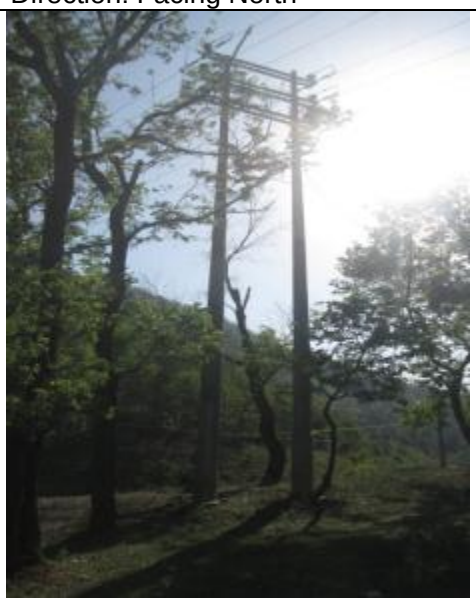


Figure 10. Pole no 3

GPS coordinate of the Pole
27˚ 45’ 12.04’’ N 85 ˚50’ 37.31’’ E
Direction: Facing South

Morphological Condition:

Morphologically, proposed project site is a flat land having 5^{o} of slope angle. Few undulating surface were observed in the middle portion of the site. Sunkoshi River lies some 50 m far from the northern border of the site. There is flat flood plain just below the site at northern border at the approximate height of about 10 m.

Figure 11. General surface view of the site

Length of the site:

The Length of the site from different direction is given in Table 2:

Table 2. Length of Site

N/S Eastern Section	110 m
N/S Western Section	40 m
E/W Northern Section	250 m
E/W Southern Section	300 m

Approach Road

The site is easily accessible by motorable road. About 1 km graveled road connects the proposed site to the Pasang Lhamu Highway at 1 kilo **(Figure 3)**. One kilo is the small settlement which is around 1 km far from Khadichaur Bazaar along the blacktopped Pasang Lhamu highway.

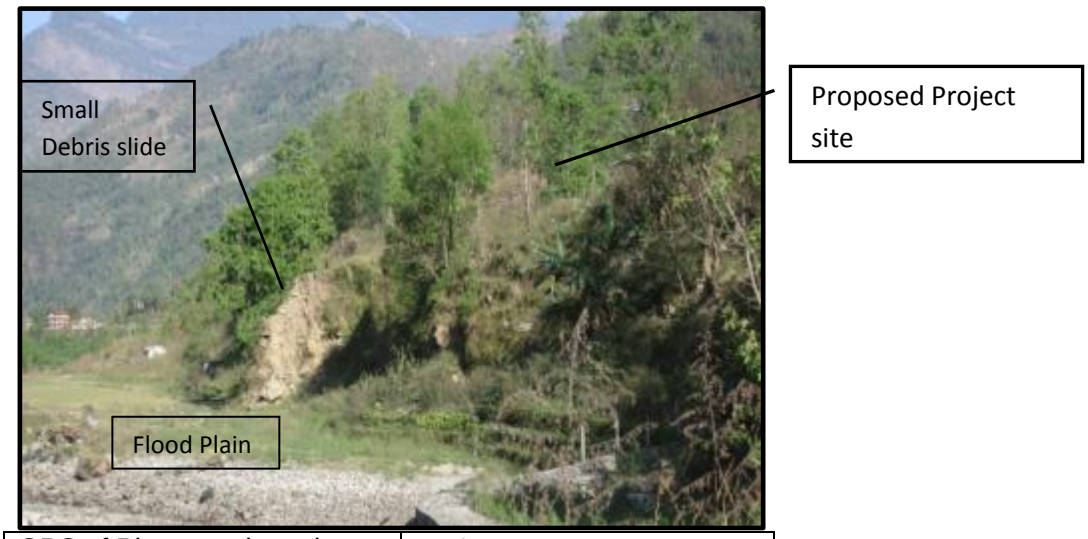
Figure 12. Access road from south eastern boundary

Erosion

As the proposed site is a flat land with some undulating surfaces, sheet erosion type is common. Small debris slide were observed in the northern part of the site as there is some height difference between flood plain of Sunkoshi River and the proposed site.

Within 250m periphery of the site boundary, no major Landslides were observed. Lapsi Khola runs along the eastern border of the site, river bed erosion is common along the Khola course. Beside, River Erosion was observed in the bank of Sunkoshi River. Other sides are similar to the project site.

Figure 13. Small Debris flow at Northern border



GPS of Photography point:	27˚ 45' 15.17'' N 85 ˚50' 23.36'' E
Direction:	Facing East

Drainage:

No natural drainage passed through the proposed site. The Lapsi Khola is the only natural drainage attached to the Eastern border of the site. Till date no impact from Lapsi Khola has been recorded on the proposed site.

The GPS location of the Lapshi Khola natural drainage is 27˚ 45' 11.04'' N and 85 ˚ 50' 39.9'' E

Figure 14. Lapsi Khola Natural Drainage

Flood
Project site doesn't lies in the flood plain. The flood plain is just below the proposed site at about 10 meter height difference **(Figure 14)**. Water logging does not occur during heavy rainfall. There is Lapsi khola natural drainage at the eastern border of the site at the distance of about 10 meterfrom the site boundary. But no impact from this drainage has been recorded till date. Nearest receiving waterway is Sunkoshi River at the northern border of the site about 50 m far from the site.

Climate
Climate of the area is sub-tropical. As the site lies near Sunkoshi River at the valley bottom, summer is sunny, humid and hot. Winter is cold and pleasent. Heavy rainfall is experienced on monsoon time (June to September) during summer season, while rainfall in winter season (November to February) is low. Mild wind is experienced throughout the year, with occasional gusting winds in the summer (March to May). Generally the wind blows from West to East direction. Sunshine hours on the site are 8 hours per day for winter season and 11 hours per day for summer.

3. Biological features

The site doesn't locate within National park or conservation area.

Flora
The proposed site is partially covered by trees dominated by Sisau species. The forest area is not a natural type and was planted by NEA in 2046 B.S,

Around 120 trees of different species were identified inside the project boundary. The details of the trees are given in Table 2 and 3 below:

Table 2. Summary of trees species within the site

S.N	Tree species (Local Name)	Scientific Name	Number
1	Sissau Tree	*Dalbergia Sisso*	109
2	Mauwa tree	*Madhuca longifolia*	4
3	Amba tree	*Psidium guajava*	1
4	Chilaune tree	*Schima wallichii*	4
5	Salla	*Pinus roxburghi*	1
6	Swami tree	*Ficus benjamina*	1
Total			**120**

Field Survey, 2014 april

Table 3. Details of trees with individual DBH & height

S.N	Tree species (Local Name)	Scientific Name	Dbh (cm)	Height (m)
1	Sissau Tree	*Dalbergia Sisso*	36	13
2	Sissau Tree	*Dalbergia Sisso*	35	12
3	Sissau Tree	*Dalbergia Sisso*	33	11
4	Sissau Tree	*Dalbergia Sisso*	36	13
5	Sissau Tree	*Dalbergia Sisso*	32	12
6	Mauwa tree	*Madhuca longifolia*	60	15
7	Sissau Tree	*Dalbergia Sisso*	40	11
8	Sissau Tree	*Dalbergia Sisso*	38	11
9	Sissau Tree	*Dalbergia Sisso*	37	10
10	Sissau Tree	*Dalbergia Sisso*	36	12
11	Sissau Tree	*Dalbergia Sisso*	39	10
12	Sissau Tree	*Dalbergia Sisso*	41	10
13	Sissau Tree	*Dalbergia Sisso*	40	9
14	Sissau Tree	*Dalbergia Sisso*	38	11
15	Sissau Tree	*Dalbergia Sisso*	39	10
16	Sissau Tree	*Dalbergia Sisso*	35	8
17	Sissau Tree	*Dalbergia Sisso*	37	13
18	Sissau Tree	*Dalbergia Sisso*	36	11
19	Sissau Tree	*Dalbergia Sisso*	45	9
20	Sissau Tree	*Dalbergia Sisso*	40	10
21	Sissau Tree	*Dalbergia Sisso*	43	12
22	Sissau Tree	*Dalbergia Sisso*	42	8
23	Sissau Tree	*Dalbergia Sisso*	46	9
24	Sissau Tree	*Dalbergia Sisso*	41	13
25	Sissau Tree	*Dalbergia Sisso*	45	11
26	Sissau Tree	*Dalbergia Sisso*	43	10
27	Sissau Tree	*Dalbergia Sisso*	39	9
28	Sissau Tree	*Dalbergia Sisso*	38	9
29	Sissau Tree	*Dalbergia Sisso*	40	10
30	Sissau Tree	*Dalbergia Sisso*	39	12
31	Sissau Tree	*Dalbergia Sisso*	43	13
32	Sissau Tree	*Dalbergia Sisso*	42	11
33	Sissau Tree	*Dalbergia Sisso*	30	9
34	Sissau Tree	*Dalbergia Sisso*	28	8
35	Sissau Tree	*Dalbergia Sisso*	29	9
36	Sissau Tree	*Dalbergia Sisso*	32	7
37	Sissau Tree	*Dalbergia Sisso*	28	8
38	Sissau Tree	*Dalbergia Sisso*	27	10
39	Sissau Tree	*Dalbergia Sisso*	31	11
40	Sissau Tree	*Dalbergia Sisso*	30	8
41	Sissau Tree	*Dalbergia Sisso*	30	9
42	Sissau Tree	*Dalbergia Sisso*	32	10
43	Sissau Tree	*Dalbergia Sisso*	29	7

S.N	Tree species (Local Name)	Scientific Name	Dbh (cm)	Height (m)
44	Sissau Tree	*Dalbergia Sisso*	28	10
45	Sissau Tree	*Dalbergia Sisso*	31	9
46	Sissau Tree	*Dalbergia Sisso*	27	8
47	Sissau Tree	*Dalbergia Sisso*	26	8
48	Amba tree	*Psidium guajava*	15	3
49	Sissau Tree	*Dalbergia Sisso*	45	9
50	Sissau Tree	*Dalbergia Sisso*	43	9
51	Sissau Tree	*Dalbergia Sisso*	40	8
52	Sissau Tree	*Dalbergia Sisso*	39	8
53	Sissau Tree	*Dalbergia Sisso*	42	7
54	Sissau Tree	*Dalbergia Sisso*	44	10
55	Sissau Tree	*Dalbergia Sisso*	38	11
56	Sissau Tree	*Dalbergia Sisso*	46	9
57	Sissau Tree	*Dalbergia Sisso*	41	8
58	Sissau Tree	*Dalbergia Sisso*	42	10
59	Sissau Tree	*Dalbergia Sisso*	45	7
60	Sissau Tree	*Dalbergia Sisso*	43	12
61	Sissau Tree	*Dalbergia Sisso*	39	9
62	Sissau Tree	*Dalbergia Sisso*	46	7
63	Sissau Tree	*Dalbergia Sisso*	41	8
64	Sissau Tree	*Dalbergia Sisso*	42	10
65	Sissau Tree	*Dalbergia Sisso*	43	12
66	Sissau Tree	*Dalbergia Sisso*	20	5
67	Sissau Tree	*Dalbergia Sisso*	21	6
68	Sissau Tree	*Dalbergia Sisso*	25	5
69	Sissau Tree	*Dalbergia Sisso*	19	7
70	Sissau Tree	*Dalbergia Sisso*	21	6
71	Sissau Tree	*Dalbergia Sisso*	24	5
72	Sissau Tree	*Dalbergia Sisso*	26	7
73	Sissau Tree	*Dalbergia Sisso*	19	7
74	Sissau Tree	*Dalbergia Sisso*	23	5
75	Sissau Tree	*Dalbergia Sisso*	25	6
76	Sissau Tree	*Dalbergia Sisso*	24	8
77	Sissau Tree	*Dalbergia Sisso*	26	9
78	Sissau Tree	*Dalbergia Sisso*	20	5
79	Sissau Tree	*Dalbergia Sisso*	26	7
80	Sissau Tree	*Dalbergia Sisso*	24	6
81	Sissau Tree	*Dalbergia Sisso*	21	8
82	Sissau Tree	*Dalbergia Sisso*	20	5
83	Sissau Tree	*Dalbergia Sisso*	25	9
84	Sissau Tree	*Dalbergia Sisso*	23	5
85	Sissau Tree	*Dalbergia Sisso*	22	8
86	Sissau Tree	*Dalbergia Sisso*	21	6

S.N	Tree species (Local Name)	Scientific Name	Dbh (cm)	Height (m)
87	Sissau Tree	*Dalbergia Sisso*	20	7
88	Mauwa tree	*Madhuca longifolia*	20	5
89	Mauwa tree	*Madhuca longifolia*	25	6
90	Chilaune tree	*Schima wallichii*	20	8
91	Chilaune tree	*Schima wallichii*	24	9
92	Chilaune tree	*Schima wallichii*	30	7
93	Chilaune tree	*Schima wallichii*	29	8
94	Sissau Tree	*Dalbergia Sisso*	19	8
95	Sissau Tree	*Dalbergia Sisso*	20	6
96	Sissau Tree	*Dalbergia Sisso*	25	8
97	Sissau Tree	*Dalbergia Sisso*	23	8
98	Sissau Tree	*Dalbergia Sisso*	22	6
99	Sissau Tree	*Dalbergia Sisso*	20	9
100	Sissau Tree	*Dalbergia Sisso*	25	7
101	Sissau Tree	*Dalbergia Sisso*	24	10
102	Sissau Tree	*Dalbergia Sisso*	19	8
103	Sissau Tree	*Dalbergia Sisso*	23	9
104	Sissau Tree	*Dalbergia Sisso*	20	6
105	Sissau Tree	*Dalbergia Sisso*	18	7
106	Sissau Tree	*Dalbergia Sisso*	25	8
107	Sissau Tree	*Dalbergia Sisso*	26	9
108	Sissau Tree	*Dalbergia Sisso*	24	8
109	Sissau Tree	*Dalbergia Sisso*	28	6
110	Sissau Tree	*Dalbergia Sisso*	22	7
111	Sissau Tree	*Dalbergia Sisso*	24	5
112	Sissau Tree	*Dalbergia Sisso*	21	9
113	Sissau Tree	*Dalbergia Sisso*	26	8
114	Sissau Tree	*Dalbergia Sisso*	23	9
115	Sissau Tree	*Dalbergia Sisso*	20	8
116	Sissau Tree	*Dalbergia Sisso*	18	9
117	Sissau Tree	*Dalbergia Sisso*	25	7
118	Salla	*Pinus roxburghi*	10	7
119	Mauwa tree	*Madhuca longifolia*	35	10
120	Swami tree	*Ficus benjamina*	200	11

Field Survey, 2014 april

Photographs of Trees

Figure 15. Swami Tree

GPS coordinate:
27˚45' 12.7'' N 85˚ 50' 39.2'' E

Figure 16. Group of Sissau Tree

GPS coordinate:
27˚45' 11.7'' N 85˚ 50' 37.5'' E

The nearest Community forest from the site is Rai majuwa CF in ward no 5 of Pangretar VDC at southern part of the site. Bar, Pipal, Sisau, Chilaune, Swami, Mauwa, Simal, Laligurans etc are the common species found in the forest and nearby place.

Fauna

The site doesn't include locally important biodiversity species and doesn't support any habitat to terrestrial wildlife.

Commonly observed wildlife found close to the site are presented in Table 5. The species recorded are based on the outcome of the public interaction.

Table 5: Faunal diversity of the project surroundings

Mammals:

S.N	Local Name	Scientific Name
1	Syal	*Canis aureus*
2	Fyauro	*Vulpus bengalensis*
3	Rato Bandar	*Macaca Mulata*
4	Lokharke	*Ratufa indica*
5	Kharayo	*Leporidae cuniculas*
6	Dhumsi	*Hystric indica*
7	Langoor	*Semnopithecus entellus*
8	Ban Biralo	*Felis chaus*

Birds:

S.N	Local Name	Scientific Name
1	Kaliz	*Catreus wallichii*
2	Crow	*Crovus splendens*
3	Maina	*Acridotheres tristis*
4	Dhukur	*Streptopelia chinensis*
5	Suga	*Psittacula krameri*
6	Jureli	*Pycnonotus leucogenys*
7	Nyaluli	*Megalaima australis*
8	Fiste	*Phylloscopus collybita*
9	Chibe	*Dicrurus macrocercus*

Reptiles:

S.N	Local Name	Scientific Name
1	Cheparo	*Calotes versicolor*
2	Vyaguto	*Rana tigrina*
3	Sungohoro	*Varanus flavescens*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species (Table 6) has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 6: List of Endangered/Threatened/Rare/Indigenous Species

SN	Species		Threat Category		
	Common name	**Scientific name**	**GoN**	**IUCN**	**CITEs**
A	**Floral Species**				
B	**Faunal Species**				
1	Fox	*Vulpes bengalensis*			III
2	Syal	*Canis aureus*			III
C	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Social Economic and Cultural Environment

Lapsi khola is the only settlement around the 250 meter periphery of the site. The settlement lies in the eastern boundary of the site at the distance of about 50 meter. It is a small settlement with few Houses dominated by Chettri community. Agriculture is the main occupation of the people in the settlement and few are engaged in formal employment.

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Pangretar	5	Lapsi Khola	50 m	Chetri	5	13	15	75%	25%

Site land ownership

The site is owned and operated by NEA. There is no encroachment of land by outsider.

Cultural, Historical and Archeological Sites

There are no signs of cultural, historical and archeological artifacts of local and regional significance within the site.

The Nearest site of cultural/religious/archeological significance is a small Saraswoti temple built by local people which is some 50 meter far from the eastern boundary of the site.

Other landmarks

The nearest school is Shree Setidevi Sharda Higher Secondary School at 10 minutes walking distance .i.e. approximately 600 meter towards eastern side of the site. Nearby Health facility is Pangretar Health post which is at 20 minutes walking distance.

Public consultation
District: Sindhupalchowk
Name of VDC: Pangretar
Date: 27th March 2014
Number of participant: 11

The key concerns of the local people are as under:

- Local people and NEA officials opined that the project is highly appreciated. They emphasize the necessity of the project at the present scenario to assist in reduction of the load shedding problem.
- There are many trees in the proposed area. For the installation of the solar farm all the trees must be cut down which may impact the stability of the land especially in the northern side, so appropriate mitigation measure should be taken.
- They feel pleasure to know about the progress of the present study at different sites of NEA owned land.

