Environmental and Social Management Plan

for

100kWp Shubhakalika Solar Mini Grid Subproject, Kalikot

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List of Abbreviation

AEPC	Alternative Energy Promotion Centre
CSR	Corporate Social Responsibility
EPA	Environment Protection Act
EPR	Environment Protection Rule
ESCOs	Energy Service Companies
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Screening
E&S	Environmental and Social
GESI	Gender Equality and Social Inclusion
GoN	Government of Nepal
HHs	Households
IEE	Initial Environmental Examination
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
masl.	Metres Above Sea Level
MGEAP	Private Sector-Led Mini-Grid Energy Access Project
MoEWRI	Ministry of Energy, Water Resources and Irrigation
NA	Not Applicable
NEA	Nepal Electricity Authority
OP	Operational Policies
PBs	Participating Banks
PV	Photovoltaic
RAP	Resettlement Action Plan
RM	Rural Municipality
VCDP	Vulnerable Community Development Plan
WB	The World Bank

Executive Summary

Alternative Energy Promotion Centre (AEPC), the apex government body under the Ministry of Energy, Water Resources and Irrigation (MoEWRI), has been implementing the Private Sector-Led Mini-Grid Energy Access Project (MGEAP) since June 2019 with support from the World Bank. The objective of the MGEAP is to increase electricity access and delivery from renewable energy mini-grids (solar, hydro, wind, and hybrid) by mobilizing private Energy Service Companies (ESCOs).

Chankheli Energy Pvt. Ltd, an ESCO for Shubhakalika Solar Mini Grid Subproject has expressed an interest for the installation of the solar mini grid with capacity of 150kWp. Due to the 100 kWp cap in the subsidy policy, the capacity of the proposed solar mini grid subproject has been revised to 100 kWp and this ESMP has also been updated accordingly. The updated 100 kWp will provide electricity to 355 HHs, 10 Households/Businesses, 1 Anchor and 3 businesses of Shubhakalika Rural Municipality. The ESCO has proposed for the installation of solar mini grid to meet energy demand of Telecom Tower, FM Station, Computer institute, Health Center, School, RM Offices, small scale enterprises, eateries and households/business situated in Ward No. 4 and 5 of Shubhakalika Rural Municipality, Kalikot District, Karnali Province. Therefore, Environmental and Social Safeguard team of the MGEAP has conducted Environmental and Social Screening (ESS) of the proposed subproject on February 4 and 5, 2020 as mandated by the Environmental and Social Safeguard Framework (ESMF) for MGEAP and categorized this subproject as 'low risk' subproject. Therefore, this Environmental and Social Management Plan (ESMP) has been prepared for the subproject, as provisioned in the ESMF of MGEAP, to address the potential environmental and social (E&S) risks and impacts.

Total land available for the subproject is 18,359m^2, of which 1351m^2 will be utilized for the installation of solar PV modules and 110m^2 will be used for the construction of powerhouse/control room. Not any major environmental and social risks and impacts have been observed during the field observation of solar modules installation site, powerhouse construction site and potential load centre. However, occupational health and safety as well as community health and safety being the major concerns during the construction and operation phase of the subproject, occupational health and safety plan, emergency preparedness and response plan, labor management plan, traffic management plan, waste management plan and battery management plan have been prepared to ensure safety of workers and community. Consultation with community people and relevant stakeholders have been conducted to ensure that every issue related to the subproject have been identified and addressed effectively. The consultation with local community and the representatives of local government revealed that the electricity demand is crucial in the proposed subproject area as they rely on solar home system.

Updates in the Report

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1 Introduction

Alternative Energy Promotion Centre (AEPC) is the apex government body under the Ministry of Energy, Water Resources and Irrigation (MoEWRI), established to promote the use of alternative/renewable energy technology to meet the energy needs in Nepal. The Private Sector-Led Mini-Grid Energy Access Project, supported by the World Bank, has been implemented by AEPC from June 2019. The objective of the program is to increase electricity access and delivery from renewable energy mini-grids (solar, hydro, wind, and hybrid) by mobilizing private Energy Service Companies (ESCOs). The project will deliver financing support to ESCOs to facilitate financial closure and enhance financial viability of the subprojects, provided to ESCOs in the form of loans through participating Banks (PBs), ESCOs to facilitate financial closure and enhance financial viability of the subprojects. The loans will be channelized through commercial class "A" bank of ESCO's choice.

1.1 Background

Chankheli Energy Pvt. Ltd, an ESCO for Shubhakalika Solar Mini Grid Subproject has expressed an interest for the installation of the solar mini grid with capacity of 150kWp. Due to the 100 kWp cap in the subsidy policy, the capacity of the proposed solar mini grid subproject has been revised to 100 kWp and this ESMP has also been amended accordingly. The updated 100 kWp will provide electricity to 355 HHs, 10 Households/Businesses, 1 Anchor and 3 businesses of Shubhakalika Rural Municipality. The ESCO has proposed for the installation of solar mini grid to meet energy demand of Telecom Tower, FM Station, Computer institute, Health Center, School, RM Offices, small scale enterprises, eateries and households/business situated in Ward No. 4 and 5 of Shubhakalika Rural Municipality, Kalikot District, Karnali Province. Therefore, Environmental and Social Safeguard team of the MGEAP has conducted Environmental and Social Screening (ESS) of the proposed subproject on February 4 and 5, 2020 as mandated by the Environmental and Social Safeguard Framework (ESMF) for MGEAP and categorized this subproject as 'low risk' subproject. As provisioned in ESMF, low risk subprojects are required to prepare Environmental and Social Management Plan (ESMP) to address the potential environmental and social (E&S) risks and impact, and specifies the process for managing such risks and impacts based on regulatory framework of the Government of Nepal (GoN) and Operational Policies (OPs) of the World Bank.

1.2 Subproject Description

The proposed subproject site of **Shubhakalika Solar Mini Grid** is located in Ward No. 4 of Shubhakalika Rural Municipality, Kalikot district, Karnali Province, which is approximately 9.5 km away west from the Sereghat of Karnali Highway. It is located at latitude 29°6'23.7"N and longitude 81°37'48.69"E with flat and south facing. Salient feature of the subproject is presented in **Table 1**.

Table 1: Salient Feature of Shubhakalika Solar Mini Grid Subproject

S.N.	Heading	Particulars	Description
1	ESCO	Name of the ESCO	Chankheli Energy Pvt. Ltd.
2	Category	Subproject Category	Greenfield
3	Subproject	Name of the Subproject	Shubhakalika Solar Mini Grid Subproject
		Capacity	100 kWp
4	Plant Location	GPS Coordinates	Latitude: 29°6' 23.7"N Longitude: 81°37'48.69"E
		Altitude	1750 meters
		Province & District	Karnali Province, Kalikot
		Rural Municipality/Municipality	Shubhakalika RM
		Village	Sukatiya (5), Khatebada (5), Udagaun (5), Adhikaribada (5), Bhattarai tole (5), Sundargaun (4), Rarakatiya (4), Chaulagainbada (4) and Dhadukhada (4)
		Approximate Distance from Nearest Highway to Subproject Site	Approximately 9.5 Km (Karnali Highway)
		Approximate Distance from Nearest Road Head to Subproject Site	Approximately 0.1 Km
5	Households/ Total Beneficiaries	Total No. of Beneficiary Households	365 Nos.
		Total No. of Businesses	3 Nos.
		Total No. of Anchors	1 No.
6	Land Profile	Type of Land	Public
		Ownership of Land	Government
		Current Land Use Pattern	Barren
		Topography and Orientation	Flat and South Facing
7	Land Acquisition	Willing Buy/Willing Sale	N/A
		Leased Land	Leased for 30 years period

There are 8 wards in Shubhakalika Rural Municipality and it intends to electrify approximately 365 households (HHs), of which 10 HHs runs small enterprises as well. Access to electricity and reliability of affordable electricity is one of the key constraints for development of this area. As

there is no national grid power supply, people are using electricity supplied through solar home system for lightning and mobile charging. Telecom Tower, RM Office, Health post, schools, FM Station, small scale enterprises, eateries and community people are facing trouble due to shortage of electricity.

Distribution of Households, Businesses/Anchor:

Total Loads: 380 Nos.

Total Number of Households: 355 Nos.

Total Number of Households/Businesses: 10 Nos.

Telecom Tower (Anchor Load): 1 No

FM Station: 1 No.

Public Institutions: 10 Nos. (Banks-2, Schools-2, Health Centers-2, RM Office-1, RM Ward Office-2, Post Office-1)

Total Number of Businesses: 3 Nos. and they are

- Carpentry
- Hulling/Grinding/Milling
- Computer Institute and Electronic Center

Figure 1: Map Showing Shubhakalika Rural Municipality in Kalikot District

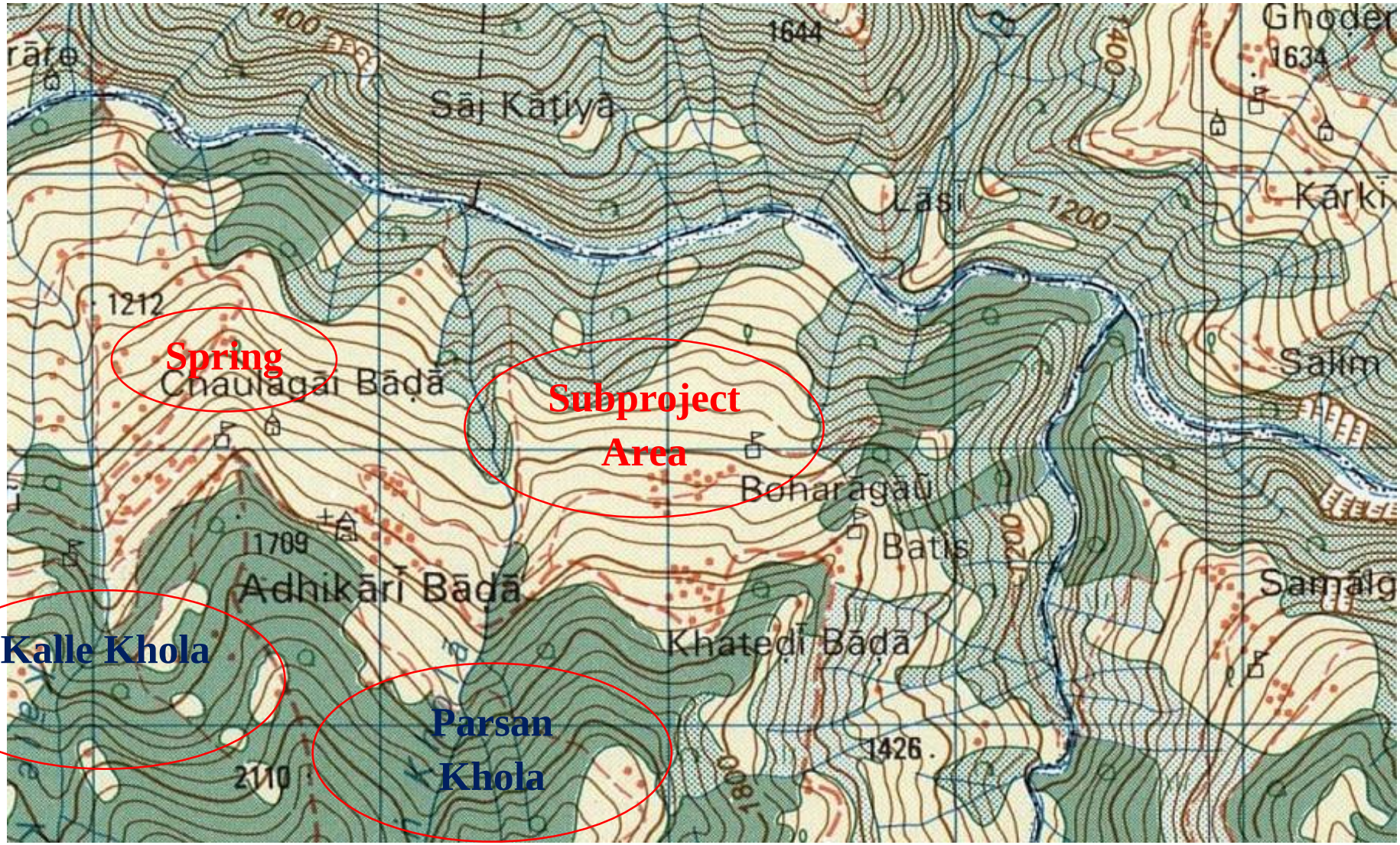

Figure 2: Topographic Map of Shubhakalika Solar Mini Grid Subproject

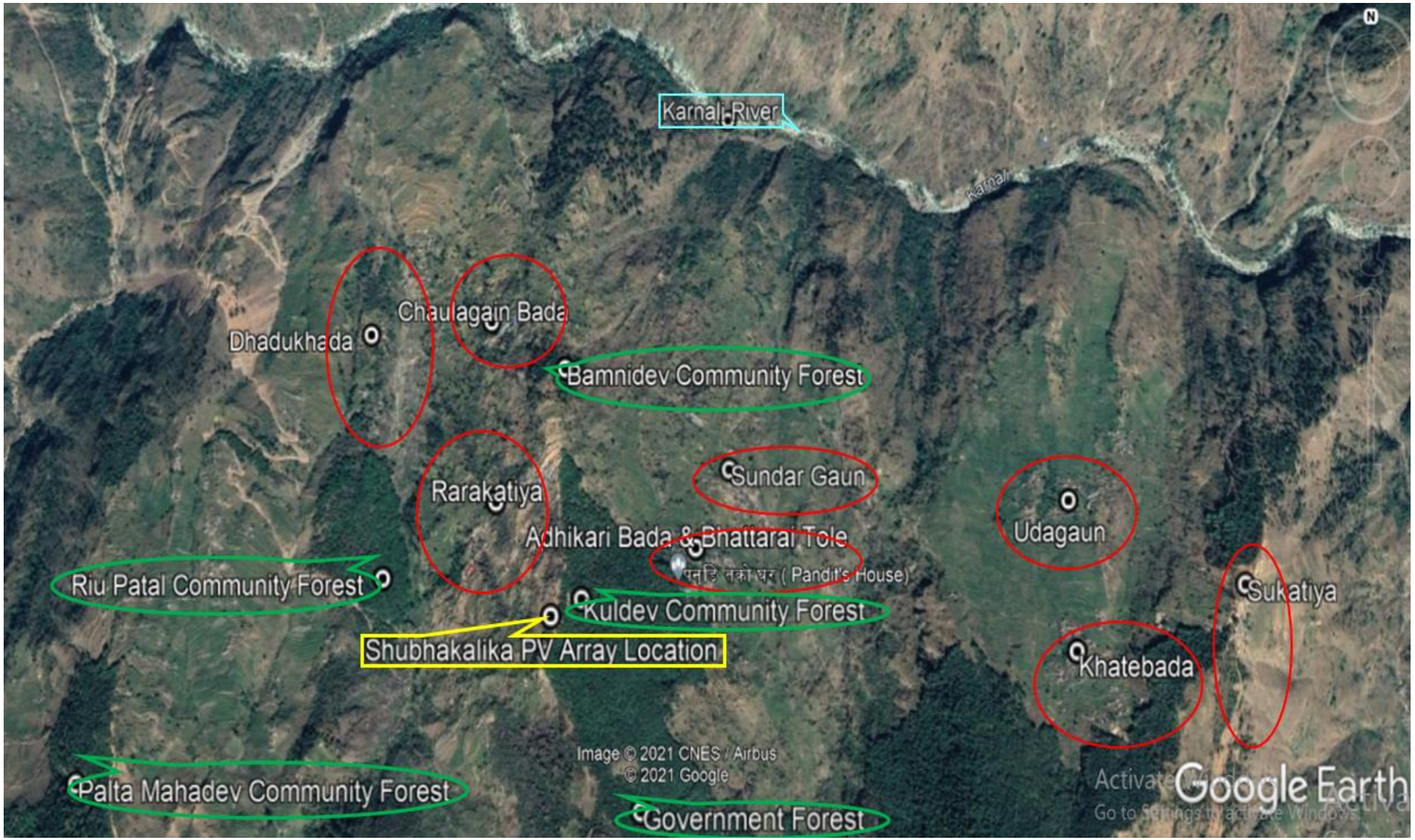

Figure 3: Google Map of the proposed subproject location

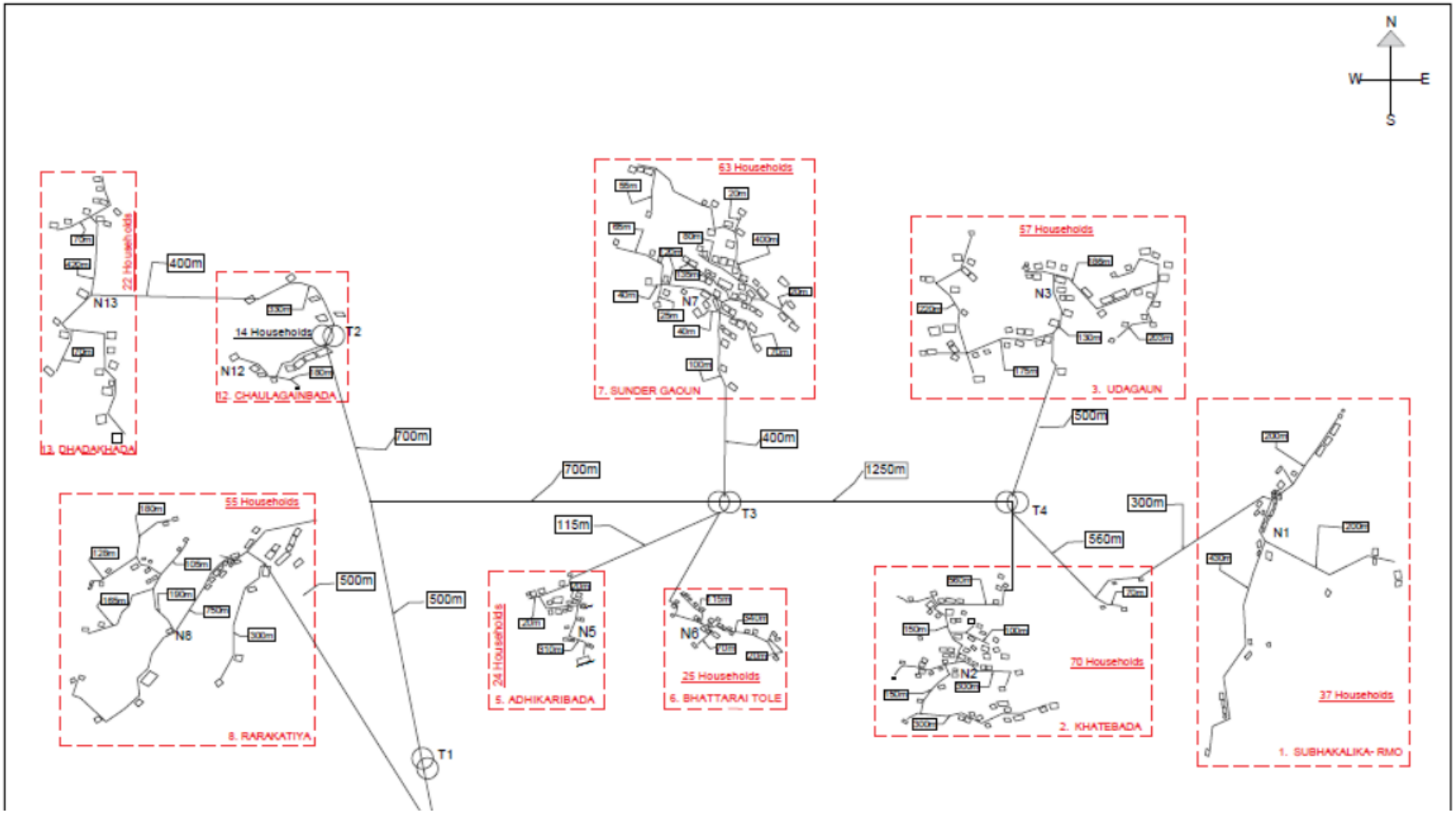

Figure 4: Layout Transmission and Distribution line showing load centre

1.3 Site Preparation and Construction

Site preparation for the installation of PV modules and construction of powerhouse involve only simple land labeling and rock/stone removal work and do not involve major land excavation and cutting filling work. Land development has already been done by the ESCO. The subproject requires approximately 1,315 m2 of land for PV modules installation and 110 m2 land for powerhouse construction. Since the proposed land for the subproject is public land and has already been leased for 30 years. The land agreement between ESCO and Rural Municipality Ward No. 4 for the solar installation was done as per the existing GoN regulation related to contract. A contract document is provided in **Annex 1**.

