ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY
Of
AMADABLAM MINIHYDRO PROJECT
(GENERATION, TRANSMISSION AND DISTRIBUTION OF 911kW)

Khumbu Pasang Lhamu Rural Municipality-4, Solukhumbu District, Koshi Province

Submitted To
Government of Nepal
Ministry of Forests and Environment
Singh Durbar, Kathmandu

Through
Ministry of Energy, Water Resources and Irrigation
Singh Durbar, Kathmandu

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नेपाल सरकार, वन तथा वातावरण मन्त्रालयको मिति २०८१/०५/१८ को ..... मा.मं. ..... स्तरको निर्णय अनुसार स्वीकृत भएको ।

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ABBREVIATIONS

AC	Alternate Current
ACSR	Aluminum Conductor Steel Reinforced
AEPC	Alternative Energy Promotion Centre
AMHP	Amadablam Mini Hydro Project
amsl	Above Mean Sea Level
B	Breath
BA	Basal Area
BOD	Biological Oxygen Demand
BS	Bikram Sambat
BZ	Buffer Zone
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CDO	Chief District Officer
CFUG	Community Forest User Groups
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	Centimeter
COD	Chemical Oxygen Demand
CTs	Current Transformers
D/ha	Density per hectare
dB	Decibel
dBH	Diameter at Breast Height
DCC	District Coordination Committee
DFS	Detailed Feasibility Study
DHM	Department of Hydrology and Meteorology
DIA	Direct Impact Area
dia.	Diameter
DNPWC	Department of National Park and Wildlife Conservation
DO	Dissolved Oxygen
DoED	Department of Electricity Development
E	East
E&S	Environmental and Social
EA	Environmental Assessment
EIA	Environmental Impact Assessment
El	Elévation
EMAP	Environmental Management Action Plan
EMIMAP	Environmental Management Implementation Management Action Plan
EMP	Environmental Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Rule
ESCOs	Energy Service Companies
ESIA	Environmental and Social Impact Assessment
FGD	Focus Group Discussion
GIS	Geographical Information System

GLOF	Glacier Lake Outburst Flood
GoN	Government of Nepal
GRM	Grievance Redress Mechanism
GWh	Giga Watt hour
Ha	Hectare
HHs	Households
Hz	Hertz
IBAT	Integrated Biodiversity Assessment Tool
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IIA	Indirect Impact Area
INGO	International Non-Government Organization
INPS	Integrated Nepal Power System
IUCN	International Union for Conservation of Nature
IVI	Important Value Index
KII	Key Informant Interview
Km	Kilometer
KPLRM	Khumbu Pasang Lhamu Rural Municipality
kV	Kilovolt
kVA	Kilovolt Ampere
kW	Kilo Watt
L	Length
L/C	Letter of Credit
lps	liter per second
m	Meter
MAPs	Medicinal and Aromatic Plants
MGEAP	Mini Grid Energy Access Project
mm	millimeter
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoFE	Ministry of Forest and Environment
MoST	Ministry of Science and Technology
mVA	Milli Volt Ampere
MW	Mega Watt
N	North
NGO	Non-Governmental Organization
No.	Number
NRs	Nepalese Rupees
NTFPs	Non-Timber Forest Products
ONAN	Oil Natural Air Natural
OPs	Operation Plans
pH	Potential of Hydrogen
PID	Proportional Integrative Derivative
ppm	Parts per Million
PTs	Potential Transformers
RCC	Reinforced Cement Concrete
RD	Relative Density
RF	Relative Frequency

RM	Rural Municipality
RoR	Run of River
RPM	Revolutions per Minute
s	Second
SNP	Sagarmatha National Park
SPIA	Project Impact Area
TDS	Total Dissolved Solids
ToR	Terms of Reference
TV	Television
VCBs	Vacuum Circuit Breakers
WB	World Bank
WECS	Water and Energy Commission Secretariat

कार्यकारी सारांश

१. प्रस्तावक

वैकल्पिक उर्जा प्रवर्धन केन्द्र अन्तर्गत मिनी ग्रिड ईनर्जी एक्सेस प्रोजेक्ट (MGEAP) को सहयोग मार्फत् प्रस्ताव गरिएको आमादब्लम मिनी हाइड्रो परियोजना (९११ कि.वा. विद्युत उत्पादन, प्रसारण तथा वितरण) को प्रस्तावक काठमाडौं महानगरपालिका -८, तिलगङ्गामा कार्यालय रहेको अमादब्लम मिनी हाइड्रो लि. हो । प्रस्तावकको ठेगाना र सम्पर्क नं. यस प्रकार रहेको छः

अमादब्लम मिनी हाइड्रो लि.
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फोन नं.: ९८०१८४२३४४

२. परियोजनाको विवरण

प्रस्तावित परियोजना सोलुखुम्बु जिल्लाको खुम्बु पासाङल्हामु गाउँपालिका, वार्ड नं. ४, पाङ्बोचेमा कार्यान्वयन गर्न प्रस्ताव गरिएको छ । भौगोलिक रूपमा,प्रस्तावित परियोजना २७°५०'५०" उत्तर देखि २७°५१'४०" उत्तर अक्षांश र ८६°४७'४९"पूर्व देखि ८६°४९'१९" पूर्व देशान्तर बीचमा रहेको छ। परियोजना क्षेत्र भित्रको उचाइ समुद्र सतहको ३९५१.१८ मिटर देखि ४४२२ मिटर सम्म रहेको छ ।यो परियोजना नदी प्रवाहमा आधारित हो ।यो परियोजनाले चोलुन्चे खोलाको पानी प्रयोग गरि परियोजना संचालन गर्ने लक्ष्य रहेको छ ।चोलुन्चे खोला सदाबहार खोला हो र इम्जा खोलाको सहायक खोला हो । उक्त खोलाबाट समुद्र सतह देखि ४४२३ मि. उचाई भएको स्थान बाट पानीलाई फर्काएर ४४२२ मि. उचाईमा इन्टेक बनाइ पानीलाई २९३० मि. लामो पेनस्टक पाइप मार्फत् ३९५१.१८ मि. उचाईमा रहेको विद्युत गृहमा ल्याइने छ । ग्रस हेड ४७१.८७ मि. हुनेछ भने डिजाइन डिस्चार्ज $Q_{80\%}$ मा ०.२५ घ.मि. प्रति सेकेण्ड रहेको छ । ४८५ कि.वा. क्षमता भएको दुईवटा टर्वाइन जोडि ६५० किलो भोल्ट अम्पाएर को दुई वटा जेनेरेटर मार्फत् ९११ कि.वा. विद्युत उत्पादन गरिने छ । यसरी उत्पादन भएको विद्युत ११ kV प्रसारण लाइन तथा १.१ kV वितरण लाइन मार्फत खुम्बु पासाङल्हामु गाउँपालिका, वार्ड नं. ४ मा अवस्थित चुकुङ्ग, देबुचे, डिङ्गबोचे, डोले, लवी-स्यास्या, लोबुचे, लुज़ा, मिलिङ्गो,मिन्ग्बो, मोछेर्मो, पाङ्गबोचे, फेरीचे, फोर्त्से, फोर्त्से टेङ्गा, मोंग्ला, फुंगी टेङ्गा, सोमारे, थुक्ला, त्याङ्गबोचे, वोर्सो र मोंग डाँडामा रहेका ४५१ घरधुरीमा पुर्याउने लक्ष रहेको छ । यो बस्तीहरु राष्ट्रिय विद्युत प्रसारण लाइनमा जोडिएको छैन र सबै बस्तीहरु सगरमाथा राष्ट्रिय निकुन्ज भित्र रहेका छन्।यो परियोजनाको कुल लागत रु. ६१,८९,०१,६३८.८९ रहेको छ ।

आयोजनाका मुख्य विशेषताहरु निम्नानुसार रहेका छन्:

क्र. सं.	विवरण /विशेषताहरु	
१	आयोजनाको नाम	आमादब्लम मिनी हाइड्रो परियोजना (९११ कि.वा. उर्जा उत्पादन, प्रसारण तथा वितरण)
२	आयोजनाको स्थान	
	प्रदेश	कोशी प्रदेश
	जिल्ला	सोलुखुम्बु
	गाउँपालिका/वडा	खुम्बु पासाङ्गल्हामु गा. पा./वडा नं. ४
	खोलाको नाम	चोलुन्चे खोला
	भौगोलिक अवस्थिति	२७°५०'५०" उत्तर देखि २७°५१'४०" उत्तर अक्षांश र ८६°४७'४९" पूर्व देखि ८६°४९'१९" पूर्व देशान्तर
	इन्टेक	२७°५०'५६.५२" उ., ८६°४९'६.१५" पू.; उचाईः ४४२२ मि.
	विद्युतगृह	२७°५१'१२.९८" उ., ८६°४७'४४.२१" पू.; उचाईः ३९५१.५० मि.
	विद्युतीकरण गरिने जम्मा घरधुरी	४५१
३	सामान्य	
	खोलाको नाम	चोलुन्चे खोला
	नजिकैको शहर	नाम्चे
	आयोजनाको प्रकार	नदी प्रवाहमा आधारित
	ग्रस हेड (मि.)	४७१.८७
	नेट हेड (मि.)	४४८.८६
	स्थापना क्षमता (कि.वा.)	९११
	अनुमानित बार्षिक उर्जा उत्पादन (कि.वा. घण्टा)	७२,२५,७८१.७६
४	जल विज्ञान (हाइड्रोलोजी)	
	हेडवर्क क्षेत्र सम्मको जलाधार क्षेत्र (वर्ग कि,मि,)	२८ (जम्मा); २१ (५००० मि. भन्दा माथि) र ७ (४००० मि. देखि ५००० मि. सम्म)
	डिजाईन डिस्चार्ज (Q80%) (घ.मि.प्र.से.)	०.२५
	डिजाईन बाढी (सय बर्षमा १ पटक) (घ.मि.प्र.से.)	१५
	वातावरणीय बहाव	प्रत्येक महिना नापिएको बहावको कम्तिमा ५०%
५	बाँध	
	बाँधको प्रकार	कंक्रिट ग्राभिटी
	लम्बाई (मि.)	१२

क्र. सं.	विवरण /विशेषताहरु	
	उचाई (मि.)	२.५७
	क्रेष्ट लेभल (मि.)	समुद्री सतहबाट ४४२३.५७ मि. उचाई
६	**जलाशय (बाँधको कारण बन्ने)**	
	सतहको क्षेत्रफल (वर्ग मि.)	३६०
	आयतन (घ.मि.)	४९३.२
	औसत गहिराई (मि.)	१.३७
	औसत चौडाई (मि.)	१२
	औसत लम्बाई (मि.)	३०
७	**अन्डरस्लुइस**	
	प्रकार	आयताकार समतल गेट
	साइज	१.० मि. x १.३ मि.
	इन्भर्ट लेवल (मि.)	४४२१.०८
८	**इन्टेक**	
	प्रकार	Orifice type side intake
	ओरिफिसको संख्या (संख्या)	१
	Opening साईज	१.५ मि. (चौ.) x ०.३. मि. (उ.)
	इन्टेक इन्भर्ट लेवल (मि.)	४४२२
	ग्रावेल ट्राप	
	आकार (ल.xचौ.xउ.)	८ मि.x१.५ मि.x१.३ मि.
	ट्राप हुने बेडलोडको आकार (मि.मि.)	२
९	**हेडरेस पाइप**	
	प्रकार	Pressurized pipe flow, MS
	लम्बाई (मि.)	१०
	ब्यास (मि.मि..)	४५०
	मोटाई (मि.मि..)	४
	आकार	गोलो
१०	**डिस्याण्डीङ्ग बेसिन/फरवे**	
	प्रकार	हेड पोन्ड भएको कन्भेन्सनल
	आकार (ल.xचौ.xउ.)	२६.५ मि.x२.६५ मि.x२.३० मि.
	संख्या	१
	सामान्य छानिएको कणको आकार (मि.मि.)	०.१५

क्र. सं.	विवरण /विशेषताहरु	
	फाइन ट्रासर्याक (२.६५ मि. x १.६ मि.)	०.८२ मि. x ०.४१ मि. (१० वटा)
११	ट्रासर्याक हिटिंग सिस्टम	हिटर १ (डिसिल्टिंग बेसिनमा): ४.५ कि.वा. हिटर २ (डिसिल्टिंग बेसिनमा): १.५ कि.वा. हिटर ३ (ग्राभेल ट्रापमा): ३.० कि.वा.
१२	पेनस्टक पाईप	
	प्रकार	माइल्ड स्टिल पाईप (पुरिने)
	ब्यास (मि.मि..)	४००
	मोटाई (मि.मि..)	६ -१६
	जम्मा लम्बाई (मि.)	२९३० मि.
१३	विद्युतगृह	
	प्रकार	सतही प्रकारको
	आकार (ल.xचौ.x उ.)	१९.९५ मि.x ७ मि.x५.८ मि.
१४	टेलरेस	
	प्रकार	पाईप र नहर
	नहरको आकार (ल.xचौ.xउ.)	१८ मि.x ०.५ मि.x०.६८ मि.
	पाईप	माइल्ड स्टिल ४०० ब्यास, ६ मि.मि. मोटाई, २१ मि. लम्बाई
१५	डीवाटर जोन	३.५ कि. मि.
१६	टर्बाइन	
	प्रकार	तेर्सो शाफ्ट भएको पेल्टन टर्बाइन सिंगल जेट
	इकाई संख्या	२
	प्रति इकाई डिस्चार्ज	०.१२५ घ.मि.
	रेटेड आउटपुट (मेकानिकल)	४८५ कि.वा.x२
	१००% डिस्चार्जमा रेटड दक्षता	८८.००%
१७	जेनेरेटर	
	प्रकार	३-फेज, सिंक्रोनस, ब्रसलेस
	प्रति इकाई रेटेड आउटपुट क्षमता	६५० के.भि.ए.
	रेटेड दक्षता	९६%
	इकाईको संख्या	२ वटा
१८	गभर्नर	
	प्रकार	इलेक्ट्रोनिक, PID तेल-हाइड्रोलिक, बिजुली बिना स्वयं बन्द हुने
	इकाईको संख्या	२ वटा
१९	ट्रान्सफरमर	
	(क) पावर ट्रान्सफरमर	

क्र. सं.	विवरण /विशेषताहरु	
	प्रकार	ONAN कूलिंग, YNyn0, ३ फेज
	रेटेड क्षमता	६३० के.भी.ए.
	भोल्टेज अनुपात	०.४/११ के.भी.
	इकाईको संख्या	२ वटा
	(ख) डिस्ट्रिब्युसन ट्रान्सफरमर	
	प्रकार	११/०.४ केभी, ३-फेज, आयल इमार्स्ड, कपर ओन्ड AVR parallel operation सहितको
	रेटेड क्षमता	१५० के.भी.ए.-२ वटा १२५ के.भी.ए.-२ वटा १०० के.भी.ए.-४ वटा ६५ के.भी.ए. -५ वटा ५० के.भी.ए.-२ वटा जम्मा १५ वटा
२०	**प्रसारण तथा वितरण लाइन**	
	क) सिंगल लाईन वितरण	६४.३८ कि.मि.
	११ केभी भूमिगत लाइनको कुल लम्बाई (भूमिगत XLPE armored 3 core ३५ व.मि.मि. एल्युमिनियम)	४० कि.मि.
	नदी क्रस गर्ने क्रममा ११ के.भी. ओभरहेड लाइन को कुल लम्बाई (Weasel ACSR)	०.९३ कि.मि.
	१.१ के.भी. ९५ वर्ग मि.मि. ४ कोर XLPE इन्सुलेट Unarmored एल्युमिनियम केबल	१२.४५ कि.मि.
	१.१ के.भी. ३५ वर्ग मि.मि. ४ कोर XLPE इन्सुलेट Unarmored एल्युमिनियम केबल	९.५ कि.मि.
	१.१ के.भी. २५ वर्ग मि.मि. २ कोर XLPE इन्सुलेट Unarmored एल्युमिनियम केबल	१.५ कि.मि.
	ख) डिस्ट्रीब्युसन ट्रान्सफर्मर	
	आवश्यक परिमाण	१५ वटा
	फेज संख्या	तीन फेज
	आवृति	५० हर्ज़

क्र. सं.	विवरण /विशेषताहरु	
	रेटेड भोल्टेज	
	१) प्राइमरी	११ के. भि.
	२) सेकेण्डरी	०.४ के. भि.
	ग) मुख्य नदीनाला क्रसिंग	९३० मि. (१० वटा)
	घ) नदि क्रस गर्दा प्रयोग हुने पोल	
	प्रकार	ग्यालभानाइज माइल्ड स्टील ट्युबुलर पोल
	जम्मा लम्बाई	९ मि.
	न्युनतम तौल	१२० के.जी.
	ङ) सब-स्टेसन	
	प्रकार	माउन्टेड पोल
	जम्मा सेट	१४
	पोलको प्रकार	ग्यालभानाइज स्टील ट्युबुलर पोल
	पोलको लम्बाई	
	च) कन्डक्टर	
	प्रकार	ACSR Conductor (Weasel)
	तोकिएको तौल, के.जी./कि.मि.	१२८
	छ) भूमिगत केवल	पोलीभिनायल क्लोराइड (PVC) इन्सुलेटेड आर्मोर्ड आल्मुनियम केवल
	ज) डिस्ट्रीब्युसन बक्स (DB)	
	जम्मा संख्या	८१
	सिस्टम	डबल ढोका
	साइज	ल. Xचौ. Xउ.= ४५ से.मि. X३० से.मि. X६० से.मि.
२१	**स्वीच यार्ड**	
	प्रकार	Indoor, Single Bus Configuration, ११ के.भी.
	डाइमेन्सन	३.५५ मि.X६.३२ मि.
	स्थान	विद्युतगृह भित्र
२२	**लोड सेन्टर**	**घरधुरी संख्या (४५१)**
२३	**शक्ति र ऊर्जा**	
	पावर प्लान्ट को प्रकार	नदी प्रवाहमा आधारित
	डिजाइन डिस्चार्ज	०.२५ क्यु.मि. प्र.से.
	जम्मा ग्रस हेड	४७१.८७ मि.
	रेटेड नेट हेड	४४८.८६ मि.

क्र. सं.	विवरण /विशेषताहरु	
	जडान क्षमता	९११ कि.वा.
	जम्मा बार्षिक उर्जा	७२,२५,७८१.७६ कि.वा.घ.
२४	परियोजना लागत अनुमान	
	मू.अ.क.तथा प्रोभिजनल रकम र IDC सहित जम्मा परियोजना लागत	रु. ६१,८९,०१,६३८.८९
	अनुदान (नेपाल सरकार/वैल्कल्पिक उर्जा प्रवर्धन केन्द्र/MGEAP)	रु. १२,८३,०७,०००.०० (२०.७३%)
	ऋण (विश्व बैंक/ वैल्कल्पिक उर्जा प्रवर्धन केन्द्र/MGEAP)	रु. ३६,६८,१४,३११.११ (५९.२७%)
	प्रस्तावकको लगानी	रु. १२,३७,८०,३२७.७८ (२०%)
	प्रति कि.वा. लागत	रु. ६७९,३६५.१४
	६% छुट फ्याक्टरमा कुल वर्तमान मूल्य	रु. २४,५६,१३,६४३.७५
	परियोजनाको प्रतिफल दर	११.२१%
	लगानी फिर्ता (Payback) हुने अवधि	७.६८ बर्ष
	आम्दानी खर्चको अनुपात	१.३५
२५	निर्माण अवधि	१८ महिना

(श्रोतः विस्तृत अध्ययन प्रतिवेदन २०२२)

३. वातावरणीय प्रभाव मुल्यांकन अध्ययनको सान्दर्भिकता

वातावरण संरक्षण नियमावली २०७७ को अनुसूची ३को क-१२ मा उल्लेख भए अनुसार राष्ट्रिय निकुन्ज, वन्यजन्तु आरक्ष, शिकार आरक्ष क्षेत्र भित्र कुनै प्रस्ताव कार्यान्वय गर्नु परेमा वातावरणीय प्रभाव मुल्यांकन प्रतिवेदन तयार गर्नु पर्ने प्रावधान रहेको छ । प्रस्तावित परियोजना सगरमाथा राष्ट्रिय निकुन्ज भित्र कार्यान्वयन गर्नु पर्ने भएकोले वातावरणीय प्रभाव मुल्यांकन प्रतिवेदन तयार गरिएको हो । त्यसैगरि सोहि नियमावलीको अनुसूची ३को क-५ अनुसार विद्युत प्रसारण वा ५० किलोमिटर सम्म लम्बाईको राष्ट्रिय वा सहायक सडकको चौडाई वृद्धि हुने गरी स्तर वृद्धि, पुनर्स्थापना वा पुननिर्माण गर्ने बाहेक अन्य प्रयोजनको लागि ५ हेक्टरभन्दा बढी वन क्षेत्र, वन संरक्षण क्षेत्र, मध्यवर्ती क्षेत्र तथा वातावरण संरक्षण क्षेत्रको वन जग्गा प्रयोग गर्ने भएमा वातावरणीय प्रभाव मुल्यांकन प्रतिवेदन तयार गर्नु पर्ने प्रावधान रहेको छ । प्रस्तावित परियोजनाले ५.७१९ हे. वन क्षेत्र मध्ये भौतिक पूर्वाधारको लागि १.१६९ हे. र प्रसारण तथा वितरण लाइनको लागि ४.५५० हे. आवश्यक पर्ने भएकोले वातावरण संरक्षण नियमावली २०७७ को अनुसूची ३ को

क-५ आकर्षित हुन्छ । प्रस्तावित प्रस्तावको आर्थिक सहयोग गर्ने निकाय विश्व बैंक रहेकोले वातावरण संरक्षण नियमावली २०२० को नियम ७ को उपनियम ८ बमोजिम अंग्रेजी भाषामा र अनुसूची १२ मा दिइएको ढाँचा प्रतिवेदन तयार गरिएको हो । वातावरण संरक्षण ऐन २०७६ को दफा ३ को उपदफा २-१ (क) अनुसार EIA प्रतिवेदन स्वीकृति दिने निकाय वन तथा वातावारण मन्त्रालय रहेकोले यो प्रतिवेदन स्वीकृतिको लागि पेश गरिएको हो ।

४. अध्ययन विधि

वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रक्रियामा वातावरण संरक्षण ऐन २०७६, वातावरण संरक्षण नियमावली २०७७ र राष्ट्रिय वातावरणीय प्रभाव मुल्यांकन निर्देशिका, २०५० को पालना गरिएको छ । वातावरणीय प्रभाव मुल्यांकन प्रतिवेदन नेपाल सरकारको कानुनी प्रावधान अनुसार र स्वीकृत क्षेत्र निर्धारण तथा कार्यसूची को आधारमा तयार गरिएको छ । विज्ञहरुको टोलीद्वारा स्थलगत अध्ययन, स्थानीय जनता, सरोकारवाला र सरकारी निकायका अधिकारीहरूसँग अन्तरक्रिया र परामर्श गरिएको थियो। त्यसैगरी, प्रस्तावित परियोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययनका लागि उपयुक्त सन्दर्भ सामाग्रीहरुको समीक्षा, स्थलगत सर्वेक्षण, अवलोकन, नमूना, चेक लिस्ट र प्रश्नावली सर्भे, समूहको बैठक र प्रभाव मूल्याङ्कन म्याट्रिक्स जस्ता विधिहरु अध्ययनको क्रममा अपनाइएका थिए।

५. विद्यमान वातावरणीय अवस्था

५.१ भौतिक वातावरण

यो परियोजना क्षेत्र नेपालको पूर्वी-उत्तर हिमाली क्षेत्रमा पर्दछ । भौगर्भिक रुपमा यो क्षेत्र नेपालको उच्च हिमाली क्रिस्टलीय क्षेत्रमा पर्दछ । परियोजना क्षेत्रमा उच्च-स्तरीय मेटामोर्फिक चट्टानहरू छन्। परियोजना क्षेत्र मा उच्च हिमालयन क्षेत्र को नाइस, सिस्ट र मार्बल र तिब्बती-टेथिस जोन सम्बन्धित टेथियन सेडिमेन्ट (चुनढुंगा, शेल, स्याण्डस्टोन आदि) छन् । धेरै जसो क्षेत्रमा पातलो कोलोभियल माटोले छोपेको छ र बेडरक देखिएको छ। कोलोभियल माटोमा बालुवा मिस्सिएको नाइसको बोल्डर, ग्रावेल, कोबल र पेबल समावेश छन्। डाइभर्सन वेयरको उचाइ ४४२३ मिटर छ भने पावरहाउस ३९५१.१८ मिटर मा हुनेछ । प्रसारण र वितरण लाइन ३३१५ मिटर देखि ५००० मिटरसम्म बिस्तारित हुनेछ । आयोजना क्षेत्र सबलपाइन देखि अल्पाइन जलवायु क्षेत्रमा पर्दछ। औसत वार्षिक वर्षा १५२४ मि.मी. रहेको छ। जनवरी सबैभन्दा चिसो महिना हो भने जुलाई परियोजना क्षेत्रको सबैभन्दा तातो महिना हो। पाङ्बोचे क्षेत्रको न्यूनतम तापक्रम वर्षको ७ महिनामा शून्य डिग्री सेल्सियस भन्दा तल झर्छ।

वडा नम्बर ४ को हालको भू-उपयोग ढाँचामा हिमनदी (५२.४०%), बाँझो जमिन (२०.८६%), घाँसे मैदान (१४.५२%), झाडी जग्गा (८.०२%), वन (२.८३%), जलस्रोत (०.६७%), निर्मित क्षेत्र (०.४५%) र कृषि (०.०.२५%) (श्रोतः खुम्बु पासाङ्गल्यामु गाउँपालिकाको वस्तुगत विवरण, २०७६) रहेको छ। वाइयर नदीभित्र बनाइने छ भने पेनस्टक पाइप घाँसे मैदान भएर जाने छ। विद्युतगृह पनि घाँसे मैदानमा निर्माण गरिनेछ । प्रसारण र वितरण लाइनहरू पर्यटक पदयात्रा मार्गहरू भएर जानेछन् ।

चोलुन्चे खोला नरे हिमनदीबाट सुरु भएर उत्तरपूर्वबाट दक्षिणपश्चिम दिशामा बग्छ। त्यसपछि यो पाङ्बोचे गाउँमा इम्जा खोलासँग मिल्छ। यो हिउँले भरिएको सदाबहार पानी बहने खोला हो जसको अधिकतम उचाइ ६५४३ मिटर छ भने जलाधारको न्यूनतम उचाइ ४४२३ मिटर छ। परियोजना क्षेत्र सम्मको कुल जलाधार क्षेत्र २७.५८ वर्ग कि.मि. छ। कुल जलाधार मध्ये ७४.७३% क्षेत्र ५००० मिटर भन्दा माथि रहेको स्थायी हिउँ रेखा भन्दा पर्दछ। हावा, पानी र ध्वनी गुणस्तरको विश्लेषणले मापदण्डहरू राष्ट्रिय मापदण्डको सीमाभित्र रहेको छ।

५.२ जैविक वातावरण

परियोजना क्षेत्र सगरमाथा राष्ट्रिय निकुञ्ज (SNP) मा पर्छ। SNP लाई UNESCO को मापदण्ड (vii) अन्तर्गत विश्व सम्पदा सूचीमा राखेको छ जस अन्तर्गत 'उत्कृष्ट प्राकृतिक प्रक्रिया वा असाधारण प्राकृतिक सुन्दरता र सौन्दर्य महत्त्व' को रुपमा समाबेश गरिएको छ । इन्टेक र पावरहाउस क्षेत्र अल्पाइन चरन क्षेत्रमा पर्दछन् जहाँ कुनै रूखहरू छैनन्, र पेनस्टक पाइप आर्द्र अल्पाइन बुट्यान अन्तर्गत जुनिपरको बुट्यान क्षेत्र भएर जान्छ । प्रसारण र वितरण (T&D) लाइनहरू पनि लेकाली चरण क्षेत्र, धुपीको बुट्यान क्षेत्र र भोजपत्र-लालीगुँरास वन तथा उप-लेकाली धुपीको वन क्षेत्र भएर जान्छ ।प्रसारण तथा वितरण लाईनहरू नदी पार गर्ने क्रम बाहेक पदमार्ग मुनि भूमिगत केवल बिछ्याउने गरी डिजाइन गरिएको छ। प्रस्तावित परियोजना कार्यान्वयनको लागि सगरमाथा राष्ट्रिय निकुन्ज भित्रको कुनै पनि रूख हटाउन आवश्यक छैन।

चोलुन्चे खोलामा हालसम्म माछा नदेखिएको स्थानीयको भनाइ छ ।त्यसैगरी सगरमाथा राष्ट्रिय निकुन्ज तथा मध्यवर्ती व्यवस्थापन योजना (२०१६-२०२०) मा समेत अत्याधिक चिसो पानी तथा प्रतिकुल हावापानीको कारण सगरमाथा राष्ट्रिय निकुन्ज भित्र बहने नदी तथा खोलाहरुमा माछा नपाइने उल्लेख गरिएको छ यद्यपि केही सरीसृप र उभयचरहरू भने रेकर्ड गरिएका छन्।

५.३ सामाजिक, आर्थिक तथा सांस्कृतिक वातावरण

खुम्बु पासाङ्गल्हामु गाउँपालिकाको वडा नम्बर ४ मा रहेका लोड सेन्टर (१९ विभिन्न बस्तीहरु) मा ३.७२ को औसत परिवार आकार भएको ४५१ घरपरिवारमा कुल जनसंख्या १६७७ रहेको छ। सबैभन्दा धेरैजनसंख्या भएको जातीय समूह शेर्पा (९५.२७%) हो। अन्य जातिहरू तामाङ (२.१८%), मगर (०.७३%), दलित (०.७३%) र अन्य (१.०९%) छन्। बहुसंख्यक (९९.५०%) मानिसहरू बुद्ध धर्म मान्छन् भने ०.५०% मानिसहरू हिन्दू धर्म मान्छन् (श्रोतः खुम्बु पासाङ्गल्यामु गाउँपालिकाको वस्तुगत विवरण, २०७६) । आयोजना क्षेत्रमा १० वटा गुम्बा छन्। यहाँको मुख्य पेशामा पर्यटन, कृषि, होटल/लज/रेष्टुरेन्ट, वैदेशिक रोजगारी र व्यापार व्यवसाय हो। लोड सेन्टरमा प्रति परिवार औसत जग्गा ८६४.८५ व. मि. (१.७० रोपनी) छ। यस क्षेत्रमा खाद्यान्न पर्याप्त तथा बाली विविधता अत्यन्तै नाजुक छ। आलु र गहुँ प्रमुख खाद्य बाली हुन्। धेरैजसो घरधुरीले हाल संचालनमा रहेका ३ वटा माइक्रो हाइड्रो प्लान्टहरूबाट बिजुली (उज्यालोको लागि मात्र) ल्याएका छन् र केहीले सौर्य उर्जा पनि प्रयोग गर्छन्। खाना पकाउन एलपीजी, मट्टितेल, गोबरको गुइठा र दाउराको प्रयोग गरिन्छ। आयोजना क्षेत्रमा साक्षरता दर ७३.९८% छ। वडा नम्बर ४ मा तीन आधारभूत विद्यालय र तीनवटा स्वास्थ्य संस्थाहरू छन्। सबै घरधुरीहरुमा शौचालय र खानेपानीको पनि पहुँच छ। सगरमाथा प्रदूषण नियन्त्रण समितिले मध्यवर्ती क्षेत्र व्यवस्थापन समिति, नेपाल प्रहरी, स्थानीयवासी र गाउँपालिकाको सहयोगमा पदमार्गमा भएका फोहोर व्यवस्थापन गर्दै आएको छ । परियोजना क्षेत्रमा मोबाइल र इन्टरनेट सुविधा उपलब्ध रहेकोछ।

६. प्रभावहरूको पहिचान/पूर्वानुमान

६.१ सकारात्मक प्रभावहरू

प्रस्तावित आयोजना निर्माणको क्रममा आयोजनाको सकारात्मक प्रभाव स्थानीय जनताका लागि रोजगारीको अवसर हो। निर्माण अवधिमा ४८,५०० मानव दिन अदक्ष र २४००० मानव दिन दक्ष जनशक्तिलाई रोजगारी दिइनेछ । अन्य फाइदाहरू प्राविधिक सीपहरू सिक्ने अवसरहरू, आर्थिक गतिविधिहरूमा वृद्धि र नयाँ प्रविधिहरूमा स्थानीयहरूको पहुँच हुन्। सञ्चालनका क्रममा मिनी जलविद्युत आयोजनाको सञ्चालन र मर्मतसम्भारमा कम्तीमा ५ जनालाई रोजगारी दिइनेछ । राष्ट्रिय प्रसारण लाइन नपुगेको ग्रामीण दुर्गम भेगमा ९११ किलोवाट विद्युत् उत्पादन गरी स्थानीयवासीको खाना पकाउन तथा अन्य घरायसी प्रयोजनको विद्युतको स्थायी आपूर्ति गरि मद्दत पुर्याउने छ ।

६.२ नकारात्मक प्रभावहरू

६.२.१ भौतिक वातावरण

भू-उपयोगमा परिवर्तन, टोपोग्राफी, माटोको क्षय, नदीको पानीमा सेडिमेन्टको मात्रा, अनावश्यक माटो-ढुँगाको उत्सर्जन, जलविज्ञान र नदीको मोर्फोलोजीमा असर र मलिलो माटोको क्षति निर्माणको

क्रममा भौतिक वातावरणमा पर्ने प्रमुख प्रतिकूल प्रभावहरू हुन्। इम्जा खोला र चोलुंचे खोला साइट बीचको प्रस्तावित इन्टेक र दोभान बीचको करिब ३.५ किलोमिटर नदीको क्षेत्रलाई ५०% पानी कम हुने क्षेत्रको रूपमा वर्गीकृत गर्न सकिन्छ। कुनै मानव बस्ती नभएको तथा सिंचाई योग्य भुमि नभएकोले नदीको यस खण्डको पानी सिँचाइ, पिउने र स्थानीय समुदायले कुनै जीविकोपार्जनको लागि प्रयोग गर्दैनन् ।साथै माछा समेत नपाइने भएकोले यस क्षेत्रमा पानीको अभावले त्यति धेरै प्रभाव पर्ने देखिंदैन । सञ्चालनको क्रममा स्थानीय हावापानी (माइक्रो क्लाइमेट) मा परिवर्तन, नदीको पानीको गुणस्तरमा परिवर्तन, विद्युत गृहबाट निस्कने ध्वनि र कम्पन, टेलरेसबाट निस्कने पानीको बहावको कारणले माटोको क्षयीकरण र सेडिमेन्ट फ्लसिंगका कारण तल्लो तटीय क्षेत्रमा पर्ने असर प्रमुख प्रभावहरू हुन्।

६.२.२ जैविक वातावरण

सगरमाथा राष्ट्रिय निकुन्जको ५.७१९ हेक्टर जमिन परियोजनाको विद्युत उत्पादन तथा वितरण सम्बन्धि विभिन्न कम्पोनेन्टहरू निर्माण गर्न आवश्यक हुनेछ । इन्धनका लागि वन माथिको निर्भरता बढ्न सक्ने, वन्यजन्तुको आवागमनमा पर्ने असर, जलचर वनस्पति र जीवजन्तुमा पर्ने असर, गैर-काष्ठ वन पैदावारमा पर्ने प्रभाव , जंगलमा आगलागी, वन्यजन्तुको चोरी-शिकारी र मानव वन्यजन्तु बिचको द्वन्द्व वृद्धिलाई निर्माणका क्रममा प्रतिकूल असरका रूपमा पहिचान गरिएको छ । पानीको बहाव घट्नु, बसोबास गर्ने कामदारले वन्यजन्तुमा पार्न सक्ने असर, वनको सम्भावित आगलागी र इन्धनका लागि वन माथिको निर्भरता बढ्न सक्ने (कामदारको कारण) सञ्चालन अवधिमा पर्ने प्रभावहरु हुन्।

६.२.३ सामाजिक, आर्थिक तथा सांस्कृतिक वातावरण

आयोजना निर्माणका लागि ५.७१९ हेक्टर जग्गा आवश्यक पर्ने देखिन्छ जस मध्ये प्रसारण तथा वितरण लाइनका लागि ४.५५ हे. र उत्पादन पूर्वाधारको लागि १.१६९ हे. आवश्यक पर्ने देखिन्छ र सम्पूर्ण जमिनको क्षेत्राधिकार सगरमाथा राष्ट्रिय निकुन्जको पर्दछ । आयोजनालाई आवश्यक पर्ने जमिन संरक्षित क्षेत्रमा पूर्वाधार निर्माणको लागि जग्गा उपलब्ध गराउने कार्यविधि, २०८० अनुसार जग्गाको भोगाधिकार लिइनेछ।

आयोजना क्षेत्रका विद्यमान सुविधा, सेवा र स्रोतमाथिको दवाब, स्वास्थ्य तथा सरसफाइ र सार्वजनिक सुरक्षा, पेशागत स्वास्थ्य तथा सुरक्षा, स्थानीय र बाह्य कामदारबीचको सामाजिक-सांस्कृतिक द्वन्द्व, लैङ्गिक हिंसा, समुदायमा पर्ने विविध बाधाहरु र बाल श्रमका विषयहरु निर्माणको क्रममा पहिचान गरिएका सम्भावित प्रभावहरू हुन्।

कामदारको पेशागत स्वास्थ्य र सुरक्षा, सार्वजनिक सुरक्षा, अचानक पानी छोड्दा तल्लो तटीयक्षेत्रमा पर्ने असर, लाभ बाँडफाँडको समस्या, विद्युत महशुलको समस्या र आयोजना क्षेत्रमा विद्यमान तीनवटा माइक्रो हाइड्रोको व्यवस्थापन सञ्चालनका क्रममा पहिचान गरिएका सम्भावित प्रभावहरू हुन्।

६.२.४ सगरमाथा राष्ट्रिय निकुन्ज तथा उत्कृष्ट विश्वव्यापी मूल्य मान्यता

प्रस्तावित परियोजना सगरमाथा राष्ट्रिय निकुन्ज भित्र अवस्थित छ र यसले प्राकृतिक सौन्दर्यमा केही हदसम्म प्रभाव पार्न सक्छ। विगत ७५ वर्षदेखि स्थानीय वासिन्दा विश्वका विविध समूहको सम्पर्कमा आएकाले स्थानीय सामाजिक र सांस्कृतिक अखण्डतामा नगण्य प्रभाव पर्नेछ। (https://whc.unesco.org/en/compendium/action=list&id_faq_themes=1528)। त्यसैगरी, प्रसारण तथा वितरण लाइनको लागि आर्मोर्ड तारहरू भूमिगत गरिने तथा इन्सुलेट गरिने भएको कारण चरा र जंगली जनावरहरूलाई विद्युतीय झड्का लाग्ने सम्भावना छैन।

७. अनुकूल प्रभावहरुको अभिवृद्धि / प्रतिकूल प्रभाव न्यूनीकरणका उपायहरू

७.१ अनुकूल प्रभावहरुको अभिवृद्धि

निर्माण र सञ्चालन चरणमा स्थानीयलाई रोजगारीमा प्राथमिकता दिइनेछ। समुदायसँगको छलफल बाटै विद्युतको महसुल दर निर्धारण गरिनेछ । १० प्रतिशत सेयर स्थानीयलाई उपलब्ध गराइनेछ, साथै उनीहरु इच्छुक भए थप सेयर समेत उपलब्ध गराइने छ ।

७.२ प्रतिकूल प्रभावहरुको न्युनीकरणका उपायहरु

७.२.१ भौतिक वातावरण

भूक्षय र पहिरो नियन्त्रण गर्न सम्भव भएसम्म जमिन उत्खनन् गर्ने कार्यलाई न्यूनीकरण गरिनेछ। उत्खनन सामग्रीहरू जमिनको यथास्थितिकरण र पुनर्स्थापनाको लागि प्रयोग गरिनेछ। खाडलहरू, उत्खनन क्षेत्रहरु र डिस्पोजल साइटहरू तुरुन्तै पुनर्स्थापित गरिनेछ। तोकिएको क्षेत्रमा (२७°५०'५६.५२"ऊ., ८६°४९'६.१५"पू. तथा (२७°५१'१२.९८"ऊ., ८६°४९'४९.२१"पू.) मात्रै अनावश्यक सामाग्रीहरु बिसर्जन गरिनेछ। पूर्व चेतावनी प्रणाली र आपतकालीन पूर्वतयारी योजना बारे स्थानीय मानिस तथा कामदारहरुलाई सचेतना कार्यक्रमहरु मार्फत सचेत गराइनेछ।

७.२.२ जैविक वातावरण

वातावरण, जैविक विविधता र वन्यजन्तुको संरक्षणमा स्थानीय जनता, विद्यालयका बालबालिका र आयोजनाका कर्मचारीहरूलाई सचेत बनाइनेछ। वन क्षेत्रमा आगलागी, सिकार र सिकारीको सम्भावित जोखिमलाई कम गर्न व्यवस्थापकीय तथा निर्माण मजदुरहरूलाई वन क्षेत्रमा अनावश्यक

रूपमा घुम्न र धुम्रपान गर्न निषेध गरिनेछ। चोलुंचे खोलाको जलीय जीवनलाई दिगो राख्न मिनी हाइड्रो सञ्चालन गर्दा औसत मासिक प्रवाहको न्यूनतम ५० प्रतिशत वातावरणीय प्रवाह कायम गरिनेछ। ३.५ कि.मि. लामो डिवाटर क्षेत्रमा अत्यधिक चिसो भएकोले माछा नपाइने र पानीको प्रवाह समेत भूमिगत रहेकोले त्यहाँको जैविक वातावरणमा प्रभाव पर्ने देखिँदैन । साथै ५०% छोडिने पानीले गर्दा त्यहाँ रहेका जीव तथा वनस्पतीको जीवनधान्न प्रशस्त हुनेछ । जङ्गल माथिको निर्भरता कम गर्न सबै कामदार र आयोजनाका कर्मचारीलाई खाना पकाउन एलपी ग्यास उपलब्ध गराइनेछ। प्रस्तावित परियोजनाले भोगाधिकार गर्ने जम्मा जमिन ५.७१९ हे. भएको र सगरमाथा राष्ट्रिय निकुन्जको क्षेत्राधिकारमा पर्ने भएकोले आयोजनाको लागि जम्मा ५.७१९ हे. जमिनको भोगाधिकारको सट्टाभर्ना जग्गामा प्रति हे. १६०० को दरले ९१५० बिरुवा रोपी ५ वर्ष सम्म रेखदेख गरि हुर्काईने छ। यी सम्पूर्ण क्रियाकलापहरु संरक्षित क्षेत्रमा पूर्वाधार निर्माणको लागि जग्गा उपलब्ध गराउने सम्बन्धि कार्यविधि २०८० अनुसार गरिने छ ।

७.२.३ सामाजिक, आर्थिक तथा सांस्कृतिक वातावरण

सबै कामदार र कर्मचारीलाई कार्यस्थल दुर्घटना बीमाको व्यवस्था गरिनेछ र व्यक्तिगत सुरक्षा प्रयोग सुनिश्चित गरिनेछ। विशेष गरी भूमिगत प्रशारण तथा वितरण लाइनहरूका लागि बनाइएको खाडलहरू दुर्घटनाबाट बच्न तुरुन्तै पुनर्स्थापना गरिनेछ। श्रमिक र स्थानीयबीचको द्वन्द्व कम गर्न यौन शोषण र दुर्व्यवहार तथा यौन उत्पीडन सम्बन्धि आचारसंहिता सहित अन्य आचार संहितालाई कडाइका साथ लागू गरिनेछ र सबै कर्मचारी र निर्माण कार्यकर्ताहरूलाई सामाजिक तथा कानुनी दण्ड सजाय बारे अभिमुखीकरण गरिने छ ।

८. वातावरणीय व्यवस्थापन योजना

आयोजनाको निर्माण र सञ्चालनका क्रममा पर्न सक्ने नकारात्मक प्रभावलाई न्यूनीकरण गर्न EIA प्रतिवेदनमा उल्लेख गरिएका न्यूनीकरण उपायहरूलाई आयोजनाले कार्यान्वयन गर्नेछ। कार्यान्वयनका लागि न्यूनीकरण उपायहरू अनिवार्य बनाउन परियोजनाको एक अंगको रूपमा वातावरणीय व्यवस्थापन योजना तयार गरिएको छ। स्थानीय तहमा भौतिक, रासायनिक, जैविक, सामाजिक, आर्थिक र सांस्कृतिक क्षेत्रमा पर्ने नकारात्मक प्रभावलाई न्यूनीकरण वा निराकरण गर्ने मुख्य जिम्मेवारी हुनेछ । वातावरणीय व्यवस्थापन योजनामा तोकिएका मुख्य तत्वहरू कार्यान्वयन गर्ने मुख्य जिम्मेवारी आमादब्लम मिनी हाइड्रो लि. को हुनेछ। वातावरणीय व्यवस्थापन योजनाका दुई भाग हुन्छन्: वातावरणीय व्यवस्थापन गतिविधि र कार्यान्वयन इकाई।

वातावरण संरक्षण नियमावली, २०७७ को अनुसुची १२ अनुसार वातावरणीय व्यवस्थापन योजना तयार गरिएको छ। यसले उत्खनन् गर्दा निस्कने काम नलाग्ने माटो-ढुंगाको व्यवस्थापन, प्रदूषण नियन्त्रण, पेशागत स्वास्थ्य र सरसफाइ, सार्वजनिक सुरक्षा, सगरमाथा राष्ट्रिय निकुन्जको उत्कृष्ट विश्वव्यापी मूल्य र मान्यताहरुको अखण्डता र अन्य विभिन्न समस्याहरूलाई सम्बोधन गर्न विभिन्न संस्थाहरूको भूमिका र जिम्मेवारीहरू परिभाषित गरेको छ। वातावरणीय व्यवस्थापन योजनामा उल्लेख गरिएका सबै अवयवहरु परियोजनाको जीवन चक्रमा संगसंगै जानेछन् ।

आयोजना सम्पन्न भएको दुई वर्षपछि आमादब्लम मिनी हाइड्रो आयोजनाको वातावरणीय परीक्षण हुनेछ । परियोजनाले यस परीक्षणको लागि नेपाल सरकार वा तोकिएको परीक्षक मार्फत आवश्यक परिक्षण व्यवस्था गर्नेछ।

वातावरणीय अनुगमन योजनामा परियोजना गतिविधिहरूको आधारभूत, नियमपालन र प्रभाव अनुगमनको लागि निर्माण पूर्व, निर्माण र सञ्चालन चरणहरूमा वातावरणीय अनुगमन योजना समावेश गरिएको छ। अनुगमनका लागि मापनयोग्य सूचकहरू तयार गरिएको छ र योजनामा अनुगमनका विधिहरू, अनुगमन आवृत्ति, अनुगमन स्थान, र अनुगमनका लागि आवश्यक पर्ने लागतहरू सहित अनुगमनका लागि जिम्मेवार निकाय समेटिएका छन्।

वातावरण अनुगमन, परीक्षण र व्यवस्थापन योजना सहित विभिन्न वातावरणीय संरक्षण सम्बन्धी गतिविधिहरूको कुल लागत रु. ७२,७४,९०६.०० अनुमान गरिएको छ। यो कुल परियोजना लागत (रु. ६१८,९०१,६३८.८९) को १.१७% हो।

९. निष्कर्ष

आमादब्लम मिनी हाइड्रो लि. ले प्रस्तावित आयोजना सगरमाथा राष्ट्रिय निकुञ्ज भित्र कार्यान्वयन गर्नेछ जसले वार्षिक औसत ऊर्जा ७,२२५,७१८.७६ किलोवाट उत्पादन गर्नेछ। आयोजनाले सगरमाथा राष्ट्रिय निकुन्जको ५.७१९ हे. जग्गाको भोगाधिकार लिने र सोहि क्षेत्रफल बराबरको जग्गा सट्टाभर्ना वापत सगरमाथा राष्ट्रिय निकुन्जलाई उपलब्ध गराउने छ । यस EIA अध्ययनले

केही प्रतिकूल र अनुकूल वातावरणीय र सामाजिक प्रभावहरू पहिचान गरेको छ र प्रत्येक पहिचान गरिएका प्रतिकूल प्रभावहरूको लागि न्यूनीकरण उपायहरू साथै अनुकुल प्रभावहरूको लागि अभिवृद्धि उपायहरू पनि प्रस्तावित गरेको छ। वातावरणीय व्यवस्थापन योजना तयार गरिएको छ र न्यूनीकरण र अभिवृद्धि उपायहरूको लागि बजेट विनियोजन गरिएको छ। प्रस्तावकले वातावरणीय व्यवस्थापन योजनाको प्रभावकारी कार्यान्वयन सुनिश्चित गर्दै प्रस्तावित परियोजना कार्यान्वयन गर्नेछ।

Executive Summary

1. Proponent

Amadablam Mini Hydro Ltd. (AMHL), at Kathmandu Metropolitan City, ward number 8, Tilganga is the proponent of 'Amadablama Mini Hydro Project (AMHP) (Generation, Transmission and Distribution of 911 kW)' under Mini Grid Energy Access Project (MGEAP) of Alternative Energy Promotion Center (AEPC). The Address of the proponent is as follows:

Amadablam Mini Hydro Ltd.
Kathmandu-8, Tilganga, Kathmandu
Bagmati Province, Nepal
Email: amadablamhydro@gmail.com
Telephone No: 9801842344

2. Project Description

The project is proposed to be implemented in Pangboche, Khumbu Pasang Lhamu Rural Municipality, Ward No.4, Solukhumbu district. Geographically, the proposed project lies between 27°50'50"N to 27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude. The elevation within the project area varies from 3951.18 m to 4422 m above mean sea level (amsl). The proposed project is a run-off-river scheme and uses water from Cholunche Khola, a perennial river and tributary of Imja Khola. Water will be diverted at elevation of 4423 m amsl and intake will be made at elevation of 4422 m amsl. Diverted water will be streamed down to powerhouse located at 3951.18 m amsl through 2930 m long penstock pipe. The gross head will be of 471.87 m with design discharge 0.25 m^3/s at $Q_{80\%}$. Two units of turbines with the rated output of 485 kW will be coupled with two 650 kVA synchronous generators which will be used to generate total electrical power of 911 kW. Generated electricity will be transmitted through 11 kVA transmission lines and distributed through 1.1 kVA distribution lines to 451 households in Chukhung, Debuche, Dingboche, Dole, Lawi-Schyasa, Lobuche, Luza, Milingo, Mingbo, Mochhermo, Pangboche, Pheriche, Phortse, PhortseTenga, Mongla, Fhungi Tenga, Shomare, Thukla, Tyangboche and Worshyo and other settlements of ward number 4 of Khumbu Pasanglhamu Rural Municipality (KPLRM) where National grid has not reached. All the settlements lie in Sagarmatha National Park. The total project cost is NPR 618,901,638.89. The salient features of the project are as follows:

1	**Location**		
	Province	:	Koshi
	District	:	Solukhumbu
	Rural Municipality	:	Khumbu Pasanglhamu Rural Municipality Ward No. 4
	Geographical Coordinates Latitude Longitude	:	27°50'50"N to 27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude
	Intake	:	27°50'56.52"N and 86°49'6.15"E, elevation 4422 masl
	Power House	:	27°51'12.98"N, 86°47'49.21"E, elevation 3951.18 masl
	Total Households to be Electrified		451
2	**General**		

	Name of River	:	Cholunche Khola
	Nearest Town	:	Namche Bazaar (13 Km)
	Type of Scheme	:	Run of River
	Gross Head	:	471.87 m
	Net Head		448.86 m
	Installed Capacity	:	911 KW
	Average Annual Energy	:	7,225,781.76 kWh
3	**Hydrology**		
	Catchment Area at Headworks Site	:	28 km^2 (Total), 21 km^2 (>5000 m) 7 km^2(5000 m< A> 4000 m)
	Design Discharge ($Q_{80\%}$)	:	0.25 m^3/s
	Design Flood (1 in 100 year)	:	15 m^3/s
	Compensation flow	:	50% of discharge at river every month
4	**Diversion Weir**		
	Type	:	Concrete gravity type weir
	Length	:	12 m
	Height	:	2.57 m
	Crest level	:	El. 4423.57 m
5	**Reservoir (due to Diversion Weir)**		
	Surface Area	:	360 m^2
	Volume	:	493.2 m^3
	Average depth	:	1.37 m
	Average Width	:	12 m
	Average Length	:	30 m
6	**Undersluice**		
	Type	:	Rectangular Flat Gate
	Size	:	1.0 m x 1.3m
	Invert level	:	El. 4421.08 m
7	**Intake**		
	Type	:	Orifice type side intake
	No of Orifice	:	1 No.
	Size of Opening	:	1.5 m (B) x 0.3 m (H)
	Intake Invert Level	:	El. 4422.00 m
	Coarse Trashrack (1.4 m x 1.5 m)	:	0.7 m x 0.37 m (6 Pcs)
8	**Gravel Trap**		
	Size (L x B x H)		8 m x 1.5 m x 1.3 m
	Bed load size to trap		2 mm
	Fine Trashrack (2m x 1.5 m)	:	1m x 0.37 m (6 Pcs)
9	**Headrace Pipe**		
	Type	:	Pressurized pipe flow, MS
	Length	:	10 m
	Diameter	:	450 mm
	Thickness	:	6 mm
	Shape	:	Circular
10	**Desanding Basin cum forebay**		
	Type	:	Conventional with head pond

	Size (L x B x H)	:	26.50 m x 2.65 m x 2.30 m
	Number of Bay	:	1 No.
	Nominal size of trapped particle	:	0.15 mm
	Fine Trashrack (2.65 m x 1.6 m)		0.82 m x 0.41m (10 Pcs)
11	**Trashrack heating system**	:	Heater 1 at desilting basin 4.5 kW Heater 2 at desilting basin 1.5 kW Heater 3 at gravel trap 3.0 kW
12	**Penstock Pipe**		
	Type	:	Mild Steel Pipe (Buried)
	Internal Diameter	:	400 mm dia
	Thickness	:	6 mm to16 mm
	Branch Pipe	:	MS 200 mm dia, 16 mm thick 16 m long
	Total Length of the pipe	:	2930 m length
	No of Anchor Block	:	58 Nos
12	**Dewatered Zone**	:	**3.5 Km**
12	**Powerhouse**		
	Type of powerhouse	:	Surface Type
	Size (L x B x H)	:	19.95 m x 7.0 m x 5.8 m
13	**Tailrace Conduit**		
	Type	:	Pipe and Canal
	Size (L x B x H)	:	18 m x 0.5 m x 0.68 m
	Pipe	:	MS 400 mm dia, 6 mm thick, 21 m long
	Turbine Axis Level	:	El. 3951.50 m
14	**Dewatered Zone**	:	**3.5 Km**
15	**Turbines**		
	Type	:	Horizontal Shaft Pelton Turbine Single Jet
	Number of Units	:	2
	Discharge per unit	:	0.125 m^3/sec
	Rated Output (Mechanical)	:	485 kW X 2 units
	Synchronous Speed	:	1500 rpm
	Rated Net Head	:	448.86 m
16	**Generators**		
	Type	:	3-Phase, Synchronous, Brushless
	Rated Output Capacity per Unit	:	650 kVA
	Rated Efficiency	:	96%
	No of units	:	2 Nos.
17	**Governor**		
	Type	:	Electronic, PID Oil-hydraulic, self-closing without electric power
	No of units	:	2 Nos.
18	**Transformer**		
	i. Power Transformer		
	Type	:	ONAN Cooling, YNyn0, 3 phase
	Rated capacity	:	630 kVA
	Voltage ratio	:	0.4/11 kV
	No of units	:	2 Nos.
	ii. Distribution Transformer		

	Type		11/0.4 kV, 3-phase, oil immersed, copper owned AVR with parallel operation
	Rated Capacity	:	150 kVA- 2 Nos
			125 kVA- 2 Nos
			100 kVA- 4 Nos
			65 kVA-5 Nos
			50 KVA-2 No.
			Total 15 Nos.
19	**Transmission & Distribution line**		
	A. Single Line Distribution		64.38 km
	Total Length of 11 kV underground line (underground XLPE armored 3 core 35 sq. mm aluminum)	:	40.00 km
	Total length of 11 kV overhead line during river crossings (Weasel ACSR)	:	0.93 km
	1.1 kV 95 sq.mm. 4 Core XLPE Insulated Unarmored Aluminium Cable	:	12.45 km
	1.1 kV 35 sq.mm. 4 Core XLPE Insulated Unarmored Aluminium Cable	:	9.50 km
	1.1 kV 25 sq.mm. 2 Core XLPE Insulated Unarmored Aluminum Cable	:	1.50 km
	B. Distribution Transformer		
	Type	:	Outdoor installation type
	Quantity required	:	Fifteen (15)
	Number of phases	:	Three phase
	Frequency	:	50 Hz
	Rated voltage	:	
	1) Primary	:	11 kV
	2) Secondary	:	0.4 kV.
	C. Major River Crossings		930 m (10 No.)
	D. Poles for Overhead Transmission During Crossings		
	Type	:	Galvanized Mild Steel Tubular poles
	Total Length	:	9 m
	Minimum weight	:	120 kg
	E. Sub-Station		
	Type	:	Pole mounted
	Total Sets	:	14
	Pole Type	:	Galvanized steel tubular poles
	Length of Poles	:	9 m
	F. Conductors		
	Type	:	ACSR Conductor (Weasel)

	Specific Weight, kg/km	:	128
	G. Underground Cables	:	Poly Vinyl Chloride (PVC) insulated armored aluminum cable
	H. Distribution Box		
	Total Number	:	80
	System	:	Double Door
	Size	:	L X B X H = 45 cm X 30 cm X 60 cm
20	**Switchyard**		
	Type	:	Indoor, Single Bus Configuration, 11 kV
	Dimension	:	3.55 m X 6.32 m
	Location	:	Inside Powerhouse
21	**Load Center**	:	Number of Consumers (HHs) (451 Beneficiary Households)
22	**Power and Energy**		
	Type of Power Plant	:	Run-of-river
	Design Discharge	:	0.25 m^3/s
	Total Gross Head	:	471.87 m
	Rated Net Head	:	448.86 m
	Installed Capacity	:	911 kW
	Total Annual Energy	:	7,225,781.76 kWh
23	**Project Cost Estimate**		
	Total Project Cost with VAT and Provisional Sums and IDC	:	NRs. 618,901,638.89
	Subsidy (GoN/AEPC/MGEAP)		NRs. 128,307,000.00 (20.73%)
	Loan (WB/AEPC/MGEAP)		NRs. 366,814,311.11 (59.27%)
	Equity (proponent)		NRs. 123,780,327.78 (20.00%)
	Cost Per kW	:	NRs. 679,365.14
	Net Present Value (@ 6% discount factor)	:	NRs. 245,613,643.75
	Project rate of return	:	11.21 %
	Payback	:	7.68 years
	BC Ratio	:	1.35
24	**Construction Period**	:	18 Months

(Source: DFS, 2022)

3. Rationality of EIA Study

As per EPR 2020, Annex 3, KA-12, there is a provision to prepare an environmental impact assessment report if any proposal has to be implemented within the national park, wildlife reserve, hunting reserve. The proposed project lies in Sagarmatha National Park (SNP), As the proposed project has to be implemented within the SNP, an environmental impact assessment report has been prepared. Likewise, according to Annex 3 of the regulation, KA-5, there is a provision to prepare an environmental impact assessment report for the proposal other than construction of electricity transmission or upgrading, restoration or rebuilding of increasing the width of national or auxiliary roads up to 50 kilometers in length, requiring the land more than 5 ha. of forest land, forest conservation area, buffer zone and environmental conservation area. The proposed project requires a total forest land of 5.719 ha of which 4.550 ha. for transmission and distribution lines, and remaining 1.169 ha. land for other physical infrastructure of the project thus schedule 3, ka-5 of Environment Protection Regulations 2077 seems to be attracted. The report has been prepared in English language as per sub-rule 8 of rule 7 of EPR

2020 as the funding agency for the proposed proposal is World Bank (WB). The EIA report was prepared in the format given in annex 12 of EPR 2020. According to Clause 3 (2-1-Ka), the approval agency for environmental assessment report is the Ministry of Forests and Environment.

4. Methodology

The EIA process followed the Environment Protection Act, 2019, Environmental Protection Regulation, 2020 and National EIA Guidelines, 1993. The EIA report was prepared as per the legal provisions of the GoN and based on the approved Scoping and ToR. Field studies by the team of professionals, interaction and consultation with the local people, stakeholders and the official of GoN line agencies were conducted. Likewise, review of pertinent literatures, field survey, observation, sampling, checklist and questionnaire administration, group meetings and impact assessment matrix were the main methodologies applied for the Environmental Impact Assessment study of the proposed project.

5. Existing Environmental Condition

5.1 Physical Environment

The proposed project area is located in northeastern mountain region of Nepal. The project area geologically lies on the Higher Himalayan Crystalline Zone in the eastern part of Nepal. The project area possesses the high-grade metamorphic rocks. The project area has gneisses, schists and marbles of the Higher Himalayan Zone and Tethyan sediments (limestone, shale, sandstone etc.) belonging to the Tibetan-Tethys Zone. Most of the area is exposed bedrock with thin colluvial soil cover. The colluvial soil comprises boulders, gravels, cobble and pebbles of gneiss with sand. The elevation of diversion weir is 4423 m while the powerhouse will be at 3951.18 m. The elevation of transmission and distribution lines ranges from 3315 to 5000 m. The project area lies in subalpine to alpine climatic zone. The average annual rainfall is 1524 mm. January is the coldest month and July is the warmest month of the project area. The minimum temperature of Pangboche area goes down below 0°C about 7 months of a year
The current land use pattern of Ward No. 4 is dominated with glacier (52.40%), followed by barren land (20.86%), grassland (14.52%), shrub land (8.02%), forest (2.83%), water body (0.67%), built up (0.45%) and agriculture (0.0.25%) (Source: Khumbu Pasanglhamu Rural Municipality Profile, 2019). The weir will be in river while penstock pipe lies in grassland. Powerhouse will be constructed in grassland. Transmission and distribution lines pass through tourist trekking routes.

The Cholunche Khola starts from Nare Glacier and flows from northeast to south west direction. It then merges with Imja Khola at Pangboche village. It is a snow fed perennial river with maximum catchment elevation of 6543 m while minimum elevation of catchment being 4423 m. The total catchment area is 27.58 km^2. Out of the total catchment 74.73% of the catchment lies in permanent snowline above 5000 m. The analysis of air, water and sound quality showed that the standards are within the limit of national guidelines.

5.2 Biological Environment

The project area lies in Sagarmatha National Park (SNP). The SNP is additionally recognized by UNESCO as the world heritage site under criterion (vii) 'contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance'. The intake and powerhouse area lies in Alpine pastureland where there are no trees, however, penstock alignment lies in Juniper Scrublands in the vegetation zone of Moist Alpine Scrubs.

Transmission and Distribution (T&D) lines also pass-through Alpine pasture land, Juniper Scrublands and Birch-Rhododendron Forest with sub-alpine juniper forest. All the T&D lines have been designed to be underground passing along foot trails except river crossings where it passes along with bridges. The project does not require removing any single tree of SNP.

According to locals, there are no fish seen in the Choulunche Khola till the date. Similarly, SNP has also mentioned the absence of fish in rivers and rivulets due to cold temperature and other extreme climatic factors, however, reptiles and amphibians are recorded in the SNP and its buffer zone (SNP and its Buffer Zone Management Plan 2016-2020).

5.3 Socio-Economic and Cultural Environment

The total population in load centers (19 different settlements) of Ward No. 4 of the Khumbu Pasanglhamu RM is 1677 in 451 households with average family size of 3.72. The most dominant ethnic group is Sherpa (95.27%). Other Caste are Tamang (2.18%), Magar (0.73%), outcaste (0.73%) and others (1.09%). Most of people (99.50%) follow Buddhism, whereas, 0.50% people are Hindu (Source: Khumbu Pasanglhamu Rural Municipality Profile, 2019). There are 10 Gumbas in the project area. Tourism, agriculture, hotels/lodges/restaurants, foreign employment and business are the main occupation. Average land holding per household in load center is 864.85 m^2 (1.70 ropani). Food sufficiency and crop diversity is very poor in the area. Potato and buckwheat are major food crops. Most of HHs have access on electricity (only for lighting purposes) from 3 existing micro hydro plants and also use solar home system. LPG, Kerosene, dung cake and fuelwood are used for cooking. The literacy rate in project area is 73.98%. There are three basic schools and three health institutions in Ward No. 4. All HHs have toilets and also have access on drinking water. Sagarmatha Pollution Control Committee with support from Buffer Zone Management Committee, SNP, locals and Rural Municipality manages the waste along the foot trails. Mobile and internet facilities are available in the project area.

6. Identification/Prediction of Impacts

6.1 Beneficial Impacts

The beneficial impact from the proposed project during construction phase is employment opportunities for the local people. A total of 72,500 man-days human resources (48,500 unskilled man days and 24,000 skilled man days) will be employed during construction period. Other advantages are opportunity to improve technical skills, increase in economic activities and exposure of locals to new technologies. At least 5 people will be employed for the operation and maintenance of the mini hydro project during operation. There will be generation of 911 kW electrical in remote rural areas without national transmission line and provide permanent supply of electricity for cooking and other household purposes.

6.2 Adverse Impacts

6.2.1 Physical Environment

Change in land use, topography, soil erosion, sedimentation in river water, spoil generation, impact on hydrology and river morphology and loss of topsoil are major adverse impacts on physical environment during construction. The river stretch of about 3.5 km between the proposed intake and confluence between Imja Khola and Cholunche Khola site can be classified as a dewatered zone (area with 50% less water flow). The water in this segment of river is not used for irrigation, drinking and not any livelihood purposes by local communities

as there is not any human settlement and arable land exist in dewater zone. During operation, change in microclimate, change in river water quality, noise and vibration at powerhouse, soil erosion due to discharge from tailrace and impact on downstream due to sediment flushing are major impacts.

6.2.2 Biological Impacts

A total of 5.719 ha land of SNP will be required to construct various project components. Pressure on forest for fuelwood, impact on wildlife movement, aquatic flora and fauna, NTFPs, forest fire, wildlife hunting and poaching and increase in human wildlife conflict are identified as adverse impacts during construction. Impacts due to reduced water flow, disturbance to wildlife due to resident workers, possible forest fire and pressure on forest for fuelwood (due to workers) are the impacts during operation.

6.2.3 Socio-economic and Cultural Impacts

A total of 5.719 hectares (ha) of land is required for construction of the project. Out of 5.719 ha, 4.55 ha land is required for transmission and distribution line while 1.169 ha for other physical infrastructure development for electricity production and all land comes under the jurisdiction of SNP while remains under GoN (foot trails). The user right of the required land will be acquired as per Procedures for Construction of Infrastructure in Protected Areas 2080.

Pressure on existing facilities, services and resources of project area, health and sanitation and public safety, occupational health and safety, socio-cultural conflicts between locals and migrant workforce, gender-based violence, issues related to disturbances to community and child labour issues are the identified potential impacts during construction.

Occupational health and safety of workers, public safety, impacts due to sudden release of water to downstream, issues of benefit sharing, issues of electricity tariff and management of existing 3 micro hydro in project areas are the identified potential impacts during operation.

6.2.4 SNP and Outstanding Universal Value (OUV)

The proposed project is located in the SNP and might have impact on scenic beauty. There will be negligible impact on local social and cultural integrity as locals are already exposed to diverse group of people since last 75 years. (https://whc.unesco.org/en/compendium/action=list&id_faq_themes=1528). Similarly, there is no possibility of electrocution to bird and wild animals due to underground T&D[1] with armored cables.

7. Benefit Augmentation/Adverse impact Mitigation Measures

7.1 Benefit Augmentation Measures

Priority for employment during construction and operation phase will be given to locals. Tariff rate for electricity will be fixed in consultation with community. Locals will get 10% of shares and in addition, more share will be provided to locals if they are interested.

[1] Underground cabling is mandatory requirements set out by GoN for National Parks and Conservation areas

7.2 Mitigation Measures

7.2.1 Physical Environment

Land clearance will be minimized to the extent possible to check erosion and landslide. Excavated materials will be used for land reclamation and rehabilitation. Trenches, quarry sites and disposal sites will be rehabilitated immediately. Spoils will be stored in designated area (27°50'56.52" N, 86°49'6.15" E & 27°51'12.98" N, 86°49'49.21" E). People will be made aware about early warning system and emergency preparedness plan through awareness program.

7.2.2 Biological Environment

Community people, school children and project workers will be sensitized on conservation of environment, biodiversity and wildlife. Unnecessarily visit and smoking in forest area will be prohibited to project staffs and construction workers to reduce possible risk of forest fire, hunting and poaching. Due to intense cold climate A minimum environmental flow of 50% of the mean monthly flow will be maintained during operation. Due to very cold climate in 3.5 Km long dewater area, fish cannot be found and the water flow is also subsurface in many places, it does not seem to affect the biological environment. In addition, water flow from 50% release will be abundant to sustain the life of animals and plants if any in the area. All the workers and project staffs will be provided with LPG for cooking to reduce the pressure in the forest. The proposed proposal requires 5.719 ha of land and the land comes under the jurisdiction of Sagarmatha National Park. The project will provide replacement of land and a total of 9150 seedlings will be planted at the rate of 1600 per ha and nurtured for next five years. All these activities will be done in accordance with the Procedures for Construction of Infrastructure in Protected Areas 2080.

7.2.3 Socio-economic and Cultural Environment

All the workers and staffs will be provided with workplace insurance and PPEs will be provided to workers. Trenches especially made for underground T&D lines will be reclaimed immediately to avoid accidents. To reduce the conflict between workers and locals, code of conduct including SEA/SH will be strictly implemented. All the staff and construction workers will be oriented about the GBV including SES/SH and social and legal consequences that one has to face for involving in any form of GBV. Separate SEA/SH code of conduct will be implemented to avoid the risk of gender-based violence, sexual exploitation and abuse, and sexual harassment.

8. Environmental Management Plan

The project will implement the mitigation measures mentioned in EIA report to reduce the negative impacts during construction and operation of the project. The environmental management plan has been developed as part of the project to make mitigation measures mandatory for implementation. The project will have the main responsibility to mitigate or minimize the negative impacts of the project on the physical, chemical, biological, social, economic and cultural sectors at the local level. The AMHPL has the primary responsibility to implement the key elements prescribed in the environmental management plan. The environmental management plan has two components: the environmental management activities and implementing organ.

The environmental management plan has been prepared as per Annex 12 of EPR 2020. It has defined roles and responsibilities of various institution to address various issues including spoil management, pollution control, occupational health and sanitation, public safety, integrity of OUV of SNP and others. All the elements mentioned in EMP go hand in hand throughout the project life cycle.

Environmental audit of ADMHP will begin after two years of the commencement of the completion of the project. The project will make necessary arrangements for this audit through GoN or its nominated auditor.

Environmental monitoring plans include the environmental monitoring during pre-construction, construction and operation phases for baseline, compliance and impact monitoring of the project activities. A set of measurable indicators have been selected for the monitoring and the plan includes methods of monitoring, monitoring frequency, monitoring location, and personnel responsible for monitoring along with the costs required for monitoring.

The total cost for various environmental protection related activities has been estimated to NPR 7,274,906.00, which includes monitoring, auditing and EMP. It is 1.17% of total project cost (NPR 618,901,638.89).