List of Participants

Name of Site: Sunkoshi Date Visited: 27th March 2014

Location: Pangretar-Lapsikhola / Mankha-Aatar

S.N.	Name	Address	Phone Number	Signature
1	Sitaram karki	Pangretar-5	9741017561	
2	Laxman karki	... ...	—	
3	Bhim Bahadur Tamang	Mankha-1	9841101151	
4	krishna Prasad Parajuli	NEA	9741114007	
5	Kesav Parajuli	NEA	9741077832	
6	Shekhar Nath Parajuli	NEA	9741016267	
7	Amrit khadka	Mankha-6	9803391398	
8	Netra karki	NEA	9741172092	
9	Badri prasad Tiyak	NEA	9841415433	
10	Sanjay pathak	NEA	9841434174	
11	Bishal pahasi	Pangretar-5		

Sunkoshi 2

1. Site location

The purposed project site lies in south-eastern part of the Sindhupalchowk district, ward no. 6 of Mankha VDC (**Figure 1**). The site can be accessed through Blacktopped Araniko Highway to the renowned market place Khadichaur Bazar which is about 2 hrs drive from Kathmandu Valley. The site is about 1 km far from Khadichaur bazaar along the Araniko Highway to Kodari **(Figure 2).**

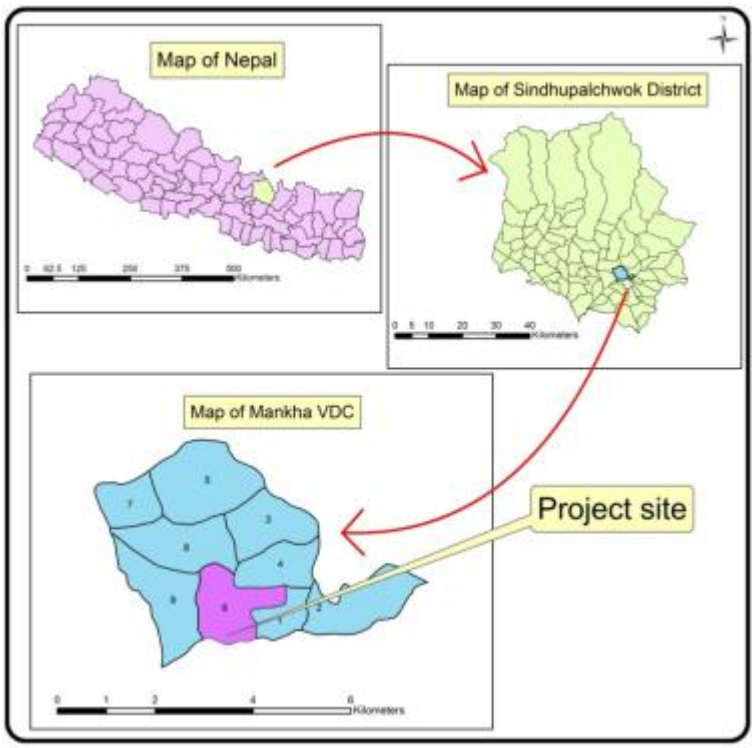


Figure 1. Location map of the site

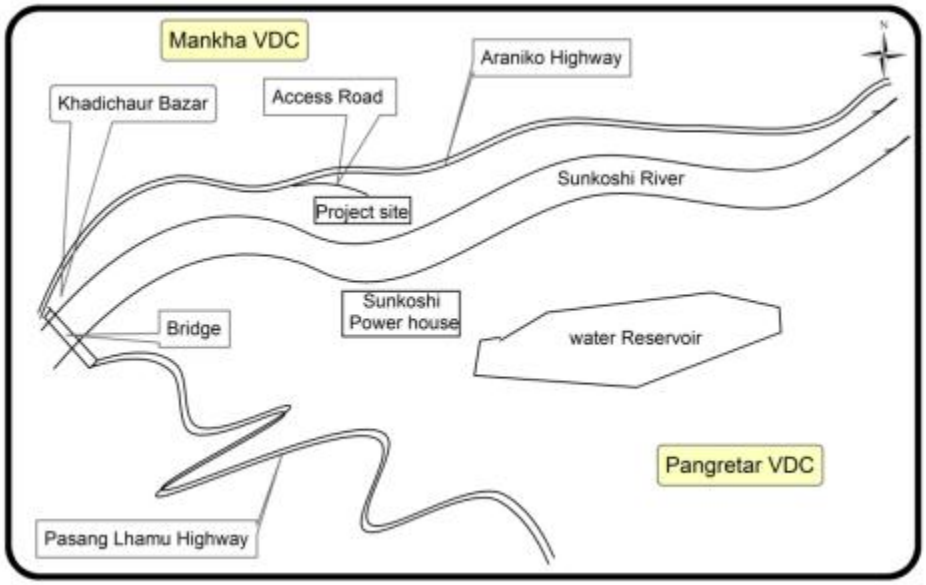


Figure 2. Sketch map of the project site

The site is somewhat flat with steep sloppy land at the northern side. The site is used for cultivation purpose and is devoid of any infrastructures. The site lies just opposite bank from Sunkoshi power house site about 40 meters far from the Sunkoshi River in the Right bank. Figure 3 presents the Google image of the site.

Figure 3. Google image of the Site

The GPS coordinate of the eastern border of the site is N 27 ˚ 45’ 18.22’’ & E 85 ˚ 50’ 9.68’’ and the western border is N 27˚ 45’ 18.77’’ & E 85˚ 50’ 5.14’’

The GPS coordinate of photography point and the general view from this point on different direction is presented in figures below.

GPS coordinate of photography point (Eastern border of the site)

27˚45’ 18.5’’ N 85 ˚50’ 06.82’’ E Altitude: 751 m

Figure 17. Facing West

Figure 18. Facing East

Figure 19. Facing North

Figure 20. Facing South

2. Physical Environment

Land use

The proposed project site is an agricultural land and is devoid of settlements and forest area. The site is managed for cultivation of different crops and vegetables.

Within 250 m radius of the site boundary, no major settlements were observed, except Small settlement Aakar by the side of Eastern boundary at the distance of about 25 m. Southern and western side is the Sunkoshi River at the distance of about 40 m where as patches of the forest area were observed at the Northern part of the site.

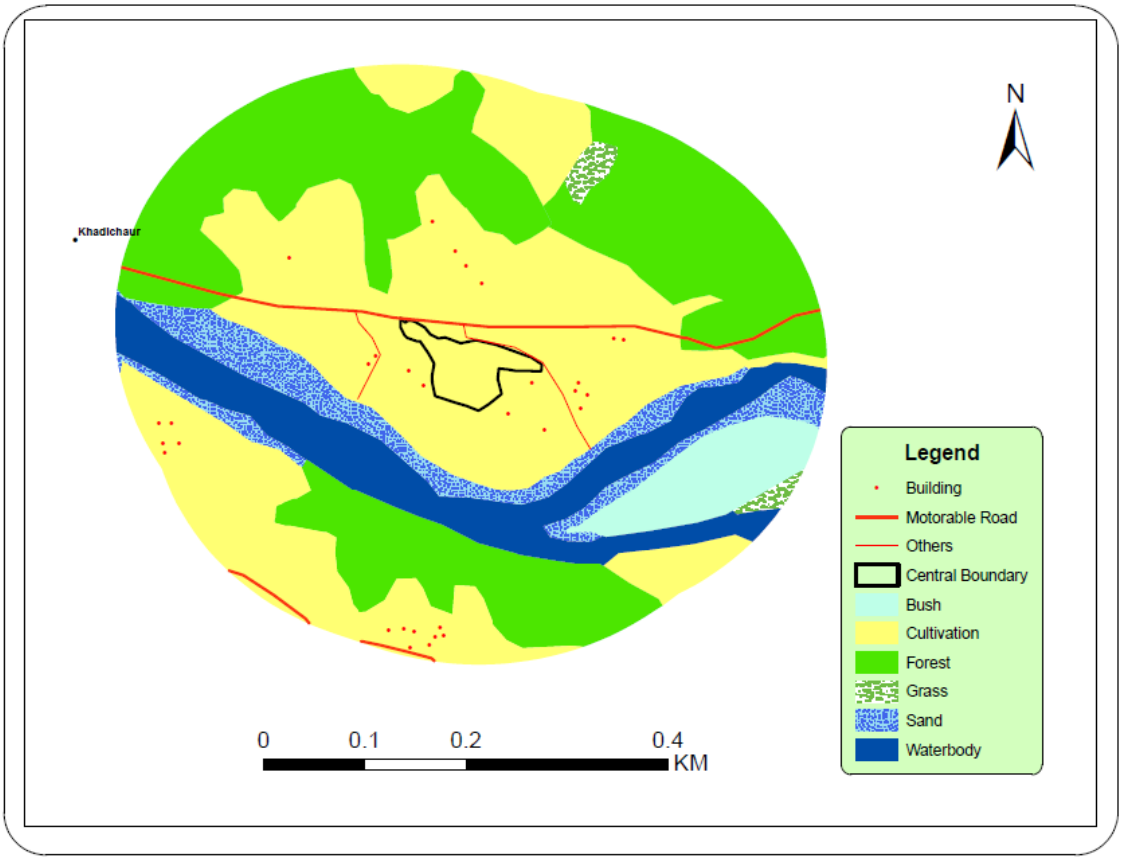


Figure 21. Land use map around project site

Built structure:

No settlement & built structure inside the site except small temporary corrugated structure at northern boundary built by Bhakta Bahadur Khadka for purpose of tea stall.

GPS coordinate of the Structure:
27˚45' 19.46'' N 85˚ 50' 06.95'' E

Figure 22. Temporary structure

Within the site boundary one electric pole is located along the northern border of the site. The GPS location of individual pole is given below:

4. Pole no 1: 27˚45' 19.12'' N 85˚ 50' 07.65'' E

Photographs of pole

Figure 23. Pole no 3

GPS coordinate of the Pole:
27˚45' 19.12'' N 85˚ 50' 07.65'' E

Morphological Condition:

Morphologically, the proposed project site is a flat land with slope angle of about 5 ^{o} at the southern side and steep slopping land with slope angle of about 35 ^{o} at northern side. Sunkoshi River lies some 40 m far from the southern border of the site.

GPS coordinate of the photography Point:
27˚45' 20.02'' N 85˚ 50' 05.60'' E
Direction: Facing South

Figure 24. General surface view of the site from Northern border

Site Dimensions

The Length of the site from different direction is given in Table 1.

Table 1. Length of Site

N/S Eastern Section	70 m
N/S Western Section	40 m
E/W Northern Section	110 m
E/W Southern Section	90 m

Site Approach Road

The site is easily accessible by motorable road through a short access graveled road (about 60 m) from the Araniko Highway. The Highway lies on the north eastern side of the site.

GPS coordinate of the photography Point:
27˚45' 19.81'' N 85˚ 50' 06.29'' E
Direction: Facing East

Figure 25. Access road from Northern boundary attached to Araniko Highway

Erosion

Since the land is used for agricultural purpose, Sheet erosion is common. No major landslides were observed nearby within 250 m periphery of the site. The river erosion was noticed along the bank of Sunkoshi River.

Drainage

Natural drainage do not pass through the proposed site. There is small manmade drainage along the eastern border of the site.

The GPS location of the manmade drainage is 27˚ 45' 18.65'' N and 85 ˚ 50' 09.78'' E

Figure 26. Small Drainage

Flood

Project site lies above the flood plain of Sun Koshi river. Water logging is not reported to occur during heavy rainfall. Nearest receiving waterway is Sun Koshi River at the southern border of the site about 40 m far from the site.

Climate

Climate of the area is sub-tropical. As the site lies near Sunkoshi River at the valley bottom, summer is sunny, humid and hot. Winter is cold and pleasent. Heavy rainfall is experienced on monsoon time (June to September) during summer season, while rainfall in winter season (November to February) is low. Mild wind is experienced throughout the year, with occasional gusting winds in the summer (March to May). Generally the wind blows from West to East direction. Sunshine hours on the site are 9 hours per day for winter season and 11 hours per day for summer.

3. Biological features

The site doesn't locate within National park or conservation area.

Flora

The proposed site is used for agricultural purposes. Few trees such as pipal, Kutmero and bamboo locates along the the boundary of site.

The details of the trees are given in table 2 below:

Table 2. Details of trees with individual DBH & height

S.N	Tree species (Local Name)	Scientific Name	Dbh (cm)	Height (m)
1	Pipal	*Ficus religiosa*	25	5
2	Kutmero	*Litsea monopelata*	20	2
3	Pipal	*Ficus religiosa*	30	6
4	Kutmero	*Litsea monopelata*	25	3
5	Kutmero	*Litsea monopelata*	18	3
6	Kutmero	*Litsea monopelata*	15	4
7	Kutmero	*Litsea monopelata*	26	2
8	Aru	*Prunus persica*	10	2
9	Aru	*Prunus persica*	10	2
10	*bamboo	*Bambusa vulgare*		6

**1 clump of bamboo (around 30 in number)*

Field Survey, 2014 April

Photographs of Trees

Figure 27. Swami Tree

GPS coordinate:
27˚45' 17.7'' N 85˚ 50' 9.2'' E

Figure 28. Group of Sissau Tree

GPS coordinate:
27˚45' 18.7'' N 85˚ 50' 7.9'' E

The nearest Community forest from the site is Mankha CF in ward no 6 of Mankha VDC at Northern part of the site. Bar, Pipal, Sisau, Chilaune, Swami, Mauwa, Simal, Laligurans etc are the common species found in the forest and nearby place.

Fauna

The site is not the natural habitat of the wildlife. Commonly observed wildlife close to the site are presented in Table 3 based on the outcome of the public consultations.

Table 3: Faunal diversity of the surrounding areas

Mammals:

S.N	Local Name	Scientific Name
1	Syal	*Canis aureus*
2	Fyauro	*Vulpus bengalensis*
3	Rato Bandar	*Macaca Mulata*
4	Lokharke	*Ratufa indica*
5	Kharayo	*Leporidae cuniculas*
6	Dhumsi	*Hystric indica*
7	Langoor	*Semnopithecus entellus*
8	Ban Biralo	*Felis chaus*

Birds:

S.N	Local Name	Scientific Name
1	Kaliz	*Catreus wallichii*
2	Crow	*Crovus splendens*
3	Maina	*Acridotheres tristis*
4	Dhukur	*Streptopelia chinensis*
5	Suga	*Psittacula krameri*
6	Jureli	*Pycnonotus leucogenys*
7	Nyaluli	*Megalaima australis*
8	Fiste	*Phylloscopus collybita*
9	Chibe	*Dicrurus macrocercus*

Reptiles:

S.N	Local Name	Scientific Name
1	Cheparo	*Calotes versicolor*
2	Vyaguto	*Rana tigrina*
3	Sungohoro	*Varanus flavescens*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species (Table 4) has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 4: List of Endangered/Threatened/Rare/Indigenous Species

SN	Species		Threat Category		
	Common name	**Scientific name**	**GoN**	**IUCN**	**CITEs**
A	**Floral Species**				
B	**Faunal Species**				
1	Fox	*Vulpes bengalensis*			III
2	Syal	*Canis aureus*			III
c	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

***GON Categories**: P Protected by legislation*

***CITES Categories**: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Social Economic and Cultural Environment

Aakar is the only settlement around the 250 meter periphery of the site. The settlement lies in the Eastern boundary of the site at the distance of about 25 meter. It is a small settlement with few Houses dominated by chettri community. Agriculture is the main occupation of the people in the settlement. Table 5 presents the households of the Aakar community close to the site.

Table 5: Households and Demography of the nearby settlement

SN	Name of VDC and Ward No of the site	Name of nearby settlements	Direction and distance from site	Major ethnic / caste groups of settlements	Total HH	Population		Major Occupation %	
						Male	Female	Farmer	Others
1	Mankha-6	Aakar	25 m	Chhetri, Brahmin, Tamang	3	9	10	65	35

Site land ownership

The site is owned by NEA. The land is encroached by the NEA retired staffs for agricultural purpose. Details of the three household of NEA retired staff is presented in Table 6

Table 6: List of persons irrigating on NEA owned land

S.N	Name of Encroachers	Address	Area Encroached	Status	Remarks
1	Bhakta Bahadur Khadka	Mankha-6, Aakar	6 Ropani approx.	Cultivated	
2	Amit Tamang	Mankha-6, Aakar	1 Ropani approx.	Cultivated	Irrigating other land than that of proposed site at the right bank of Sunkoshi river.
3	Rajendra Parajuli	Mankha-6, Chimling Besi	3 Ropani approx.	Cultivated	

Besides, at the north-eastern boundary, the temporary corrugated structure of Bhakta Bahadur Khadka is in existence but left as unused. It was built as temporary tea stall but now left abandoned. Bhakta Bahadur Khadka who is also the pensioner of NEA, have 5 Ropani land on the Northern side of the site.

Land Marks

The nearest school from the site is Shree Setidevi Sharda Higher Secondary School at 20 minutes walking distance .i.e. approximately 800 meter towards eastern side of the site. Similarly the nearest facility is Mankha Health post which is at 30 minutes walking distance.

Public consultation

District: Sindhupalchowk
Name of VDC: Mankha
Date: 27th March 2014
Number of participant: 11

The key issues and concerns of the public consultation are as under:

- Local people and NEA officials opined that the project is highly appreciated. They emphasize the necessity of the project at the present scenario to assist in reduction of the load shedding problem.
- The Sunkoshi site 2 is irrigated by different local people, as per the ecroacher the NEA should prior informed them before site preparation. They continuously conserve the land from further encroachment and make it arable as the land was barren in past. So, the project needs to compensate their 1 year productivity.
- The people are well aware about the ownership of land so, they show their positive attitude to abandon the NEA owned land prior to site preparation with some compensation.

List of Participants

Name of Site: Sunkoshi Date Visited: 27th March 2014

Location: Pangretar-Lapsikhola / Mankha-Aakar

S.N.	Name	Address	Phone Number	Signature
1	Sitaram karki	Pangretar-5	9741017561	
2	Laxman karki	... ...	—	
3	Bhim Bahadur Tamang	Mankha-1	9841101151	
4	krishna Prasad Parajuli	NEA	9741112007	
5	Kesav Parajuli	NEA	9741077832	
6	Shekhar Nath Parajuli	NEA	9741016267	
7	Amrit khadka	Mankha-6	9803391398	
8	Netra karki	NEA	9741172092	
9	Badri prasad Pilyal	NEA	9841415433	
10	Sanjay pathak	NEA	9841434174	
11	Bishal pahari	Pangretar-5		

Panauti 1

1. Site location and Accessibility

The proposed project site is located at ward number 12, Khopashi of Panauti Municipality in Kavrepalanchok district (Figure 1). The geographical position of the site is 27°33'50.7"N and 85°32'0.16"E. The site is about 36 Km from Kathmandu Valley and is connected by a motorable road. Though much of this road sections are blacktopped, some sections from Panauti to Khopashi (project site) are graveled only. The access road to the site is foot trail that extends 150m south from main road. The proposed site is adjacent to the southern face of Panauti Hydropower Reservoir.