1.4 Subproject Design

A brief description on the design of Shubhakalika Solar Mini Grid subproject is provided in **Table 2**.

Table 2: Description on Shubhakalika Solar Mini Grid Subproject Design

S.N.	Heading	Particulars	Description
1	Solar Resource Potential, Technology and Capacity	Solar Insolation (Tilted)	5.2 kWh/m^2/day (SolarGis)
		Type of PV Module	Monocrystalline
		Capacity of Each Module	445 Wp (Trina)
		Module Efficiency	20.4%
		Total No. of Modules	226 Nos.
		Total PV Array Capacity	100.57 kWp
		Type of Inverter	PV Inverter (SMA)
		Capacity of Each Inverter	50 kVA
		Inverter Peak Efficiency	98.1 %
		No. of Inverters	2 Nos.
		Total Inverter Capacity	100 kVA
		Type of Inverter	Battery Inverter (SMA)
		Capacity of Each Inverter	6 kVA
		Inverter Peak Efficiency	96%
		No. of Inverters	9 Nos.
		Total Inverter Capacity	54 kVA
		Type of Battery	OPzV VRLA Tubular Gel (SacredSun)
		Capacity of Each Battery	2V 1500 Ah
		No. of Batteries	144 Nos.
		Total Battery Capacity	432 kWh
2	Transmission and Distribution	Transformer Power Rating	100kVA, 50kVA, 25kVA
		Transformer Voltage	

S.N.	Heading	Particulars	Description
		Primary Secondary	400V, 11 kV 11 kV, 400V
		Type of Transformer	3Phase, 0.4/11kV 100kVA Step up Transformer and 11/0.4kV 50kVA & 25kVA Step down transformers 100kVA – 1 Set (Step up) 50kVA – 1 Set (Step down) 25kVA – 2 Set (Step down)
		Length of T&D Line 11kV Three Phase 400V Three Phase 230V Single Phase	 4.017 Km 4.2 Km 5.95 Km
		ABC Twisted Cables 4 Core 95 mm^2 for 3-Phase 4 Core 50mm^2 for 3-Phase 2 Core 50mm^2 for 1-Phase	 2.7 Km 1.5 Km 5.95 Km
		ACSR Conductor Rabbit (50mm^2)	 12.05 Km
		Pole Type & Number 410 SP-52 (11 meter) 410 SP-13 (8 meter)	 73 Nos. 206 Nos.
3	Electricity Generation	Estimated Annual Energy Yield	116,358 kWh
4	Cost Estimate	Estimated Subproject Cost	NRs. 62,262,016.16/-

As mentioned in Section 1.2, there is no national grid power supply and less possibility of national grid extension in the subproject area in near future. However, the subproject is designed in a way that the designed system is grid compatible and it can be connected to the grid upon the arrival of grid in the area.

1.5 Workforce Requirement

Approximately 30 human resources will be mobilized during the construction phase which will include 5 skilled, 5 semi-skilled and 20 unskilled human resources. Skilled human resources include Civil, Electrical and Mechanical Engineer, Civil and Electrical Overseer and an Environmental Expert who will be hired from nearby area as required if unavailable in subproject area. Majority of the semi-skilled and unskilled human resources will be hired from the local area based on availability and their interest. During the operation phase, an operator and support staff will be hired locally based on skill and experience. ESCO will be responsible to enhance his/her capacity. ESCO may seek technical support from AEPC/MGEAP to capacitate human resources.

2 Objective of the ESMP

The ESMF of AEPC/MGEAP has provisioned to conduct Environmental and Social Management Plan (ESMP) for the subproject categorized as 'low risk' based on the environmental and social screening. The main objective of the ESMP is to identify the potential environmental and social impacts and risks of the Shubhakalika Solar Mini Grid Subproject and to suggest appropriate mitigation measures to avoid, minimize and mitigate the adverse impacts. The general objectives of ESMP are:

- To identify, predict and assess potential adverse and beneficial environmental and social impacts from the subproject implementation.
- To define the roles and responsibilities of all stakeholders associated with environmental and social management of the subproject.
- To identify and describe the measures for avoidance, minimization and mitigation of identified impacts/risks and cost associated with such measures.
- To define environmental and social management mechanism to ensure the implementation of measures for avoidance, minimization and mitigation of identified impacts/risks.
- To establish a monitoring and reporting mechanism in line with the provision in the ESMF of MGEAP.
- To consult with affected people, community and other relevant stakeholders and to formulate the subproject based Grievance Redress Mechanism.
- To prepare various mitigation plans such as Emergency Preparedness and Response Plan, Occupational Health and Safety Plan, Traffic Management Plan, Labor Management Plan etc.

3 Methodology for the Preparation of ESMP

The Safeguard Team comprised of Senior Environmental Safeguard Expert and Social Safeguard Expert of AEPC/MGEAP visited the proposed site of Shubhakalika Solar Mini Grid subproject from February 4, 2020 to February 5, 2020 for Environmental and Social screening and categorization of the subproject. The team utilised screening checklist annexed in the ESMF for information collection and categorized the subproject as 'low risk' based on the identified impacts/risks. During the field visit, a community consultation was conducted in presence of 35 participants including local people and other relevant stakeholders of Ward No. 4 and 5 of Shubhakalika Rural Municipality. Of which, 31 (89%) were male and 4 (11%) were female; 19 (54%) were Brahmin/Chettri/Thakuri, 2 (6%) were Ethnic/Indigenous People and 14 (40%) were

Dalits. Moreover, community people were informally consulted[1] (had informal interviews while walking around and been in eateries in subproject area) to get their individual opinion and information on the proposed subproject.

Therefore, this ESMP report is prepared based on the screening report, field visit observation, and desk review of available resources, consultation with local people and other relevant stakeholders.

4 Environmental and Social Baseline Assessment

4.1 Physical Environment

4.1.1 Topography

Kalikot district is located in South West part of the Mid-Western region and is a mountainous remote district. The district is situated at a minimum level of 728 to maximum 4,790 m height from mean sea level and lies in between 28º 37' 20" north to 29º 7' 32" north and longitude ranges from 81º 49' 22" east to 82º 34' 46" east. The district is surrounded by Jumla in the east, Achham and Bajura in the west, Jumla and Mugu in the North and Dailekh and Jajarkot in the South. The total area of district is 1,741 sq km and the district headquarter is Manma, located between Karnali river and Tila river. The topography setting of the district continues mid hilly peak, hilly terrain, valley plain and river basin.

The proposed site for the installation of PV modules and the construction of powerhouse/control room lies in hilly region at an altitude of 1750 metres above sea level (masl). Most of the proposed project area lies in moderate sloppy area with slope terrain. Not any sign of landslide and other instability was found during the site visit. The land is flat and south facing.

4.1.2 Geology and Soil Type

The proposed subproject area lies within the higher Himalayan zone of the Mid-Western Region. The lithology of this zone comprises mainly of medium to low grade metamorphic rocks like phyllite, quartzite, schist which are typically fine to coarse grained Gneiss with frequent marble beds. The dominant rock types present in the subproject area include sedimentary and metamorphic rock consisting of shale, mudstone and limestone.

4.1.3 Climate and Rainfall

The climate of the subproject area varies from sub-tropical to temperate. The area experiences strong seasonal climatic variations, with wet monsoons from June to September and dry weather from October to May. The maximum annual average temperature was found to be 29.1°C and minimum annual average temperature was found to be 17.2°C. The annual average rainfall (1971-2014) was found to be 830.9 mm (DHM 2017).

4.1.4 Air Quality

The proposed site is located away from the residential area surrounded with few vegetation and located on the top of the hill. Not any activities that might pollute air of the area are observed. Moreover, not any activities such as construction work or development project is going on in or

[1] Consultation with local people while walking around and been in eateries in subproject area to collect information.

nearby vicinity of the proposed land. Therefore, the quality of air observed during field visits can be considered to be good and within the acceptable range.

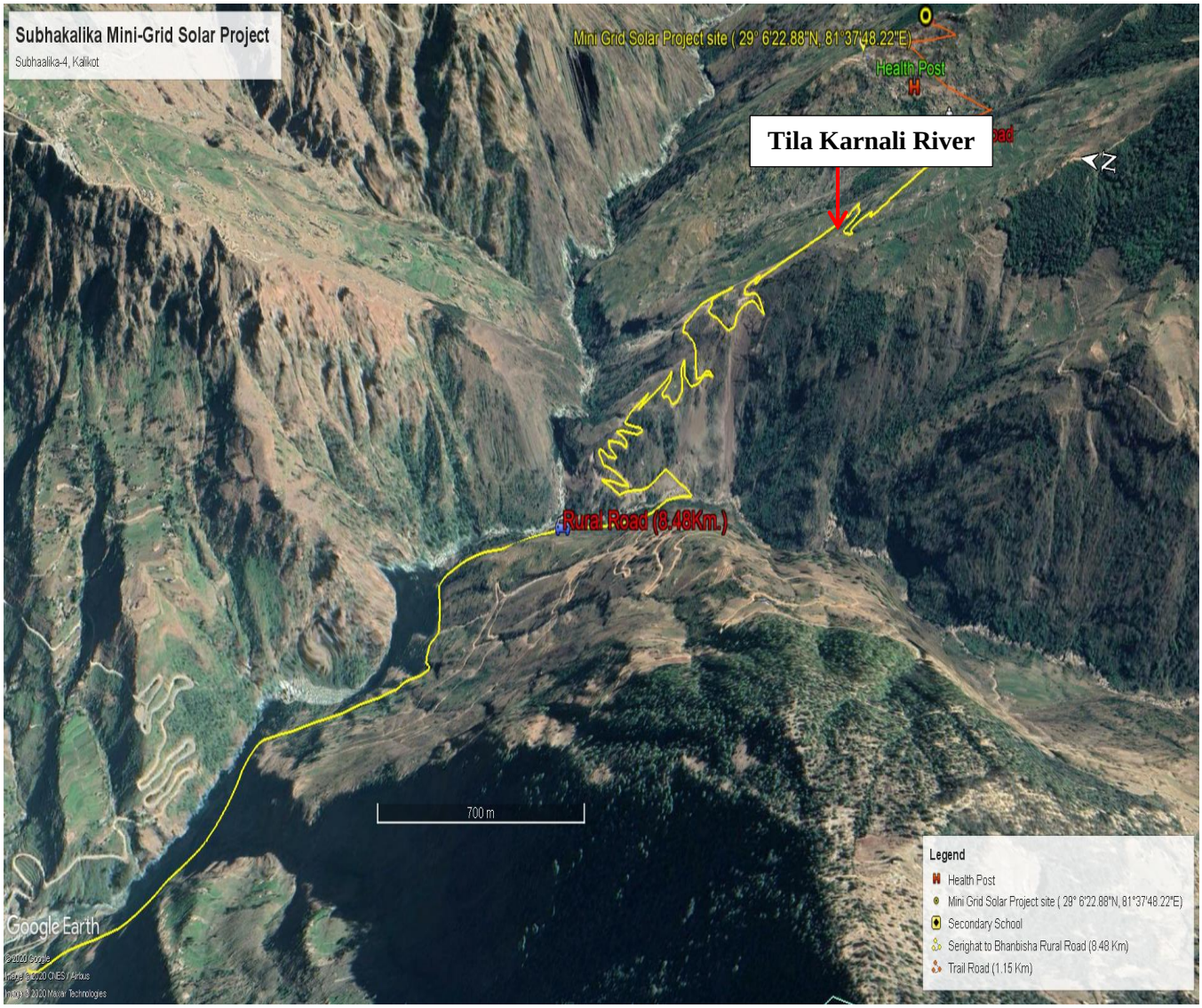

Figure 5: Tila Karnali River in 2500 m aerial distance from the subproject site.

4.1.5 Water Quality

Though a small seasonal stream runs at approx. 200 m away from the proposed site, it gets water only during monsoon for a short period. The Tila Karnali River flows approx. 2500 m aerial distance from the proposed site, **Figure 4**. The spring which is source of drinking water is approximately 1500 m away west from the subproject site, **Figure 2**. As there is not any activities which may pollute water in the river, the quality of water can be considered as good. The river water quality can get polluted only with flash flood, which might carry sediment with it during rainy season.

4.1.6 Noise Quality

The proposed site being in remote area and without access to vehicles, not any major source of noise is observed in the vicinity of the proposed site. With respect to the load centre of Shubhakalika SMG, majority is located insparsely settled residential area, commercial centres and

remotely located Telecom tower and FM station, level of noise is low. Not any major sources of noise pollution are observed during field survey.

4.1.7 Water Sources and Drainage Pattern

The Tila Karnali River is a main river that flows nearby both the proposed subproject site and load centre. The major water source in the subproject site is spring water located nearby Chaulagain Bada and Rarakatiya, Figure 2. Prasan Khola nearby Adhikari Bada and Kale Khola nearby Rarakatiya.

4.1.8 Soil Erosion and Land Stability

There was not any evidence of landslide in the subproject area during the field visit. The proposed site and load centre areas are stable.

4.1.9 Approach Road

The proposed site is reachable via existing rural road, which is apprx. 9.5 km from Karnali highway as shown in **Figure 4**. The road is semi gravelled thus can be accessed only during dry season. Thus, construction materials, solar PV modules and other equipment shall be transported during dry season.

4.2 Biological Environment

4.2.1 Vegetation and Forest Resources

The proposed subproject area is located in sub-tropical climate zone, therefore it has a wide range of flora and fauna. Kuldev community forest and Bamnidev community forest are nearby forest. Kuldev community forest is approx.100 m east and Bamnidev community forest is 600 m north from PV installation area, whereas, Riu Patal community forest and Government forest are at 800 m west and 1500 m south respectively from proposed site. These forest are shown in Figure 3. The transmission and distribution line will not be along forest area, which will be constructed along road side at private land. The major vegetation compositions of the forest are Pipal (*Ficus religiosa*), Chiuri(*Bassia butyracea*), Sirish (*Albizzia chinensis*), Simal (*Bombax ceiba*), Bakaino (*Melia azedirach*), Khanayo (*Ficus semicordata*), Bainsh (*Salix tetrasperma*), Sindure (*Buddleia paniculata*), Gunde, Rani Khirro (*Sepium insigne*), Khayer (*Acacia catechu*) , Sal (*Shorea robusta*) Khasru (*Quercus semecarpifolia*), Ipil Ipil (*Leucaena species*), Banjh (*Quercus leucotricophora*), Bamboo (*Dendrocalmus strictus*), Dudhilo (*Ficus nerifolia*), Dhaturo, Bhimal, Kapur (*Cinnamomum camphora*), Bhorle, Simali (*Vitex negundo*), Chutro (*Berberis aristata*), Chutro (*Berberis spp*.), Aiselu (*Rubus ellipticus*), Teetepati (*Artemisia vulgaris*), Siundi (*Euphorbia royleana*), Aankh (*Calatropha giganteum*), Sajiwan (*Jatropha curcas Linn*.), Areri (*Acacia Pennata*), Asuro (*Adhatoda vasica*), Khar (*Themada triandra*), and Dubo (*Cynodon dactylon*). Among the plant species present in the forest area, only Simal (*Bombax ceiba*), Khayer (*Acacia catechu*) and Sal (*Shorea robusta*) are the protected plant species. People around the subproject area depends on the forest resources for firewood collection, fodder, timber, grazing etc.

4.2.2 Fauna (Mammalian and Avian) and Fish Species

Information on mammalian and avian fauna in the subproject area was collected through field observation and consultation with local peoples. None of the faunal species were sighted during field survey and it is always not possible to detect the presence of wildlife and record their activity in their natural environment in a limited time frame, so equal preference was given to the mentioning by the local people. List of mammalian and avian fauna reported around the subproject region are presented in **Table 3**. The major river in the Subproject is the Tila Karnali River, which is rich in fish diversity. The major species found are katle (*Catla catla*), Asla (*Schizothroax plagiostomus*) and Tite (*Psilorrhynus psedochensis*). During consultation it was found that local people from subproject area are not engaged in fishing profession.

Table 3: List of Mammalian and Avian Fauna

S.N.	Local name	Scientific name	Abundance	Conservation Status
Mammalian Fauna				
1.	Common Chituwa	*Panthera pardus*	Protected	CITES II
2.	Assamese monkey	*Macaca assamensis*	Protected	CITES II
3.	Clouded leopard	*Neofelis nebulosa*	Protected	CITES I
4.	Hanuman langur	*Semnopithecus entellus*		CITES I
5.	Jackal	*Canis aureus*		CITES III
6.	Blue Rock Pigeon	*Columba livia*		CITES III
7.	Indian Fox	*Vulpes bengalensis*		CITES III

The most available bird in the forest are Jungle fowl (*Gallus gallus*). Crow (*Corvus splendens*), Parakeet *(Psittacula kramen*), Cuckoo (*Cuculus mocropterus*), Lampuchhre, Ranichara, Bhyakkur, Nyauli, Kalij, Dhukur (*Streptopalia spp*.), Red vented Bulbul (*Pycnonotus cafer*) and Indian Treepie (*Dendrocutte vagubundra*), Kukhurke (*Magalaima spp*.) are also found in the subproject area.