9. Conclusion

Amadablam Mini Hydro Ltd. will implement the proposed project in the Sagarmatha National Park which will generate 7,225,718.76 kWh of annual average energy. The project intends to use 5.719 ha of land under jurisdiction of SNP and same land area will be provided to SNP. This EIA study has identified adverse and beneficial environmental and social impacts and also proposed mitigation measures for each of identified adverse impacts as well as proposed enhancement measures for the beneficial impacts. EMP has been prepared and budget has been allocated for the mitigation and enhancement measures. The proponent will implement the proposed project ensuring effective implementation of the EMP.

CHAPTER 1:NAME AND ADDRESS OF INDIVIDUAL/INSTITUTION PREPARING THE REPORT

1.1 Name and Address of the Proponent

Amadablam Mini Hydro Ltd. (AMHL) (Initially it was private limited- **Annex I**), at Kathmandu Metropolitan City, ward number 8, Tilganga is the proponent of 'Amadablama Mini Hydro Project (AMHP) (Generation, Transmission and Distribution of 911 kW)' under Mini Grid Energy Access Project (MGEAP) of Alternative Energy Promotion Center (AEPC), and also the proponent of Environmental Impact Assessment (EIA) for the development of AMHP in Solukhumbu district. Therefore, AMHPL is responsible for the preparation of EIA for the project. The Address of the proponent is as follows:

The name and address of the proponent of the proposal:
Amadablam Mini Hydro Ltd.
Kathmandu-8, Tilganga, Kathmandu
Bagmati Province, Nepal
Email: amadablamhydro@gmail.com
Telephone No: 9801842344

1.2 Name and Address of the Institution Preparing the Report

Amadablam Mini Hydro Ltd. has entrusted Eco Friend International Pvt. Ltd. (EFI) for EIA study of the proposed AMHP (911 kW). Thus, EFI is responsible to conduct the necessary desk and field study for preparation of EIA report on behalf of the proponent adhering with the prevailing legislations. The address of the consultant is as follows:

Eco Friend International Pvt. Ltd.
Lalitpur-2, Sanepa,
Lalitpur, Nepal
Tel: +977-9851127867
Email: ecofriend.nepal@gmail.com

The EIA team includes multidisciplinary experts on different environment domains (physical, biological, and socio-economic and cultural environment) as in Table 1. Declaration letter has been attached in **Annex II.**

Table 1: Study Team and Qualification

SN	Name	Expertise	Academic Qualification	Experience on Environmental Assessment (No.)
1	Dhan B.Shrestha	Environment/ EIA/Team Leader	MSc, Environmental Science	40
2	Lokesh Sapkota	Physical Environment Expert	ME, Environmental Engineering	12
3	Ramji Bogati,	Biodiversity Expert	PhD- Spatial Planning: Landscape Ecology and Landscape Planning;	20

			MSc, Zoology	
4	Heramba Adhikari	Socio-economic and Cultural Expert	MA, Sociology/Economics	25
5	Pursottam Shilpakar	Geologist	MSc, Geology	17
6	Nirab Bhattarai	Electrical Engineer	BE, Electrical	20
7	Subodh Ghimire	Hydropower Engineer	BE, Civil	10

1.3 Rationality of EIA Study

As per EPR 2020, Annex 3, KA-12, there is a provision to prepare an environmental impact assessment report if any proposal has to be implemented within the national park, wildlife reserve, hunting reserve. The proposed project lies in Sagarmatha National Park (SNP), As the proposed project has to be implemented within the SNP, an environmental impact assessment report has been prepared. Likewise, according to Annex 3 of the regulation, KA-5, there is a provision to prepare an environmental impact assessment report for the proposal other than construction of electricity transmission or upgrading, restoration or rebuilding of increasing the width of national or auxiliary roads up to 50 kilometers in length, requiring the land more than 5 ha. of forest land, forest conservation area, buffer zone and environmental conservation area. The proposed project requires a total land of 5.719 ha of which 4.550 ha. for transmission and distribution lines, and remaining 1.169 ha. land for other physical infrastructure of the project thus schedule 3, ka-5 of Environment Protection Regulations 2077 seems to be attracted. Scoping Documents (SD) and Terms of Reference (ToR) were prepared as per clause 5 (1) of Environmental Protection (EPA) 2019. These reports have already been approved from the Ministry of Forests and Environment (MoFE) and the EIA report has been prepared in the format prescribed in Annex 12 (related to rule 7 (5-ग) of EPR 2020) of EPR 20 The report has been prepared in English language as per sub-rule 8 of rule 7 of EPR 2020 as the funding agency for the proposed proposal is World Bank (WB). Brief Environmental Impact Assessment in Nepali language has also been prepared as per subrule 9 of rule 7 of EPR 2020. According to Clause 3 (2-1-Ka), the approval agency for environmental assessment report is the Ministry of Forests and Environment as it lies in Sagarmatha National Park.

1.4 Objectives of EIA Study

The main objective of the study is to conduct Environmental Impact Assessment (EIA) and prepare environmental and social management plan to ensure safeguard compliance during implementation and operation of the proposed Amadablam Mini Hydro Project (911 kW). The specific objectives of the study are:

- To provide information on the existing environmental setting of the project area with baseline data;
- To identify the adverse and beneficial impacts that may arise as a result of proposed works on physical, biological, socioeconomic and cultural environment due to the location, construction and operation of the project structures & associated facilities in the project areas;

Amadablam Mini Hydro Limited Estd: 2076 Nepal

Eco Friend International EFI Estd. 2010

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- To carry out Alternative Analysis and compare options in terms of social and environmental consequences.
- To propose suitable, practical and site-specific mitigation & enhancement measures to avoid, reduce, mitigate, and/or compensate for identified impacts, including the institutional arrangements, budget and required human resources to implement all such measures and monitor their effectiveness;
- To define and prepare an Environmental Management Plan (EMP) as well as effective monitoring, reporting and auditing program for the project;
- To identify relevant project stakeholders and inform them regularly about the proposed project, involve them in the implementation process and receive their feedback and concerns for safeguarding the natural environment and affected people; and
- To advise decision makers regarding environmental and social implication of the project.

1.5 Scope of EIA Study

The scope of work under this study is to conduct Environmental Impact Assessment (EIA) of the project following the National EIA Guidelines and adhering to the approved SD and ToR and the requirements of EPA 2019 and EPR 2020. This EIA study of AMHP includes hydropower generation components (headworks, powerhouse, penstock etc.) and project facilities like project component such as permanent housing at powerhouse and quarry sites, crushing and batching plants and muck disposal area etc., and distribution components such as transmission and distribution lines, distribution boxes etc. As the project site is not connected with motorable roads, project will use existing local trails for movement within the internal structures of the project. Construction of access road is not within the scope of the work.

CHAPTER 2: INTRODUCTION OF THE PROJECT

2.1 Introduction of Proposal

The proposed proposal AMHP is to generate of 911 kW energy and distribute at local communities through 11 kV transmission and 1.1 kV distribution lines. Thus it will have two components— (i) power generation and (ii) transmission and distribution. The proposed project is a run-off-river scheme and uses water from Cholunche Khola (also known as Nare Khola locally), a perennial river and is a tributary of Imja Khola which is itself a tributary of Dudhkoshi River. Thus generated electricity will be distributed to the local communities of ward number 4 of Khumbu Pasang Lhamu Rural Municipality (KPLRM) of Solukhumbu district. The estimated cost of the project is NPR 618,901,638.89 including VAT.

2.2 Background

The project area is off-grid area and is also not connected with motorable roads. The area has adverse climatic and geologic condition due to high altitude with cold climate. Locals are dependent on old microhydros for lighting, and liquefied petroleum gas (LPG), animal dung and firewood for cooking and heating purposes. The cost of LPG gas is very high (NPR 10,000.00 per cylinder). Thus locals were seeking more environment friendly and sustainable energy sources. In this regard, ADML was established to generate electricity in support of Alternative Energy Promotion Centre (AEPC) that is implementing the Nepal: Private Sector-Led Mini-Grid Energy Access Project (MGEAP) since September 2019 with support from the Government of Nepal (GoN) and the World Bank (WB) as loan and grant. The objective of the MGEAP is to increase electricity access and delivery from renewable energy mini-grids (Micro/Mini Hydro, Solar, Wind and Solar/Wind Hybrid Projects) by mobilizing private Energy Service Companies (ESCOs). The project will deliver financial support to the ESCO (here proponent) to facilitate financial closure and enhance financial viability of the projects, provided in the form of subsidy from the GoN and loans from the WB through Partner Banks (PBs). It has been assumed that subsidy from GoN through AEPC will be around 20.73% (as per Renewable Energy Subsidy Policy 2078) of the project cost, loan from PBs will be around 59.27% and proponent will invest 20% of the project cost.

The project is located within Sagarmatha National Park (SNP), which is listed as World Heritage Site by United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1979, it requires detail environmental assessment of the project. Environmental Impact Assessment (EIA) is mandatory as per prevailing law of Government of Nepal (GoN) and Ministry of Forest and Environment (MoFE) has provided consent letter for EIA study (**Annex III**).

2.3 Description of Proposal

The proposed proposal AMHP is the generation of 911 kW energy and distribution at local communities through 11 kV transmission and 1.1 kV distribution lines. Thus it will have two components— (i) power generation and (ii) transmission and distribution. The proposed project is a run-off-river scheme and uses water from Cholunche Khola (also known as Nare Khola locally), a perennial river and tributary of Imja Khola which is itself

a tributary of Dudhkoshi River. Water will be diverted at elevation of 4423.57 masl and intake will be made at elevation of 4422 masl. Thus diverted water will be streamed down to power house located at 3951.50 masl through 2930 m long penstock pipe. To avoid freezing at intake, thrasrack heating system has been proposed: 2 at desilting basin and 1 at gravel trap. Similarly, the penstock pipe will be buried at least 1 m below from the ground level to protect from freezing as well for maintaining aesthetic beauty of the SNP.

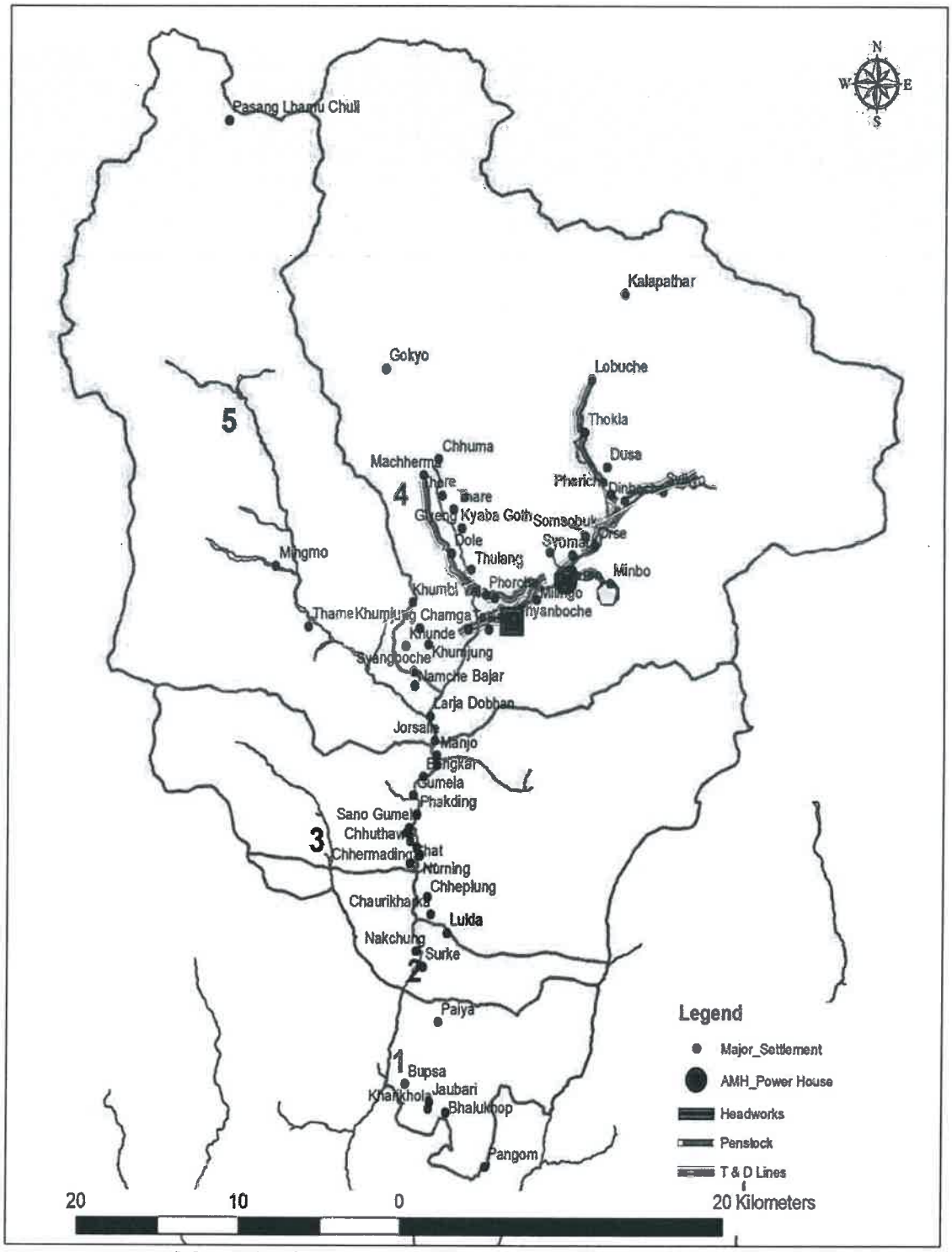
The gross head will be of 471.87 m with design discharge 0.25 m^3/s at $Q_{80\%}$. Two turbines with the rated output of 485 kW will be used to generate 911 kW energy. Thus generated electricity will be transmitted through 11 kVA transmission lines and distributed through 1.1 kVA distribution lines to 451 households in Chukhung, Debuche, Dingboche, Dole, Lawi-Schyasa, Lobuche, Luza, Milingo, Mingbo, Mochhermo, Pangboche, Pheriche, Phortse, PhortseTenga, Fhungi Tenga, Shomare, Thukla, Tyangboche and Worshyo Villages of Ward No. 4, Khumbu Pasang Lhamu Rural Municipality (KPLRM) where most of residents are indigenous people and the area is off-grid areas. All the settlements lie inside the SNP.

2.3.1 Location and Access

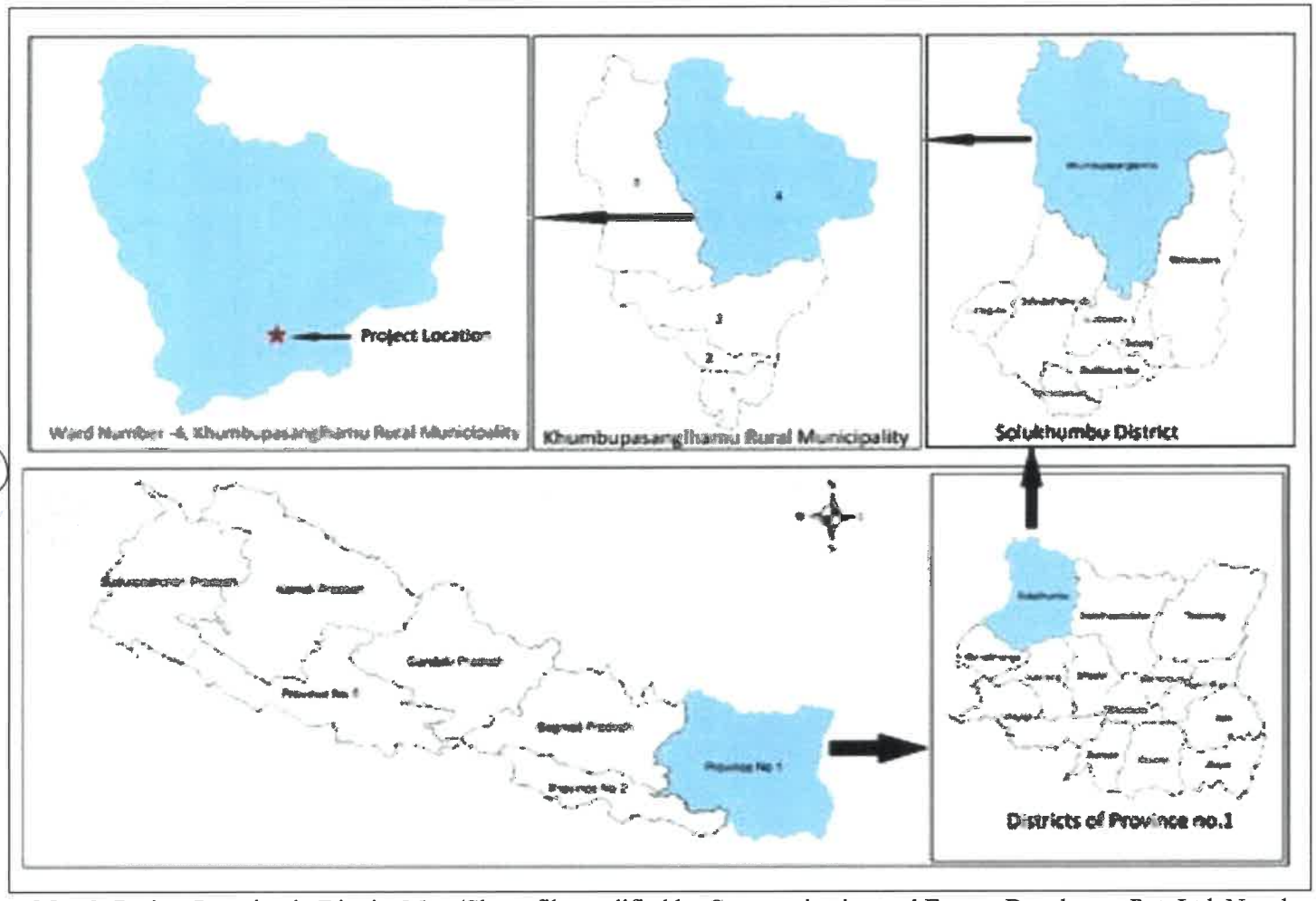
The project is proposed to be implemented in Pangboche, Khumbu Pasang Lhamu Rural Municipality, Ward No.4, Solukhumbu district. Geographically, the proposed project lies between 27°50'50"N to 27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude. The elevation within the project area varies from 3951.18 m to 4422 m above mean sea level (amsl).

Major project components such as headworks (including intake, desanding basin), penstock pipe, powerhouse, switchyard and tailrace are proposed to be located on the left bank of the Cholunche Khola.

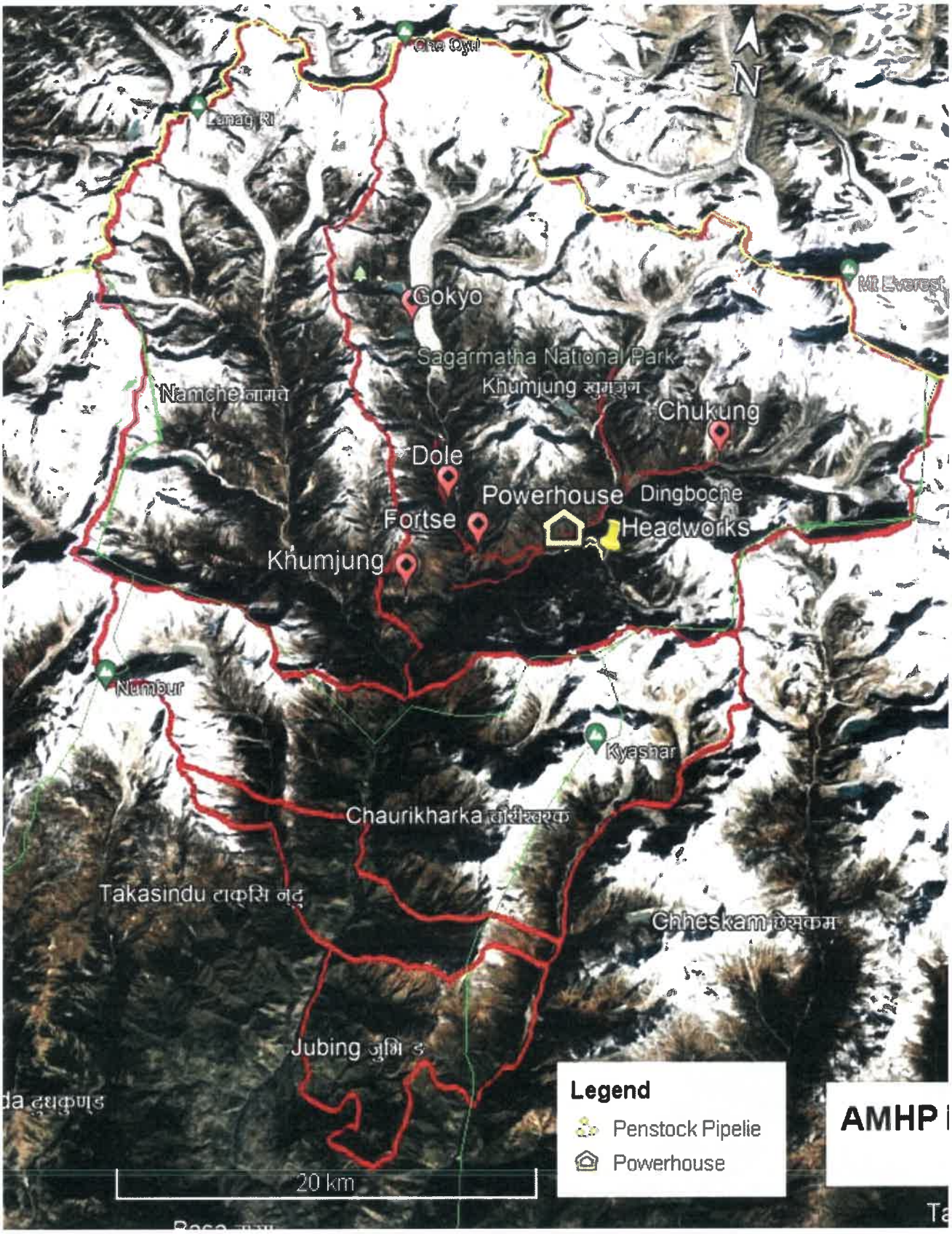
The project site can be reached via airplane up to Lukla and then by foot or by helicopter from Kathmandu. Flight from Kathmandu to Lukla takes 30 minutes. Travel from Lukla to Pangboche via Monjo - Namche Bazaar requires three days for a trekker. Construction materials and electromechanical equipment can be transported to the project site either by helicopter or mules. Alternatively, the project site can be accessible by a blacktopped motorable road up to Salleri bazaar, headquarter of Solukhumbu district. From Salleri bazzar, there is a seasonal road up to Buksa which is 48 km and from Buksa the project site is accessible either by helicopter or by foot. Travel distance from road head from Buksa via Lukla to project site is 65 km and requires 6 days for a loaded porter. From Lukla to Pangboche, it is about 35 km foot trail.



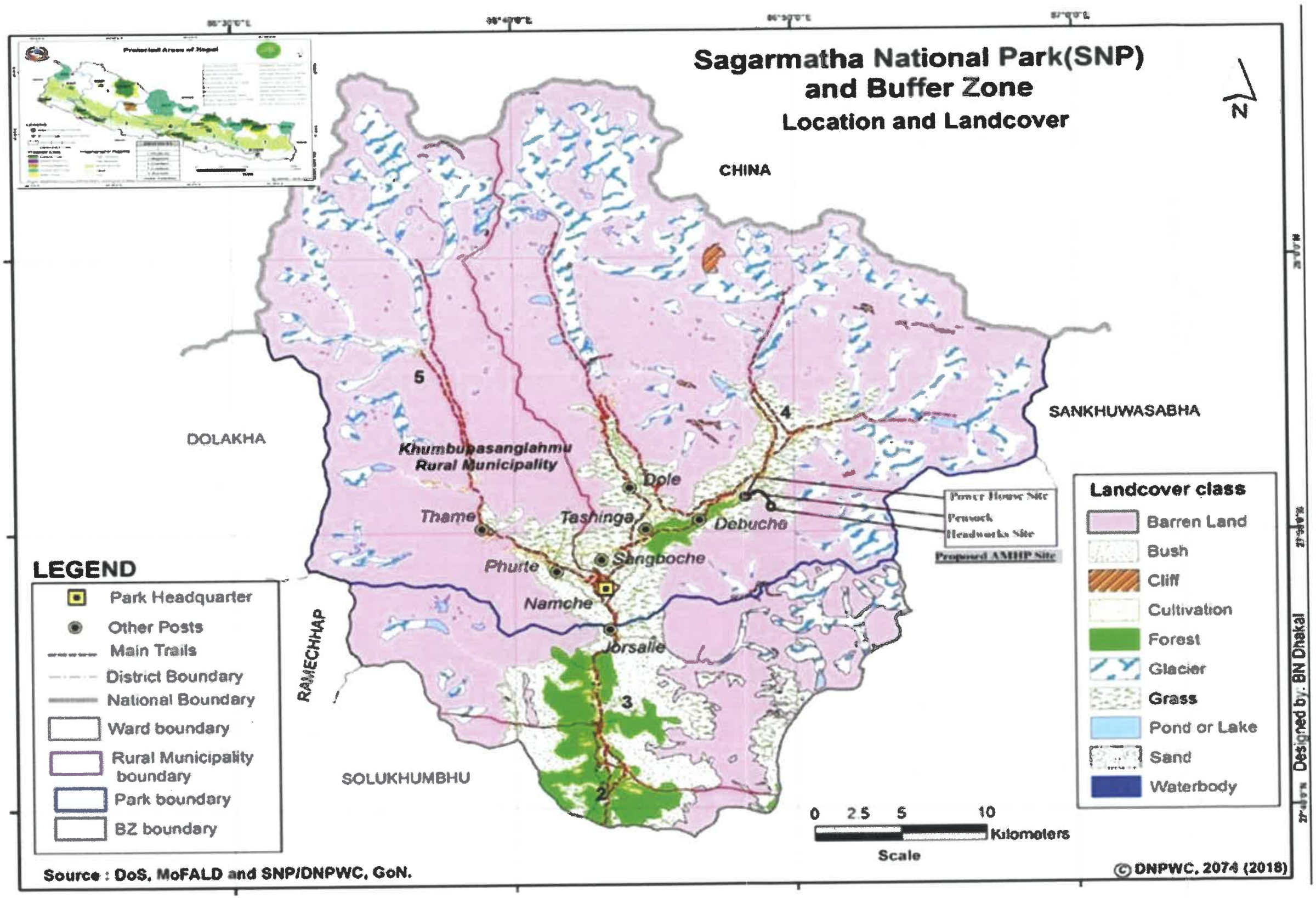
Map 1: Project Location in Rural Municipality Map
(Source: Modified from Department of Survey)



Map 2: Project Location in District Map (Shape file modified by Communication and Energy Developers Pvt. Ltd. Nepal



Map 3: Project Location on Google Earth Map



Map 4: Project Location within Sagarmatha National Park Boundary

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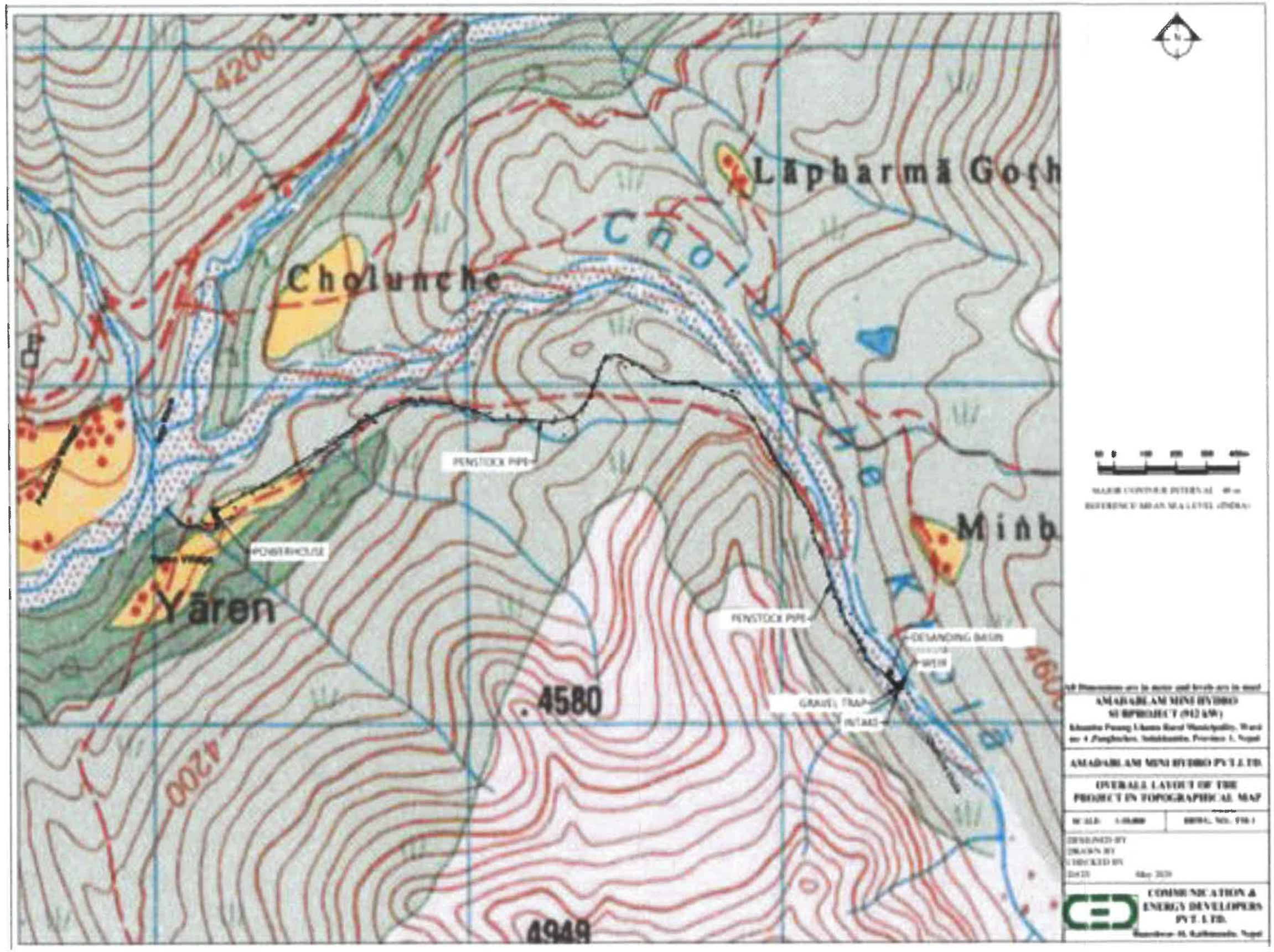
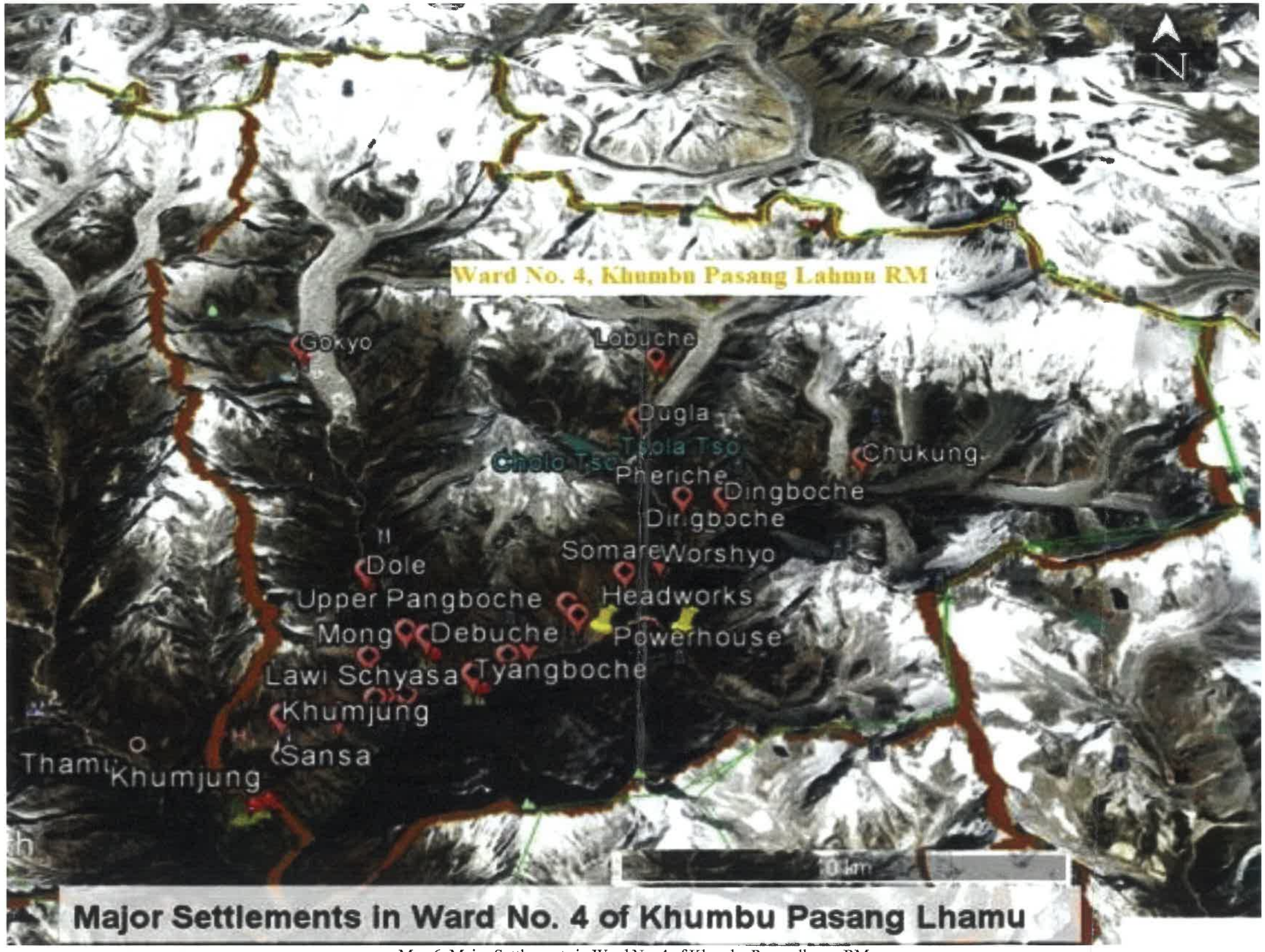
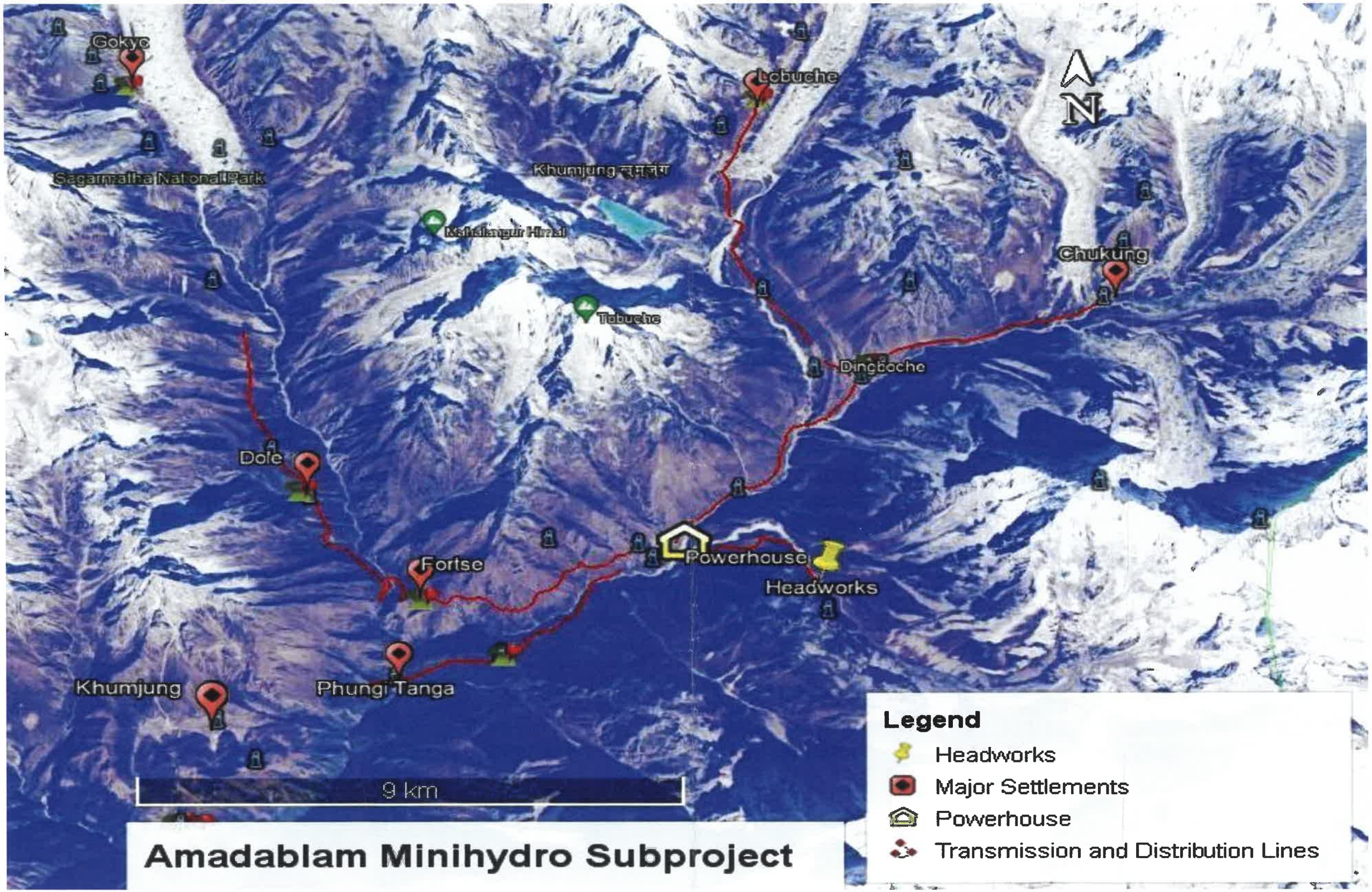


Map 5: Project Location in Topographic Map



Map 6: Major Settlements in Ward No. 4 of Khumbu Pasanglhamu RM



Map 7: Project Structure, Transmission and Distribution Lines

2.3.2 Salient Features

The salient feature of the proposed project is given in **Table 2.**

Table 2: Salient Feature of the Project

1	**Location**		
	Province	:	Koshi
	District	:	Solukhumbu
	Rural Municipality	:	Khumbu Pasanglhamu Rural Municipality Ward No. 4
	Geographical Coordinates Latitude Longitude	:	27°50'50"N to 27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude
	Intake	:	27°50'56.52"N and 86°49'6.15"E, elevation 4422 masl
	Power House	:	27°51'12.98"N, 86°47'49.21"E, elevation 3951.18 masl
	Total Households to be Electrified		451
2	**General**		
	Name of River	:	Cholunche Khola
	Nearest Town	:	Namche Bazaar (13 Km)
	Type of Scheme	:	Run of River
	Gross Head	:	471.87 m
	Net Head		448.86 m
	Installed Capacity	:	911 KW
	Average Annual Energy	:	7,225,781.76 kWh
3	**Hydrology**		
	Catchment Area at Headworks Site	:	28 km^2 (Total), 21 km^2 (>5000 m) 7 km^2(5000 m< A> 4000 m)
	Design Discharge ($Q_{80\%}$)	:	0.25 m^3/s
	Design Flood (1 in 100 year)	:	15 m^3/s
	Compensation flow	:	50% of discharge at river every month
4	**Diversion Weir**		
	Type	:	Concrete gravity type weir
	Length	:	12 m
	Height	:	2.57 m
	Crest level	:	El. 4423.57 m
5	**Reservoir (due to Diversion Weir)**		
	Surface Area	:	360 m^2
	Volume	:	493.2 m^3
	Average depth	:	1.37 m
	Average Width	:	12 m
	Average Length	:	30 m
6	**Undersluice**		
	Type	:	Rectangular Flat Gate
	Size	:	1.0 m x 1.3m
	Invert level	:	El. 4421.08 m
7	**Intake**		
	Type	:	Orifice type side intake

	No of Orifice	:	1 No.
	Size of Opening	:	1.5 m (B) x 0.3 m (H)
	Intake Invert Level	:	El. 4422.00 m
	Coarse Trashrack (1.4 m x 1.5 m)	:	0.7 m x 0.37 m (6 Pcs)
8	**Gravel Trap**		
	Size (L x B x H)		8 m x 1.5 m x 1.3 m
	Bed load size to trap		2 mm
	Fine Trashrack (2m x 1.5 m)	:	1m x 0.37 m (6 Pcs)
9	**Headrace Pipe**		
	Type	:	Pressurized pipe flow, MS
	Length	:	10 m
	Diameter	:	450 mm
	Thickness	:	6 mm
	Shape	:	Circular
	Type	:	Pressurized pipe flow
10	**Desanding Basin cum forebay**		
	Type	:	Conventional with head pond
	Size (L x B x H)	:	26.50 m x 2.65 m x 2.30 m
	Number of Bay	:	1 No.
	Nominal size of trapped particle	:	0.15 mm
	Fine Trashrack (2.65 m x 1.6 m)		0.82 m x 0.41m (10 Pcs)
11	**Trashrack heating system**	:	Heater 1 at desilting basin 4.5 kW Heater 2 at desilting basin 1.5 kW Heater 3 at gravel trap 3.0 kW
12	**Penstock Pipe**		
	Type	:	Mild Steel Pipe (Buried)
	Internal Diameter	:	400 mm dia
	Thickness	:	6 mm to16 mm
	Branch Pipe	:	MS 200 mm dia, 16 mm thick 16 m long
	Total Length of the pipe	:	2930 m length
	No of Anchor Block	:	58 Nos
13	**Powerhouse**		
	Type of powerhouse	:	Surface Type
	Size (L x B x H)	:	19.95 m x 7.0 m x 5.8 m
14	**Tailrace Conduit**		
	Type	:	Pipe and Canal
	Size (L x B x H)	:	18 m x 0.5 m x 0.68 m
	Pipe	:	MS 400 mm dia, 6 mm thick, 21 m long
	Turbine Axis Level	:	El. 3951.50 m
15	Dewatered Zone	:	3.5 Km
16	**Turbines**		
	Type	:	Horizontal Shaft Pelton Turbine Single Jet
	Number of Units	:	2
	Discharge per unit	:	0.125 m^3/sec
	Rated Output (Mechanical)	:	485 kW X 2 units
	Synchronous Speed	:	1500 rpm
	Rated Net Head	:	448.86 m
	Rated Efficiency 100%	:	88%

	Discharge		
17	**Generators**		
	Type	:	3-Phase, Synchronous, Brushless
	Rated Output Capacity per Unit	:	650 kVA
	Rated Efficiency	:	96%
	Frequency	:	50 Hz
	Rated Voltage	:	0.4 kV
	Number of Poles	:	4
	Speed	:	1500 rpm
	No of units	:	2 Nos.
18	**Governor**		
	Type	:	Electronic, PID Oil-hydraulic, self-closing without electric power
	No of units	:	2 Nos.
19	**Transformer**		
	ii. Power Transformer		
	Type	:	ONAN Cooling, YNyn0, 3 phase
	Rated capacity	:	630 kVA
	Voltage ratio	:	0.4/11 kV
	Efficiency	:	98%
	No of units	:	2 Nos.
	iv. Distribution Transformer		
	Type		11/0.4 kV, 3-phase, oil immersed, copper owned AVR with parallel operation
	Rated Capacity	:	150 kVA- 2 Nos
			125 kVA- 2 Nos
			100 kVA- 4 Nos
			65 kVA-5 Nos
			50 KVA-5 No.
			Total 15 Nos.
20	**Transmission & Distribution line**		
	I. Single Line Distribution		64.45 km
	Total Length of 11 kV underground line (underground XLPE armored 3 core 35 sq. mm aluminum)	:	40.00 km
	Total length of 11 kV overhead line during river crossings (squirrel ACSR)	:	0.93 km
	1.1 kV 95 sq.mm. 4 Core XLPE Insulated Unarmored Aluminium Cable	:	12.45 km
	1.1 kV 35 sq.mm. 4 Core XLPE Insulated Unarmored Aluminium Cable	:	9.50 km
	1.1 kV 25 sq.mm. 2 Core XLPE Insulated Unarmored Aluminum Cable	:	1.50 km
	II. Distribution Transformer		

	Type	:	Outdoor installation type
	Quantity required	:	Fifteen (15)
	Type of cooling	:	ONAN
	Number of phases	:	Three phase
	Frequency	:	50 Hz
	Rated voltage	:	
	1) Primary	:	11 kV
	2) Secondary	:	0.4 kV.
	Vector group symbol (by IEC designation)	:	Dyn11
	III. Major River Crossings		930 m
	Chukung	:	70 m
	Dingboche	:	50 m
	Thukla	:	170 m
	Power House	:	120 m
	Phortse	:	100 m
	Dole	:	70 m
	Luza	:	70 m
	Machhermo	:	80 m
	Milingo	:	100 m
	Fungi Tenga	:	
	IV. Poles for Overhead Transmission During Crossings		
	Type	:	Galvanized Mild Steel Tubular poles
	Total Length	:	9 m
	Bottom Section	:	5m long, outer diameter 165.1 mm, thickness 4.5 mm
	Middle section	:	2m long, outer diameter 139.7 mm, thickness 4.5 mm
	Top section	:	2m long, outer diameter 114.3 mm, thickness 3.65 mm
	Minimum weight	:	120 kg
	V. Sub-Station		
	Type	:	Pole mounted
	Total Sets	:	14
	Pole Type	:	Galvanized steel tubular poles
	Length of Poles	:	9 m
	VI. Conductors		
	Type	:	ACSR Conductor (Weasel)
	Code Name	:	Weasel
	Nominal Aluminum Area, mm^2	:	30
	Specific Weight, kg/km	:	128
	Resistance, ohm/km	:	95 A
	Inductive Reactance	:	0.345
	VII. Underground Cables	:	Poly Vinyl Chloride (PVC) insulated armored aluminum cable
	VIII. Distribution Box		
	Total Number	:	80
	Coordinate of DB (Lobuche)	:	X: 86.813247 °E;Y:27.957777 °N [North most]
	Coordinate of DB (Chukung)	:	X: 86.871694°E;Y: 27.904166°N [North-East Most]

	Coordinate of DB (Machhermo)	:	X: 86.715327°E;Y: 27.902013°N[North-West Most]
	Coordinate of DB (Lawi Schyasa)	:	X: 86.739166°E;Y: 27.830000°N [South Most]
	System	:	Double Door
	Size	:	L X B X H = 45 cm X 30 cm X 60 cm
21	**Switchyard**		
	Type	:	Indoor, Single Bus Configuration, 11 kV
	Dimension	:	3.55 m X 6.32 m
	Location	:	Inside Powerhouse
22	**Load Center**	:	Number of Consumers (HHs) (451 Beneficiary Households)
1	Chukung	:	12
2	Debuche	:	6
3	Dingboche	:	86
4	Dole	:	14
5	Fungi Tenga	:	11
6	LawiSchyasa	:	12
7	Lobuche	:	3
8	Luza	:	3
9	Mingbo	:	13
10	Machhermo	:	102
11	Pangboche	:	35
12	Pheriche	:	106
13	Phortse	:	3
14	PhortseTenga	:	9
15	Shomare	:	19
16	Thukla	:	2
17	Tyangboche	:	7
18	Worshyo	:	1
19	Mongla	:	7
23	**Power and Energy**		
	Type of Power Plant	:	Run-of-river
	Design Discharge	:	0.25 m^3/s
	Total Gross Head	:	471.87 m
	Rated Net Head	:	448.86 m
	Installed Capacity	:	911 kW
	Total Annual Energy	:	7,225,781.76 kWh
24	**Project Cost Estimate**		
	Total Project Cost with VAT and Provisional Sums and IDC	:	NRs. 618,901,638.89
	Subsidy (GoN/AEPC/MGEAP)		NRs. 128,307,000.00 (20.73%)
	Loan (WB/AEPC/MGEAP)		NRs. 366,814,311.11 (59.27%)
	Equity (Proponent)		NRs. 123,780,327.78 (20.00%)
	Cost Per kW	:	NRs. 679,365.14
	Net Present Value (@ 6% discount factor)	:	NRs. 245,613,643.75
	Project rate of return	:	11.21 %
	Payback	:	7.68 years
	BC Ratio	:	1.35
25	**Construction Period**	:	18 Months

(Source: DFS, 2022)

2.3.3 Project Components

Water of Cholunche Khola will be diverted by constructing 12 m long and 2.57 m high diversion weir during the construction of headworks to generate annual average energy of about 7,225,781.76 kWh. The major civil components of the project are as follows.

2.3.3.1 Headworks

The headworks of the proposed project are situated at about 3.5 km upstream from the confluence of Cholunche Khola and Imja Khola at Pangboche.

i) Diversion Weir

A permanent concrete gravity type weir is provided across the river to divert the required flow through the intake. The length of weir is 12 m and its crest level is fixed at 4423.57 masl. The bed level of river at upstream side of weir is 4422.00 masl and at downstream of weir is 4421.00 masl. The high flood level at weir is 4424.33 masl for flood discharge of 15 m^3/s at 100 yrs. return period. The platform level for gates operation is fixed at 4424.83 masl.

ii) Undersluice

The width and height of undersluice provided is 1 m. The bed level of undersluice is fixed at 4421.09 masl. The opening of undersluice is designed to pass 20% of design flood discharge for weir. Sluice gate is provided at undersluice to control the flow of water in river.

iii) Side Intake

The orifice type side intake is located about 5m upstream of weir axis. The width of orifice is 1.5 m and height is 0.3 m. The orifice is capable of diverting 0.30 m^3/s of discharge which is 20% more than the design turbine discharge. A vertical sill of 0.4 m height is provided in front of orifice to prevent entry of bed loads. Sluice gate is provided at intake to control the flow of water in gravel trap.

iv) Gravel Trap

Gravel trap is located just after the intake to trap the gravels and flush it back to the river. The design size of particle to settle is 2 mm. The length of gravel trap is 8 m, width is 1.5 m and depth is 1.3 m. The size of flushing gallery provided at gravel trap is 0.4 m x 0.4 m. The outlet from gravel trap is pressurized headrace pipe to the desanding basin. Fine trash rack is provided at outlet to prevent entry of large gravel particles and other floating particles into the pipe.

v) Headrace Pipe

Headrace pipe of diameter 450 mm and length 10 m is provided to convey water from gravel trap to desanding basin. The pipe is buried below the ground to prevent the freezing of water during winter. The velocity of water with 1 m/s in pipe is maintained so that settlement of gravel particles will not occur inside the pipe. The pipe is of mild steel with 6 mm thickness.

vi) Desanding Basin

The sediment carried in the water is trapped at desanding basin before reaching the turbine. The design size of particle to settle at desanding basin is 0.15 mm. The length of basin is 26.5 m, width is 2.65 m and average depth is 2.30 m. The inlet transition of length 5.70 m is provided to maintain the steady flow at basin. Side spillway of length 7 m is provided to spill the excess water in the desanding basin. The size of flushing gallery provided at basin is 0.4 m x 0.4 m. The bed slope of 1:50 is provided at basin.

At the end of desanding basin, head pond of length 1.95 m, width 2.65 m and depth 2.05 m is provided to maintain the adequate submergence depth for penstock pipe. Air vent pipe of diameter 100 mm is provided at head pond to release the air entered into the pipe.

2.3.3.2 Penstock Pipe and Supports

Mild steel penstock pipe of internal diameter 400 mm and length 2930 m is proposed for conveying water from head pond to the turbine. The penstock pipe will be buried in the ground with minimum burial depth of 1 m. The thickness of pipe varies from 6 mm to 16 mm. After bifurcation, two manifolds of 8 m length and 200 mm internal diameter and 16 mm thick is provided.

A total 58 numbers of anchor blocks are provided (including bifurcation and branches) to restrain the forces generated at bends in the project. A total of 364 saddle supports in form of pads are provided at every 7 m interval between two anchor blocks.

2.3.3.3 Powerhouse and Tailrace

i. Powerhouse

The powerhouse is located near Pangboche Village on left bank of Imja River. The powerhouse contains two units of turbine and generator, associated electrical and mechanical equipment and a maintenance bay. The powerhouse is surface type and is located at an elevation of 3951.18 m. It contains two units of horizontal shaft Pelton turbine which drives a generator and generates a power of 455.50 kW each, with total installed capacity of 911 kW. The dimension of the powerhouse is 19.95 m x 7.0 m x 5.8 m. Control room of size 3.6 m x 6.3 m is provided for installation of electrical components and an operator's room of size 3.7 m x 3.0 m is also provided.

ii. Tailrace

The water form two units of powerhouse is conveyed to a nearby Kholsi through combination of tailrace canal and pipe. The length of tailrace canal is 18 m and that of pipe is 21m. The diameter of pipe used in tailrace is 400 mm and thickness 6 mm. At outlet portion, gabion and boulder riprap protection are provided to prevent erosion of soil in kholsi.

2.3.3.4 Switchyard Area

An indoor switchyard of 3.55 m X 6.32 m has been proposed for the transmission of 911 kW of power. The generated powers from two 650 kVA alternators are transferred to a 400 V busbar. From this busbar two transformers of 650 kVA each are connected in parallel operation and the power is fed to a single bus system of 11 kV. This bus system will be used to transmit electricity in high voltage majorly through a high voltage underground cable. The transformers, transformer protection system, CTs, PTs, isolators, VCBs and bus bars are major equipment of the outdoor switchyard.

2.3.3.5 Transmission and Distribution Line

The generated power will be distributed through a 64.38 km long transmission and distribution line. Out of 64.38 km, 40 km is underground 11 kV line, 23.45 km is underground 1.1 kV line and 0.93 km is 11 kV overhead river crossing. The underground distribution cables will terminate on the distribution boards placed inside the PVC box mounted on the stone masonry slab. The distribution box will be of double door system, (L X

B X H = 45 cm X 30 cm X 60 cm), capacity of distributing 15 single phase users, including 1 earth fault relay, and necessary MCBs, with all accessories complete will have the necessary arrangements for the termination of distribution cables and the connection of the service wire. The transmission and distribution network are designed considering the following load centers:

Table 3: Transmission and Distribution with Load

SN	Entities	Power Allotted, kW				Total
		1.0	1.5	2.5	4.0	
1	Household	42	161			203
2	Small Hotel		58			58
3	Medium Hotel			71		71
4	Big Hotel				57	57
5	Restaurant		38			38
6	Social Institution				13	13
7	Hospital				2	2
8	Snooker House	3				3
9	Shops	4				4
10	Bakery				2	2
Total Entity		**49**	**257**	**71**	**74**	**451**
Total Allotted Power		**49**	**385.5**	**177.5**	**296**	**908**

(Source: DFS, 2022)

The generated power will be distributed through a 64.38 km long transmission and distribution line. Out of 64.38 km, 40 km is underground 11 kV line, 23.45 km is underground 1.1 kV line and 0.93 km is 11 kV overhead river crossing. The underground distribution cables will terminate on the distribution boards placed inside the PVC box mounted on the stone masonry slab. The distribution box will be of double door system, (L X B X H = 45 cm X 30 cm X 60 cm), capacity of distributing 15 single phase users, including 1 earth fault relay, and necessary MCBs, with all accessories complete will have the necessary arrangements for the termination of distribution cables and the connection of the service wire.

2.4 Project Requirements

2.4.1 Access Road/Way

Site access will be provisioned by using existing foot trails from Pangboche Village to reach to various project component sites. The details of the access trails are provided in **Table 4** hereunder. There is no need of access road construction.

Table 4: Site Access

SN	Description	Length	Width of trail	Remarks
1	Pangboche to Powerhouse	1.60 km	4 ft.	
2	Powerhouse to Headwork	3.25 km	4 ft.	

(Source: Field Survey, 2023)

The transmission and distribution lines will be along the existing trekking foot trails.

2.4.2 Human Resources

It is estimated that a total of 72,500 man-days will be required for the construction of the proposed project. The details of human resources and their type (in terms of skilled and unskilled) are as follows presented in **Table 5**.

Table 5: Details of Human Resources

SN	Category	Man days
A	**Skilled Manpower**	
1	Site Engineer	720
2	Overseer	1080
3	Mason	9000
4	Gabion Mistri	1200
5	Welder	960
6	Iron Worker	1800
7	Mechanics	720
8	Electrician	720
9	Supervisor	1800
10	Foreman	3600
11	Painter	600
12	Carpenter	1800
	Sub-Total A	**24,000**
B	**Unskilled Manpower**	
1	Camp Worker	500
2	Survey Helper	240
3	Mechanics helper	3600
4	Watchman	720
5	Welder helper	1200
6	Staff man	360
7	Tape man	1080
8	Labor	40800
	Sub-Total B	**48500**
	Grand Total	**72,500**

(Source: DFS, 2022)

2.4.3 Camps and Construction Material Storage Yard

Two project camps (one each at headworks and powerhouse location) are proposed to accommodate Contractor's construction workforce as personnel of supervising Engineers and the Employer's staff. The camp for the headworks will be constructed on the left bank of the Cholunche Khola whereas the camp for the powerhouse will be constructed on the left bank of the Imja Khola.

2.4.4 Construction Materials

A total of 783.73 m^3 of concrete and 287.53 m^3 stone masonry work are estimated to be required for construction. Sand and stones are locally available materials and will be collected from the quarry sites as shown in **Map 8**. The main construction materials and their estimated quantity are presented in **Table 6**.

Table 6: Estimate of Construction Materials

SN	Construction materials	Quantity	Source
1	Cement (bags)	5,560	Factory
2	Aggregate (m^3)	600	Quarry Sites
3	Sand (m^3)	420	Quarry Sites
4	Boulder Stone (m^3)	1,100	Quarry Sites
5	Reinforcement Bars (ton)	47	Factory

(Source: DFS, 2022)

2.4.5 Quarry Site and Burrow Pits

Local construction material requirement will be minimal as depicted in **Table** 7 below and the sites have been identified based on geological investigation. Hence, the construction material will be collected from the riverbank without disturbing the riverine ecology. Various probable quarry sites have been identified based on geological investigation (**Table 7**). The identified sites are temporary and approval for the sites will be taken from the RM/SNP before starting the construction work. These material collection or extraction will follow the existing government norms and standards with consensus from local government and NP. The stone/aggregate and sand will be collected/excavated 5 m^3 and 3 m^3 per day respectively in an average.

Table 7: Proposed Construction Material and Burrow Sites for AMHP

SN	Coordinate	Dimensions Length (m)*Breadth (m)*Depth(m)	Quantity (m^3)	Remarks (geological characteristics)
A. Intake Area	27°50'56.52"N 86°49'6.15"E	70 m * 20 m * 2 m	2800 m^3	The quarry site is heterogeneous mixture of boulder, cobble, gravel and sand
B. Powerhouse Area	27°51'12.98"N 86°47'49.21"E	80 m * 30 m * 1 m	2400 m^3	Alluvial soil composed of loose, sub rounded to rounded, gravel of gneiss with sand and silt

(Source: DFS, 2022)

2.4.6 Batching Plants and Aggregate Crusher Plants

The facilities for aggregate crusher and batching plants will be located at the headwork and powerhouse sites close to the active construction sites. These facilities will be operated with provisions of air pollution control, noise control/arresting facilities, and water and wastewater management facilities. The crushing operation will be done manually. These will be temporary facilities to be demolished at the end of the construction period.

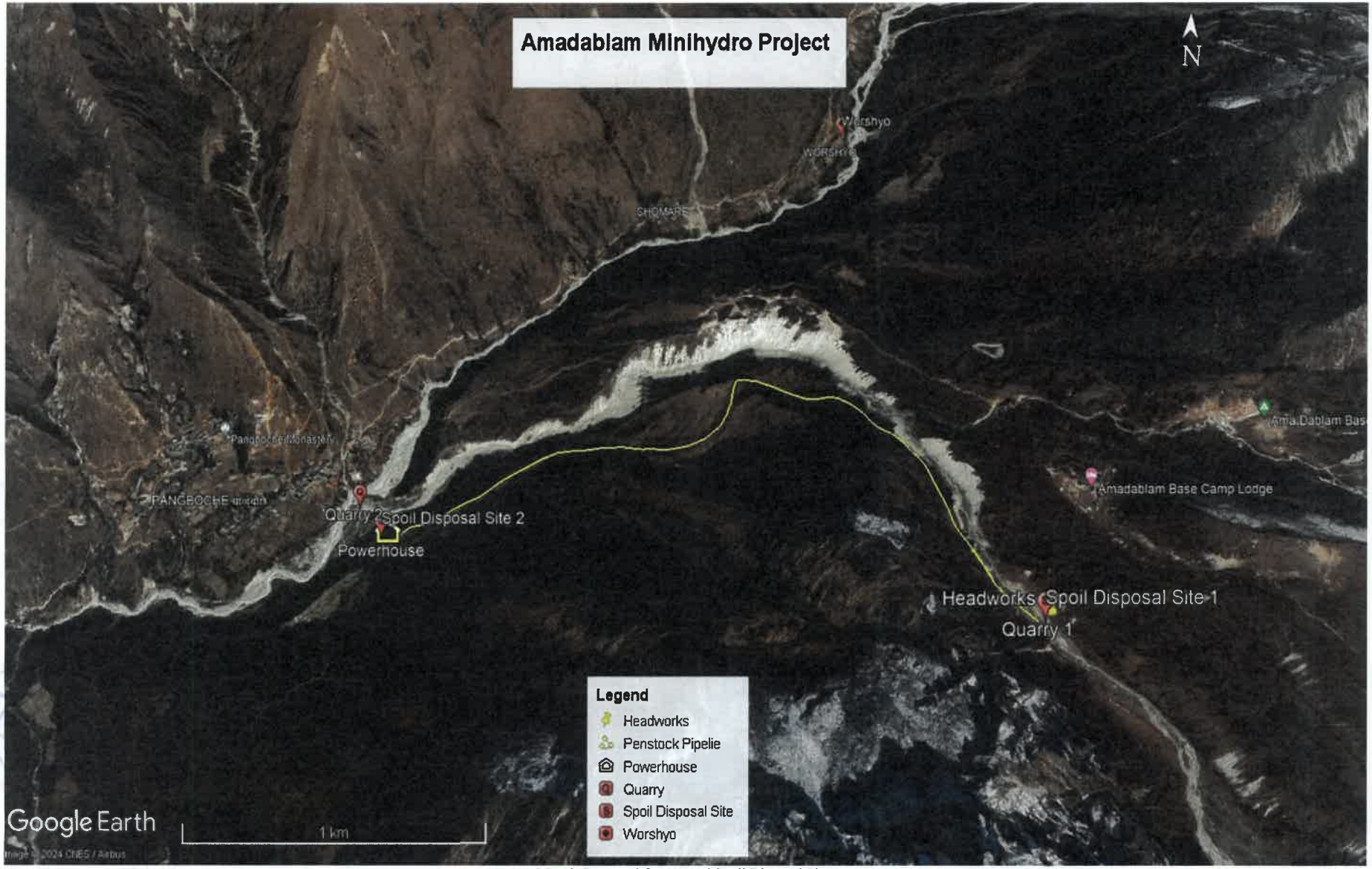
2.4.6.1 Spoil Volume & Disposal Area

The spoil generated during the execution of the project components will be utilized to label the surrounding area of intake and power house. However, remaining spoil will be disposed to the already identified disposal sites located on the left bank of the Cholunche Khola, which will be reinstated after the completion of all construction related activities. These sites are GoN land and needs to be acquired for short term lease and prior approval for the sites will be taken from the RM before starting the construction work. The quarry sites and disposal areas are at same sites to make the quarry sites for rehabilitation.

Table 8: Proposed Spoil Disposal Sites for AMHP

SN	Location	Coordinate		Ownership
		N	E	
1	Intake	27°50'56.52"	86°49'6.15"	GoN Land/SNP
2	Powerhouse	27°51'12.98"	86°49'49.21"	GoN Land/SNP

(Source: DFS, 2022)



Map 8: Proposed Quarry and Spoil Disposal Sites
(Source: Modified in Google Earth)

2.4.6.2 Materials and Equipment Transportation

The construction materials and electromechanical equipment will be transported to the project site by appropriate means of transportation. As most of the external materials and equipment will be bought from the factory (away from the Solukhumbu), they will be transported up to Buksa by vehicle and then air lifted to the project site.

2.4.6.3 Land Requirements

A total of 5.719 ha land is required for the construction of the project civil components and provisioning for project facilities (**Table 9**). Out of total, 4.55 ha land required for transmission and distribution (T & D) lines is public land as T & D lines will be laid down underground along trekking foot trails (public land-GoN). Thus the project requires 5.719 ha land for project implementation and this land will be taken from SNP for usages propose only.

Table 9: Estimated Land Requirement and Ownership for AMHP

SN	Component	Permanent/Land Area (Ha)	Temporary/ Land Area (Ha)	Land Ownership
1	Headworks	0.097		SNP
2	Office, Powerhouse, Switchyard and Tailrace	0.085		SNP
3	Penstock	0.400		SNP
4	Electric pole at river crossings	0.008		SNP
5	Reservoir	0.036		SNP
6	Underground Transmission/ Distribution Lines		4.550	Trekking Foot Trails (Public Land)
7	Distribution/Transformer Box	0.008		SNP
8	Spoil Disposal Sites		0.025	SNP
9	Quarry and Borrow Sites		0.38	SNP
10	Workshop and Material Storage		0.08	SNP
11	Project camps		0.05	SNP
	Total	**0.634**	**5.085**	SNP

(Source: DFS, 2022)

The national legislation, The Working procedure related to provision of land for Construction of Infrastructure in Protected Area, 2080 includes a provision of providing approval for land ue right in protected area for development project. It mandates that any such projects have to retrocede an equivalanet area of land that is used by the project to GoN, located in same geographical and ecological belt. The compensatory land provided by the project will be used for the afforestation or tree plantation. Further, the legislation has provision that the development project is responsible to bear the cost associated with the afforestation for the period of five years. If project is not able tp compensate the land to GoN, it will pay the cash compensation to GoN as per the amount mentioned in Schedule-2 of the working procedure, 2080 for the use of the land in protected areas.

Thus, for Amadablam Mini Hydro Project, it will adhere the provisions mentioned in the working procedures, 2080 for compensatory land or cash compensation for obtaining the land use right in SNP area.

2.4.6.4 Energy requirements

As there is no National Grid, two diesel generator sets each with 25 kVA capacities will be required at the headworks site and powerhouse respectively to meet the electricity demand of the construction purpose and for lighting of construction camps. LPG will be used for cooking. Alternatively, a nearby existing micro hydro of 25 kW (Pangboche MHP) can be used for the required energy.

2.4.6.5 Construction Equipments

Details of equipment required for the execution of the proposed project are presented in **Table 10**.

Table 10: Construction Equipment

SN	Equipment	Quantity (Number)
1	Jackhammer	5 Sets
2	Shovel	85 Sets
3	Pick Axe	30 Sets
4	Rammer	20 Sets
5	Sledge Hammer	20 Sets
6	Wheel Barrow	20 Sets

SN	Equipment	Quantity (Number)
7	Chisel	20 Sets
8	Gloves	200Sets
9	Helmet	300 Sets
10	Rubber Boots	300 Sets
11	Auto Level	3 Sets
12	Measuring Tape (30 m)	10 Sets

(Source: DFS, 2022)

2.4.6.6 Cost Estimates

The estimated cost is NPR 618,901,638.89. Details of sources of fund are given in **Table 11**.

Table 11: Estimated Cost and Sources of Fund

Cost Estimates	Amount (NPR)
Total Project Cost with VAT and Provisional Sums and IDC	618,901,638.89
Subsidy (GoN/AEPC/MGEAP)	128,307,000.00 (20.73%)
Loan (WB/AEPC/MGEAP)	366,814,311.11 (59.27%)
Equity (Proponent)	123,780,327.78 (20.00%)
Cost Per kW	679,365.14
Net Present Value (@ 6% discount factor)	245,613,643.75
Project rate of return	11.21 %
Payback	7.68 years
BC Ratio	1.35

(Source: DFS, 2022)

2.4.6.7 Project Construction Period

The estimated project construction period is 1.5 years from the date of commencement of the work (**Annex IV**). The construction works are mainly of surface construction works. Thus all works should be done in dry season. Similarly, the climatic condition of the area is very cold during winter. So, severe cold winter will be avoided. All the surface work will be scheduled in day light

CHAPTER 3: METHODOLOGY

This EIA for Amadablam Mini Hydro Project has been conducted in accordance with the methodology described in the Terms of Reference cleared by the MoFE on 19/08/2079 (5 December 2022) **(Annex-V)**. The following methodologies have been applied to collect baseline information and impact prediction:

3.1 Literature Review

The literature review process started at the beginning of the EIA study and periodically carried out during the study period till at the stage of draft EIA report preparation. At the beginning, the approved ToR document for EIA of Amadablam Mini Hydro Project is thoroughly studied and reviewed. The Detailed Feasibility Study including Detail Engineering Design Report 2022 prepared by Communication and Energy Developers (CED) Pvt. Ltd. (reviewed and updated by third party independent consulting firm, ERMC Pvt. Ltd.) is reviewed and consulted for technical information related to the project. Available published literature, documents and maps (GON's topographic map with scales 1: 50,000, land use maps, aerial photographs, cadastral survey maps, Google maps etc.) related to the project area were reviewed. Previously studied environmental assessment reports of hydropower projects and other related projects (EIA of Dudhkoshi 4 and 5) were reviewed. Solukhumbu District Profile, 2072 BS, Rural Municipality Profile of Khumbu Pasanglhamu 2076 BS, reports published by Central Bureau of Statistics (CBS) etc. were used for collecting existing rural municipality and district level information on physical, biological and socio-economic environment. Climate related data were sourced from Department of Hydrology and Meteorology (DHM). Other information was obtained from SNP Office, Department of National Parks and Wildlife Conservation (DNPWC), UNESCO, RAMSAR, Birdlife International, WWF, IUCN, ICIMOD, other line agencies, related NGOs and so on.

Topographic and Geological maps of the project area were reviewed to collect information about land use, topography, geology and other features. Study of climate of the project area was done by analyzing the data of the nearest meteorological station and monitoring station at Namche Bazar. Similarly, remaining climate data were obtained from meteoblue.com. Other information such as Hydrology and Sedimentation, Geology and Seismicity, Watershed etc. were collected from the secondary sources such as topographic, geological and seismic hazard maps and project technical reports and database of DHM etc.

The information on forest and wildlife were obtained from the MoFE, SNP, DNPWC, other institutions and research papers. District/Rural Municipality level socio-economic and cultural information such as population of affected RM, household size, male-female ratio, infrastructures, ethnicity, schools, development activities in the project area were collected from Central Bureau of Statistics (CBS), RM profile, district profile and other available literatures.

Relevant laws, acts, rules & regulation, policies, guidelines, strategies were reviewed in order to avoid any form of non-compliance. The published literatures on the biomass, flora and fauna, rare/endangered /protected species in and around the project area were

reviewed. To justify to the local concerns and local information available in the secondary literatures, officials of the local and district level, particularly Rural Municipality, District Coordination Committee, Sagarmatha National Park and Buffer Zone Community Forest User Groups were also consulted to seek site-specific information of the project area. Furthermore, the local and national institutions working in the project area were consulted to verify the project specific information related to environmental and social aspects.

3.2 Field Assessment

3.2.1 Physical Environment

In order to collect baseline information on the physical environment, field investigation along the proposed project area was carried out. The information on land use patterns, topography and soil erosion were collected through consultation, direct observation and field mapping.