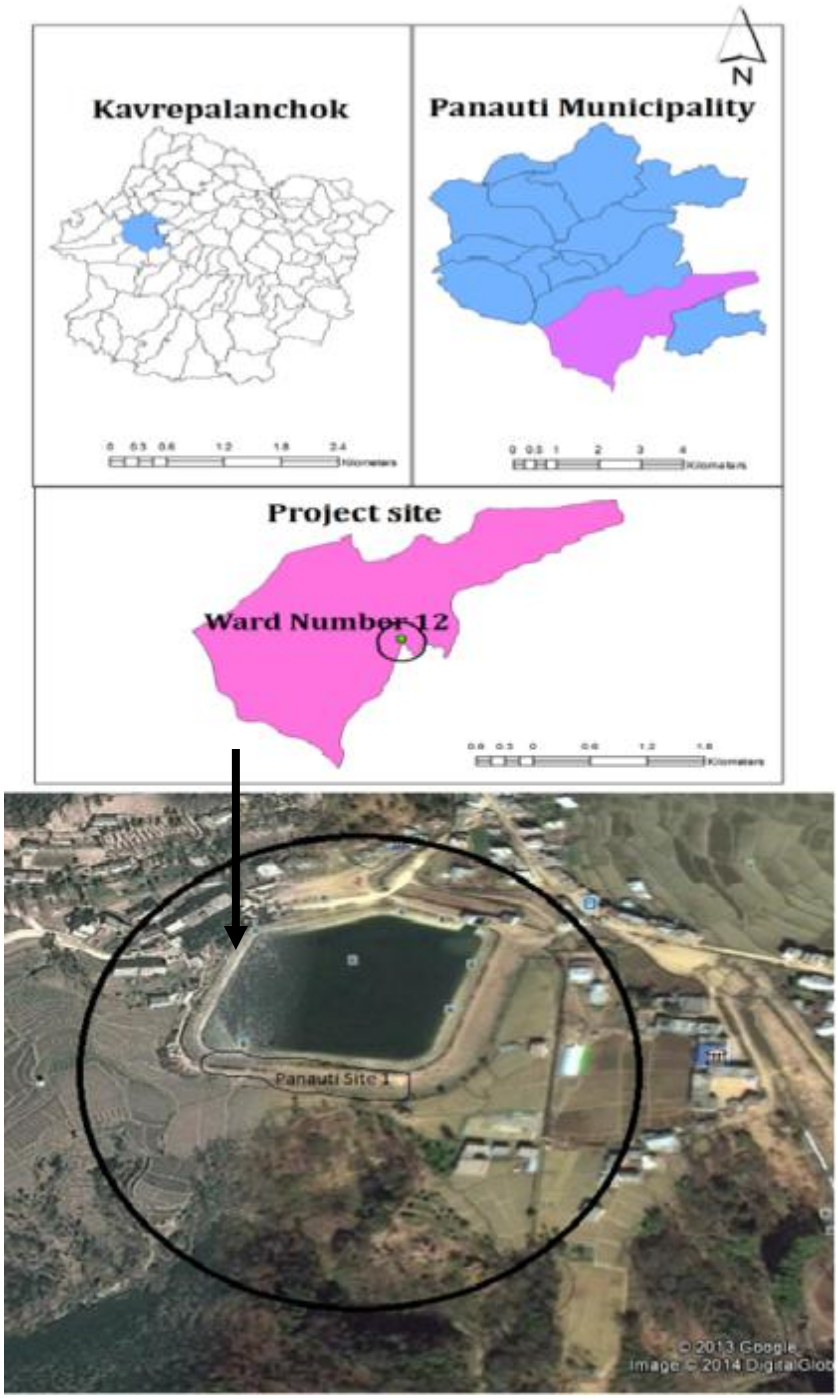


Figure 1. project site

The general view of site from different direction is shown in the pictures below (Figure 2, 3, 4 and 5)

The GPS Coordinate of the Photography Position is: 27°33'50.7"N and 85°32'0.16"E.

Figure 2.Facing North

Figure 3.Facing East

Figure 4. Facing West

Figure 5. Facing South

2. Physical Environment

Land Use

Within 250m periphery of the site the dominant land use is agriculture. Northern side of the site is the reservoir of Panauti Hydropower, beyond which lies the Khopashi Bazar. At a distance of 20m from the site on the southern side there is a forest over the eastern half and agricultural land over the western half. Similarly, Salanda khola lies south of the site at a distance of about 100m.

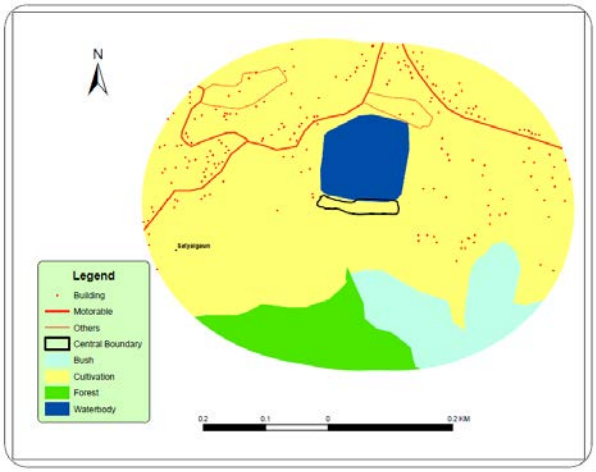


Figure 6: Land Use

There is a privately owned forest across Salanda khola within the 250m periphery on the south of the site. Likewise, agricultural land and settlements are present on both the eastern and western side of the proposed site. There is a poultry farm, Primary Health Post, school (Shree Bal Adarsha High School) and Mahila Bikash Kendra over the eastern part of the site outside the project boundary. Likewise there are agricultural land, settlements, schools, temples and a monastery over the western side of the site.

Built Structure

The proposed site for the installation of solar farm is the southern embankment of the Panauti Hydropower reservoi. Land around the embankment of the reservoir is barren with compacted hard soil covered with grasses. The built structure within the site includes the fence of the reservoir that stretches east-west along its length.

Site Length

There is a marked variation in both length and breadth of the site, as the minimum length at the southern side is 99 m and maximum length at the northern side is 105m, while the minimum breadth at the western side is 20m and the maximum breadth at the eastern side is 17m.

Morphology

Morphologically the proposed site is a slopping land with slope angle of around 30^0. Considering the 250m periphery from the site, eastern part is a gentle slope with slope angle around 15^0. Similarly, the steepness of western part is slightly high compared with the eastern part, having slope angle of around 20^0. There is a marked difference in gradient between northern and southern part, as there is a reservoir and market over the northern side on a relatively flat land (slope around 5^0). However, over the southern part there is a steep slope (slope angle around 50^0) that continues downhill up to Salanda khola. Across the Salanda khola , there is another hill with similar slope angle.

The proposed site for the installation of solar farm is not flood plain and due to its steepness there is no chance of water logging. Though major erosion phenomenon occurring over the slopping land is rill erosion (or gully erosion in the adverse case), due to the grass cover over the entire site, none of the erosion features are observed. However, at about a distance of 20m south from the site, steepness of the slope abruptly increases where there exist small gullies along the entire length of the slope. Rainfall occurring over the site drains to the Salanda khola which is about 100m downhill from the site. Thus during rainy season due to heavy rainfall, risk of formation of large sized gullies is potential.

Climate

The temperature around the site is cold in winter and warm during summer season. Much of the rainfall occurs during summer (monsoon) season characterized by heavy rainfall. However, during winter season occasional rainfall occurs. Wind pattern around the site is dominated by west to east direction

on both winter and summer season. However, wind velocity varies markedly as summer season experiences high velocity wind flow with frequent occurrence of storms. Sunshine hours vary between 10 hours in winter season and 12 hours in summer season.

3. Biological Environment

The proposed site for the installation of solar farm lies outside the National Park and Conservation area is devoid of forests. The flora and fauna of the site are not important even locally.

Flora

The plant species present over site include grasses and bushes. Forest over the southern part 20m away from the site is dominated by Uttis (Alnus nepalensis), with the co-occurrence of species like Tuni, Okhar, and Paiyun. Similarly, fodder species like Lapsi, Kaiyo, Bamboo and Bakaino are also present around the site within 250m periphery.

Fauna

The proposed solar farm site is not the natural habitat of wildlife. Wildlife reported around the site includes Leopard, Jackal, Monkey, Squirrel, Nyauli Musho, etc. Likewise bird species includes Dukur, Malewa, Jurale, Eagles, Geese, Kalij, etc. Snake and lizard are the common reptiles observed around the site. The proposed site is neither the habitat of the wildlife nor the migratory route of any wild animals.

4. Social Economic and Cultural Environment

Nearest settlement is Khopashi about 100m distance from the site boundary. It has a mixed population of Brahmins and Chhetris. Number of households estimated in the settlement is around 50 with a total population of about 190. Nearly 80% of the households rely on agriculture while around 15% are involved in other profession for livelihood.

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Khopasi	12	Satyal Dada	100m	Chhetri and Brahmin	50	100	90	85	15

Land ownership

The site property is owed by NEA. Land encroachment by local is not observed and reported.

Places of cultural significance:

The site has no places of cultural significance.

The nearest site of cultural significance is a Buddha Gumba which is about 200 m away from the proposed site towards Northern Side. It is small monastery and the only one place for the Buddhist monk to come for the worship. Though it is of small area, it is an important religious place for the Buddhist people of the area.

Public consultation

District: Kavre
Name of VDC: Kophasi
Meeting Venue: NEA Project Site Panuti Site 1
Date: 24th March 2014
Project Site: Panuti Site 1
Number of participant: 12

- Private agricultural lands are adjacent to the project site, so the locals are concern about the crop damage by the light reflection from the solar panel.
- Proposed site is the gathering place during the festival time such as Narayan Jatra and Bhimsen Jatra, is it possible to make any small passage to pass through the project site.
- As the locals are aware about the surrounding conditions, local people have shown their desire for the job opportunity with the establishment of the project.
- Concern about the intense light reflection may cause damage to vision of the people, so the project management team needs to look for the alternatives.

List of Participants

Name of Site: Panauti Site 1 Date Visited: 24th March 2014.

Location: Panauti-12

SN	Name	Address	Phone Number	Signature
1	[illegible]	[illegible]	[illegible]	
2	[illegible]	[illegible]	[illegible]	
3	[illegible]	[illegible]	[illegible]	
4	[illegible]	[illegible]	[illegible]	
5	[illegible]	[illegible]	[illegible]	
6	[illegible]	[illegible]	[illegible]	
7	[illegible]	[illegible]	[illegible]	
8	[illegible]	[illegible]	[illegible]	
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13	[illegible]	[illegible]	[illegible]	
14	[illegible]	[illegible]	[illegible]	
15	[illegible]	[illegible]	[illegible]	
16	[illegible]	[illegible]	[illegible]	
17	[illegible]	[illegible]	[illegible]	
18	[illegible]	[illegible]	[illegible]	
19	[illegible]	[illegible]	[illegible]	
20	[illegible]	[illegible]	[illegible]	
21	[illegible]	[illegible]	[illegible]	
22	[illegible]	[illegible]	[illegible]	
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Panauti 2

1. Site Location and Accessibility

The proposed project site lies in southern eastern part of the Kathmandu valley in Panauti Municipality ward no 12 (as depicted in figure 1 and 2). The site is about 36 km distance by black top road from the Kathmandu city. From the access road, the site lies at the south- western side about 200 m in distance. The site doesn't form a part of conservation area and community forest. From the Power house station, it is about 300m away towards the western side. The general view of the site from different direction is shown in the figure below (Figure 3, 4, 5, 6,).

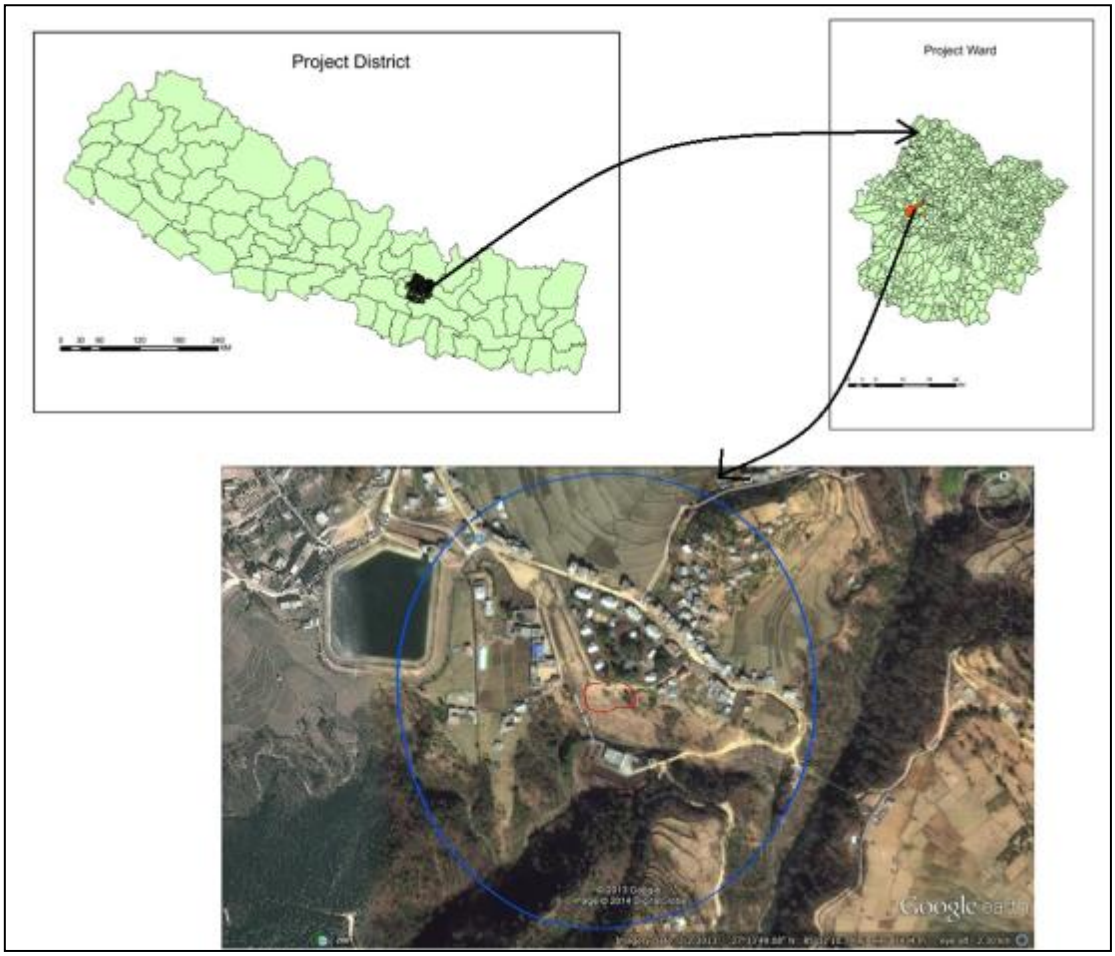


Figure 1 Location map of the site

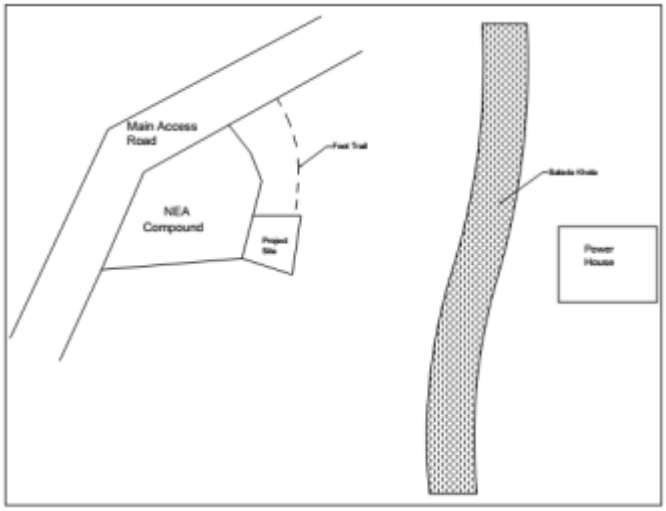


Figure 2. Sketch map of the project site

The GPS Coordinate of the Photography Position: 27°33'50.7"N and 85°32'0.16"E

Figure 3. Facing North

Figure 4.Facing East

Figure 5. Facing West

Figure 6. Facing South

The project site is about 4 Km roadway from the Panauti Bus station. Access road of the site connecting the main roads are foot trails about 100m in distance. Condition of existing main road is partially Black top and Gravel type. Foot trail are earthen type along the southern boundary of the NEA compound.

2. Physical Environment

Land use

Land use type of purposed project site consists of mainly barren land and few trees. The site is devoid of forest & natural vegetation and other infrastructures. within 250m periphery of the site are Satyal Dada at the western side has land marks including Reservoir, Dam, Schools (namely Shree Mavi Higher Secondary School, Shree Bal Adharsha School), Offices (Ward Office and Mahila Bal Bikash Kindra), Primary Health Post including agricultural land and few settlements. Eastern side is called Maza Gaun which comprise of settlements, agriculture land and private forest area including access road to the site. Northern side of the project site is Nepal Electricity Authority Courtyard including the main access road. Similarly, Southern side comprises steep hill that end at the bank of Salada Khola, Power house lies across the salada khola about 60m distance; rests are private forest land and agriculture fields.