4.3 Socio-economic and Cultural Environment

The proposed site is located in Shubhakalika Rural Municipality- 4, Kalikot district, Karnali Province. It is approximately 738 km far from the capital city Kathmandu. Rarakatiya is the nearest settlement (approximately 150 m) from the PV installation area which is one of the load centres. Other major load centres are Sukatiya (37 HHs), Khatebada (70 HHs), Udagaun (57 HHs), Adhikaribada (24 HHs), Bhattaraitole (25 HHs), Sundargaun (63 HHs), Rarakatiya (55 HHs), Chaulagainbada (14 HHs) and Dhadukhada (20 HHs). In the East of the subpproject site is Kuldev Community Forest, which is approx. 100 m away. Chaulagain Tole is in West, Shubhakalaika School is in North (around 200 meter away) and Public land with Government forest in South (approx. 1500 m away).

Agriculture (including livestock) is the main economic activity of the subproject area. Agriculture forms the major source of income for approx. 82% of the households. Migration to the nearby cities of India for foreign employment has been another major means of living for people of Shubhakalika Rural Municipality which constitutes 55% of 42% of active aging youth population. Paddy, maize, millet, wheat and barley are the usual crops and apple, potato, bean, oil seed and

herbal products are cash crops of the subproject area. Though 82% of population of Shubhakalika RM are dependent in agriculture, only 9% population has food sufficiency for whole year from the agricultural production, whereas 28% has food sufficiency for 6 to 9 months, 38% has food sufficiency for 3 to 6 months and 25% has food sufficiency for up to 3 months. This Rural Municipality has average annual production of 1.3 metric tons per hectare which is less than national average annual production. *(Source: https://kalikamunkalikot.gov.np)*

4.3.1 Demography

According to 2011 Census of Central Bureau of Statistics (CBS) and Shubhakalika RM Website (http://kalikamunkalikot.gov.np), total population & Households (HHs) of Kalikot district, Shubhakalika RM and Ward no. 4 & 5 of Shubhakalika RM is presented in table below;

District, RM & Ward	Total HHs	Male	Female	Total Population
Kalikot District	23,013	68,833	68,115	136,948
Shubhakalika RM	2,123	7,172	6,974	14,146
Ward No. 4	178	756	675	1,431
Ward No. 5	266	955	918	1,873

(Source: http://kalikamunkalikot.gov.np/ *and Nepal Census 2011 District Profiles)*

The subproject wards 4 & 5 covers only 1.04% population of Kalikot district and 23.35% population of Shubhakalika RM.

4.3.2 Caste Ethnicity

The subproject site for installation of solar modules and construction of powerhouse/control room is located in Ward No. 4 of Shubhakalika RM, Kalikot district, with an altitude1750 meter above sea level. The nearest settlement from the subproject area is Rarakatiya which is majorly resided by Brahmin/Chhetri/Thakuri and Dalits. The total beneficiaries HHs of Dalit community in Ward no. 4 and 5 of Shubhakalika RM are 88. Like other community of subproject areas, dalit community also depends on agriculture and livestock for their living and literacy rate among dalit community in subproject area is found relatively less than other castes. Indigenous people do not resides in the subproject area.

4.3.3 Land Use and Ownership

The proposed land for solar mini grid is public land and currently it is barren. During the screening (before land development) only dry grass has been observed with large stones and few bush/shrub. After the screening, ESCO has cleared the land and make it suitable for solar installation on its own responsibility. According to local people, it is being used for grazing just due to availability of open space. There are plenty of land available nearby subproject area. Though the total land area available in the site is 18,359 m^2, approximately 1,425 m^2 land will be used for the subproject, of which approximately 1,315 m^2 of land for PV modules installation and 110 m^2 land for powerhouse

construction. Hence, the construction of the new solar mini grid will not in any way hamper any existing land usage activity.

Figure 6: Land for the installation of PV modules and construction of powerhouse

4.3.4 Physical Resources in the Subproject Area

Physical resources like historical, cultural and archaeological sites were not observed near the subproject area. However, schools, health centres, banks, Rural Municipality Office, Telecom tower, FM station etc. are some of community amenities that will be benefited from the subproject.

4.3.5 Cultural Resources in the Subproject Area

Based on the consultation with the local communities, there are no cultural, religious and historical sites noted within and nearby the subproject site. People of heterogeneous culture are the beneficiaries of the sub-project and they celebrate most of the festivals celebrated in Nepal. Dashain, Tihar and Christmas are the major festivals celebrated by the community people. However, the subproject activities would not affect such religious and cultural events.

5 Relevant Policies, Legislations, Guidelines and Standards

The Government of Nepal (GoN) has a well-established legal framework for environmental assessment of development projects. The most relevant national policies, acts and guidelines of the GoN concerning environmental management, which are relevant to the proposed project, are listed as follows. A comparison among GoN and World Bank policies and gaps in policies are presented in **Annex 4**.

The Constitution

- The Constitution of Nepal

Plans and Policies

- Fifteenth Plan
- Rural Energy Policy, 2006
- Renewable Energy Subsidy Policy,2016

Acts and Rules

- Environment Protection Act, 2019 and Environment Protection Rules, 1997
- Local Government Operation Act, 2074 (2017)
- Solid Waste Management Act, 2011
- Child Labor (Prohibition and Regulation) Act, 2000
- Labor Act, 2074 (2017)
- National Foundation for Upliftment of Aadibasi/Janjati Act, 2002

Guidelines/Frameworks

- National Environmental Impact Assessment Guidelines, 1993
- Environment and Social Management Framework (ESMF), 2018

Standards

- National Ambient Air Quality Standards, 2003
- Nepal Vehicle Mass Emission Standards, 1999
- National Ambient Sound Quality Standard, 2012

International Polices and Conventions

- World Bank Safeguard Policy (OP 4.01 Environment Assessment)
- Convention on Biodiversity (CBD), 1993
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973
- Convention (No.169) Concerning Indigenous and Tribal Peoples in Independent Countries, 1989

6 Assessment of Environmental and Social Impacts and Mitigation Measures

6.1 Construction Phase

6.1.1 Land Use and Land Take

The proposed land is rocky barren and only dry grass has been observed. According to local people, it is being used for grazing just due to availability of open space. If the proposed site is used for solar mini grid, there are other alternative public lands available for grazing cattle around the project site. The proposed land is public and is located at Shubhakalika Rural Municipality,

Ward No.4 approximately 9.5 km away east or west from Karnali highway (Sereghat). The land will be used for the installation of solar PV modules and construction of powerhouse/control room. In addition, approximately 13.67 Km of Transmission and Distribution (T&D) line will be constructed to electrify the households of Ward No. 4 & 5 of Shubhakalika Rural Municipality with 11kV/400-230V **(Figure 4).** For T&D roadside private land can be used which was informed to people during consultation. Thus, necessary approval will be taken from concerned authority and individuals with respect to use of public and private land for installation of solar PV & powerhouse and T&D. In total approx. 1,425 m^2 will be used by the subproject which is already taken in leased with Rural Municipality Ward No. 4 for 30 years. The ESCO and Rural Municipality had already made land lease agreement for 30 years. The land lease agreement is provided in **Annex 1** and land document is provided in **Annex 2.** Hence, land use as an impact is considered to be moderate in magnitude, site specific and long term in duration.

Specific Mitigations

- Long term land lease agreement between RM and ESCO (for 30 years)

6.1.2 Air Quality

Subproject activities does not involve significant air pollution sources. Heavy equipment will not be required for construction purpose. The construction works are expected to be completed in 2-3 months from commencement. Air pollution is likely to cause due to;

- Earthworks such as levelling, grading, excavation works and movement of vehicles in earthen roads, especially during windy conditions
- Cement dust in construction sites

Air pollution will be limited to the construction area and are expected to be generated in small concentration and dispersed rapidly within the area. Therefore the effects are localized and temporary which implies that any deterioration in air quality at subproject location is unlikely to be significant and is expected to be transient. Air pollution is envisaged to be low in magnitude, site specific and short term in duration.

Specific Mitigations

- Water spraying in stored spoils and excavated areas
- Provide PPE such as breathing masks, safety goggles and face shield
- Regular maintenance of equipment used for construction

6.1.3 Water Quality

Tila Karnali River is about 2500 m distance from subproject site so the river water will not get affected by construction activities. It is expected that contamination of drinking water sources is unlikely as there are no drinking water sources in close vicinity of subproject construction site. The major water source in the subproject site is spring water located nearby Chaulagain Bada and Rarakatiya, **Figure 2**. Prasan Khola nearby Adhikari Bada and Kale Khola nearby Rarakatiya.

The nearest source of drinking water is spring, which is approx. 1.5 Km downstream from the proposed site. Impacts on water quality is considered to be low in magnitude, site-specific to local in extent and short term in duration.

Specific Mitigation

- Construction of sanitary toilet at the construction site
- Wastewater discharge in septic tank
- Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials.
- Hazardous material storage sites shall be covered and runoff from refuelling and work sites shall be treated before being disposed of.
- Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site.
- Stockpile materials away from drainage lines
- Prevent all solid and liquid wastes entering waterways

6.1.4 Noise Quality

Earthworks and excavation (for land levelling), material haulage, backfilling and installation of PV modules, and other equipment as well as powerhouse construction are noise producing activities in the construction site. However, the settlement at the subproject site is sparsely distributed. Hence, noise from the subproject construction activities does not significantly impact surrounding population. Noise impact is considered to be direct, reversible, low magnitude, site specific and short term in duration.

Specific Mitigations

- Construction activities will be restricted to day time only
- Workers will be provided with hearing protection devices such as ear muffs and ear plugs
- Regular maintenance of equipment used for construction

6.1.5 Waste Management

Non-hazardous waste generated during construction includes paper, wood, cement bags, plastic, and mud, whereas batteries (after used period about 15 years), scrap metals, sharp objects broken glass, absorbent material, etc. are some hazardous waste that might be generated during construction. Improper management of such wastes will cause soil pollution, water pollution, visual impacts, impacts on health and safety of workers as well as general public. Considering the size of the subproject and quantity of waste generated, the magnitude of impact is considered to be low, extent is site specific and the duration is short term.

Domestic waste will be generated by the people who are directly and indirectly involved in the subproject construction. The amount of waste generated will depend upon the number of people working in the subproject and more importantly, the number of people who temporarily migrate to the subproject area during construction, including construction crew, members of their family, and people who supply goods and services to the workers. However, the predicted impact is considered to be low in magnitude, site specific and short term in magnitude.

Specific Mitigation

- Used cement bags, plastic, empty containers will be stored at designated places and sold in market (kabaadi)
- Bio-degradable and food waste will be buried in pit for composting or used as feed material for livestock

- Waste management plan (Annex 11)

6.1.6 Muck and Spoil Disposal

Spoil will be generated by the construction work such as digging, quarrying, excavation in very small quantity. Thus, generated muck/spoil will be used for the backfilling purpose. If there is improper disposal of spoil material, it may cause destruction of productive land. The muck generated from construction activities are soil mixed with boulders, soft soil, etc. The magnitude of impact is low, extent is site specific and duration is short term.

Specific Mitigation

- Reuse of muck for backfilling purpose
- Spoil disposal site should be identified by the contractor and submit the disposal plan for AEPC/ESCO approval.
- Transport and disposal of spoils at designated disposal sites identified
- Proper dumping and adequate compaction of spoils at disposal site
- Landscaping of the disposal site after completion of works to be approved by AEPC/ESCO.

6.1.7 Stockpiling of Construction Materials

Construction materials need to be stockpiled before their application at the site. If large amounts of construction materials such as earthen materials, gravel, aggregates, sand etc. are stored for a long period near the construction site, they may become the source of escaping dust pollution and also the adjacent land may get damaged. Stockpiling of the construction material will have direct, site-specific and short-term impact.

Specific Mitigation

- Less productive land (eg barren land) will be used for stockpiling of construction materials
- Storage house shall be constructed with Zinc plates and truss roof

6.1.8 Slope instability and Soil erosion

The proposed subproject area lies within the higher Himalayan zone of the Mid-Western Region. The dominant rock types present in the subproject area include sedimentary and metamorphic rock consisting of shale, mudstone and limestone. The subproject site is mainly consist of huge rock which is considered as one of the rockiest area of the district. The land development in the subproject are has been already done. Gabion wall has been constructed to level the slop area of subproject area.

Specific mitigations

- Gabion Wall has been constructed
- Stabilize the cleared areas/exposed surface not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion.

6.1.9 Impacts on Flora, Fauna and Aquatic Life

The nearest forest is Kuldev Community forest which is approx. 100m east from the subproject area hence there may be impact in forest area, vegetation and wild animals during construction. Construction noise, dust and likely hunting by the construction workers may adversely impact flora and fauna in the area.

Since, the Tila Karnali River does not flow adjacent to the subproject site, impact on fish and other aquatic creatures are expected out of direct subproject activities. However, illegal fishing practices by the construction workers during their leisure period in the River may pose threat to aquatic life.

Specific mitigation

- Construction work will be schedule at day time only
- Prohibition of hunting and poaching of wild species
- Awareness program about importance of wild flora and fauna
- Prohibition of cutting of protected tree species
- Tree cutting should be avoided to the extent possible.
- Proposed tree cutting by the contractor should be reviewed and approved by AEPC/ESCO.
- All the approvals/permits should be obtained for tree cutting
- Proper consultation should be carried out and consent from the relevant community should be given regarding the potential impacts on community forest around the project area.
- Pre-construction survey should be conducted to ensure potential impacts on fauna and flora and proper mitigation measures are planned.
- Compensatory plantation will be carried out at the rate of 5 new trees for each tree cut. The plantation site should be identified by the contractor and approved by AEPC/ESCO.

6.1.10 Occupational Health and Safety

The construction work involves activities that can lead to accident causing injuries and even fatalities. Cut, trip, fall, electrocution are some of the common injuries. Health and safety risks are also to the general public when they are exposed to haphazardly disposed sharps, chemicals, pollution etc. Health and safety impact are considered to be direct, low to high magnitude, site-specific and short term to long term in duration.

Specific Mitigation:

- Provide adequate PPE such as hard hat, googles, safety belt, safety boot, gloves, ear plugs
- Provide training on safety health and safety
- Conduct a regular toolbox talk
- Provide First Aid Box

An Emergency response plan defining possible risks, emergency handling procedures, responsible persons, emergency contacts etc. shall be prepared by the contractor and placed in active construction areas.

6.1.11 Community Health and Safety

The presence of work force in the subproject site may affect the health and sanitation situation of community. There may also be the problems of sewage disposal. Sanitation problems due to open defecation may arise which may lead to contamination of water. Such contamination may lead to outbreak of the communicable diseases. Gathering and contacting local people may lead to transmission of infectious/communicable diseases. If proper sanitary conditions are not maintained in the construction site, it may create pool of waters and pile of waste which will attract vermin and vector diseases. Such vectors and new diseases may spread to local population, who are not immune to such diseases. Increased movements of people (from or to outside) may introduce new diseases to the area (particularly, communicable diseases like Tuberculosis, cholera, COVID-19). Moreover, spread of COVID-19, HIV/AIDS and other STDs are of major concern with influx of migrant labor in the subproject area. Hence, the envisaged impact is considered to be moderate, local in extent and short term duration.

Specific Mitigations

- The subproject/ESCO will conduct awareness programme for the labourers and other staff as well as community people about the potential diseases that may spread in subproject area.
- Health and Safety Plan will be developed to provide guidance to ESCO on minimizing and managing the risk of spread of COVID-19 at construction sites.
- Standard Operating Procedure (SOP) will be prepared and implemented.

6.1.12 Labor Influx

ESCO will execute all the construction works in environmentally and socially friendly manner without undermining the issues and mitigation measures identified and mentioned in the ESMP. Human resources (skilled, semiskilled & unskilled) available in the subproject area will be given priority for the construction of the subproject as labor force. The ESCO should make camp for construction labors and maintain the sanitary condition of the construction site. Thus, the ESCO should take into consideration for the construction of toilets for male and female workers separately and biodegradable wastes generated by workers should be managed only in suggested disposal sites. There will be around 30 numbers of labors (skilled, semiskilled & unskilled) employed for the construction of the subproject. Out of 30 around, 10 numbers of work forces (5 skilled and 5 semiskilled) will be hired from nearby the subproject area. Increased movements of people (from or to outside) may introduce new diseases to the area (particularly, communicable diseases like COVID-19, Tuberculosis, cholera etc). Spread of COVID-19, HIV/AIDS and other STDs are of major concern with influx of migrant labor in the subproject area. As labours hired from outside will remain in the subproject area for a very short period (around 2-3 months), the impacts are indirect and low in magnitude.

Local Stakeholders such as Local Government (Rural Municipality & Ward Offices), Schools, Heath Post and Grievance Redress Committee formed for Shubhakalika Solar Mini Grid will have periodic consultation to ensure the transparency during the construction & operation phase of subproject. Likewise, such stakeholders will also make sure that the environmental and social enhancement measures are carried out by ESCO as per ESMP. Labor influx as an impact is considered to be direct, low in magnitude, local in extent and short term in duration.

6.2 Operation Phase

6.2.1 Air Quality

The operation of proposed subproject will not cause degradation of air quality of the surrounding area.

6.2.2 Noise Quality

During operation phase, the subproject will not cause any noise pollution.

6.2.3 Waste management

Solar PV modules have a product warranty of 10 years and power output warrantee of 25 years therefore they will not produce waste for a considerable period of time unless they are physically damaged. The main waste that will be produced during operation is domestic waste. The other type of waste includes metallic and stationary waste from office works which can accumulate over a period of time. Waste as an impact is considered as low in magnitude, site specific and long term in duration.

6.2.4 Light Reflection

The panel of solar PV are designed to maximize absorption and minimize reflection to increase electricity production efficiency. To limit reflection, solar PV panels are constructed of dark, light-absorbing materials and covered with an anti-reflective coating. The light reflecting percentage of solar PV is as little as 2% of the incoming sunlight. Thus, there will not be reflection of light from solar panels. So, no mitigation measure is required during operation phase.