Water sample was taken from the two location of the project area—one from the Cholunche Khola (Intake Area) and another from drinking water supply located at Pangboche on 29/07/2078 (15 November 2021). The water quality analysis was conducted for sixteen different parameters (6 - physical, 9 - Chemical and 1- microbial parameters) in the Nepal Academy of Science and Technology (NAST), (**Annex-VI**). The RT-911A Mini Sound Level Meter was used to measure the sound pressure level at two locations (headworks and powerhouse) on 28 and 29 Kartik 2078 (15/16 November 2021) (**Annex VII**). In addition, the air quality was assessed based on secondary source. The slope stability and landslides, fan deposits and rock fall within the project area were studied through site observation by geologist during DFS and on-site delineation in maps, which is reviewed and verified by third party independent Geological Specialist. Moreover, the information on flooding events (using HYDEST method), glacier lake outburst flood (GLOF) events, seismic history, landslide events and locations and land degradation process etc. were collected through discussion with the local communities.

3.2.2 Biological Environment

The information on fauna and flora, protected, rare and endangered species and sensitive habitats in the project areas were collected through site visit and transect walk survey. Existing situation and possible impacts on wild fauna were studied in relation to risk of project implementation. As there was no forest area in power generation sites, no forest sampling was done. Similarly, transmission and distribution lines passes through existing trails and none of trees would be cut down, forest inventory was not done. Plant species at power generation and transmission and distribution components were noted. The SNP, Buffer Zone User Committee (BZUC) and local people of the project impact area were consulted on use and management of forest resources including availability and use of NTFPs as well as MAPs, ethno-botanical importance of the plant species, problems encountered in use and management of forest resources and the possible impacts of the project on the local flora.

Periodic consultations were done with SNP officials (Chief Conservation Officer and Assistant Conservation Officer), representatives of RM and BZMC, and locals about presence of fish in the Cholunche Khola. SNP management plans, annual report of SNP and other literatures were also referred for information on fisheries. Based on the reporting

indicating absence of fish, which might be due to high slope gradient, altitude and extreme cold water, sampling was not done for the presence of fish.

Agro-biodiversity of the project area is recorded in a data sheet (**Annex VIII**) through consultations with local informants. Information on availability of fauna was also collected in consultation with local informants, members of forest user groups and other knowledgeable locals. Interaction with local people and consultation with relevant government organizations such as MoEWRI, MoFE, DNPWC, SNP, BZUC, RM was done for wildlife diversity and terrestrial as well as aquatic flora and fauna. The loss of protected, rare and endangered species based on the CITES Appendix, IUCN Red Data and Government of Nepal protected lists were enumerated in the field throughout the project area.

Forest and Vegetation

As there is no forest cover area in the power generation sites and transmission and distribution lines, forest inventory was not relevant. Herbs and shrubs found along the penstock alignment were recorded.

Wildlife and Avian Fauna

Information on wildlife (including mammalian and avian fauna) of the project area was gathered using both direct and indirect methods. According to locals and the SNP, fishes and reptiles are absent in the area. The transect walk method was used for wildlife study in the project area. Animals and birds spotted along the route and information on the habitat where such observations were found were recorded. Moreover, identification of pug marks/footprints, droppings/pellets, ground digging and marking, animal remains such as skin, fur, feathers, and carcasses, dwellings such as nests, holes and burrows etc. were used in order to document presence of particular wild animals and birds. Calls and singings of birds were recorded as far as identified. The collection of the wildlife specimens was carried out whenever possible and photographs were taken of uncollected items for the purpose of identification of specimens. Such information was also validated by means of consultation with local informants. Special faunal record data sheets were prepared and used to record faunal presence, their abundance and other associated features in the project area (**Annex IX**). Additional information on animal presence, movements issues and conflicts were obtained by using indirect methods i.e. discussions with a range of stakeholders that included local people, BZUCs etc.

Fish

The water bodies have cold temperature and low nutrients. This prevents the high elevation lakes, streams and rivers from supporting a high diversity of aquatic life (SNP, 2016). The Cholunche Khola is a tributary of Imja river which is itself a tributary of Dudh Koshi River in Khumbu area. The snow-fed Dudhkoshi originating from the Himalaya is the main aquatic habitat in the Khumbu region. However, there is no evidence of fish in Dudhkoshi River system in Khumbu region due to icy-cold temperature (SNP, 2016). During field visit, existence of fish in Cholunche Khola was not seen in the project area. The representatives from SNP, Buffer Zone Management Committee, RM and local

people were also consulted regarding availability of fishes in Cholunche Khola. Not any primary data was collected on fishes based on the reporting of non-presence of fish.

3.2.3 Socio-economic and Cultural Environment

Data on socio-economic status and cultural aspects were collected from direct and indirect impact areas. The methods utilized for collection of socio-economic data from the primary sources include followings:

Household survey: Household (HH) survey were conducted in 405 Households of direct impact zone and indirect impact zone of the project by using structured questionnaires to obtain baseline information on demographic and educational status, land ownership patterns and farm practices, energy sources, basic health conditions, common diseases, etc. (**Annex X**). The information on socio-economic and cultural activities as well as customs & tradition of the project area was collected by conducting Focus Group Discussion (FGD) in two places namely Fortse and Pangboche with relevant stakeholders such as BZUC, ward office of RM, women groups etc. In addition, Key Informant Interview (KII) was conducted with 4 people to collect the information on Settlements and biodiversity and conservation issues (**Annex XI**).

3.2.4 Data Collection by using Checklist/Matrix and Questionnaire

Data on settlement information, wildlife and non-timber forest products (NTFPs- **Annex XII**) were collected through checklist and semi-structure questionnaires.

3.2.5 Laboratory Analysis for Water Quality

Water samples were collected from the two locations of the project area—one from the Cholunche Khola (Intake Area) and another from drinking water supply located at Pangboche on 29/07/2078 (15 November 2021) to establish the baseline on water quality. The water quality analysis was conducted for sixteen different parameters (6 - physical, 9 - Chemical and 1- microbial parameters) in the Environment and Climate Study Laboratory of NAST.

3.3 Methodology for Impact Identification, Prediction and Ranking

The information collected from different sources was processed and analyzed according to the physical, biological, socio-economic and cultural environment within the Zone of Influence (ZoI). The secondary data collected were used as the major source for validation of primary data during the field survey. The generated information from the primary source was analyzed and tabulated. The likely impacts were assessed covering both adverse and beneficial ones.

Based on identification of the impacts, their predictions were done to forecast the changes in local environment. The various methods, such as trend analysis, cause and effect relationship, expert judgment, etc were used for impact prediction. The environmental impacts were evaluated on the basis of guidelines given in the National EIA Guidelines (1993), based on the magnitude, extent and duration of the impact. Experts' judgments and experiences from the similar projects were adopted for the quantification of the impacts. If the impact lasts up to 3 years it is termed as short term (ST), if it continues for 3 to 20

years it is termed as medium term (MT) and if it lasts beyond 20 years it is considered as long term (LT). The impact which occurs within the project area is termed as site specific (SS) and which goes up to municipality level is termed as local (Lo) and which goes up to more than two RMs or Municipalities is termed as regional (Ro). Moreover, the impact which is irreversible is termed as high (H), which is in partly recoverable in long run is termed as moderate (M) and which is reversible is termed as low (L). The impact which has direct effect is termed as direct (D) and which has indirect effect is termed as indirect (I). For the impact evaluation the matrix method with numerical ranking is used for the quantitative ranking of the predicted impacts.

Table 12: Numerical Scales as Proposed in the National EIA Guidelines

Magnitude	Score	Extent	Score	Duration	Score
High/Major	60	Regional	60	Long Term	20
Moderate/Medium	20	Local	20	Medium Term	10
Minor/Low	10	Site-specific	10	Short-Term	05

(Source: National EIA Guidelines, 1993)

The cumulative scores on this analysis have been used to decide the significance of the impacts. The Environmental Impact Assessment Guidelines published by IUCN in 1993 and EPR 2077 were also taken as reference for Significance. **Table 13** depicts the cumulative score of level of significance:

Table 13: Cumulative Scores of Levels of Significance

Total scores	Significance of Impacts
Up to 44	Insignificant
45-74	Significant
Beyond 74	Very significant

(Source: National EIA Guidelines, 1993)

3.4 Preparation of EIA Report

This EIA report has been prepared based on detailed environmental and social assessment of the project and incorporating the comments/opinions/suggestions and feedbacks received during the public hearing and consultation with relevant stakeholders.

3.5 Public Hearing

The public notice was published in the national daily newspaper "Arthik Abhiyan" on 11/10/2079 (25 January 2023) to organize a public hearing on 18/10/2079 (1 February 2023) **(Annex XIII)**. The notice was affixed on notice board of various institutions and deeds of the public notice affixation were collected **(Annex XIV)** and the notice was also disseminated through radio **(Annex XV)**. A public hearing programme on "Environmental Impact Assessment Study of Amadablam Mini Hydro Project was organized by the proponent on 18/10/2079 (1st February 2023) in the premises of Pangboche Gumba, Khumbu Pasang Lhamu RM-4, Solukhumbu District. The program was chaired by Mr. Laxman Adhikari, Ward chairman of Khumbu Pasang Lhamu RM Ward No. 4, Mr. Mishra Kaji Ghising, representative of SNP as the Chief Guest. The representatives from buffer zone, women group and other settlements participated in the

program. A total of 48 people were present in public hearing program **(Annex XVI)**. Summary of public hearing is given below.

Table 14: Summary of the Meeting Minutes during Public Consultations

Date	Location	No. of participation			Issues and Suggestions	Incorporation in Report
		Male	Female	Total		
18/10/2079 (1 Feb. 2023)	Pangboche Gumba, Pangboche, KPLRM-4	29	19	48	1. Provision of employment for locals	• Section 8.1 (Table 39).
					2. Provision of investment for local people	• Section 8.1 (Table 39).
					3. Provision of low tariff for project affected people	• Section 8.1 (Table 39).
					4. Power distribution to all settlements of ward number 4.	• Section 2.2.1.3 (Table 2)
					5. Immediate implementation of the project	• Proponent has planned to initiate the project development once EIA approved from GoN

3.6 Public Notice

After incorporating the issues raised in public hearing, EIA report was prepared. A public notice on 20/10/2079 (3 Feb. 2023) was prepared seeking comments and suggestions from all concerned stakeholders and dispatched to concern authorities (**Annex XVII**); and The notice was affixed in various institutions in project area and deeds of notice affixation were collected (**Annex XVIII**); and same notice was published in same date in National Daily Newspaper "Arthik Abhiyan'' (**Annex XIX**).

3.7 Recommendation Letter

Recommendation letters were collected from concerned institutions (**Annex XX**).

3.8 Final Report Preparation

Final EIA report was prepared after following all the procedures mentioned in EPR 2077. The EIA report was submitted to UNESCO, World Heritage Site through DNPWC and suggestions were received accordingly (**Annex XX**).

CHAPTER 4: POLICIES, LAWS AND STANDARDS RELATED TO THE PROPOSAL

Government of Nepal has developed various acts, regulations and guidelines for environmental friendly development activities. Similarly, WB has guidelines and requirements for EIA study. The policies, laws, rules and regulations, and other guidelines and directives, which will be fully undertaken for implementation while implementing the proposal, include the followings.

Table 15: Relevant Law, Regulations and Policies

SN	Acts/Regulations/ Guidelines	Relevant Details
1	**Constitution of Nepal**	It has ensured the provision of environmental protection and right to live in clean environment. The article 30 (1) of the constitution has granted 'every person will have the right to live in clean environment' as a fundamental right for the people while the article 51 (f) (2) of the constitution in its Development policy gives priority for under-developed regions for balanced, environment-friendly, qualitative and sustainable physical infrastructure development. Similarly, Article 51 (g) (5) of the constitution in the conservation, management and use of natural resources policy, negative impacts of industrialization and physical development should be minimized for environmental cleanliness and protection. It has also defined the right of working area of Federal, Provincial and Local Government. According to Constitution of Nepal, Local Level has right over small hydropower project (Annex 8, SN. 19 of Constitution of Nepal).
2	**Plans, Policies and Strategy**	
2.1	**Plan**	
2.1.1	Fifteenth Plan (FY 2076/77-2080/81)(2019/20 – 2023/24)	The proposal attracts the plan as the plan has emphasized for development of micro and small hydropower for alternative energy promotion. It has expected to generate 13 MW electricity through micro and small hydropower development.
2.1.2	Nepal Biodiversity Strategy and Action Plan 2071-2077 (2014-2020)	The overall goal of the strategy and action plan is to enhance the integrity of ecological systems by 2020, thereby contributing to human well-being and sustainable development of the country. It considers that haphazard development activity is becoming a major threat to the biodiversity. Similarly, it has prioritized for the promotion of hydropower energy to reduce the demand of firewood to protect forest. It also urges for the effective implementation of EIA for conservation of biodiversity. Thus the proposal is related with the NBSAP.
2.1.3	Nepal Environmental Policy and Action Plan, 2050 (1993)	It is the earliest policy to promulgate the provision of EIA and EIA procedures in Nepal. Thus The policy and action plan is related to the proposed project. The Nepal Environmental Policy and Action Plan (NEPAP) endorsed in 1993 recognizes that a growing number of people are exposed to pollution from industrial enterprises and development activities. The Action Plan for infrastructure development within NEPAP recommends the finalization of draft EIA guidelines for water resources, the development of EIA guidelines for road construction and the use of EIA when designing hydroelectric projects.

SN	Acts/Regulations/ Guidelines	Relevant Details
2.2	**Policy**	
2.2.1	National Occupational Safety and Health Policy, 2076	The policy came to exist to ensure for the safety of workers through reduction of risks at works through appropriate occupational health safety gears and better working condition. Thus the policy is attracted to the proposed project for the wellbeing of workers.
2.2.2	National Environmental Policy 2076 (2019)	GoN has endorsed the 'National Environment Policy-2019' with the goal to control pollution, manage wastes and promote greenery so as to ensure citizens' right to live in a fair and healthy environment. Thus the proposed project attracts the policy. It has proposed 10 targets with 6 policies with strategies and working policies for the policy. The six policies are I) Pollution Prevention, Control and Minimization, II) Environmental Mainstreaming, III) Environmental Justice. IV) Public Participation, V) Sustainable Development and VI) Good Governance, Research and Capacity Development It has ensured for the participation of all three Governments while preparation of policy, laws, implementation, monitoring and evaluation of environment sector. It targets to lessen and prevent all types of environment pollutions, manage wastes emanated from all sectors including home, industry and service, expand parks and greenery in urban area and ensure environment justice to the pollution affected population. It has mentioned for mainstreaming the environmental concerns in all phases of development works. It has mentioned the issues of adverse and beneficial impacts of development works, and their monitoring and auditing.
2.2.3	Renewable Energy Subsidy Policy,2073 (2016)	As the proposed project is supposed to get subsidy under the renewable energy subsidy policy, it attracts the policy. The policy has long term goal to achieve universal access to clean, reliable and affordable renewable energy solutions by 2030. It has taken a strategy to encourage public-private sector participation in the renewable energy technology. To promote renewable energy, it has clearly mentioned to provide subsidy in different category as per districts of Nepal.
2.2.4	AEPC Gender Equality and Social Inclusion Policy, 2075 (2018)	The proposed project is supposed to get subsidy through AEPC thus attracting the policy of AEPC. The policy came to the existence for the mainstreaming of rural women, poor, marginalized and vulnerable population, and excluded groups in utilization of various technologies of renewable energy to support for the livelihood enhancement.
2.2.5	Public-Private Partnership Policy, 2072 (2015)	The proposed project is public –private partnership thus attracting the Public-Private Partnership policy. The policy was formulated to enhance public-private sector investment on development and operation of public infrastructure services through the adoption of the PPP model for comprehensive socio-economic development.
2.2.6	Land Acquisition, Resettlement and Rehabilitation Policy, 2071 (2015)	With an aim to improve social and economic status of project affected families by providing fair and adequate compensation, appropriate resettlement and rehabilitation assistances/ allowances, the GoN has released Land Acquisition, Rehabilitation and Resettlement Policy in 2015. The Policy mission is to facilitate timely execution (completion) of development projects by minimizing adverse impacts on economic, social and cultural aspects

SN	Acts/Regulations/ Guidelines	Relevant Details
		of affected families/people and the project area. The Policy classifies projects on the basis of numbers of families to be displaced such as; i. High risk project: Project that displaces (both physical and economic) 50 or more families in the mountain region, 75 or more families in the hills and 100 or more families in the Terai plains ii. Medium risk project: Project that displaces (both physical and economic) less than 50 families in the mountain region, less than 75 families in the hills and less than 100 families in the Terai plains. iii. Low risk project: Projects with no physical displacement Project with only economic displacement and None of Affected person loose more than 10% of their productive asset Four approaches for land acquisition has to be adopted namely, voluntary donation, direct negotiation, land development program and expropriation (Use of eminent domain). The proposed AMHP falls under low risk project as per the categorization of the Policy.
2.2.7	Rural Energy Policy 2063 (2006)	GoN formulated the policy is to contribute to rural poverty reduction and environmental conservation by ensuring access to clean, reliable and appropriate energy in the rural areas. It has taken strategy to encourage local groups and private sector to distribute the electricity by producing the power up to 1000 kW in rural areas.
2.2.8	Hydropower Development Policy, 2058 (2001)	The main objective of Hydropower Development is to generate/produce electric power at low cost by utilizing water resources available within the country. And to supply/extend reliable electricity service nationwide at reasonable price. Other objectives are to develop hydropower as export orientated commodity and also relate electrification with the economic activities of the country. Some of the highlights of Hydropower Development Policy 2001 are as follows: • Develop small, medium, large and reservoir type projects considering maximum and optimum benefit to the country with minimum environmental consequences. • Encourage local bodies, co-operatives and private sectors participation with clear, simple and transparent rules and regulation. • Develop hydropower as an alternative to Bio and Thermal energy with an aim to contribute in the environmental protection. • Encourage people's participation in hydropower development with a view to dissemination of benefit at local level also. • Render priority to Nepalese labour, skill and resources in implementation of hydropower projects.
2.2.9	Environmental and Social Safeguard Policy of AEPC, 2018	AEPC has developed its social and environmental safeguard principles to align with the International Finance Corporation's (IFC)Performance Standards (2012) with 7 principles as follows: i. ESS Policy Principle 1: Assessment and management of environmental and social risks and impacts; ii. ESS Policy Principle 2: Biodiversity conservation and sustainable management of living natural resources;

SN	Acts/Regulations/ Guidelines	Relevant Details
		iii. ESS Policy Principle 3: Human Rights; iv. ESS Policy Principle 4: Labour and working conditions; v.ESS Policy Principle 5: Community Health Safety and Security; vi. ESS Policy Principle 6: Land acquisition and involuntary resettlement; vii. ESS Policy Principle7: Resource efficiency and pollution prevention It has also provided Environmental and Social Management Frameworks to categorize the project into A, B or C as per its impact on environment and society. The proposed proposal has been considered as A category project.
2.3	**Strategy**	
2.3.1	National Energy Efficiency Strategy, 2075	One of the objective of the strategy is to maintain environmental balance and bring positive improvements in health by efficient use of energy through the strategic intervention of establishment of policy, legal and institutional frameworks for resources management, resources mobilization, infrastructure development and human resources development required 5 for energy efficiency and develop national standards for energy efficiency based on established international and regional standards as well as to develop equipment and means for measuring energy efficiency.
2.3.2	National Water Resource Strategy, 2058 (2002)	Nepal has adopted National Water Resource Strategy taking a holistic and systematic approach to develop and manage water resources for sustainable use of resources ensuring conservation and protection of the environment. This strategy underscores the interdependencies between water resource development and environment conservation, and has adopted environment principles related, inter alia, to the integration of ecological aspects at every level of hydropower development process, conserve biodiversity, watersheds and adopt ecosystem approach. The NWRS has a target of developing 820 MW of hydropower by 2063/064 to meet the domestic demand at base case scenario including export to the tune of 150 MW and achieve per capita electricity consumption of 100KWh.
3	**Act, Rules and Regulations**	
3.1	**Act**	
3.1.1	Environment Protection Act, 2076 (2019)	Any development project, before implementation, to pass through environmental study report, which may be a Brief Environmental Study, an IEE or an EIA depending upon the location, type and size of the projects. It has made the provision for the approval agency of environmental study report as per prevailing laws It has also made provision for quality assurance of environmental study reports. According to Clause 3-2-GA of Environment Protection Act, 2019, for the development work or proposal falling under the jurisdiction of local level, Brief Environmental Study (BES) or Initial Environmental Examination (IEE) report should be to the concerned body specified by local law and Environmental Impact Assessment (EIA) report should be submitted to provincial government body specified by state law. The proposed proposal falls under the

SN	Acts/Regulations/ Guidelines	Relevant Details
		jurisdiction of Local Government.
3.1.3	Forest Act 2076 (2019)	It has recognized the importance of forests in maintaining a healthy environment. And major objective of the Forest Act is the promotion of a healthy environment. It has made the provision for the approved work plan for different categories of forest, i.e. Community Forests, Leasehold Forests, Private Forests and religious forest. Similarly, the act has made the provision for handover of forest area for physical infrastructure development, and also for environmental examination as per prevailing laws and regulations.
3.1.4	Intergovernmental Fiscal Arrangement Act, 2074	It came into the existence for the financial sharing among three level of government in Nepal. It has clearly stated the taxes may levy by Federal Government, Provincial Government and Local Government in Schedule 1, 2 and 3. It has also made the provision of distribution of royalty from natural resources in Schedule 4.
3.1.5	Labor Act, 2074 (2017)	The Act has clearly mentioned about minimum salary, working hours, prohibition of discrimination in terms of ground of religion, colour, sex, caste, tribe, origin, language, ideological conviction or any other similar ground; and prohibition of unequal payment for similar works in term of gender. The Act defines working hours in a day and a weekend leave. Clause 68 to 83 under Chapter 12 gives details for occupational health and safety requirement to be maintained for labors. Child labor (below 14 years) is prohibited. It calls for insurance and safety management and other facilities for labors.
3.1.6	Act to Regulate and Control on International Trade in Endangered Species of Wild Fauna and Flora Act, 2074 (2016)	This acts states about the regulation and control of international trade of such endangered flora and fauna species. The species are protected by CITES against over exploitation and they are listed in three CITES Appendices I, II, and III for different levels or types of protection.
3.1.7	Muluki Criminal Code Act, 2074(2017)	This law has been issued to maintain law and order in the economic, social and cultural spheres in interests of the general public in the country through ethics, morality, virtue and goodness. It has the provision of penalty for various criminal activities. It is relevant to the proposed proposal if any kinds of criminal activities are prevalent.
3.1.8	National Civil Code Act, 2074	This is the law that came into force in order to maintain morality, decency, etiquette and convenience as well as economic interest of the public by maintaining law and order in the country and maintain harmonious relationship between various castes, races and communities, by making just provisions in the economic, social and cultural fields. It has described the right of person in different perspectives from marriage to property. It is also relevant in terms of proposed proposal as implementation of the proposal should not violate others' right and vice-versa. Clause 617 states that the tenure of lease contract lasts for forty years for the construction, development and operation of infrastructure like electricity generation. Clause 640 states about the age of person engaging in the manual works. It states that a person under 16 years should not be

SN	Acts/Regulations/ Guidelines	Relevant Details
		forced to engage in physically challenging works. Clause 641 states that workers should not be liable to work more than 8 hours a day and 48 hours a week without extra time payments.
3.1.9	Solid Waste Management Act, 2068 (2011)	The Act clearly envisages about management of solid waste and provision of licensing for management. In such case, the article (7) on discharge of solid waste entails about the person, organization that produces hazardous waste or chemical waste will have to manage such waste as prescribed (sub article 2). It is restricted that nobody will do or cause to do the work relating to the solid waste management without obtaining license from the Local Body as prescribed by article 13 of chapter, miscellaneous sub article 1.
3.1.10	Plant Protection Act 2064 (2007)	The preamble of this act explains that it is expedient to make legal provisions for preventing the introduction, establishment, prevalence and spread of pests while importing and exporting plants and plant products, promoting trade in plants and plant products by adopting appropriate measures for their effective control.
3.1.11	Child labor (Prohibition and regularization) Act, 2056 (2000)	The Act has made the provision of prohibition of engagement of child in factory, mining and similar other risky work and to make necessary provision for health. Child's safety and services and facilities while engaging them in other work.
3.1.12	Electricity Act, 2049 (1992)	Electricity Act governs the use of water for hydropower generation, establishes a system of licensing, sets out the power functions and duties of a license holder provides certain financial incentives for the license holder and sets out the powers to the government. It requires any person or corporate bodies to obtain license prior to survey, generation, transmission or distribution of electricity of more than 1000 KW. In article 24 of the Act, it states that "While carrying out electricity generation, transmission or distribution, it will be carried out in such manner that no substantial adverse effect be made on environment by way of soil erosion, flood, landslide, air pollution etc." Article 33 deals with land acquisition. Licensed individuals can apply the government to acquire land for the purpose of electricity generation, transmission and distribution. The government will acquire the land for the stated objectives under existing regulations the compensation incurred to acquire land and other property will be paid by the applicant.
3.1.13	Water Resources Act, 2049 (1992)	Water Resource Act, 1992 is the umbrella Act governing water resource management, which declares the order of priority of water use, vests ownership of water in the State, provides for the formation of water user associations, establishes a system of licensing and prohibits water pollution. Article 19 (1) of the act mentions that the government through notification in the Nepal Gazette prescribe pollution tolerance limits for the water resources. Similarly, article 19 (2) requires any person to abide by the act not to pollute water resources beyond specified limit. Article 20 states that while utilizing water resources, there should not be significant adverse impact on the environment with regard to soil erosion, flood, landslide and other similar cases. Articles 16, 19, 20 of the Act are also related to land acquisition. According to article 16 (3), the government will, according to existing laws, acquire land for the licensed person or

SN	Acts/Regulations/ Guidelines	Relevant Details
		institution and any compensation in this regard will be paid by the licensed person.
3.1.14	Land Acquisition Act, 2034 (1977)	The Act aims at amending and consolidating current legislation relevant to the acquisition of land. The Government may acquire any land at any place for any public purpose, if it so deems necessary, according to the procedure set out by this Act. To this end it regulates the nomination of an officer responsible for preliminary action in charge of the determination of the land area to be acquired (through a survey, collection of samples of soil, demarcation of land, installation of equipment), the determination of the compensation and the submission of a report to the local officer regarding the findings of preliminary action. After having received the report, the local officer will issue a notification containing all the particulars required (e.g. purpose of acquisition, location of the land, terms of acquisition, plot number or boundaries of the land, land area). Further provisions concern the publication of said notice, the decision by the Zonal Commissioner of complaints filed by the landowner, the occupation of the land by the local officer, the criteria for the determination of the compensation which will be paid either in cash or by allotment of other lands in exchange, if so, required by the landowner.
3.1.15	National Parks and Wildlife Conservation Act, 2029 (1973)	This act governs the various activities inside the protected areas. Schedule 1 relating to section 10 of this act provides the list of protected wildlife, which is prohibited for hunting. According to section 11, no person will be permitted to hunt wildlife without obtaining license. There will be punishment in terms of fine or imprisonment or both if any person illegally kills or injures wildlife within protected areas. The act is attracted as the proposal has to be implemented in SNP.
3.1.16	Aquatic Animal Protection Act, 2017 (1960)	This act mainly focuses on the protection and management of aquatic ecology, aquatic fauna including fish and wetlands. This act prohibits the use of poison or harmful chemicals or materials in the water bodies or explosives to dismantle any embankment with a view to catching or killing aquatic animals including fish. However, there is no specific law for fishing and fisheries management.
3.2	**Rules/Regulations**	
3.2.1	Forest Regulations, 2079 (2022)	Although the proposed proposal has to be implemented in National Park, it is attracted to the project as it might require to remove forest products from the forest. For example, Rule 89-2-Kha spells out about the preparation of list of tree species more than 5 cm DBH, those needs to remove while implementing the proposal. Similarly, Rule 103 describes the removal procedures of the trees from project implementation area if any trees more than 5 cm DBH have to remove.
3.2.2	Environment Protection Regulation, 2077 (2020)	This Regulation describes the details of the processes of level and type of environment assessment of different projects as per Schedule 1, 2 and 3. As per EPR 2020, Annex 3, KA-12, it is mandatory conduct EIA for the proposed proposal of construction of hydropower within National Park as the proposed project lies in Sagarmatha National Park.

SN	Acts/Regulations/ Guidelines	Relevant Details
3.2.3	Labor Rules, 2075 (2018)	This regulation is intended to provide the rights, interests and benefits of workers, to develop good labor relations by clearly defining the rights and duties of workers and employers, and to increase the productivity ending all forms of labor exploitation.
3.2.4	Electricity Regulatory Commission Rules, 2075	GoN has made these rules as per Electricity Regulatory Commission Act-2017 to clarify the key functions and duties of the Commission, and provide a more focused list of action points, mandatory requirements and guidance for the Commission on distribution lines, tariff management and electricity quality.
3.2.5	Solid Waste Management Regulation, 2070	Solid waste management rules 2070 BS have been issued by the Government of Nepal using the power conferred by section 50 of the Solid Waste Management Act 2068. Rule 3 of this Rules enforced the segregation and management of the solid waste. Sub rule 1 of this rule stipulates the segregation of solid waste at least organic and inorganic solid waste at its source under section 6 have to management and segregation of harmful and chemical waste separately. The responsibility of managing of the chemical and harmful solid waste under sub rule1 will be a concern generator. Rule 4 of this rules endorsed the discharge the solid waste as comfortable manner for transportation, processing and final discharge by take in to account the possible adverse effect on the public health and environment and the ways of reduction of such effect.
3.2.6	Plant Protection Rules, 2067 (2010 AD)	It prescribes terms and restrictions relating to the trafficking and use of plants and plant products, biological control agents and beneficial organisms.
3.2.7	Child Labor (Prohibition and Regulation) Rules, 2063 BS (2006 AD)	GoN has prepared this rule as per provision of Child Labour (Prohibition and Regulation) Act, 2056 (1999 AD). It details out various conditional arrangements for child labour use and other legal provisions related with child labour.
3.2.8	Buffer Zone Management Regulation, 2052	If any actions being operating or to be operated within or outside the buffer zone, have or wit, have the negative impact on the land use, public health, natural environment and natural resources conservation, the warden may on the recommendation of the users' committee give an order to the concerned person or institution to stop such activities immediately or to mitigate the impacts. After necessary investigation on the application tendered under the Sub—Rule (1), the warden may hand over such buffer religious forest as demanded by the applicant, or with necessary amendment to the religious authority, group, or community with a certificate under the Appendix—6. Provision should be made so as not to affect the right of the traditional users while handing over such forest. If the Ministry wishes to operate any services or amenities within the buffer zone through any person according to the Section—6 of the Act, it will publish a bid tender notice in major newspapers giving at least 35 days' notice with necessary specifications of such services or amenities and the terms and conditions of the operation, and it will also mention the office or official for the submission, the opening date and time of the bid tender in such a bid notice. Any religious authority, group or community willing to develop, conserve and

SN	Acts/Regulations/ Guidelines	Relevant Details
		utilize any religious place situated in the buffer zone from ancient time or the peripheral forest of such place will have to give an application in accordance with Appendix—5 to the warden by describing the area, boundaries and programs to be carried out in such a forest.
3.2.9	Electricity Rules, 2050 (1993)	Section (छ) of Article 12 and section (छ) of Article 13 of Electricity Regulation 1992 are important from environmental viewpoint. The Environmental Impact Assessment report will address the environmental issues, measures required to mitigate the significant adverse impacts. This regulation has also made provision for the formation of Compensation Fixation Committee for compensation of the land required for the project.
3.2.10	Water Resources Regulations, 2050 (1993)	It is mandatory under Rule 17 (e) of the regulation that any person or corporate body, who desires to obtain a license for utilization of water resources must state in his application that appropriate measures will be taken to lessen the adverse effects due to the project on the overall environment. Measures are to be taken for the conservation of aquatic life and water environment and for mitigating social and economic effects of the project in the concerned area.
3.2.11	Himali National Park Rule, 2036	It explains about the protection and conservation of National Park located in Himalayan region of Nepal. It includes the do and don'ts inside a National Park. Harm to any wildlife animals, birds or fishes as well as trees/plants are not allowed but feeding birds and fishing after permission of the national park is allowed. Any kind of pollution such as solid waste, liquid waste as well as noise pollution is restricted in this area. But, development works can be done taking permission with government.
3.2.12	National Parks and Wildlife Conservation Rules, 2030 (1974)	The rules prohibits any activities inside the protected area without permission from the authorized persons including hunting, damaging any form of wildlife, building or occupying any form of shelter, hut or house, occupying, clearing or cultivating land, pasturing domesticated livestock, damaging, felling or removing any trees, shrubs of forest products and setting of forest fire, mining and removing stone, minerals, creating earth works using explosives, using immunization or poisons, block, diverting river or streams.
3.3	**Provincial Law and Regulations**	
3.3.1	Province No. 1 Environment Protection Act, 2076 (2020)	This act has been come to exist to address the environmental concerns of development activities under the jurisdiction of Province 1. It has made the provision of environmental assessment for the development works, projects or proposal under the jurisdiction of the province given in Annex I
3.3.2	Local Government Operation Act, 2074 (2017)	It has been formulated to assist the local governments to make clarification about their working area demarcation. Similarly, Local Government Operation Act, 2074 BS has provided authority for policy, law, standards, planning, implementation, monitoring and regulatory works (परिच्छेद-३, ११ (२), घ). Thus KPLRM has right to produce a generation license for the proposed proposal.
3.3.3	Province No. 1 Environment Protection	This Regulation describes the process of environment assessment of different projects under the jurisdiction of province as per Schedule 1, 2 and 3.

SN	Acts/Regulations/ Guidelines	Relevant Details
	Regulations, 2077 (2020)	
4	**Guidelines/manuals /Directives**	
4.1	Working Procedure related to provision of land for construction of infrastructure in protected areas 2080	This procedure is designed to facilitate the use of protected area land for very essential physical infrastructure development. The procedure outlines the details for acquiring the land of protected area from the very beginning of project development. The developer or proponent of infrastructure development needs to obtain consent from Department of National Park and Wildlife Conservation for feasibility study, environmental study or survey (Clause 4-1). Environmental Study should be done as per Clause 5 of the procedure. Clause 6 spells out the detail procedure for application of land use of protected areas.
4.2	Directive Relating to Licensing of Power Projects 2075	GoN by virtue of the power conferred by Rule 94A of the Electricity Regulation 2050 (1993) issued the Directive Relating to Licensing of Power Projects 2075 ("Directive") replacing the previous Directives Relating to Licensing of Power Projects 2073 (2017). This directive has set various provisions on survey license of electricity generation, transmission and distribution as well as issuing license of generation, transmission or distribution or license amendment and its cancellation.
4.3	Hydropower Environmental Impact Assessment Manual, 2075 (2018)	Ministry of Forests & Environment has prepared this manual, in line with the National Environmental Impact Assessment Guideline. It has undergone extensive gap analysis of existing Nepali EIA related documents and legislation followed by a series of multi-stakeholder participatory processes in order to assist hydropower companies conduct better EIAs that meet international standards and aid the Government with the review and approval process. The Manual has been designed in a format that is user-friendly and aims to guide practitioners, regulators and developers in the industry understand in detail the importance of several existing gaps like meaningful engagement of stakeholders, adequate definition of areas of influence and study areas, sufficient identification of baseline studies, knowledge on identifying and quantifying impacts, need of precision on impact predictions, and suitable alternatives analysis.
4.4	Community Forest Inventory Guidelines, 2061 BS (2003 AD)	The guideline for inventory of community forests advice to classify the forest into timber trees, pole size trees and regeneration on the basis of diameter. It has recommended using 25 m x 20 m size of quadrat for timber trees, 10 m x10 m for shrub and 5 m x 5 m for sapling and 2 m x 5 m for seedling plots in the community forest. Plants having DBH (Diameter at Breast Height, i.e. 1.3 m above ground) greater than 30 cm is considered as trees. Trees having DBH between 10 to 29.9 cm are categorized as poles and plants having less than 10 cm DBH and more than one-meter height belongs to sapling and plants having height of less than one meter categorized as seedlings. The guidelines provided the methods of calculating

SN	Acts/Regulations/ Guidelines	Relevant Details
		volume of timber and fuel wood. The guideline also advises to stratify the large areas in the hills and mountains to eliminate variations in slope aspects etc. After stratification, area of each stratum could be calculated.
4.5	National EIA Guidelines, 2050 BS (1993 AD)	The guideline provides clear directions about the process of conducting EIA. This guideline makes EIA in Nepal legally mandatory and contains process for ensuring public involvement during the preparation of EIA report. It calls for information regarding identification of physical, biological, socio-economic and cultural impacts. Impacts ranking method also suggested in this guideline. It stresses the inclusion of mitigation measures to avoid, minimize and mitigate adverse impacts and maximize beneficial impacts resulting from the development project and monitoring & environmental auditing in the EIA report. Its revision in 1997 calls for the ensuring local people's participation, collection of relevant information, identifying major issues of public concerns, evaluate them and establishing priorities for EIA study. These guidelines further provide guidance to project proponent on integrating environmental mitigation measures, particularly on the management of quarries, borrow pits, stockpiling of materials and spoil disposal, operation of the work camps, earthworks and slope stabilization, location of stone crushing plants, etc.
4.6	Guideline on Environmental &Social Risk Management (ESRM) For Banks And Financial Institutions, May2018	It is the guideline prepared by Nepal Rastra Bank for Banks and Financial Institutions those providing loans for development activities. The guideline helps to assess environmental and social risks and their management. The guideline has the exclusion lists of activities in which banks and financial institutions cannot provide the loan. The guideline is also relevant to the proposed proposal as it has to take loan from the Bank.
4.7	Wildlife friendly infrastructure Construction Directives, 2079 (2022)	The directives has provision of wildlife friendly structure while constructing the infrastructure. Basic Standard of Wild life friendly Structure (Schedule- 4) of directives ensure the Headrace pipe of hydropower project and penstock pipe, petroleum pipe including other pipeline of same nature shall be buried under ground as far as possible.
5	**Working Procedures/Work Plan**	
5.1	Working Procedure for the Use of National Forest Area for National Priority Project, 2074 BS (2017 AD)	Realizing the need to manage the provision in relation with giving approval to use forest area for operation of national priority projects, Government of Nepal has endorsed this "Working Procedures relating to use of National Forest Area for Projects of National Priority, 2017" under provisions stipulated in Clause 68 (1) of the Forest Act, 1992. This working procedure supersedes the previous "*Working Procedures relating to use of National Forest Area for other purposes, 2006*". Section 3 (1) of this procedure requires Ministry (concerning to specific national priority project) to carry out feasibility study and alternatives of the project avoiding the national forest to the extent

SN	Acts/Regulations/ Guidelines	Relevant Details
		possible. However, as per the provision of Section 3 (2), if such study carried out in accordance with Section 3 (1) requires use of forest area, then the alternative requiring minimum forest area or clearance of minimum number of trees and vegetation will be selected. Section 4 (1) of the Procedures provisions need of preparation of an Initial Environmental Examination or an Environmental Impact Assessment Report relating to environmental impacts of such project which requires forest area for its implementation in accordance with the prevalent Environment Protection Act and Environment Protection Regulation. If the investigation carried out in accordance with Section 4 (2) reveals implementation of the project causes impacts on the environment, then the concerned Ministry will prepare a report incorporating mitigation measures to minimize such impacts along with environmental management plans for the project. Section 4 (4) requires concerned Ministry to take approval from the Ministry of Forests and Environment prior approval of the IEE or EIA reports in accordance with prevalent law for the projects requiring national forest area. Section 5 (1) describes the procedures to submit application for the use of national forest areas. Section 10 explains provisions relating to compensatory plantation and requires 25 saplings to be planted for loss of a tree. As per Section 11, the project will pay annual lease amount for temporary occupancy of national forest at the rate fixed for leasehold forests as per Schedule 20 of Forest Regulations, 2022. Section 12 of the Procedure mandates the project to implement mitigation measures mentioned in IEE or EIA report of the project and the cost for such measures will be borne by the project itself.
5.2	Renewable Energy Subsidy Delivery Mechanism 2073 BS (2016 AD)	AEPC has prepared the mechanism as per mandate given by Renewable Energy Subsidy Policy 2073 BS. It has spell out the detail mechanism of subsidy delivery mechanism in context of renewable energy provided by GoN. As the proposed proposal is also a program of AEPC under renewable energy, it is certainly relevant to the proposed project.
6	**Standards**	
6.1	National Ambient Air Quality Standard, 2069 BS (2012 AD)	National Ambient Air Quality Standard is established for various parameters such as TSP, PM_{10}, Sulphur Dioxide, Nitrogen Dioxide, Carbon Monoxide, Lead, Benzene, $PM_{2.5}$ and Ozone. The standard states that the maximum concentration stated for averaging time of 24 hours for TSP, PM_{10}, Sulphur Dioxide, Nitrogen Dioxide, and $PM_{2.5}$ and the maximum concentration stated for averaging time of 8 hours for Carbon Monoxide and Ozone should be under standard limit for at least 95% duration for one fiscal year and should not exceed maximum concentration for 18 days in 365 days. No any parameters will exceed its maximum concentration limit for two consecutive days within one year
6.2	National Noise Quality Standard, 2069 BS (2012 AD)	National Standard for Sound Quality is established as per Rule 15 of Environment Protection Rules, 2054. The maximum limit of sound for city and residential area is 55 decibels for daytime and 50 decibels for night hours. Whereas for the industrial area, the

SN	Acts/Regulations/ Guidelines	Relevant Details
		maximum limit of sound is 75 decibels for daytime and 70 decibels for night hours. Further, for the peace zone, the maximum limit of sound is 50 decibels for daytime and 40 decibels for night hours.
6.3	Standards for Emission from in-use and Imported Diesel Generators, 2069 BS (2012 AD)	The MoSTE (now MoFE) introduced in October 2012 the National Diesel Generator Emission Standard (NDGES) for new and in-use diesel generators with a capacity of 8 kW-560 kW (under the 1997 Environment Protection Act). In doing so they followed the Indian standards for construction equipment rather than for diesel generators sets. Hence, the Nepal emission standards for new and in-use diesel generators are less stringent than in India. The emissions standards set for new diesel generator imports is equivalent to Bharat Stage III standards and, for in-use diesel generators, is equivalent to Bharat Stage II. The emissions limits are set for four major pollutants: CO, HC, NOx, and PM. The emissions limit for PM for new DG sets less than 19 kW is 0.80 g/kWh; for 19 to <37 kW, the emissions limit is 0.60 g/kWh; for 37 to <75, it is 0.40 g/kWh; for 75 to <130 kW, it is 0.30 g/kWh; and for 130 to <560 kW, it is 0.20 g/kWh. MoSTE has not yet been able to monitor the compliance of emissions standards for new and in-use DG sets.
6.4	Tolerance Limits for Industrial Effluents to be Discharged into Inland Surface Waters, 2003	The Ministry of Environment has set tolerance limits for the industrial effluents to be discharged into the inland surface water. Since the project is considered as an industry it will have to comply with the tolerance limits set in the standard prior to the discharge of the effluents into the inland surface water during the construction and operation period.
7	**World bank ESS Instruments**	
7.1	**Operation Policy**	
7.1.1	Environmental Assessment EA (OP 4.01)	The policy is to ensure that Bank financed projects are environmentally sound and sustainable. As per the policy, an integrated Environmental Screening and Environmental Assessment (EA) with Environmental and Social Management Plan (ESMP) has to be prepared or developed to manage environmental risks and maximize environmental and social benefits wherever applicable.
7.1.2	Natural Habitats (OP 4.04)	The policy is to support the protection, maintenance and rehabilitation of natural habitats in its project financing, as well as policy dialogue and analytical work. The Bank also expects the Borrowers to apply a precautionary approach to natural resources management to ensure environmentally sustainable development. Here the policy is triggered by the Project due to activity requiring land of SNP for implementation of the proposed proposal.
7.1.3	Involuntary Resettlement (OP 4.12)	Objective of this policy is to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs. Furthermore, it intends to assist displaced person in improving their former living standards; community participation in planning and implementing resettlement; and to provide assistance to affected people, regardless of the legality of title of land. This policy may not be attracted as the proposed proposal does not acquire any land displacing the people.
7.1.4	Physical and Cultural	This policy is to assist in the preservation of cultural property,

SN	Acts/Regulations/ Guidelines	Relevant Details
	Resources (0P 4.11)	historical, religious and unique natural value-this includes remains left by previous human inhabitants and unique environment features, as well as in the protection and enhancement of cultural properties encountered in Bank- financed project. It may be triggered by the project as the proposal has to be implemented in SNP where Sherpa communities reside with their cultural, historical, religious and unique natural value; and SNP has unique environment features.
7.1.5	Indigenous People (0P 4.20)	This policy aims to protect the dignity, right and cultural uniqueness of indigenous people to ensure their participation in project design and implementation, do not suffer from development activities; that they receive social and economic benefits. This policy is relevant to the proposed proposal as SNP is the home of Sherpa Community.
7.2	General Environmental Health and Safety Guidelines	The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. The general EHS guidelines covers four different concerns; Environment, Occupational Health and Safety, Community Health and Safety, and Construction and Decommissioning.
7.3	Environmental Health and Safety Guidelines for Electric Power Transmission and Distribution	This guideline includes information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. The guideline provides a summary of EHS issues associated with electric power transmission and distribution that occur during the construction and operation phases of a facility, along with recommendations for their management.
8	**International Instruments**	
8.1	Guidance and Toolkit for Impact Assessment in World Heritage Context, 2022	The Guidance and toolkit has been prepared to explain how impact assessments can be used to protect the Outstanding Universal Value of World Heritage properties in order to manage continuity and change by informing good decision making in the context of UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage – the 'World Heritage Convention' (UNESCO, 1972).
8.2	World Heritage Advice Note: Environmental Assessment (18 Nov 2013): A step-by-step guidance on environmental assessment for world	IUCN advice notes on EIA for projects occurring in heritage sites (IUCN, 2013a) provides the principles guidance for the assessments that needs to incorporated in the EIA study suggesting additionally incorporation of the CBD's voluntary guidance of biodiversity inclusive impact assessment and Ramsar impact assessment handbook. The IUCN, 2013a focuses on impact on heritage's outstanding universal values that comprise of Values, Integrity and Protection and Management as inscribed for the site. The assessment

SN	Acts/Regulations/ Guidelines	Relevant Details
	heritage properties.	needs to be assessed for direct, indirect and cumulative impact on environmental and social aspects of the OUVs. Alternative assessment also needs to be done with 'No Project Option' and that mitigation measure should be sought with avoidance and reduction. A separate chapter should be included in the EIA report that concludes the impacts and their mitigation measures and should be summarized too.
8.3	The United Nations Declaration on the Rights of Indigenous Peoples, UNDRIP, 2007	It has established a universal framework of minimum standards for the survival, dignity and well-being of the indigenous peoples of the world and it elaborates on existing human rights standards and fundamental freedoms as they apply to the specific situation of indigenous peoples. Significantly, in Article 3 the UNDRIP recognizes Indigenous peoples' right to self-determination, which includes the right "to freely determine their political status and freely pursue their economic, social and cultural development." Article 4 affirms Indigenous peoples' right "to autonomy or self-government in matters relating to their internal and local affairs," and Article 5 protects their right "to maintain and strengthen their distinct political, legal, economic, social and cultural institutions." Article 26 states that "Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired," and it directs states to give legal recognition to these territories
8.4	International Labour Organization Convention, 1998	It is the Declaration on Fundamental Principles and Rights at Work in 1998.
8.5	Convention on Biological Diversity (CBD), 1992	Nepal signed the Convention on Biological Diversity (CBD) during the Earth Summit in June 1992; ratified it in the fall of 1993; and it has entered into force since 21 February 1994. Nepal is committed to implementation of the convention. The Forest Act, 1993, Forest Rules, 1995, EPA, 1997 and EPR 1997 are enforced by GoN in response to CBD. As the state is fully committed to conserve its biodiversity, the proposed project being an entity of state itself is also full-heartedly committed to conserve biodiversity in and around project area.
8.6	Concerning Indigenous and Tribal Peoples in Independent Countries, 1991 Convention (No.169)	Article 7 of the convention provides the right to the indigenous and tribal people to decide their own priorities for the process of development. However, for the national development plans and programs, it mandates consultation with them in the formulation of the plans and programs. Article 12, 13, 14 and 15 safeguards rights of the indigenous people in the land and natural resources in territories traditionally occupied by them. In the event that the state retains the right of the natural resources in their territories, it mandates formulation of special provisions under the state legislation for participation in the decision-making process and resettlement process with full compensation of the resulting loss or injury (Article 16). As Nepal is signatory of the convention will have to comply the provisions stipulated in the conventions, if the project is to impact the safeguard rights of the indigenous people.
8.7	World Heritage	This convention has been adopted to address the threats to the

SN	Acts/Regulations/ Guidelines	Relevant Details
	Convention, 1975	world's cultural and natural heritages by traditional/natural decay and socio-economic changes occurring globally. The Sagarmatha National Park of Nepal parts of which, this project will be implemented within has been designated as World Heritage Site based upon the criteria VII (UNESCO, 1979 for its superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. The convention with total of 38 articles defines and describes World Heritage Sites, responsibilities of parties for protection, conservation and presentation of heritage sites. The convention also addresses study and research, Cooperation and Funding related to World Heritage Sites. The article 1 and 2 define cultural and natural heritage sites. Article 5 urges the parties to adopt a policy which aim to give functional life to community with integration of protection and if required establishment of multiple services that assure conservation. Parties are bound to report periodically the status of world heritage sites including the threats and dangers posed by traditional decays, changing socio-economic status and natural disasters (article 11). Article 17 considers encouraging establishment of national, public or private foundations or associations that could contribute to the efforts of protection and conservation of heritage sites. Article 34 of the convention mentions that if the heritage sites belong to any federal jurisdiction, the role of that state or province towards the heritage site will equally be that of the nation to which the state belongs. Any project in a world heritage site requires World Heritage Impact Analysis to be integrated in the EIA of the project. The guideline is given as per the IUCN's advice notes (IUCN, 2013 a).
8.8	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),1973	The convention classifies species according to criteria where access or control is important (e.g. I-species threatened with extinction, II-species which could become endangered; III-species that are protected; E- Endangered; V- Vulnerable, R-Rare (CITES 1983)). The project will have to minimize impacts to the species as far as possible.

CHAPTER 5: EXISTING ENVIRONMENTAL CONDITION

5.1 Physical Environment

5.1.1 Land Use

The Rural municipality covers 1539.11 Km^2 land, of which 43.93% is covered with snow/glacier, 19.93% is barren land, 15.61% is grass land, 9.98% is covered with forest and 9.30% is shrub land. In addition, 0.67% is agriculture land, 0.005% is built up area and 0.58% is covered with water body.

Out of total area of 702.16 Km^2 in Ward No.4, 52.40% is covered with snow/glacier, 20.86% is barren land, 14.52% is grassland, 8.02% is shrub land, 2.83% is covered with forest 2.83%, 0.67% is covered with water body, 0.45% is built up area and 0.25% agriculture land (KPLRM, 2019).

5.1.2 Topography

The topography of the project area is of gentle to steep. The AMHP is situated in the gentle topography. The river slopes are covered with colluvial soil deposit while the bedrock outcrops are exposed at the slopes. The deposit is moist, and seepage is frequent. The elevation of powerhouse and intake area ranges from 3951.18 masl to 4422 masl. The powerhouse site is at alluvial terrace which is flat.

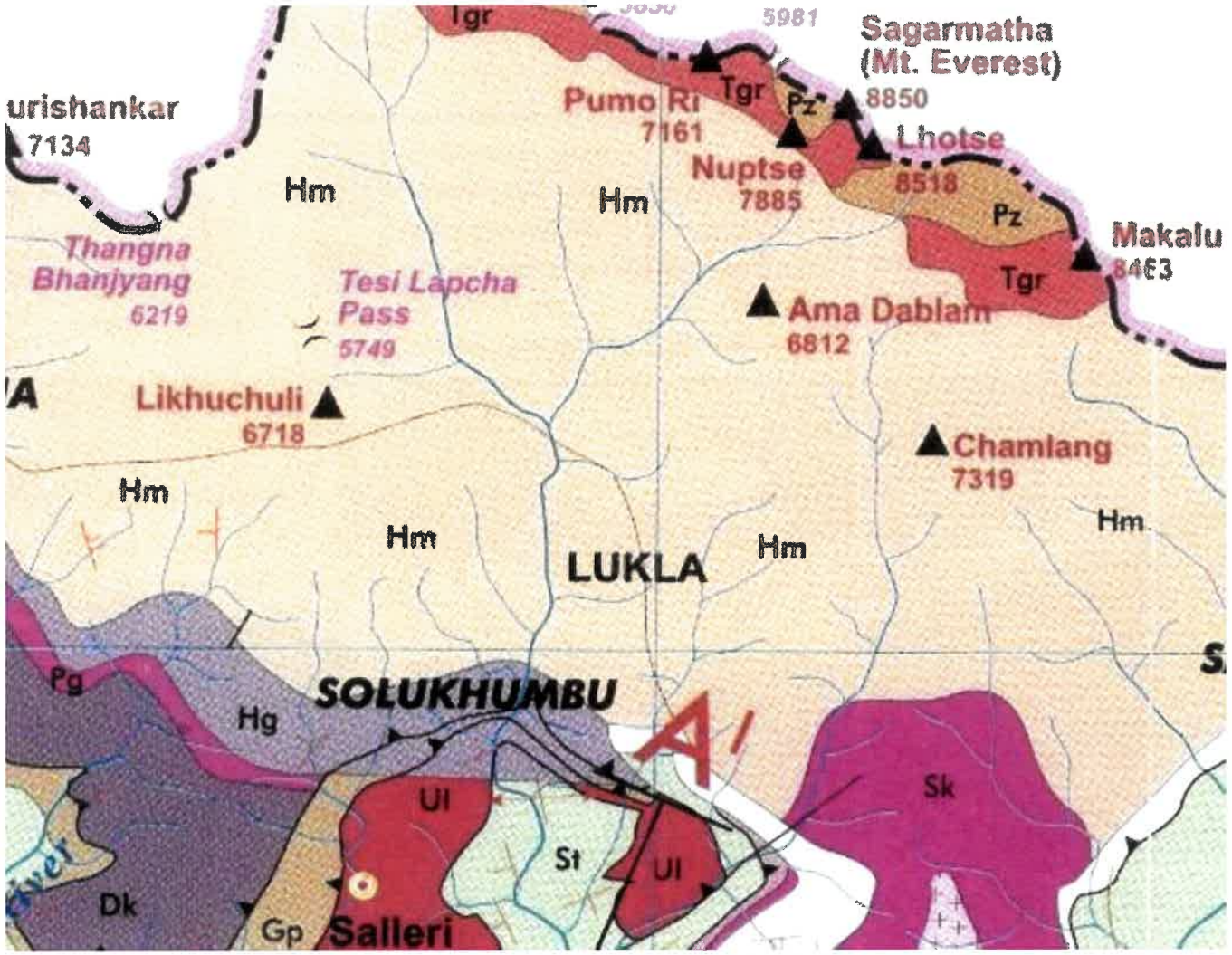
5.1.3 Geology

The project area consists of gneisses rocks of Higher Himalaya (Map 9). The Main Central Thrust (MCT) is the major tectonic boundary which is located about 32 km south of the project which will not create any construction risk for the project development. The Exposed rock nearby the project area consists of fresh to slightly weathered, grey to white, medium to coarse-grained, strong to medium strong, widely foliated gneisses with schist.

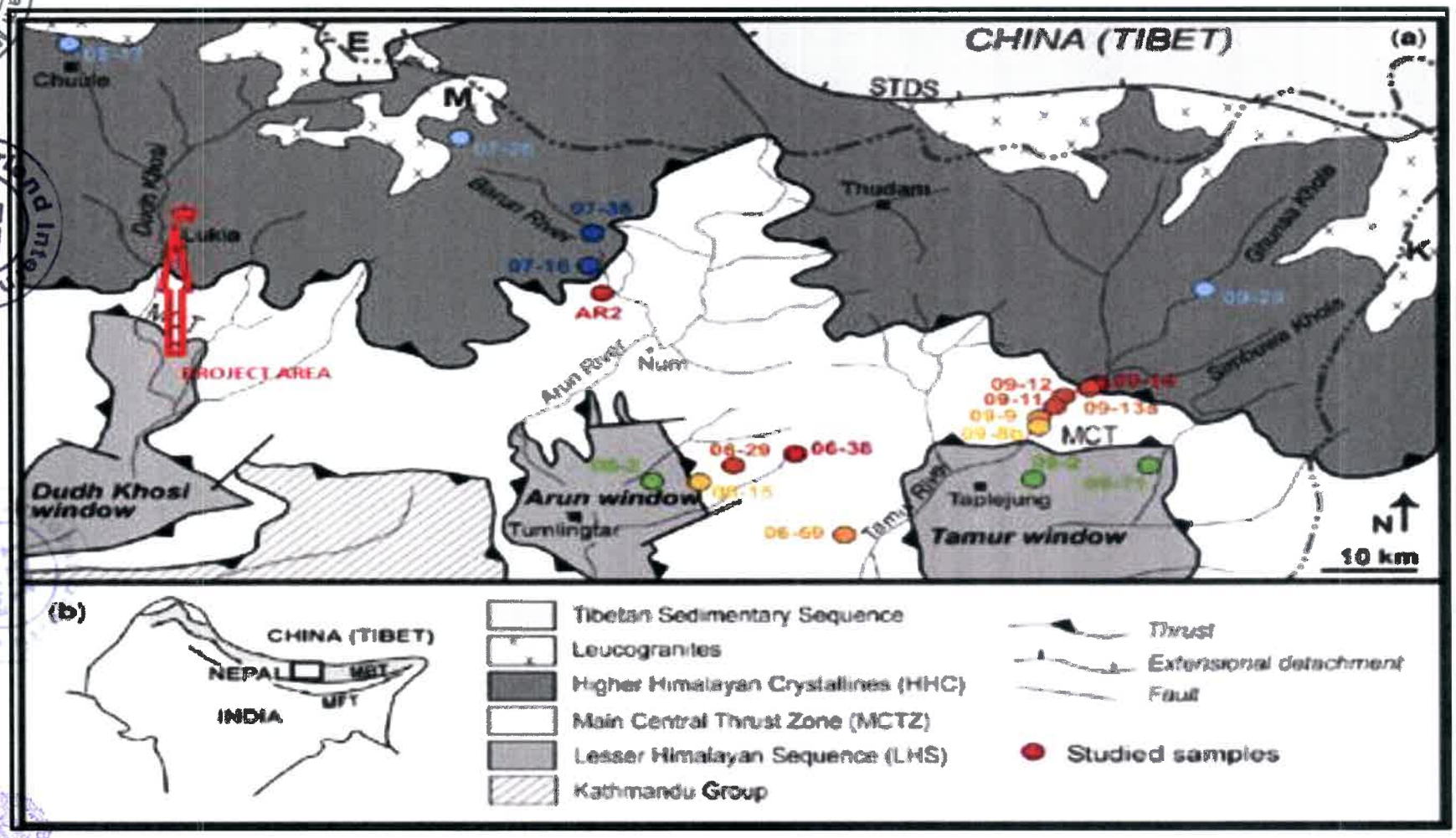
5.1.3.1 Geology of the Headworks Area

The intake site is located in the narrow valley of Cholunche Khola which is 20-25 m wide. It is located about 2800m upstream from the confluence of Imja River and Cholunche Khola. There is alluvium soil in the left and right side of proposed headworks and river terrace, loose alluvial deposit with big boulders present at proposed weir axis of the headworks. At downstream and left bank of the dam site, the river terrace is followed by colluvial soil and steep rock cliffs.

The quaternary deposits include alluvium at headworks and desander area, and followed by colluvium and rock cliff in the hill slope. The alluvial soil comprises sub rounded to rounded, boulders, gravels, cobble and pebbles of gneiss with sand. Most dominant proportion (about 60%) is of boulder and gravel. The cobble pebble and sand deposit constitute the remaining proportion. According to Unified Soil classification the soil near weir axis and desander lies in GW category that includes well graded gravels with sand. Colluvium soil in the hill slopes in left bank comprises sub angular to angular, boulders, gravels, cobble and pebbles of gneiss with sand. Most dominant proportion (about 70%) is of boulder and cobble. The pebble, gravel and sand deposit constitute the remaining proportion.



Map 9: Geological Map showing the Project Site (Published by Himalayan Map house)



Map 10: Simplified Geological Map of Eastern Nepal
(Modified from Goscombe et al. (2006), Groppo et al. (2009), and Mosca et al. (2011)) Red Star indicates study area)

5.1.3.2 Geology of Water Conveyance

The water conveyance route passes through the barren land at left bank of Cholunche Khola which is covered by colluvial and alluvial deposits. Initially alignment passes through the steep alluvial terrace deposit then it passes flat alluvial terrace and colluvial deposit at left bank of Cholunche Khola. The alluvial soil comprises sub rounded to rounded, boulders, gravels, cobble and pebbles of gneiss and sand with silt, similarly colluvial deposit consists of sub angular to angular, boulders, gravels, cobble and pebbles of gneiss with sand.

The penstock pipe alignment passes through slide area around chainage Ch.0+160 to Ch. 0+260m. The alignment passes though just below the crown of the slide on loose alluvial terrace deposit. Hanging loose blocks were observed near the crown part of slide area. Above the slide area land is flat and relatively stable. Before construction works the slide area should be protected. Initially, the hanging loose blocks must be trimmed and retaining structure will be constructed from the riverside and after the pipe installation it should be buried. After the slide area the alignment passes through the flat river terrace of Cholunche Khola. There are mostly free blocks laying on the flat terrain which have been transported from uphill slope consisting bed rock of gneiss. It is recommended to avoid these free blocks for the construction of anchor blocks and saddle supports.

5.1.3.3 Geology of the Powerhouse Area and Tailrace

The power house site is located about 60 m upslope from the Imja Khola on old river terrace deposit on the left bank of Imja Khola. The area is relatively flat and consists of alluvial soil composed of ill sorted, loose, sub rounded to rounded, gravel of gneiss with sand and silt. The area is relatively stable. Land use of the area has sparse vegetation consisting bushes and small trees.

5.1.3.4 Soil Quality

The soil of project area comprises of sub rounded to rounded boulders, gravels, cobble and pebbles of gneiss with sand. About 60% area of powerhouse, penstock alignment and headworks comprises of boulder and gravel whereas, 40% area constitute of cobble, pebble and sand deposit.

There are colluvial soil deposits in the hill slope that comprises of sub angular to angular boulders, gravels, cobble and pebbles of gneiss with sand. The power house site is located at the left bank of Imja Khola, where, there is colluvium soil composed of loose, sub rounded to rounded, gravel of gneiss with sand and silt. Most of the materials are gneiss. The thickness of soil is expected to be 7-10 m according to field observation.

5.1.4 Hydrology and Meteorological condition

5.1.4.1 Air Temperature

The average annual temperature is -2.9 °C | 26.8 °F in Pangboche. The warmest month of the year is July, with an average temperature of 4.5 °C | 40.1 °F. January is the coldest month, with temperatures averaging -11.7 °C | 11.0 °F.

Table 16: Temperature by Month

Temp. (°C) / Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Avg.	-11.7	-11.2	-8.4	-3.6	0.2	3.8	4.5	4.3	2.7	-2.2	-5.3	-7.7
Min	-16.4	-16	-13.4	-8.8	-4.3	0.6	2.5	2	-0.3	-6.3	-10	-12.2
Max	6.8	-6.6 °C	-3.8	0.7	3.7	6.6	6.6	6.7	5.2	1.5	-0.6	-2.9

Source: Climate-Data Org, 2020

5.1.4.2 Precipitation

The rainfall at Pangboche is 1524 mm per year. Between the driest and wettest months, the difference in precipitation is 416 mm. The driest month is November, with 12 mm of rainfall. Most of the precipitation falls in July with an average of 428 mm. Monsoon wetness index of the catchment area is taken as 1000 from Isolines in Monsoon Index Map.

Table 17: Monthly Precipitation according to Köppen–Geiger Climate Map (mm)

Locations	Elevation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pangboche	3865 masl	21	29	33	60	111	238	428	344	190	46	12	12

Source: Köppen–Geiger Climate Map, 2020

5.1.4.3 Humidity

As there is no any meteorological station at the project site, the humidity of the Namche Bazar is taken as reference. As shown in Figure 1, December has the lowest humidity while July is with the highest humidity. The similar situation is sighted for Pangboche although the figure may vary due to slight variation in geographical location and altitude.

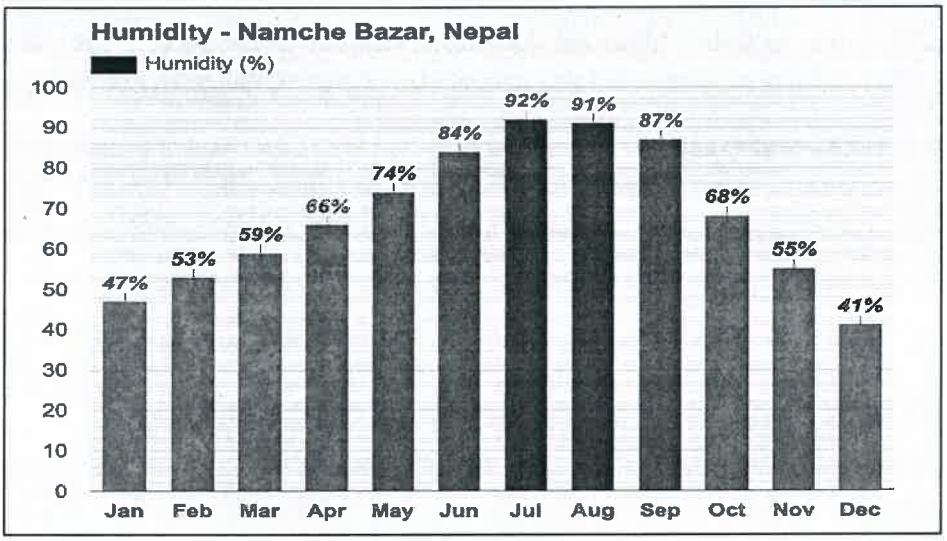


Figure 1: Humidity
(Source: https://www.weather-atlas.com/en/nepal/namche-bazar-climate)

5.1.4.4 Water Resources

The Imja River and Cholunche Khola are the major water resources in the project area which are snow fed. These resources are not used for any domestic and irrigation purpose.

5.1.4.5 River Discharge

Discharge measured on 9th March 2020 by salt dilution method was found to be 410 lps (DFS 2022). The monthly discharge of the Cholunche Khola was estimated based on MIP methods (DFS 2022). The highest flow is 7.32 m^3/s in August while the lowest flow is 0.29 m^3/s in April (**Table 18**).

Table 18: Mean Monthly Flow

Months	Monthly River Discharge, (m^3/sec)	Design Discharge for power generation, (m^3/sec)	Discharge at the river after flow diversion to intake, (m^3/sec)	Percentage
January	0.70	0.25	0.45	64.29
February	0.53	0.25	0.28	52.83
March	0.38	0.18	0.20	52.63
April	0.29	0.14	0.15	51.72
May	0.76	0.25	0.51	67.11
June	1.76	0.25	1.51	85.80
July	4.25	0.25	4.00	94.12
August	7.32	0.25	7.07	96.58
September	4.83	0.25	4.58	94.82
October	2.34	0.25	2.09	89.32
November	1.20	0.25	0.95	79.17
December	0.91	0.25	0.66	72.53

(DFS 2022)

5.1.4.6 Climate of Project Area

Pangboche has a **tundra climate.** It is cold here all year round. The average annual temperature for Pangboche is -2.9°C and there is about 1524 mm of precipitation in a year. It is dry for 110 days a year with an average humidity of 68%.

5.1.4.7 Air Quality, Water Quality and Sound Quality

a. Air Quality

The project area is in rural setting and there is no industry that causes air pollution. The source of air pollution is only from households and hotels for cooking and heating purposes. Thus air quality of the area seems good. The air quality complies with the national ambient air quality standard PM_{10}; 120 $\mu g/m^3$ in 24 hrs. (Figure 2).

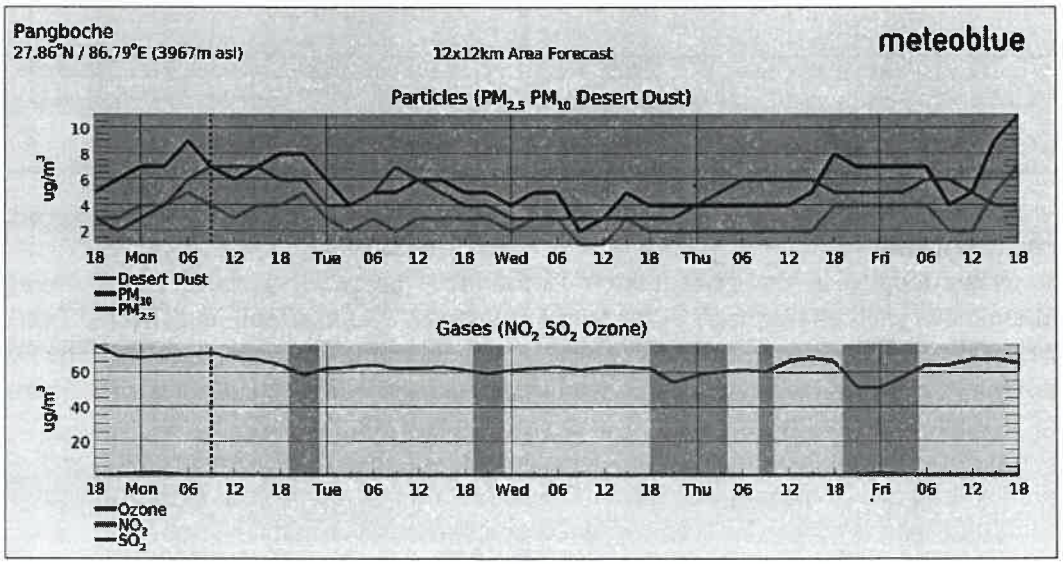


Figure 2: Air Quality Forecast of Pangboche (March 14 to March 16, 2022)

(Source: meteoblue.com)

b. Wind Speed

The project area is located in relatively wide valley surrounded by towering Snowy Mountain. High wind speed is rarely expected at the project site. The highest wind speed seems to be not above 20 km/hr. (Figure 3) which occurs during February-April.

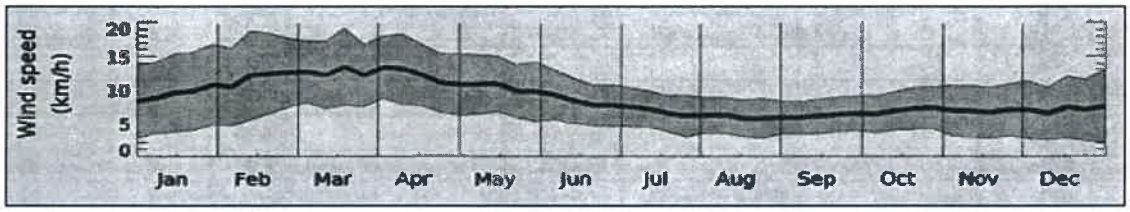


Figure 3: Average Monthly Wind Speed at Pangboche

(Source: meteoblue.com)

c. Wind Direction

Wind direction at Pangboche is presented in Figure 4.