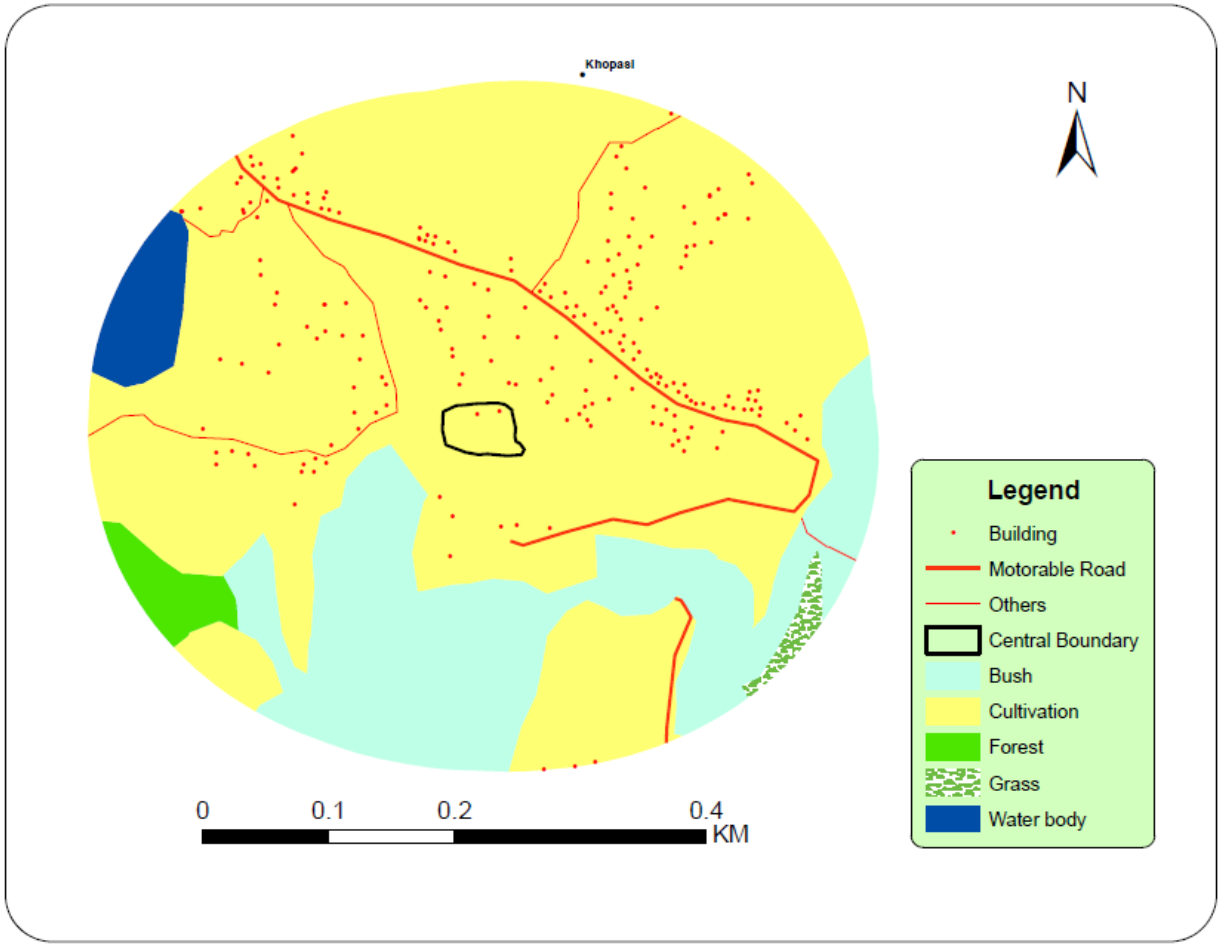


Figure 29. Land use map around the project site

Built Structures

The site is devoid of settlements. Major built structures are 5 electrical poles and a Krishna Mandir (Temple). Out of 5 electricity pole, 4 of them are distribution transmission line and one is high voltage transmission line. Similarly, Krishna Mandir (Temple) lies at the western edge of the project site including two other infrastructures (Temporary shade - Northern Side and a permanent built structure called Pati - Eastern Side)). The Pati is a construction of the locals on the private land that is not a part of the NEA land but it seems to be inside the project site. The GPS locations of the mentioned infrastructures are depicted as follows:

The infrastructures that occur in the site are electrical poles and a temple called Krishna Mandir.

 **Figure 30. Pole**	 **Figure 31. Pole**
GPS coordinate: 27˚ 33’ 50.2’’N 85˚32’ 11’’E Direction: Facing West	GPS coordinate: 27˚33’ 50.4’’N 85˚32’ 10.7’’E Direction: Facing East
 **Figure 32. Pole**	 **Figure 33. Pole**
GPS coordinate: 27˚33’ 50.4’’N 85˚32’ 10.7’’ E Direction: Facing West	GPS coordinate: 27˚33’ 50.5’’N 85˚32’9.3 ’’E Direction: Facing West

<table>
<tr>
<td> 
Figure 34. Transmission line</td>
<td> 
Figure 35. Krishna Mandir (Temple)</td>
</tr>
<tr>
<td>GPS coordinate:
27˚33’50.5 ’’N
85˚32’ 9.3’’E
Direction: Facing West</td>
<td>GPS coordinate:
27˚33’ 50.2’’N
85˚32’ 10.2’’E
Direction: Facing West</td>
</tr>
<tr>
<td> 
Figure 36 Built Structure</td>
<td> 
Figure 37. temporary stall</td>
</tr>
<tr>
<td>GPS coordinate:
27˚33’ 50.2’’N
85˚32’ 10.2’’E
Direction: Facing West</td>
<td>GPS coordinate:
27˚33’ 50.4’’N
85˚ 32’ 10.7’’E
Direction: Facing North</td>
</tr>
</table>

Figure 38 Built Structure (Building of Pati)

GPS coordinate:
27˚33' 49.9''N
85˚32' 11.3''E
Direction: Facing West

Length of the site

SN	Section	Length
1	**N/S Eastern Section**	25m
2	**N/S. Western Section**	30m
3	**E/W Northern Section**	54m
4	**E/W Southern Section**	56m

Figure 39 Access Road to the Project Site

Direction: Facing North

Morphology

Morphologically, proposed project site is a slopping land unit with slope angle 35^{o}. In the 250m surrounding area, western side (Satyal dada) is also a slopping land. Whereas, opposite eastern side is a flat land. Southern side is a steep hill up to the bank of Salada Khola having sharp slope angle of 40^{o}. Similarly, Northern side is a completely plain surface having grass land and a small water drainage from the reservoir. The picture of the proposed project site is shown in figure 16.

Figure 40 Picture of Proposed Site

Direction: Facing East

Erosion

Erosion type at the site is sheet erosion on the plain surface (Northern side) and rill erosion on the slopping hill towards southern side. Within 250m from the project site boundary, on the western and eastern side erosion type is dominated by sheet erosion. Northern Side, erosion types is rill and sheet erosion. Gully erosion and sheet erosion are visible in the southern territory of the project site.

Purposed site does not lie on the flood plain. But during heavy rainfall, high surface runoff enters into the area from the surrounding slopping land. Ground Geology of the site is hard soil with less possibility of landslide.

Climate

Based on the people's perception, weather of the site is cold in winter and warm in summer. Heavy rainfall is experienced on monsoon time during summer season where as occasional rainfall is experienced in winter season. Since the site is at the hill top, strong wind from west to east is common in both summer and winter season. Sunshine hour on the site are 11 hour per day on summer and 9 hour per day in winter.

3. Biological Features
Flora and Fauna within the Project Site

The purposed site lies outside the national park and conservation area. The site does not include locally important biodiversity species. Since the land is the property of NEA, the land is used for the purpose of the NEA work. Within the project site, there is no encroachment of the local people. The land is a barren land with few tree species. The details of tree species observed on the project site are as follows:

SN	Local Name	Scientific name	DBH	Height
1	Lapsi	*Choerospondias axillaris*	85 cm	20m
2	Piayo	*Betula alnoides*	35 cm	12m

	
Figure 41 Lapsi Tree	**Figure 42 Paiyo Tree**
GPS coordinate: 27°33'49.5"N 85°32'11.2"E Direction: Facing East	GPS coordinate: 27°33'49.8"N 85°33'10.0"E Direction: Facing west

The site is not a habitat of the wildlife.

Flora and Fauna Outside Project site

The plant species that occurs outside the project site are mainly Tuni, Okhar, Paiyo, Utish, Kiyo and Lapsi.

Commonly observed wildlife close to the site includes Mammal: Leopard, Monkey, Wolf and Squirrel, Birds: Dukur, Malewa, Jurale, Eagles, Geese, Kalij, and Reptile: Snake. The proposed site is neither a habitat to terrestrial wildlife nor the migratory route.

List of Plant species

SN	Common Name	Scientific Name
1	Tuni	*Toona Ciliata*
2	Okhar	*Juglans regia*
3	Paiyo	*Betula alnoides*
4	Utish	*Alnus nepalensis*
5	Kiyo	*Dibymocarpus villosus*
6	Lapsi	*Choerospondias axillaris*

List of Animal Species

SN	Common Name	Scientific Name
1	Leopard	*Panthera pardus*
2	Monkey	*Macaca fascicularis*
3	Fox	*Vulpes bengalensis*
4	Squirrel	*Ratufa macroura*

List of Bird Species

SN	Common Name	Scientific Name
1	Dukur (Oriental Turtle Dove)	*Streptopelia orientalis*

2	Malewa (Rock Pigeon)	*Columba livia*
3	Jurale (Striated Bulbul)	*Pycnonotus striatus*
4	Eagle (Pallas's Fish Eagle)	Haliaeetus leucoryphus
5	Geese (Cattle Egret)	*Bubulcus ibis*
6	Kalij Pheasant	*Catreus wallichii*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix. All of these species are located outside the project site.

List of Endangered/Threatened/Rare/Indigenous Species

SN	Species		Threat Category		
	Common name	**Scientific name**	**GoN**	**IUCN**	**CITEs**
A	**Floral Species**				
1	Okhar	*Juglans regia*	Protected		
B	**Faunal Species**				
1	Fox	*Vulpes bengalensis*			III
2	Leopard	*Panthera pardus*			I
c	**Aves species**				
1	Kaliz	*Catreus wallichii*	Protected		I

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Social Economic and Cultural Environment

Nearest settlement is Khopashi about 100m distance from the site boundary. It has a mixed population of Brahmins and Chhetris. Number of households estimated in the settlement is around 50 with a total population of about 190. Nearly 80% of the households rely on agriculture while around 15% are involved in other profession for livelihood.

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Khopasi	12	Satyal Dada	100m	Chhetri and Brahmin	50	100	90	85	15

Land ownership

The site property is owed by NEA. Land encroachment by local is not observed and reported.

Places of cultural significance:

The site includes a Krishan Mandir (Temple) and two other structures of the Temple. During the survey, frequency of people on the temple was less. But, people do come to the temple on the time of occasion such as Krishnasthami, Krishna jatra and so on.

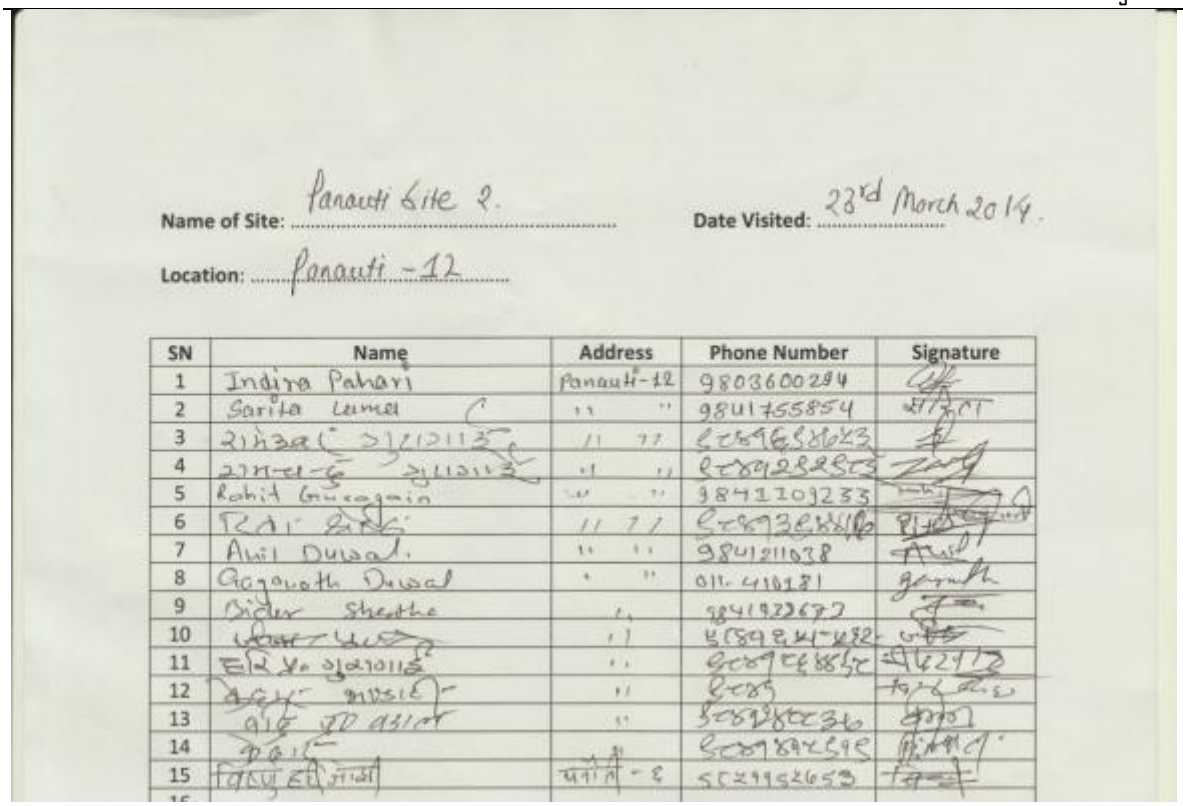
The nearest site of cultural significance is a Buddha Gumba which is about 270 m away from the proposed site. It is small monastery and the only one place for the Buddhist monk to come for the worship. Though it is of small area, it is an important religious place for the Buddhist people of the area.

Public consultation

District: Kavre
Name of VDC: Kophasi
Meeting Venue: NEA Project Site Panuti Site 2
Date: 23th March 2014
Project Site: Panuti Site 2
Number of participant: 14

- People want to have employment with the establishment of the projects.
- Including the project site other barren land should be used for the solar plane installation (suggestion by the locals).
- Temple on the site is the only Krishna temple in the area, with the establishment of the project on site 2, it will be difficult for the local to visit temple. So, it will be better to have an alternative for this problem.
- As the site is near the forest area, there is a chance of wildlife disturbance. These thing need to be taken into consideration for the establishment of solar panel.
- During the festival such as Bhimsen Jatra and Narayan Jatra, the proposed sites 1 and 2 are the road way, so the Project management team needs to consider these issues during preparation of the study report.

List of Participants



Name of Site: Panauti Site 2. Date Visited: 23rd March 2014.

Location: Panauti -12

SN	Name	Address	Phone Number	Signature
1	Indira Pahari	Panauti-12	9803600284	
2	Sarita Lama	" "	9841755854	
3				
4				
5	Rohit Gurung	" "	9841709233	
6				
7	Anil Dulal	" "	9841211038	
8	Gajanath Dulal	" "	011-490181	
9	Bidur Shrestha	"	9841923677	
10		"		
11		"		
12		"		
13		"		
14				
15				

Trishuli Site

1. Site Location

The proposed site for the installation of solar farm is located at ward number 10, Trishuli Bazar of Bidur Municipality in Nuwakot district. The site is enclosed within the coordinates $27^0$55'20.1"N; $85^0$08'49.3"E, $27^0$55'21.1"N; $85^0$08'47.9"E, $27^0$55'20.1"N; $85^0$08'46.1"E and $27^0$55'19.1"N; $85^0$08'49.3"E. Figure 1, 2 and 3 presents the location map of the project site.

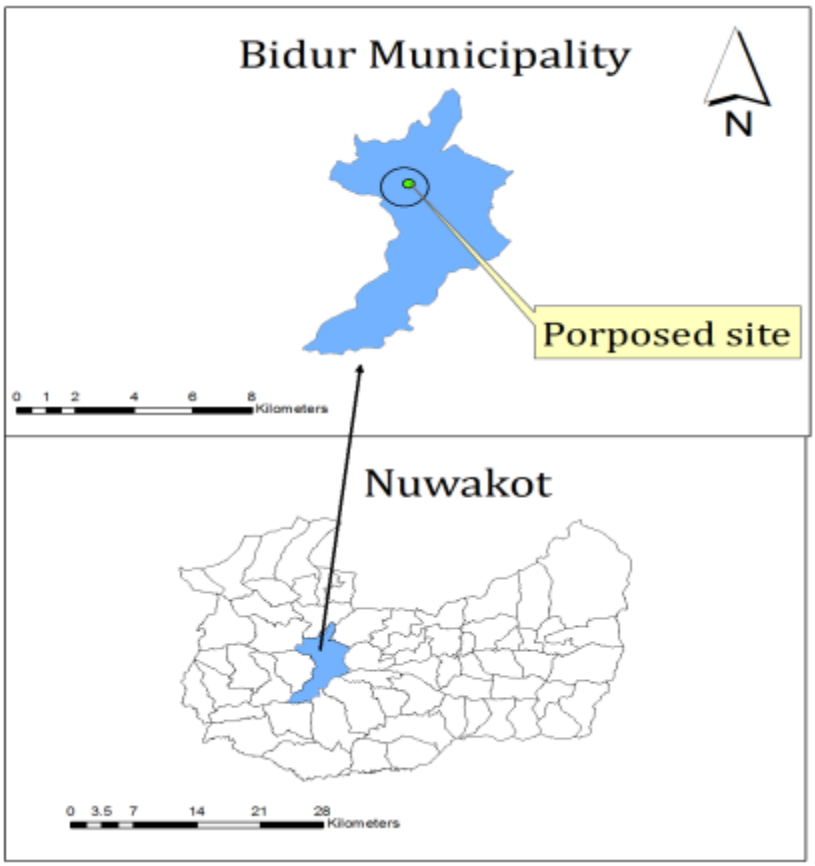


Figure 1: General Location of the site

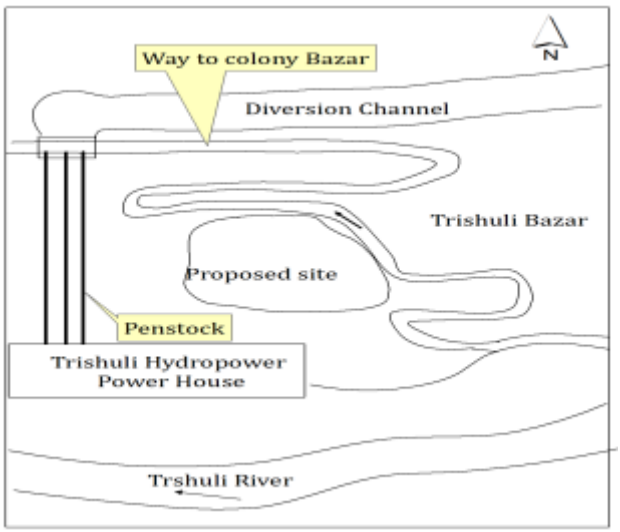


Figure 2: Sketch of the site

Figure 3: Google map of the site Physical Environment

The site is about 69km north-west from Kathmandu through blacktopped road. There is well access of road network to the site as it is located along the main road (Kathmandu-Trishuli road). The powerhouse of the Trishuli Hydropower lies in the south at a distance of about 50m, and the site is being used as the store of the Trishuli Hydropower. The general view of the site from different direction taken from $27^0$55'19.59"N and $85^0$08'48.05"E is shown in the picture below:

Figure 4.Facing North

Figure 5.Facing East

Figure 6. Facing West

Figure 7. Facing South

2 Physical Environment

Land Use

The proposed site for the installation of the solar farm lies north of Trishuli Hydropower Power House at a distance of about 50m in a settlement area used for housing and agriculture.

Within 250m periphery of the site is the Trishuli Bazar on the eastern, and northern side. Trishuli Bazar is a marketplace for the people around Nuwakot and Rasuwa district. Similarly, western and southern side is dominantly agricultural lad with few households.