6.2.5 Health and Safety

Solar mini-grids can be related to a range of health and safety hazards if necessary precautions to be taken are overlooked such as emergency fire hazard, electrocution of workers and public due to faulty electrical equipment, electric short circuits and exposed electrical wires may be the chief sources of electrocution. Damaged PV modules with exposed high voltage conductor also present high risk of electrocution. Glare effect caused due to reflection of incident solar beams on the reflective surface of the laid PV panels can pose threat to safety to nearby residents and pedestrians. Health and safety impact can be considered as direct low to high magnitude, site-specific and short term to long term in duration.

6.2.6 Labor Influx

After testing and commissioning of subproject, ESCO is liable to operate the system for at least 10 years. During the operation phase only few human resources like operator and few support staff may needed for the subproject and these labour force will be mobilised from the people of subproject based on availability and their interest. So, it can be said that there will be no major labour influx in the subproject area during operation phase and ESCO is responsible to adhere all environmental and social safeguard measures specified in ESMP during the operational phase. All the relevant local stakeholders will also ensure the effectiveness of environmental and social measures to be implemented by ESCO for the subproject. Therefore, not any labor influx impact is anticipated during operation phase.

6.3 Benefit Sharing Mechanism

For the benefit sharing of the subproject, an inclusive committee will be formed to ensure the Benefit Sharing Activities and implementation for the community as part of social responsibility of ESCO. ESCO will prepare an action plan for sharing the benefits with local communities both in monetary and non-monetary terms during the construction and operation periods. Committee will be responsible in benefit sharing management and governance. An agreement will be made wherein a fair and equitable sharing of benefits arising from the use of genetic resources for this subproject will be laid out. The ESCO has proposed the Environmental Enhancement, Community Development & Local Infrastructure, Educational & Health Support and Livelihood (Employment & Training) activities as a part of benefit sharing during the construction and operational phases of the subproject.

7 Environmental and Social Mitigation Plan

Table 4: Environmental and Social Mitigation Plan

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
A. Construction Phase							
1.	Land Use and Land Take	In total approx. 1,425 m^2 (2.8 ropanies) public land will be used by the subproject, which is leased by the ESCO from Shubhakalika Rural Municipality Ward No. 4	Long term land lease Agreement between Rural Municipality, Ward No. 4 and ESCO (30years). The land lease agreement is provided in **Annex 1**and land document is presented in **Annex 2**.	Construction Site	Construction and Operational	As provisioned in POM, cost related to land will be excluded from subproject cost	ESCO/contractor
2.	Air Quality	Construction activities such as levelling, grading, excavation works, and site clearance will generate dust Gaseous emission from movement of vehicles will decrease air quality of the surrounding area	Water spraying in heaps of temporarily stored spoils and in active excavated areas Construction workers will be provided with adequate personal protection equipment (PPE) such as breathing masks and safety goggles to protect them from exposure to dust and other pollutants Vehicles and machines used for construction shall be maintained regularly	Construction Site	Construction	100,000/-	ESCO/contractor
3.	Water Quality	Contamination of surface water is expected due to accidental spillage of spoils and construction materials such as cement	Construction workers will be strictly instructed to avoid open urination and defecation, sanitary toilets will be provided in the construction area Spoils and construction materials will be	Construction Site	Construction	NA	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
		slurries in nearby water sources Construction workers can practice open urination and defecation which may lead to pollution of water sources.	stored at least 50m away from the water sources to avoid the contamination by spillage Hazardous material storage sites shall be covered and runoff from refuelling and work sites shall be treated before being disposed of. Install temporary sediment basins, where appropriate, to capture sediment –laden run-off from site Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials. Stockpile materials away from drainage lines Prevent all solid and liquid wastes entering waterways				
4.	Noise Quality	Noise will be generated during earthworks and excavation Construction workers will be in direct exposure to the generated noise and continuous exposure to high dB noise can impair their hearing and psychological health	Construction activities will be restricted to daytime only Construction workers will be provided with appropriate and adequate hearing protection devices such as ear muffs and ear plugs. Maintenance of all vehicles and construction machinery	Construction Site	Construction	25,000/-	ESCO/contractor
5.	Waste Management	Improper management of construction and domestic wastes will cause soil pollution, water pollution, visual impacts, impacts on	Construction wastes will be stored out and kept separates instead of throwing haphazardly Domestic wastes will be managed by burying in pit Recycling and reuse mechanism will be	Construction Site and Camp Site	Construction	25,000/-	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
		health and safety of workers and general public.	applied for minimization of waste volume				
6.	Muck and Spoil Disposal	Spoil will be generated by the construction work such as digging, quarrying, slope cutting, excavation. Improper disposal of spoil materials, may cause destruction of productive land	Reuse of spoil in construction activities such as filling materials and construction aggregates Spoil disposal site should be identified by the contractor and submit the disposal plan for AEPC/ESCO approval. Transport and disposal of spoils at designated disposal sites identified Proper dumping and adequate compaction of spoils at disposal site Landscaping of the disposal site after completion of works to be approved by AEPC/ESCO.	Construction Site	Construction	25,000/-	ESCO/contractor
7.	Stockpiling of Construction Materials	Construction materials such as earthen materials, gravel, aggregates, sand, cement etc. need to be stockpiled before their application at the site. Improper handling may become the source of escaping dust and also the adjacent land may get damaged.	Barren land adjacent to installation site will be used for stockpiling of construction materials Construction of storage house with Zinc plates and truss roof Stockpiling of construction materials along existing road side and highly productive land will be strictly prohibited Remaining construction debris will be disposed at designated disposal site only, far away from water resources and precaution will be made on minimization of such waste as far as possible through environment friendly concepts (reuse, reduction and recycling) The area will be cleaned promptly after	Construction Site	Construction	100,000/-	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			completion of the construction work				
8.	Slope Instability and Soil Erosion	The dominant rock types present in the subproject area include sedimentary and metamorphic rock consisting of shale, mudstone and limestone. The subproject site mainly consists of huge rock which is considered as one of the rockiest area. The land development in the subproject ares has been already done. Gabion wall has been constructed to level the slop area of solar panel installation area	Stabilize the cleared areas/exposed surface not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion	Construction Site	Construction		ESCO/contractor
9.	Impacts on Flora, Fauna and Aquatic Life	Construction noise, dust and likely hunting by the construction workers may adversely impact flora and fauna in the area Illegal fishing practices by construction workers during their leisure period in Tila Karnali River can pose threat to aquatic life of this River stream	Tree cutting should be avoided to the extent possible. Prohibition of cutting of protected tree species Proposed tree cutting by the contractor should be reviewed and approved by AEPC/ESCO. Compensatory plantation will be carried out at the rate of 5 new trees for each tree cut. The plantation site should be identified by the contractor and	Construction Site	Construction	NA	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			approved by AEPC/ESCO. All the approvals/permits should be obtained for tree cutting Awareness raising and training to the workers regarding importance of wild life and vegetation Construction work will be schedule at day time only Prohibition of hunting and poaching of wild species and illegal fishing practices in nearby River.Proper consultation should be carried out and consent from the relevant community should be given regarding the potential impacts on community forest around the project area. Pre-construction survey should be conducted to ensure potential impacts on fauna and flora and proper mitigation measures are planned.				
10.	Occupational Health and Safety	Construction activities may cause accidents and injury Health and safety risks are also to the construction workers and general public	Contractor will be required to implement Occupational health and safety plan as explained in Annex- 6. Adequate and appropriate safety signs shall be placed at construction site in Nepali language. Local public shall not be allowed trespass into active construction areas Emergency first aid supplies at active construction areas Construction workers shall be provided with adequate Personal Protecting Equipment (PPEs) such as safety helmet, safety boots, face & dust masks,	Construction Site, Camp Site and Nearby Settlement Area	Construction	300,000/-	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			safety goggles, gloves, high visibility clothing, etc depending upon specificity of the job Construction safety harness shall be provided for construction workers working on height. All electrical equipment, power lines and cables will be insulated in accordance with standard Nepal safety requirements Fire-fighting equipment such as fire extinguisher and sand bucket shall be placed in active construction areas An Emergency response plan defining possible risks, emergency handling procedures, responsible persons, emergency contacts etc. shall be prepared and placed in active construction areas Recording and reporting of accidents and efficient response to it Project staff/workers will be briefed about COVID-19 and other infectious diseases related responsible hygienic behaviour and practices, which will be done periodically and records of such activities will be maintained and shared. All possible precautionary measures will be adopted to minimize transmission of highly communicable disease such as COVID-19 An Emergency response plan defining possible risks, emergency handling procedures, responsible persons, emergency contacts etc. shall be				

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			prepared by the contractor and placed in active construction areas				
11.	Community Health and Safety	Nuisance to community people due to vehicular movement Accident due to vehicular movement	Ensure an effective implementation of Traffic Management Plan Waste generated during the construction phases of subproject will be well managed and disposed by segregated as degradable and non-degradable instead of throwing haphazardly elsewhere in subproject surrounding and community Subproject workers as well as the local community shall be provided periodic awareness program on health and sanitation to control open defecation and communicable diseases like COVID-19.	Construction Site, Camp Site and Nearby Settlement Area	Construction		ESCO/contractor
12.	Labor Influx	Social conflict due to influx of workforce	Reduce labor influx by tapping into local workforce (Skill, Semi skill & Unskilled to the possible extent) Construction of labor camp with sanitary facility for the migrant workers Awareness programmes for labours about local culture and practices and the different types of communicable diseases, COVID-19, HIV/AIDs and STDs etc. Labor management plan, including labor registration Project staff/workers will be briefed about COVID-19 related responsible hygienic behaviour and practices All possible precautionary measures will be adopted to minimize transmission of highly communicable disease such as	Construction Site, Camp Site and Nearby Settlement Area	Construction	50,000/-	ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			COVID-19 as per GoN and WHO standards.				
13.	Benefit Sharing Mechanisms	Benefit Sharing action plan will be prepared for sharing the benefits with local communities as a part of corporate social responsibility (monetary and non-monetary)	Strengthen the community's awareness on environment protection activity. Educational and Health related activities for community of subproject Employment opportunities for local communities (During construction and post construction) Provide support to improve infrastructure or transfer revenue community development fund Livelihood trainings	Construction Site, Camp Site and Nearby Settlement Area	Construction & Operational	Included in Subproject Cost	ESCO
14.	GRM and Sexual Exploitation, Sexual Abuse and Sexual Harassment (SEAH)	Grievance/concerns/complaints of locals on project activities and Sexual Exploitation, Sexual Abuse and Sexual Harassment (SEAH) to the subproject related personnel	ESCO/AEPC • Put in place a functioning GRM system along with required logistics and record keeping system. • A manual for the operation and management of GRM and SEA/SH will be developed and implemented. • Ensure a safe environment, free from discrimination on any ground and from sexual harassment, abuse and exploitation for all subproject related activities in construction and operation phases. • Code of conduct related to SEAH will be developed and implemented. • Personnel related subprojects found involved in any type of misconduct to SEAH is subject to punish disciplinary measures as appropriate and can be declared not eligible to work further in MGEAP related	Construction Site, Camp Site and Nearby Settlement Area	Construction & Operational	N/A	AEPC/ESCO/contractor

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			work • Gender Action Plan of ESMF will be strictly implemented to address the issues related the gender equality and social inclusion Procedure/mechanism to register complaints of SEAH will be developed and implemented.				
15.	Stakeholder engagement and information disclosure	Local stakeholder will be informed and make them aware about project activities on a regular basis	ESCO/AEPC • Ensure periodic consultation meetings with stakeholders, including the representatives of local level and project beneficiaries and vulnerable people such as Dalits and religious minorities • Ensure dissemination of project related information in a way that is culturally appropriate and understandable to the locals.	Construction Site, Camp Site and Nearby Settlement Area	Construction & Operational	N/A	AEPC/ESCO
B. Operation Phase							
16.	Waste Management	The main waste that will be produced during operation is domestic waste. The other type of waste includes metallic and stationary waste from office works which can accumulate over a period of time	Degradable waste will be disposed by burying in pit Recyclable waste such as plastic, paper, glass, etc will be collected and sent for recycling	Mini Grid Installation Area	Operation	25,000/-	ESCO
17.	Health and Safety	Emergency fire hazard, electrocution of workers and public due to faulty electrical equipment, electric short circuits and exposed electrical wires	PPE such as hard hat, leather gloves, arc-rated pants, long sleeved shirt, face shield, safety boot, shall be provided to the workers in order to protect them from electrocution. Fire Extinguishers will be placed at	Mini Grid Installation Area, Settlement Area	Operation	150,000	ESCO

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
		may be the chief sources of electrocution. Damaged PV modules with exposed high voltage conductor also present high risk of electrocution. Glare effect caused due to reflection of incident solar beams on the reflective surface of the laid PV panels can pose threat to safety to nearby residents and pedestrians.	appropriate spots General awareness program on electrical safety will be conducted for local residents Distribution of safety pamphlet to villagers specifying hazards and prohibited activities Mini grid installation area will be properly fenced to check unauthorized access in to the area Appropriate safety signs shall be placed at applicable locations in Nepali language PV modules should be placed in such a way to avoid glare exposure to sensitive locations such as roads and houses in and around the subproject site Use of lightning arrester to protect from lightning strikes Ensure an effective implementation of Occupational Health and Safety Plan and Emergency Response Plan Community and Project staff/workers will be briefed about COVID-19 related responsible hygienic behaviour and practices				

S No.	Issues	Impacts	Mitigation Measures	Location	Time of Action	Estimated Cost	Responsibility
			All possible precautionary measures will be adopted to minimize transmission of highly communicable disease such as COVID-19.				
18.	GRM and SEA/SH, stakeholder consultations	Local stakeholder will be informed and make them aware about project activities on a regular basis	• The GRM will continue to operate and the project will conduct consultations with the local stakeholders and local levels periodically.	Mini Grid Installation Area, Settlement Area	Operation		ESCO

8 Stakeholder Engagement and Grievance Redress Mechanism (GRM)

The major objectives of Stakeholder Engagement are to keep all stakeholders informed on potential beneficial & adverse impacts related to subproject activities and to ensure that stakeholders actively participate in all levels of the project cycles, come up with mitigation plans to minimize the potential negative impacts of the subproject. These will ultimately contribute towards narrowing down the gaps between the subproject officials & beneficiaries and to gain broad support from community to implement subproject activities smoothly. It involves interactions between identified groups of people and provides stakeholders with an opportunity to raise their concerns and opinions (e.g. by way of meetings, consultation, interviews and focused group discussion) and ensures that their concerns and opinions are taken into consideration when making subproject decisions. The following mechanisms will be followed for stakeholders' engagement during the construction and operational phases of subproject.

i. Leaflets & brochures regarding to subproject information will be distributed to all the stakeholders (Language of leaflet and brochures will be Nepali and Local language)
ii. Periodic public meetings in the subproject influence area
iii. Information/ awareness campaigns through engaged locally formed Clubs, Groups and NGOs (some of the clubs and NGO working in the subproject area are Human Right and Environment Development Centre (HURENDEC), Danphe Yuba Club & Samiti Yuba Club)
iv. Formation of committees and/or groups including stakeholders at various stages of the subproject.
v. Development of grievance redresses mechanism in the subproject premises.
vi. Disclosure/ dissemination of subproject information by mobilizing local Mass media (local newspaper, FM/Radio & TV) and by organizing meeting /Workshops on decision making process and how the grievances of subproject affected people will be addressed.

While conducting stakeholders' engagement it will be taken in to consideration that all the consultation will be two way dialogues between PMT, ESCO and its stakeholders. The subproject-affected communities will be continually consulted to identify upcoming needs, constraints, priorities and kind of social and environmental corrective measures needed to be pursued during the construction and operational phases of the subproject through periodic consultations. The mechanism of meaningful consultation will include;

- Free, prior and informed consultation with all stakeholders including venerable groups of people
- Appropriate timing and venue of consultation for different groups
- Use of local language, sign languages and local facilitators including women
- Information dissemination in collaboration with local NGOs and CBOs
- Direct contact with representatives of stakeholders though mobile phones to understand their perception about the subproject and organizing small FGDs maintaining social distance
- Well targeted and inclusive engagement with stakeholder
- Focused group discussion and interviews with stakeholders
- Consultation will be continued throughout the project life cycle

8.1 Stakeholder Consultation

For Shubhakalika Solar Mini Grid Subproject, Sukatiya (37 HHs), Khatebada (70 HHs), Udagaun (57 HHs), Adhikaribada (24 HHs), Bhattaraitole (25 HHs), Sundargaun (63 HHs), Rarakatiya (55 HHs), Chaulagainbada (14 HHs), Dhadukhada (20 HHs), Rural Municipality, Health Post, Bank,

School, Telecom Tower, FM station etc. are some of the stakeholders identified during the field visit.

The first consultation was conducted on February 4, 2020 in Shubhakalika Rural Municipality Ward No. 4 during the field visit for Environmental and Social screening of the subproject. A community consultation was conducted in presence of 35 participants, which included 11% female and 89% male. Out of total participants, 54% were Brahmin/Chettri/Thakuri, 6% were Ethnic (participants were from AEPC) and 40% Dalit. In the consultation, the participants were the representatives of Municipality Office, Ward Offices, Schools and Health Post and local people of Ward No. 4 & 5 of Shubhakalaika Rural Municipality. Moreover, community people were informally consulted to get their individual opinion and information on the proposed subproject. Minute of consultation is presented in **Annex 3**.

During the consultation, all participants were informed about subproject modality and potential positive and negative impacts associated with solar mini grid subproject. The significant issues raised by participants in consultation are:

- People of subproject area are heavily depending on small solar home systems for lighting their homes which is not even sufficient to charge mobile phones so the community people are willing to have reliable source of electricity supply at their homes, offices and commercial entities as early as possible and they also have shown their concern about the electricity tariff.
- When Community people were informed that private land could be used for Transmission & Distribution lines, they were found keen to contribute for it.
- Community people were also informed about the subproject GRM and GRC that has been established at subproject level as well as in project level to lodge if there are any grievances related to the subproject. Though the GRC at field level has been formed, the details procedure to handle grievances will be prepared and implemented once the agreement will be done to commence work at site between ESCO and AEPC/MGEAP. The process of GRC will be communicated to all the stakeholders of subproject area.
- They requested ESCO to initiate the process for construction of subproject as early as possible and they assured ESCO to provide necessary support that needed from the community during the construction and operational phases of the subproject.

8.2 Grievance Redress Mechanism

An accessible and responsive complaint management process is important part of any stakeholder engagement strategy. Therefore, a Grievances Redress Mechanism has been formulated for all the subprojects going to implement under AEPC/MGEAP as provisioned in the ESMF, in which all the stakeholders and community people are given a venue to lodge complaints and grievances regarding to any environmental and social issues related to the subproject and allows subproject authority to respond to & resolve the issues in an appropriate manner.