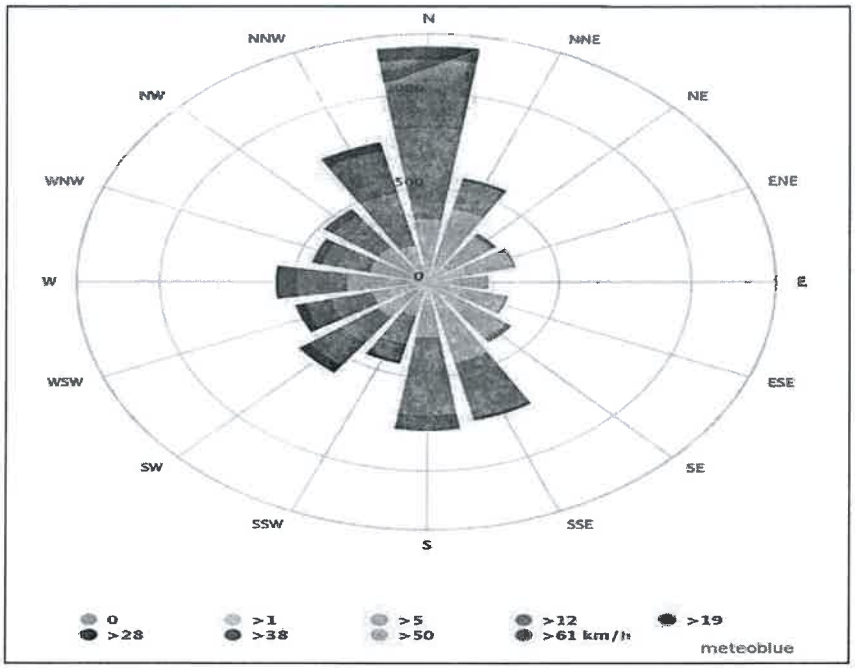


Figure 4: Wind Direction at Pangboche (Number of hours of wind blow in a year)

(Source: meteoblue.com)

d. Water Quality

The water quality in the project area is found to be good as there is no source of contaminants such as sewerage system and industries. Water sample is collected from the Cholunche Khola (Intake Area) to establish the baseline on water quality. The water quality analysis was conducted for sixteen different parameters (6 - physical, 9 - Chemical and 1- microbial parameters) in the Environment and Climate Study Laboratory of NAST (**Annex-VI**). Water quality is suitable for MHP, which will not impact turbine blades, which will be one of the major factors for sustainability of the project. Coliform count was found high as many previous study on water quality in Sagarmatha National Park also had

shown similar results due to high influx of tourists and trekkers (K. Nicholson et al. 2016). However, the coliform presence doenot have adverse impact on electricity production.

Table 19: Water Quality of Cholunche Khola

SN	Parameters	Sampling Sites River Water	Remarks
	Physical		
1	Temperature (°C)	18.5	This temperature is recorded in Kathmandu Water Temperature at field was recorded as 0.6°C.
2	pH	8.05	
3	Conductivity (µS/CM)	21	
4	Turbidity (NTU)	1.75	
5	Total Dissolved Solids (mg/L)	10.29	
6	Total Suspended Solids (mg/L)	28	
	Chemical		
7	Total Hardness (as $CaCO_3$)	12	
8	Chloride Content (mg/L)	2.84	
9	Iron Content (mg/L)	0.1	
10	Arsenic Content (mg/L)	ND	
11	Ammonia Content (mg/L)	ND	
12	Nitrate (mg/L)	2	
13	Dissolved Oxygen (mg/L)	7.6	
14	Biological Oxygen Demand (mg/L)	1.2	
15	Chemical Oxygen Demand (mg/L)	ND	
	Microbial Test		
16	Total Coliform Count	20	0/100 mL
# Nepal Drinking Water Quality Standard 2062; ND-Non-Detected; number in brackets () refers the acceptable values when alternatives not available.			

*The presence of Coliform in the river has no negative effect on the production of electricity.

e. Noise Quality

The noise quality seems to be within tolerable limits and there are no any means of noise pollution sources except naturally flowing streams and helicopters movement. The sound level measured at headwork area was 48 dB while 65dB in powerhouse site at noon. The recorded sound levels were higher than the value for rural residential area of National Ambient Sound Quality Standard, 2012 i.e. 45 dB and 40 dB during day and night respectively. The higher level of sound in the headworks and powerhouse area is due to the sound of flowing water in steep gradient.

5.2 Bio-ecological Environment

The most of the project area lies in lower alpine bio-climatic zone (elevation range: 4000-4500 m) and in upper sub-alpine bioclimatic zone (elevation range: 3500-4000 m). As per The Conservation Science Programme WWF-US (1998), the project area falls under East Himalayan alpine shrub/meadow Ecoregion (4000-4500 m) with Montane grasslands and shrub lands vegetation, and East Himalayan sub-alpine conifer forest ecoregion (3000-4000 m) with sub-alpine conifer forest vegetation. The intake area lies in Alpine pastureland where there are no trees, however, penstock alignment lies in Juniper Scrublands in the vegetation zone of Moist Alpine Scrubs. The powerhouse area lies in the vegetation zone of Birch-Rhododendron Forest with subalpine juniper forest.

Transmission and distribution lines also pass-through Alpine pastureland, Juniper Scrublands and Birch-Rhododendron Forest with subalpine juniper forest.

5.2.1 Vegetation in Project Area

The project's components such as headworks and intake lies in Cholunche Khola within Alpine Pasturelands where there are no trees. Herbaceous and grass species are found in left and right bank of Cholunche Khola. Although the area lies within Juniper Scrub Vegetation Zone, the dominant shrub species of Rhododendron is found on left and right sides of the proposed penstock alignment. The powerhouse area lies in the vegetation zone of Birch-Rhododendron Forest with subalpine juniper forest. Table 20 presents the recorded species of vegetation in the project area.

5.2.1.1 Headworks/Intake

Headworks and intake area lies with in Alpine Pasturelands where there are no trees. Common shrubs observed are *Bistorta vaccinifolia, Rhododendron nivale*, Salix sp. etc. Similarly, common herbs are *Anaphalis triplinervis, Bistorta vivipara, Juncus concinnus, Pedicularis confertiflora, Potentilla coriandrifolia, Ranunculus brotherusii,* Saxifraga sp. *etc.*

5.2.1.2 Penstock Pipe

Penstock pipe lies between the elevations of 3952 m to 4421 m. Although the area lies within Juniper Scrub Vegetation Zone, the area is mostly dominated with shrub species of Rhododendron such as *R. anthopogon, R. nivale* and *R. lepidotum* at higher elevation. In lower elevation, sparse dwarf species of junipers such as *Juniperus indica and J. recurva* are also seen. Regenerating tree species such as *Betula utilis, Abies spectabilis, R. wightii, and R. fulgens* are also found at lower slope. Other common shrubs are *Berberis angulosa, Cassiope fastigiata, Ephedra gerardiana, Juniperus squamata, Salix lindleyana* etc. Aconitum sp., *Agrostis pilosula*, Anaphilissp., Anemone sp., Aster sp., *Bistorta macrophylla, Juncus leucanthus,* Leontopodium sp., Pedicularis sp., Primula sp., Saxifraga sp. etc. are herbs found in the area.

5.2.1.3 Powerhouse and Tailrace Area

The powerhouse site lies in an altitude of 3951.18 m. It falls in Sub-Alpine Juniper forest, a subgroup of Birch-Rhododendron Forest. Sparse trees are seen here. In the project area, common tree species such as *B. utilis, A. spectabilis, R. wightii, and R. fulgens* are seen around the periphery of the proposed powerhouse site. *Berberis wallichiana, Ephedra gerardiana, Juniperus squamata, Potentilla fructicosa, R. campanulatum, R. lepidotum, Spirae abella* etc. are shrubs found in the area. Similarly, *Aconitum laciniatum, Arisaema jacquemontii, Bergenia purpurascens, Corydalis longipes, Deschampsia caespitosa,* Primula sp., *Swertia racemosa* etc. are herbs that are found in the area.

5.2.1.4 Transmission & Distribution (T&D) Lines

The T&D lines will be distributed to Lobuche in north and Lawi Schyasa in south, Chukung in East and Machhermo in west. The T&D line will be underground along the foot trails except in river crossings. Along the T&D line, there are four vegetation zones - Alpine Pasture, Juniper Scrub, Sub Alpine Juniper Forest and Upper Temperate Blue Pine Forest. Major plants recorded in the project area are presented in **Table 20.**

Table 20: Recorded Species of Vegetation in the Project Area

SN	Local Name	Scientific Name	Type	CITES Appendix	IUCN Red List	GoN
1	Gobresalla	*Abies spectabilis*	Tree	NoList	NT	Protected
2	Bhojpatra	*Betula utilis*	Tree	NoList	LC	Not Protected
3	Chireyal (Gurans)	*Rhododendron fulgens*	Tree	-		
4	(Gurans)	*R. wightii*	Tree	-		
5	Chutro	*Berberis angulosa*	Shrub	-		
6	Chutro	*B. wallichiana*	Shrub	-		
7	Pulungejhar	*Bistortavaccinifolia*	Shrub	-		
8	Phursan	*Cassiopefastigiata*	Shrub	-		
9	Somalata	*Ephedra gerardiana*	Shrub	-		
10	Dhupi	*Juniperus indica*	Tree/Shrub	No List	LC	Not Protected
11	Dhupi	*J. recurve*	Tree/Shrub	No List	LC	Not Protected
12	Dhupi	*J. squamata*	Shrub	No List	LC	Not Protected
13	Chiniya phal	*Potentilla fructicosa*	Shrub	-		
14	Cheriala	*R. campanulatum*	Shrub	-		
15	Bhalesunpate	*R. lepidotum*	Shrub	-		
16	Sunpate	*R. anthopogon* .	Shrub	-		
17	*NA*	Salix sp.	Shrub	-		
18	Setokhareto	*Spiraeabella*	Shrub	-		
19	Murula	*Aconitum laciniatum*	Herb	-		
20	*NA*	Aconitum sp	Herb	-		
21	Ghans	*Agrostispilosula*	Herb	-		
22	BukiFul	*Anaphalistriplinervis*	Herb	-		
23	BukiFul	Anaphilis sp.	Herb	-		
24	*NA*	Anemone sp.	Herb	-		
25	*NA*	*Arisaema jacquemontii*	Herb	-		
26	*NA*	Aster sp.	Herb	-		
27	Pakhanbed	*Bergenia purpurascens*	Herb	-		
28	Chawaphul	*Bistorta macrophylla*	Herb	-		
29	Khalti	*Bistorta vivipara*	Herb	-		
30	Ghans	*Deschampsiacaespitosa*	Herb	-		
31	*NA*	*Juncus concinnus*	Herb	-		
32	*NA*	*J. leucanthus*	Herb	-		
33	*NA*	Leontopodium sp.	Herb	-		
34	*NA*	Pedicularis sp.	Herb	-		
35	*NA*	Primula sp.	Herb	-		
36	*NA*	*Ranunculus brotherusii*	Herb	-		
37	*NA*	Saxifraga sp	Herb	-		
38	*NA*	*Swertia racemosa*	Herb	-		

NT: Near Threatened; LC: Least Concern; No Prot: Not Protected; No List: Not Listed

(Source: Field Survey 2022)

5.2.1.5 Non-Timber Forest Products Used (NTFPs) in Project Area

There are more than 50 plant species that the local communities use as medicine, food, incense, timber, fuelwood, fodder and decorative item. Commonly used NTFPs are Aconitum sp., Anaphilis sp., *Arisaema flavum,* Barberis sp., Clematis sp., *Cotoneaster microphyllus,* Drepanostachyum sp., *E. gerardiana, Euphorbia sikkimensis, Gaultheria fragrantissima,* Juniperus sp., *Meconopsis horidula, Michelia champaca, Nardostachys grandiflora, Plantago erosa, Rheum australe, R. anthopogon, R. campylocarpum, Rumex nepalensis* etc. In addition, the local people use wild edible mushrooms extensively are *Armillarie llamellea*, Boletus sp., *Hydnum repandum*, Ramaria sp., *Paxillus involutus, Tylopilus eximus* etc.

5.2.2 Fauna (mammalian and avian)

Though the Annual Progress Report of Fiscal Year 2077/78 of Sagarmatha National Park has reported 7 species of amphibian and 11 species of reptile in the national park and its buffer zone, the consultation with SNP and locals reported that reptiles, amphibians and fish are not observed in the project area. Therefore, only mammals and birds are discussed as follows.

5.2.2.1 Mammals

14 species of mammal were reported from the project areas. Large mammals visit this area in search of food while small mammals such as *Lepus oiostolus* (Wolly Hare), *Ochotana macrotis* (Large-eared Pika) and *Marmota bobak* (Steppe marmot) reside in the rocky areas of the project area. *Hemitragus jemlahicus* (Himalayan Tahr), *Canis aureus* (Golden Jackal), *Canis lupus* (Grey Wolf), *Uncia* (Snow Leopard), *Moschus chrysogaster* (Musk Deer), *Alticola strachey* (Strachey's Mountain Vole), *Ursus thibetanus* (Asian Black Bear) etc. are also seen in the area. Table 21 presents the conservation status of mammals.

5.2.2.2 Birds

More than 80 different bird species have been reported in the project area. Common birds are *Aquilla heliacal* (Imperial Eagle), *Buteo* (Common Buzzard)., *Gyps himalayensis* (Himalayan Griffon), *Eremophila alpestris* (Horned Lark), *Collocalia brevirostris* (Himalayan Swiftlet), *Columba leuconota* (Snow Piegon), *Corvus corax* (Common Raven), *Corvus macrorhynchos* (Large-billed Crow), *Clamator jacobinus* (Pied Cuckoo), *Falco tinnunculus* (Common Kestrel), Carpodacus sp., *Delichon dasypus* (Asian House Martin), *Delichon nepalensis* (Nepal House Matin), *Lanius tephronotus* (Grey-backed Shrike), Luscinia sp., *Zoothera dixoni* (Long-tailed Thrush), Motacilla sp., Montifringilla sp., *Passer domesticus* (House Sparrow), Prunella sp., *Lophophorus impejanus (Himalayan Monal), Tragopan satyra* (Satyr Tragopan), *Garrulax ocellatus* (Spotted Laughing Thrush), Yuhina sp., *Upupa epops* (Common Hoop) *etc.* Table **23** presents the conservation status of birds.

5.2.2.3 Herpetofauna

The following reptiles and amphibians are present in the SNP and its buffer zone. Himalayan Toad *(Bufo himalayanus),* Liebig's frog *(Paa liebigii),* Eastern keelback *(Amphiesma platyceps),* Himalayan trinkt snake *(Elaphe hodgsonii) and* Himalayan/Glacier skink *(Scincella ladecense himalayanus*), these species are reported in the annual progress report of the SNP. However, these are not categorized as protected species.

5.2.2.4 Fishes

During consultation with the people living from generations in the project area, it was revealed that neither they have seen fishes in Cholunche Khola in their life time nor they have heard from their ancestor about it. According to the local people and representatives from RM, SNP and BZMC, the nearest point from the project site where the fishes can be found is Khari Khola, located in Ward No. 1 of Pasanglhamu RM, and is about 35 Km in south.

A consultation organized by AEPC with the representatives of Khumbu Pasanglhamu RM, SNP, BZMC and proponent on 18 September 2022 at AEPC Office, Mid Baneshwor (**Annex XIII**) also verified the information. During consultation, a discussion was focussed on presence of fishes in Choliunche Khola. As per the discussion, there is no availability of fishes in those river due to high drops and slop gradient, high altitude and cold and freezing water. The Chief Conservation Officer of SNP also mentioned the statement "The snow-fed Dudhkoshi and Imja Khola originating from the Himalayas and the Tibet Autonomous Region (TAR) of China are the main aquatic habitats in the Khumbu region. In addition, there are many glacial lakes that harbor wetland habitats for migratory birds. However, there is no evidence of aquatic life in its river systems and lakes due to icy-cold temperature (SNP, 2016)" published in "Sagarmatha National Park and Its Buffer Zone Management Plan 2016-2020" published by the GON, and highlighted his experience of no evidences of fishes in the river systems around the proposed project areas. This statement is also supported by Khatri et al. 2020, with the statement "The presence of fish beyond the tree line in Nepal[2] has not been reported yet. High altitude lakes and rivers are known to be naturally fishless because the elevation acts as a natural physical barrier against fish migration and colonization (Ventura et al., 2017). In Nepal, only three endemic species of Schizothorax have been reported from Lake Rara - a high mountain lake in the western region of the country". AEPC also consulted with ICIMOD and Department of Environmental Science and Engineering, Kathmandu University regarding the study on fish population on those rivers. So, these screening confirmed that there is not existence of fish. In addition, the Chairperson of the RM shared his experience related to COVID-19 pandemic. People had a belief that consuming Himalayan Toad (PAHA) will provide immunity and strength to fight with the disease. So, people conducted a massive search for it in Cholunche Khola. Even during that period, people did not find any fish, though they were able to catch few toads.

5.2.3 Protected Areas

The project area lies in the Sagarmatha National Park (SNP), legally protected area of Nepal. Additionally, it is recognized as a World Heritage Site (WHS) by UNESCO upon the criterion (vii). The SNP is identified as an Important Bird Area (IBA) by Birdlife International, which recognizes the important biodiversity value of the area. Ramsar Wetlands of international importance are also located in SNP. Thus, potential impacts of

[2]Out of the thirty-four species recorded from the study forest (SNP), *A. spectabilis* was the co-dominant species with high species diversity. Total tree density was the highest at 3450 m and the lowest at 3550 m. Elevation appeared to be the important environmental factor that affects the community attributes of the study forest.
Nagarkoti et al. 2019, Community structure and regeneration pattern of *Abies spectabilis* in Sagarmatha National Park, Central Himalaya, Nepal, Banko Janakari, Vol 29 No. 1, 2019 Pp 12–24 (https://www.nepjol.info/index.php/BANKO/article/view/25150/21115)

projects to the Outstanding Universal Value (OUV) has been assessed during the preparation of this EIA report.

5.2.3.1 Terrestrial Ecosystem, Protected Areas and Red Book Species

The conservation status of flora and fauna (mammalian and avian) is presented in **Table 21, 22 and 23.**

Table 21: Conservation Status of Flora of Project Area

S. N.	Nepali Name	English Name	Scientific Name	CITES Appendix	IUCN Red List	GoN
1	Talispatra	Webb Fir	*Abies spectabilis*	-	NT	Protected
2	Chanp	Mangolia	*Michelia champaca*	-	LC	Protected
3	Jatamansi, Bhutle	Himalayan Spikenard	*Nardosta chysjatamansi (formerly N. grandiflora)*	II	CR	Protected
4	Jhyau	Lichen	*Parmelia sp. & others spp.*	-	-	Protected

(Source: Field Survey 2022; IUCN Red List of Threantened Species 2023)

Table 22: Conservation Status of Mammals potentially occurring in Project Area with updates from IBAT

SN	Nepali Name	Common Name	Scientific Name	Conservation Status		
				Nepal Red Data Book (2012)	IUCN Red List	CITES Appendix
1	Sikkime Ghanse Muso	Sikkim Vole	*Pitymys sikimensis*	LC	LC	-
2	Chhuchundro	Brown Toothed Shrew	*Episoriculus caudatus (formerly Soriculus caudatus)*	LC	LC	-
3	Chituwa	Common Leopard	*Panthera pardus*	VU	VU	I
4	Pani Chuchundro	Elegant Water Shrew	*Nectogale elegans*	LC	LC	
5	Chuchundro	Golden Jackal	*Canis aureus*	LC	LC	III
6	Bwasho	Grey Wolf	*Canis lupus*	CR	LC	I
7	Kalo Bhalu	Himalayan Black Bear	*Ursus thibetanus*	EN	VU	I
8	Muse Thutekharayo	Himalayan Mouse-hare	*Ochotona roylei*	DD	LC	-
9	Jharal	Himalayan Thar	*Hemitragus jemlahicus*	NT	NT	-
10	Duhure Ghar Muso	House Mouse	*Mus musculus*	LC	LC	-
11	Ghar Muso	House Rat	*Rattus*	LC	LC	-
12	Dhendu	Langur	*Semnopithecus priam ssp. Thersites* (Formerly *Presbytis entellus)*	LC	VU	I
13	Kasturi	Himalayan Musk Deer	*Moschus leucogaster (formerly M. chrysogaster)*	DD	EN	I
14	Habre	Himalayan Red Panda	*Ailurus fulgens sub sp. fulgens*	EN	EN	I
15	Rato Bandar	Rhesus Macaque	*Macaca mulatta*	LC	LC	-

SN	Nepali Name	Common Name	Scientific Name	Conservation Status		
				Nepal Red Data Book (2012)	IUCN Red List	CITES Appendix
		Monkey				
16	Saiberiyali malasapro	Siberian Weasel	*Mustela sibirica*	LC	LC	III
17	Malsapro	Yellow-throated Marten	*Martes flavigula*	LC	LC	III
18	KaloSalak	Chinese Pangolin	*Manis pentadactyla*	EN	CR	I
19	Ban Kukur	Dhole	*Cuonalpinus*	EN	EN	II
20	Mandelliko Musakane Chamero	Mandelli's Mouse-eared Myotis (Bat)	*Myotis sicarius*	VU	VU	-
21	Hiun Chituwa	Snow Leopard	*Panthera uncia*	EN	VU	I
22	Thar	Mainland Serow	*Capricornis sumatraensis*	NT	VU	I
23	Bhote Kharayo	Wolly Hare	*Lepus oiostolus*	LC	LC	
24	Lamkaane Thutekharayo	Large-eared Pika	*Ochotona macrotis*	-	LC	
25	Phyaumuso	Bobak Marmot	*Marmota bobak*	-		
26	Sunkanthe Kasturi	Alpine Musk Deer	*Moschus chrysogaster*	EN	EN	I
27	Ghansemuso	Stoliczka's mountain Vole	*Alticola strachey*	-	LC	-

(Source: Field Survey 2022; IUCN Red List of Threantened Species 2023)

Table 23: Conservation Status of Birds in Project Area

SN	Nepali Name	English Name	Scientific Name	CITES Appendix	IUCN Red List	Nepal Red Data Book
1	Giddha	Cinereous Vulture	*Aegypius monachus*	-	NT	EN
2	Chilime	Blood Pheasant	*Ithaginis cruentus*	II	LC	LC
3	Cheel	Osprey	*Pandion haliaetus*		LC	LC
4	Danphe	Impeyan Pheasant	*Lophophorusim pejanus*	I	LC	NT
5	Tibbati Him-Kukhura	Tibetan Snowcock	*Tetraogallus tiebetanus*	-	LC	-
6	Dadi Bhayeko Giddha	Bearded Vulture	*Gypaetus barbatus*	-	NT	VU
7	Munal	Crimson-horned Pheasant	*Tragopan satyra*	III	NT	VU

SN	Nepali Name	English Name	Scientific Name	CITES Appendix	IUCN Red List	Nepal Red Data Book
8	Shahi Baaj	Peregrine Falcon	*Falco peregrinus*	I	LC	LC

(Source: Field Survey 2022)

5.3 Socio-economic and Cultural Environment

5.3.1 Project Load Centre (Beneficiary) and Distance from the Project Site

Altogether 19 settlements with 451 households are identified as load centers **(Table 24)**.

Table 24: Load Centers with Distance

SN	Settlements (Load Centers)	No. of HHs (451 Beneficiary Households)	Distance from Powerhouse (Km)
1.	Chukung	12	11.00
2.	Debuche	6	3.57
3.	Dingboche	86	6.20
4.	Dole	14	11.20
5.	Fungi Tenga	9	6.90
6.	Lawi Schyas	11	7.82
7.	Lobuche	12	13.67
8.	Luza	3	14.50
9.	Milingo	3	2.85
10.	Machhermo	13	16.00
11.	Pangboche	102	1.05
12.	Pheriche	35	7.05
13.	Phortse	106	6.05
14.	PhortseTenga	3	7.50
15.	Shomare	19	2.40
16.	Thukla	2	10.78
17.	Thyangboche	7	4.57
18.	Worshyo	1	3.40
19.	Mongla	7	4.00

(Source: Field Survey 2022; IUCN Red List Threantened Species 2023)

5.3.2 Local Level and Ward

All the settlements of the project area are within ward number 4 of Khumbu Pasang Lhamu Rural Municipality of Solukhumbu District.

5.3.3 Population, House Size and Male Female Ratio

The total population of Khumbu Pasanglhamu RM is 8989 in 2433 houses with average family size of 3.69 (KPLRM, 2019). The total population in Ward No. 4 where the project site lies is 1912 in 551 HHs with average family size of 3.47. In beneficiary households (451 HHs), total population is 1651 with average family size of 3.66 **(Table 25)**. The female population (50.02%) is slightly more than male population in the RM while male population is 52.27% in beneficiary HHs.

5.3.4 Ethnicity and Religion

Out of 451 households surveyed, the dominant ethnic group is Sherpa (95.27%). Other Castes are negligible. Based on religion, out of total HHs, 78.80% HHs are Buddhists, followed by Hindu (20.63%) and Christian (0.57%).

5.3.5 Religious and Cultural Place in the Project Area

Gumba is the main religious place in the project area. There are 10 Gumbas in the project area. The nearest Gumba is Pangboche Gumba which is 800 m in west from powerhouse site which is one of the main meeting or gathering place. Gumbas are at Khumjung, Fortse, Tengboche, Debuche and Khunde. The Tengboche Gumba is well known and the largest Gumba in the SNP.

In Sherpa Community, crematory is considered as a sacred place. There are crematories in each village of Solukhumbu, so as in Pangboche. These are the only open spaces of cultural significance.

Table 25: Number of Houses in Affected Settlements

S.N.	Place Name	No. of HHs	Male	Female	Total
1	Chukung	12	22	27	49
2	Debuche	6	2	3	5
3	Dingboche	86	174	147	321
4	Dole	14	26	33	59
5	Fungi Tenga	9	15	11	26
6	LawiSasa	11	12	8	20
7	Lobuche	12	15	9	24
8	Luza	3	0	0	0
9	Milingo	3	10	12	22
10	Mochhermo	13	32	14	46
11	Pangboche	102	194	201	395
12	Pheriche	35	56	55	111
13	Phortse	106	200	197	397
14	PhortsheTenga	3	3	7	10
15	Shomare	19	37	36	73
16	Thukla	2	7	4	11
17	Tyangboche	7	42	14	56
18	Worshyo	1	2	2	4
19	Mongla	7	8	9	15
	Total	**451**	863	788	1651

(Field Survey 2022)

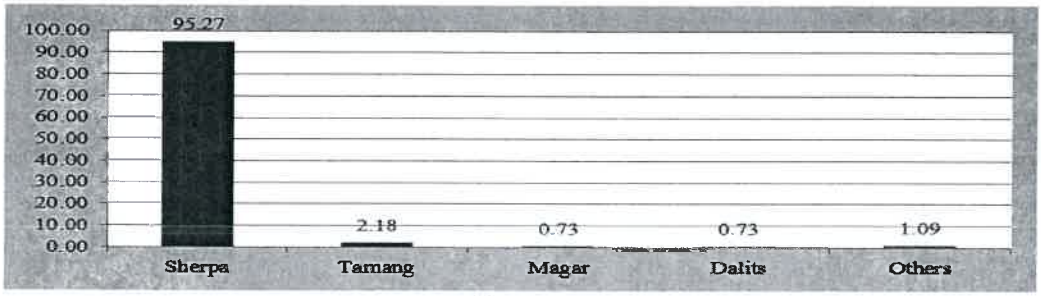


Figure 5: HHs Percentage Based on Caste/Ethnicity in Ward No. 4

(Source: KPLRM, 2019)

5.3.6 Cultural Practices and Festivals in Project Area

Buddha Purnima, Mani Rimdu and Dumji are the major festivals and ceremonies that are celebrated in the project area. Manirimdu is celebrated for 3 days in November. The first day of festival involves prayers, second day for colorful lama dancing, they wear brocade gown and wonderfully painted papier-mâché masks. Last day is for humorous dances and chanting prayers. Dumji is celebrated on the occasion of birthday of Guru Rimpoche. The festival serves as a religious and community duty to help bring the villagers together. Every 13 years it falls upon three families to provide food and drink for the entire village for the duration of celebrations, which lasts for 4 days (Source: https://www.guideinhimalaya.com/). Sherpa are the community that worships the nature. There is a traditional practice of cultural and religion including the restriction of animal hunting and slaughtering, and reverence of all living beings.

5.3.7 Literacy and Education

Literacy rate in Ward No. 4 is 73.98% while it is 67.7% in the RM.

Table 26: Literacy Rate of Khumbu Pasanglhamu RM

Ward Number	Literate (%)	Illiterate (%)
1	63.26	36.74
2	75.28	24.72
3	70.41	29.59
4	73.98	26.02
5	62.56	37.44
Total	67.72	32.28

(Source: KPLRM, 2019)

There are 15 government schools and one private school in the RM. There are two basic schools at Pangboche and Phorse while one secondary school is in Khumjung (**Table 27**).

Table 27: Educational Institutions

Ward No.	SN	Name of School	Level	Remarks
1	1	Shree Khari Khola Secondary School, Khari Khola	Secondary	
	2	Shree Mera Adharbhut School, Khari Khola	Basic	
	3	Shree Pankonija Adarbhut School, Khari Khola	Basic	
	4	Shree Buksa Adharbhut School, Khari khola	Basic	
2	5	Shree Lukla Adharbhut School, Lukla	Basic	
	6	Shree Sagarmatha Adharbhut School, Surke	Basic	
	7	Shree Himalayan English Boarding School	Basic	Private
3	8	Shree Mahendra Jyoti Secondary School, Chaurikharka	Secondary	
	9	Shree Pemachholing Adharbhut School, Ghat	Basic	
	10	Shree Jansewa Adharbhut School, Gumela	Basic	
	11	Shree Yuwa Barsha Adharbhut School, Manju	Basic	
4	12	Shree Pangboche Adhabhut School, Pangboche	Basic	
	13	Shree Fortche Adharbhut School, Fortche	Basic	
	14	Shree Khumjung Secondary School, Khumjung	Secondary	
5	15	Shree Himalaya Adharbhut School, Namche	Basic	
	16	Shree Thame Adharbhut School, Thame	Basic	

(Source: KPLRM, 2019 and Field Study 2078)

Locals rarely send their children at local school. Most of locals educate their children in Kathmandu. People with higher education in project area is very few (**Figure 6**).

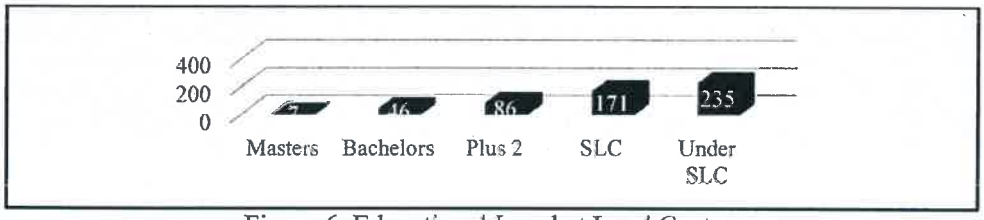


Figure 6: Educational Level at Load Centers

(Source: Field Survey 2022)

5.3.8 Health and Sanitation

Most of the (98%) has access on piped drinking water in ward no. 4. Most of people use community tap while few have personal (Source: KPLRM, 2019). Almost all HHs have toilet facility in the project area. Hotels have modern toile facility while most of HHs has traditional toilets (Source: KPLRM, 2019). As the project area is well known tourist destination, local people are aware about waste management. Buffer Zone User Groups are managing the wastes of public places while waste from hotels and houses are managed from community level. Sagarmatha Pollution Control Committee supports for waste management along the trekking routes as well settlements.

Blood pressure, diabetes and gastritis are major chronic diseases in ward number 4. Other common health problems are headache, stomach pain, accidental cases and common cold (KPLRM, 2019). There is 1 hospital at Khunde, 1 health post in Khumjung and 1 sub-health post at Pangboche. Hospital at Khunde is run by a NGO and has a little bit more facility. Others have basic facility for treatment and immunization. People have to go to Kathmandu even for basic treatment (Source: KPLRM, 2019).

5.3.9 Occupation and Income

Tourism activities such as trekking, mountain climbing, hotel and restaurant are the major economic activities of the project area. The other sources of economic activities are agriculture and foreign employment. Despite the large number of people in project area engaged in tourism related business unemployment rate is found relatively higher in Ward No. 4 comparing to other Wards of the RM.

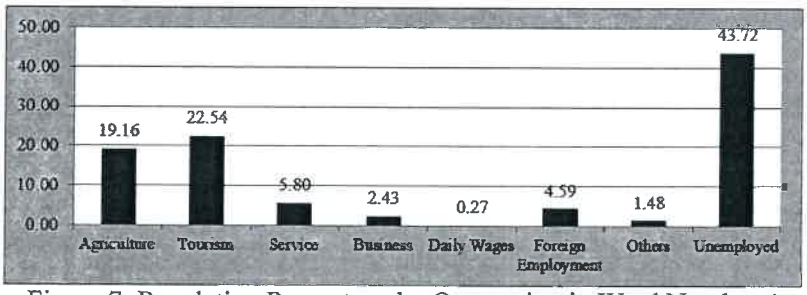


Figure 7: Population Percentage by Occupation in Ward Number 4

(Source: KPLRM, 2019)

Annual or Monthly average income of people in the project area is more than NPR 40,000.00 (Figure 8). 23% HHs has income upto NPR 10000.00 while 18% HHs in-between NPR10-20 thousand.

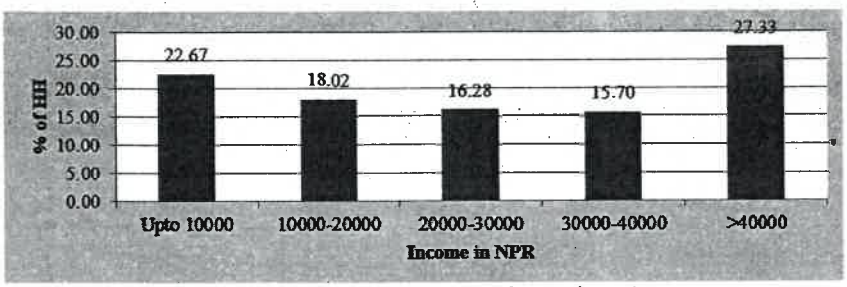


Figure 8: HH Annual Income in Project Area

(Source: KPLRM, 2019)

5.3.10 Marginalized of People Project Area

Most of the people in the project area belongs to Sherpa ethnic community followed by Tamang, Rai and Dalit. 170 women are single while 2 people are disable in the project area. The project does not have adverse impact to the people directly or indirectly to these identified vulnerable groups. All project components will be in public land so nobody will be displaced and land from locals will not be acquired. As almost all people are indigenous Sherpa and the project benefits them without any adverse impacts. The project provides the energy during operation that can be used for various purposes such as cooking, lighting, heating and many more. Thus, the project will benefit people including vulnerable groups of project area with beneficial impacts rather than adverse impacts.

5.3.11 Industry and Factory

There are no any industries or factories in the project area. There are many hotels and restaurants, shop and bakery, established to support tourism in the project area.

Table 28: List of Hotels and Other Facilities

Entities	Number
Hotels and Restaurant	224
Shop	4
Bakery	2

(DFS & DED, 2022)

5.3.12 Physical Infrastructure

5.3.12.1 Transport

The project area has no motorable road. There is only trekking route which is 4-6 feet in width. The area is accessible through helicopter which is common in the area.

5.3.12.2 Energy

The project area is far from the national grid of power supply. They are using limited electricity generated from existing micro hydro projects. There are three micro hydro projects in the project area (Table 29). Very few HHs uses solar panel for light. Most of HHs are using fuelwood for cooking while users of LPG are also high in ward number 4 (Figure 9) (Source: KPLRM, 2019).

Table 29: Existing Micro Hydro

SN	Hydropower	Ward	Installed Capacity (kw)
1	Tengboche Micro Hydropower	4	35
2	Pangboche Micro Hydropower	4	25
3	Phorche Micro Hydropower	4	50

(Source: Field Survey 2022)

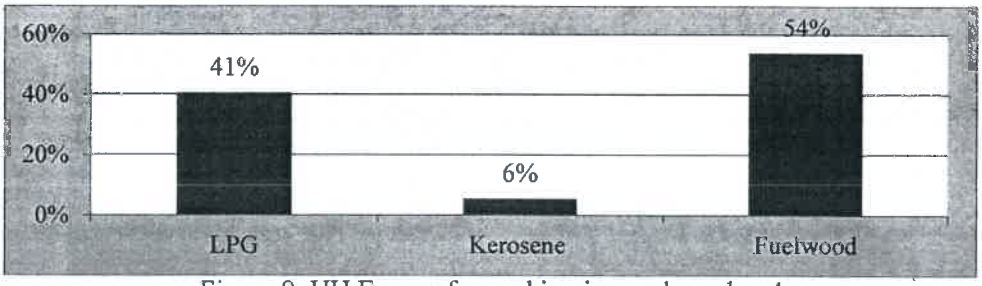
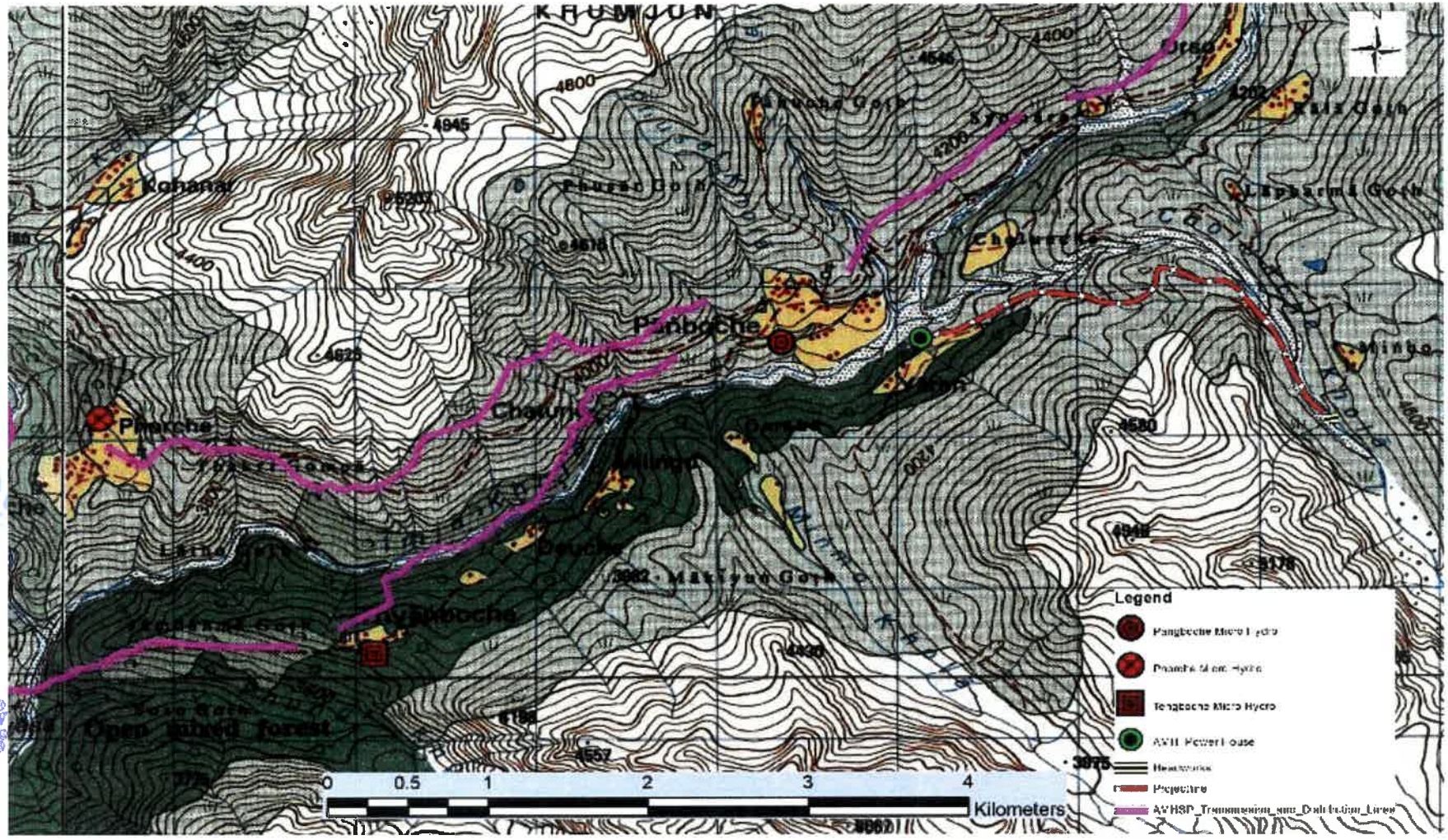


Figure 9: HH Energy for cooking in ward number 4

(Source: KPLRM, 2019)



Map 11: Location of Existing Microhydro

Table 30: Bridges in SPIA

SN	Name of Bridge	Type of Bridges	Address	Remarks
1	Phungi Tenga Bridge	Suspension	Phungi Tenga	Dudhkoshi Crossing
2	Milingo Bridge	Suspension	Milingo	
3	Dingboche	Iron Bridge	Dingboche	Feriche
4	Feriche Bridge	Iron Bridge	Feriche	
5	Thugla Bridge	Iron Bridge	Thugla	Feriche
6	Fortse Tenga	Iron Bridge	Fortse Tenga	Dudhkoshi Crossing
7	Dole Kathe Sangu	Wooden Bridge	Dole Kathe	Crossing
8	Nala Iron Bridge	Iron Bridge	Nala Phalame	
9	Gokyo Iron Bridge	Iron Bridge	Gokyo	Crossing
10	Imja	Iron Bridge	Pangboche	Crossing

(Source: Field Survey 2022)

5.3.13 Migration

Both out-and in- migration is very low in the project area. Traditionally locals do not sell their land and houses to outsiders. Locals rent out their houses to outsiders for business purpose only. Therefore, migration is almost nil in the project area.

5.3.14 Market

There is no market center in ward number 4. Namche and Lukla are major market centers in the RM. Pangboche is a small settlement with a few shop and many hotels.

5.3.15 Probable Development Centre

As the proposed project is itself a small project, it does not impart huge impacts on local as well regional economy. The geographical location, climate and local culture system also do not lead to develop a commercialized regional development centre.
exists in project area with 9 BZUGs.

5.4 Outstanding Universal Values (OUV) of Sagarmatha National Park Heritage Site

According to The Operation Guidelines for Implementing the World Heritage Convention (UNESCO 2017), the Outstanding Universal Value (OUV) is cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity whose permanent protection of the heritage is of the highest importance to the international community as a whole. The OUV consists of Criteria/Value, Integrity and Protection and Management at the time of nomination as a World Heritage Site. SNP has been inscribed as a UNESCO's natural World Heritage in 1979 AD. The OUV of SNP as inscribed (OUV statement), are as followings.

5.4.1.1 Value/Criteria

The SNP is under the criteria VII of the World Heritage Criteria for superlative natural phenomenon or areas of exceptional beauty and aesthetic importance. SNP contains the highest point of earth's surface- Mount Everest and has religious and cultural settings such as Tengboche monastery and Sherpa culture. Along with its 'unquestionable' superlative

natural phenomena (Mt. Everest and its surrounding natural features) and unique Sherpa culture and Lifestyle (as in IUCN, 1979), SNP perfectly meets and falls under the UNESCO World Heritage criteria VII as evaluated by IUCN, 1979.

The site contains 7 other peaks with altitude more than 7000 m that are geologically young with deeply incised valleys by glacier giving rise to magnificent landscape that are aesthetically striking features. The zone provides the barrier between the Palearctic realm and Indo-Malayan realm. There are six altitudinal vegetation classes from oak forest at lower elevation to lichen and mosses at higher elevations that harbors rare and endangered animals such as Snow Leopard and Red Panda. The Gokyo and associated lake group has been enlisted as Ramsar sites since 2007 that has added value to the site. The property (site) also hosts about 6000 Sherpa people and over 20 Sherpa villages whose culture and lifestyles has allowed sustaining protection of the park.

5.4.1.2 Integrity

The SNP has an area of 124,400 ha., which was established as a national park in 1976 under the National Park and Wildlife Conservation Act, 1973 (NPWC Act) and managed by the Department of National Parks and Wildlife Conservation. The entire site is bounded by Great Himalayan range that borders the Qomolongma Nature Reserve of China, physically at Monjo in south, Makalu-Barun National Park in east and Gaurishankar Conservation Area in west. A buffer zone was established in 2002 in the south, as the name suggest itself, with objective to protect its integrity. The buffer zone is not among SNP's OUV.

The site integrity can be sought as combination of natural features with the Sherpa culture and lifestyle. The conservation-oriented Sherpa cultural elements such as 'Nawa' (pasture land regulator), 'Beyul' (sacred hidden valleys), 'Yul-lha' (Mountain protector), 'Chaam/Nyingje' (Principle of kindness among all living beings), 'Gompa' Forest (Forest sanctioned by Monasteries' etc. have contributed the integrity of the existing landscape. The properties related with trade and agriculture held by the Sherpa people does not come under park administration i.e. those are excluded from the park by legal definition.

5.4.1.3 Protection and Management

The NPWC Act 1973 is the principal legislation under which the site is protected supplemented by the Himalayan National Park Regulations (1978). The Sagarmatha National Park office has the administrative role of ensuring park services with conservation under the Department of National Parks and Wildlife Conservation, Ministry of Forest and Environment and Nepalese Army has been deployed for its protection. A Buffer Zone Management Committee (BZMC) manages 3 Buffer Zone Users Committee (BZUC) that have 28 Buffer Zone User Groups (BZUG) within the national park (as Village Enclaves) and outside to the south. The park provides 50% of its revenue to the local communities through the Integrated Conservation and Development Program (ICDP). The Park and Buffer Zone Management Plan (2016-2020) focuses on habitat and biodiversity conservation, Tourism and Interpretation, Buffer Zone Management and Research, Monitoring and Capacity building with special programs on species conservation for Snow Leopard, Musk Deer and Red Panda. As from the experience from the implementation of the earlier plan (2007-2012, budget constraints hindered the effectiveness (SNP/GoN, 2016).

Tourism is the main income source for the local people and the park. Due to huge number of tourist movement (45,112 tourist visited in FY 2016/017 AD) in the project area has created human pressure in park's ecology and other resources. The effects generate in form of demand for more food, water, energy, lodging, solid waste generation and new trail development. Other sources of impact in the site are from development works such new trail construction, building resorts and lodges. The local demand for firewood is also a major cause for deterioration of the park OUV where only 3% of the park is forested. The park is affected by air pollution, illegal activities, impacts from tourism, use of excess energy, livestock farming, visitor's accommodation, mining and querying, climate change, solid wastes and wild plant collection as in year 2018 (UNESCO, 2019).

CHAPTER 6: ALTERNATIVE ANALYSIS

Alternative analysis is an integral part of project feasibility study. Alternative analysis is primarily governed by the factors like technical feasibility, economic viability, and environmentally and socially acceptable. This section focuses on the assessment and evaluation of the following aspects of the available alternatives: (i) Choice of design; (ii) Analysis of potential alternative project sites; (iii) Topography; (iv) Technology; (v) Procedures of Operation, Work Plan; (vi) Raw Materials and (vii) Use of government land.

The aim of the proposed project AMHP is to construct the mini hydro of 911 kW capacity and to distribute at local level through 11 kVA transmission lines. The various alternatives to achieve the project objectives of AMHSP with no or minimum environmental damages are discussed in the following sections.

6.1 Design Alternative

Proposed AMHP is a run of river and initially it was proposed as an installed capacity of 600 kW. During Detailed Feasibility Study it was found that electricity demand in the project area is very high. Therefore, alternative options in the right side and left side of Cholunche Khola were carried out. Technically both sides found feasible for Mini Hydro, but left side option found better than right side with significant head gain to increase project capacity up to 911 kW. Additionally, both sides of the Khola is landslide area[3] and left side route found more safe than right side to construction of civil structure, thus left side proposed for development of AMHP.

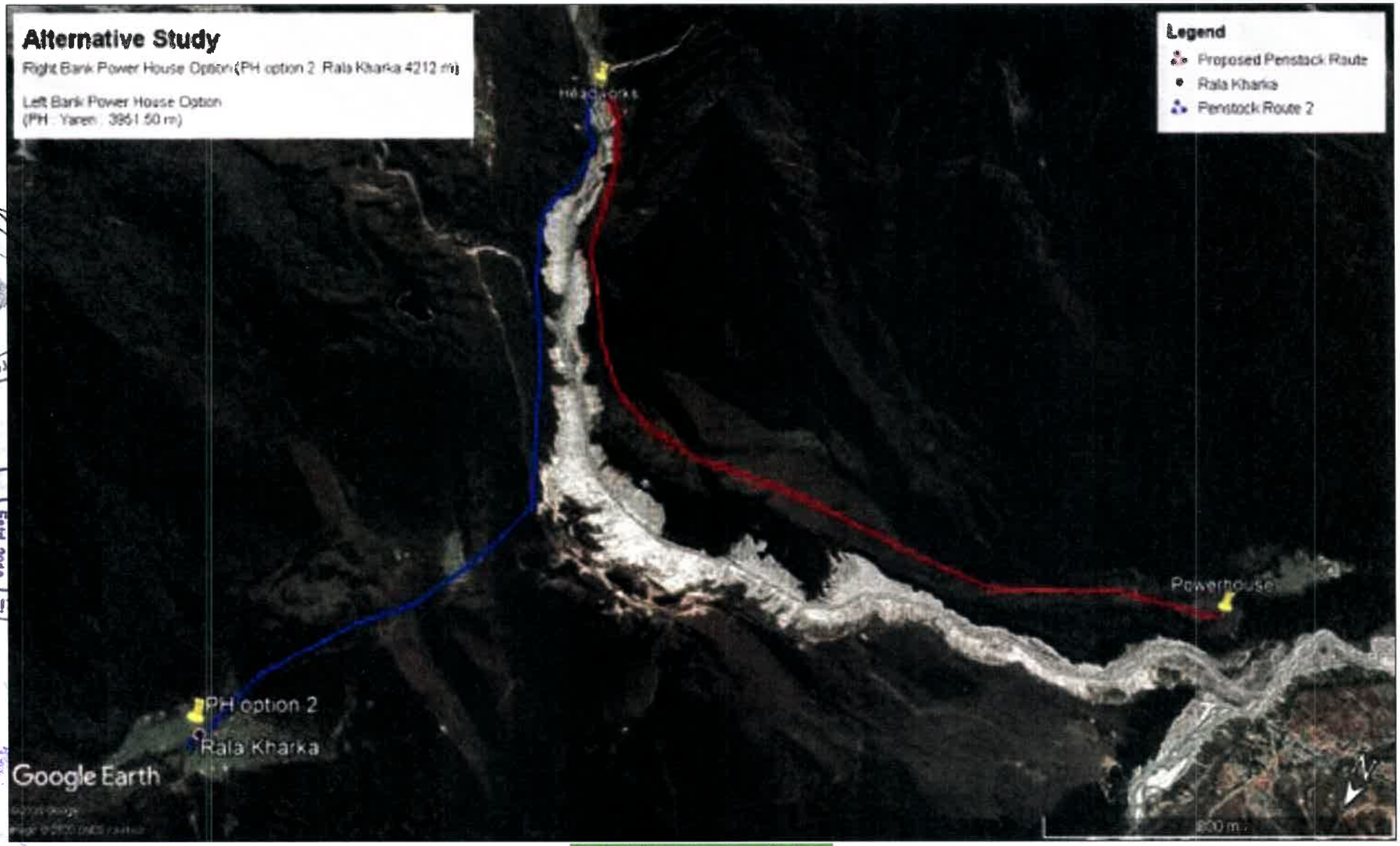
6.2 Project Sites

Upstream locations from the chosen intake are unsuitable because there is not much significant head gain while going upstream as the river gradient is very low. It will only increase the headrace cost with not much contribution to increase in power generation. Going downstream from present location of intake, new intake structures will have to be placed on a landslide which is also not recommended. Choosing right bank of the river, would lead to a power house location in Rala Kharkha (Blue Line). But the gross head was relatively low compared to the proposed power house location (Red Line). As the demand for electricity is very high in this area, this PH location at Rala Kharkha was neglected.

Table 31: Alternative Sites for Powerhouse

	Proposed Power House	Power House option 2
Power House Elevation	3,951.18 asml	4,212.00 asml
Gross Head	471.87 m	211.37 m

[3] It is revealed during discussion with the SNP warden that landslide occurred about 50 years back and after that it no landslide occurred, seems to be stable. Nonetheless necessary precaution will be taken during execution of the project to ensure sustainability of project.



Map 12: Different Alternatives of the Project

Table 32: Analysis of Alternatives

SN	Alternative	Description	Remarks
1	No Project Option	This option is the current situation without enough hydro energy, depending on LPG for cooking and biomass for heating. Locals always deprive for energy if no project option is accepted. Furthermore, pressure for biomass i.e. fuelwood is further more on National Park	Rejected
2	Option I-Power House on left bank (Opposite of Pangboche)	The site is suitable in terms of elevation, head (gross head: 471.87 m), energy generation (as higher head, more energy generation), suitable geological condition compared to option II.	Accepted
3	Option II- Powerhouse on Right bank (Rala Kharka)	Less gross head (211.37), less energy generation, difficult for laying of penstock pipe as it has to pass through highly eroded area along with large boulder area.	Rejected

6.3 Topography

Penstock pipe route through right bank was impossible due to rough topography with the deposition of masses of big boulders. Left bank is comparatively smooth with small boulders. Therefore, left bank was chosen for laying of penstock pipe.

6.4 Technology

Solar and wind power are other possible alternatives of electricity in the project vicinity. The potentiality of both solar and wind power depends on sunshine hour and wind velocity. The number of sunshine hour available in the project area is low which leads to less energy yield.

Moreover, the installation of wind or solar power generation will have a big visual impact on the landscape which will not be compatible with the OUV. Therefore, mini hydro will be the best and reliable source of energy in compare to solar PV.

6.5 Raw Materials

Various physical resources are consumed for the construction of proposed project. The materials to be used are boulders (stones) for gabion and walls, gabion wires, masonry wall, brick or concrete block, aggregates for concreting. Other local resources will be quarry and burrow used from the area. Reinforcement bars and cement will also need to be transported from other parts of the country. Electro-mechanical equipment needs to be imported from overseas manufacturers. There are no other cost-effective alternatives for the above materials in construction works of the project. The construction is intended to be carried out by manually.

6.6 Use of Forest

The no forest option helps to conserve and protect forest areas for optimal option selected for the project. It will obviously provide ecosystem services, soil and nutrient conservation, habitat for wildlife, source of fuel wood, forage and fodder to local people and other forest based raw materials. Both the climate and terrain is harsh and growth of

vegetation is limited. There are scattered trees after 2 Km chainage of penstock. To conserve these trees, penstock alignment has been designed in such a way to avoid tree cutting. Similarly, route for transmission lines and distribution lines will be followed the existing trails to avoid vegetated area and will be buried underground after laid down except river crossing. Thus the proposed project does not require tree felling and destruction of forest.

6.7 Construction Schedule

The estimated project construction period is 1.5 years from the date of commencement of the work. The construction works are mainly of surface construction works. Thus all works should be done in dry season. Similarly, the climatic condition of the area is very cold during winter. So, severe cold winter will be avoided. All the surface work will be scheduled in day light

6.8 Associated Risks

The project design has given due consideration to avoid risks both in terms of environment/social and project structures. While doing so, efforts were also made to minimize the project's cost. All the structures have been designed based on the surface geological investigations and has risk associated with cost overrun during construction. The powerhouse area is located on the terrace made by the Imja Khola and has been designed considering GLOFs from Imja. The risk of GLOF has also been accounted by referring to the potential GLOF discharge estimates. However, the T&D lines will be underground along the foot trails, except in river crossing areas. Hence, there is no risk associated with the T&D lines.

Another major item to consider is the risk of the peaking reservoir. A reservoir with the designed storage capacity is not envisaged to pose risks to the downstream population and other natural and environmental resources in the event of normal operation. As the dam is small and risk of inundating the downstream even during a dam break event is less.

Next minor risk is due to landslide along penstock alignment (Ch.0+160 to Ch. 0+250). The alignment passes though just below the crown of the slide as loose terrace deposit. The slide falls in loose river terrace deposit; it is not from the hill slope. Therefore, it has been believed that it will not create a great problem and has also been considered in design of the project.

On the same way, as there will be insulated cable used for T&D, which will not be risk the electrocution to the birds and other animals where the transmission lines expose while crossing the stream or rivers

CHAPTER 7: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section provides a description of beneficial and adverse impact on physical, biological, socio-economic, and cultural environment due to the implementation of the proposed project which is based on field observation. The impact assessment has been focused within the project influence area considering general profile at RM level. The impacts have been classified in terms of magnitude (low, medium and high), extent (site specific, local, and regional) and duration (short term, medium term and long term) as per National EIA Guidelines 1993.

7.1 Impacts

7.1.1 Beneficial Impacts

7.1.1.1 Construction Phase

i) Employment generation and skill enhancement

A total of 72,500 man days human resources will be employed during construction period with priority given to workers from the project affected area based on their skills and qualifications. The employment generated during construction phase will provide opportunity to increase income of local people which ultimately supports to strengthen the local economy. People involved during the construction of project can enhance their skills. After completion of the project construction, people can utilize their skills to get other opportunity of similar nature. *The impact will be direct in nature, high in magnitude, local in extent and short term in duration.*

ii) Benefits from implementation of environmental mitigation programs and benefit augmentation measures

The project will implement environmental mitigation programs and benefit augmentation measures as proposed in the EIA report. It will benefit the people of project affected area at large. Beside the mentioned activities in EIA, 1% of total project cost has been allocated for implementation of environmental and social mitigation measures during construction and operation. *The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.*

iii) Benefits from community and social support programs

Although the project has not allocated the budget for community and social support programs separately, the project will support on various community and social programs such as improvement of local services like health posts, schools, drinking water and social services from the budget allocated for ESMP as 1% of total project cost (6 million rupees) has been allocated for implementation of environmental and social mitigation measures during construction and operation. These programs are envisaged to help develop local infrastructures and social services in the project impacted area helping local people to improve their quality of life.

The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.

iv) Increase in economic activities in the project area and associated beneficial impacts in local economy

During the construction period, migrant work force will reside in the project area. Since they will have to purchase goods, there will be plenty of demand for different type of food, beverage, and other daily necessary items from the local market. To meet these demands, many local and outside people may operate a number of small shops and restaurants around the vicinity of the construction sites. This will increase local trade and business in the area. As a result of increased trade and business, significant amount of cash will be channeled into the local economy. *The impact will be indirect in nature, moderate in magnitude, local in extent and short term in duration.*

v) Benefits for exposure of local population to new technologies and technology transfer

The project requires professional technical persons for implementation of the construction works. Local people who will get opportunities to work with these professionals will get opportunities to learn knowledge and skills from the professionals. Thus, local people will be able to get employment in similar projects. Such knowledge and skills will be obtained, particularly in the areas of masonry, construction of dry walls, gabion walls and bio-engineering etc. *The impact will be direct in nature, low in magnitude, local in extent and long term in duration.*

vi) Utilization of local resources

Construction crew utilizes the local resources such as local agriculture produces, water resources and construction materials. This ultimately supports for local economy. *The impact will be indirect in nature, low in magnitude, local in extent and short term in duration.*

7.1.1.2 Operation Phase

i) Employment generation and skill enhancement

During operation, two operators, one in-charge, one helper, and one technician will be required for operation of the plant. This creates opportunity for employment and enhancement of skill to locals. *The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.*

ii) Benefits to be incurred from addition of 911 kW of power to local people

The implementation of the proposed AMHP will generate 7,225,781.76 kWh of hydroelectricity per year and distributed to local community, thus will help to improve the energy situation. This will be energy input in the local level power planning as there is no reliable source of electricity. Hydroelectric being clean renewable energy will also support to protect the environment through replacing traditional use of biomass fuel and LPG. Furthermore, electricity facility will help locals for lighting, establishment of small industries related to tourism, reduction of time in searching fuelwood in forest, improvement in health, replaced the traditional use of biomass as fuel, LPG, operation of electronic appliances such as fridge, washing machine, television and room heater etc. *The impact will be direct in nature, high in magnitude, local in extent and long term in duration.*

iii) Sharing of electricity royalty to concerned authorities

As per the provisions in the Inter-Governmental Fiscal Arrangement Act, 2074, 50 % of the total royalty obtained will be allocated to the Government of Nepal, 25% to the Koshi Province and 25% to the concerned local level. Although this will not be applicable in mini hydro projects, local government can fix the royalty from the mini hydro project. KPLRM has fixed 1% royalty from micro hydro. Similarly, SNP/GoN will get 50% of royalty that KLPRM gets. *The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.*

7.1.2 Cumulative Impacts

There is no existing/planned hydropower and irrigation project in Cholunche Khola. Similarly, existing micro hydro's will not impact as electricity will be bought as per agreement (**Annex XXIII**). It is decided during the screening that cumulative impact analysis is not necessary.

7.1.3 Adverse Impacts

7.1.3.1 Physical Environment

7.1.3.1.1 Construction Phase

i) Change in Land Use

Areas under different land use patterns will be required for the project construction. In the case of AMHP, river deposit areas, grassland and foot trails will be utilized for the project construction. The project requires 5.719 ha of land. Out of the total land to be acquired, project requires 1.169 ha of land from SNP for the construction of different project components such as headworks, office, powerhouse, switch yard, tailrace, reservoir, and electric poles at river crossing, thus changing the land use category and remaining from foot trails which immediately reinstate. Spoil disposal sites, quarry and borrow sites, workshop and material storage, project camps, transmission and distribution lines need 5.085 ha of land temporarily, but these will be made underground to reduce the impact on OUV of SNP. (*See Table 9 for details*). Thus impact of project on land use change seems minimal. *The impact will be direct in nature, moderate in magnitude, site specific in extent and long term in duration.*

ii) Change in Topography

The topography of the project area will be changed due to excavation, slope cutting, grinding etc. during construction. The placement of the project structure like intake, power house and staff quarters will change the landscape of the sites. Impact on the topography will also occur by the disturbance of fragile slopes, clearance of land and disposal of muck. As these areas will be rehabilitated and stabilized, the project will have minimal impact on topography. *The impact will be direct in nature, low in magnitude, site specific in extent and long term in duration.*

iii) Possible Glacier Lake Outburst Flood (GLOF) and associated impacts

The impacts of potential outbursts of glacial lakes upstream of the Chulunche Khola (Nare Khola) and Imja are expected to be significant. However, GLOFs occur in many different forms and can vary in character from catastrophic to insignificant and unrecorded. The downstream impact of any lake outburst depends on the size, depth, and type of dam of the

lake, distance from the project, nature of dam break, slope of the river channel downstream, possible obstruction to high floods by narrow cross sections downstream and other factors. A major lake outburst may release enormous amounts of stored water that, together with the debris flow, can causes serious flood damages downstream along the river channel. Vulnerability of people and property is higher during construction due to the number of people being exposed to the dangers of GLOF events. Impacts of GLOFs, unrelated to the Project, are expected to be low as probability of GLOFs from Nare glacier has not been expected. If it occurs, it may affect headwork only. *The impact will be indirect in nature, high in magnitude, local in extent and short term in duration.*

iv) Landslide and Soil Erosion

Construction activities like land excavation, slope cutting, grading etc. which will change the existing slope of land. So, these activities on slopes may induce slope failure and mass wasting. Minor Landslide along penstock alignment (Ch.0+160 to Ch. 0+250) may increase in size due to excavation work. The clearing activities of grassland for the construction of project structures will make the soil surface loose. So, soil erosion may occur during the rainy season especially in the steep slopes. The eroded particles may be transported to the river by monsoon runoff and exacerbate sedimentation in river. The unstable slopes and landslide areas has been identified during DFS and to minimize the risk, a suitable Gabion protection of length 100 m and cross-sectional area of $6m^2$ is construction on landslide area in penstock alignment. Thus these problems will not aggravate the environmental issues. *The impact is indirect, moderate in magnitude, site specific in extent and long term in duration.*

v) Generation of spoils and spoil disposal related issues

Improper disposal of the spoil may result in destruction of grassland, increased turbidity of river water, increased dust in project environment, adverse impact on aquatic life, and ugly scars in the landscape. This occurs during construction period only. These sites will be rehabilitated and reinstated immediately after construction. The proponent will prepare rehabilitation plan and implement it effectively after taking approval from the RM. *This impact is predicted to be direct in nature, moderate in magnitude, short term in terms of temporal coverage and site-specific in terms of spatial coverage.*

vi) Impact due to quarrying activity

Local construction material requirement will be minimal and the sites have been identified based on geological investigation. Hence, the construction material will be collected from the riverbank without disturbing the riverine ecology. Quarrying of construction material produces unwanted material also, thus affecting air quality due to dust and water quality through sedimentation. Similarly, it effects on local topography. The impacts last for construction period only. These sites will be reclaimed immediately after completion of construction activities. *This impact is predicted to be direct in nature, moderate in magnitude, short term in terms of temporal coverage and local in terms of spatial coverage.*

vii) Impact on material quarrying sites

Due to quarrying activities, the topography of quarry sites will be changed. The site may become unstable and materials for future may be shortage. The sites will be reinstated and rehabilitated immediately to reduce the impacts. The proponent will prepare rehabilitation

plan and implement it effectively after taking approval from the RM. *This impact is predicted to be direct in nature, moderate in magnitude, long term in terms of temporal coverage and site specific in terms of spatial coverage.*

viii) Water Pollution and Increase in sediment loads

Changes in water quality of surface water bodies are likely to occur due to construction activities. There will be a temporary increase in the turbidity and sediment content of the river due to unavoidable disturbance of river beds and banks and likely accidental spills of sediment producing material in the river. In addition, potential uncontrolled spillage of petrochemicals, oils, paints, cement slurry, and hazardous substances may also have an adverse impact on the river water quality during construction on headwork site. Besides this, wastewater from labour camps are likely to pollute the water microbiologically and add inorganic elements like carbon, nitrogen and phosphorus. Such pollution will take place in spite of project efforts to contain discharges and limit the extent as far as possible. The discharge of the camps' effluent into the water bodies could be significant with far reaching implications to the water users downstream, but mitigation measures to prevent this are included in the project. Improper management of waste, both solid and liquid, generated by the people directly or indirectly involved in the project will probably take place, and increased BOD and Fecal coliform in Cholunche and Imja Khola can be expected to a certain level. The potential for adverse impacts is nevertheless short-term in nature. *The impact will be direct in nature, moderate in magnitude, short term in duration and local in terms of spatial coverage.*

ix) Noise Pollution

Construction activities and aggregate crushing plants at project sites will generate noise and vibrations. The increase in ambient noise levels will have impacts to workers and on settlement (lower Pangboche) just opposite of powerhouse site. The impact is expected to be low in magnitude and for short duration. *The impact is direct in nature, low in magnitude, site specific in extent and short term in duration.*

x) Soil Pollution

Various chemicals, paints, petrochemicals etc. will be used in the different activities of project. Mishandling and spillage of different chemicals, paints, petrochemicals etc. may affect the soil of the project construction area. To prevent soil pollution, these materials should be handled carefully and stored in safe place. *The impact will be of direct in nature, low in magnitude, site specific in extent and short term in duration.*

xi) Issues of Haphazard Stockpiling of Construction Material

The project has designated separate areas for the stockpiling of construction materials such as sand, aggregates, iron rods, steel frames, cement, etc for the project construction period. However open and haphazard stockpiling is a potential to degrade the aesthetic beauty of the stockpiling areas. Seepage and leakages from the stockpiled construction materials can directly impact soil and water quality of the river. *The impact will be direct in nature, moderate in magnitude, site specific in extent and short term in duration.*

xii) Solid Waste Generation

During construction, two types of wastes will be generated by the project i.e. domestic and construction wastes. Improper handling and management of these wastes can result in unpleasant odor, deterioration of water qualities, visual impacts and public health hazards.

Construction wastes generated include synthetic materials and inorganic wastes like metal scraps, unused concrete mixtures, cement bags, containers, rubbers, iron bars etc. The improper disposal of these materials will cause land pollution and visual impact. *Considering the size of the project and quantity of waste generated, the magnitude of impact is considered to be medium, extent is local and the duration is short term.*

Domestic wastes generated include kitchen wastes, grocery packaging, and waste from worker's camp. Improper dumping of these wastes will result in unpleasant odor, water pollution and land pollution. The amount of domestic waste depends on the numbers of people involved in the project construction. It is expected that domestic wastes generated will be mostly organic in nature and if not managed properly will produce foul smell, visual impact and land pollution. The nearest settlement from the project site is Lower Pangboche which is 1.6 km away from the powerhouse construction site and proposed labour camps. As the project construction site is in isolated area and far from human settlement, adverse impacts to community due to solid waste are not envisioned. *Considering the size of the project and types of waste generated, the magnitude of impact is considered to be low; extent is site specific and short term in duration.*

xiii) Air quality degradation

During construction period, activities such as transportation of material, excavation and operation of crushing plant will generate dust. This impact on air quality will however be short in duration and limited to the project site. The impact will be most severe at weir site, powerhouse site, crushing activities, concrete mixing sites, and the spoil disposal area. Other potential impacts on air quality are unpleasant odor due to improper management of sewage and solid waste and indoor air pollution due to cooking activities. Increased dust in the air will impair the health of people and workers through increased incidence of Acute Respiratory Infections (ARI), wheezing, shortness of breath and dust allergies. *The impact will be indirect in nature, low in magnitude, local in extent and short term in duration.*

xiv) Hydrology and River Morphology

The diversion of water through the pipe will have an impact on the river flow and morphology. The river will divert up to 0.25 m^3/s of flow through the pipe to the powerhouse located downstream. Therefore, the river stretch of 3.5 km between the proposed intake and confluence between Imja Khola and Cholunche Khola site can be classified as a reduced flow length or zone. The basin hydrology and flow regime of Cholunche Khola will not be impacted by the project during the construction phase. Shortly downstream of the weir construction site, the river will be running in its natural state until dam closure and diversion to the power station commences. Possible extraction of large boulders from the riverbank for construction purposes may have impact on the river morphology in the long run. *The impact will be direct in nature, moderate in magnitude, site specific in extent and long term in duration.*

xv) Loss of Top Soil

Project requires grass land. The top soil, estimated to be about 300 m^3 will be destroyed if not removed before construction. *The impact will be direct in nature, low in magnitude, site specific in extent and long term in duration.*

xvi) Impacts on Dewatered Zone

The river stretch of 3.5 km between the proposed intake and confluence between Imja Khola and Cholunche Khola site can be classified as a dewatered zone. The water in this segment of river is not used for irrigation, drinking and not any livelihood purposes by local communities as there is not any human settlement exist in dewater zone.

Similarly, as per the consultation with RM representatives, SNP officials (Chief Warden and Assistant Warden) and locals, due to high slope gradient, altitude and extreme cold water the presence of fishes in Cholunche Khola is not reported. SNP and its Buffer Zone Management Plan was also referred for information on fisheries. Thus, impacts on fishes and community livelihood due to the reduction of river flow (50% of mean monthly release of water as per GoN policy) in dewatered zone is not observed.

xvii) Impacts due to Airlift of Equipments

As there is no road network of facility, heavy equipment need to be airlifted to the project site. Although it might seem to be new and expected impacts from the airlift, this is the fate of the region. As hanging of various equipment and materials in helicopter is common in the area due to lack of road facility as dozens of flights are seen daily. Thus it has been assumed that there is no any impact due to airlifting of materials and equipment.