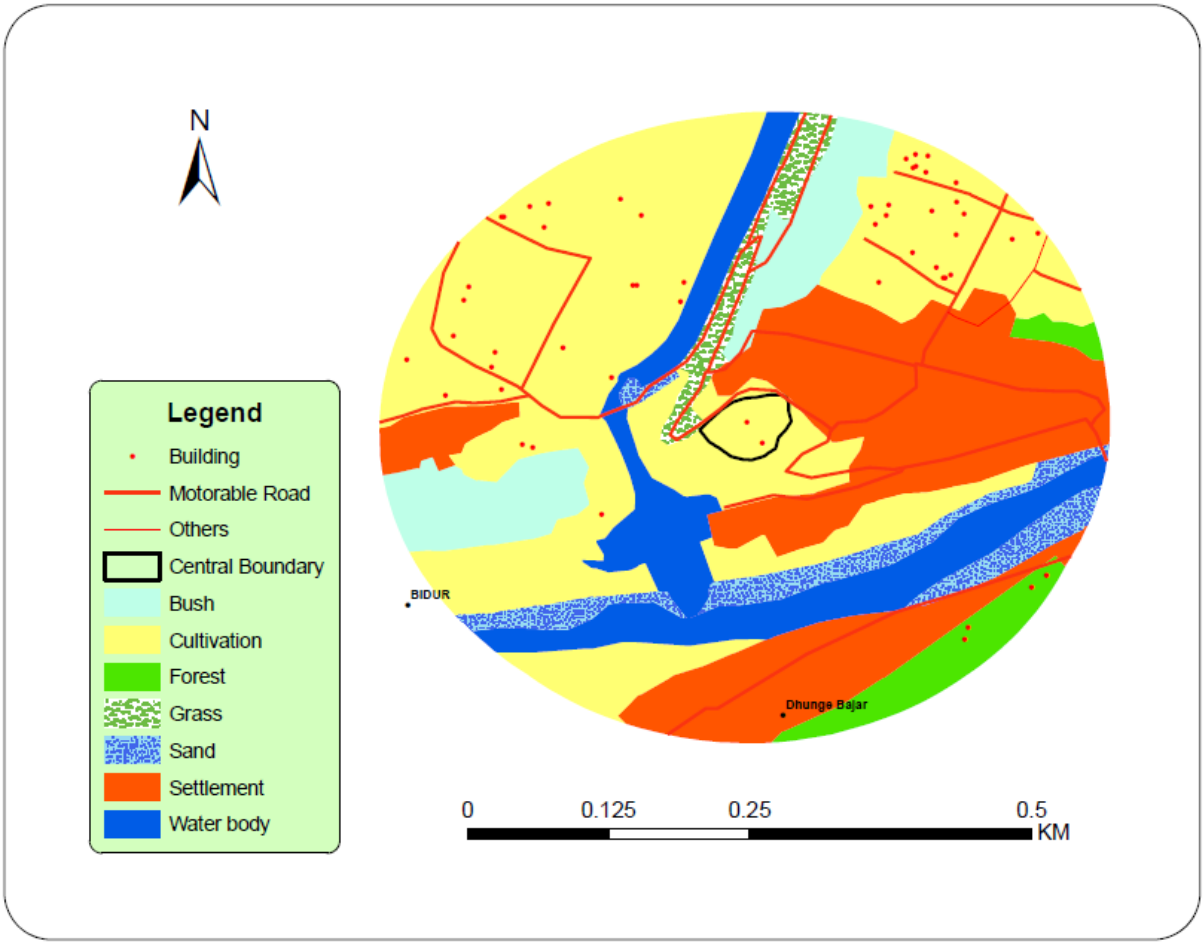


Figure 43. Land use map around the project site

Built Structures:

There are two built structures within the site which are used as store to keep worn out machineries of Trishuli Hydropower. The detail of the built structures is presented in the Table 1 below.

Table 3: Details of the built structures

S.N.	Type	Length (m)	Breadth (m)	Area(m^2)	Wall/Roof
1	Store	30	9	270	Brick, cement wall/tin roof
2	Store	14	10	140	Metal trust/tin roof

GPS Coordinates: $27^0$55'19.09" N, $85^0$08'48.06" E

GPS Coordinates: $27^0$55'19.91" N, $85^0$08'47.70" E

Figure 44: Built structures within the site

Similarly, there are two electrical poles within the site. Likewise a High voltage transmission line also passes through the site. The detail of the poles and transmission line is given in the Table 2 below.

Table 2: Location of electrical poles within the site

S.N.	Particular	Latitude	Longitude
1	Pole 1	$27^0$55'19.1"	$85^0$08'46.7"
2	Pole 2	$27^0$55'19.5"	$85^0$08'47.5"
3	Pole 3 (transmission line)	$27^0$55'19.5"	$85^0$08'47.5"

The photograph of each of the pole is presented below:

Pole 1


Pole 2


Pole 3 (transmission line)

Figure 45: Electrical poles within the site

Built structures around 250m periphery of the site include the settlement of Trishuli Bazar in the eastern side, penstock of Trishuli Hydropower in the western side, diversion channel in the northern side and powerhouse of Trishuli Hydropower in the western side.

Site Dimensions

The length of the site from various directions is presented below in Table 3.

Table 3: Site Dimensions

N/S Eastern section	40m
N/S Western section	60m
E/W Northern section	50m
E/W Southern Section	75m

Landmarks

Northern side: On the northern side at a distance of 100m there is a diversion channel that supplies water to the Trishuli Hydropower.

Southern Side: On the southern side at about a distance of 70m from the boundary of the site, there is a temple (Bhagawati temple) and monastery (Sugatpur Bihar, established in 2008 B.S). Similarly, power house of Trishuli Hydropower lies in the south western part of the site.

Eastern Side: On the eastern side at a distance of about 15m from the boundary of the site, Trishuli Bazar is located.

Western Side: On the western side of the site at a distance of about 60m from the western boundary of the site there are penstock pipes of the Trishuli Hydropower.

Approach Road

The site is accessible through 60km black topped motorable road from Kathmandu. It lies in the western part of Trishuli Bazar, about 1.5km from the Trishuli Bridge, 70m above the microbus park.

Figure 46: Access road to the site

Morphological Condition:

Though the surroundings of the site are a slopping area with slope angle of about 30^0, proposed site is a relatively flat with slope angle less than 5^0. Eastern side outside the site boundary and within 250m periphery steepness is relatively low compared to that of western side which contains the area with the penstock pipes of the Trishuli Hydropower.

Figure 47: General surface view of the site

Erosion

As the proposed site is flat land sheet erosion is very common type of erosion occurring over the site.

Though the slope of the area within 250m periphery of the site is relatively high, other forms of erosional features are not observed. Due to very low flow of water in the Trishuli River, bank cutting in the southern side is also not observed.

Drainage

The proposed site is located above the floodplain of Trishuli and has remote possibility of water logging even in the monsoon (June to September). Trishuli River is the nearest natural drainage from the site lying about 150m south. Surface runoff from the site drains to Trishuli River.

Figure 48: Trishuli River along with Trishuli Bazar above it

Ground Geology

The site ground geology is represented by alluvial deposits of quaternary age. Soft soil covered with vegetation is present over the site. Soil texture is dominated by silt and sand.

Climate

The climate of the project site is sub-tropical. Weather around the site is characterized by cold winter (December to February) and very hot and humid summer (April and May). During monsoon season (June to September) very heavy rainfall occurs, but rainfall is occasional during winter. High wind storm occur during summer season (April and May) while it is calm during winter. Dominant wind direction is from north to south. Average sunshine hour during winter is 9.5 hours; while in summer is 12 hours.

3. Biological Environment

The proposed site for the installation of solar farm lies outside National Park, conservation areas and natural forest areas.

Flora

Thick vegetation cover is observed in the western part of the site which includes shrubs and trees. Sisso (*Dalbergia Sisso)* is the dominant planted tree species in the site. The site doesn't include any locally important species of conservation significance. The details of the tree species present within the site is given in Table 4 below.

Table 4: Plant species within the Solar Farm Site

S.N	Common Name	Scientific Name	DBH	Height	Latitude	Longitude
1	Aap	*Mangifera indica*	35	22	$27^0$55'19.8"	$85^0$08'49.0"
2	Sisso	*Dalbergia Sisso*	28	23	$27^0$55'20.2"	$85^0$08'48.9"
3	Sisso	*Dalbergia Sisso*	24	27	$27^0$55'20.1"	$85^0$08'48.6"
4	Sisso	*Dalbergia Sisso*	24	26	$27^0$55'19.8"	$85^0$08'47.7"
5	Sisso	*Dalbergia Sisso*	25	12	$27^0$55'19.6"	$85^0$08'47.5"

6	Sisso	*Dalbergia Sisso*	23	14	$27^0$55'49.5"	$85^0$08'47.0"
7	Sisso	*Dalbergia Sisso*	24	13	$27^0$55'49.5"	$85^0$08'47.3"
8	Sisso	*Dalbergia Sisso*	27	14	$27^0$55'49.5"	$85^0$08'47.53"
9	Sisso	*Dalbergia Sisso*	32	12	$27^0$55'49.8"	$85^0$08'47.57
10	Chuwa	*Phlogacanthus thyrsiflorus*	24	8	$27^0$55'49.8"	$85^0$08'47.57"
11	Aap	*Mangifera indica*	38	11	$27^0$55'19.6"	$85^0$08'48.7"
12	Bhogote	*Maesa macrophylla*	22	6	$27^0$55'19.6"	$85^0$08'48.67"
13	Aap	*Mangifera indica*	31	25	$27^0$55'19.6"	$85^0$08'48.67"

Figure 49: Vegetation cover within the site

Similarly, plant species outside the site boundaries includes Sisso, Peepal, Aap, Palas, Uttis, Masala, Bar and Katahar. These planted species are present in several small patches around the 250m periphery of the site.

Fauna

The solar farm site is not the natural habitat of the wildlife. Table 5 presents the faunal species reported in the earby forested areas based on the public interaction.

Table 5: Faunal Diversity in the surrounding areas of the Solar Farm

Mammals

S.N.	Common Name	Scientific name
2	Jackal	*Canis aureus*
3	Nyauli Musho	*Herpestes auropunctatus*
4	Squirrel	*Ratufa indica*

Birds

S.N.	Common Name	Scientific name
1	Jureli	*Pycnonotus cafer*
2	Dhukur	*Streptopelia chinensis*
3	Lampuchre	*Urocissa erythrorynca*
4	Chibe	*Dicrurus macrocercus*
5	Eagle	*Milvus migrans*
6	Fiste	Phylloscopus schwarzi

Reptiles

S.N.	Common Name	Scientific name

2	Lizard	*Calotes versicolor*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, the following species (Table 6) has been identified as species of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

Table 6: List of Endangered/Threatened/Rare/Indigenous Species of the surrounding areas

SN	Species		Threat Category		
	Common name	Scientific name	GoN	IUCN	CITEs
A	**Floral Species**				
B	**Faunal Species**				
2	Syal	*Canis aureus*			III

Note:

IUCN Red List Categories: *Extinct (EX), Extinct In the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD)*

GON Categories*: P Protected by legislation*

CITES Categories*: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species)*

4. Socio-economic and cultural environment

Trishuli Bazar is the nearest settlement on the eastern side of the project at distance of 20 m. The community is dominated by Tamang ethinically (Table 7). Agriculture is the main occupation of the local people followed by business. The details of socio-economic status of local people are given below;

Table 7: Demography and Ethnicity of the surrounding settlements

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Bidur municipality	10	Trishuli bazar	Eastand N-E /200m	Tamang	250	483	585	40	60
2	Bidur	9	Trishuli colony	North /200	Tamang	1257	2743	2223	65	35

Site Ownership

The site is the property of NEA. The site is not encroached by outsiders. Dalit or marginal family will not be affected adversely by project establishment. The land is devoid of any public or community structure.

Cultural, Historical, and Archeological Importance

The site does not show signs of religious or cultural , historical or archeological artifacts.

The nearst site of cultural and religious significance is Bhairavi Temple on the eastern side at distance of about 300m.

Land Marks

There is one campus on the eastern side of the project at distance of 300m. There are some market areas as well as school in the northern and eastern side of project at a distace of more than 300m.

(Fig 15: higher secondary school in the project periphery).

Public consultation

District: Nuwakot
Name of VDC: Bidur municipality
Date: 5/04/2014
Number of participant: 5

The key cocern of the local people are presented as under.

- The site is the store of Trishuli Hydropower Project and is enclosed within its compound. Thus, local people did not have much concern regarding the installation of solar farm in the proposed site.

List of People consulted

S.N.	Name of consult person	Contact person	Remarks
1	Shyam rimal	9841833651	
2	Keshab rimal	9841 546784	
3	Narayan lamsal	9841642672	
4	Shiva raj panthi	9841658346	
5	Bishnu chalise	9841262483	

Sundarijal site

1. Site location

The purposed project site lies in north-eastern part of the Kathmandu Valley in Sundarijal VDC ward no. 9 (as depicted in figure 5), adjacent to the Bagamati River. The site is about 20 Km distance by black top road from the Kathmandu City Center. The access road to the site from main road lies on the south western corner from the Sudarijal Bus Station i.e. about 25 m in distance. The site lies outside of Shivapuri National Park/Conservation area. From the Sundarijal Power House Station, Shivapuri park is about 200m towards northern side. Figure 1, 2 presents the site location. The general view of the site from different direction is shown in the figure below (Figure 3, 4, 5, 6).

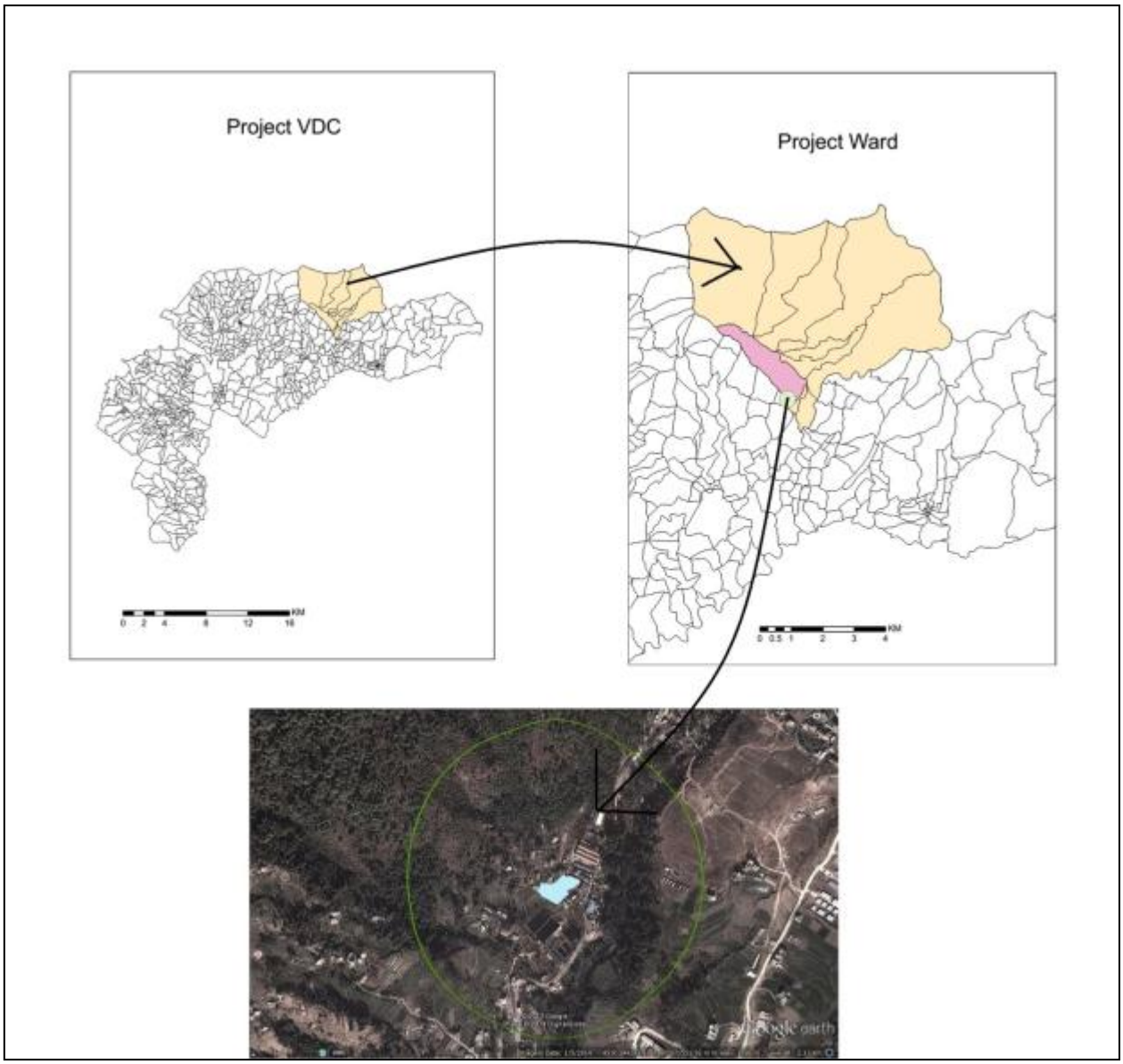


Figure 1: Site Location

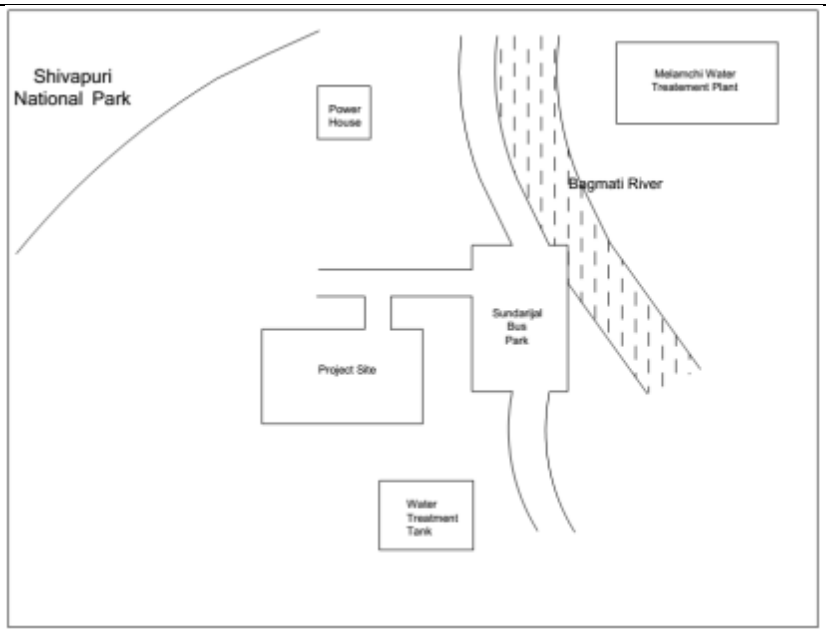


Figure 2: Sketch Map of the Site

The GPS coordinate of the photography point is 27° 45' 33.51" N & 85° 25' 12.75" E

Figure 3.Facing North

Figure 4.Facing East

Figure 5. Facing West

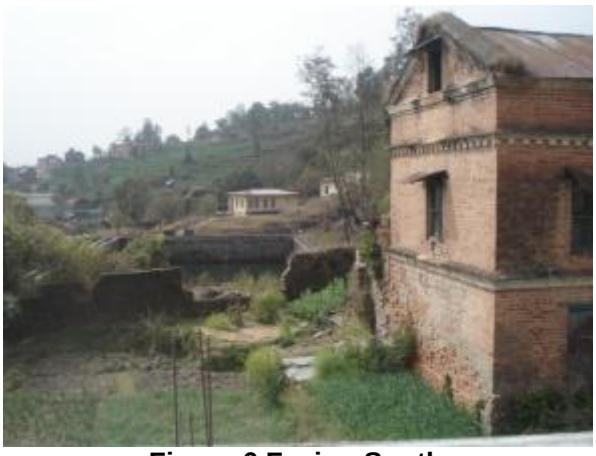


Figure 6 Facing South

2. Physical Environment

Land use type of purposed project site consists of mainly settlements and agriculture land including few trees. The site is devoid of forest & natural vegetation (Figure 7).