The **Grievance Redress Mechanism** includes the following:

- At the subproject level (Level 1), a focal person (or, Member Secretary of Subproject Level GRC) will be appointed to receive/handle any kind of grievance related to the subproject. His/her name and contact number will be displayed at the entrance of the subproject site, so

that affected people can have direct access to him/her.

- A register will be maintained (electronically also) including the name of grievant, date and time of grievance recorded, assigned a tracking number, acknowledge to claimant, issue raised, and time frame to redress the received grievance (a template is presented in **Annex 5**).
- A suggestion box will be place at the entrance of the suproject site for collecting grievances, in addition to it another suggestion box will be placed in the subproject site premises to collect grievances from employees.
- The subproject level will provide periodic updates to the grievant regarding the status and actions taken to resolve the Grievances.
- At subproject level, ESS focal person is responsible to resolve the received grievances within 10 days. If it is not resolved at the subproject level, the focal person will forward it to the Project Level.
- Grievances can be registered via AEPC website http://www.aepc.gov.np and via phone to AEPC/MGEAP's ESS focal person.
- If the subproject level GRC remains unable to redress the grievance, it will be forwarded/ escalated to the project level GRC (Level 2).
- Affected persons have the option of accessing the court of law in case of dissatisfaction with the decision of the project level GRC.

The project level (Level 2) **Grievance Redress Committee** (GRC) has been formed, which consist of the following members:

1) Project Manager - Chairperson, AEPC/MGEAP
2) Representative of beneficiary -Member
3) Representative of ESCO-Member
4) Technical Expert of MGEAP-Member
5) Social Safeguard Expert of MGEAP-Member Secretary

Apart from project level GRC, a Grievance Redress Committee (GRC) will be formed at subproject level where subproject affected people can file complaints verbally and in written from. The project affected persons will have access to all level of grievance redress procedure established under MGEAP without any cost. ESCO will be responsible to record all the grievances received at subproject level and submit AEPC the details of issues/grievances resolved.

Subproject Level (Level 1)Grievance Redress Committee (GRC)

1) Chairperson/Subproject Manager of ESCO – Chairperson
2) Representative of local body, Ward level – Member (1)
3) Representative of local body, Municipality level – Member (1)
4) Representative of local CBO – Members (1)
5) Safeguard Expert of the ESCO – Member Secretary


Public consultation and Stakeholder meeting conducted on February4, 2020 in Shubhakalika RM

9 Monitoring and Reporting Mechanism

As provisioned in the ESMF, the social and environmental safeguard implementation will be monitored internally. The team comprises of the representatives of stakeholders and ESCO will monitor the project site in the initial, construction, post construction and operational phase of subproject to ensure that all environmental and social issues related to the subproject are well addressed and comply with the requirements mentioned in ESMP. In addition to it, as per the project need, an independent third party monitoring will be carried out. The ESCO will prepare quarterly progress report on the implementation of the ESMP and submit them to the AEPC. During construction period, the AEPC will prepare a quarterly report based on the progress report provided by ESCO and share it with the World Bank. During operation period, AEPC will prepare semi-annual monitoring report and submit it to the WB and these reports will be made available to all the stakeholders.

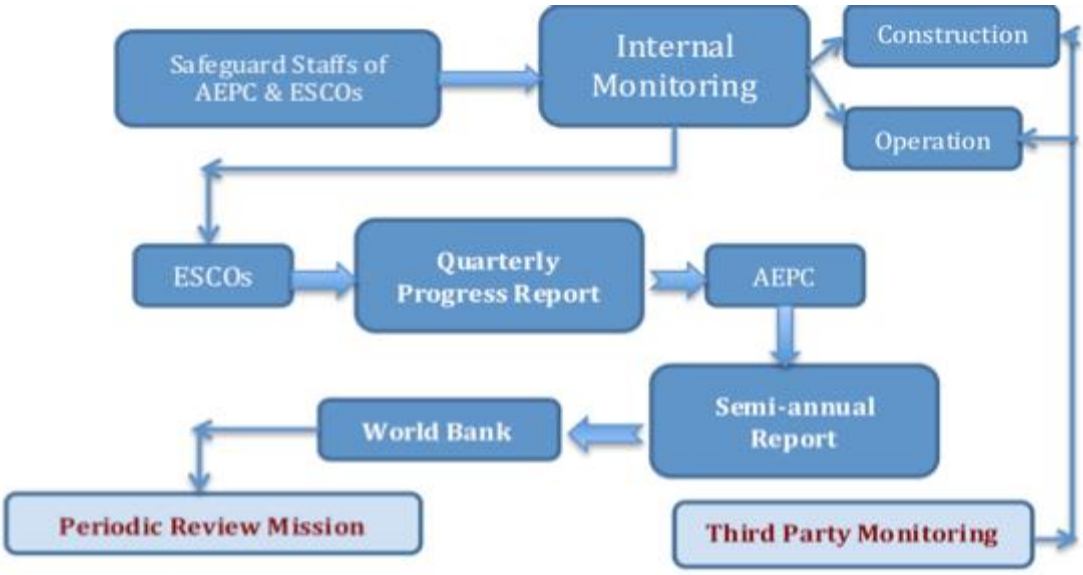

Table 5: Compliance monitoring, Construction and Operation Phase

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
Construction Phase							
1	Land Use and Land Take • Long term land lease Agreement between Shubhakalika RM, Ward No. 4 and ESCO (30 years).	ESCO	Observation	Once before construction period	AEPC		-
2	Air Quality • Water spraying in heaps of temporarily stored spoils and in active excavated areas • Construction workers will be provided with adequate personal protection equipment (PPE) such as breathing masks and safety goggles to protect them from exposure to dust and other pollutants • Vehicles and machines used for construction shall be maintained regularly	Contractor/ ESCO	Site Observation/ Record	Once during construction period	ESCO/AEPC	Subproject Site	-
3	Water Quality • Good construction practices will be adopted to prevent accidental spillage of construction chemical and materials • Construction workers will be strictly instructed to avoid open urination and defecation, sanitary toilets will be provided in the construction area • Storage areas for the chemicals, oils and other substances will be located far from the water sources to avoid the contamination by spillage • All reasonable measures will be taken to prevent the waste water produced in construction from entering into the nearby seasonal stream	Contractor/ ESCO	Site Observation/ Record	Once during construction period	ESCO/AEPC	Subproject Site	-
4	Noise Quality • Construction activities will be restricted to	Contractor/ ESCO	Site Observation/ Record	Once during construction	ESCO/AEPC	Subproject Site	

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	daytime only • Construction workers will be provided with appropriate and adequate hearing protection devices such as ear muffs and ear plugs. • Maintenance of all vehicles and construction machinery			period			-
5	<u>Waste Management</u> • Construction wastes will be stored out and kept separates instead of throwing haphazardly • Domestic wastes will be managed by burying in pit • Recycling and reuse mechanism will be applied for minimization of waste volume	Contractor/ ESCO	Site Observation/ Record	Twice during construction period	ESCO/AEPC	Subproject Site	-
6	<u>Muck and Spoil Disposal</u> • Reuse of spoil in construction activities such as filling materials and construction aggregates • Re-vegetation of the area • Disposal of spoil in identified disposal sites • Construction workers will be instructed for proper storage and handling procedures of construction waste and other solid wastes.	Contractor/ ESCO	Site Observation/ Record	Once during construction period	ESCO/AEPC	Subproject Site	-
7	<u>Stockpiling of Construction Materials</u> • Less productive land will be used for stockpiling of construction materials • Construction of storage house with Zinc plates and truss roof • Stockpiling of construction materials along existing road side and highly productive land will be strictly prohibited • Remaining construction debris will be	Contractor/ ESCO	Site Observation/Records	Once during pre-construction and once during construction period	ESCO/AEPC	Subproject Site	

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	disposed at designated disposal site only, far away from water resources and precaution will be made on minimization of such waste as far as possible through environment friendly concepts (reuse, reduction and recycling) • The area will be cleaned promptly after completion of the construction work						
8	<u>Impacts on Flora, Fauna and Aquatic Life</u> • Pollution of water sources will be minimized to the extent possible • Proper management measures to prevent damage to the natural vegetation of the site will be implemented such as establishing and enforcing a proper code of conduct and awareness raising/training • Prohibition of hunting and poaching of wild species and illegal fishing practices in nearby Tila Karnali River • Proper storage, collection, and disposal of generated waste	Contractor/ ESCO	Site Observation/Records	Once during construction Period	ESCO/AEPC	Subproject Site/ surrounding area/River	
9	<u>Occupational Health and Safety</u> • Project staff/workers will be briefed about COVID-19 related responsible hygienic behaviour and practices • All possible precautionary measures will be adopted to minimize transmission of highly communicable disease such as COVID-19, including implementation of WHO and government guidelines for civil construction. • Local public shall not be allowed trespass into active construction areas • Emergency first aid supplies at active construction areas	Contractor/ ESCO	Site Observation/Records/Interview with workers and staffs	Once a week during construction period	ESCO/AEPC	Subproject Site/T&D	

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	• Construction workers shall be provided with adequate and appropriate Personal Protecting Equipment (PPEs) such as safety helmet, safety boots, , face and dust masks, safety goggles, gloves etc depending upon specificity of the job • Safety belt shall be provided for construction workers working on height • Ensure an effective implementation of Labor Management Plan, Occupational Health and Safety Plan and Emergency Response Plan						
10	Community Health and Safety • Nuisance to community people due to vehicular movement • Accident due to vehicular movement • Subproject workers as well as the community people shall be provided periodic awareness program on health and sanitation to control open defecation and communicable diseases like COVID-19	Contractor/ ESCO	Site Observation/Records/Interview with community people	Once a week during construction period	ESCO/AEPC	Subproject Site/surrounding area	
11	Labor Influx • Reduce labor influx by tapping into local workforce (Skilled, Semi-skilled & Unskilled to the possible extent) • Awareness programmed for labours about different types of communicable diseases, such as COVID-19, HIV/AIDs and STDs. • Precautionary measures adopted to minimize transmission of highly communicable disease such as COVID-19 as per GoN and WHO standards.	Contractor/ ESCO	Site Observation/Records/Interview with community people	Once a week during construction period	ESCO/AEPC	Subproject Site	
12	Grievance Redress Mechanism (GRC) • Formation of Grievance Redress Committee in subproject level	ESCO	Site Observation/Records/Interview	Periodically in operational	AEPC/ESCO	Subproject Site	

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	• The Subproject level GRC focal person and contact number displayed at the entrance of subproject. • Well maintained register to lodge grievances via any means (Phone, Verbal & written) • Periodic updates to the grievant regarding the status and actions taken to resolve the Grievances		with community people	and construction phase			
13	Benefit Sharing Mechanisms • Strengthen the community's awareness of the environment • Reforestation and vegetation of ccommunity forest • Conservation of water sources • Employment opportunities for local communities (During construction and post construction) • Provide support to improve infrastructure or transfer revenue community development fund • Livelihood trainings	ESCO	Observation/Records/Interview with community people	Once in construction period and twice in operation period	AEPC	Subproject Site/Community	
14	Sexual Exploitation, Sexual Abuse and Sexual Harassment (SEAH) • Ensure a safe environment, free from discrimination on any ground and from sexual harassment, abuse and exploitation for all subproject related activities in construction and operation phases. • A manual/code of conduct related to SEAH will be developed and implemented. • Personnel related subprojects found involved in any type of misconduct to SEAH is subject to punish disciplinary	ESCO/AEPC	Observation/Records/Interview with community people	Periodically in operational and construction phase	ESCO/AEPC	Subproject Site/Community	

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	measures as appropriate and can be declared not eligible to work further in MGEAP related work • Gender Action Plan of ESMF will be strictly implemented to address the issues related the gender equality and social inclusion • Procedure/mechanism to register complaints of SEAH will be developed and implemented.						
15	Periodic consultations with stakeholders and information disclosure	ESCO	Observation/Records/Interview with community people	Periodically in operational and construction phase	ESCO/AEPC	Subproject Site/Community	
Operation Phase							
1	Waste Management • Degradable waste will be disposed by burying in pit • Recyclable waste such as plastic, paper, glass, etc will be collected and sent for recycling	ESCO	Site Observation	Twice a year during operation Phase	ESCO/AEPC	Subproject Site/Community	-
2	Health and Safety • Proper personal protective equipment shall be provided to the workers in order to protect them from electrocution • General awareness program on electrical safety will be conducted for local residents • Distribution of safety pamphlet to villagers specifying hazards and prohibited activities • Mini grid installation area will be properly fenced to check unauthorized access in to the area	ESCO	Observation/Interview with workers and community people	Twice a year during Operation Phase	ESCO/AEPC	Subproject Site/Community	-

S.N	Provisions of compliance	Responsibility	Methods	Frequency /Time	Monitoring authority	Place	Cost (NRs.)
	• Appropriate safety signs shall be placed at applicable locations in Nepali language • PV modules should be placed in such a way to avoid glare exposure to sensitive locations such as roads and houses in and around the subproject site. • Use of lightning arrester to protect from lightning strikes • Ensure an effective implementation of Occupational Health and Safety Plan and Emergency Response Plan • Community and Project staff/workers will be briefed about COVID-19 related responsible hygienic behavior and practices • Precautionary measures adopted to minimize transmission of highly communicable disease such as COVID-19 as per GoN and WHO standards.						

10 Environmental and Social Safeguard Plans

It is essential to provide a safe working environment and avoid accidents involving workers, staffs, visitors, or the surrounding settlements, while performing any activities during construction and operation phase of the subproject. Therefore, it is very necessary to be fully aware of the required safety measures for the successful implementation of the subproject. These provisions are prepared based on mitigation measures suggested in the event of probable impacts. The following plans are formulated to ensure safeguarding of the workers, staffs, visitors, or the surrounding settlements of the Shubhakalika Solar Mini Grid subproject.

10.1 Occupational Health and Safety Plan

The Occupational Health and Safety plan is a plan of action designed to prevent accidents and occupational diseases. The workers and staff are prone to accidents, injuries, and diseases while performing activities during the construction and operation phase of the subproject. It is the responsibility of the ESCO to provide a safe working environment for workers and staff. The Occupational Health and Safety Plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 6**.

10.2 Emergency Preparedness and Response Plan

The Emergency Preparedness and Response Plan is prepared in order to take immediate action to minimize losses. The Plan provides onsight on protective measures to follow in case any emergency events occur in the subproject site. The Emergency Response Plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 7**.

10.3 Traffic Management Plan

The Traffic Management Plan is prepared to keep workers safe from vehicles and equipment both outside and within worksites. The plan helps to provide safe traffic and work zone during construction phase. The Traffic Management Plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 8**.

10.4 Labor Management Plan

The Labor Management Plan provides guidance on protecting the worker's right, health, safety and security during the subproject construction and operation phase. The plan outlines the actions necessary for assuring the effective health, safety and security measures are considered by the contractor, all their employees and the employees of their sub-contractors. The Labor Management Plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 9**.

10.5 Battery Management Plan

Battery is a storage medium that contains single or multiple electro-chemical cells that converts chemical energy to electrical energy. Shubhakalika Solar Mini Grid subproject is planning to Lead Acid Battery during its operation phase. Therefore, the Battery Management Plan provides guidance on managing used battery after its life. The plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 10**.

10.6 Waste Management Plan

Some packaging waste such as cardboard, platic sheet, small plastic pieces etc,. are supposed to be generated during the construction phase, which will be in the packages of solar PV supply and other equipment. The waste management plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 11**.

10.7 Gender Equality and Social Inclusion (GESI) Action Plan

A gender equality and social inclusion action plan is developed for Shubhakalika Solar Mini Grid subproject to ensure the participation of women, poor, dalit, and other excluded groups of subproject area in planning, construction, operational and implementation processes and promote equal access to resources and benefit. The GESI Action Plan for Shubhakalika Solar Mini Grid subproject is presented in **Annex 11.**

11 Implementation of ESMP

The ESMP shall be the part of the Detiled Feasibility Study report of Shubhakalika Solar Mini Grid Subproject. It is the responsibility of ESCO to ensure that this ESMP is approved from the AEPC/MGEAP. The ESCO shall ensure that this ESMP is well implemented by the Contractors during the construction phase. The contractors are obliged to implement the mitigation measures prescribed for each identified impacts as well as for those impacts which comes up during the construction phase, and not anticipated during the preparation of this ESMP.