7.1.3.1.2 Operation Phase

i) GLOF and associated impacts

Within the Cholunche Khola catchment, there is a Nare glacier. Due to moraine collapse of Nare glacier on 1977, a GLOF event was occurred, which took two or three lives and destroyed all the bridges for 35 km downstream including other properties (ICIMOD 2011). From 1977 (after GLOF) to till date, there is no formation of glacial lake and thus the probability of GLOF in Chulunche khola from Nare Glacier is expected to very low; and if occurred, it will impact on headwork area while GLOFs from Imja may impact on transmission and distribution system. The powerhouse of AMHP is located at left bank of Imja Khola with an altitude 3951.50 masl. Elevation difference (3951.50-3911 masl) between the riverside and powerhouse location is 40 m. As the potential GLOF depth at Pangboche is 7.6 m (Bajracharya et al., 2007), the Powerhouse location is safe from potential Imja GLOF. Impacts of GLOFs, unrelated to the project, are expected to be from moderate to high in magnitude, as it has been expected to affect headworks and distribution system. *The impact will be indirect in nature, high in magnitude, local in extent and short term in duration.*

ii) Change in topography and land use

Change in topography is not expected during operation phase as no additional structural components will be constructed. However, land used for the intake area and powerhouse area will be in use by project. The project structural features will be in existence till the project exists and the impact remains as a residual impact till then. *The impact is considered to be low in magnitude, site specific in extent and long term in duration.*

iii) Impacts on river morphology and possible microclimatic changes

The diversion of Cholunche Khola in intake site will eventually result in impacts on the downstream dewatered zone. Low volume of water is likely to increase the temperature in the dewatered zone. The change in flow during wet season is not considered significant but in dry period (2 months) the flow will be reduced which might cause impact on river

microclimate. This will be a residual impact until the project will be in operation. **Table 34** presents the predicted range of monthly water discharge in the River and reduction from original water flow. **Figure 10** presents the current and future seasonal water flow. Monthly design discharge was determined using Medium Irrigation Project (MIP) method.

Table 33: River Discharge after Flow Diversion

Months	Monthly River Discharge, (m3/sec)	Design Discharge for power generation, (m3/sec)	Discharge at the river after flow diversion to intake, (m3/sec)	Percentage
January	0.70	0.25	0.45	64.29
February	0.53	0.25	0.28	52.83
March	0.38	0.18	0.20	52.63
April	0.29	0.14	0.15	51.72
May	0.76	0.25	0.51	67.11
June	1.76	0.25	1.51	85.80
July	4.25	0.25	4.00	94.12
August	7.32	0.25	7.07	96.58
September	4.83	0.25	4.58	94.82
October	2.34	0.25	2.09	89.32
November	1.20	0.25	0.95	79.17
December	0.91	0.25	0.66	72.53

There will be changed in the water quality in the dry season in the reduced flow length of the river between weir and confluence of Cholunche khola and Imja Khola. Because of the reduction of the flow discharge and contribution of nutrients, there may be growth of blue filamentous algae in the reduced flow length stretch of the river. The dissolved oxygen level might drop with increased in water temperature. *The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.*

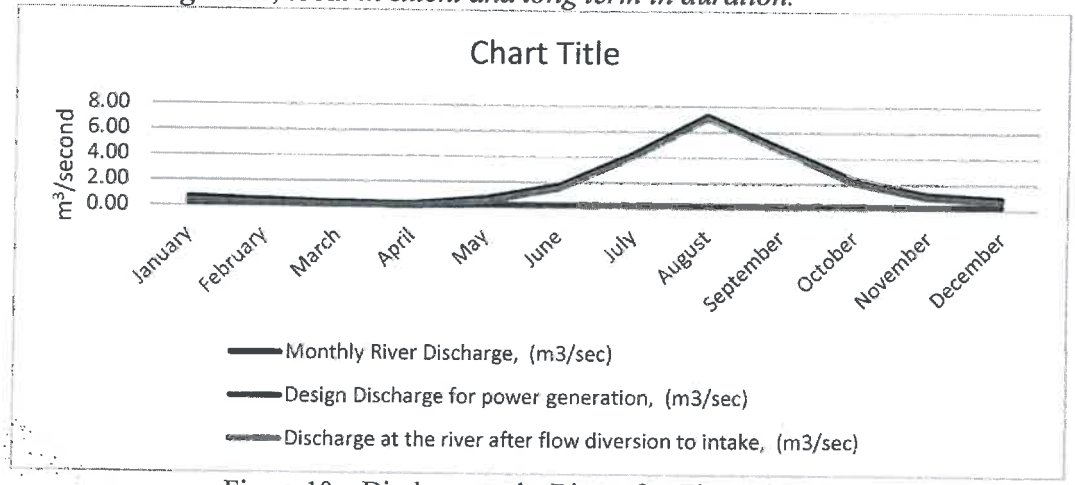


Figure 10: Discharge at the River after Flow Diversion

(Source: DFS 2022)

iv) Land submergence due to diversion weir and associated impacts

The diversion structure and creation of reservoir in front of the diversion structure in the operation phase divide the existing river morphology into distinct three sections as follows:

(i) Undisturbed section upstream the upper limit of the reservoir

(ii) Reservoir section of about 30 m length
(iii) Reduced flow length section of about 3.35 km length

As the existing aquatic life are co-existing with the undisturbed river morphology but are unlikely difficulties to sustain their life cycle in the changed morphological and water conditions of the changed river stretches. Changes in aquatic life may occur in the reservoir section and in the dewatered section through November to May every year. But due to freezing temperature, high altitude and steep topography, there are no fishes in the Cholunche Khola. The aquatic fauna is restricted to a limited diversity of invertebrates which have season life cycles. Most of these species are restricted to the aquatic environment during their larval stage but are able to fly and thereby disperse during their adult life stage. The aquatic habitat will therefore not be fragmented for most invertebrate species, and the impact of the project is expected to be nominal.
The impact will be direct in nature, low in magnitude, local in extent and long term in duration.

v) Management/final disposal of solid waste and waste water (both black water and grey water)

Pollution due to solid waste in and around project area during operation phase will be very low as compared to that during construction period. The solid waste generation sources will be limited after project construction. Waste water will be generated only from the Quarter and Office of the project site which will be managed by constructing septic tank.
This impact is indirect in nature, low in magnitude, site specific and long term in duration.

vi) Change in river water quality

Due to release of 50% of the mean monthly flow of water and absence of any source of contaminants nearby the project area, change in water quality is not envisioned.
This impact is low in magnitude, site specific and long term in duration.

vii) Noise and vibration at powerhouse

The noise and vibration is expected to be low at powerhouse site due to running of turbines and generator. As the powerhouse site is isolated from the human settlements, there will not be any impact to the community. Noise and vibration will be confined to the powerhouse site only. *The noise impact is direct in nature, low in magnitude, site specific and long term in duration.*

viii) Soil erosion due to tailrace discharge

The water from two units of powerhouse is conveyed to a nearby Kholsi through combination of tailrace canal and pipe. The confined discharge of water from tailrace might erode the soil around the tailrace during operation of the power generation plant.
The impact is direct in nature, low in magnitude, site specific and long term in duration.

ix) Impact on downstream due to sediment flushing

Sudden release of sediment from reservoir may erode the river bank. *The impact is indirect in nature, low in magnitude, site specific in extent and long term in duration.*

7.1.3.2 Biological Environment

7.1.3.2.1 Construction Phase

i) Loss of grassland area

Total land of SNP required by the project is 1.169 ha which is grass land. The project will acquire user right of land. As there is abundant of open space for grazing, the loss of small parcel of grass land will not have significant impacts. *Impact is of direct in nature, moderate in magnitude, site specific in extent and long term duration.*

Table 34: Grassland Required for Project Components

SN	Component	Land Area (ha)	Ownership	Acquisition
1	Headworks	0.097	GoN/SNP	Permanent
2	Office, Powerhouse, Switchyard and Tailrace	0.085	GoN/SNP	Permanent
3	Penstock	0.4	GoN/SNP	Permanent
4	Electric pole at river crossings	0.008	GoN/SNP	Permanent
5	Reservoir	0.036	GoN/SNP	Permanent
6	Distribution/Transformer Box	0.008		
	Sub-total	***0.634***		
7	Spoil Disposal Sites	0.025	GoN/SNP	Temporary
8	Quarry and Borrow Sites	0.38	GoN/SNP	Temporary
9	Workshop and Material Storage	0.08	GoN/SNP	Temporary
10	Project camps	0.05	GoN/SNP	Temporary
	Sub-total	***0.535***		
	Total	**1.169**		

ii) Loss of vegetation and overall vegetation diversity

There is no tree in penstock route, and civil structure will be made avoiding tree cutting. With respect to T & D, it will be taken underground through foot trails without disturbing any vegetation. *The impact is low in magnitude, site specific in extent and short term in duration.*

iii) Pressure on Forest for Fuelwood

As the area is cold, unsupervised construction crews might use or demand fuelwood for heating as well for cooking. This might increase the pressure on forest products for fuelwood. *The impact will be indirect in nature, moderate in magnitude, site specific in extent and short term in duration.*

iv) Impact on Sagarmatha National Park

There will be construction workers brought into the national park as well as a lot of equipment. This might have risk of introducing invasive alien plants, increased risk of poaching wildlife and a disruption to tourism during the construction period, especially along T&D route, which will place an increased burden on management and could also have a financial impact through reduce tourist park entry fees. *The impact will be direct in nature, moderate in magnitude, site specific in extent and short term in duration.*

v) Impact on natural and critical natural habitat features

vi) Impact on Red Panda and Himalayan Musk Deer

The preferable altitude for the habitat of Red Panda is (3000-3200 m)[4] and Himalayan Musk Deer is (3800-4000 m)[5]. The range of project area is 3860 m (Mongla village) to 4422 m (intake area), which is not habitat for Red Panda. However, Himalayan Musk Deer is rarely spotted around the project vicinity. Furthermore, during consultation with local people and other relevant stakeholders (SNP, Buffer Zone Committee, and RM) revealed that these animals rarely visit around the project area; they are not territorial of the major project component like intake and powerhouse area. The indirect impact might be an influx of workers which could disturb Musk Deer through illegal hunting or through the introduction of domestic dogs. *This impact is of direct in nature, moderate in magnitude, site specific in extent and long term in duration.*

vii) Impact on Himalayan Black Bear:

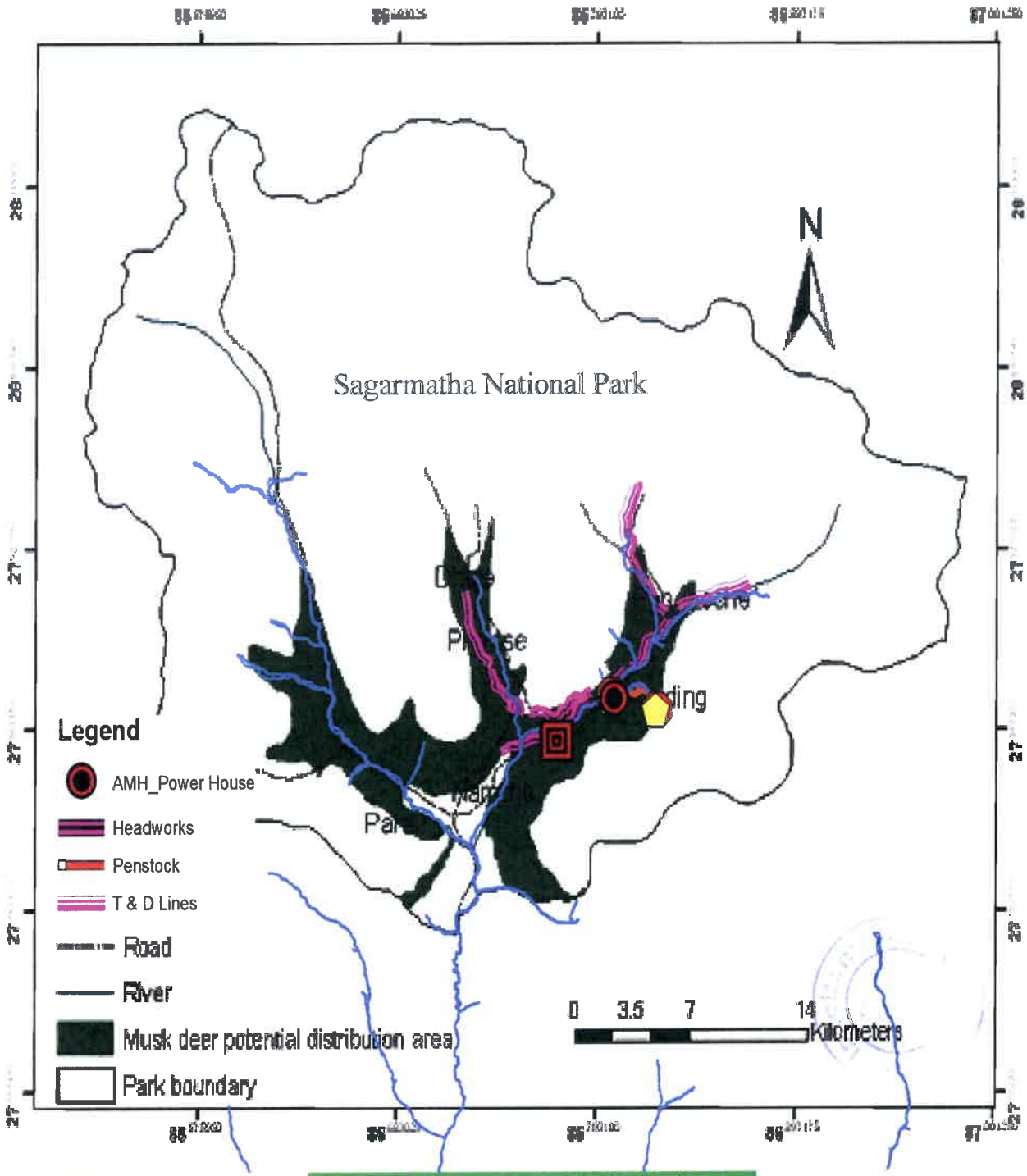
The preferable altitude for the habitat of Himalayan Black Beer is (1000-3000 m)[6]. They are dangerous animals that forage opportunistically as both hunters and scavengers. Food waste that is disposed inappropriately will attract bear into close proximity with people and increase the risk of harm to both people and bear. Most of the project components are in the left bank of cholunche Khola and along the trekking trails so there is very less chance of animal's movement except intake area. *This impact is of indirect in nature, moderate in magnitude, site specific in extent and long term in duration.*

To understand the habitat of major wild animals in SNP, potential habitat distribution of musk deer, red panda and snow leopard was done (Map13-15).

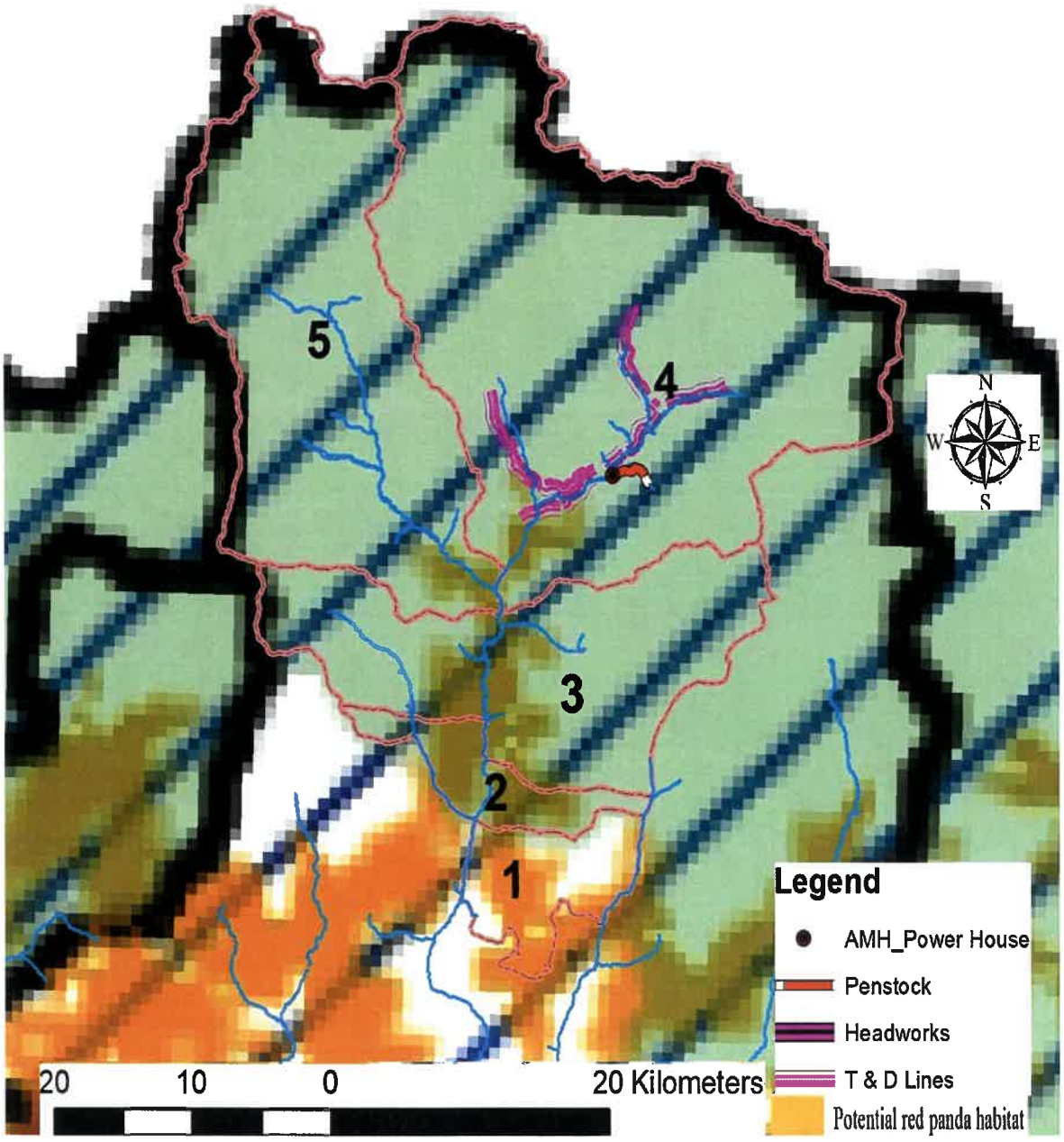
[4] Environment Service and Engineering Consultancy Pvt. Ltd. 2020, *Assessment of Status of Red Panda ad its Habitat in Sagarmatha National Park and Buffer Zone Area*

[5] Asian Centre for Development Pvt. Ltd. 2018, *Musk Deer Count in Sagarmatha National Park and its Buffer Zone*

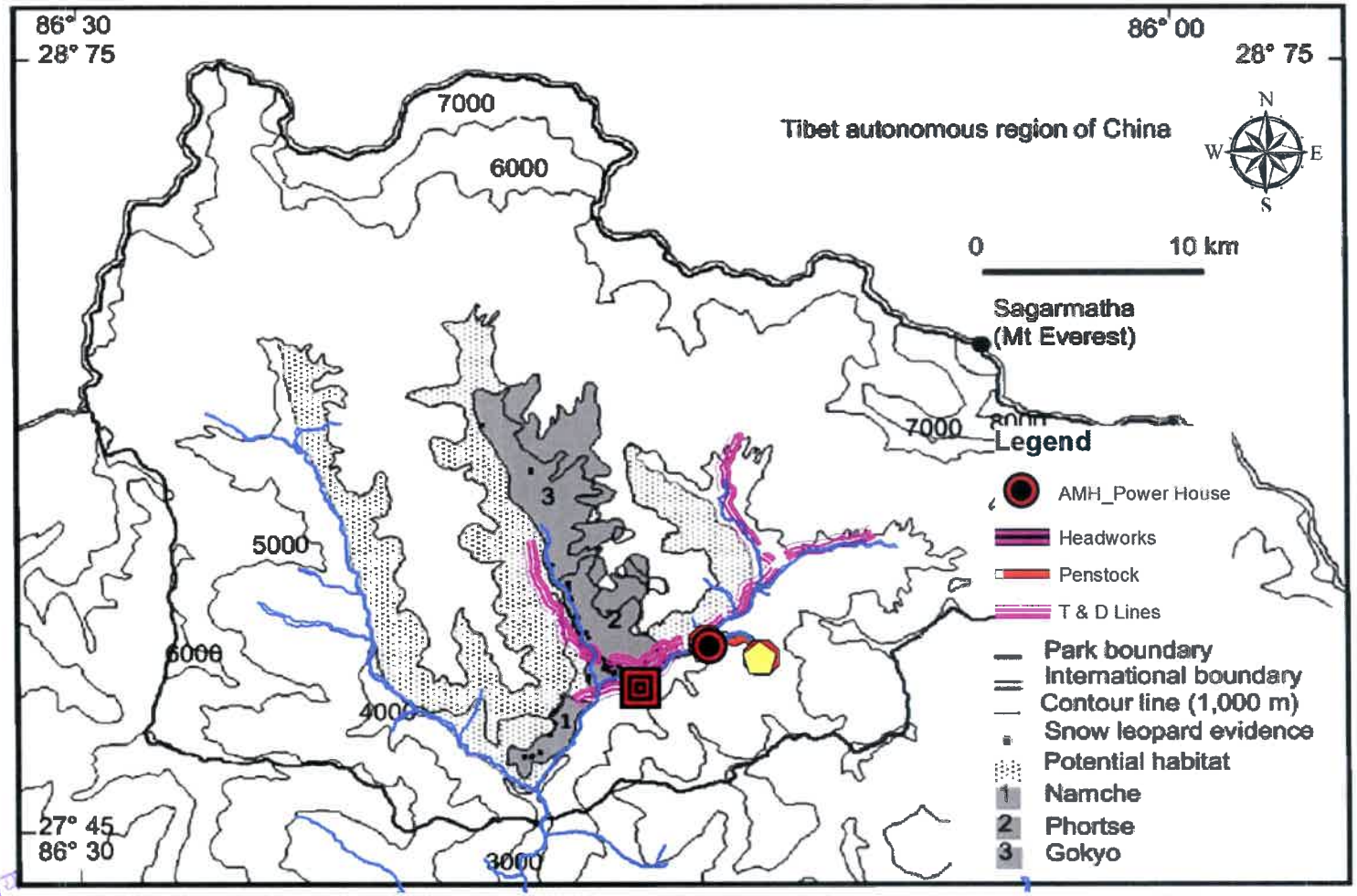
[6] Sagarmatha National Park 2016, *Sagarmatha National Park and its Buffer Zone Management Plan 2016 - 2020*



Map 13: Musk Deer Potential Distribution Area



Map 14: Red panda Potential Distribution Area



Map 15: Snow Leopard Potential Distribution Area

viii) Impact on aquatic flora and fauna

Construction activities and waste from labour camps may degrade the water quality affecting the aquatic flora and fauna. Dumping of spoils and other construction waste in river might increase sediment load and discharge of chemicals and organic waste might increase the BoD of the river water, which may deplete DO in the water. *The impact is direct, low in magnitude, site specific in extent and short term in duration.*

ix) Impact on non-timber forest products/Medicinal and Aromatic Plants (MAPs)

Aconitum sp. (Bikh), *Anaphilis sp.* (Bukiful), *Arisaema flavum* (Banko), *Barberis sp.* (Chutro), *Clematis sp.* (Junge Lahara), *Cotoneaster microphyllus* (Khareto), *Drepanostachyum sp.* (Nigalo), *E. gerardiana* (Somlata), *Juniperus sp.* (Dhupi), *Nardostachys grandiflora* (Jatamashi), *Plantago erosa* (Isafgol), *Rheum austtrale* (Padamchal), *R. anthopogon* (Sunpati), *R. campylocarpum* (Chimal), *Rumex nepalensis* (Halhale) and wild edible mushroom are the major NTFPs/MAPs that might be affected due to excavation during project construction. The affected NTFPs/MAPs are abundant in other parts of the project area as well as outside the project area. *The impact will be direct in nature, low in magnitude, site specific in extent and short term in duration.*

x) Possible Risk of forest fire

Many types of fuel might be in use in and around the construction area that pose fire hazards, such as slash accumulation of ground clearance, dried grass and debris accumulation, accumulation of flammable leaves, dry bushes etc. Fire might be set accidentally due to inadvertently thrown cigarette stub and left campfire or deliberately by ruffians. Small fire can turn huge forest fire. Improper garbage disposal and improper storage of inflammable gases and liquids at the construction site can aggravate the situation.

The impact will be indirect in nature, low to moderate in magnitude, local in extent and short term in duration.

xi) Wildlife hunting and poaching

Workers from outside the project area may involve in wildlife hunting and poaching. However, this risk is unlikely as the community follow Buddhisim and slaughtering is strictly prohibited in the Khumbu region. *The impact will be indirect in nature, low in magnitude, local in extent and short term in duration.*

xii) Increased Incidence of Human Wildlife Conflict

Though the prime habitat of wildlife is not reported in the project area, construction activities may affect the wildlife movement. In addition, they might enter to nearby agriculture land and settlements, resulting in increased crop raiding and livestock loss. Moreover, construction actives may result in food waste near construction camp and construction site which could attract wild animal and increase the risk of human wildlife conflict. The encounter of villagers and workers with wildlife may create conflict between them leading to wildlife killing. However, human wildlife conflict is expected to decrease after the construction work is over. *The impact will be indirect in nature, low in magnitude, site specific in extent and short term in duration.*

7.1.3.2.2 Operation Phase

i) Reduced river flow

The diversion of Cholunche Khola in intake site will eventually result in impacts on the downstream dewatered zone. Low volume of water is likely to increase the temperature in the dewatered zone. The change in flow during wet season is not considered significant but in dry period (2 months) the flow will be reduced which may cause impact on river microclimate. This will be a residual impact until the project will be in operation. There will be changed in the water quality in the dry season in the dewatered stretch of the river. Because of the reduction of the flow discharge and contribution of nutrients, there will be growth of blue filamentous algae in the dewatered stretch of the river. The dissolved oxygen level might drop with increased water temperature. *The impact will be direct in nature, low in magnitude, local in extent and long term in duration.*

ii) Disturbance to the wildlife due to resident workforce

The Resident workers associated with operation and maintenance of mini hydro plant have to inspect the headwork areas and other structures on regular basis which might affect the movement and forage of wild animals. *The impact will be indirect in nature, low in magnitude, site specific in extent and long term in duration.*

iii) Impact on rare, endangered, protected and threatened species of flora and fauna

All the excavated areas for penstock pipes and transmission lines will be rehabilitated immediately. Movement of work force will be almost negligible after construction. Thus it has been expected that there will not be impact on rare, endangered, protected and threatened species of flora and fauna during operation period. *The impact will be indirect in nature, low in magnitude, site specific in extent and long term in duration.*

iv) Bird casualties due to electrocution and collision with transmission line

The T & D line will be underground in all areas except in river crossing. And the transmission lines will have armored cable. Therefore, the probability of bird causality due to electrocution and collision with transmission line is almost nil and the impact is negligible. Therefore, the impact has not been envisioned.

v) Forest fire

As there will be resident workers for operation and maintenance of power plant, there is likelihood of incidence of the forest fire caused by workforce indiscipline. The grass species and pine trees present in project sites are vulnerable to fire, especially during the dry season. Even a small fire in the form of cigarette bud and match stick used by the resident crew could be a crucial factor for fire hazard. Likewise, short circuit of electricity could also be the cause of fire. The forest fire could create a big fire hazard affecting the whole region. *The impact will be indirect in nature, low in magnitude, local in extent and long term in duration.*

7.1.3.3 Socio-economic and Cultural Environment

7.1.3.3.1 Construction Phase

i) Land acquisition and compensation related issues

A total of 5.719 ha land is required for construction of the project components, of which 0.634 ha land will be acquired for long term for project component construction and the

remaining 5.085 ha land will be acquired for short term temporarily (for quarry, borrow and spoil disposal sites, T & D lines). The land required for long term lease is grassland, not forest land. The permanent structure of the project will be constructed in the permanently leased land and temporary project ancillaries will be constructed in leased land. Land acquisition process starts only after approval of EA report from GoN. *The impact is direct, moderate in magnitude, local in extent and long-term in duration.*

ii) Loss of Agriculture Land and Crop

The project components will be constructed in the GoN land within the SNP and not any agricultural land going to be used. So, the project development activities will not pose any risk of losing agriculture land and crops.

iii) Pressure on existing facilities, services and natural resources of the project area

There will be increased pressure on social services and facilities due to the migrant workforce and influx of outsiders. The population of a relatively smaller project area can become crowded with the addition of outsiders, creating pressure on social service-providing institutions in the area. Experiences of hydropower project construction in Nepal reveal pressure on social service institutions, particularly health services, water supply systems, administrative services, local law and order-maintaining institutions, and, above all, sanitation management of the area. This implies shortages of medicine and medical personnel in nearby health posts, shortages in water supply, an increase in thefts and quarrels over resources, a burden on local administrative office and, above all, can increase in solid waste, human waste, and degradation of the overall sanitation status of the area. In addition to this, project development activities (such as laying penstock pipe) may temporarily obstruct the access trail of natural and ecosystem resources for people during the construction period, though people of Lower Pangboche visit the forest occasionally to collect dry leaves and fodder for their livestocks by passing through the project development site. *The impact will be indirect in nature, moderate in magnitude, site specific in extent and short term in duration.*

iv) Health, sanitation and public safety

Public safety during construction phase is also an issue of concern. People unknowingly can get into accidents during construction activities. Also, the spilled chemical, hazardous materials, sharp construction materials pose threat to public safety unless adequate awareness is provided and strict regulations are formulated. Similarly, trench made for laying of transmission distribution lines may be ambush for locals and trekkers. Notice board and temporary fencing will be placed at the construction sites and such sites will be reinstated daily making section wise works. *The impact will be indirect in nature, moderate in magnitude, site specific in extent and short term in duration.*

v) Occupational health and safety related issues

The construction activities such as working in the river, steep slopes, may cause accidents and injuries. The most common injuries that might occur are due to accidental falls from scaffoldings or other structures, injuries due to falling objects such as rocks or other construction equipment. The victims will most probably be construction worker although injuries to local people area also possible. Similarly, construction practice without use of Personal Protective Equipment (PPE) like glove, boot and helmet results into the minor accidents. Health hazard may also occur due to unhygienic sanitation condition of camps.

Work related injuries are the likely impacts predicted due to implementation of the proposed project. *The impact will be direct in nature, high in magnitude, site specific in extent and short term in duration.*

vi) Social-cultural conflict between local community and the outside work force

Another socio-cultural impact in the project area during construction will be an overall disruption of the traditional cultural ways of people living in and near the project area. Disruption of social life will also be caused by the presence of the construction workforce and an anticipated influx of job seekers during construction period of the project. For example, it is likely that the influx of construction workers will result in increased cases of inter-caste marriages locally. Eventually, changes in ethnic and community solidarity and occupational patterns can be expected in the area. It is also likely that the construction workers, contractors and engineers and their families, would interact with the local people that could expose them to wide range of information opinions and ideas outside of their areas. Thus, the project will have impacts on social, cultural and religious features of the project areas. *These impacts are expected to be direct, low in magnitude, local in extent and of short term.*

vii) Gender discrimination (issues of equal pay between women &men for work of equal value)

Male and female workers may be paid unequally for the same or similar works. Similarly, contractor may select male and female workers for selective works rather than the capacity of individual workers. Such gender discrimination on works and pay scale may create dispute at workplace and hindrance on progress of works. *The impact will be indirect in nature, moderate in magnitude, site specific in extent and short term in duration.*

viii) Stakeholder Engagement and information disclosure

Stakeholder engagement and information disclosure is very important for the successful implementation of the proposed project. Avoiding or evading the stakeholders on proposed project activities may hamper the progress and sustainability of the project. Likewise, if information regarding the project is not shared with concerned stakeholders and locals of SPIA, it can also create problems in project implementation and sustainability. *The impact will be indirect in nature, moderate in magnitude, local in extent and long term in duration.*

ix) Issues of Grievances Management and Gender Based Violence (GBV)

Locals of SPIA, construction crews and other concerned stakeholders may have complaints regarding project activities and also about the behaviors of project staffs and workers. On the same way, there may be gender based violence and sexual exploitation & harassment in/among workers, project staffs and also with local people. Due to the large number of labour influx in the project area during the construction phase can pose risk related to SEA/SH. The risks of GBV triggered by labor influx when workers interact with community girl and women in the local communities cannot be ruled out for the project. For example, the project construction (specially T&D) will potentially take place near school or trekking route or access route to natural resources (fodder & dry grass collections) that women and girls use for their daily activities and which may increase the risk of GBV and thus, abusive behavior can also occur between project related staffs and those living in and around the project construction area. So, an effective and timely

mitigation measures need to be placed to deal with the risk of SEA/SH. *The impact will be indirect in nature, high in magnitude, local in extent and short term in duration.*

x) Issues related to disturbance to community during construction

Construction activities, movement of construction crew and associated activities may disturb to local communities. Socio-cultural invasion, unsocial behavior, increment of wastes, unnecessary noise and shouting might disturb the nearby community during the time of T&D construction that take places near to the human settlement. *The impact will be indirect in nature, moderate in magnitude, local in extent and short term in duration.*

xi) Child labor

There is probability of using children as cheap construction labour. However, the project area lies on a world renowned trekking trail, the local people and the local government are very careful on preventing child labor because it can cause a bad reputation on their tourism business. *The impact will be direct in nature, low in magnitude, local in extent and short term in duration.*

xii) People's Behaviors due to change in economy

The area is along famous tourist trekking route and people are earning handsome money in every tourist season. Thus it has been supposed that there will not be significant economic change of local community. Therefore, it does not play important role to change behaviors of local people.

xiii) Stress on local resources & infrastructure

Laying of transmission and distribution lines needs to be dig along the trails. Similarly, drinking water distribution pipes may be affected. This also impacts on travel and associated risks of accidents. *The impact will be direct in nature, moderate in magnitude, site specific in extent and short term in duration.*

xiv) The pattern of uses of natural resources in festivals and religious rituals (if any)

The proposed project does not have any negative impacts on pattern of uses of natural resources in festivals and religious rituals.

xv) Impact on historical, religious, cultural& touristic important sites

The project is located at around 1.5 km away from the human settlement and major construction works of intake & powerhouse and penstock pipe installation will be taken place at isolated area from the community where there is not presence of any historical, religious, and culturally important sites. So, the proposed project does not have any negative impacts on historical, religious, cultural, and touristic sites. However, the T&D works will be carried out near the community, the increased labour influx from outside the project area could have influence on tradition, belief, and practices of local community. *The impact will be direct in nature, low in magnitude, site specific in extent and short term in duration.*

7.1.3.3.2 Operation Phase

i) Occupational health and safety related issues of the power station workers

Occupational Health and Safety issues during operation phase are particularly associated with long term exposures to noise from turbine operation and accidents due to electrocution causing injuries and deaths.
Occupational health impacts are direct in nature, moderate in magnitude, site specific in extent and long-term duration.

ii) Public Safety Related Issues/Movement of people in dangerous places
Local people with ignorance may not know about new structures and dangerous places such as the switch yard. They may visit these areas and risk their well-being. Children are especially susceptible to such hazards, which can result in accidents. *The impact will be direct in nature, moderate in magnitude, site specific in extent and long term in duration.*

iii) Issues related to benefit sharing of project
The local people of project are also found keen (during the consultation) to invest in project in the form of share equity and they are also demanding benefits from the project as the private company is going to used their natural resources. If the issue regarding to benefit sharing is not managed effectively, it may affect on sustainability of the project. *Thus this impact is indirect in nature, moderate in magnitude, local in extent and long term in duration.*

iv) Issues related to tariff of electricity
Most of the locals in the project area are using energy from existing micro hydro and solar for lighting purposes only. Most of the micro hydro plants were constructed from community initiatives and ownership, providing electricity service to the people of the project area. The existing micro hydro in the project area are not operating at full capacity, as these plants are more than 10-12 years old and need regular repair and maintenance. The micro hydro management committee of the existing micro hydro have fixed the tariff rate in consultation and mutual understanding with the community people. Though the community people have shown their readiness to pay the tariff according to their electricity consumption, the existing MHPs are not able to meet the current energy demand of the community people. During the consultation with the people of the proposed project area, they requested the proponent to fix the tariff rate in line with the tariff rate of the existing micro hydro. *This impact is indirect in nature, moderate in magnitude, local in extent and long term in duration.*

v) Issues relating to sudden release of water to downstream
Water is released suddenly to downstream area to flush out the sediment load from settling basin especially during the wet season. People may be washing in the river if they are unaware of the situation. Thus, there is a high risk of accidents and even loss of life if people are unknown and are not informed about the sudden release of water.
The impact will be direct in nature, moderate in magnitude, local in extent and long term in duration.

vi) Withdrawal of economic opportunity
The first and foremost impact during the operation phase is the withdrawal of economic activities which flourished during the construction phase since the construction workforce will leave the project areas. During operation phase when the energy is distributed to locals, the economic activities will be much less, only about 2~3 percent of total

investment is necessary for annual expenditure. The labour requirement will decrease drastically, and so will be the income opportunities from construction related activities. But the impact may be compensated from the electricity generation which brings more opportunity in project area through uses of electricity in various purposes such as bakery, small cottage industry and other tourism related business. The impact will be indirect in nature, low in magnitude, local in extent and short term in duration.

vii) Water right issues

Currently water has not been used for any other purposes. Thus there is no issues in water use right.

viii) Stress on local resources & infrastructure

The proposed project does not make any stress on local resources and infrastructures during operation phase.

ix) Issues related to management of micro hydro project that exist in project affected area

There are three existing micro-hydro systems in the project area (Table 29 in Section 5.3.1.14) which are older than 10-12 years and currently providing electricity service mainly for lighting purposes. As the existing micro-hydro systems are not able to meet the current energy demand of the community people, they are looking for alternatives that can provide them reliable and sufficient energy. In this regard, when the AMHP is constructed and starts to provide reliable electricity, the community people will automatically switch to get electricity from the mini-hydro instead of the existing micro-hydro. Thus, the existing micro-hydro will be impacted to their revenue collection can be impacted. *This impact is direct in nature, high in magnitude, local in extent and long term in duration.*

7.1.3.4 Impacts to integrity of protected areas and Outstanding Universal Values

7.1.3.4.1 Beneficial Impacts

A. <u>Construction Period</u>

i) Slope Stability

During construction period, slope instability might occur along penstock alignment from chainage Ch.0+160 to Ch. 0+260m. The alignment passes beneath the crown of the slide on loose alluvial terrace deposit. Hanging loose blocks were observed near the crown part of slide area. *The impact is indirect in nature, moderate in magnitude, local in extent and long term in duration.*

B. <u>Operation Period</u>

i) Ecological Integrity and Conservation in SNP

In operation period, it has been expected that dependency on biomass fuel for heating and cooking will be drastically decreased and forest and vegetation of SNP will be ultimately protected thus supports for habitat protection of diverse groups of wild animals in SNP. This will support for conservation of ecological integrity and conservation in SNP. *The impact is indirect in nature, high in magnitude, local in extent and long term in duration.*

7.1.3.4.2 Adverse Impacts

A. Construction Period

i) Impacts on Landscape

Construction activities for power generation and distribution may have minor impacts to local physical landscape. Trench making by excavation for laying of penstock pipe, transmission and distribution lines certainly changes the local landscape. But all the excavated sites will be rehabilitated immediately. *The impact is indirect in nature, low in magnitude, local in extent and short term in duration.*

ii) Impacts on Ecological Integrity

During construction, ground vegetation needs to be cleared for power generation and construction of physical structures. Construction activities may impact on movement of wildlife. Workers may involve in hunting poaching of wildlife. In addition, this may lead to loss of vegetation, grassland area and have impact on natural and critical natural habitat, impact on aquatic flora and fauna, rare, endangered, protected and threatened species of flora and fauna. All these will certainly impact on ecological integrity for short time of construction in specific locality. *The impact is indirect in nature, moderate in magnitude, site specific in extent and short term in duration.*

iii) Impacts on Scenic Beauty

Construction activities for power generation and distribution may impact local physical landscape. Fresh excavation works impart visual disturbances and attracts the attention of visitors even for short time of construction. All the excavated sites will be rehabilitated immediately after completion of construction works. *The impact is indirect in nature, moderate in magnitude, local in extent and short term in duration.*

iv) Impacts on Social and Cultural Integrity

Influx of outsider construction workers may impact on local social and cultural practices. But the locals have been exposed to external social, cultural and traditions from last 75 years. Thus it has been expected that the impacts from the external workforce on social and cultural practices will be of minimum and of short period during the construction. However, this might have pressure on forest for fuel. *The impact is indirect in nature, low in magnitude, local in extent and short term in duration.*

7.1.3.4.3 Operation Period

During operation period, the impacts on OUV of SNP are very minimal. All the excavated area will be restored and rehabilitated. During operation, there are no impacts on landscape and ecological integrity. Impacts on scenic beauty are very minimal (only in river crossing area due to transmission and distribution lines that already exist). Water from tailrace will be released in Cholunche Khola itself. The water current of such discharge will be minimal so it is envisaged not to have adverse impacts on the ecology of Cholunche Khola Thus it has been observed that there is no significant impact on OUV of SNP during operation.

7.2 Evaluation of Impacts

The significance of the impacts has been evaluated using the words significant, moderately significant and insignificant. Assumption has also been made to evaluate the significant impacts. Impacts having total score of over 75 are considered significant; impacts having

45 to 75 score are considered moderately significant; and impacts having total score of less than equal to 45 are considered insignificant for this project. However, the impacts whose total score exceeds 45 may not be significant in view of the nature of the predicted impacts. Impacts having less than 45 score could also be considered significant. It has been done so as the impacts are related to the subjective judgment on magnitude, extent and duration of the impacts (Table 36, 37 and 38). For example, impacts likely to occur outside the projects direct impact zone and of indirect nature may not be significant although the total score exceeds 45. This ranking has provided a basis to select and propose environmental protection measures, i.e., beneficial impacts augmentation measures, and adverse impacts mitigation measures.

Table 35: Evaluation of Beneficial Impacts

SN	Likely Impacts	N	M	E	D	Total Score	Significance Level
1. Construction Stage							
1.1	Employment generation and skill enhancement	D	H(60)	L(20)	ST(05)	85	Positively Significant
1.2	Benefits from implementation of environmental mitigation programs and benefit augmentation measures	ID	M(20)	L(20)	LT(20)	60	Moderately Positively Significant
1.3	Benefits from community and social support programs	D	M (20)	L (20)	LT (20)	60	Moderately Positively Significant
1.5	Benefits for Exposure of local population to new technologies and technology transfer	D	L(10)	L(20)	LT(20)	50	Moderately Positively Significant
	Increase in economic activities in the project area and associated beneficial impacts in local economy through micro-enterprise development	ID	M(20)	L(20)	ST(05)	45	Moderately Positively Significant
1.6	Utilization of local resources	ID	L (10)	L (20)	ST (05)	35	Insignificant
2. Operational Stage							
2.1	Benefits to be incurred from addition of 911 kW of power	D	H(60)	L(20)	LT(20)	100	Highly Positively Significant
2.2	Employment generation and skill enhancement	D	M (20)	L(20)	LT(20)	60	Moderately Positively Significant
2.3	Sharing of electricity royalty to concerned authorities	D	M (20)	L(20)	LT(20)	60	Moderately Positively Significant

Note: D = Direct, ID = Indirect, S= Site specific, L= Local, R= Regional, ST=Short Term, LT= Long Term, H = High, M=Moderate, LO= Low
Value in the parenthesis are based on numeric value provided in National Environmental Impact Assessment Guideline, 1993. Priority rank; 1 (sum of numerical value 70 or above) = highly significant; 2 (sum of numerical value45- 70) = moderately significant; 3 (sum of numeric value below *45) = low significant.*

Table 36: Evaluation of Adverse Impacts

SN	Likely Impacts	N	M	E	D	Total Score	Significance Level
I. Physical Environment							
1.1 Construction Phase							
1.1.1	Possible Glacier Lake Outburst Flood (GLOF) and associated impacts	IN	H (60)	L (20)	ST (05)	85	Significant
1.1.2	Landslide and soil erosion	IN	M (20)	SS (10)	LT (20)	50	Moderately Significant
1.1.3	Change in land use	D	M (20)	SS (10)	LT (20)	50	Moderately Significant
1.1.4	Impact on material quarrying sites	D	M (20)	SS (10)	LT (20)	50	Moderately Significant
1.1.5	Hydrology and river morphology	D	M (20)	SS (10)	LT (20)	50	Moderately Significant
1.1.6	Impact due to quarrying activity	D	M (20)	L (20)	ST (05)	45	Moderately Significant
1.1.7	Water pollution and increase in sediment loads	D	M (20)	L (20)	ST (05)	45	Moderately Significant
1.1.8	Change in Topography	D	L (10)	SS (10)	LT (20)	40	Insignificant
1.1.9	Issues of haphazard stockpiling of construction material	D	M (20)	SS (10)	ST (05)	35	Insignificant
1.1.10	Generation of spoils and spoil disposal related issues	D	M (20)	SS (10)	ST (05)	35	Insignificant
1.1.11	Solid Waste Generation	D	M (20)	SS (10)	ST (05)	35	Insignificant
1.1.12	Air quality degradation	ID	L (10)	L (20)	ST (05)	35	Insignificant
1.1.13	Loss of Top Soil	D	L (10)	SS (10)	LT (20)	40	Insignificant
1.1.14	Noise Pollution	D	L (10)	SS (10)	ST (05)	25	Insignificant
1.1.15	Soil Pollution	D	L (10)	SS (10)	ST (05)	25	Insignificant
1.2. Operational Phase							
1.2.1	GLOF and associated impacts	ID	H (60)	L (20)	ST (05)	85	Significant
1.2.2	Impact on Downstream due to Sediment Flushing	ID	M (20)	L (20)	LT (20)	60	Moderately significant
1.2.3	Impacts on river morphology and possible microclimatic changes	D	M (20)	L (20)	LT (20)	60	Moderately Significant
1.2.4	Land submergence due to diversion weir and associated impacts	D	L (10)	L (20)	LT (20)	50	Moderately Significant
1.2.5	Management/final disposal of solid waste and wastewater (both black water and grey water)	ID	L (10)	SS (10)	LT (20)	40	Insignificant
1.2.6	Change in river water quality	D	L (10)	SS (10)	LT (20)	40	insignificant
1.2.7	Noise and vibration	D	L (10)	SS (10)	LT (20)	40	Insignificant

SN	Likely Impacts	N	M	E	D	Total Score	Significance Level
1.2.8	Soil Erosion due to Tailrace Discharge	D	L (10)	SS (10)	LT (20)	40	Insignificant
1.2.9	Change in topography and land use	D	L (10)	SS (10)	LT (20)	40	Insignificant
2. Biological Environment							
Adverse Impacts ***2.1. Construction Stage***							
2.1.1	Loss of grassland area	D	M (20)	SS (10)	LT (20)	50	Moderately significant
2.1.2	Impact on Sagarmatha National Park	D	M (20)	SS (10)	LT (20)	50	Moderately significant
2.1.3	Impact on Red Panda and Himalayan Musk Deer	D	M (20)	SS (10)	LT (20)	50	Moderately significant
2.1.4	Impact on Himalayan Black Bear	D	M (20)	SS (10)	LT (20)	50	Moderately significant
2.1.5	Increased incidence of Human Wildlife Conflict	D	L (10)	L (20)	LT (20)	50	Moderately significant
2.1.6	Wildlife hunting and poaching	ID	L (10)	L (20)	ST (05)	45	Moderately significant
2.1.7	Loss of forest vegetation and overall vegetation diversity	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.8	Pressure on Forest for Fuelwood	ID	M (20)	SS (10)	ST (05)	35	Insignificant
2.1.9	Impact on natural and critical natural habitat features	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.10	Impact on aquatic flora and fauna	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.11	Impact on non-timber forest products/MAPs	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.12	Possible Risk of forest fire	ID	L (10)	L (20)	ST (05)	35	Insignificant
2.2. Operational Stage							
2.2.1	Reduced river flow	D	L (10)	L (20)	LT (20)	60	Moderately significant
2.2.2	Forest Fire	ID	L (10)	L (20)	LT (20)	60	Moderately significant
2.2.3	Disturbance to the wildlife due to resident workforce	ID	L (10)	SS (10)	LT (20)	40	Insignificant
2.2.4	Impact on rare , endangered, protected and threatened species of flora and fauna	ID	L (10)	SS (10)	LT (20)	40	Insignificant
2.2.5	Bird casualties due to electrocution	-	-	-	-	-	No impact

SN	Likely Impacts	N	M	E	D	Total Score	Significance Level
3.	***Socio economic and Cultural Environment***						
Adverse Impacts							
3.1.	**Construction Stage**						
3.1.1	Issues of Grievances Management and Gender Based Violence (GBV)	ID	H (60)	L (20)	ST (05)	85	Significant
3.1.2	Occupational health and safety related issues	D	H (60)	SS (10)	ST (05)	75	Significant
3.1.3	Stress on local resources and infrastructure	D	M (20)	SS (10)	ST (05)	75	Significant
3.1.4	Land acquisition and Land compensation related issues	D	M (20)	L (20)	LT (20)	60	Moderately significant
3.1.5	Stakeholder Engagement and information disclosure	ID	M (20)	L (20)	LT (20)	60	Significant
3.1.6	Issues related to disturbance to community during construction	ID	M (20)	L (20)	ST (05)	45	Moderately significant
3.1.7	Child labour	D	M (20)	L (20)	ST (05)	45	Moderately significant
3.1.8	Pressure on existing facilities, services and resources of the project area	ID	M (20)	SS (10)	ST (05)	35	Insignificant
3.1.9	Health and sanitation and public safety	ID	M (20)	SS (10)	ST (05)	35	Insignificant
3.1.10	Socio-cultural conflict between local community and outside work force	D	L (10)	L (20)	ST (05)	35	Insignificant
3.1.11	Gender Discrimination	ID	M (20)	SS (10)	ST (05)	35	Insignificant
3.1.12	Impact on historical, religious, cultural& touristic important sites	D	L (10)	SS (10)	ST (05)	35	Insignificant
3.2. Operation Phase							
3.2.1	Issues related to management of micro hydro project that exist in project affected area	ID	H (60)	L (20)	LT (20)	100	Highly Significant
3.2.2	Issues related to benefit sharing of project	ID	M (20)	L (20)	LT (20)	60	Moderately significant
3.2.3	Issues related to tariff of electricity	ID	M (20)	L (20)	LT (20)	60	Moderately significant
3.2.4	Issues relating to sudden release of water to downstream	D	M (20)	L (20)	LT (20)	60	Moderately significant
3.2.5	Occupational health and safety related issues of the power station workers	D	M (20)	SS (10)	LT (20)	50	Moderately significant
3.2.6	Public Safety Related Issues/Movement of people in dangerous places	D	M (20)	SS (10)	LT (20)	50	Moderately significant
3.2.7	Withdrawal of economic opportunity	ID	L (10)	L (20)	ST (05)	35	Insignificant

Table 37: Evaluation of Impacts on Protected Areas and OUV

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Significance
4. Integrity of Protected Areas and OUVs							
4.1 Beneficial Impacts							
***4.1.1* Construction Stage**							
4.1.1.1	Slope Stability	ID	M (20)	L (20)	LT (20)	60	Moderately significant
***4.1.2* Operation Stage**							
4.1.2.1	Ecological Integrity and Conservation in SNP	ID	H (60)	L (20)	LT (20)	100	Significant
4.2 Adverse Impacts							
4.2.1 Construction Stage							
4.2.1.1	Impact on Scenic Beauty	ID	M (20)	L (20)	ST (05)	45	Moderately significant
4.2.1.2	Impact on Landscape	ID	L (10)	L (20)	ST (05)	35	Insignificant
4.2.1.3							
4.2.1.4	Impact on Social and Cultural Integrity	ID	L (10)	L (20)	ST (05)	35	Insignificant
4.2.2 Operation Stage		-	-	-	-	-	No Impact

CHAPTER 8: AUGMENTATION AND MITIGATION MEASURES

To overcome any adverse impacts by the project, the team have suggested appropriate site specific measures to avoid, reduce, mitigate, and/or compensate for all evaluated impacts. The basic philosophy of mitigation is to outline measures appropriate to mitigate the adverse impacts to the level required by National Standards and Guidelines as well as WB Safeguard Policies and EHS Guidelines; or to reduce the impacts to what may be considered as tolerable level, or as indicated by the National Standards as well as WB Safeguard Policies and EHS Guidelines where available. Measures have been proposed based on nature of environmental impacts and components of environment that is affected, appropriateness and cost analysis. Each of the identified adverse impacts has been evaluated in detail and cost effective mitigation measures have been suggested to avoid and/or minimize the adverse impacts. Furthermore, enhancement measures have been proposed to enhance or augment beneficial impacts due to implementation of the project.

Furthermore, the EIA report has also included Environmental and Social Mitigation and Management Action Plan with responsible agency/party to carry out mitigation activity, the location of mitigation implementation, methods, time schedule and estimated budget. The EIA report has defined organizational set up to carry out these activities. The costs for mitigation and enhancement measures have provided separately for both construction and operation stages for physical, biological, socio-economic and cultural environment.

8.1 Environmental Enhancement Measures

The benefit from the project could be enhanced or made more effective if they are planned properly. The following are the possible augmentation measures to enhance the benefit(s).

Table 38: Augmentation Measures for Positive Impacts

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Enhancement Measures
1. Construction Stage							
1	Employment generation and skill enhancement	D	H(60)	L(20)	ST(05)	85	A total of 72,500 man days human resources will be employed during peak construction period with priority given to workers from the project affected area based on their skills and qualifications. The project will provide necessary training to local people engaged in construction work, if necessary, depending upon the nature of the work offered. Local people will be recruited for administrative and technical works as per their qualifications and skills. Skill enhancement training will be provided to locals as per need and demand of local people.
2	Benefits from implementation of environmental mitigation programs and benefit augmentation measures	ID	M(20)	L(20)	LT(20)	60	Implementation of ESMP during the construction period will benefit the local community. Support on community facilities such as education, health, drinking water and trekking trails will certainly benefit the local people. In addition, training will be provided to local community to boost local economy. Electrician, house wiring, electrical appliance repairing, tourism related training (housekeeping, chef), bakery, vegetable farming is of the trainings.
3	Benefits from community and social support programs	D	M (20)	L (20)	LT (20)	60	The project will support on various community and social programs such as improvement of local services like health posts, schools, drinking water and social services from the budget allocated for ESMP as 1% of total project cost has been allocated for implementation of environmental and social mitigation measures during construction and operation.
4	Increase in economic activities in the project area and associated beneficial impacts in local economy through micro-enterprise	ID	M(20)	L(20)	ST(05)	45	Training will be provided as per need on local demand.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Enhancement Measures
	micro-enterprise development						
5	Benefits for Exposure of local population to new technologies and technology transfer	D	L(10)	L(20)	LT(20)	50	The project will launch training programs in specialized area such as electro–mechanical works of hydroelectric, house wiring and maintenance, spoil handling etc. First priority will be given to the project affected families (PAFs) and local people to the extent they are interested to get involved in the construction activities.
6	Utilization of local resources	ID	L (10)	L (20)	ST (05)	35	Insignificant
2. Operational Stage							
2	Employment generation and skill enhancement	D	M (20)	L(20)	LT(20)	60	Priority will be given to locals.
2	Benefits to be incurred from addition of 911 kW of power	D	H(60)	L(20)	LT(20)	100	The locals can use the electricity as per their needs such as cooking, heating, lighting and so on. Tariff for electricity will be made in close coordination with community so that all can use the electricity at affordable cost. Similarly 10% share will be provided to locals, more will be provided if interested.
2	Sharing of electricity royalty to concerned authorities	D	M (20)	L(20)	LT(20)	60	Royalty generated from the electricity will be another source of income of local government, which can be utilized for various

8.2 Environmental Mitigation Measures

As per need of donor agency and sensitiveness of project location, mitigation measures for many of insignificant impacts have been proposed along with other mitigation measures (Table 39).

Table 39: Mitigation Measures

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
1. Physical Environment							
1.1 Construction Phase							
1.1.1	Change in land use	D	M (20)	SS (10)	LT (20)	50	• Due consideration will be given to avoid use of forest land for the establishment of labour camp, quarry sites, construction material stockpiling area including other permanent project features such as power house, staff quarter, switch yard ; • Temporarily acquired land will be leased for construction period and it will be rehabilitated to its original status as possible, after the completion of construction work, while in place of 5.719 ha of SNP land, same land area will be provided and will be afforested @ of 1600 plants per ha. A total of 9150 tree seedlings will be planted in coordination with MoFE/SNP and cared for next five years (Selection of plants and costs will be finalized in coordination with MoFE/SNP) •Plantation will be done with local species to rehabilitate excavated sites.
1.1.2	Change in Topography	D	L (10)	SS (10)	LT (20)	40	**Insignificant** All the temporarily used areas such as quarry sites and disposal sites will be rehabilitated. All the areas dug for laying of penstock pipe, transmission and distribution lines will be rehabilitated immediately by burying and plantation.
1.1.3	Possible Glacier Lake Outburst Flood (GLOF) and associated impacts	IN	H (60)	L (20)	ST (05)	85	• Make aware to workers about GLOF warning system of Imja Khola while working at powerhouse and tailrace site. • Prepare emergency plans in respect of GLOF warnings and establishment of evacuation paths for escape to higher ground

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							required for project development •Plantation will be done with local species to rehabilitate excavated sites.
1.1.2	Change in Topography	D	L (10)	SS (10)	LT (20)	40	**Insignificant** All the temporarily used areas such as quarry sites and disposal sites will be rehabilitated. All the areas dug for laying of penstock pipe, transmission and distribution lines will be rehabilitated immediately by burying and plantation.
1.1.3	Possible Glacier Lake Outburst Flood (GLOF) and associated impacts	IN	H (60)	L (20)	ST (05)	85	• Make aware to workers about GLOF warning system of Imja Khola while working at powerhouse and tailrace site. • Prepare emergency plans in respect of GLOF warnings and establishment of evacuation paths for escape to higher ground at critical sites. • Establishment of GLOF warning system at intake site.
1.1.4	Landslide and soil erosion	IN	M (20)	SS (10)	LT (20)	50	• Land clearance will be minimized as far as possible • Storage and dumping of excavated spoils in the hill slope will be avoided • Surface excavations works in headwork, penstock pipe, powerhouse and transmission and distribution lines areas will be controlled as to the geotechnical requirements of land stability and erosion • After excavation works, the excavated slopes in all areas will be stabilized by the application of bioengineering works as required by the local geotechnical conditions. • The spoil will be deposited to levels and heights taking into consideration of the geotechnical stability of deposited materials and reused for land filling as in case of pen stock laying. • All excavated materials will be deposited in the safe spoil disposal sites as designated in the proposal • Disposal of excavated loose materials along the water

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							pathways will be prohibited • Appropriate protection measures for major landslides will be constructed. • A suitable Gabion protection of length 100 m and cross-sectional area of $6m^2$ is constructed on landslide area in penstock alignment • Retention wall constructed would be that of filling the gabion mess wire.
1.1.5	Generation of spoils and spoil disposal related issues	D	M (20)	SS (10)	ST (05)	35	**Insignificant** • Top soil (up to 15cm depth from the surface) from the affected area will be scrapped and stored for later reuse in land development at disposal sites and other degraded land in the project area. • The excavation materials will be used for backfilling purposes wherever required • All excavated materials will be deposited in the safe spoil disposal sites as provided by the project design. • Deposition of the spoils on the hill slopes, drainage structures, natural waterways etc will be strictly prohibited. • The excavated areas including the slopes will be vegetated with the local species of grass, herbs, shrubs or trees so that the erosion prone area could be protected. • The Proponent will prepare rehabilitation plan and implement it effectively after taking approval from the RM.
1.1.6	Impact due to quarrying activity	D	M (20)	L (20)	ST (05)	45	• Quarry will be done in specified area • Construction materials will be kept in designated area with appropriate covering materials such as textile, plastic; • Haphazard quarry activities will be prohibited • Spoils will be kept separately and used for land reclamation • Quarry sites will be reclaimed • The Proponent will prepare rehabilitation plan and implement

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							it effectively after taking approval from the RM.
1.7	Impact on material quarrying sites	D	M (20)	SS (10)	LT (20)	50	• Materials will be extracted with careful manner so that slope stability will be maintained • Haphazard materials extraction will be prohibited • Spoils will not throw/kept haphazardly • Natural drainage will not be blocked due to stock piling of construction materials and spoils • The quarry site will be rehabilitated and vegetated. • The proponent will prepare rehabilitation plan and implement it effectively after taking approval from the RM.
1.1.8	Water pollution and increase in sediment loads	D	M (20)	L (20)	ST (05)	45	• The storage areas for the chemicals, oils and other substances will be located far from the water sources to avoid the contamination by spillage. • Workshop facilities will be located at least 100 m away from the water sources. Spilled oil and grease trapping systems will be built in the workshop to avoid contaminated runoff into the water courses. • Both degradable and non-degradable waste will be kept away from water sources to avoid contamination through seepage or direct runoff. • Toilets will be provided at all construction sites and camp site with appropriate septic system. Toilets will be located away from water courses. • Open urination and defecation will be prohibited. • Camp effluents will not be discharged directly into the water sources. An adequate size effluent treatment system will be constructed to treat the camp effluent. • Any discharge in inland surface water will be practiced as per the tolerance limit set by the MoFE. • Water quality of the sources in and around the construction sites, camp sites and major settlements will be monitored

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							quarterly (dry season and wet season monitoring). The drinking water used in the camps and housings will also be monitored.
1.1.9	Noise Pollution	D	L (10)	SS (10)	ST (05)	25	**Insignificant** • Installing noise reducing equipment in the ventilators, compressors and diesel generator set • The noise generating machineries and equipment such as generators will be placed far from the residential areas • Noise intensity level will be monitored regularly in the major construction sites such as headworks, powerhouse, settlements etc.
1.1.10	Soil Pollution	D	L (10)	SS (10)	ST (05)	25	**Insignificant** • Chemicals, paints, petrochemicals etc. will be handled carefully; • These materials will be stored separately in safe store house.
1.1.11	Issues of haphazard stockpiling of construction material	D	M (20)	SS (10)	ST (05)	35	**Insignificant** • remaining construction materials will be disposed in specified area; • Stockpiling and storage of the construction materials in designated sites only. • The construction materials such as sand and gravel will be methodically stored at proper locations separately; and • The residual of construction materials will be re-utilized for other construction purposes like construction of resting places wherever possible.
1.1.12	Solid Waste Generation	D	M (20)	SS (10)	ST (05)	35	**Insignificant** • Dumping facilities will be provided at each construction site to avoid proliferation of the litters and construction trash materials. • The construction wastes will be managed within the work areas. Tins and other metals are kept in a closed scrap yard within the construction premise.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							• Solid waste from the camp and work areas will be collected regularly and disposed in coordination with SNP and RM. • Separate waste collection bins will be provided in the camps to segregate wastes of different nature such as degradable, non-degradable, hazardous etc.
1.1.13	Air quality degradation	ID	L (10)	L (20)	ST (05)	35	**Insignificant** • The aggregate crushing plants will be located far from the settlements and camp areas. • The spoils disposed in the spoil tip areas will be compacted in order to stabilize them and avoid dust blowing by the wind; after the completion of the construction plantation will be carried out in the spoil tip areas. • Excavated areas will be vegetated to minimize the bare surface. • The air quality monitoring will be done at least three times - before construction, during construction and operation in major construction sites such as headworks, powerhouse, and settlements. Compliance with National Ambient Air Quality Standard of GoN will be checked.
1.1.14	Hydrology and river morphology	D	M (20)	SS (10)	LT (20)	50	**Moderately significant** The extraction of river bed materials will be planned properly in such a way that river morphology does not change after the removal of the materials. Further, during the extraction of materials, due consideration will be given to minimize bank erosion. Similarly, the construction of the weir will be planned in a way so that concentrated flow or the diverted flow does not make bank erosion as such.
1.1.15	Impact on Dewatered Zone	D	M (20)	SS (10)	LT (20)	50	**Moderately significant** 50% of mean monthly flow of water will be released to maintain the river hydrology.
1.1.16	Loss of Top Soil	D	L (10)	SS (10)	LT (20)	40	**Insignificant**

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							While preparing the site for construction for laying of penstock pipe, powerhouse and headworks, the top soil will be managed separately and saved in a separate area for later rehabilitation works. The top soil (0-15 cm) from the productive land (penstock pipe and powerhouse) will be preserved and reused for plantation and restoration purposes. A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
1.2. Operational Phase							
1.2.1	GLOF and associated impacts	ID	H (60)	L (20)	ST (05)	85	• Educate the local residents about the early warning system and characteristics of lake outbursts as there is already early warning system in Imja Khola and Cholunche Khola.
1.2.2	Impacts on river morphology and possible microclimatic changes	D	M (20)	L (20)	LT (20)	60	Changes in microclimate will be expected during dry season in the downstream area. As a mitigation measure, the project will maintain a minimum flow of 50% of the mean monthly flow. Moreover, 5 % additional discharge has been considered in design for seepage and evaporation. The extraction of river bed materials will be planned properly in such a way that river morphology does not change after the removal of the materials. Further, during the extraction of materials, due consideration will be given to minimize bank erosion.
1.2.3	Land submergence due to diversion weir and associated impacts	D	L (10)	L (20)	LT (20)	50	The river bank erosion due to bed level rise will be minimized by the river bank protection measures such as gabion wall and retention walls in the critical areas as per provided in DFS.
1.2.4	Management/final disposal of solid waste and wastewater (both black water and grey	ID	L (10)	SS (10)	LT (20)	40	**Insignificant** • Solid waste from permanent camp and project will be segregated as per nature of waste such as degradable and non-degradable. Degradable waste will be composted while non-degradable waste will be managed in coordination with SNP

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
	water)						and RM. Suitable composting methods and technology will be adopted while implementing the projects. • Wastewater from project permanent camp and project office will be managed properly making soak pit and septic tank as per requirement. • Haphazard disposal of wastes will be strictly prohibited.
1.2.5	Change in river water quality	D	L (10)	SS (10)	LT (20)	40	**Insignificant** • The effluent discharges from project office and project camp to nearby water sources will be prohibited. • The spillage of chemicals such as oils and paints which can occur during repairing and maintenance of powerhouse equipment and machines will be controlled. • Haphazard disposal of spent oils and lubricants from the powerhouse and the switchyard will be prohibited. All the spent oils, lubricants, from the powerhouse and switch yards and transformers will be collected and kept in a separate designated area. • Drinking water quality of the camp and water quality of the water sources around powerhouse will be monitored periodically.
1.2.6	Noise and vibration	D	L (10)	SS (10)	LT (20)	40	**Insignificant** The powerhouse workers will be provided with the ear muffs to reduce the exposure to continuous noise of turbine operation.
1.2.7	Soil Erosion due to Tailrace Discharge	D	L (10)	SS (10)	LT (20)	40	**Insignificant** Pipe and open canal has been proposed for tailrace. Open canal will be made in such a way to protect from ground scouring. At outlet portion, gabion and boulder riprap protection are provided to prevent erosion of soil in Kholsi.
1.2.8	Impact on Downstream due to Sediment Flushing	ID	M (20)	L (20)	LT (20)	60	People will be made aware and notify regarding the sediment flush. Similarly, weak and vulnerable river banks will be stabilized with proper structures such as gabion wall, dry wall,

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							retention wall.
2. Biological Environment							
Adverse Impacts							
2.1. Construction Stage							
2.1.1	Loss of grassland area	D	M (20)	SS (10)	LT (20)	50	• The excavated area will be rehabilitated and restored with plantation of local plant species.
2.1.2	Loss of forest vegetation and overall vegetation diversity	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.3	Pressure on Forest for Fuelwood	ID	M (20)	SS (10)	ST (05)	35	Insignificant
2.1.4	Impact on Sagarmatha National Park	D	M (20)	SS (10)	LT (20)	50	• As far as possible, clearing of rare, endangered, endemic species of flora will be avoided • In case of the clearing required by the project layout. Such species will be saved when they are excavated and safely replanted during rehabilitation and restoration of the excavated areas. • Make provision for members of the local communities who have a good knowledge of plants in the area, are involved in the project to identify which plants need to be avoided from construction works and which plants can be transplanted. • The project will organize programs to raise awareness on conservation of wildlife habitats and wildlife species for local people, school's children and project workers • Night time construction activities will be avoided as possible. If needed, it will be done in coordination with local government, SNP and other line agencies with mitigation measures.
2.1.5	Risk of invasive and alien plant species of	ID	M (20)	SS (10)	ST (05)	35	**Insignificant** • Workers will be strictly prohibited to bring plant or plant parts

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							those with capabilities for propagation from outside of SNP; • Plant propagation activities will not be allowed in Camp area by workers.
2.1.6	Impact on natural and critical natural habitat features	D	L (10)	SS (10)	ST (05)	35	Insignificant
2.1.7	Impact on Himalayan Musk Deer	D	M (20)	SS (10)	LT (20)	50	• No poaching and hunting activities will be allowed. • Minimum disturbance will be maintained. • There must be no food waste disposal in or around construction sites. • Keeping of domestic dogs in construction camps will be prohibited • SNP authorities will be hosted to explain park rules for wildlife protection to construction workers. Risks and penalties if park rules are not followed will be explained. All construction workers will sign letters that they agree to follow all park rules. • SNP Park rules will be printed and displayed on a notice board accessible to all workers. • Contractor will develop appropriate nature awareness programs for workers. • All workers brought to the site from outside of the SNP will be registered with SNP authorities prior to start working.
2.1.8	Impact on Himalayan Black Bear	D	M (20)	SS (10)	LT (20)	50	• Awareness to construction workers about the risks of inappropriate food waste encouraging bears and causing problems • No poaching and hunting activities will be allowed. • Minimum disturbance will be maintained. • There must be no food waste disposal in or around construction sites. • Construction camps must use bear-proof dustbins.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							• Awareness of Construction workers of the risk of inappropriate food waste encouraging bears and causing problems. • Keeping of domestic dogs in construction camps will be prohibited • SNP authorities will be hosted to explain park rules for wildlife protection to construction workers. Risks and penalties if park rules are not followed will be explained. All construction workers will sign letters that they agree to follow all park rules. • SNP Park rules will be printed and displayed on a notice board accessible to all workers. • Contractor will develop appropriate nature awareness programs for workers. • All workers brought to the site from outside of the SNP will be registered with SNP authorities prior to start working.
2.1.9	Impact on aquatic flora and fauna	D	L (10)	SS (10)	ST (05)	35	**Insignificant** • Unless required by the project structural placement, the riverbed will not be disturbed • Spoil disposal in the river floodplain will be prohibited • Wastewater from camps will not be discharged to water body without proper treatment
2.1.10	Impact on non-timber forest products/MAPs	D	L (10)	SS (10)	ST (05)	35	**Insignificant** • The project will develop programs to support NTFPs/MAPs promotion. • While carrying out afforestation, the plantation of NTFPs/MAPs species will also be carried out.
2.1.11	Possible Risk of forest fire	ID	L (10)	L (20)	ST (05)	35	**Insignificant** • The project staff and workforce will be instructed not to visit the forested areas • Awareness relating to importance of forest and biodiversity

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							and consequences of forest fires will be provided to the local people and the project staffs.
2.1.12	Wildlife hunting and poaching	ID	L (10)	L (20)	ST (05)	45	• No poaching and hunting activities or purchase of wildlife meat or other products such as skins, horns etc will be allowed by construction workers. • Minimum disturbance of wildlife and lesser fauna will be maintained • Workers will be made aware about wildlife conservation and the penalties of non-compliance.
2.1.13	Increased incidence of Human Wildlife Conflict	D	L (10)	L (20)	LT (20)	50	• Wild animals will not be disturbed if seen during construction • No poaching and hunting activities will be allowed. • Construction works will not be done at dusk and dawn, and night. • Workers will be made aware about wildlife conservation through awareness and sensitization programs at least once in a month.
2.2. Operational Stage							
2.2.1	Reduced river flow	D	L (10)	L (20)	LT (20)	60	• Residual environmental flow (50% of monthly flow) will be released round the year from the weir as per Hydropower Policy to sustain the aquatic life of the dewatered section between weir and tailrace. • The proponent will prepare and implement an Environmental Flow Implementation Plan (EFIP), which will be monitored by the RM and SNP. The EFIP will include (but not limited to): (1) Minimum volumes of water flow that will be released from the reservoir at different stages of the year, (2) Responsibilities for implementation; (3) Measures for monitoring downstream flow levels; (4) Reporting requirements such as frequency and report content to other authorities as required; and (5) Review cycle for revision of the EFIP.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
2.2.2	Disturbance to the wildlife due to resident workforce	ID	L (10)	SS (10)	LT (20)	40	**Insignificant** • No poaching and hunting activities will be allowed. • Labor camp will be constructed nearby residential area • Minimum disturbance will be maintained • The project staff and workforce will be instructed not to visit the forested areas • Awareness relating to importance of forest and biodiversity to the local people and the project staff.
2.2.3	Impact on rare , endangered, protected and threatened species of flora and fauna	ID	L (10)	SS (10)	LT (20)	40	**Insignificant**
2.2.4	Bird casualties due to electrocution	ID	L (10)	SS (10)	LT (20)	40	**Insignificant** • Bird reflector will be place in the electric poles used for river crossing.
2.2.5	Forest Fire	ID	L (10)	L (20)	LT (20)	60	• The project staffs will be instructed not to visit the forested areas • Awareness relating to importance of forest and biodiversity and consequences of forest fires will be provided to the local people and the project staffs • Smoking will be prohibited in forest area
3. Socio economic and Cultural Environment							
Adverse Impacts							
3.1. **Construction Stage**							
3.1.1	Land User Right and Land compensation	D	M (20)	L (20)	LT (20)	60	• The user right of the lands required for the project will be taken as per GoN Rule. The project will provide the land in replacement as per GoN rule. • Minimum land will be acquired as per need. • Land used for temporary uses will be rehabilitated and

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							restored.
3.1.2	Pressure on existing facilities, services and resources of the project area	ID	M (20)	SS (10)	ST (05)	35	**Insignificant** • The project will support the existing educational institution in the project area • The project will support existing health institution in the project area to upgrade its capacity • The project will support to upgrade the existing trekking trails of project affected area • Trenches especially made for undergrounding the penstock pipe and T& D lines will be reclaimed immediately to avoid accidents. • People will be well informed about the trails obstruction with proper signage and route diversion will be arranged, if required.
3.1.3	Health and sanitation and public safety	ID	M (20)	SS (10)	ST (05)	35	**Insignificant** • Provisions will be made for checking health status of the worker for contagious diseases • The project will launch community awareness program on health and sanitation, communicable disease and ways to prevent such disease. • Signboards with signs on different construction related activities will be placed in the construction sites. • All the construction sites will be fenced and unauthorized persons will not be allowed in the construction sites. • All visitors in the construction site will be instructed to wear protective gears
3.1.4	Occupational health and safety related issues	D	H (60)	SS (10)	ST (05)	75	• The project will have the facility of first aid for its staff and construction worker. Such service will be provided free of cost service to the people of local area. • A contract will be done with Helicopter Company for emergency cases of injury and illness. • Emergency firefighting systems will be provisioned in the

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							camps and the construction areas. • Personnel Protective Equipment(PPE) such as helmets, gloves, boots, mask, ear plugs, safety belts etc. as to the requirement of the construction work nature to each of the construction workers and supervisors will be provided. Workers without required PPEs will not be allowed to enter in to the construction site. • The project will make the Contractor to organize regular safety instruction prior to, during and after the working hours in a routinely manner.
3.1.5	Socio-cultural conflict between local community and outside work force	D	L (10)	L (20)	ST (05)	35	**Insignificant** • Code of conduct for the project staff will be prepared and implemented and project staff will be provided the orientation on norms, values, and cultural belief of communities. • The project will organize regular ethical behavioral programs to outside workers before work session to respect local people, their culture and traditions • Labour management plan will be prepared and implemented. • Gambling and alcohol drinking will be prohibited within the camp and in the communities as well.
3.1.6	Gender Discrimination	ID	M (20)	SS (10)	ST (05)	35	**Insignificant** • Both women and men will be given equal opportunity for employment and ensured that no one will be discriminated on the basis of sex, caste, religion and ethnicity in project development activities • Participation of women and socially excluded groups will be ensured in any committee formed related to project development • No gender discrimination will be done in terms of wages for the same or similar works (Male and female will be paid equal wages for similar nature of work)

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
3.1.7	Stakeholder Engagement and information disclosure	ID	M (20)	L (20)	LT (20)	60	All the activities related to project will be made transparent and periodic consultation with relevant stakeholders will be carried out. The mechanism to have access to information related to project will be developed. Information related to project will be publicly disclosed via website, local FM, Newspaper and TV as per need basis. Stakeholder engagement plan will be developed and implemented.
3.1.8	Issues of Grievances Management and Gender Based Violence (GBV)	ID	H (60)	L (20)	ST (05)	85	GRC at project level will be established to address the issues related to labour, SEA/SH, stakeholders and local people. Orientation to the project staff & GRC on sexual exploitation and harassment and gender based violence will be provided. The code of conduct regarding the SEA/SH will be implemented. Furthermore, GRC will be made open to receive and investigate all the concerns and complaints about the project activities and will be made functional throughout the project lifecycle
3.1.9	Issues related to disturbance to community during construction	ID	M (20)	L (20)	ST (05)	45	Trenches especially made for undergrounding the transmission and distribution lines will be reclaimed immediately to avoid accidents. During the work taking place in trekking trails for T & D, people will be well informed about the trails obstruction with proper signage and route diversion will be arranged if required. Precaution will be made while digging trenches to protect water pipes and other cables (if exist in working trails). And if water distribution pipe gets damage, it will be maintained immediately.
3.1.10	Child labour	D	M (20)	L (20)	ST (05)	45	• Uses of child labour will be completely prohibited • Records of all the workers will be kept along with their identity showing age.
3.1.11	Stress on local resources and infrastructure	D	M (20)	SS (10)	ST (05)	35	During the work taking place in trekking trails for T & D, people will be well informed about the trails obstruction with proper signage and route diversion will be arranged if required.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
							Precaution will be made while digging trenches to protect water pipes and other cables (if exist in working trails). And if water distribution pipe gets damage, it will be maintained immediately.
3.1.2	Impact on historical, religious, cultural & touristic important sites	D	L (10)	SS (10)	ST (05)		• Workers Code of Conduct (CoC) will be prepared and implemented • Orientation programs for laborers regarding potential harm and damage that could be done to local religious, cultural, historical, and tourist important sites.
3.2. Operation Phase							
3.2.1	Occupational health and safety related impacts of the power station workers	D	M (20)	SS (10)	LT (20)	50	• Occupational health and safety plan (OHSP) specific to operation and maintenance phase of the project will be developed incorporating plans to deal with safety in powerhouse as well as maintenance activities will be developed and implemented. Compliance of the implementation of the measures recommended in the plan will be monitored periodically. • Safety signs, warning symbol boards will be placed in powerhouse. • Powerhouse workers will be equipped with all necessary safety equipment. • Emergency firefighting system will be provisioned in the camps and the powerhouse • Powerhouse workers will be made aware of the safety issues inside the powerhouse.
3.2.2	Public Safety Related Impacts/Movement of people in dangerous places	D	M (20)	SS (10)	LT (20)	50	• All dangerous sites such as switch yard will be fenced as a precautionary measure to restrict people's movement in the area; • Safety signs and posts will be erected at critical areas; and • Local people will be made aware of dangerous project areas.