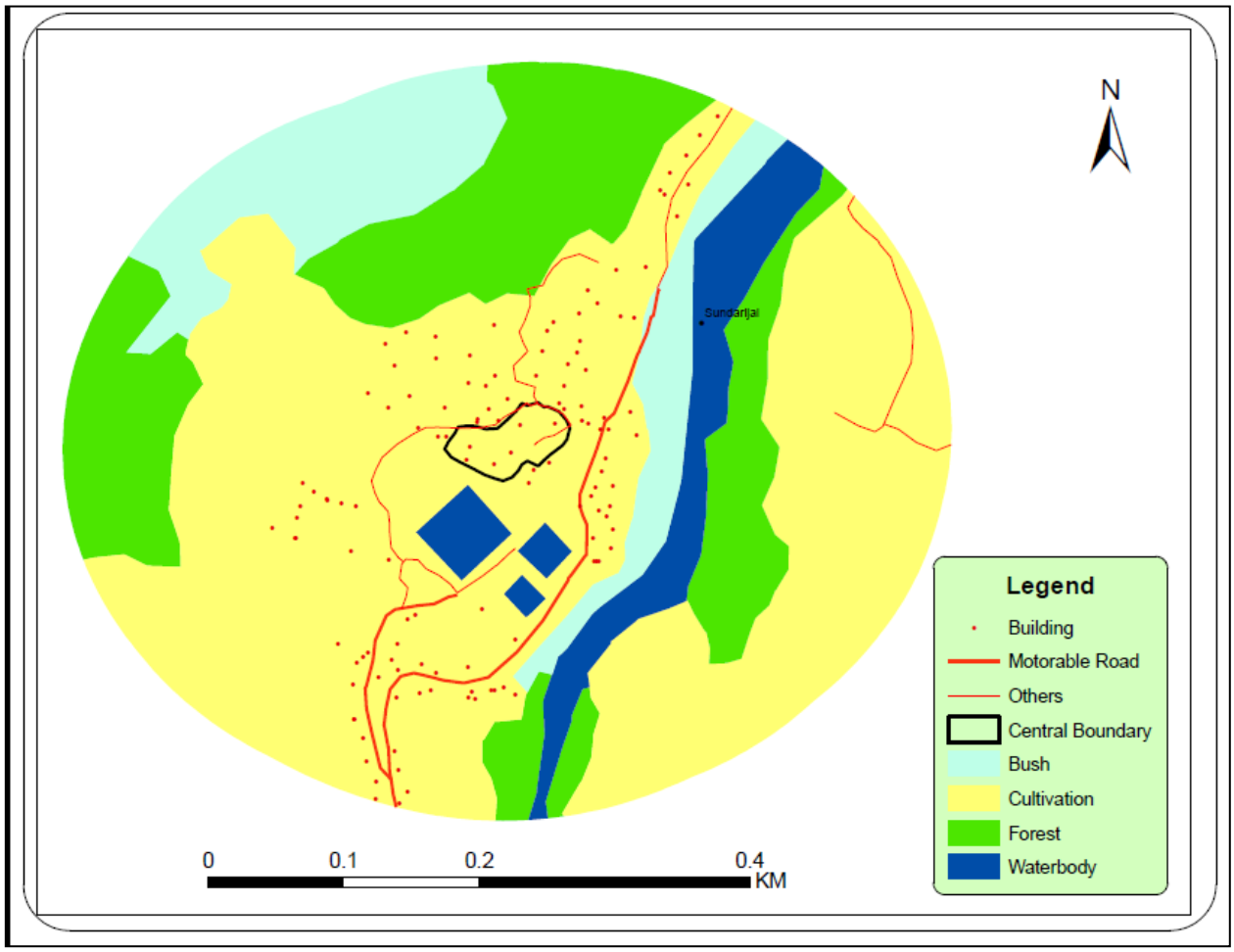


Figure 50. Land use map around project site

within 250m radius of the site boundary shows following land uses. Western and northern sides, after the agricultural land are covered by patches of forest area of National Park. Small patch of Forest, is observed on the eastern side along Bagmati River beyond the Bazaar area. On the southern side lies Sundarijal Water Treatment Tank, Agricultural Land and few scattered houses. In total, 40 houses are observed within the periphery of 250m that includes commercial, institutions and residential houses. All total 35 households are identified within the 250m radius from the boundary of the site.

Built Structures

Allocated plot of land for the solar farm installation is 7 Ropani and 5 Ana (about 0.3 ha). In total, six built structures locates in the Site. All of them are accommodations housing structures for the NEA staffs. Out of 6 houses, five houses are old structures built during the Chandra Samsar period around 1991 B.S. whereas one is recently built concrete structure. In addition, site includes a toilet and a small building block of brick lies in western and eastern side respectively. Figure 8 to 15 presents the built structures of the site.

Figure 51. House no 1

GPS coordinate:
27˚45'33.5''N 85˚25'11.6''E
Direction: Facing North

Figure 52. House no 2

GPS coordinate:
27˚45'33.08''N 85˚25'12.21'' E
Direction: Facing Northkj

Figure 53. House no 3

GPS coordinate:
27˚45' 33.34''N 85˚25'12.64'' E
Direction: Facing East

Figure 54. House no 4

GPS coordinate:
27˚45' 33.89'' N 85˚25' 13.04'' E
Direction: Facing North

Figure 55. House no 5

GPS coordinate:
27˚45' 33.89'' N 85˚25'13.04'' E
Direction: Facing East

Figure 56. House no 6

GPS coordinate:
27˚45'33.09'' N 85˚25'13.5'' E
Direction: Facing North

Figure 57. Toilet

GPS coordinate:
27˚45'33.14'' N 85˚25'11.6'' E
Direction: Facing East

Figure 58. Building Block

Two electric poles are placed in the designated site to support the main electricity distribution line and telephone lines. The GPS location of individual pole is given in figure 16 and 17.

Photographs of electrical poles with the site

 **Figure 59. Pole no 1**	 **Figure 60. Pole no 2**
GPS coordinate: 27˚45'33.9'' N 85˚25'12.9'' E Direction: Facing East	GPS coordinate: 27˚45' 33.8'' N 85˚25'13.8'' E Direction: Facing East

Natural Drainage

The site is devoid of natural drainage. Natural drainage close to the site lies towards western border of the site which is located on the steep hill of the Shivapuri National Park as shown in figure 18.

Figure 61. Natural Drainage

A drinking water supply pipe line is present inside the project site which is extension of the nearby main water supply pipe of the drinking water treatment plant (Figure 19).

Figure 62. Water Supply

GPS coordinate:
27°45'33.74"N 85°25'12.65"E
Direction: Facing East

Approach Road

Roadway from the Kathmandu city to the proposed site is about 25 km (Black Top Road). Access road to the site is 25 m from the main road which is a motorable road and condition of the existing road is earthen type. The photograph of the access road is shown in Figure 20.

Figure 63. Access Road

Direction: Facing East (Top)

Site Dimensions

The Length of the site from different direction is given below in Table 1:

Table 4. Length of Site

N/S Eastern Section	80m
N/W Western Section	70m
E/W Northern Section	60m
E/W Southern Section	55m

Nearest Landmarks

The nearest school is Okhareni Higher Secondary School at 5 minutes walking distance .i.e. approximately 400 meters towards north-eastern side. The nearest health facility is Nepal Medical Hospital, about 2 kilometers from the site.

Morphology
Morphologically, proposed project site is a table flat land having <10^{o} of slope angle. Within 250m radius from the site boundary shows the following morphological features. Western side (Shivapuri National Park Boundary) has steep land with slope angle around 30^{o}. Eastern side is table flat land consists of Bagmati River Canyon with slope angle 10^{o}. Northern side is a way to power house which is similar to the eastern side with slope angle 12^{o}. Similarly, Southern side is a plain land with slope angle of <5^{o}.

Erosion

As the proposed site is a flat land, sheet erosion type is common. Within 250m radius from the site boundary, the most erosion prone landscape is north-western side to the project location (Shivapur National Park) has signs of landslide and gully erosion. Other sides are similar to the project site

Flood Conditions
Project site lies above the flood plain of Bagmati River. But, during heavy rainfall on monsoon season, natural drainage on the north-western side causes damage to the wall of the project site.

Ground Geology
Ground geology is represented by soft soil mostly of colluvial nature.

Climate
The area represents sub-tropical climate. Weather of the site is chilling cold on winter and warm and comfortable summer. Heavy rainfall is experienced on monsoon time (June to September), while in winter rainfall is little.

Since the site is at the base of Shivapuri hill, mild wind from east to west is common in both summer and winter season with occasional gusty winds in the dry summer (March to May). Sunshine hours on the site is 10 hours per day for winter season and 12 hours per day for summer.

3. Biological features

The purposed site lies outside the Shivapur National Park and doesn't locate within forest area. The site doesn't include locally important biodiversity species. Since the land is private property of NEA (Nepal Electricity Authority), the land is utilized by the staff members for residential as well as vegetable farming. .

Figure 64. Growing vegetable inside the site area

Flora

Three species of trees are identified inside the project boundary namely Lapsi tree, Naspati trees and Aru tree. The details of the trees are given in Table 2 below:

Table 5. Details of trees

S.N	Local Name	Scientific Name	Dbh (cm)	Height (m)	GPS coordinate
1	Aru tree 1	*Prunus persica*	32	4	27˚45' 33.04'' N 85˚ 25' 11.77'' E
2	Aru tree 2	*Prunus persica*	21	7	27˚45' 33.49'' N 85˚ 25' 11.27'' E
3	Aru tree 3	*Prunus persica*	25	6	27˚45' 33.66'' N 85˚ 25' 11.30'' E
4	Naspati tree 1	*Pyrus communis*	41	8	27˚45' 33.85'' N 85˚ 25' 12.18'' E
5	Naspati tree 2	*Pyrus communis*	49	10	27˚45' 34.03'' N 85˚ 25' 12.67'' E
6	Lapsi tree	*Choerospondias axillaris*	64	12	27˚45' 34.25'' N 85˚ 25' 13.48'' E

Photographs of Trees

Figure 65. Aru tree 1

GPS coordinate:
27˚45' 33.04'' N 85˚ 25' 11.77'' E

Figure 66. Aru tree 2

GPS coordinate:
27˚45' 33.49'' N 85˚ 25' 11.27'' E

Figure 67. Aru tree 3

GPS coordinate:
27˚45' 33.66'' N 85˚ 25' 11.3'' E

Figure 68. Naspati tree 1

GPS coordinate:
27˚45' 33.85'' N 85˚ 25' 12.18'' E

Figure 69. Naspati tree 2

GPS coordinate:
27˚45' 34.03'' N 85˚ 25' 12.67'' E

Figure 70. Lapsi tree

GPS coordinate:
27˚45' 34.25'' N 85˚ 25' 13.48'' E

Fauna

Common terrestrial animal seen by the locals in the project site are presented in Table 3. But the project site is not the habitat for the any of the terrestrial wildlife and it is not a migratory route to any wild animals.

Table 3: Faunal Species in the surroundings of the site

Mammals

SN	Common Name	Scientific Name
1	Monkey	*Macaca Mulatta*
2	Deer	*Odocoileus virginianus*

Birds

SN	Common Name	Scientific Name
1	Sparrow	*Passer italiae*
2	Crow	*Corvus splendens*
3	Eagles	*Haliaeetus leucoryphus*
4	Pigeon	*Columba livia*
5	Gauthlai	*Aerodramus brevirostris*
6	Bakula	*Ardea alba modesta*
7	Koili	*Cuculus canorus*

Reptiles

SN	Common Name	Scientific Name
1	Lizard	*Zootoca vivipara*

Endangered/Threatened/Rare/Indigenous Species

Of the reported floral and faunal species, none of the species are of conservation significance under the conservation list of Government of Nepal (NPWC Act, 1973), IUCN Red data book and CITES Appendix

4. Social Economic and Cultural Environment

The surrounding settlement within 250m radius of the project site boundary is comprised of 470 households. The settlements are close to the site. The dominant ethnic group of the site surrounding is Tamang. Nearly 50% of the households are farmers ;while rest have adopted other occupations (Table 5)

Table 5: Socio-economic characteristics of the site surrounding

SN	Name of the VDC	Ward No of the Site	Name of the Nearby Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
1	Sundarijal	9	Sundarijal	25m	Tamang	61	178	178	33%	67%
2	Sundarijal	1,2,3,4 ,5,6,7, 8	Sundarijal	25m	Tamang	409	1055	1054	75%	25%

Site land ownership
The proposed site is the property of NEA and does not show any type of land encroachment.

Public consultation

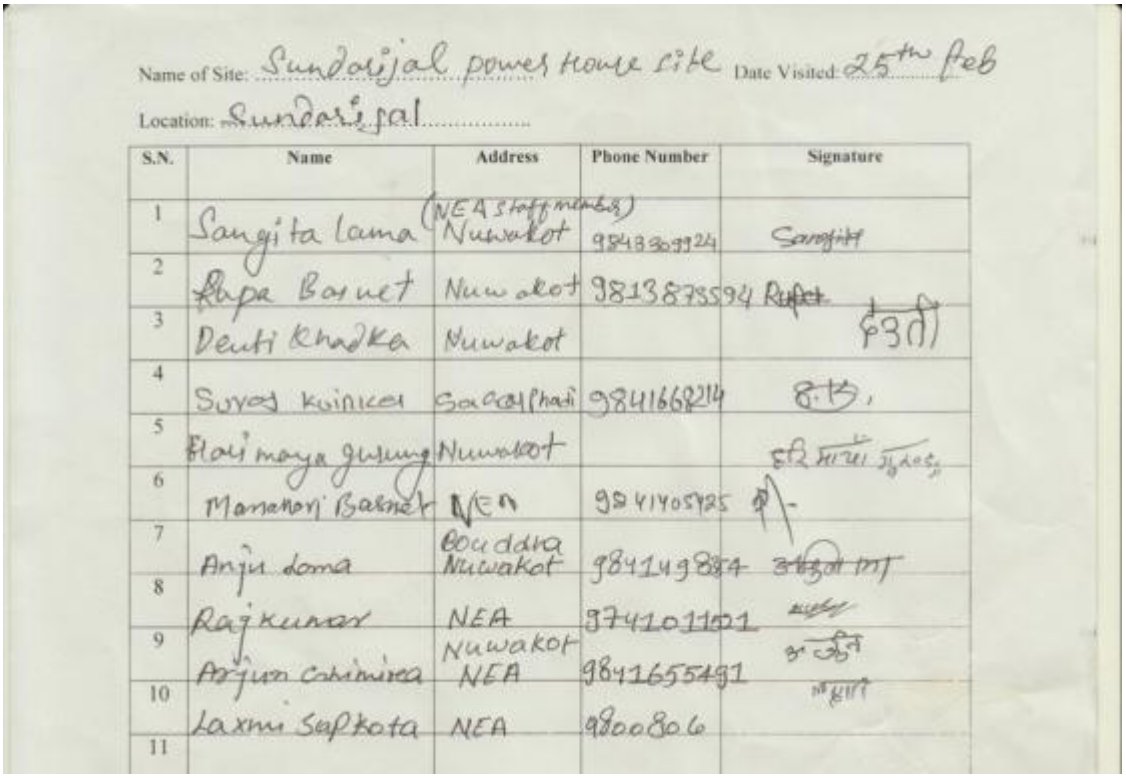
District: Kathmandu
Name of VDC: Sundarijal
Meeting Venue: NEA Project Site

Date: 25th February 2014
Project Site: Sundarijal
Number of participant: 10

The Key issues noted in the public consultation are:

- Private agricultural lands are adjacent to the project site, so the locals have concern about the intense light reflection from farm causing damage to vision of the people, so the project management team needs to look for the alternatives
- Proposed site consists of staff quarters, so before installation of panels alternatives need to be made.
- As the locals are aware about the surrounding conditions, local people have shown their desire for the job opportunity with the establishment of the project.

List of Participants



Name of Site: Sundarijal power house site Date Visited: 25th Feb

Location: Sundarijal

S.N.	Name	Address	Phone Number	Signature
1	Sangita Lama	(NEA staff member) Nuwakot	9843099124	Sangita
2	Rupa Basnet	Nuwakot	9813875594	Rupa
3	Deuti Khadka	Nuwakot		
4	Suraj Kunwar	Sacalphati	9841668214	
5	Bhaimaya Gurung	Nuwakot		
6	Manakori Basnet	NEA	9841405425	
7	Anju Lama	Boudda Nuwakot	9841498854	
8	Rajkumar	NEA	9741011021	
9	Arjun Chhimwa	Nuwakot NEA	9841655491	
10	Laxmi Sapkota	NEA	9800806	
11				

Annex 2: Environmental Screening Format to Evaluate the GSEEP project

Instructions for Completing Screening Checklist

1. The environmental screening checklist is designed to capture and record relevant environmental information needed for environmental screening of a proposed subproject. It also provides early warning to subproject preparation team about potential environmental concerns, and provides opportunity to address them in time.
2. The screening team must be familiar with subproject's background through secondary information before walk through.
3. During walkthrough the team should held discussion or inquire with communities along the way. Note a more detailed environmental investigation will follow at the later stage. The method to be follow include; observation, inspection and inquiry with local people.
4. Use ball pen or pencil to fill the checklist. Do not use washable ink or that can mutilate.
5. Insert new page if the spaces provided is not sufficient.
6. The team must carry topographical map with them, mark important environmental features on the map and refer to appropriate section of the checklist. The map should be included as annex to the screening report.
7. The team should take photographs of areas with environmental implications, and attach in the report with caption.
8. The team should include summary of the screening findings, listing main environmental issues / concerns related to subproject.