The role of Contractor during subproject construction are as follow:

- To carry out construction activities in environmentally and socially sound manner as per ESMP and other E&S Safeguard Plans proposed in Section 10.
- To manage construction team and reduce the environmental and social impacts
- To coordinate with ESCO, AEPC to resolve any environmental and social issues during construction
- To implement Environmental and Social Management Plan (Occupational Health and Safety Plan, Emergency Preparedness and Response Plan, Traffic Management Plan, Labor Management Plan, Battery Management Plan, Waste Management Plan and GESI Action Plan) prepared by AEPC.
- To carry out self E&S monitoring by the qualified E&S specialist in charge and provide necessary information to ESCO for preparation of quarterly progress report including the status of ESMP implementation
- To report major accidents/incidents and significant non-compliance issues/grievance at/around project sites as soon as its identification

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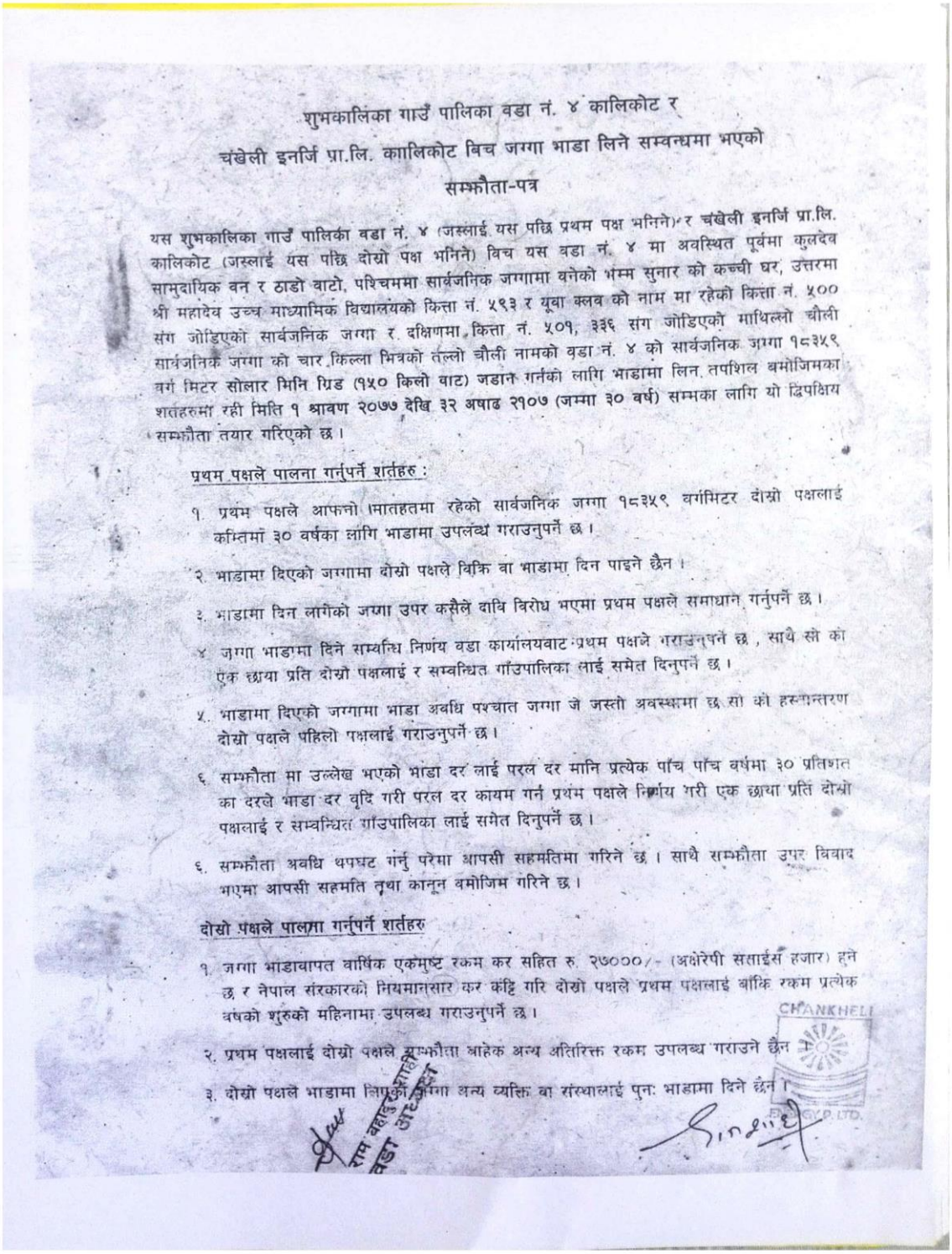
Annex 1: Land Lease Document



शुभकालिका गाउँ पालिका वडा नं. ४ कालिकोट र

चंखेली इनर्जि प्रा.लि. कालिकोट बिच जग्गा भाडा लिने सम्बन्धमा भएको

सम्झौता-पत्र

यस शुभकालिका गाउँ पालिका वडा नं. ४ (जस्लाई यस पछि प्रथम पक्ष भनिने) र चंखेली इनर्जि प्रा.लि. कालिकोट (जस्लाई यस पछि दोस्रो पक्ष भनिने) बिच यस वडा नं. ४ मा अवस्थित पूर्वमा कुलदेव सामुदायिक वन र ठाडो बाटो, पश्चिममा सार्वजनिक जग्गामा बनेको भम्म सुनार को कच्ची घर, उत्तरमा श्री महादेव उच्च माध्यामिक विद्यालयको किल्ला नं. ५९३ र यूवा क्लव को नाम मा रहेको किल्ला नं. ५०० संग जोडिएको सार्वजनिक जग्गा र दक्षिणमा किल्ला नं. ५०१, ३३६ संग जोडिएको माथिल्लो चौली सार्वजनिक जग्गा को चार किल्ला भित्रको तल्लो चौली नामको वडा नं. ४ को सार्वजनिक जग्गा १८३५९ वर्ग मिटर सोलार मिनि ग्रिड (१५० किलो वाट) जडान गर्नको लागि भाडामा लिन तपशिल बमोजिमका शर्तहरुमा रही मिति १ श्रावण २०७७ देखि ३२ असाढ २१०७ (जम्मा ३० वर्ष) सम्मका लागि यो द्विपक्षिय सम्झौता तयार गरिएको छ ।

प्रथम पक्षले पालना गर्नुपर्ने शर्तहरु :

१. प्रथम पक्षले आफ्नो मातहतमा रहेको सार्वजनिक जग्गा १८३५९ वर्गमिटर दोस्रो पक्षलाई कम्तिमा ३० वर्षका लागि भाडामा उपलब्ध गराउनुपर्ने छ ।

२. भाडामा दिएको जग्गामा दोस्रो पक्षले बिक्रि वा भाडामा दिन पाइने छैन ।

३. भाडामा दिन लागेको जग्गा उपर कसैले दावि विरोध भएमा प्रथम पक्षले समाधान गर्नुपर्ने छ ।

४. जग्गा भाडामा दिने सम्बन्धि निर्णय वडा कार्यालयवाट प्रथम पक्षले गराउनुपर्ने छ , साथै सो को एक छाया प्रति दोस्रो पक्षलाई र सम्बन्धित गाँउपालिका लाई समेत दिनुपर्ने छ ।

५. भाडामा दिएको जग्गामा भाडा अवधि पश्चात जग्गा जे जस्तो अवस्थामा छ सो को हस्तान्तरण दोस्रो पक्षले पहिलो पक्षलाई गराउनुपर्ने छ ।

६. सम्झौता मा उल्लेख भएको भाडा दर लाई परल दर मानि प्रत्येक पाँच पाँच वर्षमा ३० प्रतिशत का दरले भाडा दर वृदि गरी परल दर कायम गर्न प्रथम पक्षले निर्णय गरी एक छाया प्रति दोस्रो पक्षलाई र सम्बन्धित गाँउपालिका लाई समेत दिनुपर्ने छ ।

६. सम्झौता अवधि थपघट गर्नु परेमा आपसी सहमतिमा गरिने छ । साथै सम्झौता उपर विवाद भएमा आपसी सहमति तथा कानून बमोजिम गरिने छ ।

दोस्रो पक्षले पालना गर्नुपर्ने शर्तहरु

१. जग्गा भाडावापत वार्षिक एकमुष्ट रकम कर सहित रु. २७०००/- (अक्षेरेपी सत्ताईस हजार) हुने छ र नेपाल सरकारको नियमानसार कर कट्टि गरि दोस्रो पक्षले प्रथम पक्षलाई बाँकि रकम प्रत्येक वर्षको शुरुको महिनामा उपलब्ध गराउनुपर्ने छ ।

२. प्रथम पक्षलाई दोस्रो पक्षले सम्झौता बाहेक अन्य अतिरिक्त रकम उपलब्ध गराउने छैन ।

३. दोस्रो पक्षले भाडामा लिएको जग्गा अन्य व्यक्ति वा संस्थालाई पुनः भाडामा दिने छैन ।

CHANKHELI ENERGY P. LTD.

४. प्रथम पक्षले भाडामा दिएको जग्गा सम्झौता भएको मितिको एक महिना दिनभित्र खालि गराउनुपर्ने छ ।

५. दोस्रो पक्षले भाडामा लिएको जग्गामा वातावरणमैत्री कारोबार गर्नुपर्नेछ । कानुनले वर्खिलाप हुने गरि कार्य गर्न पाउने छैन यदि गरेको पाईएमा कानुन बमोजिम दोस्रो पक्ष नै जिम्मेवार हुने छ ।

६. दोस्रो पक्षले भाडामा लिएको जग्गामा सार्वजनिक कार्यका लागि मिनि ग्रिड सोलार पावर स्थापना गरि कारोबार गर्न सक्ने छ, सो को जानकारी पहिलो पक्षलाई जानकारी गराउनुपर्ने छ ।

पहिलो पक्षको तर्फबाट

हस्ताक्षर: राम बहादुर शाही
वडा अध्यक्ष
नाम : राम बहादुर शाही
पद: ४ नं वडाध्यक्ष शुभकालिका गाउँपालिका
सम्पर्क नम्बर: ९८६८३५८६५३
मिती : २०७६ साल पुष ४ गते
कार्यलयको छाप :

दोस्रो पक्षको तर्फबाट

हस्ताक्षर:
नाम : जज राज शाही
पद: प्रवन्ध संचालक
सम्पर्क नम्बर: ९८४८३०११५६
मिती : २०७६ साल पुष ४ गते
कम्पनिको छाप :

CHANCHELI ENERGY P. LTD.

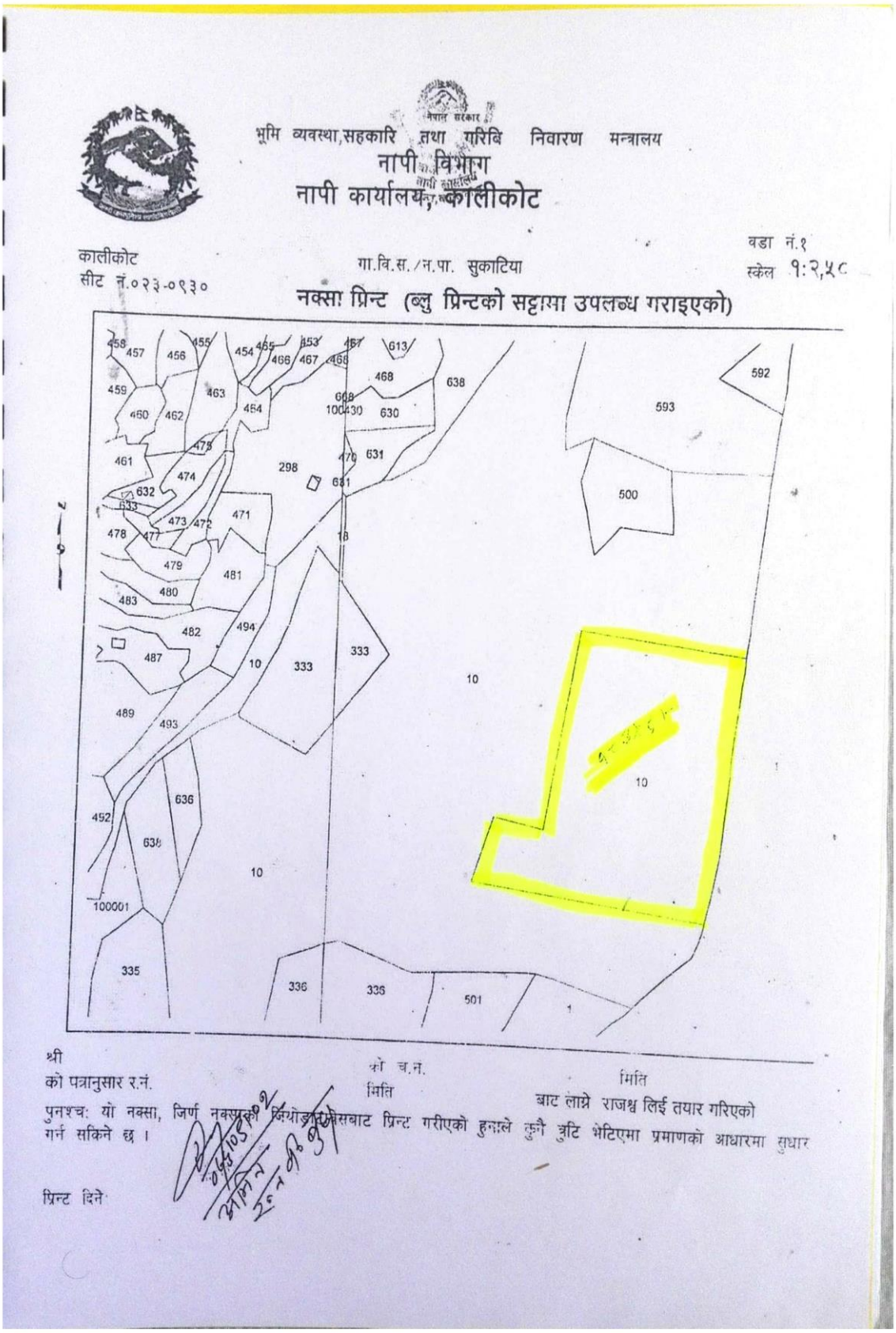
साक्षी १

हस्ताक्षर:
नाम : भम्म सुनार
पद: ४ नं वडा सदस्य
सम्पर्क नम्बर: ९८६८९३७२२८
मिती : २०७६ साल पुष ४ गते

साक्षी २

हस्ताक्षर:
नाम : प्रेम बहादुर शाही
पद: संचालक
सम्पर्क नम्बर: ९८५८३९०३७१
मिती : २०७६ साल पुष ४ गते

Annex 2: Land Document



नेपाल सरकार
भूमि व्यवस्था,सहकारि तथा गरिबि निवारण मन्त्रालय
नापी विभाग
नापी कार्यालय, कालीकोट

कालीकोट
सीट नं.०२३-०९३०

गा.वि.स./न.पा. सुकाटिया

वडा नं.१
स्केल १:२,५००

नक्सा प्रिन्ट (ब्लु प्रिन्टको सट्टामा उपलब्ध गराइएको)

श्री
को पत्रानुसार र.नं.

को च.नं.
मिति

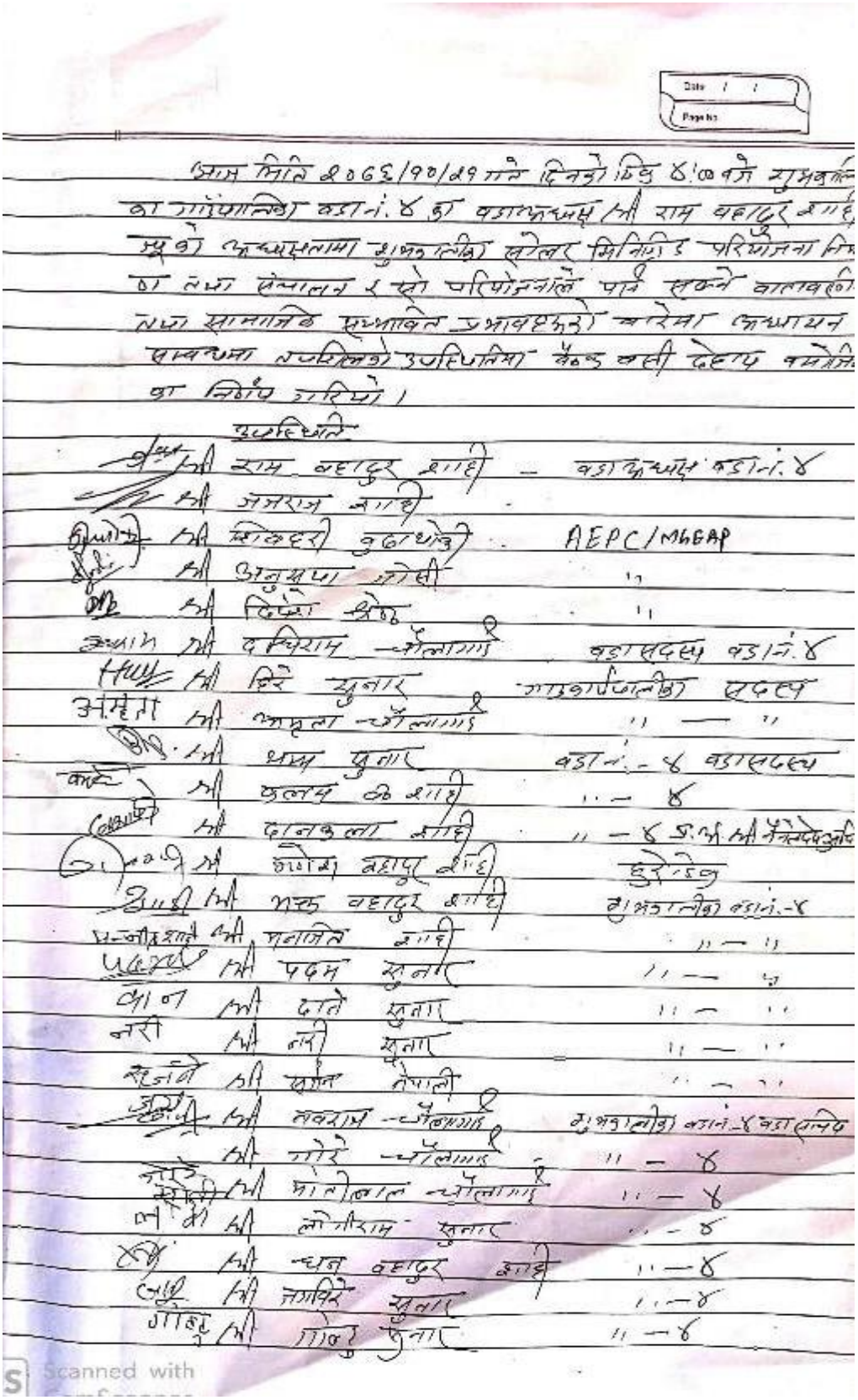
मिति
बाट लाग्ने राजश्व लिई तयार गरिएको

पुनश्चः यो नक्सा, जिर्ण नक्सालाई [illegible]बाट प्रिन्ट गरीएको हुनाले हुनै त्रुटि भेटिएमा प्रमाणको आधारमा सुधार गर्न सकिने छ ।

प्रिन्ट दिने

Annex 3: Meeting Minutes of Consultations

Minute of the Meeting conducted on February 4, 2020



Date / /
Page No.