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Mitigation Measures
3.2.3	Impacts related to benefit sharing of project	ID	M (20)	L (20)	LT (20)	60	Proponent is in consultation with local people of project area regarding of providing at least 10% of the shares to people living around the project area during the construction phase. In addition to the shares, locals will benefit from implementation of ESMP. The local government will receive the revenue and it can be used for local development activities.
3.2.4	Impacts related to tariff of electricity	ID	M (20)	L (20)	LT (20)	60	This issue related to tariff will be managed in coordination with beneficiaries and Electricity Regulatory Commission (ERC).
3.2.5	Impacts relating to sudden release of water to downstream	D	M (20)	L (20)	LT (20)	60	During the operation phase, the sudden release of water downstream of the headworks may cause accidents. Thus, as a mitigation measure, a siren system will be established to make the downstream people aware about the timings of the release of water. Similarly, local people will be made aware about the siren system or alternatively local FM will also be used for scheduled flushing or flushing required during emergencies
3.2.6	Withdrawal of economic opportunity	ID	L (10)	L (20)	ST (05)	35	Insignificant • The project will try to appoint maximum number of local people as far as possible during the operation period; • Training sessions will be conducted at least 3 months prior to the project completion, so that the labour force will be able to start their own businesses immediately upon the termination of their jobs in the project; • Training programs will be organized particularly targeting the skilled labour force willing to establish their own entrepreneurship, where they can utilize their skills and make a living.
3.2.7	Impacts related to management of micro hydro project that exist in project affected area	ID	H (60)	L (20)	LT (20)	100	Agreement for energy generation, distribution and management with three existing micro hydros has been done separately. The proponent will purchase the generated energy from existing micro hydro and is responsible for distribution of while micro hydro manages the production system themselves.

8.3 Enhancement and Mitigation Measures for Impacts to integrity of protected areas and Outstanding Universal Value

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Enhancement/Mitigation Measures
4. Integrity of Protected Areas and OUVs							
4.1 Beneficial Impacts							
***4.1.1* Construction Stage**							
4.1.1.1	Slope Stability	ID	M (20)	L (20)	LT (20)	60	• Gabion protection of length 100 m and cross-sectional area of 6m2 will be construction on landslide area along penstock alignment.
***4.1.2* Operation Stage**							
4.1.2.1	Ecological Integrity and Conservation in SNP	ID	H (60)	L (20)	LT (20)	100	• Awareness program on Biodiversity conservation • Conservation of flora and fauna • Adequate Electricity supply which reduce in dependency towards firewood • Provision of low tariff • Excavated material at a specified place
4.2 Adverse Impacts							
4.2.1 Construction Stage							
4.2.1.1	Impact on Landscape	ID	L (10)	L (20)	ST (05)	35	• Excavation of construction materials from designated sites • Deposition of spoils at specified area • Rehabilitation and restoration of excavated sites for material collection, laying of penstock, distribution and transmission lines immediately • Plantation of local grasses/plants at rehabilitated sites of penstock laying and excavation sites for materials.
4.2.1.2	Impact on Ecological Integrity	ID	M (20)	SS (10)	ST (05)	35	• No poaching and hunting activities will be allowed. • Restriction on visit in forest area • Restriction on collection forest produces from forest • Prohibition of use of fire in forest area

SN	Likely Impacts	Nature	Magnitude	Extent	Duration	Total Score	Enhancement/Mitigation Measures
							• Biodiversity conservation awareness raising activities to workers as well locals
4.2.1.3	Impact on Scenic Beauty	ID	M (20)	L (20)	ST (05)	45	• Rehabilitation and restoration of excavated sites for material collection, laying of penstock, distribution and transmission lines immediately • Plantation of local grasses/plants at rehabilitated sites of penstock laying and excavation sites for materials.
4.2.1.4	Impact on Social and Cultural Integrity	ID	L (10)	L (20)	ST (05)	35	• Preparation and implementation of code of conduct for project staffs/workers • Orientation on norms and values of project affected communities • Organization of regular ethical behavioral programs to outside workers before work session to respect local people, their culture and traditions • Prohibition of Gambling and alcohol drinking within the camp and working sites.
4.2.2 Operation Stage		-	-	-	-	-	No Impact

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CHAPTER 9: MONITORING AND REPORTING PLAN

9.1 Environmental Monitoring Plan

This chapter will discuss the monitoring and reporting mechanism. The National EIA Guidelines of 1993 propose three types of monitoring. They are baseline monitoring, compliance monitoring and impact monitoring; the plans for which are presented in this chapter.

9.1.1.1 Baseline Monitoring

Baseline monitoring is required to compile and maintain the database on environmental conditions prior to the implementation of the project. The primary concern during this phase will be to implement field data collection programs to obtain the baseline conditions, such as scientific and sociological information needed to finalize the design and cost of the mitigation measures. This is especially important if the project is delayed due to unforeseen circumstances. For AMHP, if the project comes under construction within 2 years from the data collection for this EIA study, the baseline data and information presented in this EIA report will serve as baseline and hence baseline monitoring will not be required. However, under any unforeseen circumstances, if the proposed AMHP gets delayed for more than two years (from the data collection for the present EIA), the project requires to carry out a baseline monitoring prior project construction. A plan for the baseline monitoring for the proposed AMHP is presented in **Table 40.** The project will also do self-monitoring in every 6 months after implementation of project as per provision of EPR 2020.

Table 40: Plan for Baseline Monitoring

SN	Parameter	Indicators	Method	Location	Time	Cost (NPR)	Responsibility
A. Physical and Chemical Environment							
1	Topography	Degrees of slopes	Site observation	Construction area	Before Construction	100,000.00	Proponent/SNP/RM
2	Land use	Area of land under different land use such as forest, cultivated lands etc.	Site observation, GIS Mapping	project Area	Before Construction		
3	Hydrology	Discharge and flood level	Direct discharge measurements, gauge readings	Cholunche Khola	Before Construction		
4	Geology	Stability of slopes, Occurrence of land slides	Field observation	Project Area	Before Construction		
5	Water Quality	Temperature, pH, Turbidity, Electrical conductivity, TSS, TDS, Iron, Sulphate, BOD, COD, DO, Alkalinity, Total Hardness, Total Coliform	Field measurements, Water sampling and lab testing	Cholunche Khola	Before Construction		
6	Noise	Loudness and intensity of noise	Field measurement using a dB meter	Headworks and Powerhouse	Before Construction		
7	Solid waste	Quantity and composition of waste	Observation and questionnaire survey	Project Area	Before Construction		
B. Biological Environment							
8	Forest and vegetation	Vegetation composition, fuelwood NTFPs, forest use, Energy use	Observation, GIS mapping, measurements (Quadrate sampling for	Project Area	Before Construction	100,000.00	Proponent/SNP/RM

SN	Parameter	Indicators	Method	Location	Time	Cost (NPR)	Responsibility
			grass), household surveys, FGD				
9	Wildlife (including mammals, avian fauna and herpetofauna)	Wildlife habitat, wildlife species, hunting and poaching activities, crop and animal depredation, human wildlife conflicts	Observation, Transect survey, Questionnaire surveys, FGD, KII	Project Area	Before Construction	250,000.00 (as before)	Proponent/SNP/RM
C. Socioeconomic and Cultural Environment							
10	Demographic characteristics	Household numbers, population, ethnicity, religion, language spoken, migration, education and literacy, occupation and skills	Secondary sources, Household survey, FGD	Project Area	Before Construction	200,000.00	Proponent/RM /Local Service Providers
11	Agriculture and livestock	Land ownership, land holding, cultivated area, cropping practices, crop production, crop yield, agro-biodiversity Livestock ownership and holding, livestock products Crop and livestock product market	Secondary sources, Household survey, FGD	Project area	Before Construction		
12	Economy	Occupation and skills, markets, annual income and expenditures, food sufficiency	Household survey, FGD	Project area	Before Construction		
13	Sanitation and health	Drinking water source, treatment practices,	Secondary sources, Household survey, FGD	Project Area	Before Construction		

SN	Parameter	Indicators	Method	Location	Time	Cost (NPR)	Responsibility
		toilet availability and types, cooking practices, waste management practices Diseases, treatment practices, disability, natality and mortality	FGD				
14	Culture	Religious shrines, festivals	Discussions with the local people, Rural Municipality wards and observation, Questionnaire surveys	Project area	Before Construction		Proponent/RM /Local Service Providers
15	History and archaeology	Sites of archaeological and historic significance	Secondary Sources, FGD	Project area	Before Construction		
16	Gender	Property ownership in women, participation of women in community groups, decision making by women	Household survey, FGD	Project area	Before Construction		
17	Infrastructures	Bridge, School, health facilities, drinking water system, community building, watermills, and shrines, Cremation sites etc.	Secondary Sources, FGD, Rural Municipality surveys	Project area	Before Construction		

9.1.1.2 Compliance Monitoring

Compliance Monitoring employs a continuous recording of specific environmental quality indicators in order to ensure project compliance with recommended environmental protection standards. The main objective of the compliance monitoring is to ensure that all conditions set forth and commitments made in the approved EIA report and other applicable regulatory requirements and standards, the project documents including project contracts and specifications etc. An early compliance assessment is also required to check if the environmental mitigation activities prescribed in the approved EIA report are well integrated in subsequent project documents such as detailed engineering design and tender documents.

Table 41 gives the compliance monitoring plan, which includes compliance parameters, indicators for measuring compliance, methods to be followed and guiding document to be referred, responsible parties for compliance monitoring and the schedule for compliance check.

Table 41: Plan for Compliance Monitoring

S.N.	Parameter	Indicators	Method/ Guiding Document	Location	Time	Cost (NPR)	Responsibility
1	EIA mitigations	Incorporation of EIA mitigation measures recommendations into contractual documents	Review of detailed design, project specification and tender documents/ Approved EIA	Office	Following completion of tender documents	10,000.00	Consulting engineers/ Proponent/AEPC
2	Environmental Considerations	The presence of each of the environmental considerations from the tender documents in the work plan	Review of proposed work plans/ Approved EIA	Office/Project Area	During contract negotiations	10,000.00	Consulting engineers/ Proponent /AEPC/SNP/RM
3	Contractor's compliance in carrying out environmental mitigation activities prescribed in EIA, project contract documents and project specification documents	Forest clearance, Excavation of lands for project construction, spoils management, work area, application of slope stability measures, air quality protection, water quality protection, noise minimization, solid waste management, over extraction of aggregates, felling of trees, intrusion in the surrounding forest, pre-employment screening of project workers, safety equipment for workers and safety assurance practices in area, public safety assurance practices, project camp management (drinking water, toilets, cooking fuel), control of social disorder (alcoholism, gambling, prostitution)	Site observation and discussion with project management, project staffs and local people using a checklist/ Approved EIA, Project Contract and Specification document, Regulatory documents of GON	Project Area	Continuous during the construction period	900,000.00	Consulting engineers/ Proponent /AEPC/RM/SNP/ DNPWC/Provincial Government
4	Contractor's compliance to GON's and	Water quality, air quality, noise, forest clearance, employment, occupational health and safety	Review of the regulatory documents, enlisting of the relevant clauses, site	Project Area	Continuous during the construction		Consulting engineers/ Proponent

S.N.	Parameter	Indicators	Method/ Guiding Document	Location	Time	Cost (NPR)	Responsibility
	WB's regulatory requirements (Acts, Regulations, Guidelines, Standards)		inspection and observation/All the documents mentioned in Chapter 3.		period		/AEPC/RM/SNP/ DoEN
5	Project Proponent's compliance in carrying out activities prescribed in environmental mitigation and environmental enhancement activities	Compensation, soil erosion and landslide control, compensatory plantation, staff employment, implementation of trainings, income generating programs, awareness programs, support to social institutions and all others mentioned in Chapter 6 of this EIA report	Review of project correspondence letters, evidence documents, observations, interviews with the concerned project authority, interviews with the project affected households/ Approved EIA	Project Area	Continuous during the construction period	400,000.00	AEPC/RM/SNP/ DNPWC/DoEN
6	Project Proponent's compliance GON's regulatory requirements	Land acquisition and compensation, project staff employment, environmental protection	Review of the regulatory documents, enlisting of the relevant clauses, site inspection and observation/ All the regulatory documents mentioned in point 4 above (of this table) including Land Acquisition Act (1977)		Continuous during the construction period		AEPC/RM/SNP/ DNPWC/MoFE

9.1.1.3 Impact Monitoring

Impact monitoring measures the physical, chemical, biological, socio-economic and cultural parameters within the project area during the construction and operation phases in order to detect environmental changes that occur as a result of project implementation. It involves actual measurement of the impacts of construction activities on the environment, such as water quality samples being taken at regular intervals to assess pollution concentrations in the river from construction work camps, after mitigation steps are taken.

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Table 42: Plan for Impact Monitoring

S. N.	Parameter	Indicators	Methods	Location	Schedule (Time)	Cost (NPR)	Responsibility
A. Physical/Chemical Environment							
1	Land use	Change in area under different land use	Observation, GIS Mapping	Project Area	One time after completion of project construction	100,000.00	Proponent /AEPC/RM
2	Soil Erosion and land stability	Development of rill and gullies, occurrence of landslides, drainage failures, river bank cutting	Observation	Construction area, spoil disposal areas, River bank	Continuous throughout project construction		Proponent /AEPC/RM
3	Water Quality	Temperature, pH, Turbidity, TDS, TSS, Conductivity, alkalinity, hardness, iron, BOD, COD, SO_4, DO, Total Coliform	Water sampling and laboratory test	Cholunche Khola downstream of weir and drinking water of project camp	Twice a year during construction phase in dry and wet season; two-time monitoring of project permanent camp drinking water and Headwork area		Proponent /AEPC/RM/DoEN
4	Noise	Noise intensity level	Measurement of noise using dB meter	Major construction areas, settlements	During peak construction period		Proponent /AEPC/RM/DoEN
5	Solid waste	Proliferation of waste	Observation	Project area	Continuous throughout project construction and one year of project operation		Proponent /AEPC/RM/DoEN
6	E-flow	Minimum volumes of water flow release from the reservoir	Salt dilution method	Reservoir, Downstream	Monthly during operation phase	-	Proponent/SNP/DNPWC/RM/RM
B. Biological Environment							
7	Grassland	Change in grassland area	Observation, GIS mapping	Headworks, Penstock Pipe alignment, forests in	One time monitoring after completion of project construction	50,000.00	Proponent /AEPC/BZMC/BZUG/SNP/RM/DNPW

S. N.	Parameter	Indicators	Methods	Location	Schedule (Time)	Cost (NPR)	Responsibility
				alignment, forests in the project area			G/SNP/RM/DNPWC
8	Protected species	No of protected species cleared	Records of clearance of species	Headworks, Penstock Pipe alignment	During clearance in each area		
9	Wildlife	Poaching events, crop depredation frequency	Interviews with local people	Project area	Continuous throughout project construction	50000	Proponent /AEPC/BZMC/BZUG/SNP/DNPWC
10	Critical Natural Habitat Species	No of critical endangered species spotted in the project area Human wildlife conflict	Consultation with local communities to know if the species are still present or if there has been any change as a result of the project.	Project area	During construction		Proponent /AEPC/RM/ Contractor/SNP/DNPWC
C. Socioeconomic and Cultural Environment							
11	Affected households	Livelihood conditions of the affected households by land and property acquisition	Household survey using structured questionnaires	Affected households	End of every year during construction period; at the end of the first year of operation	200,000.00	Proponent /AEPC/BZMC/BZUG/SNP/RM
12	Affected community	Quality of community life in project area	Observation, Interviews, FGD	Affected Rural Municipality	End of every year during construction period; at the end of the first year of operation		Proponent /AEPC/BZMC/BZUG/SNP/RM
13	Employment	No of local as well as migrant employees working for the	Records of employees	Project Work	Every month during construction phase; one time monitoring		Proponent /AEPC/RM

S. N.	Parameter	Indicators	Methods	Location	Schedule (Time)	Cost (NPR)	Responsibility
		Contractor and the Proponent			in the beginning of operation		
14	Community services	Pressures in existing service institutions and facilities such as schools, health posts, drinking water etc.	Records of particular service institution such as health posts and school, interviews with schools, teachers, health personnel, water user groups	Service institutions in the project area	Every four months during construction, one-time monitoring at the end of first year of operation		Proponent /AEPC/RM/Local Service Provider
15	Community health and safety	Incidence of communicable diseases, STDs, accidents	Interviews, structured questionnaire surveys, reports from health institutions	Project area	Every three months during construction, one time monitoring at the end of first year of operation	300,000.00 (already mentioned)	Proponent /AEPC/Contractor/RM/Local Service Provider
16	Occupational health and safety	Injuries, deaths, accidents of construction workforce	Project reports, interviews with construction workers	Construction areas	Every month during construction, one time monitoring at the end of first year of operation		Proponent /AEPC/Contractor/RM
17	Conflicts	Conflicts between locals and outside workforce	Interviews, record keeping, registered disputs	Project area	Every months during construction		Proponent /AEPC/RM/SNP
18	Law and order	Events of burglary, fights	Interviews, record keeping	Project area	Every month during construction		Proponent /AEPC/RM/Police Post/SNP
19	Environmental Enhancement Programs	People perception of environmental enhancement programs	Discussions with the beneficiary of enhancement programs	Project area	Every six-month during project construction, one time at the end of first year of operation		Proponent /AEPC/RM/SNPBZMC

CHAPTER 10: ENVIRONMENTAL AUDITING

According to 12 (1) of EPA 2076, Ministry or the designated institution will have to prepare an environmental audit report of the project requiring EIA within 6 months after the date of completion of 2 years of the proposed proposal providing the services or distribution to assess and evaluate the efficacy of the mitigation measures to minimize the adverse impacts imposed by the projects. This cost will be managed by GoN. As per provision made in Clause 45 (1) of Section 8 [Miscellaneous], the project will have to self-monitor the impact on the environment at the stage of construction and operation of the proposal and submit its report to the concerned body or department every six months. This cost will be managed by proponent itself.

Environmental audit is an effective tool by providing control authorities with an overall picture of the main impacts of the project and identifying issues of concern, where actual impacts have exceeded norms. Proponent will carry out the environmental and social audit through independent consultant during implementation. It helps to examine the actual environmental impacts, accuracy of predictions, effectiveness of environmental impact mitigation and enhancement measures and functioning of monitoring mechanisms. In order to assess the impact on the environment at the stage of project implementation, the report proposes for the environmental auditing following the Environment Protection Act 2076, Environment Protection Regulations 2077 and international good practices. The following will be done under the environmental auditing:

- Decision-Making Level Auditing
- Implementation Auditing
- Functional Auditing
- Project Impact Auditing
- Assessed Technology Auditing
- EIA Process Auditing

During above mentioned environmental audit, indicators of physical, biological and socio-economic and cultural environment, mitigation measures of project impacts and their efficacy will be assessed and report will be prepared as given in the format in EPR 2077. The cost for annual environmental auditing has been given as follows:

Table 43: Cost for Environmental Auditing

SN	Types of Auditing	Associated Team/Party/Group	Cost (NPR)
1.	Decision-Making Level Auditing	Internal	100,000.00
2.	Implementation Auditing	External[7]*	
3.	Functional Auditing	Independent External	100,000.00
4.	Project Impact Auditing	Internal External	100,000.00
5.	Assessed Technology Auditing	Internal External	100,000.00
6.	EIA Process Auditing	Internal	100,000.00
	Total Cost (NPR)		**500,000.00**

[7] The cost will be incurred by the GoN or concerned authorities.

CHAPTER 11: ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

The Environmental Management Plan (EMP) has been prepared as an integral part of ADMHP to set out the procedural framework to ensure the implementation of mitigation measures, monitoring and auditing requirements. The plan specifies the environmental responsibilities of all parties involved in the project, and detail environmental management requirements for the project during the pre-construction, construction and operation phases. The plan also specifies the coordination mechanism with various line agencies, non-project participants and schedule. The monitoring component likewise defines the monitoring mechanism, reporting etc. The project proponent will be responsible for the implementation of the EMP. The plan will apply adaptive management to accommodate changes in project design during the time. The EMP will follow Plan – Do – Check Act Cycle (PDCA) approach. The EMP will be updated during the detail design to cover the likely changes in project design, likely changes in policy and regulatory mechanism and stakeholder concerns.

11.2 Institutional Arrangements

Institutional arrangements are intended to make sure that the National laws are not violated during the pre-construction, construction and operational stages of the project. This chapter will provide an E&S institutional arrangement within the institutional structure of the proponent of the project. The E&S institutional arrangement has clearly spelled out the roles and responsibilities of each position for the implementation of the identified mitigation measures.

11.2.1 Institutions and Their Roles

11.2.1.1 Ministry of Forests and Environment

Ministry of Forests and Environment (MoFE) is the concerned ministry for preparation and implementation of environment related policy, plan, rule s and regulations in the country. It is the concerned authority to approve the Scoping Document, Terms of Reference and EIA report of the project. It is also a concerned Ministry for providing approval letter EIA study within National Park through Department of National Parks and Wildlife.

11.2.1.2 Ministry of Energy, Water Resources and Irrigation

Ministry of Energy, Water Resources and Irrigation (MoEWRI) is the line ministry and will provide oversight to AEPC. It mandates to formulate and implement environmental policies, plans and programs at national level although it has no direct responsibility in the project. It has the role of facilitation as and when needed on environmental and social safeguard.

11.2.1.3 UNESCO, World Heritage Center

UNESCO, World Heritage Center has overall monitoring of the heritage sites worldwide and plays a role of watch dog. It evaluates risks and threats (both natural and manmade) on the sites and suggests for appropriate actions to tackle the problems. Without permission of the institution, any kind of development activities cannot be implemented in world heritage sites.

As the SNP is also the World Heritage Site under criteria (vii) from 1979. Thus the project can be implemented only after the permission of UNESCO.

11.2.1.4 The World Bank

The World Bank will support AEPC to ensure effective implementation of E&S risk management measures for the project. It will review E&S instruments and provide clearance. It also supports AEPC in E&S capacity enhancement.

11.2.1.5 Project Management Team at AEPC

Project Management Team (PMT) at AEPC has overall responsibility from selection of projects to implementation fulfilling the requirements (Technical, Environmental and Social) of GoN and the World Bank. It supports for studies to conduct Detail Feasibility Study and E&S studies as per the Project Operational Manual (POM) and ESMF of MGEAP.

11.2.1.6 Department of National Parks and Wildlife Conservation

Department of National Parks and Wildlife Conservation (DNPWC), established in 1980 AD, is the institution for overall conservation and management of wildlife and biodiversity of the country. It works under the MoFE and governs all the conservation and management activities in protected areas of Nepal through field based offices.

11.2.1.7 Sagarmatha National Park (SNP)

The SNP is responsible for following activities:

- All activities will be cleared with them in advance,
- Permits will be obtained for all workers entering the park,
- Park authorities will be encouraged and supported to inspect project activities on a regular basis.

11.2.1.8 Khumbu Pasanglhamu Rural Municipality (KPLRM)

The KPLRM RM is the concerned authority to provide generation license. It has right for monitoring activities of project.

11.2.1.9 Partner Banks

Partner Banks (PBs) will take active part in the E&S screening, assessment, and monitoring cycle in order to better understand their risks. PBs will be specifically responsible for providing matching loan to Proponent as per an agreement between Proponent and PB.

11.2.1.10 The Proponent

The proponent will be responsible for the preparation of DFS/DED, and ESIA as required by the WB and Environmental Impact Assessment (EIA) as required by GoN. Proponent may hire consulting firms to conduct EIA. However, it will be sole responsibility of proponent to implement ESMP effectively. The proponent will prepare biannual progress reports and submit it to MoFE regarding the impacts and associated mitigation measures adopted to address the impacts.

11.2.1.11 Grievances Redress Committee (GRC)

There will be two GRC – one is formed at project level and another one will be formed at project level (field level) for the management of the any grievances related to the project. The GRC,

headed by the Project Manager will be responsible to resolve the grievances if other mechanism to handle the grievances fails to address or resolve the grievances/ complaints lodged related to the project development activities.

11.2.1.12 Buffer Zone Management Committee

Buffer Zone Management Committee (BZMC) is the apex body to manage the buffer zone management activities of SNP. It can play an important role in effective implementation and monitoring of proposed project.

11.2.1.13 Buffer Zone User Committee (BZUC)

Under BZMC of SNP, there are three Buffer Zone User Committees (BZUCs). The project lies under Khumbi Hulya BZUC. It can also an important role in effective implementation and monitoring of proposed project.

11.2.1.14 Buffer Zone Use Groups

Under Khumbi Hulya BZUC, there are 9 Buffer Zone User Groups (BZUGs). Out of 9, 6 BZUGs lies in PA and they can coordinate for effective implementation and monitoring of proposed project.

11.2.1.15 Grievances Redress Unit

GRU established at field level, has the responsibilities to resolve the local grievances and also of workers at field level within 10 days of grievance logged.

11.2.1.16 Construction Contractor

Construction here refers to civil construction works including minor civil works related to hydro-mechanical installation works, electromechanical installation works and transmission/distribution works. Construction will be carried out by the contractor as specified in the contract agreement. The construction contractor will be responsible for implementation of mitigation measures specified in the part of contractor and compliance with the tender clauses. The contractor will be responsible for the implementation of spoil disposal, waste management, occupational safety, structural bioengineering measures, air, noise and water quality protection measures, etc.

11.2.1.17 Construction Management/Supervision Consultant

The coordination of the compliance monitoring and mitigation program allocated under the contractor will be the responsibility of Consultant. Environment Monitoring Unit of the project will work for the monitoring of compliance issues and report to the Project Manager. The Consultant will also be responsible for the supervision and quality control of the works conducted by Contractor.

11.2.1.18 Local Consultative Forum

It is the forum formed at local level as a platform for locals to keep their concerns, suggestions and grievances, and coordinates to addresses these issues. It will forward the concerns, suggestions and grievances to GRU.

Table 44 defines the roles and responsibilities of different administrative structure during the project cycle i.e., pre-construction, construction and operation phases.

Table 44: Roles and Responsibilities of Various Institutions for EMP Implementation

SN	*Institutions*	*Roles and Responsibilities*
1	Ministry of Forests and Environment	Leading roles on formulation, implementation and monitoring of national law on environment; approval agency for EIA; authorized agency for environmental auditing.
2	Ministry of Energy, Water Resources and Irrigation	Being line Ministry, has mandates to formulate and environmental policy, plans and programs but no direct responsibility in the project.
3	UNESCO, World Heritage Center	Monitoring activities of the world heritage sites worldwide and playing a role of watch dog; Evaluation of risks and threats (both natural and manmade) on the sites and suggestion for appropriate actions to tackle the problems; authorized agency to provide permission for the implementation of proposed project.
4	The World Bank	Partner of the project and has supportive roles to ensure effective implementation of overall project Ensure effectiveness of E&S risk management measures for the project, review E&S instruments and provide clearance Support AEPC in E&S capacity enhancement.
5	Project Management Office at AEPC	Overall responsibility from selection to implementation of project.
6	DNPWC	Coordinates overall management of SNP from central level; provides required suggestion for the project implementation.
7	Sagarmatha National Park	• Implementation and monitoring of the proposed project. • All activities will be cleared with them in advance, • Permits will be obtained for all workers entering the park, • Park authorities will be encouraged and supported to inspect project activities on a regular basis.
8	Khumbu Pasang Lhamu Rural Municipality	Concerned authority to provide generation license and approval agency for Brief Environmental Study Report as per prevailing law of Nepal with monitoring responsibilities of project.
9	Partner Bank	Has roles in the E&S screening, assessment, and monitoring cycle in order to better understand their risks, and specifically responsible for providing matching loan to proponent as per project policy.
10	Proponent (Amadablam Khola Mini Hydro Ltd.)	responsible for the preparation of DFS including DED and EIA according to WB requirements Preparation of EIA and get approval from the MoFE Monitoring of the project Preparation of monitoring and progress report and submit it to the AEPC.
11	GRC	responsible to resolve the grievances at third level came through field level to Project Safeguard Unit, E &S Team of AEPC
12	BZMC	can play an important role in effective implementation and monitoring of proposed project
13	BZUC	an important role in effective implementation and monitoring of proposed project

SN	Institutions	Roles and Responsibilities
14	BZUGs	can coordinate for effective implementation and monitoring of proposed project
15	GRU	the responsibilities to resolve the local grievances and also of workers at field level
16	Construction Contractors	responsible for implementation of mitigation measures specified in the part of contractor and compliance with the tender clauses
17	Construction Management/Supervision Consultant	coordination of the compliance monitoring and mitigation program
18	LCF	a platform for locals to keep their concerns, suggestions and grievances, and coordinates to addresses these issues

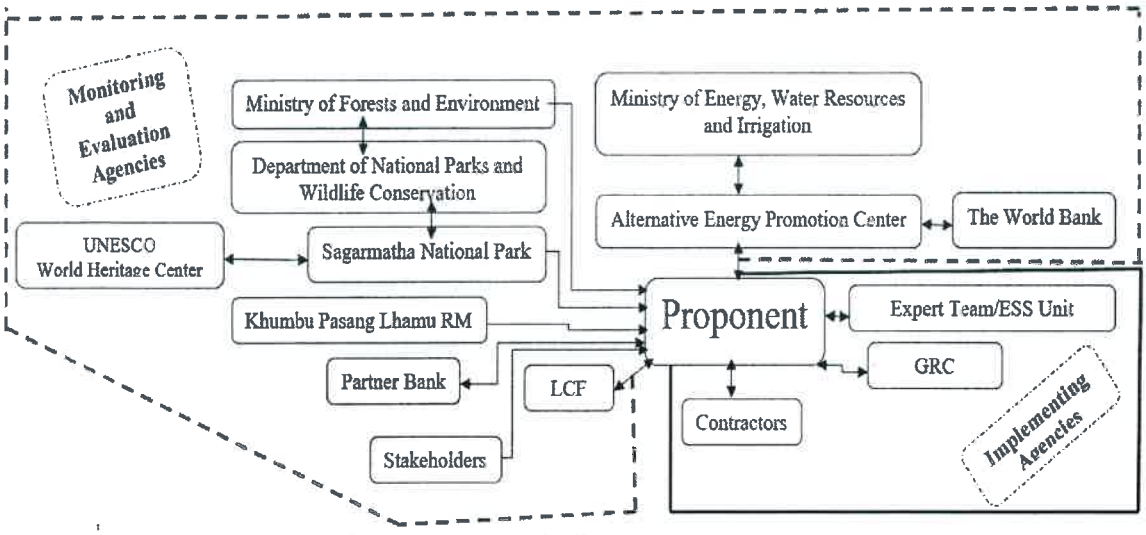

Figure 11: Organogram of EMP Implementing Institutions

11.3 Environmental Impacts and Mitigation Measures

The details of augmentation measures for positive impacts and mitigation measures are given in **Table 45** and **Table 46** respectively.

Table 45: Enhancement Measures for Positive Impacts

SN	Likely Impacts	Augmentation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Budget	Monitoring and Evaluation
1. Construction Stage									
1.1	Employment generation and skill enhancement	Priority given to workers from the project affected area based on their skills and qualifications. The project will provide necessary training to local people engaged in construction work, if necessary, depending upon the nature of the work offered.	Making Roster of interested people with their skill and capacity	Project area	Making roster in coordination with local government	Pre-Construction	Proponent (in coordination with local level)	Project Administration (No extra cost is required); For training: NPR 2,050,000	Local Level
1.2	Benefits from implementation of environmental mitigation programs and benefit augmentation measures	Support on community facilities such as education, health, drinking water and trekking trails will certainly benefit the local people. In addition, training will be provided to local community to boost local economy. Electrician, house wiring, electrical appliance repairing, tourism related training (housekeeping, chef), bakery, vegetable farming is of the trainings.	Implementation as proposed in EMP and Mitigation Measures	Specified in Mitigation Measures	Making mitigation measures and EMP as compliance	Pre-Construction to Operation Period	Proponent/ Contractor	Estimated as in Mitigation Measures	Local and Central Level
1.3	Benefits from community and social support	The project will support on various community and social programs such as	Plan with locals	Project area	Consultation and negotiation	Pre-Construction to Operation	Proponent/ Contractor	As per given in DFS	Local Level

SN	Likely Impacts	Augmentation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Budget	Monitoring and Evaluation
	programs	improvement of local services like health posts, schools, drinking water and social services from the budget allocated for ESMP as 1% of total project cost has been allocated for implementation of environmental and social mitigation measures during construction and operation.			with local people and government	Period			
1.4	Increase in economic activities in the project area and associated beneficial impacts in local economy through micro-enterprise development	Training will be provided as per need on local demand.	Plan with locals	Project area	Consultation and negotiation with local people and government	Pre-Construction to Operation Period	Proponent/ Contractor	For training: NPR 2,050,000 [Already included]	Local Level
1.5	Benefits for Exposure of local population to new technologies and technology transfer	The project will launch training programs in specialized area such as electro–mechanical works of hydroelectric, house wiring and maintenance, spoil handling etc. First priority will be given to the project affected families	Plan with locals	Project area	Consultation and negotiation with local people and government	Pre-Construction to Operation Period	Proponent/ Contractor	For training: NPR 2,050,000 [Already included]	Local Level

SN	Likely Impacts	Augmentation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Budget	Monitoring and Evaluation
		(PAFs) and local people to the extent they are interested to get involved in the construction activities.							
2. Operational Stage									
2.1	Employment generation and skill enhancement	Priority will be given to locals.	Making Roster of interested people with their skill and capacity	Project area	Making roster in coordination with local government	Pre-Construction	Proponent (in coordination with local level)	Project Administration (No extra cost is required)	Local Level
2.2	Benefits to be incurred from addition of 911 kW of power	The locals can use the electricity as per their needs such as cooking, heating, lighting and so on. Tariff for electricity will be made in close coordination with community so that all can use the electricity at affordable cost. Similarly 10% share will be provided to locals; additional shares will be provided if they interested.	Fixation of Electricity Tariff	Project area	Consultation and negotiation with local people and government	Pre-Construction to Operation Period	Proponent (in coordination with local level)	Project Administration (No extra cost is required)	Local Level
2.3	Sharing of electricity royalty to concerned authorities	Royalty generated from the electricity will be another source of income of local government, which can be utilized for various	Fixation of Royalty	Project Area/ Local Government	Consultation and negotiation with local government	Pre-Construction to Operation Period	Proponent (in coordination with local	Project Administration (No extra cost is required)	Local Level

SN	Likely Impacts	Augmentation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Budget	Monitoring and Evaluation
							level)		

Table 46: Mitigation Measures of Adverse Impacts

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
A. Physical Environment									
Construction Phase									
1	Change in land use	• Avoid of forest area for labor camp, quarry sites, construction material stock piling	Avoid of Forest area	Labor camp, quarry sites, construction material stock piling area	Site selection in non-forested area	Pre-construction and Construction	Proponent/ Contractor	No Cost	Local Level/SNP
		• Rehabilitation of temporarily acquired land	Rehabilitation	Labor camp, quarry sites, construction material stock piling area, penstock pipe alignment	Coordination with SNP and Local Level	Construction and Operation	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Plantation with local plant species to rehabilitate excavated sites	Plantation	Labor camp, quarry sites, construction material stock piling area, penstock pipe alignment	Coordination with SNP and Local Level	Construction and Operation	Proponent/ Contractor	5,00,000.00	Local Level/SNP
2	Change in	• Rehabilitation of	Rehabilitation	quarry sites and	Coordination	Construction	Proponent/	Included	Local

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
	Topography	quarry sites and excavated sites for laying of penstock pipe, transmission and distribution lines		excavated sites for laying of penstock pipe, transmission and distribution lines	with SNP and Local Level	and Operation	Contractor	in project cost	Level/SNP
3	Possible Glacier Lake Outburst Flood (GLOF) and associated impacts	• Awareness to workers about early warning system	Orientation Program	Project Area	Coordination with SNP and Local Level	Construction and Operation (1 time in construction and once in a year in operation time)	Proponent/ Contractor	300,000.00	Local Level/SNP
		• Preparation of Emergency Plan	Preparation of Emergency Plan	Project Area					
		• Installation of GLOF warning system at intake site	Installation of Early Warning System	Intake Area and Project Area					
4	Landslide and Erosion	• Minimal land clearance	Pegging of the area	Areas with Intake, Penstock, Powerhouse, Camps, transmission and distribution and other facilities area where land is required	Coordination with SNP and Local Level	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Avoidance of dumping of excavated spoils in hill slope	Site selection for spoil disposal	Intake and Powerhouse Site	Coordination with SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Stabilization	Application of	Excavation sites	Coordination	Construction	Proponent/		Local

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		of excavated slopes with the application of bioengineering	bioengineering		with SNP and Local Level		Contractor		Level/SNP
		• Gabion protection of length 100 m and cross-sectional area of $6m^2$ will be construction on landslide area along penstock alignment	Construction as per design	Penstock alignment (Ch.0+160 to Ch. 0+250)	Coordination with SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
		• Stabilization of river banks constructing gabion wall/retention wall	Construction as per design	Intake and bank cutting areas	Coordination with SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
		• Deposition of spoils in designated area	Site selection for spoil disposal	Intake and Powerhouse Site	Coordination with SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Reuse of excavated materials	Rehabilitation	Labor camp, quarry sites, construction material stock piling area, penstock pipe alignment	Coordination with SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
		• Prohibition of disposal of spoils in waterways	Site selection for spoil disposal	Intake and Powerhouse Site	Coordination with SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
	Spoil generation and disposal issues	• Top soil will be stored separately and later use in land rehabilitation	Storage of Top Soil	Intake, Penstock Alignment and Powerhouse Site	Coordination with SNP and Local Level	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Use in back filling	Reuse of spoil	Labor camp, quarry sites, construction material stock piling area, penstock pipe alignment	Coordination with SNP and Local Level	Construction			Local Level/SNP
		• Deposit in specified place	Site selection for spoil disposal	Intake and Powerhouse Site	Coordination with SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Revegetated the excavated areas	Plantation	quarry sites, construction material stock piling area, penstock pipe alignment	Coordination with SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
		• Proponent will prepare rehabilitation plan for spoil disposal area and implement it effectively after taking approval from the RM.	Preparation of rehabilitation plan; discussion and consultation with Locals, Local Level	Project Area	Coordination with Locals, SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
			and SNP						
6	Impacts due to quarrying activity	• Quarry will be done in specified area	Identification of quarry sites	Project Area	Coordination with Locals, SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Constructio n materials will be kept in designated area with covering	Identification of Storage yard	Project Area	Coordination with Locals, SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Haphazard quarry activities will be prohibited	Identification of quarry sites	Project Area	Coordination with Locals, SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Spoils will be kept separately and used for land reclamation	Identification of Storage yard	Project Area	Coordination with Locals, SNP and Local Level	Pre-construction and Construction	Proponent/ Contractor		Local Level/SNP
		• Quarry sites will be reclaimed	Rehabilitation	Quarry sites	Coordination with SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
		• Proponent will prepare rehabilitation plan for quarry sites and implement it effectively after taking approval from the RM.	Preparation of rehabilitation plan; discussion and consultation with Locals, Local Level and SNP	Quarry sites	Coordination with Locals, SNP and Local Level	Construction	Proponent/ Contractor		Local Level/SNP
7	Impacts on	• excavation for	Excavation	Penstock	excavation only	Construction	Proponent/	Included	Local

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
	material quarrying sites	laying penstock with careful manner so that slope stability will be maintained	only from designated sites with due care of slope	alignment	from designated sites		Contractor	in project cost	Level/SNP
		• Haphazard materials extraction will be prohibited	Making aware to workers about excavation from designated sites	Quarry sites	excavation from designated areas	Construction	Proponent/ Contractor		Local Level/SNP
		• Spoils will not throw/kept haphazardly	Making aware to workers about spoil deposit sites	Spoil disposal sites	spoil disposal only in designated area	Construction	Proponent/ Contractor		Local Level/SNP
		• Natural drainage will not be blocked due to stock piling of construction materials and spoils	identification of natural drainages and spoil disposal area	Project Area	spoil disposal only in designated area	Construction	Proponent/ Contractor		Local Level/SNP
		• The quarry site will be rehabilitated and vegetated.	Rehabilitation and Plantation	Quarry sites	Coordination with Locals, SNP and Local Level	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
8	Water quality and waste water disposal issues	• Storage of chemicals away from water sources	Site selection and Making storage yard	Project Area	site selection in coordination with SNP	Pre-construction/ Construction/ Operation	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Establishment of workshop facilities at	Site selection	Project Area	site selection in coordination	Pre-construction/	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		least 100 m away from water sources with oil and grease trapping system			with SNP	Construction/ Operation			
		• Provision of toilets at construction and camp sites with appropriate septic system and provision of ETP if needed	Site selection and construction	Project Area	site selection in coordination with SNP	Pre-construction/ Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Prohibition of open urination and defecation	Make aware to workers	Project Area	Coordinate with workers	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• No direct discharge of camp effluents in water sources and provision of ETP if needed.	Make aware to workers and provision of soak pits	Camp Area	Coordinate with workers	Construction and Operation	Proponent/ Contractor		Local Level/SNP
9	Noise and vibration related issues	• Installation of noise reducing equipment in ventilators, compressors and diesel generators	Provision of air plug to workers; Provision of low noise generating equipment	Intake, Powerhouse	Working with procurement section	Pre-construction/ Construction/ Operation	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Placing of generators away from settlements	Site selection (discussion with locals, local level and	Project Area	discussion with locals, local level and SNP	Pre-construction/ Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
			SNP)						
10	Soil Pollution	• Chemicals, paints, petrochemicals etc. will be handled carefully;	Making aware to workers	Project Area	Coordinate with workers	Pre-construction/ Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• These materials will be stored separately in safe store house.	Provision of store house	Store Yard	Coordinate with workers	Pre-construction/ Construction	Proponent/ Contractor		Local Level/SNP
11	Issues of haphazard stockpiling	• Storage at designated sites	Site selection for spoil disposal	Intake and Powerhouse Site	discussion with locals, local level and SNP	Pre-construction/ Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Disposal of remaining construction materials in spoil disposal sites	Management of construction materials	construction sites and spoil disposal area	Implementation of mitigation measures	Construction	Proponent/ Contractor		Local Level/SNP
12	Solid waste generation	• Provision of compost facilities for biodegradable waste; dumping yards for non-biodegradable waste; collection yard for reusable and recyclable waste	Site selection and management	construction sites	discussion with locals, local level and SNP	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Collection and storage of scraps in scrap yard	Provision of Storage Yard	Project Area	discussion with locals, local level and SNP	Pre-construction/ Construction	Proponent/ Contractor		Local Level/SNP
		• Separate collection bins in camps for	Making aware to workers	Camp Area	Coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		segregation of waste of different nature							
13	Air Pollution	• Crushing activities away from settlements	Site selection for crushing plant	Project Area	discussion with locals, local level and SNP	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Stabilization of spoils at tipping area	Compaction	Spoil disposal sites	Coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• provision of PPEs to workers	Provide PPEs to workers	Quarry sites	Coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Revegetation of bare area	Plantation	Spoil disposal sites	Coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
14	Impact on River Morphology	• Extraction of river bed materials without affecting the river morphology	Minimal extraction without eroding the bank areas	Quarry sites	Coordinate with workers	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Maintain regular water flow	Release of 50% of water of monthly flow	Intake/Dewater zone	Coordinate with workers	Operation	Proponent/ Contractor	Included in project cost	Local Level/SNP
15	Loss of fertile top soil	• Preservation of top soil and reused for plantation and restoration purposes	collection and storage of top soil	excavation sites	Coordinate with workers	Construction	Proponent/ Contractor	Included in project cost	Local Level/SNP
16	GLOF and associated impacts	• Educate locals and workers about early warning system	Aware locals and workers	Project Area	discussion with locals, local level and SNP	Construction/ Operation	Proponent/ Contractor	Included in project cost	Local Level/SNP
		• Preparation of Emergency Preparedness Plan	discussion with locals, local level and SNP and other	Project Area	Coordinate with workers, locals, local level and SNP	Construction/ Operation	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
			stakeholders						
Operation Phase									
	Impacts on flow regime downstream of diversion weir	• Maintain minimum flow of 50% of the mean monthly flow	Measurement of flow	intake area	Using standard measurement method such as salt dilution, current meter	Operation	Proponent/ Contractor		Local Level/SNP
2	Land submergence created by 1.37 m high diversion weir	• Bank protection measures	Implementation as per DFS	Intake area	Monitoring the implementation	Construction	Proponent/ Contractor		Local Level/SNP
3	Solid waste and waste water generation	• Solid waste and waste water management at camp	Segregation and management of waste	Camp Area	provision of separate bines as per waste category and coordination with local level and SNP for disposal	Construction	Proponent/ Contractor		Local Level/SNP
		• No disposal of waste and waste water haphazardly	Make aware to workers	Camp Area	Regular monitoring	Construction	Proponent/ Contractor		Local Level/SNP
4	Water contamination	• No discharge of effluent and chemicals in water body	Make aware to workers	construction sites	Regular monitoring	Construction	Proponent/ Contractor		Local Level/SNP
		• Monitoring of water quality periodically	Measure the water quality	Intake and Powerhouse Site	Testing water quality parameter at	Construction and Operation	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
					least twice a year				
5	Noise and Vibration	• Ear muffs will be provided for construction workers	Make aware to workers about use of ear plugs and muffs	construction sites	Regular monitoring	Construction and Operation	Proponent/ Contractor		Local Level/SNP
6	Soil erosion due to tailrace	• Provision of piped and open canal	Implementation as per DFS	Tailrace	Monitoring the implementation	Construction	Proponent/ Contractor		Local Level/SNP
		• Protection measures for ground and side scouring	Implementation of Protection works	Tailrace	Monitoring the implementation	Construction	Proponent/ Contractor		Local Level/SNP
	Protection of Bank	• Construction of bank protection measures	Construction of gabion wall, drywall and retention wall	Intake and river material extraction sites	Monitoring the implementation	Construction	Proponent/ Contractor		Local Level/SNP
8	Impacts on downstream due to sediment flushing	• A siren system will be installed	Aware workers and locals about the siren system	Project Area	Installation of siren system and monitoring the works	Operation	Proponent/ Contractor		Local Level/SNP
		• local people will be made aware about the siren system	Discussion and coordination with locals	Project Area	Workshop and field visit	Operation	Proponent/ Contractor		Local Level/SNP
		• Stabilization of weak river banks	Construction of gabion wall, drywall and retention wall	Project Area	Implementation and Monitoring the implementation works	Construction and Operation	Proponent/ Contractor		Local Level/SNP
B. Biological Environment									
Construction Phase									

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
1	Impacts on grassland and vegetation and SNP Land	• Immediate rehabilitation and restoration will be done in excavated areas	Plantation in coordination with SNP	Intake, Penstock Alignment and Powerhouse Site	Discussion, Field visit and implementation	Construction and Operation	Proponent/ Contractor	1,045,906.00	Local Level/SNP
2	Pressure on forest for fuelwood	• Use of fuelwood for cooking and heating will be prohibited in camps	Provision of alternatives of fuelwood	camps	LPG and Kerosene will be provided	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
3	Impact on wildlife and birds; red panda; musk deer; Himalayan black bear	• Prohibition on hunting and poaching	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Awareness on wildlife and habitat conservation	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• No work on night time as possible. If needed, permission will be taken from concerned authorities.	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
4	Impact on aquatic flora and fauna	• Unnecessary river bed will not be disturbed	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Prohibition of spoil disposal in river flood plain	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• No discharge of waste water in waterbody	Make aware to workers and project staffs	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
5	Impacts on NTFPs/MAPs	• Support on NTFPs/MAPs promotion	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Priority for NTFPs/MAPs in afforestation	Plantation	Project Area	Plantation in coordination with locals/SNP	Construction	Proponent/ Contractor		Local Level/SNP
6	Forest fire	• Restriction of visit on forest area	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
7	Wildlife hunting and poaching	• Prohibition on hunting and poaching	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
8	Human wildlife conflict	• No disturbance to wildlife if seen	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
		• No hunting and poaching	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
		• No work at dusk, dawn and night	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
Operation									

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
	Impacts due to reduced flow	• Maintain residual environmental flow (50% of monthly flow) and additional 5% of design discharge for seepage and evaporation loss	Release of environmental flow	Intake Area	Measurement of discharged water	Operation	Proponent/ Contractor		Local Level/SNP
2	Disturbance to wildlife due to resident workforce	• No visit in forest area • No poaching and hunting	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
		• Labour camp will be constructed nearby residential area	Site selection in coordination with locals and SNP	Project Area	Consultation with locals and SNP	Pre-construction/ Construction	Proponent/ Contractor		Local Level/SNP
3	Rare, Endangered, Protected and Threatened Species of flora and fauna	• Awareness among workforce • No work will be done during dusk and night when there will be movement of wildlife	Awareness for conservation to workers and locals	Project Area	Orientation program	Construction	Proponent/ Contractor		Local Level/SNP
4	Bird casualties	• Bird deflectors will be used in Transmission line over the river crossing	Installation of bird reflectors	River crossing area	coordination with SNP	Construction	Proponent/ Contractor		Local Level/SNP
5	Forest Fire	• No permission to workers/staff to visit forest area	Installation of information board,	Project area	coordination with SNP	Construction			Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		• Awareness on biodiversity conservation • Smoking will be prohibited in forest area	orientation on biodiversity conservation						
C. Socioeconomic and Cultural Environment									
Construction Phase									
	Land acquisition	• Acquisition of land as per GoN Rule and regulation on long term and short term lease as per need	Coordination and negotiation with GoN	Project area	Consultation and coordination	Preconstruction	Proponent/ Contractor		Local Level/SNP/ GoN
		• Rehabilitation and restoration of temporarily leased land	Plantation and rehabilitation	Intake, quarry sites, spoil disposal sites, camp sites	Coordination with SNP and GoN	Construction	Proponent/ Contractor		Local Level/SNP/ GoN
2	Pressure on existing facilities, services and resources of the project area	• Support on educational, health and drinking water facilities	Regular health checkup of workers along with locals; Separate facility for drinking water	Project Area	Coordination with SNP	Construction and operation	Proponent/ Contractor	100,000.00 (for health checkup); 500,000.00 (for drinking water facility).	Local Level/SNP
		• The project will support to upgrade the existing trekking trails	Rehabilitation of trekking trails	T & D Lines area	Coordination with SNP	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		of project affected area							
3	Issues relating to public health and sanitation and as well as public safety	• Regular health checkup of Workers	Regular health checkup of workers along with locals;	Project Area	Coordination with SNP	Construction and operation	Proponent/ Contractor	100,000.00 (for health checkup);	Local Level/SNP
		• Awareness program on health and sanitation	Orientation Program	Project Area	Coordination with SNP	Construction and operation	Proponent/ Contractor		Local Level/SNP
		• Provision of sign boards	Installation of sign board	construction sites-Intake area, powerhouse and T & D line area	Coordination with SNP	Construction and operation	Proponent/ Contractor	25,000.00 (Sign Board)	Local Level/SNP
		• Provision of fencing and restriction of unauthorized persons in construction sites	Provision of fencing	construction sites-Intake area, powerhouse and T & D line area	Coordination with SNP	Construction and operation	Proponent/ Contractor		Local Level/SNP
4	Issues of Occupational Health and Safety	• Provision of PPEs and First Aid	Provide PPEs and First Aid to workers	Project Area	Distribute to workers on demand	Construction	Proponent/ Contractor	100,000.00 (PPEs); 25,000.00 (First Aid)	Local Level/SNP
		• Preparation of Emergency Preparedness Plan	Consultation with locals, SNP and workers	Project Area	workshop and orientation	Construction	Proponent/ Contractor		Local Level/SNP
		• Provision of Fire Fighting Systems	Installation of firefighting system	Camps/storage yard/mechanical yard	installation of firefighting system and monitoring the	Construction	Proponent/ Contractor	25,000.00 (Fire Fighting)	Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
					works				
		• Regular instruction on safety to workers	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Provision of accidental insurance	Discussion with workers	camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
5	Socio-cultural issues	• Awareness program on ethical behavior, local tradition, culture and religious activities	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Prohibition on gambling and alcohol drinking in work place and camp premises-	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
6	Issues related to unsocial behaviors	• Implementation of code of conduct	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Organization of programs on ethical behavior programs	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Prohibition on gambling and alcohol drinking in work place and camp premises	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
7	Gender discrimination in terms of payment	• No gender discrimination on payment	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor	No extra cost	Local Level/SNP
		• Provision on	Orientation and	Camp	coordinate with	Construction	Proponent/		Local

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		payment as per work	discussion with workers		workers		Contractor		Level/SNP
8	Stakeholder engagement and information disclosure	• Maintenance of transparency of project activities	Consultation with locals, SNP and workers; Disclosure pf information related to project via website, local FM, Newspaper and TV as per need basis. Stakeholder engagement plan will be developed and implemented.	Project Area	Coordinate with workers, locals, SNP and other stakeholders	Pre-construction/ Construction/ Operation	Proponent/ Contractor	150,000.00 (for meeting if required)	Local Level/SNP
		• Preparation of Stakeholder Engagement Plan	Provision of stakeholder engagement and information disclosure	Project Area	Coordinate with workers, locals, SNP and other stakeholders	Pre-construction/ Construction/ Operation	Proponent/ Contractor		Local Level/SNP
9	Issues of GRM and GBV	• GRC at project level will be established	Consultation with locals, SNP and workers	Project Area	Coordinate with workers, locals, SNP and other stakeholders	Pre-construction/ Construction/ Operation	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		• GBV will be punishable	Formation of GRC	Project Area	Coordinate with workers, locals, SNP and other stakeholders	Pre-construction/ Construction/ Operation	Proponent/ Contractor		Local Level/SNP
10	Effect on existing social infrastructures	• Rehabilitation of construction sites especially trenches for laying penstock pipe, transmission and distribution lines	Immediate rehabilitation	penstock pipe, transmission and distribution lines	Coordinate with workers, locals, SNP and other stakeholders	Construction	Proponent/ Contractor		Local Level/SNP
11	Issues related to disturbance to community	• Separate construction camps for man and woman will be made	Site selection in coordination with workers/SNP	Project Area	Coordinate with workers, locals, SNP and other stakeholders	Preconstruction/ Construction	Proponent/ Contractor		Local Level/SNP
		• Make aware about social activities, customs, traditional, cultural and religious activities to construction crew	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Checking of unnecessary and untimely movement of construction crew	Record keeping of the movement of workers	Camp and construction sites	Maintain ledger in coordination with workers	Construction	Proponent/ Contractor		Local Level/SNP
		• Code of Conduct (CoC) including SEA/SH for project	Orientation and discussion with workers	Camp	coordinate with workers	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		staff will be prepared and implemented							
12	Issues of Child Labour	• Prohibition of child labour in works • Record keeping of labour with identity card showing age • Uses of PPEs is compulsory • Isolation wards will be made • Uses of masks and sanitizers will be made compulsory	Record keeping of workers	Camp and construction sites	coordinate with workers	Construction	Proponent/ Contractor	5,000.00 (Record keeping)	Local Level/SNP
Operation Phase									
1	Occupational health and safety issues	• OHSP will be prepared	Orientation and discussion with workers	Camp	coordinate with workers	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Safety signs, warning symbol boards will be placed in powerhouse	Orientation and discussion with workers	Camp and construction sites	coordinate with workers	Construction/ Operation	Proponent/ Contractor	100,000.00 (For safety sign);	
		• All necessary safety equipment will be provided to workers	Orientation and discussion with workers	Construction sites	coordinate with workers	Construction/ Operation	Proponent/ Contractor	25,000.00 (Safety equipment)	Local Level/SNP
		• Emergency firefighting system will be provisioned in	Orientation and discussion with Staffs	Camp and powerhouse	Coordinate with staffs	Construction/ Operation	Proponent/ Contractor	25,000.00 (Fire Fighting)	Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		the camps and the powerhouse							
		• Powerhouse workers will be made aware of the safety issues inside the powerhouse.	Orientation and discussion with Staffs	Powerhouse	Coordinate with staffs	Operation	Proponent/ Contractor		Local Level/SNP
2	Public Safety Related Issues/Movement of people in dangerous places	• Restriction people in dangerous area	Orientation and discussion with locals/visitors	Camp and powerhouse	Coordinate with locals/SNP	Construction/ Operation	Proponent/ Contractor	50,000.00	Local Level/SNP
		• Safety signs and posts will be erected at critical areas	installation of sign boards in coordination with locals and SNP	Project Area	Coordinate with locals/SNP	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Prohibition of trespassing of local people in the project area	installation of sign boards in coordination with locals and SNP	Project Area	Coordinate with locals/SNP	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
3	Issues related to benefit sharing	• Provision of shares	Consultation with locals	Project Area	Coordination with locals	Construction/ Operation	Proponent		Local Level
		• Implementation of EMP	Orientation to workers	Project Area	Coordination with locals, local level and SNP	Construction/ Operation	Proponent/ Contractor		Local Level/SNP
		• Local development from revenue	Consultation with locals, local level and	Project Area	Coordination with locals, local level and	Operation	Proponent		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
			SNP		SNP				
	Issues related to tariff of electricity	• Tariff will be fixed in coordination with local people	Consultation with locals, local level and SNP	Project Area	Coordination with locals, local level and SNP	Operation	Proponent		Local Level
	Issues relating to sudden release of water	• A siren system will be installed	local people will be made aware about the siren system	Project Area	Coordination with locals, local level and SNP	Operation	Proponent	25,000.00 (Siren system)	Local Level/SNP
6	Issues of Withdrawal of economic opportunity	• Priority for employment during operation will be given to local people	Consultation and training to locals	Project Area	Coordination with locals and local level	Operation	Proponent		Local Level
7	Issues of management of existing micro hydro	• Purchases of electricity generated from existing micro hydro and distribution to community (Already agreement has been done for this- Annex-XXII)	Negotiation with existing micro-hydro	Project Area	Coordination with locals and local level	Pre-construction/ Construction/ Operation	Proponent		Local Level
Protected Areas and OUV									
• Construction Period									
1	Slope Stability	• Gabion protection of length 100 m and cross-sectional area of $6m^2$ will be construction on	Construction as per design	Penstock alignment (Ch.0+160 to Ch. 0+250)	Coordination with SNP	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		landslide area along penstock alignment.							
2	Impacts on landscape	• Excavation of construction materials from designated sites	Orientation to workers for excavation in designated areas	Quarry sites	Coordination with local level and SNP	Construction	Proponent/ Contractor		Local Level/SNP
		• Deposition of spoils at specified area	Orientation to workers to deposit spoils at designated areas	Spoil deposition area	Coordination with local level and SNP	Construction	Proponent/ Contractor		Local Level/SNP
		• Rehabilitation and restoration of excavated sites for material collection, laying of penstock, distribution and transmission lines immediately	Plantation and rehabilitation	Quarry sites, construction material stock piling area, penstock pipe alignment, distribution and transmission lines	Coordination with local level and SNP	Construction	Proponent/ Contractor		Local Level/SNP
3	Impacts on ecological integrity	• No poaching and hunting activities will be allowed. • Restriction on visit in forest area • Restriction on collection forest produces from forest	Make aware to workers and locals	Project Area	Coordination with local level and SNP	Construction/ Operation	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		• Prohibition of use of fire in forest area • Biodiversity conservation awareness raising activities to workers as well locals							
4	Impacts on Scenic beauty	• Rehabilitation and restoration of excavated sites for material collection, laying of penstock, distribution and transmission lines immediately • Plantation of local grasses/plants at rehabilitated sites of penstock laying and excavation sites for materials.	Plantation and rehabilitation	Quarry sites, construction material stock piling area, penstock pipe alignment, distribution and transmission lines	Coordination with local level and SNP	Construction	Proponent/ Contractor		Local Level/SNP
5	Impacts on Social and Cultural Integrity	• Preparation and implementation of code of conduct for project staffs/workers • Orientation on norms and values of project affected communities	Orientation and aware to workers	Project Area	Coordination with local level and SNP	Construction	Proponent/ Contractor		Local Level/SNP

SN	Environment & Social Impact	Mitigation Measures	What to do	Where to do	How to do	When to do	Who will do	Estimated Cost (NPR)	Monitoring and Evaluation
		• Organization of regular ethical behavioral programs to outside workers before work session to respect local people, their culture and traditions							
		• Prohibition of Gambling and alcohol drinking within the camp and working sites.							

11.4 Disaster Management Plan

SN	Pre-disaster Actions	Actions to be taken during a disaster	Post Disaster Actions
1.	Disaster Management Plan Formulation and Coordination • Formation of Disaster Management Committee • Assessment of resources available for disaster management • Preparation of a mechanism for coordination with local stakeholders in the project area	Management of the injured and affected people • Mobilization of Disaster Management Committee at disaster spot or site • Arrangement of emergency first aid • Arrangement for immediate rescue of the injured and take them to the hospital for treatment • Management of essential service facilities and operate them temporarily	Primary Treatment and Safety • First aid the injured and move them to a safe place
2.	Awareness Program • Training to members of Disaster Management Committee • Identification of Disaster Prone Area • Awareness program to locals at disaster prone areas		Provision of emergency shelter • Management of shelter in coordination with local government • Management of food, accommodation and daily necessities
3.	Search and rescue operations and capacity development • Formation of search and rescue teams • Training of search and rescue activities • Management of search and rescue materials • Practice search and rescue from time to time		Post-disaster epidemic control and prevention • Awareness to local communities about the communicable diseases due to surrounding environment • Management of safe drinking water and toilets in emergency shelters • Regular monitoring on basic needs and services • Management of dead body

11.5 Emergency Response Plan

Table 47: Emergency Response Plan

Activities	Schedule	Location	Responsibilities
Provision of helipad for emergency evacuation of injured or other people	Preconstruction	Construction sites	Proponent/ Contractor
Provision of standby stretcher to evacuate the injured at the earliest to the nearest health post/hospital	Construction	Construction sites/Camp	Proponent/ Contractor
Provision of medical stock particularly for water borne disease to tackle the epidemic in the camp or in the villages surrounding the subproject site	Construction	Health care facility at subproject site	Proponent/ Contractor
Provision of firefighting equipment and regular firefighting training as needed	Construction/post-construction	Construction Sites/Powerhouse/Switchyard	Proponent/ Contractor
Provision of sirens to inform people of the emergencies (fire hazards, chemical hazard, accidents, earthquake etc.)	Construction/post-construction	Powerhouse, camp sites, headwork	Proponent/ Contractor
Emergency preparedness training (GLOF, floods, release of water from weir, epidemic outbreak, earthquake etc.) at least every year	Construction/post-construction	All project site/ powerhouse	Operation Manager

11.6 Environmental Monitoring, Auditing and Management Cost

The total cost for various environmental protection related activities has been estimated to NPR 7,274,906.00 which includes monitoring, auditing and EMP (**Table 48**). It is 1.17% of total project cost (NPR 618,901,638.89). The land replacement cost has been included in the project cost.

Table 48: Environmental Cost

SN	Activities	Cost (NPR)	Remarks
1	**Baseline Monitoring**		**As per Table 40**
1.1	Physical Indicators	100,000.00	
1.2	Biological Indicators	100,000.00	
1.3	Socio-economic and Cultural Indicators	200,000.00	
	Subtotal	**400,000.00**	
2	**Compliance Monitoring**	**1,320,000.00**	**As per Table 41**
3	**Impact monitoring**		**As per Table 42**
3.1	Physical Indicators	100,000.00	
3.2	Biological Indicators	100,000.00	
0.3	Socio-economic and Cultural Indicators	200,000.00	
	Subtotal	**400,000.00**	
4	**Environmental Auditing**		**As per Table 43**
4.1	Decision-Making Level Auditing	100,000.00	
4.2	Implementation Auditing		
4.3	Functional Auditing	100,000.00	
4.4	Project Impact Auditing	100,000.00	
4.5	Assessed Technology Auditing	100,000.00	
4.6	EIA Process Auditing	100,000.00	
	Subtotal	**500,000.00**	
5	**Environmental Augmentation and Mitigation**		**As per Table 45 & 46**
5.1	Enhancement Measures	2,050,000.00	
5.2	Mitigation Measures		
5.2.1	Physical Impacts	800,000.00	
5.2.2	Biological Impacts	1,045,906.00	
5.2.3	Socio-economic and Cultural Impacts	1,155,000.00	
	Subtotal	**5,050,906.00**	
	Total	**7,274,,906.00**	

CHAPTER 12: CONCLUSION AND COMMITMENT

Amadablam Mini Hydro Ltd will implement the proposed AMHP in the Sagarmatha National Park (SNP) which will generate 7,225,781.76 kWh of annual average energy. Apart from the generation of the hydroelectric power, the project will provide a number of benefits during construction and the operational stages. During construction, the beneficial impacts include employment generation, increase in local economy and enhancement of technical skills. It will have long-term beneficial impact for the development of the local area along with fulfillment of clean energy demand replacing biomass-based energy. This ultimately imparts positive impacts on ecological integrity and conservation of the SNP. The SNP is additionally recognized by UNESCO as the world heritage site under criterion (vii).