A. PROJECT BRIEF A. PROJECT BRIEF

Name of sub-project/ site, (name of VDCs, main settlements and other identifying features)	
Proposed Work / Activities,	
Implementation approach and institutions involved	
Cost (NRs): Approximate Investment Required	

B. ENVIRONMENTAL SETTING OF THE PROJECT LOCALITY

B.1	**Protected Areas and/or Forest**		
	Are there any Protected Areas or Forest on the component sites (Tick Mark)	**Yes**	**No**
	If yes, please provide following information		
	Name of Forest / PA	Description-Past and present conditions and values (including size, species found, ownership type):	
		Problems and causes of problems	
B.2	**Landslides and Erosion Prone Areas**		
	Are there any Landslide and Erosion prone areas on the component sites ? (Tick) (Tick Mark)	**Yes**	**No**
	If yes, please provide following information		
	Location in relation to site	Description-Past and present conditions and values (including tentative area to be affected, risky areas):	
		Problems and causes of problems	
B.3	**Flood Prone / River Cutting / Low Lying Areas**		
	Are there any Flood Prone / River Cutting / Low Lying areas on the component sites ? (Tick) (Tick	**Yes**	**No**

	Mark)			
	If yes, please provide following information			
B.4	**Built Structures within the site boundary**			
	Are there any built structures on the component sites ? (Tick) (Tick Mark)		**Yes**	**No**
	If yes, please provide following information			
	No of structures		Description-of the structures including ownerships and relocation need	
			Problems and causes of problems	
B.5	**Water sources and springs within site**			
	Are there any water sources or sprigs on the component sites ? (Tick) (Tick Mark)		**Yes**	**No**
	If yes, please provide following information			
	Type of source		Description-of the source along with use status	
			Problems and causes of problems	
B.6	**Historical / Religious / Cultural Sites** such as temple, mosque, palace, etc.			
	Are there any Historical / Religious / Cultural sites on the component sites ? (Tick) (Tick Mark)		**Yes**	**No**
	If yes, please provide following information			
	Name of site	Location in relation to site	Description-Past and present conditions and values	
			Problems and causes of problems	
B.7	**Aesthetically Important Viewpoints**			
	Is the site locates on Aesthetically Important View points? (Tick) (Tick Mark)		**Yes**	**No**
	If yes, please provide following information			
	Name of site	Location in relation to site	Description-Past and present conditions and values	
			Problems and causes of problems	
B.8	**Main Settlement and Trade Centre:** Bazaar areas, major settlements, settlement of special groups			
	Is the site locates on Aesthetically Important View points? (Tick) (Tick Mark)		**Yes**	**No**
	If yes, please provide following information			
	Name of site	Location in relation to site	Description (approximate no. of HH and population, nature and special feature / importance / significance)	
B.9	**Check country's legal requirement (including cost and sensitivity criteria)**			

C. Decision on Categorization

After reviewing the above, it is determined that the sub-project is:

Category I: Interventions requiring IEE (or limited EA)

Category II: Interventions requiring site Environmental Management Plan (EMP)

Category III: Interventions requiring Code of Practice

Note: Section 1.6 of ESMF excludes high risk interventions from support under the project. Hence, high risks interventions that require full EA (as per World Bank Policy) or EIA (as per GoN requirements) are unlikely. However, if an intervention requires full EA or EIA, this will need special consideration, and therefore, prior approval of the World Bank will be obtained for safeguard steps, process and procedures to be followed.

D. Environmental Checklist and Approach for Rural Electrification Activities

Survey and preparation of maps: During this stage of work, following environmental information will be collected and shown in the map of 1:10,000 scale, together with 33 kV and 11 kV lines (minimum area to be covered within 2.5 km left and right of the line routes and within 100 m either side of proposed distribution line, same as stipulated in the mapping requirement).

a. Legally protected areas (national parks, wildlife reserve, conservation area, etc)
b. Areas proposed for legal protection (although the area may not have received status of legal protection yet)
c. Areas identified as worthy of protection
d. State Forests
e. Community Forests
f. Religious Forests
g. Cultural, religious and historic/ archeological sites
h. Wetlands
i. Touristic points/areas (viewpoints, landscape)
j. Potentially high flood prone/risk areas/ spots
k. High landslide and erosion prone/risk areas/ spots
l. Known areas of unique scientific interests (unique geology, topography, caves, etc)
m. Areas specially known for herbs and non-forest timber products (NTPF) and/or known habitat or migration / movement route of protected rare and endangered species
n. Public open spaces, playground and common property

Transmission and distribution line route selection: Following guidelines will be applied while selecting the sub-transmission and distribution line routes.

a. Avoid legally protected areas and areas already proposed for protection.
b. As far as possible avoid the areas identified as worthy of protection and other forest areas also. In the event a forest is unavoidable, the line may : (i) have insulated cables, or (ii) preferably be routed along the boundary or periphery of the forest (line passing through the middle of the forests is least desirable).
c. The sub-transmission and distribution routes as well as locations of towers/poles (supports) and transformers should not cross diagonally playground/ common property in order to avoid or minimize adverse impacts on them, and preferably be reasonably away from touristic view points, wetlands, and sites of cultural / religious / archeological / historic significance.
d. The line route and locations of towers/ poles shall try to avoid landslide & erosion prone/ risk and/or high flood prone area/ spots, and provide adequate safety measures against flood, landslide and erosion, where avoidance is not practical.

Standards to be followed. Following are the minimum standards to be followed.

a. Transformers with non-PCB transformers are to be used.
b. The transformer posts shall be kept at least 5 m away (preferably more) from health facility, school, and residential house.
c. Design of the Transformers Tower's base will have necessary features to contain and collect oils in the event of accidental leaks from the transformers.
d. Minimum Clearance to be maintained

		for up to 11 kV	for 33 kV
i.	Normal ground and trails for pedestrian only	5.5 m	5.8 m
ii.	Residential area	5.8 m	6.1 m
iii.	Highway, Road and streets	5.8 m	6.1 m
iv.	Horizontal distance from building or structure upon which human may stand	1.25 m	2 m
v.	Power lines or telephone lines (above or below)	1.2 m	1.5 m
vi.	Avoid stringing of 11, 33 kV lines over residential buildings		

Minimum mitigations to be used.

i. Trimming of the trees branches in the line route to keep the line conductors out of contact. (usually clear cutting to be limited to strip. Beyond 5-m, only trimming of the high growing trees and plants to the height less than 5 m below stringing cable as required for safety of the cable).
ii. Use insulated cable for crossing forest area, if required, within the forest areas, except for the construction of towers/ poles etc
iii. maintaining ground vegetation in the cleared areas
iv. compensatory plantation (25 saplings for the loss of one common or protected tree species above 10 cm DBH)
v. use of bio-engineering and other appropriate soil erosion/ landslide/ gully protection measures around towers and poles
vi. provision of necessary occupational health and safety items/ facilities and sanitation /camp facilities to workers
vii. providing alternative fuel to workers, banning workers from wildlife hunting
viii. proper management of excavated spoils

Procedures to be followed.

a. Engineering design shall consider above guidelines while selecting the routes (item 'B' above), and standards followed (item 'C' above).
b. Survey report will provide information on: a) environmental setting of the area (as indicated in item 'A' above.
c. Mitigations measures stated above (item 'D' above) shall be implemented during construction and operation phase.
d. Each proposal/ package will be subjected to environmental screening, which may lead to specific recommendations.
e. Site specific Environmental Management Plan (site-EMP), if required by the environmental screening, will be prepared for the proposal/ package.
f. Each proposal/ package will be subjected to the environmental compliance monitoring as explained in the ESMF.

Annex 3: Steps and Requirements for IEE Studies for Project

DESK STUDY

Task 1: Collection and Review of Project Baseline data (EPR, Rule 5, Rule 7 and schedule 5, IEE Guidelines)

Activities:

- Collection and review of project related sectoral legal documents, institutional arrangements and capacities
- Collection and review of project documents, layouts, magnitude of operations and considered alternatives
- Collection and review of topography, geology, forest, soil, geomorphology maps
- Collection and review of the physical, biological and socio-economic and cultural and archeological baseline environmental conditions.
- Identification of data gaps and study focus areas
- Development of tools for field survey and analysis for physical, biological and socio-economic environments.
- Preparation of field survey and mobilization

Task 2:

- Preparation of ToR
- Submission to concerned ministry) as per EPR- Rule 5 (1)

Activities:

- Review and assessment of environmental baseline
- Preparation of Terms of Reference
- Submission to ministry through the client

Responsibility: Consultant/Client

Task 3:

Review and approval of ToR as per EPR Rule 5 (3)

Activities:

- Review by the client as applicable with recommendations
- Presentation to concerned ministry by client
- Review by ministry and approval with or without modifications

Responsibility: Ministry / Client

Task 4:

Fifteen days Public Notification in National daily Newspaper as per EPR Rule 7 (2)

Activities:

- Notice publication

Responsibility: Client/Consultant

FIELD STUDY

Task 5: Notice posting, Public Deed of Enquiry and interaction with client and the Stakeholders as per EPR Rule-7

Activities:

- Public deed of enquiry
- Meetings with the Client
- Obtain relevant documents from the client
- Notification to the stakeholders at local level for issues of GEESP construction
- Interaction with key persons
- Collection of recommendation letters from DDC, Municipalities and VDC, if any.

Responsibility: PMU/Clint/Consultant

Task 6: Field investigation, interaction with local people and other stakeholders and collection of baseline data as per EPR Rule 7 and schedule 5, IEE Guidelines for all alternative routes.

Activities:

- Field investigation on physical and chemical environments using applicable tools (direct observation and mapping, monitoring, public interactions, past history etc) for erosion, sedimentation, landslides, geomorphic processes, land forms, geology, soil, hydrology, meteorology, air, noise, vibrations, land use, water quality, water pollution etc.
- Field surveys on biological (terrestrial and aquatic) environments using applicable tools (direct observation and mapping, sampling (plot and specimens), public interaction, past records, questionnaires surveys and interviews with knowledgeable persons etc) for forest types and coverage, vegetation species, aquatic species, rare, endangered, indigenous species, ecological value, biodiversity value, habitat, medicinal plants etc.
- Field investigations for socioeconomic and cultural environment using applicable tools (Rapid Rural appraisal, participatory Rural appraisal, questionnaires, interviews and public consultations, cadastral surveys, social mapping, photographic records etc.) for population and dynamics, social development and institutions, occupation and employment, earning and expenditures, cultural values, indigenous or tribal population etc.

Responsibility: PMU/Clint/Consultant

ANALYSIS & REPORTING

Task 7: Data Analysis and interpretation.

Activities:

- Alternative assessment with no project, route or section, design and construction approach, time schedule and process, resources, site specific etc.)
- Impact prediction, beneficial and adverse impacts, quality of data, key data gaps and uncertainties associated with predictions
- Mitigation alternatives to identified the impacts, residual impacts that cannot be mitigated, opportunities for environmental enhancement
- Monitoring indicators and methods of monitoring
- Environmental Management Action Plan: mitigation planning with details of work programs and schedules, responsibilities, capital and recurrent costs, institutional and training requirement; and Monitoring Planning with details of type of monitoring, responsibility, cost and any other institutional and training requirements.

Responsibility: PMU/Clint/Consultant

Task 8: Preparation of Draft IEE report and submission as per EPR Rule 5, 7 and 10 and schedule 5

Activities:

- Preparation of Draft IEE reports incorporating all concerns of stakeholders as obtained in the public interaction and recommendation letters from DDCs, Municipalities and VDCs.
- Presentation of IEE report and seek comments and suggestions
- Submission of Draft IEE report to the client for approval

Responsibility: PMU/Clint/Consultant

Deliverables: Draft IEE Report

Task 9: Review and approval of IEE as per EPR Rule 11 (1)

Activities:

- Review of the IEE study report by concerned ministry
- Approval of IEE by ministry with or without modification
- Submission of final IEE report by the consultant/PMU to Client with electronic version.

Responsibility: Review and approval by concerned ministry

Report preparation and submission by the PMU/consultant.

Annex 4: Project Environmental Management Plan

(Example of EMP)

Table of CONTENT FOR GSEEP EMP Preparation

CHAPTER: 1

PROJECT DESCRIPTION, Components and Environmental management Plan

1. Introduction

1.1 Background

1.2 Project Scope

Project Activities

The project activities may be categorized mainly into three phase which are activities in

(i) Design and Bidding Phase
(ii) Construction Phase
(iii) Operation Phase

CHAPTER: 2

2.1 Scope of Environmental Management Plan (EMP)

2.1 Objectives of Environmental Management Plan

The basic objectives of the EMP are to:

- to ensure that all mitigation measures and monitoring requirements will actually be carried out at different stages of project implementation and operation - pre-construction, construction and operation and maintenance;
- recommend a plan of action and a means of testing the plan to meet existing and projected environmental problems;
- establish the roles and responsibilities of all parties involved in the project's environmental management;
- describe mitigation measures that shall be implemented to avoid or mitigate adverse environmental impacts and maximizing the positive ones;
- ensure implementation of recommended actions aimed at environmental management and its enhancement; and
- ensure that the environment and its surrounding areas are protected and developed to meet the needs of the local people, other stakeholders and safeguard the interests of the common people.

2.2 Implementation of EMP

2.3 Project Impacts

The anticipated impacts due to project and mitigation measures are briefly discussed in this section.

2.3.1 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts on the physical, biological, and socio-economic and cultural environments during the pre-construction, construction and operation and maintenance phases are discussed here in detail with the mitigating measures.

The summary of the anticipated environmental impacts and the mitigation measures are given in matrix format.

2.3.1.1 Pre-construction Phase

a. Environmental impacts due to project design

2.3.1.2 Construction Phase

a. Environmental impacts due to project construction

i. Physical Environment (Examples)

Water and land pollution

Pollution due to air, noise and vibrations

ii. Biological Environment (Examples)
Loss of trees including endangered and indigenous species
iii. Socio-Economic and Cultural Environment (Examples)
Reinstatement of damaged community services and infrastructure, Influx of outside workforce, money and unwanted activities, Occupational Health and Safety (OHS), Traffic management etc.

2.3.1.3 Operational Phase

3.0 Mitigation Measures:

The mitigation measures shall be designed during the construction and operation phases of the project to minimize the adverse environmental impacts. The mitigation measures along with the item wise mitigation cost are prepared in EMP.

The envisaged impacts due to implementation of GSEEP component could be grouped into positive and adverse impacts. The goal of mitigation measures is to maximize the positive impacts and minimize or reduce the adverse impacts.

The proposed mitigation measures for predicted adverse impacts could be grouped into three categories as Physical, Biological, Socio-economic and cultural environment. Such impacts could be further classified as impacts during the construction stage and operation stage.

3.1 Construction Phase Impacts and Mitigation Measures

-Physical Environment
-Biological Environment
-Socio-economic environment

The potential impacts and mitigation measures for construction are highlighted in the main document Chapter 4.

3.2 Operation Phase Mitigation Measures (prepared as per specific project for GSEEP)

-Physical Environment
-Biological Environment
-Socio-economic environment
The potential impacts and mitigation measures for operation phase are highlighted in the main document Chapter 4.

4. Project Environmental Management Plan Structure and Stakeholders Responsibility

The Project Environmental Management Plan of GSEEP is prepared to shows linkages with different parties to be involved directly or indirectly during the different phases of project development and operation in compliance with the existing Act and Rules. Overall project environmental management is the responsibility of NEA.

4.1 Environmental Mitigation Management Plan

Environmental management actions to be undertaken and to be adopted for the realization of environmental enhancement and environmental mitigation for construction and operation phases are presented in the format (***Table 1)*** for each of the Project component. This briefly describes impacts, description of enhancement/mitigation action required, individual or agency responsible, national standards and guidelines, timing of actions, responsible authority, and tentative financial requirements.

Table 1 : Environnemental Mitigation Management Plan

SN	Impact	Enhancement Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental Management Costs (NRs)
I	**Socio-economic Environment (construction an operation phase)**						
I	Physical Environment						
I.A	Construction Phase						
I.B	Operation Phase						
II.	**Biological Environment (Construction and Operation Phase)**						
A	Construction Phase						
B	Operation Phase						
III	Socio-economic and Cultural Environment						
A.	Construction Phase						
B	Operation Phase						

4.2 Environmental Monitoring Management Plan

Three types of monitoring are envisaged in the plan, namely: Baseline Monitoring, Compliance Monitoring and Impact Monitoring. Since the required databases for the environmental baseline are already collected by the IEE study, the project is not likely to require Baseline Monitoring.

The impact monitoring in the plan relates to only those measurable indicators in the physical, Biological and socio-economic, Cultural environments. For each of the monitoring indicators, monitoring methods, frequency of monitoring, responsible parties along with the required cost estimates have been estimated (***Table 2***).