श्री होविन्द सुनार शुभकालिका - ४
श्री मुने सुनार ,, - ४
श्री कमल सुनार ,, - ४
श्री प्रजापति चौलागाईं ,, - ४
श्री कपिल राज शाही ,, - ४
श्री पृथ्वी बहादुर शाही ,, - ४ वडा प्रशासन
श्री कुल प्रसाद पाण्डे ,, - ४
धनपति श्री धनपति चौलागाईं ,, - ४ वडा सदस्य
श्री वर्ण चौलागाईं ,, - ४
बल श्री बल सुनार ,, - ४

निर्णय तथा प्रस्तावहरु

निर्णय नं.(१) शुभकालिका गाउँपालिका वडा नं. ४ र ८ मा कुनै पनि माध्यमले विद्युतीकरण नभएको हुँदा शुभकालिका सोलार मिनिग्रिड निर्माण तथा सञ्चालन गरी वडा नं. ४ र ८ मा विद्युतिकरण गराउने कार्यका लागि छलफल गरी निर्णय गरियो।

निर्णय नं.(२) शुभकालिका सोलार मिनिग्रिडको निर्माणबाट पर्न सक्ने वातावरणीय तथा सामाजिक प्रभावहरुको अध्ययन गरि आवश्यक सुरक्षाका उपायहरु अपनाउने बारेमा छलफल गरी निर्णय गरियो।

निर्णय नं.(३) सोलार मिनिग्रिडका प्राविधिक पक्षहरुका बारेमा छलफल गरी प्रभावकारी निर्माण कार्य गर्ने सम्बन्धमा छलफलका साथ निर्णय गरियो।

Annex 4: Policy Gap between GoN and WB

Category	Government of Nepal (GoN) Policy	World Bank (WB) Policy	Gaps between GoN & WB policy	Recommendations to Bridge the Gaps
A. Environment (Natural Habitat , & Forest including terrestrial and aquatic) (OP/BP-4.01, 4.04 & 4.36)	Development Project under EPR97 criteria should be subjected to IEE/EIA, Schedule 1&2 pertaining to Rule-3. (for example operation of electricity generation up to 50 MW requires IEE. However any proposal irrespective of the capacity is to be implemented in the following areas requires EIA: • Historical, cultural and archaeological sites; • Environmentally weak and wet areas; • National Parks, wild life sanctuaries and conservation areas; • Semi-arid, mountainous and Himalayan regions; • Flood prone and dangerous areas; • Residential, school and hospital areas; and • Areas with main sources of public water supply. This approach often ignores potential risks and impacts and risks are site specific and depending on site condition. • Forest regulation requires	• Environment Assessment shall be carried out for identifying potential risks and adverse impacts, along with mitigation measures; • Detail Environmental Management Plan (EMP) shall be prepared to address all the policies triggered related with natural habitat and physical, cultural resources. The EMP shall adequately address the relevant issues.	• Activities listed in EPR97 Schedule 1 require an IEE, and those listed in Schedule 2 requires EIA. The Schedule 1 and 2 are based on activity type, threshold/size, as well as location. The Potential risks associated with the project are omitted in GoN policy. • Hence, Environmental & Social (E&S) Screening exercise shall be carried out to assess the potential risk associated with the project before selection of the project proposal.	• Detailed E&S Screening shall be carried out followed by detailed ESMP in parallel with the Detail Engineering Design to bridge the gap between WB and GoN requirements/approach. The ESMP aims to address all the adverse environmental impacts arise during execution and operation of the project. • The ESMP so prepared shall be made integral part of bidding document so that the Contractor shall adhere to the provisions prescribed in the ESMP during execution of the project.

	permission from related authorities (Conservation Authorities, DFO, CFUG etc.) for any intervention in forested area. • National Park and Wildlife Conservation (NPWC) Act, demands permission from Ministry of Forests and Environment (MoFE).			
B. Physical-Cultural Resources (OP/BP- 4.11)	The EPR97 Rule 28 & 30 states that physical and cultural resources shall not be disturbed or damaged without the prior approval of concerned authority.	Environmental Assessment needs to carried out incase such resources are found to be affected by the implementation of the subproject	"Chance find' is not covered by the EPR requirements	ESMP shall address such issues following GON and WB Policy with the addition of "Chance Find" provisions and requirements.
C. Involuntary Resettlement and Loss of Land/Structure Crop/Income Source (OP/BP-4.12)	• Clause 3 of the Land Acquisition Act states that any asset that is required for public purposes shall be acquired by providing compensation. • Compensation Fixation Committee shall establish the Compensation rates. • Guthi Corporation Act, 2033 (1976). Section 42 of this Act states that Guthi land (religious trust land) acquired for the purpose of the development shall be replaced with other land, than compensated in cash • The LRA 1964 establishes	• Full compensation at replacement cost for lost assets shall be provided according to asset types and location. • Resettlement and Rehabilitation assistance to affected people shall be provided by the project to enable them to improve their living standard. • As per OP 4.12 community 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	• The Land Acquisition Act of Nepal only has a provision for cash compensation based on degree of loss. It does not take into account vulnerability of the affected person upon losing the land.	• The project shall be required to prepare vulnerability assessment and mitigation plan for the affected people that have a impacts on their livelihood after losing the land. The project shall assist those who have impacts on their livelihood due to land acquisition by the project including tenants. • The community assets need to be replaced following the Build Back Better Philosophy. • Pragmatic livelihood assistance program shall be designed by the project

	the tiller's right on the land, which s/he is tilling. It additionally specifies the compensation entitlements rights of registered tenants on the sold land by the owner. • Compensation shall be provided for loss of crop damaged and income source.	sharecroppers. • Full compensation for loss of land/crop/ asset/income source shall be provided.		
D. Indigenous People & Community (IP&C) (OP/BP-4.10)	• The GoN encourages to include and consider IP&C's concerns in each and every development and infrastructure programs and formulate a plan or mechanism to incorporate income generation program targeted to IP&C. • NFDIN Act 2002, Local Self-Governance Act, 1999 and Tenth Plan (2007-10) and Three Year Interim Plan (2011-13)	• The WB policy ensures Free, Prior, and Informed Consultation (FPIC) with the affected indigenous people to obtain broad community support for the project. • Details Social Impact Assessment (SIA) shall be carried out to identity potential impacts and prepare plans to ensure that indigenous peoples receive social and economic benefits that are culturally appropriate.	• The GoN encourages development programs to incorporate income generation schemes for IP&C, the provision of FPIC and broad consent from the IP&C is absent. Nonetheless, the GoN has ratified ILO 169 and United Nations Declaration of Rights of Indigenous People (UNDRIP). • The GoN is in the process of preparing National Action Plan to implement the international commitments. • GoN does not have a standalone policy on Indigenous Peoples and other vulnerable communities which otherwise would have been put significant emphasis on delivering basic services to the disadvantaged and indigenous	• The Project shall carry out FPIC with the indigenous community and other vulnerable communities to obtain broad consent on the project. • Project shall prepare Vulnerable Community Development Plan (VCDP) based on community need assessment.

			people, Dalits, women, disabled and other vulnerable groups. The Policy, Acts and Plans shall facilitate to embrace the Adivasi/Janajati and other disadvantaged groups in the main stream of development process by: • creating an environment for social inclusion; • participation of disadvantaged groups in policy and decision making; • developing special programs for disadvantaged groups; • positive discrimination or providing equal opportunity 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 inclusive.	

Annex 5: A Template of Grievance Record Form

Name of Grievant:	**Contact detail** **Work Phone:** **Home Phone:** **Mobile No.:**
Home Mailing Address:	**Work Mailing Address:**
Date, time and place of grievance recorded:	
Detailed description of grievance:	
Proposed solution to grievance:	
_____ Signature of Grievant	_____ Signature of Grievance Receiver

Annex 6: Occupational Health and Safety Plan

Shubhakalika Solar Mini Grid Subproject, Kalikot

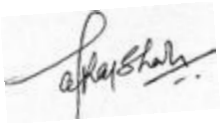
Occupational Health and Safety Plan

A. Management Commitment to Occupational Health Safety (OHS)

1. Goals for OHS Plan:

- Develop, implement, and maintain a safe workplace for our employees consistent with all applicable national regulations
- Consistently improve the safety program to minimize incidents, therefore ensuring employees' long-term safety and wellness.

Person responsible for implementing and monitoring the Safety Program: *Jaj Raj Shahi*
Managing Director: *Jaj Raj Shahi*
Date: 8th May 2020



2. Employer Responsibilities

To provide employees with a workplace free of hazards that may cause illness or serious physical harm.

To comply with standards, rules, and regulations

- Allow employees free access to tools and equipment necessary to do a job safely.
- Provide employees with training/orientation on specific safety issues and equipment.
- Conduct regular inspections.
- Following up after safety incidents with thorough accident investigations, correcting problems and post-accident employee training.
- Recognize employees with the best OHS practices.

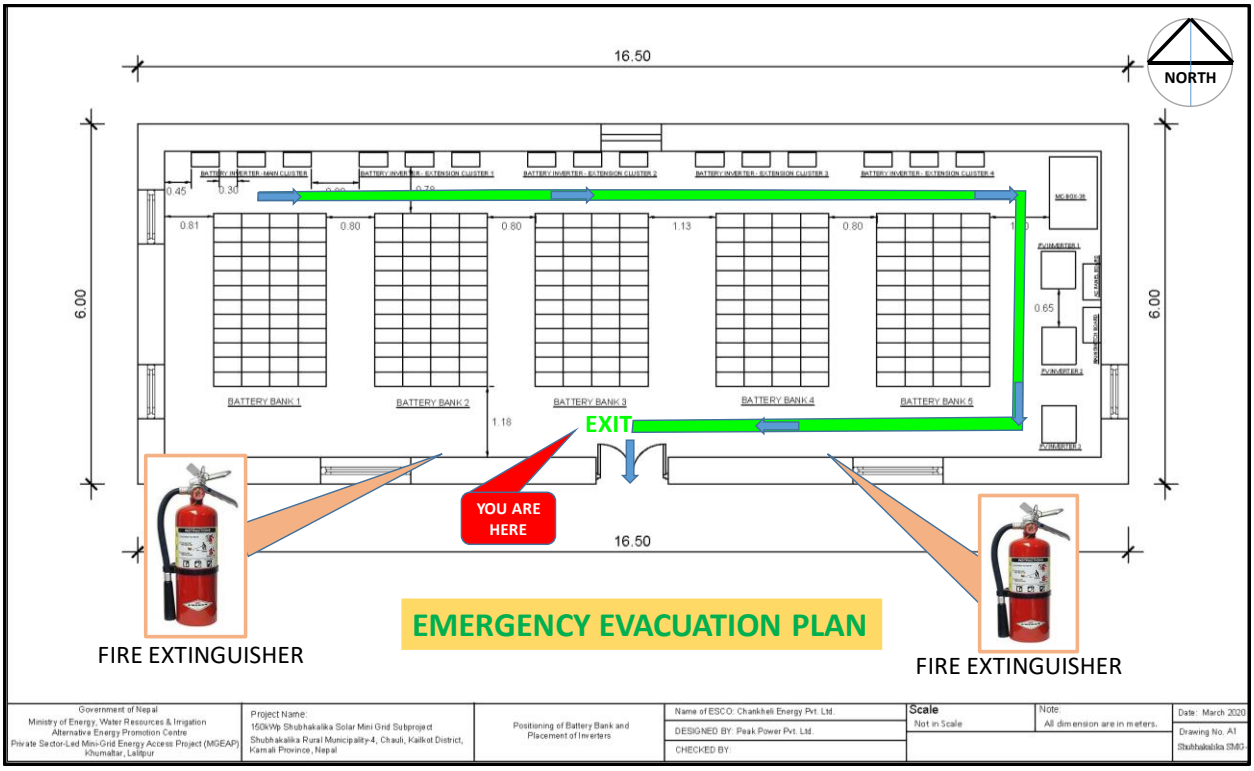
3. Employee Responsibilities

- Handle equipment and work processes in accordance with established procedures and documented protocols.
- Report any unsafe conditions, defects in equipment, or injuries to management immediately.
- Complying with all management instructions for safe conduct.
- Attend OHS related trainings/orientations and practice drills.
- Obtain permission to operate equipment.
- Never participate in horseplay, scuffling, and other acts that endanger the safety or well-being of the team.
- Not report to work under the influence of alcohol and/or drugs or during illness.

4. Employee Injury and Illness Reporting

All injuries must be reported to the immediate supervisor or Emergency Response Team.

- Location of First-aid box and fire extinguisher : Within the premises of Solar PV location area/Powerhouse
- Emergency contact number : +9779851166256, 9848301156
- Emergency health centre location: Rarakatiya Health Post Center, Shubhakalika RM, Kalikot
- Evacuation location: Ward No. 4, Shubhakalika RM



Report any hazard to:

Supervisor's Name: Naya Ram Chaulagani, Chakra Rokaya
Contact No.: 9864361621, 9848301461
After hours/weekends:

5. Incident Investigation

In an emergency situation, **dial 100** immediately

- All injuries and illnesses should be reported, no matter how large or small.
- Fill up incident reporting form.
- Document the injury/illness completely while doing a thorough root cause analysis of the incident so that corrective action can be determined to prevent future incidents.
- Part of the safety corrections may include employee orientation and counselling to correct unsafe behaviours, prevent injuries, and improve safety.

B. Hazard Identification and Assessment

1. Information available in the workplace may include:

- Equipment and machinery operating manuals.
- Material Safety Data Sheets (MSDS)

- Records of previous injuries and illnesses
- Patterns/trends of frequently occurring injuries and illnesses
- Existing safety and health programs, such as tag out, confined spaces, process safety management, personal protective equipment etc.
- Input from workers

2. General Safety Programs

- Confined space entry
- Driving safety
- Electrical safety (wiring methods, components and equipment, electrical system design)
- Emergency Action Plan
- Ergonomics (scientific study of people and their working environment)
- Fall protection
- Fire safety

3. Personal Protective Equipment

All personal protective equipment (PPE) and tools to safely perform the work will be provided to employees and properly maintained in accordance with manufacturer guidelines.

Organization's PPE Plan – use of appropriate PPE

All employees will be trained on the personal protective equipment that is required to do their jobs effectively. The Company will review any employee feedback on the use of this equipment and potential improvements that can be made.

All employees will be provided with safety vests and safety hard hats. The employees will also be wearing steel-toe boots within the construction premises. Safety harnesses will also be provided for work above the ground and in elevated areas. Safety gloves and glasses will be worn at all times.

4. Hazard Prevention and Control

Using the following standard methods:

- Safe Work Practices
- Engineering Control
- Training
- Enforcement
- Personal Protective Equipment
- Administrative Control
- Preventive Maintenance

5. Work Place Environment

- Light
- Temperature
- Ventilation
- Sound
- Working space Cleanliness
- Garbage Management
- Provision of Drinking Water
- Canteen
- Toilet Facility
- Resting time and resting place
- Safety provision in workplace

6. Communication

Standard methods for the communication with employees:

- Group orientation/individual induction
- Posters/signage/forms/formats
- Regular Meetings on OHS
- Safety suggestion box
- Online forms
- Hotline

C. Training and Education

Safety training will be provided for employees:

- During new hire on boarding.
- When beginning new job assignments.
- When cross training on new types of machinery/equipment.
- When new substances, processes, procedures, or equipment are introduced to the workplace and represent a new hazard.
- Periodically, in the form of refresher training (this may be following a near miss or incident, which can be required).

The purpose of our training program is to provide employees with:

- Knowledge and skills needed to do their work safely and avoid creating hazards that could place themselves or others at risk.
- Provide awareness and understanding of workplace hazards and how to identify, report, and control them.
- Specialized training, when their work involves unique hazards.

D. Program Evaluation and Improvement

- Verify that the core elements of the program have been fully implemented.
- Ensure that the following key processes are in place and operating :
    - Reporting injuries, illnesses, incidents, hazards, and concerns.
    - Conducting workplace inspections and incident investigations.
    - Tracking progress in controlling identified hazards and ensuring that hazard control measures remain effective and is completed promptly.
    - Collecting and reporting any data needed to monitor progress and performance.
- Review the results of any compliance audits to confirm that any program shortcomings are being identified and that actions are being taken that will prevent recurrence.
- Review and update plans/processes based on the company's loss history.
- The person tasked with the overall responsibility to evaluate the Company's safety program and processes is:

Name: Mr. Jaj Raj Shahi
Contact Information: +9779848301156, 9851166256

Annex 7: Emergency Preparedness and Response Plan

Shubhakalika Solar Mini Grid Subproject, Kalikot

Emergency Preparedness and Response Plan

Types of Incident, Severity and Level of Response

Types of Incident	Severity	Level of Response
Serious injury or medical emergency Fire or explosion Chemical spill Vandalism and other threats Others	Level 1 – Minor: e.g, localized fire Level 2 – Serious: e.g, containable fire Level 3 – Severe: e.g, serious fire	**Level 1** ● can be dealt with by the person identifying the problem ● supervisor should be informed and the incident formally logged ● do not involve plant evacuation or Emergency Response Team (ERT) **Level 2** ● Immediate action should be taken ● the person identifying the problem call Security to summon ERT assistance ● ERT takes necessary emergency actions ● May involve plant evacuation **Level 3** ● Immediate action should be taken ● the person identifying the problem call Security to summon ERT assistance ● ERT takes necessary emergency actions ● Must involve plant evacuation and Emergency Response Team

ERT – Emergency Response Team

1. The Emergency Organization

Operating Personnel	ERT	External Services	Others
Problem Identifier Supervisor	Incident controller First Aiders Fire checkers Others, as required	Ambulance Fire Medical Health & Safety Security	ESS specialist Site in charge

2. Emergency Response Equipment

Emergency Response Equipment	Location	Capability functions	Inspection frequency
Smoke Purge Generator	Utilities	To Extract Smoke To power in emergency	Monthly and quarterly
Fire alarm	Reception and plant rooms	To audibly alert all personnel of the presences of a Fire or Smoke	Weekly
Spill kits	Security	To contain potential local	Monthly

		leaks	
Radio	Individually held and Reception	To ensure clear open communication in event of emergency	Weekly
Fire Extinguishers	Plant wide	To provide local, portable extinguishers for the suppression of a small fire	Annual
First Aid Kits	Security	To Supply Dressing/Burn Material	Weekly

3. **Training**

To	**On what**
Employees	Emergency response and evacuation
Contractors	Emergency response and evacuation
Visitors	Emergency response and evacuation
Emergency Response Team	Emergency response procedure Basic fire response procedure Chemical Spill
First aiders	First aid
Security	Call response and dealing with external threat
Incident controller	Incident control

4. **Drill and communication** – *should be taken annually*

5. **Incident Response**

Personal Injury/Medical Emergency			
Instructions for all employees and contractors	**Instruction for First Aid Personnel**	**Instruction for Supervisors**	**Instructions for Security**
If incident involves personal injury - remove the hazard if safe to do so	On instruction from Security or Incident Controller, proceed to scene of injured personnel	Liaise with First Aider and find out what further medical intervention is required.	Ask caller to **Remain Calm**
General Site Evacuation			
should make safe any equipment you are using if safe to do so and immediately leave the building by the nearest emergency exit Proceed to your designated Assembly Point			
Fire			
If trapped - Close as many doors as possible between you and the fire			Receive emergency call Fire alarm activation Sprinkler water flow alarm

In case of smoke - Stay as low as possible			
Chemical spill			
Others:			
Instructions for ● Emergency Response Team ● Others			

6. Incident Report Checklist

A. Attendance		
	Present	**Signature**
Fire checker		

B. Notification		
	Notified	**Response**
Ambulance	Yes/No	Yes/No
Fire brigade		
C. Responsibilities		
Security	Security guard	Ensured no authorized entry