The project will also result in adverse impacts of various magnitudes, in different locations and even for the long-term duration. The major adverse impacts include land acquisition. The project intends to acquire about 5.719 ha of the Sagarmatha National Park. Out of this, the project will also require 5.085 ha land temporarily while remaining 0.634 ha permanently. Out of 0.634 ha land required for permanently, only 0.234 ha land will be occupied surficial while 0.400 ha of land required for penstock pipe will be used underground area only. The T&D lines require 4.550 ha of land temporarily as these structures will be underground except river crossing. There is no need of tree felling. During operation phase, water in the dewatered zone is not used for irrigation, drinking and not any livelihood purposes by local communities. Similarly, as per the consultation with SNP officials (Chief Warden and Assistant Warden) and locals, due to high slope gradient, altitude and extreme cold water the presence of fishes in Cholunche Khola is not reported. Thus, impacts on fishes and other aquatic life and livelihood of local community due to the reduction of river flow in dewatered zone is not observed. The impact of the project on OUV of the SNP is mostly insignificant and occurs during construction period only. Red Panda, Himalayan Musk Deer and Himalayan Black Beer are the critical wild fauna found in the SNP. The indirect impact on these wild animals might be an influx of workers which could disturb Red Panda and Musk Deer populations through illegal hunting or through the introduction of domestic dogs.

This EIA report includes mitigation measures for each identified adverse impacts as well as proposed enhancement measures for the beneficial impacts. EMP has been prepared and budget has been allocated for the mitigation and enhancement measures. The proponent will implement the proposed project ensuring effective implementation of the proposed EMP. The proponent will also compensate/mitigate any other impacts encountered during project implement, that not included in the EMP. Similarly, the EIA report has been prepared incorporating all the terms and condition and suggestions provided during consent letter for EIA study (Dispatch No. 243 on 2078/06/24 by MoFE), ToR/SD approval letter (Dispatch No. 464 on 2079/08/19 by MoFE) and Concerns of UNESCO (Dispatch No. 1203 on 2080/08/18 by DNPWC along with the letter of UNESCO), concerns and suggestion raised during public hearing on 2079/09/20. The EIA report has been prepared fulfilling all the requirements of GoN. No further environmental study will be required for project.

The Amadablam Mini Hydro Ltd. is committed to implement all the plans mentioned in the Environmental Impact Assessment report along with appropriate suggestions provided by locals and concerned stakeholders.

CHAPTER 13: REFERENCES

Bajracharya, B., Shrestha, A. B., & Rajbhandari, L. (2007). Glacial Lake Outburst Floods in the Sagarmatha Region: Hazard Assessment Using GIS and Hydrodynamic Modeling. *Mountain Research and Development*, *27*(4), 336–344. http://www.jstor.org/stable/25164154

Bajracharya, Samjwal & Mool, Pradeep. (2010). Glaciers, glacial lakes and glacial lake outburst floods in the Mount Everest region, Nepal. Annals of Glaciology. 50. 10.3189/172756410790595895.

Detail Feasibility Study of including Detailed Engineering Design Report of Amadablam Mini Hydro Project, Kathmandu, Nepal.

Everest Link Pvt. Ltd., 2020, *Draft Report Environmental Impact Assessment of Laying Optical Fiber and Wireless Hybrid Network in Khumbu Pasanglhamu Rural Municipality*, Ministry of Information and Communication

GoN, 2019.Environment Protection Act, Ministry of Forest and Environment, Kathmandu, Nepal.

GoN, 2020.Environment Protection Regulation, Ministry of Forest and Environment, Kathmandu, Nepal.

HMGN, 1993.National Environmental Impact Assessment Guidelines, Nepal Gazette Volume, 45 Number 19 Kathmandu, Nepal

ICIMOD (2011). Glacial lakes and glacial lake outburst floods in Nepal. Kathmandu: ICIMOD

ICIMOD, 2001. Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Floods Monitoring and Early Warning Systems in the Hindu Kush-Himalayan Region Nepal. Kathmandu, Nepal

IFC, 2007.Environmental, Health and Safety Guidelines. International Finance Corporation (IFC), World Bank Group. April 2007.

IFC, 2012.Performance Standards on Environmental and Social Sustainability, International Finance Corporation (IFC), World Bank Group. Effective 1 January 2012.

Inskipp C., Baral H. S., et al. (2016) The status of Nepal's Birds: The National Red List Series. Zoological Society of London, UK. Department of National Parks and Wildlife Conservation, Kathmandu, Nepal.

IUCN, 2014. IUCN red list of threatened species, version 2012.2, www.iucnredlist.org
Jnawali, S.R., Baral, H.M. et al. (2012). The Status of Nepal's Mammals: The National Red List Series. Department of National Parks and Wildlife Conservation, Kathmandu, Nepal.

Khanal, Sanjay & Hogland, William & Bhatt, Ramesh &Manandhar, Dinesh &Kafle,

Khumbu Pasanglhamu Rural Municipality, 2076 (BS). Rural Municipality Profiles of Khumbu Pasanglhamu Rural Municipality. Solukhumbu, Nepal

Kumud. (2012). Implications of Climate Change and Tourism in the Mt. 10.1201/b14323-23.

Nicholson, K., Hayes, E., Neumann, K., Dowling, C. and Sharma, S. (2016) Drinking Water Quality in the Sagarmatha National Park, Nepal. Journal of Geoscience and Environment Protection, 4, 43-53.

Uprety, B.K. 2003. Safeguarding the resources Environmental Impact Assessment process and Practice. Utara Uprety, Kathmandu.

ANNEXES

ANNEX I: REGISTRATION CERTIFICATE

नेपाल सरकार

उद्योग, वाणिज्य तथा आपुर्ति मन्त्रालय

कम्पनी रजिष्ट्रारको कार्यालय

कम्पनी दर्ताको प्रमाण-पत्र

दर्ता नं. २१६६४/०८०/०८१

श्री अमादब्लम मिनि हाईड्रो

नामको प्राइभेट लिमिटेड कम्पनी संम्वत् २०८० साल आश्विन महिना २३ गते रोज ३ मा प्राइभेट लिमिटेड बाट पब्लिक लिमिटेडमा परिणत भएको हुनाले कम्पनी ऐन, २०६३ को दफा १३ को उपदफा १(क) बमोजिम यो प्रमाण-पत्र दिइएको छ।

उप. रजिष्ट्रार

मिति: २०८०-०६-२४

Government of Nepal

Ministry of Industry, Commerce & Supplies

Office of the Company Registrar

Registration No: 321664/080/081

CERTIFICATE OF INCORPORATION OF COMPANY

This Certificate of Incorporation has been issued to

M/s Amadablam Mini Hydro

Private Limited company having Converted it from Private Limited to Public Limited on the 10 day of October, 2023 pursuant to sub-section (1) of section 13 of the Companies Act, 2006.

Deputy Registrar

Date: 2023-10-11

शर्त कम्पनी संस्थापनलाई मात्र कम्पनीको उद्देश्य कार्यान्वय गर्ने इजाजत प्रदान गरिएको नमानिने हुनाले कानून अनुसार लिनुपर्ने अनुमति सम्बन्धित निकायबाट लिएर मात्र कम्पनीको उद्देश्य अनुसार कारोबार गर्न पर्नेछ ।

यस कार्यालयमा मिति २०७६-०१-२४ मा प्रति नं २१४८०/०७५/७६ मा दर्ता भएको अमादब्लम मिनि हाईड्रो नामक प्राइभेट लिमिटेड कम्पनीको सम्पूर्ण ऋण धन दायित्व यसै अमादब्लम मिनि हाईड्रो ले नै व्यहोर्नु सकार्ने गरि उक्त प्रति साई मिति २०८०-०६-२३ को निर्णय अनुसार पब्लिक लिमिटेडमा परिणत गरी उपरोक्त नयाँ दर्ता नं कायम गरिएको छ।

नेपाल सरकार

उद्योग, वाणिज्य तथा आपुर्ति मन्त्रालय

कम्पनी रजिष्ट्रारको कार्यालय

कम्पनी दर्ता प्रमाण-पत्र

दर्ता नं: २१४५८०/७५/०७६

श्री अमादब्लम मिनि हाईड्रो नामको प्राइभेट लिमिटेड कम्पनी संम्वत् २०७६ साल बैशाख महिना २४ गते रोज ३ मा दर्ता भएको हुनाले कम्पनी ऐन, २०६३ को दफा ५ को उपदफा (१) बमोजिम यो प्रमाण-पत्र दिइएको छ ।

स. रजिष्ट्रार

सहायक रजिष्टार

मिति: २०७६-०१-२५

Government of Nepal

Ministry of Industry, Commerce & Supplies

Office of the Company Registrar

Registration No: 214580/75/076

CERTIFICATE OF INCORPORATION OF COMPANY

This Certificate of Incorporation has been issued to M/s Amadablam Mini Hydro Private Limited having incorporated it on the 7 day of May, 2019 pursuant to sub-section (1) of section 5 of the Companies Act, 2006.

Asst. Registrar

Date: 2019-05-08

शर्त कम्पनी संस्थापनलाई मात्र कम्पनीको उद्देश्य कार्यान्वय गर्ने इजाजत प्रदान गरिएको बमानिने हुनाले कानून अनुसार लिनुपर्ने अनुमति सम्बन्धित विकासबाट लिएर मात्र कम्पनीको उद्देश्य अनुसार कारोबार गर्नु पर्नेछ ।

नेपाल सरकार
अर्थ मन्त्रालय
आन्तरिक राजस्व विभाग

स्थायी लेखा नम्बर (PAN) दर्ता प्रमाण पत्र

दर्ता मिति

	दिन	महिना	साल
आधार	०१	०२	२०७६

स्थायी लेखा नम्बर : ६ ० ९ ५ ३ ९ ९ २ ६

आन्तरिक राजस्व कार्यालय : आन्तरिक राजस्व कार्यालय बबरमहल/पुतलीसडक [illegible]

कारोबारको नाम : अमादब्लम मिनि हाईड्रो प्रा.लि.

करदाताको प्रकार : प्राइभेट लिमिटेड

ठेगाना : वार्ड नं. ८, [illegible] महानगरपालिका, काठमाडौं, काठमाडौं

व्यवसायका कारोबारहरू : विद्युत उत्पादन तथा वितरण,

करदाताको दस्तखत

Amadablam Mini Hydro Pvt. Ltd.

२०७६।०२।०१

कर अधिकृत

करदाताले पालना गर्नुपर्ने कर्तव्यहरू:

- [illegible]
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- [illegible]

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय

विद्युत विकास विभाग

२०५०

(..........अनुमतिपत्र महाशाखा..............)

फोन नं. ४४९१०७४, ४४९११३७, ४४९१९६८, ४४९०५०१, ४४४४७७५, ४४७४९११, ४४९१३६२
फ्याक्स ४४४३९०२
पोष्ट बक्स नं. २५०७
सानोगौचरण
काठमाडौं, नेपाल

पत्र संख्या :-२०७६/०७७
चलानी : १०२०

मिति:०७६/१०/१३............

विषय:- Technical Clearance उपलब्ध गराइएको सम्बन्धमा ।

श्री खुम्बु पासाङ्ल्हामु गाउँपालिका
गाँउ कार्यपालिकाको कार्यालय,
चौरीखर्क,सोलुखुम्बु ।

प्रस्तुत विषयमा तहाँको पत्र संख्या २०७६/०७७ , च.नं.३०८ को प्राविधिक परामर्श(सफाई) सम्बन्धी पत्र प्राप्त भइ व्योहोरा अवगत भयो ।

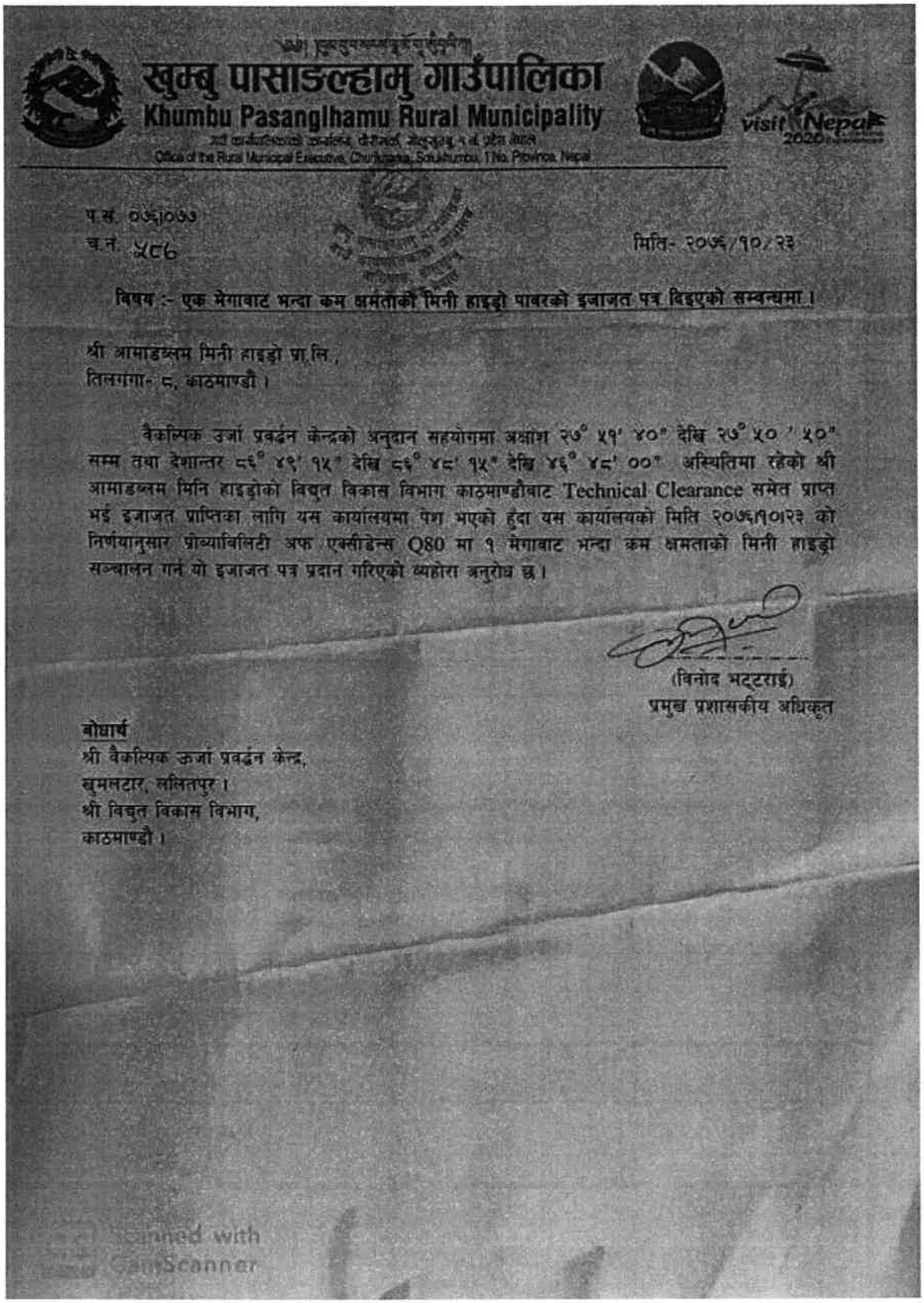
प्रस्तावित आमादब्लम मिनी जलविद्युत आयोजना (off-grid) को लागि तहाँबाट माग भएको Technical Clearance सम्बन्धमा कारवाही हुँदा विभागको Database अनुसार अन्य आयोजनाहरु संग दोहोरो पर्ने नदेखिएको तथा सो आयोजनाको क्षमता प्रोब्याब्लिटी अफ एक्सीडेन्स Q४० मा १(एक)मे.वा. भन्दा कम देखिएकोले प्रचलित कानुन अनुसार विकास गर्न प्राविधिक रुपमा बाधा नपर्ने हुँदा तपसिल बमोजिमको सर्वेक्षण क्षेत्रमा Technical Clearance उपलब्ध गराइएको व्योहोरा विभागको मिति २०७६/१०/०५को निर्णयानुसार जानकारी गराइन्छ । साथै उक्त आयोजना विकास सम्बन्धी तहाँ बाट भए गरेको निर्णय कार्यान्वयनको जानकारी यस विभागलाई उपलब्ध गराइदिनु हुन अनुरोध छ ।

<u>तपसिल:</u>

अक्षांश: २७° ५१' ४०" देखि २७° ५०' ५०" सम्म
देशान्तर: ८६° ४९' १५" देखि ८६° ४८' ००" सम्म

(प्रदिप कुमार राउत)
इन्जीनियर

बोधार्थ:
१.श्रीमान महानिर्देशकज्यू,विद्युत विकास विभाग
२.श्री आमादब्लम मिनी हाइड्रो प्रा.लि. ,तिलगंगा ,काठमाडौं,९८०१०६५९२८



खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
Office of the Rural Municipal Executive, Chunjuma, Solukhumbu, Province No. 1, Nepal

visit Nepal 2020

प.सं. ०७१/०७७
च.नं. ४८६

मिति- २०७६/१०/२३

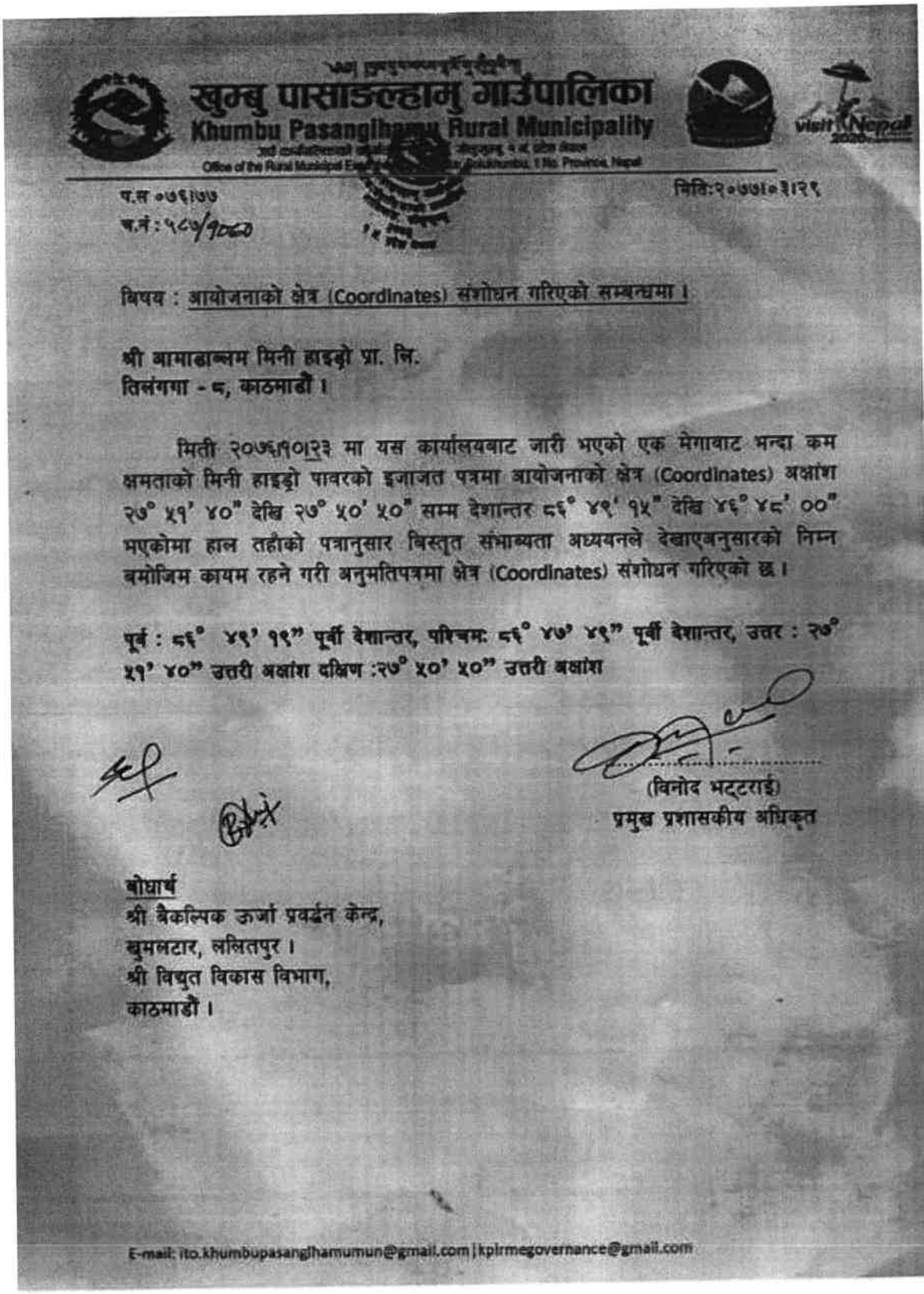
विषय :- एक मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो पावरको इजाजत पत्र दिइएको सम्बन्धमा ।

श्री आमाडब्लम मिनी हाइड्रो प्रा.लि.,
तिलगंगा- ८, काठमाण्डौ ।

वैकल्पिक उर्जा प्रवर्द्धन केन्द्रको अनुदान सहयोगमा अक्षांश २७° ५१' ४०" देखि २७° ५० ' ५०" सम्म तथा देशान्तर ८६° ४९' १५" देखि ८६° ४८' १५" देखि ४६° ४८' ००" अस्थितिमा रहेको श्री आमाडब्लम मिनि हाइड्रोको विद्युत विकास विभाग काठमाण्डौबाट Technical Clearance समेत प्राप्त भई इजाजत प्राप्तिका लागि यस कार्यालयमा पेश भएको हुदा यस कार्यालयको मिति २०७६।१०।२३ को निर्णयानुसार प्रोव्याबिलिटी अफ एक्सीडेन्स Q80 मा १ मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो सञ्चालन गर्न यो इजाजत पत्र प्रदान गरिएको व्यहोरा अनुरोध छ ।

(विनोद भट्टराई)
प्रमुख प्रशासकीय अधिकृत

बोधार्थ
श्री वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र,
सुमनटार, ललितपुर ।
श्री विद्युत विकास विभाग,
काठमाण्डौ ।



खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
Office of the Rural Municipal Executive, Solukhumbu, 1 No. Province, Nepal

Visit Nepal 2020

प.सं ०७६।७७
च.नं : ५८७/१०८०

मिति:२०७७।०३।२९

विषय : आयोजनाको क्षेत्र (Coordinates) संशोधन गरिएको सम्बन्धमा ।

श्री आमाढाब्लम मिनी हाइड्रो प्रा. लि.
तिलंगगा - ८, काठमाडौं ।

मिती २०७६।१०।२३ मा यस कार्यालयबाट जारी भएको एक मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो पावरको इजाजत पत्रमा आयोजनाको क्षेत्र (Coordinates) अक्षांश २७° ५१' ४०" देखि २७° ५०' ५०" सम्म देशान्तर ८६° ४९' १५" देखि ४६° ४८' ००" भएकोमा हाल तहाँको पत्रानुसार विस्तृत संभाव्यता अध्ययनले देखाएअनुसारको निम्न बमोजिम कायम रहने गरी अनुमतिपत्रमा क्षेत्र (Coordinates) संशोधन गरिएको छ ।

पूर्व : ८६° ४९' १९" पूर्वी देशान्तर, पश्चिम: ८६° ४७' ४९" पूर्वी देशान्तर, उत्तर : २७° ५१' ४०" उत्तरी अक्षांश दक्षिण :२७° ५०' ५०" उत्तरी अक्षांश

(विनोद भट्टराई)
प्रमुख प्रशासकीय अधिकृत

बोधार्थ
श्री वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र,
खुमलटार, ललितपुर ।
श्री विद्युत विकास विभाग,
काठमाडौं ।

E-mail: ito.khumbupasanglhamumun@gmail.com | kplrmegovernance@gmail.com

खुम्बु पासाङ्ल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
गाउँ कार्यपालिकाको कार्यालय, चौरीघर्क, सोलुखुम्बु कोशी प्रदेश नेपाल
Office of the Rural Municipal Executive Ch[illegible], Solukhumbu, Koshi Province Nepal

प.स.: ०८०/८१

मिति २०८०।०९।०८

च.नं.: ५०९

श्री अमादब्लम मिनि हाइड्रो लिमिटेड,
खुम्बु पासाङ्ल्हामु गाउँपालिका-०४,
सोलुखुम्बु ।

विषय: अनुमति सम्बन्धमा ।

खुम्बु पासाङ्ल्हामु गाउँपालिका बाट मिति २०७६/१०/२३ मा बिद्युत संचालन अनुमति प्राप्त अमादब्लम मिनि हाइड्रो लि. लाई विद्युत उत्पादन पश्चात विद्युत प्रसारण र वितरणका लागि अनुमति प्रदान गरिएको व्यहोरा अनुरोध छ ।

(मिङ्मा छिरी शेर्पा)
अध्यक्ष

Email: ito.khumbupasanglhamumun@gmail.com, info@khumbupasanglhamumun.gov.np
Phone: +97738590046

ANNEX II: DECLARATION FROM STUDY TEAM MEMBERS AND PROPONENT

1. **Name of Project**: Amadablam Mini Hydro Project
2. **Name and Address of Proponent:**
   Amadablam Mini Hydro Ltd.
   Kathmandu-8, Tilganga, Kathmandu
   Bagmati Province, Nepal
   Email: amadablammminihydro@gmail.com
   Telephone No: 01-4464222, 01-4464333

3. **Name and Address of Consultant:**
   Eco Friend International Pvt. Ltd.
   Lalitpur-2, Sanepa,
   Lalitpur, Nepal
   Tel: +977-9851127867
   Email: ecofriend.nepal@gmail.com

4. **Name of Report: Scoping/ToR/ EIA Report of Amadablam Mini Hydro Project**

We declare followings:

- we have studied professionally using acceptable and universal methods;
- The findings of the study are correct to the best of our knowledge and have not changed in any way;
- The proposed impact mitigation and enhancement measures, to the best of our knowledge, are sufficient to comply with reliable, practical and relevant legal requirements; and
- we will be responsible for any misleading information contained in this part of the report relating to our field of study.

SN	Name	Expertise	Signature
1	Dhan B.Shrestha	Environment/Team Leader, [MSc Environmental Science]	
2	Lokesh Sapkota	Physical Environment Expert [ME, Environmental Engineering]	
3	Ramji Bogati	Biodiversity Expert [MSc, Zoology]	
4	Heramba Adhikari	Scocio-economic and Cultural Expert [MA, Sociology/Economics]	
5	Pursottam Shilpakar	Geologist [Msc, Geology]	
6	Nirab Bhattarai	Electrical Engineering, [BE Electrical]	

7	Subodh Ghimire	Hydropower Engineering [BE, Civil]	Subodh

PROPONENT	CONSULTANT
Amadablam Mini Hydro Ltd. Kathmandu-8, Tilganga, Kathmandu Bagmati Province, Nepal Email: amadablammminihydro@gmail.com Signature: Stamp Amadablam Mini Hydro Limited	Eco Friend International Pvt. Ltd. Lalitpur-2, Sanepa, Lalitpur, Nepal Tel: +977-9851127867 Email: ecofriend.nepal@gmail.com Signature: Stamp Eco Friend International EFI Estd. 2019

ANNEX III: CONSENT LETTER FROM MOFE FOR EIA STUDY

पत्रोत्तरमा पत्र संख्या मिति उल्लेखित हुन अपेक्षित छ ।

नेपाल सरकार

वन तथा वातावरण मन्त्रालय

वातावरण तथा जैविक विविधता महाशाखा

EX: पो.ब.नं. :३५८७
सिंहदरबार, काठमाण्डौं

पत्र संख्या:-
चलानी नं. २३३
प्राप्त पत्र संख्या र मिति:

जैविक विविधता/२०७८/०७९

मिति: २०७८/६/२४

विषय: वातावरणीय प्रभाव मूल्याकंन अध्ययन गर्ने सहमति सम्वन्धमा ।

श्री अमादब्लम मिनी हाइड्रो प्रा.लि,
तिलगंगा-८, काठमाण्डौं ।

प्रस्तुत विषयमा तहाँ कम्पनीबाट प्रर्वद्धन गरिने सोलुखुम्बु जिल्लामा सगरमाथा राष्ट्रिय निकुञ्ज क्षेत्र भित्र पर्ने अमादब्लम मिनी जलविद्युत आयोजनाको लागि वातावरणीय प्रभाव अध्ययन गर्न सहमति माग भएको सम्वन्धी फाइलमा कार्वाही हुँदा निम्न वमोजिमका शर्तहरुको पूर्ण पालना गर्ने गरी वातावरणीय प्रभाव मूल्याकंन अध्ययन गर्न सहमति दिने भनि वन तथा वातावरण मन्त्रालय (सचिवस्तर) बाट मिति २०७८/६/२० मा निर्णय भएको व्यहोरा अनुरोध छ ।

शर्तहरु

१) प्रस्तावित आयोजनाको वातावरणीय प्रभाव मूल्याकंन अध्ययन प्रतिवेदन तयार गर्दा UNESCO [illegible] operational guidelines, विश्व सम्पदा सूचिमा सूचिकृत सगरमाथा राष्ट्रिय निकुञ्ज सम्वन्धी उपलब्ध विवरण, स्थलगत अध्ययनवाट क्रममा संकलन गरिने तथ्य र तथ्याकंको आधारमा विषय विज्ञबाट वस्तुगत विश्लेषण गरी/गराई सगरमाथा राष्ट्रिय निकुञ्ज विश्वव्यापी महत्वको सम्पदा भएको हुँदा यसमा पर्ने प्रभाव सम्वन्धमा अध्ययन प्रतिवेदनमा प्रष्ट रुपमा उल्लेख गर्नुपर्ने ।

२) वातावरणीय प्रभाव मूल्याकंन प्रतिवेदन उपर UNESCO, WHC बाट प्राप्त हुने राय सुझाव प्रतिवेदनको अभिन्न अङ्ग हुनुपर्ने ।

३) वातावरणीय अध्ययन गर्दा सगरमाथा राष्ट्रिय निकुञ्ज कार्यालयका अधिकृतस्तरका प्राविधिक कर्मचारीलाई अनिवार्य संलग्न गराउने र साथै कार्यालयका कर्मचारीहरु, व्यवस्थापन समितिका पदाधिकारीहरु र स्थानिय सरोकारवालाहरुसँग अनिवार्य अन्तर्क्रिया गरी प्राप्त राय सुझाव र कार्यालयसँग नियमित तवरमा राय परामर्श लिने साथै कार्यालयबाट प्राप्त हुने राय/सुझाव अन्तिम प्रतिवेदनको अङ्ग हुनेगरी समावेश गर्ने व्यवस्था मिलाउनु पर्ने ।

४) वातावरणीय अध्ययन गर्दाको सवै चरणहरुमा सगरमाथा राष्ट्रिय निकुञ्ज, मध्यवर्ती क्षेत्र व्यवस्थान समितिको सहभागिता सुनिश्चित गर्ने ।

५) अध्ययनको क्रममा स्थानीय जनता र सरोकारवाला निकायहरुबाट उठान भएका आर्थिक, सामाजिक, जैविक प्रभाव सम्वन्धी सवालहरु सम्वोधन गर्ने सम्वन्धमा अवलम्वन गर्नुपर्ने न्यूनीकरण उपायहरु प्रतिवेदनको अभिन्न अङ्गको रुपमा समेटिनुपर्ने ।

६) आयोजना निर्माण क्षेत्र वन्यजन्तुको प्रमुख वासस्थान (Ecological Hotspot) नपर्ने गरी अध्ययन गर्नुपर्ने ।

७) वातावरणीय अध्ययन गर्दा विभिन्न विकल्पहरु अध्ययन गरी सो विकल्पहरु मध्ये तथ्य र तथ्याङ्कको आधारमा जैविक विविधता र समग्र वातावरणमा न्यून नकारात्मक प्रभाव पुऱ्याउने विकल्पको छनौट गरी प्रतिवेदन तयार गर्नुपर्ने ।

८) अध्ययन टोलीमा वन्यजन्तु, वन तथा वातावरण विज्ञ र जैविक विविधता विज्ञ अनिवार्य सहभागी गराइ आयोजनाले न्यस क्षेत्रका रैथाने वन्यजन्तुहरुको आवतजावत र विभिन्न मौसममा वसाइसराइ गरी आउने जाने वन्यजन्तुहरुलाइ कस्तो नकारात्मक प्रभाव पर्ने हो र त्यसका न्यूनिकरण र विकल्पका उपायहरु सम्वन्धी विस्तृत अध्ययन गरी यथार्थपरक र मापनयोग्य तथा प्रतिफलमूलक कार्यक्रम र बजेट वातावरण व्यवस्थापन योजनामा प्रस्ताव गर्ने व्यवस्था हुन ।

९) प्रस्तावित आयोजनाको लागि निर्माण गर्न प्रस्ताव गरिएका संरचनाहरुको GPS कोअर्डिनेट सहित GIS प्रविधि समेत प्रयोग गरी तयार गरिएको टोपोनक्सा प्रतिवेदनमा समावेश भएको हुनुपर्ने ।

१०) आयोजना निर्माणका लागि Biodiversity Hotspot नपर्ने गरी स्थानको अध्ययन हुनुपर्ने साथै वन, वन्यजन्तु वनस्पति स्थानिय वातावरण र प्राकृतिक सौन्दर्यताका साथै सो क्षेत्रको आर्थिक सामाजिक धार्मिक र पुरातात्विक महत्वका सम्पदामा आयोजना निर्माण कार्यबाट कम भन्दा कम नकारात्मक प्रभाव पर्ने वारे कम्तिमा ३ वटा विकल्पको अध्ययन हुनुपर्ने ।

सचिव : ४२११५६७, फ्याक्स: ४२११८६८

पत्रोत्तरमा पत्र संख्या मिति उल्लेखित हुन अपेक्षित छ ।

नेपाल सरकार
वन तथा वातावरण मन्त्रालय

EX: यो.ब.नं. :३५८७
सिंहदरबार, काठमाण्डौं

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

पत्र संख्या:-
चलानी नं.:-४४३
प्राप्त पत्र संख्या र मिति:-

११) संरक्षित क्षेत्रभित्र भौतिक पूर्वाधारहरु निर्माण तथा सञ्चालन सम्बन्धी कार्यनीति-२०६५ को बुँदा ५ र ९ ले गरेको व्यवस्था बारे अध्ययन हुनं ।

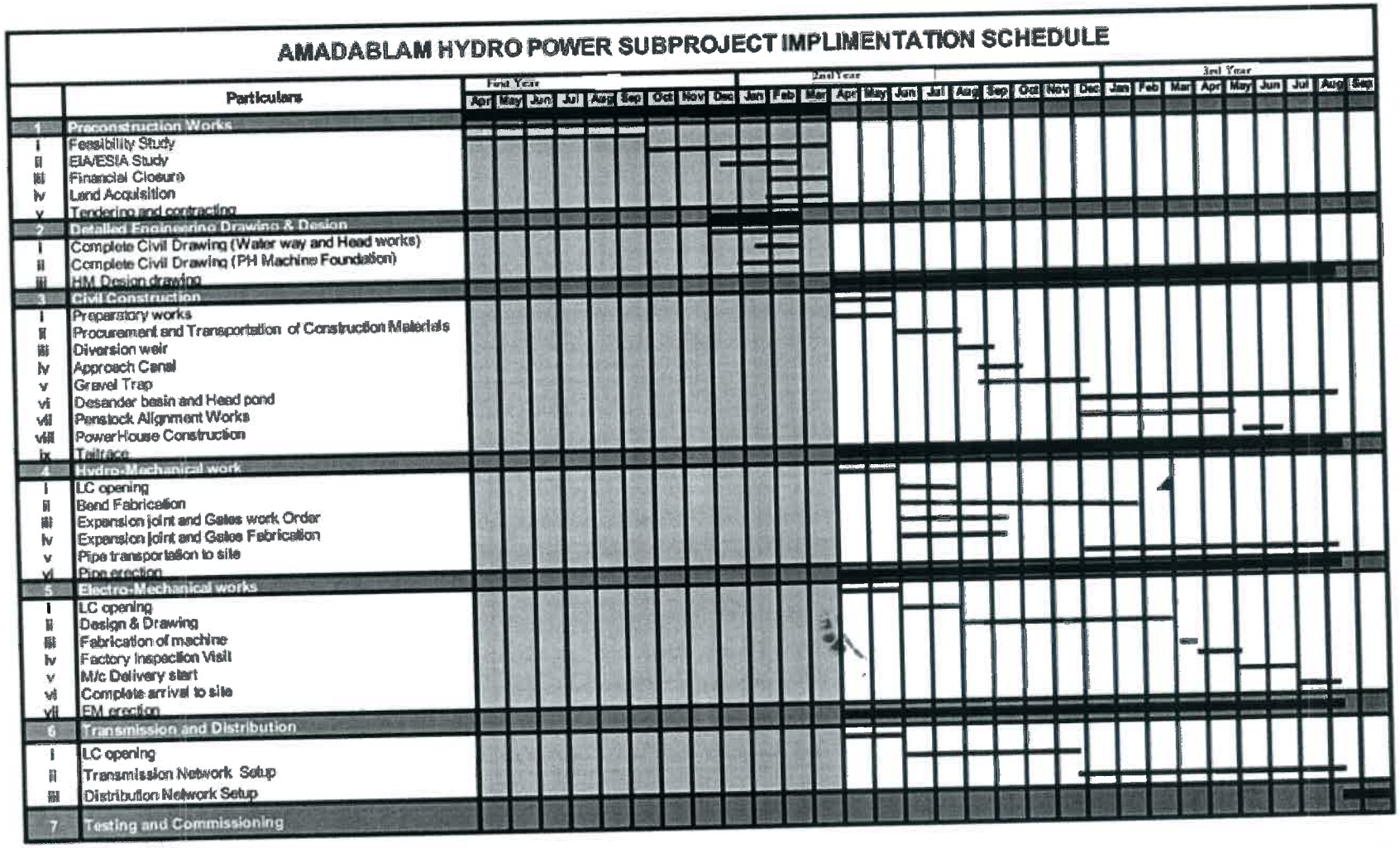
१२) राष्ट्रिय निकुञ्जको क्षेत्रभित्र अन्य कुनै क्रियाकलाप र निर्माणका कार्य हुन नपाउने गरी राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण ऐन, २०२९ दफा (६), हिमाली राष्ट्रिय निकुञ्ज नियमावली-२०३६ नियम (३०) र संरक्षित क्षेत्र भित्र भौतिक पूर्वाधारहरु निर्माण एवं सञ्चालन सम्बन्धि कार्यनीति, २०६५ को कार्यनीतिको उद्देश्य (क) र कार्यनीति प्रयोग गर्नुपर्ने अवस्था (क) को व्यवस्था अनुरुप वातावरण संरक्षण ऐन २०७६ र वातावरण संरक्षण नियमावली २०७७ अनुसार हुनेगरी प्रस्तावित आयोजनाको वातावरणीय प्रभाव मूल्याकंन अध्ययन हुनुपर्ने ।

.....
(ज्ञानेन्द्र कायस्थ)
(स.व.अ.)

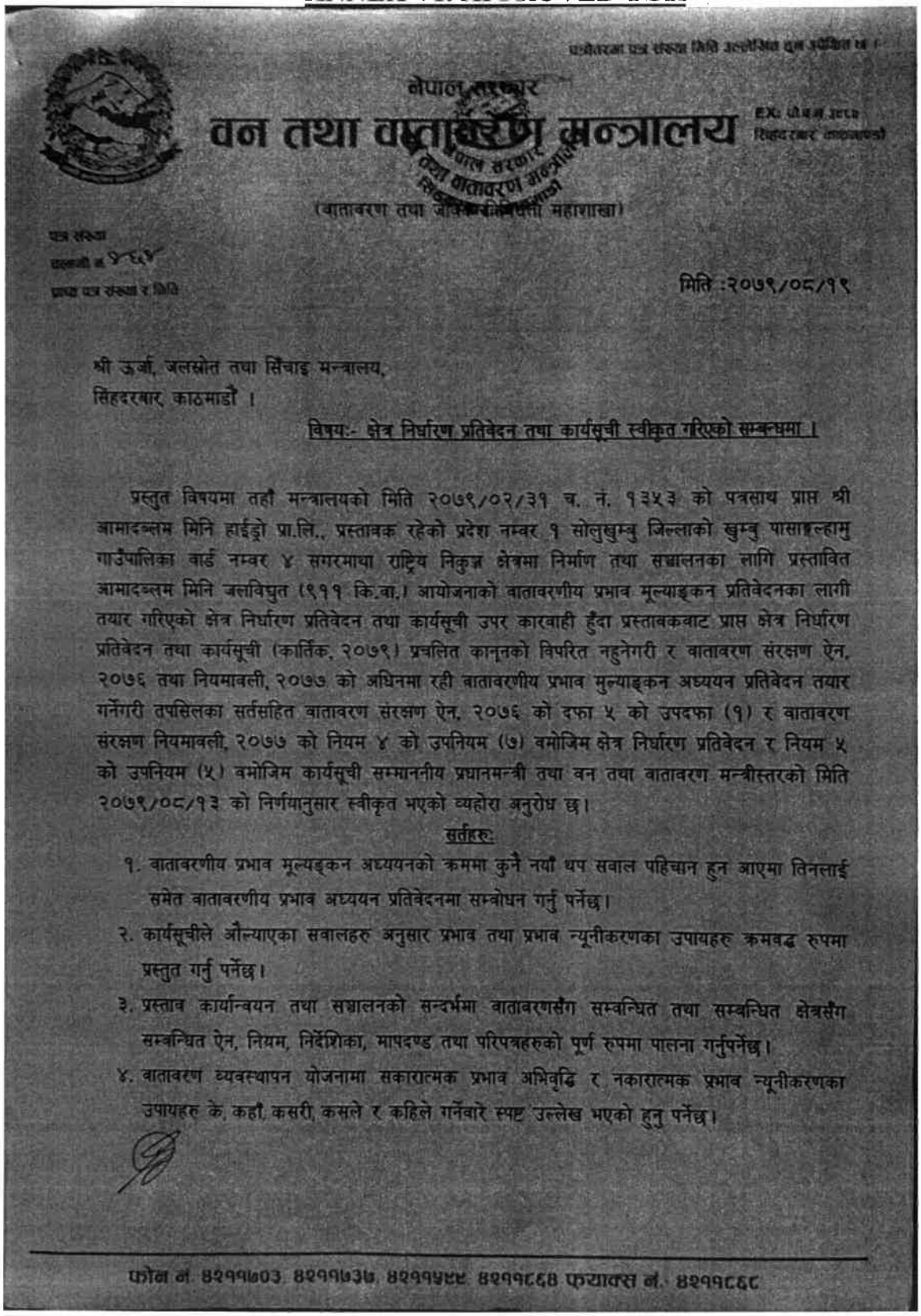
बोधार्थ:
श्री राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग, बबरमहल, काठमाण्डौं ।
श्री सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय, नाम्चे, सोलुखुम्बु।

सम्पर्क : ४२११५६७, फ्याक्स: ४२११८६८

ANNEX IV: CONSTRUCTION SCHEDULE



ANNEX VI: APPROVED TOR



नेपाल सरकार

वन तथा वातावरण मन्त्रालय

(वातावरण तथा जलवायु परिवर्तन महाशाखा)

मिति :२०७९/०८/१९

श्री ऊर्जा, जलस्रोत तथा सिँचाइ मन्त्रालय,
सिंहदरबार, काठमाडौं ।

विषय:- क्षेत्र निर्धारण प्रतिवेदन तथा कार्यसूची स्वीकृत गरिएको सम्बन्धमा ।

प्रस्तुत विषयमा तहाँ मन्त्रालयको मिति २०७९/०२/३१ च. नं. १३५३ को पत्रसाथ प्राप्त श्री आमादब्लम मिनि हाईड्रो प्रा.लि., प्रस्तावक रहेको प्रदेश नम्बर १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गाउँपालिका वार्ड नम्बर ४ सगरमाथा राष्ट्रिय निकुञ्ज क्षेत्रमा निर्माण तथा सञ्चालनका लागि प्रस्तावित आमादब्लम मिनि जलविद्युत (९११ कि.वा.) आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदनका लागी तयार गरिएको क्षेत्र निर्धारण प्रतिवेदन तथा कार्यसूची उपर कारवाही हुँदा प्रस्तावकबाट प्राप्त क्षेत्र निर्धारण प्रतिवेदन तथा कार्यसूची (कार्तिक, २०७९) प्रचलित कानूनको विपरित नहुनेगरी र वातावरण संरक्षण ऐन, २०७६ तथा नियमावली, २०७७ को अधिनमा रही वातावरणीय प्रभाव मुल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नेगरी तपसिलका सर्तसहित वातावरण संरक्षण ऐन, २०७६ को दफा ५ को उपदफा (१) र वातावरण संरक्षण नियमावली, २०७७ को नियम ४ को उपनियम (७) बमोजिम क्षेत्र निर्धारण प्रतिवेदन र नियम ५ को उपनियम (५) बमोजिम कार्यसूची सम्माननीय प्रधानमन्त्री तथा वन तथा वातावरण मन्त्रीस्तरको मिति २०७९/०८/१३ को निर्णयानुसार स्वीकृत भएको व्यहोरा अनुरोध छ।

सर्तहरु:

१. वातावरणीय प्रभाव मूल्यङ्कन अध्ययनको क्रममा कुनै नयाँ थप सवाल पहिचान हुन आएमा तिनलाई समेत वातावरणीय प्रभाव अध्ययन प्रतिवेदनमा सम्बोधन गर्नु पर्नेछ।

२. कार्यसूचीले औल्याएका सवालहरु अनुसार प्रभाव तथा प्रभाव न्यूनीकरणका उपायहरु क्रमवद्ध रुपमा प्रस्तुत गर्नु पर्नेछ।

३. प्रस्ताव कार्यान्वयन तथा सञ्चालनको सन्दर्भमा वातावरणसँग सम्बन्धित तथा सम्बन्धित क्षेत्रसँग सम्बन्धित ऐन, नियम, निर्देशिका, मापदण्ड तथा परिपत्रहरुको पूर्ण रुपमा पालना गर्नुपर्नेछ।

४. वातावरण व्यवस्थापन योजनामा सकारात्मक प्रभाव अभिवृद्धि र नकारात्मक प्रभाव न्यूनीकरणका उपायहरु के, कहाँ, कसरी, कसले र कहिले गर्नेबारे स्पष्ट उल्लेख भएको हुनु पर्नेछ।

फोन नं. ४२११७०३, ४२११७३७, ४२११५४९, ४२११८६४ फ्याक्स नं. ४२११८६८

पत्रोत्तरमा पत्र संख्या मिति उल्लेखित हुन उपेक्षित छ ।

नेपाल सरकार

वन तथा वातावरण मन्त्रालय

EX: पी.ए.आ ३८८७
सिंहदरबार काठमाण्डौं

(वातावरण तथा जैविक विविधता महाशाखा)

पत्र संख्या
चलानी नं.
प्राप्त पत्र संख्या र मिति

५. प्रस्तावित आयोजना निर्माण तथा सञ्चालनको क्रममा निस्कने ठोस तथा तरल काम नलाग्ने चिजहरुको व्यवस्थापन कसरी र कसले गर्ने भन्ने कुरा वातावरणीय प्रभाव अध्ययन प्रतिवेदनमा स्पष्ट रुपमा उल्लेख हुनु पर्नेछ।

६. वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयारीको क्रममा गरिने सार्वजनिक सुनुवाईमा स्थानीय निकाय र सगरमाथा राष्ट्रिय निकुञ्ज कार्यालयका प्रतिनिधि एवम् वन उपभोक्ता समुह र अल्पसंख्यक समुदायका प्रतिनिधि समेतको सहभागी गराएको सम्पुष्टी हुने कागजात संलग्न गर्नु पर्नेछ।

७. सार्वजनिक सुनुवाइमा उठेका सवालहरुलाई माईन्युटिङ्ग गरी सरोकारवालाहरुको हस्ताक्षर सहित प्रतिवेदनमा समावेश गर्नुपर्ने छ र ती सवालहरुको सम्बोधन हुनुपर्ने तथा यदी सम्बोधन नगरीने भएमा के कती कारणले सम्बोधन नहुने हो सो को उल्लेख गरिनु पर्नेछ।

८. प्रस्तावकले वातावरणीय प्रभाव अध्ययन प्रतिवेदन वातावरण सरंक्षण ऐन, २०७६ र वातावरण सरंक्षण नियमावली, २०७७ मा भएका व्यवस्था तथा वन तथा वातावरण मन्त्रालयको च.नं. २४३ मिति २०७८/०६/२४ को वातावरणीय प्रभाव मूल्याङ्कन अध्ययन सहमति पत्रमा उल्लेखित शर्तहरुको पुर्ण पालना गरी तयार पार्नु पर्नेछ।

९. स्थानीय निकायको सिफारिश संलग्न गर्दा सार्वजनिक सुनुवाइको मिति पश्चातको हुनु पर्नेछ।

१०. वातावरणीय प्रभाव अध्ययन प्रतिवेदनमा आयोजनाको विपद व्यवस्थापन सम्बन्धी कार्ययोजना समावेश गर्नु पर्नेछ।

अमर बहादुर ओली
समाजशास्त्री

बोधार्थ:
श्री आमादब्लम मिनि हाईड्रो प्रा.लि., तिलङ्गा, काठमाडौं।

फोन नं. ४२११७०३, ४२११७३७, ४२११५९९, ४२११८६४ फ्याक्स नं. ४२११८६८

AMADABLAM MINIHYDRO PROJECT
(GENERATION, TRANSMISSION AND DISTRIBUTION OF 911kW)

Terms of Reference (ToR)

of

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY
Khumbu Pasang Lhamu Rural Municipality-4, Solukhumbu District, Province No. 1

Submitted To

Government of Nepal
Ministry of Forests and Environment
Singh Durbar, Kathmandu

Through

Ministry of Energy, Water Resources and Irrigation
Singh Durbar, Kathmandu

Submitted By

Amadablam Mini Hydro Pvt. Ltd.
Kathmandu 8, Tilganga
Bagmati Province, Nepal
Telephone No: 01-4464222, 01-4464333
Email:amadablamminihydro@gmail.com

September 2022

TABLE OF CONTENT

LIST OF TABLES

Amadablam Mini Hydro Pvt. Ltd. Kathmandu

Eco Friend International EFI Estd. 2016

ACRONYMS

AC	Alternate Current
ACSR	Aluminum Conductor Steel Reinforced
AEPC	Alternative Energy Promotion Centre
AMHP	Amadablam Mini Hydro Project
ASL	Above Sea Level
BA	Basal Area
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CDO	Chief District Officer
CED	Clean Energy Developers
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CTs	Current Transformers
D/ha	Density per hectare
dB	Decibel
DBH	Diameter at Breast Height
DCC	District Coordination Committee
DHM	Department of Hydrology and Meteorology
DIA	Direct Impact Area
DNPWC	Department of National Park and Wildlife
DoED	Department of Electricity Development
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMAP	Environmental Management Action Plan
EMIMAP	Environmental Management Implementation Management Action Plan
EMP	Environmental Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Rule
ESCOs	Energy Service Companies
ESIA	Environmental and Social Impact Assessment
GIS	Geographical Information System
GLOF	Glacier Lake Outburst Flood
GoN	Government of Nepal

GWh	Giga Watt hour
ha	Hectare
HHs	Households
Hz	Hertz
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IIA	Indirect Impact Area
ILO	International Labor Organization
INGO	International Non-Government Organization
IUCN	International Union for Conservation of Natural Resources
IVI	Important Value Index
KII	Key Informant Interview
KPLRM	Khumbu Pasnag Lhamu Rural Municipality
Km	Kilometer
KV	Kilovolt
kVA	Kilovolt Ampere
KW	Kilo Watt
L/C	Letter of Credit
m	Meter
MAPs	Medicinal and Aromatic Plants
MGEAP	Mini Grid Energy Access Project
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoFE	Ministry of Forest and Environment
mVA	Milli Volt Ampere
MW	Mega Watt
NTFPs	Non-Timber Forest Products
ONAN	Oil Natural Air Natural
OUV	Outstanding Universal Value
pH	Potential of Hydrogen
PID	Proportional Integrative Derivative
PPA	Power Purchase Agreement
PPm	Parts per Million
PTs	Potential Transformers
RCC	Reinforced Cement Concrete
RD	Relative Density
RF	Relative Frequency
RM	Rural Municipality

RoR	Run of River
RPM	Revolutions per Minute
SD	Scoping Document
SNP	Sagarmatha National Park
SPSS	Statistical Package for Social Sciences
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
VCBs	Vacuum Circuit Breakers
WB	The World Bank
WECS	Water and Energy Commission Secretariat
WHS	World Heritage Sites

CHAPTER 1: NAME AND ADDRESS OF INSTITUTION PREPARING THE REPORT

1.1 BACKGROUND

Alternative Energy Promotion Centre (AEPC), a Government institution was established on 3 November 1996 under then Ministry of Science and Technology (MoST) with the objective of developing and promoting renewable/alternative energy technologies to meet the energy needs in Nepal. At present, AEPC is under the Ministry of Energy, Water Resources and Irrigation (MoEWRI).

AEPC has been implementing the Private Sector-Led Mini-Grid Energy Access Project (MGEAP) since September 2019 with support from the Government of Nepal (GoN) and the World Bank (WB) as loan and grant. The objective of the MGEAP is to increase electricity access and delivery from renewable energy mini-grids (Micro/Mini Hydro, Solar, Wind and Solar/Wind Hybrid Projects) by mobilizing private Energy Service Companies (ESCOs). The project will deliver financial support to the ESCO (here proponent) to facilitate financial closure and enhance financial viability of the projects, provided in the form of subsidy from the GoN and loans from the WB through Partner Banks (PBs). It has been assumed that subsidy from GoN through AEPC will be around 25% of the project cost, loan from PBs will be around 55% and proponent will invest 20% of the project cost.

1.2 NAME OF PROPONENT

Amadablam Mini Hydro Pvt. Ltd. (AMHPL), at Kathmandu Metropolitan City, ward number 8, Tilganga is a private Energy Service Company (ESCO), registered at Ministry of Industry, Commerce and Supplies, office of company registrar office, Kathmandu on ward number 8, Tilganga (**Annex I**) has proposed to develop the proposed project 'Amadablama Mini Hydro Project (AMHP) (Generation, Transmission and Distribution of 911 kW)' under MGEAP. AMHPL has been selected by AEPC through open call from throughout the Nepal (**Annex II**). Thus AMHPL is the proponent of the proposed AMHP. Similarly, AMHPL is the proponent of Environmental Impact Assessment (EIA) for the development of AMHP in Solukhumbu district. Therefore, AMHPL is responsible for the preparation of Scoping Document (SD) and EIA for the same. AMHPL has received technical clearance from the Department of Electricity Development (DoED) on 12/10/2076 (26 February 2020) (**Annex III**). Khumbu Pasang Lhamu Rural Municipality has provided generation license on 6 March 2020 (**Annex IV**). Since this project is located within Sagarmatha National Park (SNP) which is listed as World Heritage Site by United Nations Educational,

Scientific and Cultural Organization (UNESCO) in 1979, it requires detail environmental assessment of the project. Environmental Impact Assessment (EIA) is mandatory as per prevailing law of Government of Nepal (GoN) and Ministry of Forest and Environment (MoFE) has provided consent letter for EIA study (**Annex V**).

Thus Amadablam Mini Hydro Pvt. Ltd. is the proponent of EIA for the development of Amadablam Mini Hydro Project (AMHP) in Solukhumbu district. Therefore, Amadablam Mini Hydro Pvt. Ltd. is responsible for the preparation of Terms of Reference (ToR) and EIA for the same. The Address of the proponent is as follows:

The name and address of the proponent of the proposal:
Amadablam Mini Hydro Pvt. Ltd.
Kathmandu-8, Tilganga, Kathmandu
Bagmati Province, Nepal
Email: amadablammminihydro@gmail.com
Telephone No: 01-4464222, 01-4464333

1.3 NAME OF CONSULTANT

Amadablam Mini Hydro Pvt. Ltd. has entrusted for Eco Friend International Pvt. Ltd. (EFI) for EIA study of the proposed AMHP (911 kW). Thus EFI is responsible to conduct the necessary desk and field study and preparing Terms of Reference (ToR) and EIA report on behalf of the proponent adhering with the prevailing legislations and facilitation for approval from Provincial Government through KPLRM. The address of the consultant is as follows:

Eco Friend International Pvt. Ltd.
Lalitpur-2, Sanepa,
Lalitpur, Nepal
Tel: +977-9851127867
Email: ecofriend.nepal@gmail.com

1.4 OBJECTIVES OF TOR

The main objective of the ToR is guide for the EIA study of the proposed project as per prevailing law of Government of Nepal (GoN), Provincial Government, Province 1 and Khumbu Pasang Lhamu Rural Municipality (KPLRM). The general objectives of ToR are:

- To list and delineate the specific activities to be performed during EIA study
- To delineate project influence area (Direct and Indirect Impact Zone)
- To provide the technical guidance in order to accomplish the work within the time frame.
- To list the major issues and impacts to be addressed during EIA study and
- To provide guidance for the EIA report preparation.

1.5 OBJECTIVES OF THE EIA STUDY

The main objective of the study is to conduct Environmental Impact Assessment (EIA) and prepare environmental and social management plan to ensure safeguard compliance during implementation and operation of the proposed Amadablam Mini Hydro Project (911 kW). The specific objectives of the study are:

- To carry out Alternative Analysis and compare options in terms of social and environmental consequences.
- To provide information on the existing environmental and social setting of the project area with baseline data;
- To identify the project influence area;
- To identify the adverse and beneficial impacts that may arise as a result of proposed works on physical, biological, socioeconomic and cultural environment due to the location, construction and operation of the project structures & associated facilities in the project areas;
- To propose suitable, practical and site-specific mitigation & enhancement measures to avoid, reduce, mitigate, and/or compensate for identified impacts, including the institutional arrangements, budget and required human resources to implement all such measures and monitor their effectiveness;
- To define and prepare an Environmental and Social Management Plan (ESMP) as well as effective monitoring, reporting and auditing program for the project;
- To identify relevant project stakeholders and inform them regularly about the proposed project, involve them in the implementation process and receive their feedback and concerns for safeguarding the natural environment and affected people; and

- To advise decision makers regarding environmental and social implication of the project.

1.6 RELEVANCY OF EIA

As per EPR 2020, Annex 3, KA-12, it is mandatory conduct EIA for the proposed proposal of construction of hydropower within National Park as the proposed project lies in Sagarmatha National Park (SNP). Similarly, the proposal requires 5.295 ha land of SNP which is more than 5 ha of forest land. Thus it is also mandatory to conduct EIA as per as per EPR 2020, Annex 3, KA-5. There is provision of preparation of Scoping Documents (SD) and Terms of Reference (ToR) in clause 5 (1) of Environmental Protection (EPA) 2019. Thus this ToR report has been prepared in the format prescribed in Annex 8 (related to sub-rule of rule 4 of EPR 2020) of EPR 2020. The report has been prepared in English language as per sub-rule 8 of rule 7 of EPR 2020. According to Clause 3 (2-1-Ka), the approval agency for environmental assessment report is the Ministry of Forests and Environment. The report has been prepared in English language as per sub-rule 8 of rule 7 of EPR 2020 as the the funding agency for the proposed proposal is World Bank (WB).

CHAPTER 2: INTRODUCTION OF THE PROPOSAL

2.1 GENERAL INTRODUCTION

The proposed proposal AMHP is the generation of 911 kW energy and distribution at local communities through 11 kV transmission and 1.1 kV distribution lines. Thus it will have basically two components— (i) power generation and (ii) transmission and distribution. The proposed project is a run-off-river scheme and uses water from Cholunche Khola (also known as Nare Khola locally), a perennial river and tributary of Imja Khola which is itself a tributary of Dudhkoshi River. Water will be diverted at elevation of 4423.57 masl and intake will be made at elevation of 4422 masl. Thus diverted water will be streamed down to power house located at 3951.50 masl through 2930 m long penstock pipe. The penstock pipe will be buried at least 1 m below from the ground level to protect from freezing as well for maintaining aesthetic beauty of the SNP. The gross head will be of 471.87 m with design discharge 0.25 m^3/s at $Q_{80\%}$. Two turbines with the rated output of 485 kW will be used to generate 911 kW energy. Thus generated electricity will be transmitted through 11 kVA transmission lines and distributed through 1.1 kVA distribution lines to 444 households in Chukhung, Debuche, Dingboche, Dole, Lawi-Schyasa, Lobuche, Luza, Milingo, Mingbo, Mochhermo, Pangboche, Pheriche, Phortse, PhortseTenga, Fhungi Tenga, Shomare, Thukla, Tyangboche and Worshyo Villages of Ward No. 4, Khumbu Pasang Lhamu Rural Municipality (KPLRM) where majority of residents are indigenous people and the area is off-grid areas. All the settlements lie inside the SNP.

2.2 RELEVANCY OF PROPOSAL

The objective of the proposal is to develop a mini hydro project with the generation capacity of 911 kW from Cholunche Khola and distribute it to local people of KPLRM-4, Solukhumbu district to reduce the dependency on traditional use of fuelwood and dung cake of animals along with liquefied petroleum gas (LPG). The project has been proposed in such a high altitude of 4422 masl with no motorable road networks mainly due to lack of national grid (and may be impossible in immediate future) and other distribution system of electricity.

The main purpose of the proposed project is to supply energy to meet household demand for electricity, cooking and space heating in Chukhung, Debuche, Dingboche, Dole, Lawi-Schyasa, Lobuche, Luza, Milingo, Mingbo, Mochhermo, Pangboche, Pheriche, Phortse, Phortse Tenga, Fhungi Tenga, Shomare, Thukla, Tyangboche and Worshyo villages of ward number 4. The local demand for energy is very high in the area due to tourism activities and cold weather.

Therefore, the proposed proposal will produce energy to supply electricity to fulfill the demand in the area. Currently, household energy demand for cooking is being met by seasonal harvesting of fuelwood, dung cake and LPG. Forest products are insufficient as the households lie inside the Sagarmatha National Park. Thus, use of forest products is very limited. Yak dung is a traditional source for cooking but excessive use of dung for heating and cooking propose has led to problems such as decrease in agricultural productivity because of the scarcity of manure in the fields. LPG is also used but is expensive because of high cost of transportation of LPG cylinders. On the same way, hotels use LPG gas for cooking and small solar home system for lighting. Existing micro hydro cannot produce sufficient energy even for light. It is anticipated that electricity from AMHP can fulfill the demand of electricity for light along with replacement of expensive LPG gas for cooking in hotels. Excess electricity can be utilized for space heating. Micro enterprises related to tourism service industries such as bakeries, social institutions, restaurants will consume electricity from the project. Therefore, the proposed project has been considered very significant to reduce the dependency on forest resources as well as the LPG thus reducing the emission of greenhouse gases. It will replace the uses of solar panel thus reducing the generation of hazardous waste (solar batteries). Therefore, the proposed proposal is the substitute of fuelwood, LPG and even solar panel thus producing clean energy and supporting the overall conservation of Sagarmatha National Park.

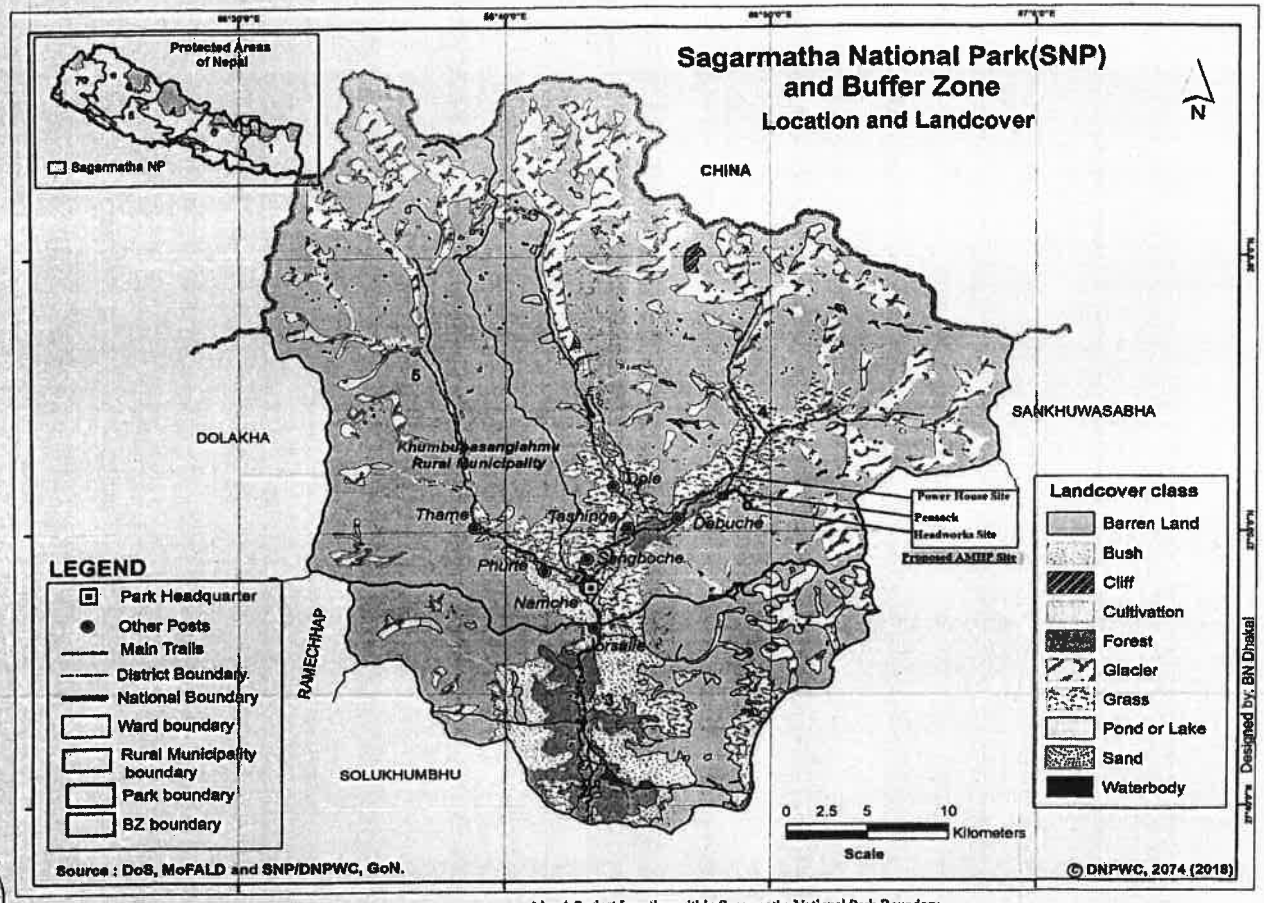
2.3 LOCATION AND ACCESSIBILITY

The proposed project lies in Pangboche, Ward No.4, KPLRM, Solukhumbu district, Province No.1 (**Maps 1, 2**). Geographically, the proposed project lies between 27°50'50"Nto27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude. The elevation within the project area varies from 3951.50 meter (m) to 4422 m above mean sea level (amsl).

From Kathmandu, the project site is accessible by commercial air flight and on foot. Flight from Kathmandu to Lukla takes 30 minutes. From Lukla, the site is either accessible by helicopter or on foot. Travel on foot from Lukla to Pangboche via Monjo- Namche Bazaar requires three days for a trekker. Materials and equipment to the project site can be transported either by helicopter or mules. Alternatively, the project site can be accessible by a motorable road from *Katari* along East-West highway connects Salleri bazzar, Headquarter of Solukhumbu. From Salleri bazzar there is seasonal road to Buksa and from Buksa the project site is accessible either by helicopter or on foot. Travel distance on foot from road head via Lukla to project site is around 65 km and requires 6 days for a loaded porter. From Lukla to Pangboche, it is approximately 31 Km foot trail.

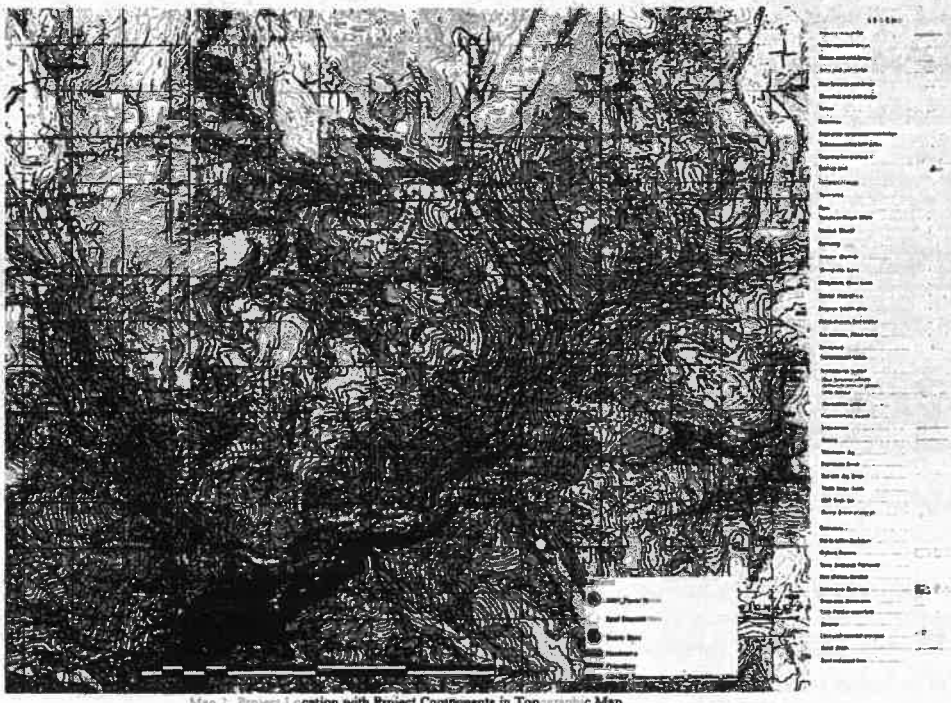
2.4 NATURE AND TYPE

It is a mini hydro project with installed capacity of 911 kW generating energy of 7,231,758.14 kWh annually. It is a Run-of-River (RoR) type power generation scheme in which water will be diverted at the rate of 0.25 m^3/s. Thus generated energy will be evacuated or distributed in more than 15 different settlements of ward number 4 of Khumbu Pasang Lhamu RM through a 63 km long transmission and distribution lines with 11kV transmission line and 1.1 kV distribution line with 400/230 V as distribution voltage.