Table 2: Environmental Monitoring Plan

S.N	Issues for Monitoring	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring cost
I	Baseline Monitoring						
A	Physical Environment						
B	Biological Environment						
C	Socio-economic and Cultural Environment						

S.N	Issues for Monitoring	Monitoring Indicator	Monitoring Location	Monitoring Method	Monitoring Frequency	Monitoring Responsibility	Monitoring cost
II	Compliance Monitoring						
A	Construction Phase						
a	Physical Environment						
b	Biological Environment						
c	Socio-economic and Cultural Environment						
B	Operation Phase						
a	Physical Environment						
b	Biological Environment						
c	Socio-economic and Cultural Environment						
III	Impact Monitoring						
A	Construction Phase						
a	Physical Environment						
b	Biological Environment						
c	Socio-economic and Cultural Environment						
B	Operation Phase						
a	Physical Environment						
b	Biological Environment						
c	Socio-economic and Cultural Environment						

5. Environmental Reporting and Documentation

The EMP is a live document and constantly changes with the inputs from the mitigation and monitoring exercise in the project cycle. It is therefore essential to make a plan for reporting and documentation of the

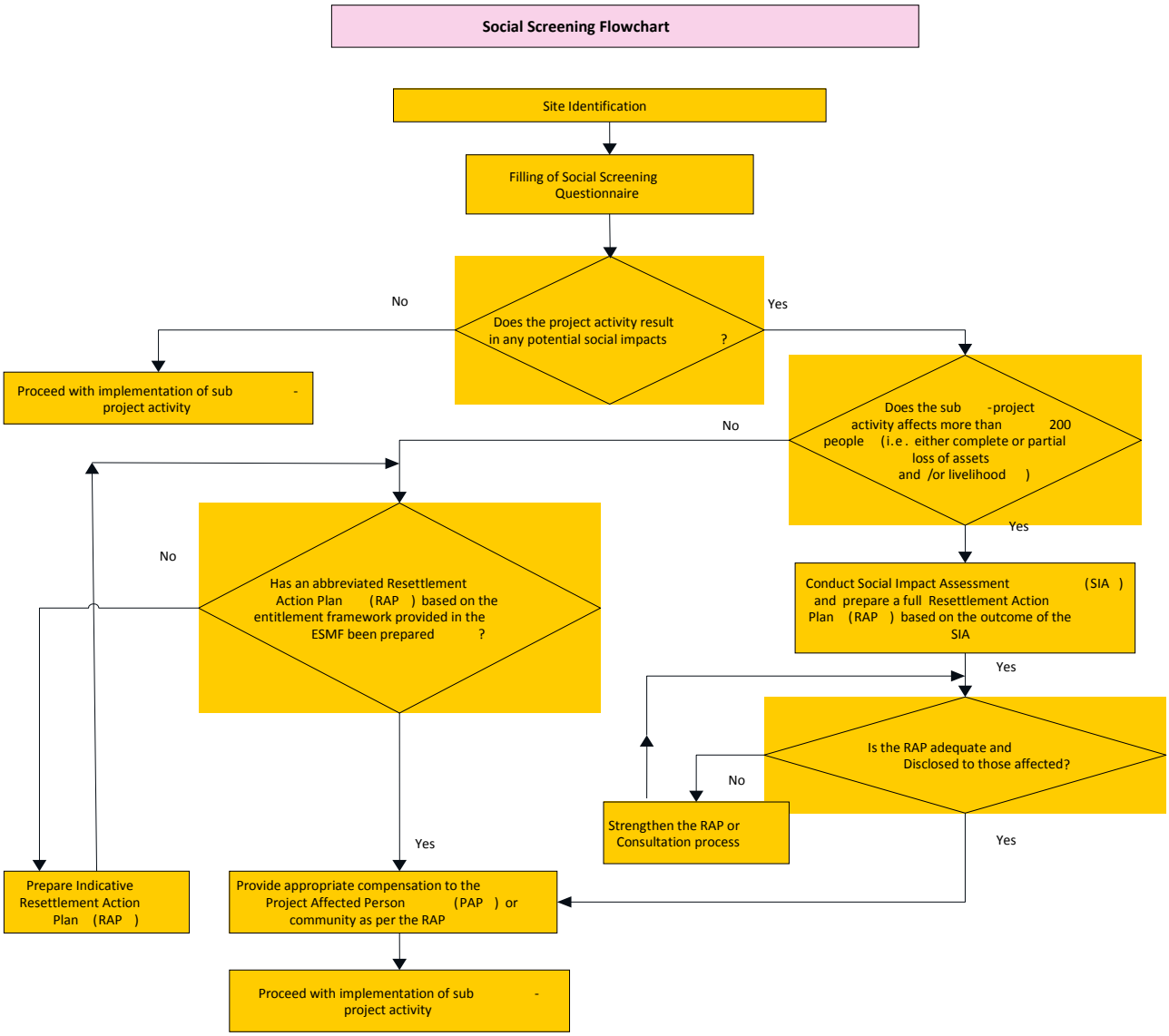
project performance. The monitoring results are documented and reported with a clear chain of responsibilities among the involved individuals for project environmental management. For the project of this nature, though daily record keepings of the monitoring are maintained, reporting is usually undertaken once in three months to the involved stakeholders of the project. Such reports not only records the status of the project compliance and impacts but also the corrective actions implemented to avoid or minimize the project impacts including the changes in the environmental management strategy over the time.

6. Environmental Management Costs

This section summarizes the estimated environmental management costs over the project cycle.

Annex 5:Social Screening Criteria

Figure: World Bank's Generic Social Screening for GSEEP Criteria for RAP (if applicable); Flow Chart showing Key Steps



a) Determine potential impacts of selected sub components as to whether they are likely to cause negative social impacts
b) Determine the scope and focus of detailed social assessment
c) Helps in making appropriate decision about inclusion or exclusion of the site/location under consideration.

The envisaged activities and scope of GSEEP may not require SIA or RAP. However, the short term impact on livelihood and access to facilities and properties of household may prevail. Such impacts (if any) shall be well documented.

SURVEY QUESTIONNAIRE FOR SOCIAL SCREENING

A. BACKGROUND INFORMATION:

1. Name of the proposed site:
2. Address : District…… VDCs…… and number of settlements within 250 m radius from the site boundary
3. When and how the candidate site is fixed (specially the solar farm location
4. **Location and physical characteristics of site:** Please prepare a social map that shows physical characters of the site including settlement, river, forest, public buildings, land use

pattern (private, public and their use) and also marked probable population and property affect by the candidate site.

B SOCIO-ECONOMIC INFORMATION:

Please fill the form for each of the candidate Solar Farm site and Transmission line corridor (if New TL):

SN	Name of the VDC	Ward No of the Site	Name of the Settlements	Direction and distance from site	Major ethnic/Caste groups of settlements	Total HH	Population		Major Occupation %	
							Male	Female	Farmer	Others
B.1	Within the designated candidate site									
B.2	Within 250 m perimeter from the component site boundaries									

Please Fill the form for each of the candidate Solar Farm site and Transmission Line corridor (if New TL)

B.3	The Land ownership of Solar farm or the Transmission Line Pole Foundation (Tick Mark)	Private	NEA	Government
	If Private provide following information			
	Number of HH owning land	Total land owned (ha)	Number of Built in private structures	Total built area (m2)
		Problems and Issues		
	If NEA owned Land Provide following information			
	No. of built in structures	Total built area (m2)	Encroachment of Land and purpose	No of Encroachers
		Problems and Issues (if any)		
	If Govt. Owned Land Provide following information			
	Type of Land use	Any encroachment and use		No of encroachers
		Problems and Issues (if any)		

C. Decision on Categorization

After reviewing the above, it is determined that the sub-project is:

Categorized as an A project, requiring full scale SIA including Land Acquisition and Resettlement Rehabilitation Plan is required

Categorized as a B project, a specific action favorable to local issue is required and addressed through a specific provision in related plans such as a Resettlement Plan, or a general Social Action Plan

Categorized as a 'C' project, no specific action required

Annex 6: IPs & Vulnerable Groups Impact Screening & Categorization Form

A. Project Data

Name of site:

B. Identification of Impact on IPs/ Vulnerable Group in Sub-project Area

Impact on Indigenous Peoples (IPs)/ Ethnic Minority(EM)/ Vulnerable Group	**Not known**	**Yes**	**No**	**Remarks or identified problems, if any**
Are there dalits, janjatis, or ethnic minorities present in project locations?				
Do they maintain distinctive customs and traditions and economic activities in their locality?				
Will the project in any way affect their economic and social activity and make them more vulnerable?				
Will the project affect their socioeconomic and cultural integrity?				
Will the project disrupt their community life?				
Will the project positively affect their health, education, livelihood or social security status?				
Will the project negatively affect their health, education, livelihood or social security status?				
Will the project alter or undermine the their local knowledge, customary behaviors or institutions?				
Are IP and VC households likely to lose customary rights over, access to land?				
Are IPs and VCs likely to lose shelter/business and be displaced?				
In case no disruption of indigenous community life as a whole, will there be loss of housing, strip of land, crops, trees and other fixed assets owned or controlled by individual indigenous households?				

B. Additional Information Required

- Total and affected areas of land, by type of land assets;
- Total and affected areas of structures, by type of structure (main or secondary);
- Legal status of affected land and structure assets, and duration of tenure and ownership;
- Quantity and types of affected crops and trees;
- Quantity of other losses, e.g. business or other income, jobs or other productive assets, estimated daily net income from informal shops;
- Quantity/area of affected common property, community or public assets, by type;
- Summary data on PAP households, by ethnicity, gender of head of household, household size, primary and secondary source of household income viz-a-viz whether household is headed by women, or consists of marginalized ethnic groups (Dalits, Freed Kamaiya), Muslims/religious minorities, elderly, disabled, indigenous people (highly marginalized, marginalized, and, disadvantaged IPs), below poverty line of NRs 3000/month), landless or households losing 50% of total landholdings (particularly those totally dependent on agriculture for livelihood), as well as remote villages.
- Identify whether affected land or source of income is primary source of income; and
- AP knowledge of the subproject and preferences for compensation and as required, relocation sites and rehabilitation measures

D. Anticipated project impacts on indigenous peoples

Project activity and output	Anticipated positive effect	Anticipated negative effect
1.		
2.		
3.		
4.		
5.		

E. Decision on Categorization

After reviewing the above, it is determined that the sub-project is:

Categorized as an A project, an Indigenous Peoples Development Plan (IPDP) is required

Categorized as a B project, a specific action favorable to indigenous peoples is required and addressed through a specific provision in related plans such as a Resettlement Plan, or a general Social Action Plan

Categorized as a ‘C’ project, no IPDP or specific action required

Annex 7: Outline Structure of an IP - Vulnerable Community Development Plan

The identities, cultures, lands and resources of IPs groups are uniquely intertwined and vulnerable to changes caused by development programs. Because of this uniqueness and cohesiveness, sub-projects that include janajati and dalit settlements, should ensure that these groups are not disadvantaged by these development interventions and the proposed mitigation measures/benefits are culturally compatible. This annexure provide a set of guidelines for addressing impacts on IP and vulnerable population through the preparation of an IP-VCDP.

Suggested Guidelines of Preparation of an IP-VCDP
A. The Contest of IP-VCDP and its Objectives 1. Provide overall background and context of preparing IP-VCDP 2. Describe the objectives of IP-VCDP
A. Legal Framework 1. Establish the legal status of the IPs and vulnerable groups identified under the sub-project 2. Spell out what is required by the relevant Acts and rules
B. Baseline Data 1. Include accurate, up-to-date maps and photographs of the sub-project area showing the areas inhabited by IPs and vulnerable people 2. Present a description of the subproject and implication for IPs and vulnerable communities and analyze the social structure and income sources and socioeconomic level of the population by category of gender, caste and ethnicity 3. Provide disaggregated baseline data on the magnitude and nature of negative impact and losses from project intervention 4. Provide natural resource and asset holding, land tenure and livelihood related information 5. Capture the full range of production and marketing activities in which these people are engaged.
C. Strategy for Local Participation 1. Documentation of consultations with vulnerable groups to ascertain their views about the project design and proposed mitigation measures 2. Devise mechanisms for participation by these people in decision making throughout subproject planning, implementation, and evaluation. 3. Provide effective channels for communicating local preferences, representation and appropriate methods to guarantee full local-level participation with specicial attention to IPs and VCs and their organizations (IPOs and CBOs representing VCs).
D. Mitigation Activities 1. Propose assistance to these people including skill training and income generating activities. Ensure that activities that draw upon indigenous knowledge are used as they succeed better than those that are entirely new principles and institutions.
E. Institutional Arrangement 1. Provide institutional structure and linkage with other project arrangement to implement IP-VCDP. 2. Provide brief description about the adequacy of experienced professional staff and ability of indigenous peoples' own organizations, and local NGOs to interact with specialized government institutions. 3. Describe the role IPs and VCs and their organizations (IPOs and CBOs representing VCs will have in the implementation process.
F. Implementation Schedule 1. Prepare an implementation schedule with benchmarks by which progress can be measured at appropriate intervals.
G. Monitoring and Evaluation 1. Suggest monitoring mechanism (internal and independent monitoring institutions/officials. Explore the possibility of finding Janjati or Dalits peoples' own organizations for sub-project management 2. Prepare monitoring reporting formats for assessing sub-project implementation
H. Cost Estimates and Financing 1. Prepare a plan which detailed cost estimates for planned activities and investments

Annex 8: Action Points for Preparation of Gender Action Plan

General Checklist

- Identify key gender and women's participation issues.
- Identify the role of gender in the project objectives.
- Prepare terms of reference (TOR) for the gender specialist or social development specialist of the client
- Conduct gender analysis as part of overall Social Assessment.
- Draw up a socioeconomic profile of key stakeholder groups in the target population and disaggregate data by gender.
- Examine gender differences in knowledge, attitudes, practices, roles, status, wellbeing, constraints, needs, and priorities, and the factors that affect those differences.
- Assess men's and women's capacity to participate and the factors affecting that capacity.
- Assess the potential gender-differentiated impact of the project and options to maximize benefits and minimize adverse effects.
- Identify government agencies and nongovernmental organizations (NGOs), community-based organizations (CBOs), and women's groups that can be used during project implementation. Assess their capacity.
- Review the gender related policies and laws, as necessary.
- Identify information gaps related to the above issues.
- Involve men and women in project design.
- Incorporate gender findings in the project design.
- Ensure that gender concerns are addressed in the relevant sections (including project objectives, scope, poverty and social measures, cost estimates, institutional arrangements, social appendix, and consultant's TOR for implementation and M & E support).
- List out major gender actions.
- Develop gender-disaggregated indicators and monitoring plan.

Specific Checklists to be covered during various stages of project cycle

Desk review

- Review available information (e.g., statistics, gender analysis, documents of previous projects) in the project area and the socioeconomic profile of the target population.
- Review the relevant legal (e.g., inheritance law), policy (e.g., R&R policy), and institutional framework (e.g., current administrative system for land acquisition, compensation disbursement) and their gender implications.

Household surveys

- Draw up gender-disaggregated socioeconomic and cultural profiles and identify the constraints, and needs of the target population.
- Collect quantitative information.

Participatory methodologies

(e.g., participatory rapid appraisal, focus group discussions, random interviews, walking tours)

- Collect qualitative information which cannot be collected through surveys.
- Define ways in which men and women beneficiaries and other stakeholders, especially poor women can participate in the project.
- Map out the target areas. Which are the most disadvantaged areas in terms of access to services and poverty level?
- Identify major stakeholder groups and their stake.

Staffing

- Ensure adequate gender balance in field teams.
- Select field team members with gender awareness, local knowledge, cultural understanding, and willingness to listen.

Primary Data to Be Collected

Macro institutional framework

- Gender impact of sector policy; legal and institutional framework.
- Executing agency's capacity and commitment to participatory approaches and gender focus.

Socioeconomic profile

Demographic

- Composition by gender, ethnicity/caste, age, etc.
- In and out migration trend (male and female)
- Percentage of households headed by females
- Household size
- Age at marriage, by gender

Economic

- Income level and sources, by gender
- Expenditure patterns and decision making, by gender
- Land tenure and use, by gender

Health

- Population growth rate
- Infant and maternal mortality rates
- Service availability
- Food allocation and nutrition level within households, by gender
- Incidence of domestic violence

Education

- Literacy and school enrollment ratios, by gender
- School dropout ratio, by gender
- Child labor, by gender

Status of women

- Political representation and awareness
- Socio - cultural perceptions and practices of men and women
- Gender-discriminatory policies and laws
- Gender roles and responsibilities
- Broad gender division of labor in productive (e.g., agriculture, income-generating activities) and reproductive (e.g., household chores, child care) responsibilities, and time allocation for each responsibility.

Water

Drinking water

- What sources (e.g., public streams, rivers, tanks, lakes, communal wells or tanks, ponds, privately owned wells or tanks, water pipes) are used?
- How far away are the water sources?
- Water collection and storage
- Who collects and stores water? How?
- How much time is spent in water collection and storage?
- Who carries water and how?
- How much time is spent transporting water?
- Are there any health hazards resulting from the transport of water?
- How is the collected water used differently by men and women (e.g., for cooking, sanitation, home gardens, livestock)?
- Who decides the allocation?
- Is water available in the dry season?
- How is water use managed during the water-scarce season? By whom?

Access, control, constraints

- How do men and women differ in their access to and control of land, agricultural inputs, extension, markets, employment opportunities, and credit?
- Is external assistance provided to improve access/control? By whom?

Participation

- What factors affect the level of men's and women's participation?
- What are the incentives and constraints?
- During which season is the demand for labor highest?
- Which modes of participation do men and women favor (e.g., decision making in planning, cash contribution, labor contribution for construction, training, financial management, organizational management)?

Project impact

- Do men and women perceive positive and negative impacts of the project differently?
- Are the benefits likely to be distributed equitably?
- How can negative effects be mitigated?
- Are there any disadvantaged or vulnerable groups?
- Who are they? Where do they live? What are their socioeconomic characteristics?
- How will the project affect these groups?
- Land acquisition/Resettlement: Extent of land to be acquired
- What are the gender-specific implications?

Organization

- What is the current level of women's representation in other community decision- making bodies?
- Are there local organizations (e.g., local governments, national NGOs, CBOs, mass organizations) that address women's constraints and needs? How can the project link up with them?
- What mechanisms can be used to ensure women's active participation in project activities?
- What organizations can be used to mobilize and train women in the project activities and livelihood options?
- Incorporate the preferences of community men and women on issues such as: number and location of assets and sharing vs. individual arrangement of assets;
- Highlight women's strengths in mobilizing savings and resources.
- Incorporate the preferences of men and women in the community on:

- financing arrangement
- possible preferential treatment for very poor, female-headed and other disadvantaged families
- credit or community-based revolving funds for women SHGs

Community participation mechanism

- Develop a participation strategy for men and women during project implementation and M & E.
- Avoid overly high expectation of women's participation and develop a practical schedule, as women often have time and financial constraints. The strategy should incorporate the following:
- Planning: Conduct women specific consultation to take their views and suggestions on the design. Any mechanism established during the project design such as grievance mechanisms should have adequate representation from women.
- Construction: Ensure work conditions that are conducive to women's participation (e.g., gender-equal wage rates, construction season, toilet and child-care facilities).

Monitoring and evaluation (M & E): Develop a feedback mechanism in which both male and female have a voice. Identify organizations that could facilitate women's participation during implementation and M & E.

Training Options

- Identify ways to link up with income-generation, literacy, and other activities to support an integrated approach to poverty reduction and women empowerment
- Support a decentralized structure to allow linkages between the village and local government.
- Include financial and technical capacity building for relevant local government bodies to enable them to effectively support women SHGs.

Staffing, Scheduling, Procurement and Budgeting

- Hire female project staff.
- Consider seasonal labor demand in scheduling civil works.
- If appropriate, set a minimum percentage of female laborers and prohibit the use of child laborers in the civil works contract.
- Ensure adequate and flexible budgeting to allow a "learning" approach (e.g., training budget, consulting service budget for women's organizations).

Monitoring and Evaluation

- Develop M & E arrangements: (i) internal M & E by project staff; (ii) external M & E by NGOs or consultants, as necessary; and (iii) participatory monitoring by beneficiary men and women.
- Disaggregate all relevant indicators by gender such as number of women gaining access to credit, increase in women's income, and career prospects for project trained women.

Documentation

- Document the gender-responsive design features in the DPR and include covenants in the loan agreement to ensure gender-sensitive project design mechanisms to be complied by the executing agency