7. Directory of Emergency Contacts

Name	Organization	Contact Address	Contact No.
Jaj Raj Shahi	Security	Kalikot, Shubhakalika-4	9851166256
Dr. Bhisma Pokherel	Physician	Kalikot Hospital Manma	9858322665
Kalikot	Hospital	Manma	9858322665
N/A	Fire Brigade	N/A	N/A
Dipak Bokati	Ambulance	Manma Hospital	9869114428
Khadananda Chaulagani	1. Shubhakalika Rural Municipality	Shubhakalika-5	9848360941
Ram Bahadur Shahi	Ward Office – Ward No. 4, Shubhakalika Rural Municipality	Shubhakalika-4	9868358653
Keshan Bahadur Shahi	Ward Office – Ward No. 5, Shubhakalika Rural Municipality	Shubhakalika-5	9858060460
Rajesha Gautam	ESS Focal Person of the subproject	Kalikot Manma	9860022003
Jaj Raj Shahi	Team Leader, ERT	Kalikot, shubhakalika-5	9851166256
Peak Power Company	Contractor	Kathmandu	9841271241

Annex 8: Traffic Management Plan

Shubhakalika Solar Mini Grid Subproject, Kalikot

Traffic Management Plan

Name of the Subproject: Shubhakalika Solar Minigrid

Capacity of the Subproject: 100 kWp

Address: Shubhakalika, Kalikot

Detail of vehicle	Types of vehicle: Excavator No. of vehicle: 1
Designated staff (who implements TMP) Equipment/vehicle operators	Name: Bishal Subedi Contact No. 9865999221 Contact Address: Surkhet
Work time (for vehicle movement)	10 AM to 5 PM
Transportation route	Inform traffic police Co-ordination with traffic police Kathmandu to Surkhet Surkhet to Sereghat Kalikot Sereghat to Rarakatiya Shubhakalika
Use of signage Number and type of signs to be placed Condition of signs (clean, legible, and reflective)	Do not enter – 2 (Reflective) Construction work is in progress – 2 (Reflective) Battery explosion sign Battery safety sign Shutdown sign
Flagging	Use of flag Use of illuminating flag for night time

	Training for flaggers Provide high visibility vest for flaggers (especially for night time) Drivers to be warned in advance
Work Zone protection	Speed limit to 10km/hr Communication between worker on ground and equipment operator Communication between equipment operators
Traffic control devices	Use of Barricade, Cones Signals, Message boards
Lightening	Illuminated for night time at least 5 foot candle (1 ft)
Training	Training on Traffic Management Plan - Route of construction vehicle movement For those who are directly/indirectly involved

Annex 9: Labor Management Plan

Potential Issue	Strategy	Proposed Activities	Responsibility	Timeline
Health and Safety Condition of Workers	• A **safe and healthy work environment** taking into account inherent risks and hazards. • **Awareness raising** activities to prevent accidents, injury and disease. • **Proper record of Accidents, injury and disease.**	• Regular Orientation and Training regarding Occupational Health and Safety. • Provision of preventative and protective measures (PPE use). • Documentation and reporting of accidents, diseases and incidents. • Emergency prevention, preparedness and response arrangements.	ESCO (to be verified by AEPC)	Project preparation phase to end of sub-project.
Non-Discrimination and Equal Opportunity	• **Ensure equal opportunity and fair treatment** with respect of hiring, working conditions access to training and promotion.	• **Promote fair and equitable labor practices** for the fair treatment, non-discrimination and equal opportunity to workers. • Maximize the **local employment opportunity.**	ESCO (to be verified by AEPC)	Project preparation phase to end of sub-project.
Protecting the Workforce (Child labor, Forced labor and labor influx)	• **Will not employ children** in any manner. • **Will not employ forced labor**, which consists of any work. • **Hire skilled and unskilled workers from affected communities.** • Incoming workers, their living arrangements should be **discussed and agreed with communities** in advance.	• Follow National Laws as applicable (Children below the age of 18). • Working hours for women must be between 6 AM to 6 PM and prohibits night working hours. • Labor Registration Sheet must be filled with mentioned details. **During construction phase**, it must be reported **monthly** and in **operation phase, it should be semi-annually.**	ESCO (to be verified by AEPC)	Project preparation phase to end of sub-project.
Implementation of Workers Code of Conduct	• **Preparation and implementation** of Workers Code of Conduct	• Do's and Don'ts for the workers/labors • Regular Orientation regarding the code of conduct.	ESCO	Project preparation phase to end of sub-project.

Potential Issue	Strategy	Proposed Activities	Responsibility	Timeline
Lack of social and cultural awareness	**Awareness training** about different type harassment and gender-based violence.	• Social and cultural awareness training especially on gender norms and other norms and values of the community. • Implementation of sub-project GRM and ensuring accessibility of female members of community.	ESCO	Project preparation phase to end of each sub project.
Labor Camp Management	Follow **Occupational Health and Safety Plan, National rule and regulation/ policies for labor**.	As per **Occupational Health and Safety Directive of Brick Industry, 2074 (ईटा उद्योग)** • Room size 10ft /8ft and 8ft height • Beside family members, separate room for male and female workers. • Kitchen and room must be separate. • Keep 100 m distance between work station and labor camp • Availability of First Aid Kit • Sufficient Water Supply (including drinking)	ESCO (to be verified by AEPC)	Project preparation phase.

Annex 10: Battery Management Plan

Shubhakalika Solar Mini Grid Subproject, Kalikot

1. **Product Name and Type**
   Sacred Sun OPzV series, Valve Regulated Sealed Lead Acid Battery (VRLA) 15 OPzV 1500 2V1500Ah (OPzV Series)

2. **Supplier of the product**
   Sacred Sun Power Sources Co., ltd.

3. **Composition/information on ingredients**
   Sacred Sun OPzV series are valve regulated lead-acid cells which use a combination of tubular positive plate woven gauntlets, pasted negative plate design and gel electrolyte using advanced filling techniques in production which assure superior service life and excellent battery reliability. GEL state electrolyte prevents leakage and layering. Low resistance PVC or PF micro-porous separator ensures low self-discharge rate.

4. **Properties (Stability and Reactivity)**
   - 1500+ cycles at 80% DOD
   - High rate discharge performance
   - High gas recombination efficiency
   - Maximum charge efficiency
   - GEL state electrolyte prevents leakage and layering
   - Low resistance PVC or PF micro-porous separator ensures low self-discharge rate
   -

5. **Regulatory Framework**
   - IEC 60896-21/22
   - IEC 61427
   - DIN 43539-T5
   - DIN 40742
   - EUROBAT guide

6. **Hazards and Response**

	Hazard	Response
Inhalation	Sulfuric acid's hazard increases as a fume, causing significant damage to internal tissues. Lead can replace metallic atoms in biological processes which is a major component of red blood cells, or the calcium in bones.	In VRLA battery there is less likelihood of spillage and inhalation. Battery will be sent to recycle after its life so that it do not contaminate other components. Power house design and built with well ventilation.
Ingestion	Neurotoxin, as electrodes causing significant damage to internal tissues.	In VRLA battery there is less likelihood of spillage and ingestion. Battery will be sent to recycle after its life so that it do not contaminate other components. Power house design and built with well ventilation.
Skin contact	a highly acidic acid, as a electrolyte, cause damage -	In VRLA battery there is less likelihood of spillage and skin

	Hazard	Response
	particular to bodily tissue	contact. Battery will be sent to recycle after its life so that it do not contaminate other components. Power house design and built with well ventilation.
Eye contact	Sulfuric acid's hazard increases as it can come in contact with eyes, causing significant damage to internal tissues.	In VRLA battery there is less likelihood of spillage and eye contact. Battery will be sent to recycle after its life so that it do not contaminate other components. Power house design and built with well ventilation.

7. Protection Measures

i. First Aid measures

Measure	Capability functions	Inspection frequency
First Aid Kits	To Supply Dressing/Burn Material	Weekly
Training on first aid	Basic emergency response procedure	Biannual

ii. Firefighting Measures

Measure	Capability functions	Inspection frequency
Fire alarm	To audibly alert all personnel of the presences of a Fire or Smoke	weekly
Fire Extinguishers	To provide local, portable extinguishers for the suppression of a small fire	annual

iii. **Accidental Release Measures**:

Serious injury or medical emergency	**Level 1 (minor)** • can be dealt with by the person identifying the problem • supervisor should be informed and the incident formally logged • do not involve plant evacuation or Emergency Response Team (ERT) **Level 2 (serious)** • Immediate action should be taken • the person identifying the problem call Security to summon ERT assistance • ERT takes necessary emergency actions • May involve plant evacuation **Level 3 (severe)** • Immediate action should be taken • the person identifying the problem call Security to summon ERT assistance • ERT takes necessary emergency actions
Fire or explosion	
Chemical spill	
Vandalism and other threats	
Others	

	• Must involve plant evacuation and Emergency Response Team

iv. Exposure Controls/Personal Protection

Instructions for all employees and contractors	**Instruction for First Aid Personnel**	**Instruction for Supervisors**	**Instructions for Security**
If incident involves personal injury - remove the hazard if safe to do so	On instruction from Security or Incident Controller, proceed to scene of injured personnel	Liaise with First Aider and find out what further medical intervention is required.	Ask caller to Remain Calm
Evacuation		Proceed to your designated Assembly Point	immediately leave the building by the nearest emergency exit
If trapped			Close as many doors as possible between you and the fire
In case of smoke -		Receive emergency call Fire alarm activation	Stay as low as possible Sprinkler water flow alarm

8. Toxicological Information

	Toxicity	Hazard
Sulphuric acid	Use of sulphuric acid - a highly acidic acid, as a electrolyte	Sulfuric acid's hazard increases as a fume, causing significant damage to internal tissues.
Lead	Neurotoxin, as electrodes causing significant damage to internal tissues.	Lead can replace metallic atoms in biological processes which is a major component of red blood cells, or the calcium in bones.
Explosive gas	Production of explosive gas when overcharged	Acid may become airborne in the form of fumes. As a fume, as it can come in contact with eyes or be inhaled, causing significant damage to internal tissues.

9. Ecological Information

	Ecological Information
Sulphuric acid	Sulphuric acid is subsequently known as a dangerous chemical for the environment.
Lead	Lead is a significant problem in the fishing industry, in which the lead content in fish can be passed on to humans. As the lead passes from animal to animal through the food chain, more and more lead content will accumulate and become increasingly

	poisonous towards the end of the food chain, which in many cases is the human population.
Explosive gas	If a lead acid battery is overcharged, it can causes hydrogen gas to vent out of the battery. Hydrogen gas is highly flammable, and will combust if exposed to a spark or flame.

10. Transport Information (from the manufacturer to the subproject site)

Germany to Kathmandu

China to Kathmandu

Kathmandu to Surkhet

Surkhet to Sereghat Kalikot

Sereghat to Rarakatiya Shubhakalika

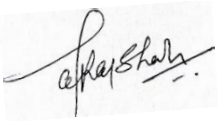
- Shipping name: Valve Regulated Sealed Lead Acid Battery CAS NO: 7439-92-1
- The product has been undergone the testings including Vibration test, Pressure differential test and Leakage test at 55° C according to the SP-238 all the test resulted are passed.

11. Disposal Considerations

The aged VRLA batteries will send to recycling plant. Valve regulated sealed lead acid battery are restricted land disposal objects. All spent batteries should be properly recycled to a permitted Secondary Lead Smelter. All battery parts should be properly recycled. No whole spent battery should be landfilled or placed in house hold garbage.

12. Name and Contact detail of person responsible for battery management

Mr. Jajraj Shahi,



Managing Director,

Chankheli Energy

9848301156, 9851166256

Annex 11: Waste Management Plan

Construction Waste Management Plan of Shubhakalika Solar Mini Grid

This Construction Waste Management Plan is prepared by AEPC to manage construction waste generated during construction of solar mini grid subproject under AEPC/MGEAP.

This plan will be adhered to by all contractor, sub-contractors, ESCO along with construction workers during the construction of solar mini grid subproject.

Types of Waste Generated:

- Cardboards
- Wooden boxes
- Cement bags
- Plastic products
- Metal scarps
- Glasses
- Nails
- Sharp materials
- Rubbers

Management of Waste at Project Sites

a) Follow 3 R (Reduce, Reuse and Recycle) principle
b) To the extent possible, the project shall reuse of second products, repairing broken items instead of buying new item, etc.
c) Follow prevention (avoid) of waste generation at source
d) Project should proposed waste mitigation measures

Management of Construction Waste Generated at Construction Site

S. No.	Types of Waste	Method of Management
1.	Cardboards	Recycle
2.	Wooden boxes	Recycle and Reuse
3.	Cement bags	Reuse
4.	Plastic products	Recycle and Reuse
5.	Metal scarps, Nails	Recycle
6.	Broken glasses	Recycle

Annex 12: Gender Equality and Social Inclusion Action Plan

Gender Issues	Strategy	Proposed Activities	Responsibility	Timeline
Lack of awareness	Awareness campaign about the project for the communities focusing on the vulnerable groups including women and socially excluded groups.	• Ensure representation of women and socially excluded people in the grievance redress committee, benefit sharing scheme committees as well as in other committees formed under the subproject, ensuring women take up one of the three key roles. Share information about the subproject benefits in Nepali language (if possible in local language). • Information/ awareness campaigns through coordinating with locally formed Clubs and Groups and NGOs.	ESCOs (to be verified by AEPC)	Preparation, construction and operational phases of sub project.
Excluded from Opportunities and low level of participation in decision making and leadership process because of social/cultural	Gender sensitization to all stakeholders including subproject entities. Gender inclusive consultation and social mobilization	• Carry out consultation, focus group discussion, interviews, meetings and interaction program with and orientation especially to women in the subproject area, at time and venue convenient for them.	ESCOs (to be verified by AEPC)	Throughout the subproject period
Disparity in Wages	• Accord priority employment to women and people of vulnerable groups in construction activities under the project. • Promote equal wages for equal work	• Identify women and vulnerable people interested to work; assess their skills and provide them employment as per their capabilities. • Nondiscriminatory approaches will be taken in employment on the basis of sex, caste, religion and ethnicity as per the mandate of labor law. • Ensure women's wage rate and do the needful to guarantee wage equality for similar nature of works.	ESCOs (to be verified by AEPC)	

Lack of trained women in mini grid sector	Promote need based technical, administrative and support services.	• Conduct training on newly introduced technologies and its health and safety usages • Skill training to women in vocational fields and to establish enterprises/business after electrifying the subproject area.	ESCOs (to be verified by AEPC)	

Annex 13: Update in the 100kWp ESMP Report

Matrix for updates on the Environmental and Social Management Plan (ESMP) of Shubhakalika Solar Mini Grid Subproject, Kalikot

Page No.	Chapter/Heading	Existing (150kWp)	Changes (100kWp)
2	Executive Summary 2nd para	solar mini grid with capacity of 150.48 kWp, which will provide electricity to 516 HHs, 15 Households/Businesses and 5 businesses of Subhakalika Rural Municipality.	100 kWp, which will provide electricity to 355 HHs, 10 Households/Businesses, 1 Anchor and 3 businesses of Shubhakalika Rural Municipality.
2	3rd para	Total land available for the subproject is 18,359m^2, of which 2,185m^2 will be utilized for the installation of solar modules and 115 m^2 will be used for the construction	Total land available for the subproject is 18,359m^2, of which 1351m^2 will be utilized for the installation of solar modules and 110 m^2 will be used for the construction
6	1.1 Background 1st para	solar mini grid with capacity of 150.48 kWp	capacity of 100 kWp
6	1st para	The ESCO has proposed for the installation of solar mini grid of 150.48 kWp capacity	for the installation of solar mini grid of 100 kWp capacity
6	1.2 Subproject Description	It is located at latitude 29°6'22.90"N and longitude 81°37'48.30"E with slopes	29°6'23.7"N and longitude 81°37'48.69"E with flat and south facing
7	Subproject Description	Table 1	Table 1 is changed
8	Subproject Description	Ward No. 4 & 5 which contains approximately 531 HHs.	contains approximately 365 HHs.
7	Distribution of Households, Businesses/Anchor	Total Loads: 550 Nos. Total Number of Households: Approximately 516 Nos. Total Number of Households/Businesses: 15 Nos. Total Number of 3-Phase Loads (Businesses): 5 Nos. and they are • Metal Grill Workshop • Carpentry • Cold Storage • Hulling/Milling/Grind Milling • Water Pumping/Irrigation	Total Loads: 380 Nos. Total Number of Households: 355 Total Number of Households/Businesses: 10 Nos. Telecom Tower (Anchor Load): 1 No FM Station: 1 No. Public Institutions: 10 Nos. (Banks-2, Schools-2, Health Centers-2, RM Office-1, RM Ward Office-2, Post Office-1) Total Number of 3-Phase Loads (Businesses): 3 Nos. and they are • Carpentry • Hulling/Milling/Grind Milling • Computer Institute and Electronic Center
11	1.3 Site Preparation and Construction	The subproject requires approximately 2,185 m^2 of land for solar panels installation and 115 m^2 lands for powerhouse construction.	approximately 1,315 m^2 of land for solar PV modules installation and 110 m^2 land for powerhouse construction
11	1.4 Subproject Design	Table 2	Details of Table 2 are changed
17	4.3 Socio-economic and	Major load centres are Thana (96 HHs), Rarakatiya (27HHs), Sundar	Major load centres are Sukatiya (37 HHs), Khatebada (70 HHs), Udagaun

Page No.	Chapter/Heading	Existing (150kWp)	Changes (100kWp)
	Cultural Environment	Gaun (71 HHs), Khate Bada (84 HHs), Adhikari Bada (27 HHs), Uda Gaun(61 HHs) and Karki Tole (15 HHs).	(57 HHs), Adhikaribada (24 HHs), Bhattaraitole (25HHs), Sundargaun (63 HHs), Rarakatiya (55 HHs), Chaulagainbada (14 HHs) and Dhadukhada (20 HHs).
20	6.1.1 Land Use and Land Take	Approximately 16 Km of Transmission and Distribution (T&D) line	approximately 13.67 Km of Transmission and Distribution (T&D) line
20	6.1.1 Land Use and Land Take	Approx. 2,300 m^2 will be used by the subproject	Approx. 1,425 m^2 will be used by the subproject
22	6.1.11 Labor Influx	There will be around 30 numbers of labors (skilled, semiskilled & unskilled) employed for the construction of the subproject. Out of 30 around 8 numbers of work forces (skilled and semiskilled) will be hired from outside the subproject area.	There will be around 30 numbers of labors (skilled, semiskilled & unskilled) employed for the construction of the subproject. Out of 30, around 10 numbers of work forces (5 skilled and 5 semiskilled) will be hired from nearby the subproject area.
25	Table 7 Environmental and Social Mitigation Plan Construction Phase Land use and land take	In total approx.2275 m^2 (4.47 ropanies) public land will be used by the subproject.	In total approx. 1,425 m^2 (2.8 ropanies) public land will be used by the subproject.

Annex 14: Photographs

Proposed Land for Solar PV Installation

Existing Rural Road

Retaining wall

Proposed Load Centre

Community Consultation

Community Consultation