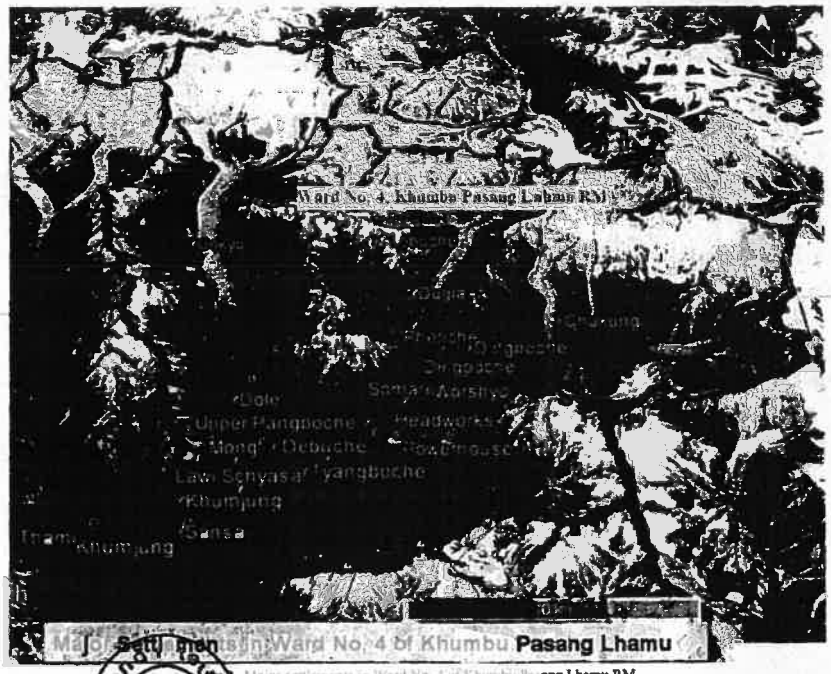


Map 1:Project Location within Sagarmatha National Park Boundary

(Source: Modified from DNPWC 2018)



Map 2: Project Location with Project Components in Topographic Map
(Source: Modified in Topo Sheet 2786 03 & 2786 04 Published by Department of Survey)



(Source: Modified from Google Earth)

2.5 SALIENT FEATURES AND PROJECT COMPONENTS

2.5.1 SALIENT FEATURES

The salient feature of the proposed project is as follows given in table.

Table 1: Salient feature of the Project

1	**Location**		
	Province	:	1
	District	:	Solukhumbu
	Rural Municipality	:	Khumbu Pasang Lhamu Rural Municipality Ward No. 4
	Geographical Coordinates Latitude Longitude	:	27°50'50"N to27°51'40"N latitude and 86°47'49"E to 86°49'19"E longitude
	Intake	:	27°50'56.52"N and 86°49'6.15"E, elevation 4422 masl
	Power House	:	27°51'12.98"N, 86°47'44.21"E, elevation 3951.50masl
	Total Households to be Electrified		444
2	**General**		
	Name of River	:	Cholunche Khola
	Nearest Town	:	Namche Bazaar (13 Km)
	Type of Scheme	:	Run of River
	Gross Head	:	471.87 m
	Installed Capacity	:	911 KW
	Average Annual Energy	:	7,231,758.14 kWh
3	**Hydrology**		
	Catchment Area at Headworks Site	:	28 km^2 (Total), 21 km^2 (>5000 m) 7 km^2(5000 m< A> 4000 m)
	Design Discharge ($Q_{80\%}$)	:	0.25 m^3/s
	Design Flood (1 in 100 year)	:	15 m^3/s
	Compensation flow	:	50% of discharge at river every month*
4	**Diversion Weir**		
	Type	:	Concrete gravity type weir

	Length	:	12m
	Height	:	2.57 m
	Crest level	:	El. 4423.57 m
5	**Pondage(due to Diversion Weir)**		
	Surface Area	:	360 m^2
	Volume	:	493.2 m^3
	Average depth	:	1.37 m
	Average Width	:	12 m
	Average Length	:	30 m
6	**Undersluice**		
	Type	:	Rectangular Flat Gate
	Size	:	1.0 m x 1.3m
	Invert level	:	El. 4421.08 m
7	**Intake**		
	Type	:	Orifice type side intake
	No of Orifice	:	1 No.
	Size of Opening	:	1.5 m (B) x 0.3 m (H)
	Intake Invert Level	:	El. 4422.00 m
	Coarse Trashrack (1.4 m x 1.5 m)	:	0.7 m x 0.37 m (6 Pcs)
8	**Gravel Trap**		
	Size (L x B x H)		8 m x 1.5 m x 1.3 m
	Bed load size to trap		2 mm
	Fine Trashrack (2m x 1.5 m)	:	1m x 0.37 m (6 Pcs)
9	**Headrace Pipe**		
	Type	:	Pressurized pipe flow, MS
	Length	:	10 m
	Diameter	:	450 mm
	Thickness	:	4 mm
	Shape	:	Circular
	Type	:	Pressurized pipe flow
10	**Desanding Basin cum forebay**		
	Type	:	Conventional with head pond
	Size (L x B x H)	:	28.65 m x 2.65 m x 2.30 m

	Number of Bay	:	1 No.
	Nominal size of trapped particle	:	0.15 mm
	Fine Trashrack (2.65 m x 1.6 m)		0.82 m x 0.41m (10 Pcs)
11	**Trashrack heating system**	:	• Heater 1 at desilting basin4.5 kW • Heater 2 at desilting basin1.5 kW • Heater 3 at gravel trap3 kW
12	**Penstock Pipe**		
	Type	:	Mild Steel Pipe (Buried)
	Internal Diameter	:	400 mm dia
	Thickness	:	4-16 mm
	Branch Pipe	:	MS 200 mm dia, 10 mm thick 16 m long
	Total Length of the pipe	:	2930 m length
	No of Anchor Block	:	58Nos
12	**Powerhouse**		
	Type of powerhouse	:	Surface Type
	Size (L x B x H)	:	19.95 m x 7 m x 5.8 m
13	**Tailrace Conduit**		
	Type	:	Pipe and Canal
	Size (L x B x H)	:	18 m x 0.5 m x 0.68 m
	Pipe	:	MS 400 mm dia, 4 mm thick, 21 m long
	Turbine Axis Level	:	El. 3951.50 m
14	**Turbines**		
	Type	:	Horizontal Shaft Pelton Turbine Single Jet
	Number of Units	:	2
	Discharge per unit	:	0.125 m^3/sec
	Rated Output (Mechanical)	:	485kW X 2 units
	Synchronous Speed	:	1500 rpm
	Rated Net Head	:	448.86 m
	Rated Efficiency at 100% Discharge	:	88%
15	**Generators**		
	Type	:	3-Phase, Synchronous, Brushless
	Rated Output Capacity per Unit	:	650 kVA

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	Rated Efficiency	:	96%
	Frequency	:	50 Hz
	Rated Voltage	:	0.4 kV
	Number of Poles	:	4
	Speed	:	1500 rpm
	No of units	:	2 Nos.
16	**Governor**		
	Type	:	Electronic, PID Oil-hydraulic, self-closing without electric power
	No of units	:	2 Nos.
17	**Transformer**		
	A. Power Transformer		
	Type	:	ONAN Cooling, YNyn0, 3 phase
	Rated capacity	:	630 kVA
	Voltage ratio	:	0.4/11 kV
	Efficiency	:	98%
	No of units	:	2 Nos.
	B. Distribution Transformer		
	Type		11/0.4 kV, 3-phase, oil immersed, copper owned AVR with parallel operation
	Rated Capacity	:	150 kVA- 2 Nos
			125 kVA- 2 Nos
			100 kVA- 4 Nos
			65 kVA-5 Nos
			50 KVA-1 No.
			25 kVA-1 No.
18	**Transmission & Distribution line**		
	A. Single Line Distribution		
	Total Length of 11 kV underground line (underground XLPE armored 3 core 35 sq. mm aluminum)	:	40.00 km

	Total length of 11 kV overhead line during river crossings (squirrel ACSR)	:	1 km
	1.1 kV 95 sq.mm. 4 Core XLPE Insulated UnarmouredAluminium Cable	:	11.00 km
	1.1 kV 35 sq.mm. 4 Core XLPE Insulated UnarmouredAluminium Cable	:	9.5 km
	1.1 kV 25 sq.mm. 2 Core XLPE Insulated UnarmouredAluminum Cable	:	1.5 km
	B. Distribution Transformer		
	Type	:	Outdoor installation type
	Quantity required	:	Fifteen (15)
	Type of cooling	:	ONAN
	Number of phases	:	Three phase
	Frequency	:	50 Hz
	Rated voltage	:	
	1) Primary	:	11 kV
	2) Secondary	:	0.4 kV.
	Vector group symbol (by IEC designation)	:	Dyn11
	C. Major River Crossings		
	Chukung	:	70
	Dingboche	:	50
	Thukla	:	170
	Power House	:	120
	Phortse	:	100
	Dole	:	70
	Luza	:	70
	Machhermo	:	80

	Milingo	:	100
	Fungi Tenga	:	100
	D. Poles for Overhead Transmission During Crossings		
	Type	:	Galvanized Mild Steel Tubular poles
	Total Length	:	9 m
	Bottom Section	:	5m long, outer diameter 165.1 mm, thickness 4.5 mm
	Middle section	:	2m long, outer diameter 139.7 mm, thickness 4.5 mm
	Top section	:	2m long, outer diameter 114.3 mm, thickness 3.65 mm
	Minimum weight	:	120 kg
	E. Sub-Station		
	Type	:	Pole mounted
	Total Sets	:	14
	Pole Type	:	Galvanized steel tubular poles
	Length of Poles	:	9 m
	F. Conductors		
	Type	:	ACSRConductor (Weasel)
	Code Name	:	Weasel
	Nominal Aluminum Area, mm^2	:	30
	Specific Weight, kg/km	:	128
	Resistance, ohm/km	:	95 A
	Inductive Reactance	:	0.345
	G. Underground Cables	:	Poly Vinyl Chloride (PVC) insulated armored aluminum cable
	H. Distribution Box		
	Total Number	:	80
	Coordinate of DB (Lobuche)	:	X: 86.813247 °E;Y:27.957777 °N [North most]
	Coordinate of DB (Chukung)	:	X: 86.871694°E;Y: 27.904166°N [North-East Most]

	Coordinate of DB (Machhermo)	:	X: 86.715327°E;Y: 27.902013°N[North-West Most]
	Coordinate of DB (LawiSchyasa)	:	X: 86.739166°E;Y: 27.830000°N [South Most]
	System	:	Double Door
	Size	:	L X B X H = 45 cm X 30 cm X 60 cm
19	**Switchyard**		
	Type	:	Indoor, Single Bus Configuration, 11 kV
	Dimension	:	3.55 m X 6.32 m
	Location	:	Inside Powerhouse
20	**Load Center**	:	Number of Consumers (HHs) (444 Beneficiary Households)
1	Chukung	:	12
2	Debuche	:	6
3	Dingboche	:	86
4	Dole	:	14
5	Fungi Tenga	:	11
6	LawiSchyasa	:	12
7	Lobuche	:	3
8	Luza	:	3
9	Mingbo	:	13
10	Machhermo	:	102
11	Pangboche	:	35
12	Pheriche	:	106
13	Phortse	:	3
14	PhortseTenga	:	9
15	Shomare	:	19
16	Thukla	:	2
17	Tyangboche	:	7
18	Worshyo	:	1
21	**Power and Energy**		
	Type of Power Plant	:	Run-of-river
	Design Discharge	:	0.25 m³/s
	Total Gross Head	:	471.87 m

	Rated Net Head	:	448.86 m
	Installed Capacity	:	911 kW
	Total Annual Energy	:	7,231,758.14 kWh
22	[1]**Project Cost Estimate**		
	Total Project Cost with VAT	:	NRs. 522,048,184.41
	Cost Per kW	:	NRs. 573,049.60
	Net Present Value (@ 10% discount factor)	:	NRs. 51,139,293.39
	Project rate of return	:	11.84%
	Payback	:	7.38 years
	BC Ratio	:	1.11
23	**Construction Period**	:	18 Months
			(Source: CED 2021)

2.5.2 PROJECT COMPONENTS

Water of Cholunche Khola will be diverted by constructing a 12 m wide and 2.0757 m high diversion weir to generate annual average energy of about 7,231,758.14 kWh. Entire major civil components of the project are site on/along the left bank of Cholunche Khola. The major civil components of the project are discussed briefly as follows.

2.5.2.1 HEADWORKS

The headworks of the proposed project are situated at about 3.5 Km upstream from the confluence of Cholunche Khola and Imja Khola at Pangboche.

i) Diversion Weir

A permanent concrete gravity type weir is provided across the river to divert the required flow through the intake. The length of weir is 12 m and its crest level is fixed at 4423.57 m amsl. The bed level of river at upstream side of weir is 4422.00 m amsl and at downstream of weir is 4421.00 m amsl. The highest flood level at weir is 4424.33 m amslwith discharge of 15 m^3/s at 100 yrs return period. The platform level for gates operation is fixed at 4424.83 m amsl. Upstream apron of 2m length is provided whereas downstream apron is of length 5m.

[1] Source of Fund: Detailed Feasibility Study and Detailed Engineering Design Report of Amadablam Mini Hydro Sub Project.

ii) Undersluice

The width and height of undersluice provided is 1m and 1.3 m. The bed level of undersluice is fixed at 4421.09 m amsl. The opening of undersluice is designed to pass 20% of design flood discharge for weir.

iii) Side Intake

The width of orifice is 1.5 m and height is 0.3m. The orifice is capable of diverting 0.30 m^3/s of discharge which is 20% more than the design turbine discharge. The invert level of orifice is at 4422.00 m amsl and the normal water level at intake is fixed at 4423.37 m amsl. Trash rack is provided at orifice to prevent entry of gravels and other floating materials.

iv) Gravel Trap

The design size of particle to settle is 2mm in gravel trap. The length of gravel trap is 8m, width is 1.5m and depth is 1.3m. The normal water level at gravel trap is 4423.30 m amsl. Side spillway of length 6m is provided at gravel trap to spill the excess flood discharge. The crest level of spillway is fixed at 4423.35 m amsl. The size of flushing gallery provided at gravel trap is 0.4m x 0.4m. The outlet from gravel trap is pressurized headrace pipe to the desanding basin.

v) Headrace Pipe

Headrace pipe of diameter 450 mm and length 10m is provided to convey water from gravel trap to desanding basin. The pipe is buried below the ground to prevent the freezing of water during winter. The velocity in pipe is maintained so that settlement of gravel particles will not occur inside the pipe. The pipe is of mild steel with 4mm thickness.

vi) Desanding Basin

The design size of particle to settle at desanding basin is 0.15mm. The length of basin is 26.5 m, width is 2.65 m and average depth is 2.30m. Additional depth is provided for storage of sediments and freeboard. The inlet transition of length 5.70m is provided to maintain the steady flow at basin. Side spillway of length 7m is provided to spill the excess water in the desanding basin. The size of flushing gallery provided at basin is 0.4m x 0.4m. The bed slope of 1:50 is provided at basin.

At the end of desanding basin, head pond of length 1.95m, width 2.65m and depth 2.05m is provided to maintain the adequate submergence depth for penstock pipe.

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Air vent pipe of diameter 100mm is provided at head pond to release the air entered into the pipe. Fine trashrack is provided at head pond to prevent entry of floating particles. The normal water level at head pond is maintained at 4422.87 m amsl.

2.5.2.2 PENSTOCK PIPE, ANCHOR BLOCKS AND SADDLE SUPPORT

Mild steel penstock pipe of internal diameter 400 mm and length 2930 m is proposed for conveying water from head pond to the turbine. The penstock pipe will be buried in the ground with minimum burial depth of 1 m. The thickness of pipe varies from 4 mm to 15 mm. After bifurcation, two manifolds of 7.84 m length and 200 mm internal diameter is provided.

Total 58numbers of anchor blocks are provided (including bifurcation and branches) to restrain the forces generated at bends in the project. A total of 364 saddle supports in form of pads are provided at every 7m interval between two anchor blocks.

2.5.2.3 POWERHOUSE AND TAIL RACE

i. Powerhouse

The powerhouse is located near Pangboche Village on left bank of Imja River at an elevation of 3950 m amsl and is of surface type. It contains two units of horizontal shaft Pelton turbine which drives two generators with total installed capacity of 911 kW. The dimension of the powerhouse is 23.05 m x 7.5m x 6.5m. The floor level of powerhouse is fixed at 3950.79 m elevation and the turbine axis level is at 3951.50 m elevation.

ii. Tailrace

The water form two units of powerhouse are conveyed to a nearby Kholsi through combination of tailrace canal and pipe with the length of tailrace canal is 18 m and that of pipe is 21 m. The bed slope of 1:200 is provided for tailrace canal. Tailrace canal have width of 0.5 m and overall depth of 0.68 m. The canal is to be constructed with stone masonry structure in 1:4 c/s mortar and is lined with 12 mm plastering with 1:4 c/s concentration on sides and with M20 PCC on base. The diameter of pipe used in tailrace is 400 mm. At outlet portion, gabion and boulder riprap protection are provided to prevent erosion of soil.

2.5.2.4 SWITCHYARD AREA

An indoor switchyard of 3.55 m X 6.32 mhas been proposed for the transmission of 911 kW of power. The generated powers from two 650 kVA alternators are transferred to a 400 V busbar. From this busbar two transformers of 630 kVA each are connected in parallel operation and the power is fed to a single bus system of 11 kV. This bus system will be used to transmit electricity in high voltage majorly through a high voltage underground cable. The transformers, transformer protection system, CTs, PTs, isolators, VCBs and bus bars are major equipment of the outdoor switchyard. The details of switchyard equipment can be viewed in the electrical single line diagram of Amadablam Mini Hydro Project.

2.5.2.5 TRANSMISSION AND DISTRIBUTION LINE

The transmission and distribution network are designed considering the following load centers:

i. 161 HHs with the demand of 1.5 kW per household and 42 HHs with 1 kW demand.
ii. 56 big hotels with the demand of 4 kW per hotel, 65 medium hotels with the demand of 2.5 kW per hotel and 58 small hotels with the demand of 1.5 kW per hotel.
iii. 38 restaurants, with the demand of 1.5 kW each.
iv. 13 Social Institutions with the demand of 5 kW each
v. 2 hospitals with the demand of 5 kW each.
vi. 3 Snooker houses, 2 bakeries and 4 shops with demand of 1 kW each.

Further as a part of project, the power/energy to be generated at AMHP will be evacuated and distributed to the proposed Khumbu Pasang Lhamu RM-4 through a 63 km long transmission and distribution with 11kV transmission line and 1.1 kV distribution line with 400/230 V as distribution voltage.

2.6 PROJECT ACTIVITIES

2.6.1 PRE-CONSTRUCTION PHASE

- Consultation with the relevant stakeholders;
- Detail design of the project components;
- Environmental and Social assessment;

- Preparation of bid documents and Selection of contractors for the construction works;
- Arrangement/acquisition of land for the project and establishment of construction power;
- Appointment of contractors and suppliers and organization of project management group;
- Generation license acquisition and Power purchase agreement, and
- Financial closure of the project.
- Obtaining required permits, including the final approval of EIA
- Institutional arrangement to implement EMAP and conduct training
- Settle issues of old existing Micro Hydro Projects

2.6.2 CONSTRUCTION PHASE

- ***Preparatory works:*** Land acquisition, hire required human resource, Establishment of construction facilities and Arrangement of borrow area of construction materials
- ***Civil works:*** Construction Activities of sub-project components
- ***Hydromechanical works:*** Fabrication, transportation, erection and testing of gates, trash racks, penstock pipes etc., Civil works for steel structures and then the installation works.
- ***Electromechanical works:*** Equipment installation
- ***Erection of Transmission Line***
- ***Commissioning of Power Plant***
- ***Testing and Commissioning of Power Plant***
- EMAP ***implementation and periodic reporting***
- Continuation of consultations with stakeholders and functioning of GRM

2.6.3 OPERATION AND MAINTENANCE PHASE

- Trial Operation/Staff training;
- Defect liability maintenance;
- Adjustments and provisions;
- Final Bills and Completion Certificates;
- Review of output;
- Availability Declarations;
- O & M Scheduling;

2.7 CONSTRUCTION PLAN

2.7.1 LAND AREA

An estimated land area of about 5.287 ha is required for construction of the project components and provisioning for project facilities (Table 2).
An estimated land area required for power generation component is about 0.74 ha, required for construction of the project components and provisioning for project facilities (Table 2). Out of this, 0.58 ha is required for throughout the project life and remaining for construction period only. Similarly, about 4.56 ha of land is required for transmission and distribution line components of the project (Table 3).

Table 2: Estimated Land Requirement for Power Generation and Acquisition Time Requirement

SN	Component	Land Area (Ha)	Acquisition
1	Headworks	0.097	Throughout Project Life
2	Office, Powerhouse, Switchyard and Tailrace	0.085	Throughout Project Life
3	Penstock	0.4	Throughout Project Life
	Subtotal	**0.582**	
4	Spoil Disposal Sites	0.025	Construction Period (1.5 Yr.)
5	Quarry and Borrow Sites	0.38	Construction Period (1.5 Yr.)
6	Workshop and Material Storage	0.08	Construction Period (1.5 Yr.)
7	Project camps	0.05	Construction Period (1.5 Yr.)
	Subtotal	**0.155**	
	Total	**0.737**	

(Source: CED 2021)

Table 3: Estimated Land Requirement for Power Transmission and Distribution and Acquisition Time Requirement

SN	Component	Land Area (Ha)	Acquisition
1	Underground Transmission/Distribution Lines	4.55	Throughout Project Life
2	Electric pole at river crossings	0.008	Throughout Project Life
	Total	**4.558**	

(Source: CED 2021)

2.7.2 LAND TYPE

More than 80% of the land required for power generation is grassland while remaining is river deposit area (Table 4). Similarly, most of the land required for the transmission and distribution is foot trails as all the transmission and distribution lines will be underground (Table 5). All the land belongs to SNP.

Table 4: Land Type Required for Power Generation

SN	Component	Land Area (Ha)	Land Type	Land Ownership
1	Office, Powerhouse, Switchyard and Tailrace	0.085	Grassland	SNP
2	Workshop and Material Storage	0.08	Grassland	SNP
3	Subproject camps	0.05	Grassland	SNP
4	Penstock	0.4	Grassland	SNP
5	Spoil Disposal Sites	0.025	Grassland/River Deposits	SNP
6	Headworks	0.097	River Deposits	SNP
7	Quarry and Borrow Sites	0.38	River Deposits	SNP
	Total	**0.737**		

(Source: CED 2021)

Table 5: Land Type Required for Power Transmission and Distribution

SN	Component	Land Area (Ha)	Land Type	Land Ownership
1	Electric pole at river crossings	0.008	Grassland	SNP
2	Underground Transmission/ Distribution Lines	4.55	Trails	SNP
	Total	**4.558**		

(Source: CED 2021)

2.8 PROJECT REQUIREMENTS

2.8.1 HUMAN RESOURCES

It has been estimated that about a total of 200 unskilled and 80 skilled workers will be involved daily during the peak construction period in two shifts. The details of workers and their type (in terms of skilled, semiskilled and unskilled) will be assessed during EIA study as per different stages of the project.

2.8.2 CONSTRUCTION MATERIAL AND SOURCES

Estimated volumes 783.73 $m^3$of concrete and stone masonry work of volume 287.53 $m^3$are estimated to be required for the project construction. The main construction materials and their estimated quantity are presented in **Table 6.**

Table 6: Estimate of construction materials

SN	Construction materials	Quantity	Source
1	Cement (bags)	5,560	Factory
2	Aggregate (m^3)	600	Quarry Sites
3	Sand (m^3)	420	Quarry Sites
4	Boulder Stone (m^3)	1,100	Quarry Sites
5	Reinforcement Bars (ton)	47	Factory

(Source: CED 2021)

2.8.3 CONSTRUCTION SCHEDULE

The proposed AMHP will require an estimated time frame of about 18 months for completion from the date of commencement to the date of commercial operation **(Annex VI).**

2.8.4 ENERGY REQUIREMENTS

As there is no National Grid, two diesel generator sets each with 10 kVA capacities will be required at the headworks site and powerhouse respectively to meet the electricity demand of the construction purpose and for lighting of construction camps. Alternatively, a nearby micro hydro of 15 kW (Pangboche MHP) can be used for required energy.

2.8.4.1 TECHNOLOGY ANCILLARY FACILITIES

a) Technology

The technology used in the project implementation will be labor-intensive with some mechanized works as the area is very remote and transportation of heavy machine is almost impossible.

b) Site Access

Site access shall be provisioned by using existing trails from Pangboche to reach to various project component sites. The details of the access trails are provided in **Table 7** hereunder.

Table 7: Site Access

SN	Description	Length	Width of trail	Remarks
1	Pangboche to Powerhouse	1.6 Km	4 ft	
2	Powerhouse to Headwork	3.25 Km	4 ft	

(Source: CED 2021)

c) Project Camps

Two project camps (one each at headworks and powerhouse location) are proposed to accommodate Contractor's construction workforce as personnel of supervising Engineers and the Employer's staff. Camp at head works is located at coordinates: 27°51'0.25"N , 86°49'2.63"E and that of Powerhouse is located at coordinates: 27°51'12.58"N, 86°47'43.48"E. The camps will be constructed on the left bank of the Cholunche Khola whereas the nearest settlement is located at the right bank of Imja Khola. A careful assessment is needed in the EIA to understand potential E&S impacts of the labor camp, its location, proximity to settlements and the way workers will be managed.

d) Material Storage and Workshop

Material storage and mechanical workshops are located on the left bank of Cholunche Khola both at headworks and the powerhouse location. Location Near Powerhouse :27°51'12.93"N, 86°47'43.81"E, Location Near Intake: 27°51'0.27"N, 86°49'2.71"E

e) Quarry Site and Borrow Pits

Various probable quarry sites have been identified based on geological investigation which is discussed below in **Table 8.**

EFI Estd. 2010

Amadablam Mini Hydro Pvt. Ltd. Kathmandu

Table 8: Proposed quarry and borrow sites for AMHP

SN	Coordinate	Dimensions Length (m)*Breadth (m)*Depth(m)	Approximate Quantity (m^3)	Remarks (geological characteristics)
A. Intake Area	27°50'56.52"N 86°49'6.15"E	70 m * 20 m * 2 m	2800 m^3	The quarry site is heterogeneous mixture of boulder, cobble, gravel and sand
B. Powerhouse Area	27°51'12.98"N 86°47'44.21"E	80 m * 30 m * 1 m	2400 m^3	Alluvial soil composed of loose, subrounded to rounded, gravel of gneiss with sand and silt

(Source: CED 2021)

f) Batching Plants and Aggregate Crushing Plants

The facilities for aggregate crushing and batching plants will be located at the headwork and powerhouse sites close to the active construction sites. Coordinates of plant near intake location is 27°50'59.94"N , 86°49'3.24"E and that located at powerhouse has coordinates: 27°51'16.69"N, 86°47'44.28"EThese facilities will be operated with provisions of air pollution control, noise control/arresting facilities, and water and waste water management facilities. These will be temporary facilities to be demolished at the end of the construction period.

g) Spoil Volume & Disposal Area

About 450 cubic meters of spoils has been estimated to be generated due to excavation for project component construction. Two disposal sites are proposed for the purpose all of which are on the left bank of Cholunche Khola (**Table 9**). The EIA study will prescribe rehabilitation of spoil disposal sites considering erosion prevention and aesthetic retention.

Table 9: Proposed Spoil Disposal Sites for AMHP

SN	Location	Coordinate	
		N	E
1	Intake	27°50'56.52"	86°49'6.15"
2	Powerhouse	27°51'12.98"	86°47'44.21"

(Source: CED 2021)

h) Materials and Equipment Transportation

Materials and equipment will be transported to site by appropriate means of transportation. As the project area lacks motorable road, air transport and manual carrying of load porters and mules will be used.

2.8.5 OTHER ADDITIONAL DETAILS

The proposed AMHP with an installed capacity of 911 KW will utilize a net head of 471 m with design discharge of 0.25 m^3/s to generate total average annual energy 7,231,758 kWh (Table 10).

Table 10: Estimated Monthly Power and Energy Generation from the proposed AMHSP

Month	Numbers of operating days/ month	Turbine discharge	Net head	Generation capacity	Total energy
		m3/s	m	kW	kWh
Jan	31	0.250	448.86	911	650,672.64
Feb	28	0.250	448.86	911	587,704.32
Mar	31	0.181	459.57	675	482,112.00
Apr	30	0.139	464.39	525	362,880.00
May	31	0.250	448.86	911	650,672.64
Jun	30	0.250	448.86	911	629,683.20
Jul	31	0.250	448.86	911	650,672.64
Aug	31	0.250	448.86	911	650,672.64
Sep	30	0.250	448.86	911	629,683.20
Oct	31	0.250	448.86	911	650,672.64
Nov	30	0.250	448.86	911	629,683.20
Dec	31	0.250	448.86	911	650,672.64
Total annual energy generated (GWH)					7231.75

(Source: CED 2021)

CHAPTER 3: STUDY METHODOLOGY TO COLLECT DATA AND INFORMATION

3.1 DATA REQUIREMENT FOR PREPARING THE REPORT

The study requires the baseline data on physico-chemical, biological, socio-economic and cultural environment. Relevant data on the environmental and social conditions of the project area will be collected as follows.

3.1.1 PHYSICAL AND CHEMICAL ENVIRONMENT

The following baseline data on physical environment should be included in the EIA report are;

3.1.1.1 CLIMATE

- Rainfall
- Temperature
- Relative humidity
- Wind velocity and direction
- Atmospheric pressure

3.1.1.2 WATER AND WATERSHED AREA

- River
- Lake
- Watershed area
- Water flow and discharge
- Flood
- Outburst of Glacial Lakes

3.1.1.3 GEOLOGY

- Type of Rock and Soil
- Geological formation and structure
- Geological Risk
- Landslide and erosion

3.1.1.4 LAND

- Topography and land stability
- Land use and land cover

3.1.1.5 WATER QUALITY

- Surface (Cholunche Khola) and Drinking Water Quality
- Temperature, pH, conductivity, turbidity, total dissolved solids (TDS), total suspended solids (TSS)), total hardness (as $CaCO_3$), chloride content, iron content, arsenic content, ammonia content, nitrate, dissolved oxygen, biological oxygen demand, chemical oxygen demand and total coliform count

3.1.1.6 AIR AND SOUND QUALITY

- Air Quality
- Sound Quality

3.1.2 BIOLOGICAL ENVIRONMENT

3.1.2.1 VEGETATION

- Forest Types
  - Based on Climate
  - Based on Vegetation
- Forest Ownership; Forest Management And Conservation Status; And Livelihood
- Species List
  - Major vegetation
  - NTFPs
  - Invasive Species
  - Ethnobotany
  - Aquatic Species
  - Species Status
- Agro Biodiversity
- Sensitive Natural Habitats and Biodiversity Hotspots
- Socio-Economic Assessment

3.1.2.2 WILDLIFE

- Details of Wild Animals
  - Mammals
  - Birds
  - Reptiles
  - Aquatic Life
  - Others

- Species Status
- Wildlife Movement
- Corridor and Habitat Status

3.1.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

- Demography
  - Population
  - Birth and Death Condition
  - Gender
  - Age Group
  - Caste
  - Religion
  - Occupation
  - Households
  - Migration
  - Vulnerable and Marginalized Population
- Education
  - Number and Type of Educational Institution
  - Literacy Rate
  - Educational Status
- Health and Sanitation
  - Health Status
  - Types of Disease
  - Condition of Health Institutions
  - Condition of Drinking Water Condition
  - Condition of Toilet
  - Condition of Waste Management
- Physical and Community Infrastructure
  - Energy Supply
  - Communication
  - Drinking Water
  - Market
  - Irrigation System
  - Industry/Factory
- Economic
  - Employment/Occupation/Business
  - Land Ownership
  - Agriculture Production
  - Livestock Rearing

- Income and Expenditure
- Other Production

➢ Water Utility
- Agriculture
- Recreation
- Others
- Upstream and Downstream Water Utility

➢ Culture
- Historical and Cultural Heritage
- Open spaces of cultural significance
- Religious Places
- Cultural beliefs, customs and traditions

➢ Language
- Local languages and speaking communities
- Mother tongue speaking community

➢ Festivals and other Practices
- Major festivals and Ceremonies
- Funeral Sites and Practices

3.2 METHODOLOGY FOR DATA COLLECTION

Data and information required for EIA will be collected through primary as well as secondary sources. The data collection procedure includes the followings:

3.2.1 DESK STUDY AND LITERATURE REVIEW

Available useful data and information with the line agencies at the local, district and central level shall be collected and reviewed. Possible sources of information are District Coordination Committee (DCC), Rural Municipality, Sagarmatha National Park (SNP) Office, Department of National Parks and Wildlife Conservation (DNPWC), UNESCO, RAMSAR, Birdlife International, World Wildlife Fund (WWF), IUCN, ICIMOD, NTNC, other line agencies, related NGOs and other project offices in the district. Topographic map, Geological map and maps/information from the Department of Hydrology and Meteorology (DHM) are the other sources of information.

Moreover, review of the pertinent legal documents such as Acts, Rules, Manuals, Standards, Guidelines, and Policies etc. will also be carried out in order to analyze the legal and policy implications of project implementation (**refer Chapter 4**).

Additionally, EIA, EIA and IEE reports of the similar hydropower projects (especially of the Dudhkoshi Basin) will be reviewed to take assistance in developing study methodologies, identifying impacts and mitigation measures. Hence, desk study and literature review will start at the beginning till the completion of the EIA study.

For the cumulative impact assessment, review the relevant documents of existing projects/infrastructure. The planning documents of new development projects/infrastructure which are foreseeable in the near future will also be reviewed.

3.2.1.1 PHYSICAL ENVIRONMENT

Topographic and geological maps of the project area will be reviewed to collect information about soil type, land use, topography, geology and other features. Study of climate and air quality of the study area will be done by analyzing the data of the nearest meteorological station and monitoring station. Meteorological and hydrological data will be collected from DHM. Other information such as Hydrology and Sedimentation, Geology and Seismicity, Watershed etc. will be collected referring from the secondary sources such as topographic, geological and seismic hazard maps and project technical reports and data base of DHM etc.

3.2.1.2 BIOLOGICAL ENVIRONMENT

Secondary data on forest and wildlife will be obtained from publications of the Ministry of Forests and Environment (MoFE), SNP and DNPWC office, WWF, IUCN etc and other institutions and research papers.

The current state of legally protected areas, UNESCO World Heritage Sites and internationally recognized areas of high biodiversity value (such as key biodiversity areas, important bird areas and Ramsar sites) will be reviewed and documented.

3.2.1.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

District/Rural Municipality level socio-economic and cultural information such as population of affected Rural Municipality, household size, male-female ratio, infrastructures, ethnicity, schools, development activities in the project area, festivals and cultural activities shall also be reviewed from Central Bureau of

Statistics (CBS) publication, RM profiles, district profiles and other available literatures.

3.2.2 FIELD STUDY

A multi-disciplinary study team comprising of environmental expert, biodiversity expert, sociologist, hydrologist and geologist will visit the project site and carry out field investigation through survey, inspection, observation and measurement to collect baseline information on physical, biological and socio-economic and cultural environments and identify possible issues including seasonal differences such as water flow and aquatic fauna and impacts on environmental and social aspects. Various participatory tools like focus group discussion, key informant interview, consultations with relevant stakeholders and interactions will be employed to aid collection of relevant information. The collected baseline data will be verified by citing standard references and evaluated before accessing impacts on them.

When seasonal data would be required for more precise baseline study and impact analysis but is difficult to collect through field study, such data should be supplemented through secondary data collection.

3.2.2.1 PHYSICAL ENVIRONMENT

Walkover survey and field observation will be carried out to collect site-specific information about physical environment of the project area. Geological investigation will be made to explore the general geology, geomorphology, geological features like discontinuities and possible geologic hazard, land stability within the project area. Soil type and its characteristics will be observed during field investigation. Hydrological analysis will be conducted using the method suggested by the GON Water and Energy Commission Secretariat (WECS). Information derived from secondary sources will be verified with site observation, site specific photography and consultation with local communities. Walkthrough survey and field observation will be carried out to study and record soil erosion prone area, landslide areas, and other geologically vulnerable areas in the project surroundings (including specific project locations), which could adversely affect the project activities during construction and operation phase. Baseline data on existing pollution levels of water, air and noise in the project area will be generated. Water samples from the Cholunche Khola and the drinking

water in the project area will be collected and tested for 6 physical parameters, 9 chemical parameters and 1 microbial parameter (Table 11). Baseline data on noise level at the major construction sites such headwork and powerhouse sites as well as major settlement areas will be measured using a sound pressure level meter (dB meter). Visual observations and analysis of presence of the sources causing deterioration in air quality such as industries, quarry site, etc. will be made and qualitative information on air quality will be prepared. Quantitative data on air quality will be collected from secondary sources if available. Solid waste situation of the project area will be studied through direct observations.

3.2.2.2 BIOLOGICAL ENVIRONMENT

(a) Vegetation

Composition, distribution patterns and characteristics of vegetation and forest types and sensitive habitat in the project area will be assessed from direct field observations, systematic forest sampling (wherever applicable), transect walk survey, photography, maps, interaction with local people and concerned authority. The types of forest and management practices around the project area will be studied and identified. Complete enumeration of the standing trees will be carried out during EIA study in those component sites where tresses exist. Diameter at Breast Height (dBH) and height of each of the enumerated standing tree (>10cm dBH) within these sites will be recorded for calculation of loss of timber and ecological values. In addition, systematic vegetation sampling using quadrate method will be carried out to make an assessment of understory vegetation in project area. For this, quadrate plot of 5 x5 $m^2$and 1x1 m^2 will be laid out with systematic purposive sampling for shrubs including tree sapling and herbs including tree seedling respectively. Canopy cover of the forest will be estimated by visual observation. Classification, measurement and calculation of various parameters of trees will be done as per given methodology and formula in Forest Regulation 2079 BS and community forestry inventory guidelines 2061 BS. Standard vegetation record checklists will be prepared and used during forest measurement (**Annex V**). The unidentified plant specimens will be identified with the help of various literatures (Polunin & Stainton, 1984; Stainton, 1988; Shrestha, 1998; Press et al., 2000). In the case of unknown plant species, pressed samples of twigs, flowers and/or seedpods will be prepared and identified with the help botanical experts of the National Herbarium at Godawari, Lalitpur. Local names as well as the use of all species recorded on the data-sheet will be noted consulting with the local people. The data obtained from the sampling of the

vegetation and sample plots will be quantitatively analyzed only for density, frequency, abundance, dominance, basal area, standing wood volume and importance value index, if applicable. These parameters will be calculated by using standard formulae **(Annex VI).**

The forest vegetation assessment shall include calculation of forest loss at different project components, total loss in terms of plant species, total forest loss, loss of Non-Timber Forest Product (NTFP) and economic valuation of loss in forest product using methodology and formula given in Forest Regulation 2079 BS **(Annex VII).** Details of the trees to be fell will be kept in the format given in Annex 50 of Forest Regulation 2079 BS.

Ethno-botanical information will be obtained by conducting Rapid Rural Appraisal tools. The list of protected, rare and endangered species based on the CITES Appendix, IUCN Red Data and Government of Nepal protected lists will be enumerated in the field throughout the project area. Local people shall be consulted regarding the local uses of the plant species such as medicinal, food, timber, fuel wood etc. Commercially important plant species will also be documented. Similarly, information on the protected floral and faunal species of the project area will also be identified by tallying the species list with GoN protected list and various international protection categories such as CITES appendices and IUCN Red Data Book and will be described in the EIA report.

(b) Wildlife and Birds

Direct observation as well as study of pug marks, fecal droppings, vocal sounds, interaction with local communities etc. will be used to record the wildlife (mammals and avian fauna) in the project area and their natural as well as critical habitat. Birds will be observed with the help of binocular and identified using standard key developed by Fleming (1976) and Inskipp (1985). It has been reported that there are no records of herpetofauna and fishes in the area, but shall be confirmed through consultation with local communities. Photography identification will be applied while consultation with locals. This information will be verified with SNP officials and SNP publication such as management plan. Recorded wildlife will be tallied with IUCN Red Data Book, CITES Appendices, ICIMOD and GoN (2007), Government of Nepal's list of mammals and birds assigned respective threat and protection status according to DNPWC Act 2029 BS.

Key informant interviews will be taken for the information on crop and livestock depredation by the wild animals, human wildlife conflicts, hunting and poaching activities in the project area and other relevant information.

(c) Protected Areas

Issues of threats, enforcement and management will be assessed through review of management plans, observations made in the field, consultation with local communities and park managers and local representatives. Particular focus will be placed on the Outstanding Universal Values (OUV) of the Sagarmatha National Park World Heritage Site.

3.2.2.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

Primary information on socio-economic environment will be obtained through group discussion with communities, key informant interviews, onsite observation and questionnaires and stakeholder consultations. All these have been planned for basic health and sanitation conditions, educational, gender issues, infrastructure facilities, water and energy related issues, customs, practices and traditions with focus on community consultations, dispute settlement and acquiring public information, and expectations from the project (**Annex VIII**).

Focus Group Discussions (FGD) with the peoples of the concerned wards (such as buffer zone user's group, women groups' etc.) and local level agencies will be carried out to collect the information on general settings of local socioeconomic and culture such as population, ethnicity, occupation, business, tradition, energy requirements, crop diversity and productivity and so on. Similarly, Key Informant Interviews (KIIs) and FGDs with women's group (gender), school teachers (education), CFUGs (Resource use) will be carried out during the field survey to gather information on socio-economic and cultural activities as well as customs & tradition of the project area communities. The information and data collected from the field will be processed and analyzed by using Statistical Package for the Social Sciences (SPSS) and excel. These data will be used as baseline information as well for the impact identification, prediction and evaluation.

Table 11: Data Requirements and Methodology

Aspect of Environment	Data Parameter Requirements	Methods
Physical	Climate—Rainfall, Temperature, Relative Humidity, Wind Velocity and Direction	Literature Review/ Secondary Sources—DHM/Meteoblue/others
	Water and Watershed Area—Drainage and Hydrology/River/Lake/Watershed Area/Water Flow and Discharge/Flood/GLOFs	Literature Review/Secondary Sources—Topographic Maps/DHM/ICIMOD/WECS/ others; Field Survey and GIS Analysis
	Geology—Rock and Soil Type, geological structures, slope stability and seismicity, Topography, slope condition, geomorphology and land use in the project placement and work site areas	Literature Review/Secondary Sources—Topographic Maps/ Geological Maps/ Seismological Maps/DMG/ICIMOD; Field Survey
	Land—Land Use and Land Cover	Literature Review ; Field Survey
	Water quality [6 physical parameters—temperature, pH, conductivity, turbidity, total dissolved solids (TDS) and total suspended solids (TSS); 9 chemical parameters—total hardness (as $CaCO_3$), chloride content, iron content, arsenic content, ammonia content, nitrate, dissolved oxygen, biological oxygen demand and chemical oxygen demand; and 1 microbial parameter –total coliform count]	Sampling and Laboratory Test
	Ambient air quality	Literature Review/Secondary Sources
	Noise Level	Sound Meter
Biological	Vegetation around the project area;	Secondary Sources; Field Survey
	Wildlife (mammal, bird, Herpetofauna and aquatic fauna) found in and around project area;	Secondary Sources, FGD and Walk Through Survey
	Threat and Conservation status of flora and fauna based on Government of Nepal list, National Park and Wildlife Conservation Act (1973); IUCN's Red Data Book and CITES list;	Literature Review/Secondary Sources
	Ethno-botany of the project area;	FGD/Literature review
	Information on wildlife habitat	Literature review, FGD and walk through survey
Socioeconomic and Cultural	Demographic characteristics (population distribution, gender composition, ethnicity, households' size, migration, religion, etc.);	FGD, Household Survey and Literature review/secondary sources

Aspect of Environment	Data Parameter Requirements	Methods
Socioeconomic and Cultural	Economic activities (employment, agriculture/horticulture, livestock, trade, tourism, business etc.)	FGD, Household Survey and Literature review
	Education and skill level: Literacy rates, skills and skilled manpower, etc.;	FGD, Household Survey and Literature review
	Health and sanitation;	FGD, Household Survey and Literature review
	Land holding size in the project area;	FGD, Household Survey and Literature review
	Cropping pattern and practices;	FGD, Household Survey and Literature review
	Local institutions and activities: Government and non-government agencies, cooperatives, CBOs;	FGD and Literature review
	Social service facilities and community infrastructures (drinking water supply, educational institution, health care facilities, irrigation, electricity, communication, transportation, etc)	FGD, Household Survey and Literature review
	Vulnerable groups;	FGD and Literature review
	Archaeological, cultural, historical and religious sites.	FGD and Literature review

3.3 GENERAL

The study requires the baseline data on physical, biological, socio-economic and cultural environment. Relevant data on the environmental conditions of the project area will be collected and assembled into concise description. Such documentation should focus on those aspects likely to be altered through project implementation and will include physical, biological, social, cultural and economic environment. Source of all data and information given in the report will be identified. If the source is field survey and specific methodologies used will be given, and if source is published report or literature then standard reference format will be used with reference list.

The information collected from different sources will be processed and analyzed according to the physical, biological, socio-economic and cultural environment. The secondary data collected will be used as the major source for verification and crosschecking of primary data during the field survey. The generated information from the primary source will be analyzed and tabulated. The likely impact will be assessed covering both adverse and beneficial ones.

CHAPTER 4: LAW AND POLICY

Government of Nepal has developed various acts, regulations and guidelines for environmental friendly development activities. Similarly, WB has some guidelines and requirements for EIA study. A brief review of the policy and legal mechanisms shall be presented focusing on the provisions attracting the implementation and operation of the project in EIA report. Moreover, an analysis on the gap between national legislation and WB policies and EHS guidelines will be done. The policies, laws, rules and regulations, and other guidelines and directives, which will govern the undertaking of EIA, include the followings:

SN	Acts/Regulations/Guidelines
1	Constitution of Nepal
2	Plans, Policies and Strategy
2.1	Plan
2.1.1	Fifteenth Plan (FY 2076/77-2080/81) (2019/20 – 2023/24)
2.1.2	National Environmental Policy 2076 (2019)
2.1.3	Nepal Biodiversity Strategy and Action Plan 2071-2077 (2014-2020)
2.1.4	Nepal Environmental Policy and Action Plan, 2050 (1993)
2.2	Policy
2.2.1	National Solid Waste Management Policy, 2079 BS (2022 AD)
2.2.2	National Water Resource Policy 2077 (2020) AD)
2.2.3	National Occupational Safety and Health Policy, 2076
2.2.4	National Environmental Policy 2076 (2019)
2.2.5	Renewable Energy Subsidy Policy,2073 (2016)
2.2.6	AEPC Gender Equality and Social Inclusion Policy, 2075 (2018)
2.2.7	Public-Private Partnership Policy, 2072 (2015)
2.2.8	Land Acquisition, Resettlement and Rehabilitation Policy for Infrastructure, 2071 (2015)
2.2.9	Rural Energy Policy 2063 (2006)
2.2.10	Hydropower Development Policy, 2058 (2001)
2.2.11	Environmental and Social Safeguard Policy of AEPC, 2018
2.3	Strategy
2.3.1	National Energy Efficiency Strategy, 2075
2.3.2	National Water Resource Strategy, 2058 (2002)
3	Act, Rules and Regulations
3.1	Act
3.1.1	The Act Related to Land 2076 BS (2020 AD)
3.1.2	Environment Protection Act, 2076 (2019)
3.1.3	Forest Act 2076 (2019)
3.1.4	Land Use Act 2076 BS (2019 AD)

SN	Acts/Regulations/Guidelines
3.1.5	The Act Related to Children, 2075 BS (2018 AD)
3.1.6	Disaster Risk Reduction and Management Act 2074 BS (2017 AD)
3.1.7	Local Government Operation Act, 2074 (2017)
3.1.8	Intergovernmental Fiscal Arrangement Act, 2074
3.1.9	Labor Act, 2074 (2017)
3.1.10	Act to Regulate and Control on International Trade in Endangered Species of Wild Fauna and Flora Act, 2074 (2016)
3.1.11	Muluki Criminal Code Act, 2074(2017)
3.1.12	Muluki Civil Code Act, 2074
3.1.13	Solid Waste Management Act, 2068 (2011)
3.1.14	Plant Protection Act 2064 (2007)
3.1.15	Child labor (Prohibition and regularization) Act, 2056 (2000)
3.1.16	Electricity Act, 2049 (1992)
3.1.17	Water Resources Act, 2049 (1992)
3.1.18	National Parks and Wildlife Conservation Act, 2029 (1973)
3.1.19	Aquatic Animal Protection Act, 2017 (1960)
3.2	**Rules/Regulations**
3.2.1	Forest Regulation 2079
3.2.2	Environment Protection Regulation, 2077 (2020)
3.2.3	Labor Rules, 2075 (2018)
3.2.4	Electricity Regulatory Commission Rules, 2075
3.2.5	Solid Waste Management Regulation, 2070
3.2.6	Plant Protection Rules, 2067 (2010 AD)
3.2.7	Child Labor (Prohibition and Regulation) Rules, 2063 BS (2006 AD)
3.2.8	Conservation Area Management Rules, 2053
3.2.9	Buffer Zone Management Regulation, 2052
3.2.10	Electricity Rules, 2050 (1993)
3.2.11	Water Resources Regulations, 2050 (1993)
3.2.12	Mines and Minerals Act 2042 BS (1985 AD)
3.1.13	Himali National Park Rule, 2036
3.2.14	National Parks and Wildlife Conservation Rules, 2030 (1974)
4	**Guidelines/manuals/Directives**
4.1	Directive Relating to Licensing of Power Projects 2075
4.2	Hydropower Environmental Impact Assessment Manual, 2075 (2018)
4.3	Working Policy on constructing and operating physical infrastructures in Protected Area 2065 (2008)
4.4	Community Forest Inventory Guidelines, 2061 BS (2003 AD)
4.5	National EIA Guidelines, 2050 BS (1993 AD)
4.6	Guideline on Environmental &Social Risk Management (ESRM) For Banks And Financial Institutions, May 2018
5	**Working Procedures/Work Plan**
5.1	Wildlife Friendly Physical Infrastructure Construction Directives, 2078 BS (2022 AD)

SN	Acts/Regulations/Guidelines
5.2	Working Procedure for the Use of National Forest Area for National Priority Project with Standards, 2076 BS (2019 AD)
5.3	Renewable Energy Subsidy Delivery Mechanism 2073 BS (2016 AD)
6	**Standards**
6.1	Stone, Gravel and Sand Extraction, Sell and Management Standards, 2077 BS (2020 AD)
6.2	National Ambient Air Quality Standard, 2069 BS (2012 AD)
6.3	National Noise Quality Standard, 2069 BS (2012 AD)
6.4	Standards for Emission from in-use and Imported Diesel Generators, 2069 BS (2012 AD)
6.5	Tolerance Limits for Industrial Effluents to be Discharged into Inland Surface Waters, 2003
7	**World bank ESS Instruments**
7.1	**Operation Policy**
7.1.1	Environmental Assessment EA (OP 4.01)
7.1.2	Natural Habitats (OP 4.04)
7.1.3	Involuntary Resettlement (OP 4.12)
7.1.4	Physical and Cultural Resources (0P 4.11)
7.1.5	Indigenous People (0P 4.20)
8	**International Instruments**
8.1	The United Nations Declaration on the Rights of Indigenous Peoples, UNDRIP, 2007
8.2	International Labour Organization Convention, 1998
8.3	Convention on Biological Diversity (CBD), 1992
8.4	Concerning Indigenous and Tribal Peoples in Independent Countries, 1991 Convention (No.169)
8.5	World Heritage Convention, 1975
8.6	World Heritage Advice Note: Environmental Assessment (18 Nov 2013): A step-by-step guidance on environmental assessment for world heritage properties.
8.7	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),1973

CHAPTER 5: TIME, BUDGET AND HUMAN RESOURCES

5.1 TIME REQUIRED FOR REPORT PREPARATION

The EIA study is planned to be completed within a period of 5 months (**Table 12**).

Table 12: Time Schedule for EIA

SN	Activities	Time in Month				
		1	2	3	4	5
1	SD/ToR of EIA Submission					
2	Approval of SD/ToR					
3	Field Visit and Preparation of EIA Report					
5	Public Hearing					
7	Incorporation the issues form Public Hearing in EIA Report					
8	EIA Report Submission					
9	Submission of Final EIA for Approval					

*Note: It does not include the time taken by concerned authority for approval.

5.2 ESTIMATED BUDGET

The estimated budget for the EIA study of the proposed project will be as per agreement between Developer (Amadablam Mini Hydro Pvt. Ltd.) and consultant (EFI), and it has been estimated to NPR 795,000.00 for EIA study.

5.3 EXPERTS (HUMAN RESOURCES)

The EIA team includes multidisciplinary experts on different environment domains (physical, biological and socio-economic and cultural environment) as in Table 13.

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Table 13: Study Team and Qualification

SN	Name	Expertise	Academic Qualification	Experience on Environmental Assessment (No.)
1	Dhan B.Shrestha	Environment/ EIA/Team Leader	MSc, Environmental Science	40
2	Lokesh Sapkota	Physical Environment Expert	ME, Environmental Engineering	12
3	Ramji Bogati,	Biodiversity Expert	PhD- Spatial Planning: Landscape Ecology and Landscape Planning; MSc, Zoology	20
4	Heramba Adhikari	Scocio-economic and Cultural Expert	MA, Sociology/Economics	25
5	Mr. Pursottam Shilpakar	Geologist	MSc, Geology	17

CHAPTER 6: ISSUES IDENTIFIED AND PRIORITIZED IN SCOPING DOCUMENT

6.1 ISSUES IDENTIFIED BY STAKEHOLDERS

The issues identified by the stakeholders are summarized as below:

6.1.1 BENEFICIAL ISSUES

6.1.1.1 CONSTRUCTION PHASE

i. Employment generation and skill enhancement
ii. Benefits for exposure of local population to new technologies and technology transfer

6.1.1.2 OPERATION PHASE

i. Employment generation and skill enhancement
ii. Issues related to addition of 911 KW of power to local people
iii. Less pressure in forest for fuelwood
iv. Replacement of LPG
v. Retain of fertility of soil (Dung will be used for heating)
vi. Easier Life during winter

6.1.2 ADVERSE ISSUES

6.1.2.1 PHYSICAL AND ENVIRONMENT

Construction Phase

i. Spoils and spoil disposal related issues
ii. Issues of Haphazard Stockpiling of Construction Material

Operation Phase

Stakeholders did not identify any negative issues on physical and chemical environment.

6.1.2.2 BIOLOGICAL ENVIRONMENT

Construction Phase

i. Pressure on forest for fuelwood
ii. Issues of non-timber forest products/MAPs
iii. Possible Risk of forest fire
iv. Illegal wildlife hunting and poaching

v. Increased incidence of Human wildlife conflict
vi. Disturbance to wildlife movement

Operation Phase

i. Bird casualties due to electrocution and collision with transmission line
ii. Forest fire

6.1.2.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

Construction Phase

i. Health and sanitation
ii. Occupational health and safety related issues
iii. Social-cultural conflict between local community and the outside work force
iv. Issues relating to unsocial activities like gambling, alcoholism, girl trafficking and prostitution
v. Stakeholder Engagement and information disclosure
vi. Issues of historical, religious, cultural& touristic important sites
vii. Issues of tourist movement and accidents

Operation Phase

i. Occupational health and safety related issues of the power station workers
ii. Public Safety Related Issues/Movement of people in dangerous places
iii. Issues related to benefit sharing of project
iv. Issues related to tariff of electricity
v. Management of existing micro hydro

6.2 ISSUES IDENTIFIED BY EXPERTS

Issues identified the experts are summarized as below:

6.2.1 POWER GENERATION

6.2.1.1 BENEFICIAL ISSUES

6.2.1.1.1 Construction Phase

i. Employment generation and skill enhancement
ii. Benefits from community and social support programs
iii. Benefits from implementation of environmental mitigation programs and benefit augmentation measures

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iv. Increase in economic activities in the project area and associated beneficial issues in local economy
v. Benefits for exposure of local population to new technologies and technology transfer
vi. Utilization of local resources

6.2.1.1.2 Operation Phase

i. Employment generation and skill enhancement
ii. Generation of 911 kW of power to local people

6.2.1.2 ADVERSE ISSUES

6.2.1.2.1 Physical Environment

Construction Phase

i. Change in Land Use
ii. Change in Topography
iii. Change in landscape and OUV
iv. Possible Glacier Lake Outburst Flood (GLOF) and associated issues
v. Acceleration on Landslide and Soil Erosion
vi. Spoils and spoil disposal related issues
vii. Issues due to quarrying activity
viii. Water Pollution and Increase in sediment loads
ix. Noise Pollution
x. Soil Pollution
xi. Issues of Haphazard Stockpiling of Construction Material
xii. Solid Waste Generation
xiii. Air pollution related issues
xiv. Change in Hydrology and River Morphology
xv. Loss of Top Soil

Operation Phase

i. GLOF and associated issues
ii. Change in River morphology and possible microclimatic changes
iii. Management/final disposal of solid waste and waste water (both black water and grey water)
iv. Change in water quality
v. Noise and vibration at power house
vi. Soil erosion due to tailrace discharge

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vii. Issues of sediment flushing

6.2.1.2.2 Biological Environment

Construction Phase

i. Loss of forest area
ii. Loss on forest vegetation and overall vegetation diversity and OUV
iii. Fuelwood during construction
iv. Issues of natural and critical habitat (wildlife and their movement route and migratory bird movement route)
v. Issues of aquatic flora and fauna
vi. Issues of non-timber forest products/MAPs
vii. Possible risk of forest fire
viii. Wildlife hunting and poaching
ix. Increased incidence of human wildlife conflict
x. Issues of integrity of ecosystem and protected areas

Operation Phase

i. Disturbance to the wildlife due to resident workforce
ii. Issues of rare, endangered, protected and threatened species of flora and fauna
iii. Forest fire

6.2.1.2.3 Socio-economic and Cultural Environment

Construction Phase

i. Land acquisition issues
ii. Pressure on existing facilities, services and resources of the project area
iii. Health and sanitation issues
iv. Occupational health and safety related issues
v. Community health and safety issues
vi. Social-cultural conflict among local community and the outside work force
vii. Issues relating to unsocial activities like gambling, alcoholism, girl trafficking and prostitution
viii. Gender discrimination (issues of equal pay between women & men for work of equal value)
ix. Issues of Grazing Land
x. Stakeholder Engagement and information disclosure

xi. Issues of Grievances Management
xii. Issues related to disturbance to community during construction
xiii. Child labour
xiv. Stress on local resources & infrastructure
xv. The pattern of uses of natural resources in festivals and religious rituals (if any)
xvi. Issues of historical, religious, cultural & touristic important sites

Operation Phase

i. Occupational health and safety related issues of the power station workers
ii. Public Safety Related Issues/Movement of people in dangerous places
iii. Issues related to benefit sharing of project
iv. Issues relating to sudden release of water to downstream

6.2.2 TRANSMISSION AND DISTRIBUTION LINES

6.2.2.1 BENEFICIAL ISSUES

6.2.2.1.1 Construction Phase

i) Employment generation and skill enhancement
ii) Benefits from community and social support programs
iii) Benefits from implementation of environmental mitigation programs and benefit augmentation measures
iv) Benefits for exposure of local population to new technologies and technology transfer

6.2.2.1.2 Operation Phase

i) Employment generation and skill enhancement
ii) Generation of 911 kW of power and supply of clean energy to local people
iii) Electricity royalty to concerned authorities
iv) Promotion of conservation in SNP and Contribution to OUVs
v) Promotion of Tourism

6.2.3 ADVERSE ISSUES

6.2.3.1 PHYSICAL ENVIRONMENT

6.2.3.1.1 Construction Phase

i) Possible Glacier Lake Outburst Flood (GLOF) and associated Issues
ii) Landslide and Soil Erosion
iii) Spoils and spoil disposal related issues
iv) Water Pollution and Increase in sediment loads

Operation Phase

i) GLOF and associated issues

6.2.3.1.2 Biological Environment

Construction Phase

i) Issues of wildlife movement
ii) Issues of wildlife casualty
iii) Possible risk of forest fire
iv) Wildlife hunting and poaching
v) Issues of integrity of protected areas

Operation phase

No issue has been expected in biological environment due to transmission and distribution lines.

6.2.3.1.3 Socio-economic and Cultural Environment

Construction Phase

i) Land Acquisition Issues
ii) Pressure on Existing Facilities, Services and Resources of the Project Area
iii) Occupational Health and Safety Related Issues
iv) Public Safety Issues
v) Hindrance to Tourist Movement
vi) Social-Cultural Conflict Among Local Community and the Migrant Work Force
vii) Issues Relating to Antisocial Activities such as Gambling, Alcoholism, Girl Trafficking and Prostitution
viii) Gender Discrimination (issues of equal pay between women &men for work of equal value)

ix) Stakeholder Engagement and Information Disclosure
x) Issues of Grievances Management
xi) Issues Related to Disturbance to Community
xii) Possibility of Sexual Exploitation and Abuse/Sexual Harassment
xiii) Child Labour
xiv) The Pattern of Uses of Natural Resources in Festivals and Religious Rituals (if any)
xv) Isuues on Historical, Religious, Cultural & Touristic Important Sites

Operation Phase

i) Occupational Health and Safety Related Issues of Maintenance Workers
ii) Issues Related to Benefit Sharing of Project
iii) Issues Related to Tariff of Electricity
iv) Management of Existing Micro Hydro

6.3 PRIORITIZED ISSUES

Prioritized positive and negative issues are given in **Table 14** and **Table 15** respectively.

6.4 JUSTIFICATION FOR EXCLUSION OF THE ISSUES IDENTIFIED BY STAKEHOLDERS BUT NOT PRIORITIZED

All the issues raised or identified by stakeholders are prioritized.

Table 14: Prioritized Positive Issues

Phase	Issues	
	Power Generation	**Transmission and Distribution**
Construction	i. Employment generation and skill enhancement ii. Benefits from community and social support programs iii. Benefits from implementation of environmental mitigation programs and benefit augmentation measures iv. Increase in economic activities in the project area and associated beneficial issues in local economy v. Benefits for exposure of local population to new technologies and technology transfer vi. Utilization of local resources	i) Employment generation and skill enhancement ii) Community and social support programs iii) Benefits from implementation of environmental mitigation programs and benefit augmentation measures iv) Benefits for exposure of local population to new technologies and technology transfer
Operation	i. Employment Generation and Skill Enhancement ii. Generation 911 kW of Power to Local People	i) Employment generation and skill enhancement ii) Supply of clean energy to local People iii) Electricity royalty to concerned authorities iv) Promotion of conservation in SNP and Contribution to OUVs v) Promotion of Tourism

Table 15: Prioritized Adverse Issues

Phase	Issues	
Construction	**Power Generation**	**Transmission and Distribution**
Physical and Chemical	i. Change in Land Use ii. Change in Topography iii. Possible Glacier Lake Outburst Flood (GLOF) and Associated Issues iv. Landslide and Soil Erosion v. Spoils and Spoil Disposal Related Issues vi. Issues Related to Quarrying Activity vii. Water Pollution and Increase in Sediment Loads viii. Noise Pollution	i. Possible Glacier Lake Outburst Flood (GLOF) and Associated Issues ii. Landslide and Soil Erosion iii. Spoils and Spoil Disposal Related Issues iv. Water Pollution and Increase in Sediment Loads

Phase	Issues	
	ix. Soil Pollution x. Issues of Haphazard Stockpiling of Construction Material xi. Solid Waste Generation xii. Air Pollution Related Issues xiii. Hydrology and River Morphology xiv. Loss of Top Soil	
Biological	i. Loss of Forest Area ii. Loss on Forest Vegetation and Overall Vegetation Diversity iii. Pressure on Forest for Fuelwood iv. Issues of Natural and Critical Habitat (wildlife and their movement route and migratory bird movement route) v. Fragmentation of Wildlife Habitat and Disturbance to Wildlife Movement vi. Issues of Non-Timber Forest Products/MAPs vii. Possible Risk of forest fire viii. Wildlife Hunting and Poaching ix. Wildlife Casualty x. Increased Incidence of Human Wildlife Conflict xi. Issues of Integrity of Protected Areas	i. Issues of Wildlife Movement ii. Issues of Wildlife Casualty iii. Possible Risk of Forest Fire iv. Wildlife Hunting and Poaching v. Issues of Integrity of Protected Areas
Socio-Economic	i. Land Acquisition Issues ii. Pressure on Existing Facilities, Services and Resources of the Project Area iii. Health and Sanitation Issues iv. Occupational Health and Safety Related Issues v. Community Health and Safety vi. Social-cultural Conflict Among Local Community and the Migrant Work Force	i. Land Acquisition Issues ii. Pressure on Existing Facilities, Services and Resources of the Project Area iii. Occupational Health and Safety Related Issues iv. Public Safety Issues v. Hindrance to Tourist Movement vi. Social-Cultural Conflict Among Local Community and the Migrant Work Force

Phase	Issues	
	vii. Issues Relating to Antisocial Activities such as Gambling, Alcoholism, Girl Trafficking and Prostitution viii. Gender Discrimination (issues of equal pay between women &men for work of equal value) ix. Issues of Grazing Land x. Stakeholder Engagement and Information Disclosure Issues xi. Issues of Grievances Management xii. Issues Related to Disturbance to Community During Construction xiii. Possibility of Sexual Exploitation and Abuse/Sexual Harassment xiv. Child Labour xv. The Pattern of Uses of Natural Resources in Festivals and Religious Rituals (if any) xvi. Issues of on Historical, Religious, Cultural& Touristic Important Sites	vii. Issues Relating to Antisocial Activities such as Gambling, Alcoholism, Girl Trafficking and Prostitution viii. Gender Discrimination (issues of equal pay between women &men for work of equal value) ix. Stakeholder Engagement and Information Disclosure x. Issues of Grievances Management xi. Issues Related to Disturbance to Community xii. Possibility of Sexual Exploitation and Abuse/Sexual Harassment xiii. Child Labour xiv. The Pattern of Uses of Natural Resources in Festivals and Religious Rituals (if any) xv. Issues of Historical, Religious, Cultural & Touristic Important Sites
Operation		
Physical and Chemical	i. GLOF and Associated Issues ii. Issues of River Morphology and Microclimatic Changes iii. Management/Final Disposal of Solid Waste and Waste Water (both black water and grey water) iv. Change in Water Quality v. Noise and Vibration at Power House vi. Soil Erosion due to Tailrace Discharge vii. Issues of Sediment Flushing	i. GLOF and Associated Issues
Biological	i. Disturbance to the Wildlife due to Resident Workforce	No issue has been expected.

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Phase	Issues	
	ii. Issues of Rare, Endangered, Protected and Threatened Species of Flora and Fauna iii. Forest fire	
Socio-Economic	i. Occupational Health and Safety Related Issues of the Power Station Workers ii. Public Safety Related Issues/Movement of people in Prohibited/Dangerous Places iii. Issues Relating to Sudden Release of Water to Downstream	i. Occupational Health and Safety Related Issues of Maintenance Workers ii. Issues Related to Benefit Sharing of Project iii. Issues Related to Tariff of Electricity iv. Issues Related to Benefit Sharing of Project v. Management of Existing Micro Hydro

CHAPTER 7: ENVIRONMENTAL IMPACT EVALUATION

The study will identify and predict the potentially significant aspects and impacts during construction, operation and maintenance phase of the proposed project on existing physical, biological and socio-economic & cultural environmental domains. Generic impacts will be avoided and the impacts will have clear bearing on the project activities, location and existing environmental component's sensitivity to change. Impacts will be discussed with quantified information of likely changes, alteration and losses; and will be further assessed based on characteristics of existing condition and sensitivity of environmental components in physical, biological and socioeconomic and cultural domains. Adverse and beneficial impacts/issue that are not identified or anticipated at this stage, if later discovered during EIA study, will be duly incorporated in the report. Thus identified and predicted impacts will be evaluated on the basis of National EIA Guidelines (1993), based on the magnitude, extent and duration of the impact. Experts' judgments and experiences from the similar projects will be adopted for the quantification of the impacts. If the impact lasts up to 3 years it will be termed as short term (ST). If impact continues for 3 to 20 years, it will be termed as medium term (MT) and if it lasts beyond 20 years it will be considered as long term (LT). The impact which will occur inside the project will be termed as site specific (SS) and which goes up to Municipality or Rural Municipality level will be termed as local (L) and which goes up to more than two Municipality or Rural Municipality will be termed as regional (R). Similarly, the impact which is irreversible will be termed as high (H), which is in partly recoverable in long run will be termed as moderate (M) and which is reversible will be termed as low (L). The impact which has direct effect will be termed as direct (D) and which has indirect effect will be termed as indirect (I). For the impact evaluation the matrix method with numerical ranking will be used for the quantitative ranking of the predicted impacts (**Table 16**).

Table 16: Numerical scales as proposed in the National EIA Guidelines

Magnitude	Score	Extent	Score	Duration	Score
High/Major	60	Regional	60	Long Term	20
Moderate/Medium	20	Local	20	Medium Term	10
Minor/Low	10	Site-specific	10	Short-Term	05

(Source: National EIA Guidelines, 1993)

The cumulative scores on this analysis have been used to decide the significance of the impacts. **Table 17** below depicts the cumulative score of level of significance:

Table 17: Cumulative scores of levels of significance

Total scores	Significance of Impacts
Up to 44	Insignificant
45-74	Significant
Beyond 74	Very significant

(Source: National EIA Guidelines, 1993)

Impact identification, estimation, ranking and evaluation will be done as per given in **Table 18.**

Table 18: Impact Evaluation Matrix

Beneficial Impacts	
Preconstruction Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	
Construction Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	
Operation Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	
Adverse Impacts	
Preconstruction Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	
Construction Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	
Operation Phase	
Physio-Chemical	
Biological	
Socio-Economic	
Cultural	

CHAPTER 8: ALTERNATIVES

Alternative analysis has been considered as an integral part of EIA study, which involves an alternative way of achieving the objectives of the proposal. The aim of alternative analysis is to arrive at a development option, which maximizes the benefits while minimizing the unwanted impacts. The likely impacts of each alternative will be assessed and compared in terms of adverse environmental impacts and benefits, and the environmentally sound alternative will be recommended. Alternative analysis shall be assessed based on the following 5 aspects i.e. technical, financial, Administrative and environmental & social ground. The study team will conduct alternative analysis considering the following issues keeping these as an option:

- **No project option:** The alternative analysis will be done on implementation of project or without project scenarios.
- **Types of Project:** Alternative analysis will be done based on different types of project including solar, extension of rural electrification program.
- **Use of Forest Area:** Project will be designed in such a way to use forest area in minimal, so its alternatives will be analyzed.
- **Design of the project, Site, Technology and Operation Method:** Various design alternatives (diversion weir and intake, waterway alignment Transmission & Distribution and powerhouse) shall be considered and analyzed with a view to opt for the best alternative so as to minimize impacts on environment and ensuring safety

  Analysis of different alternatives of project component sitting could result in recommendation of best alternative so as to avoid some of the significant impact such as decreased number of trees to be clear felled, avoiding prime cultivation land or major forest area, interference with the local trails etc.

  If the project requires houses and property acquisition culminating to relocation or resettlement of the people, location alternatives of the project component shall be assessed to avoid resettlement as far as possible.

  Alternative analysis shall be carried out for other technology such as solar. The analysis shall be carried out based on secondary information.

  Project implementation technology (mechanized, labor intensive, labor based); process of proposal implementation (contractors, local labor groups etc.) shall be assessed.
- **Time Schedules:** Similarly, project operation time shall be assessed in terms of whether it is round the year operation or seasonal operation.

- **Raw Materials to be used:** Alternatives to different sources of energy which would be required for project construction as well as for camps for day to day living will be assessed and the best suitable energy (from environmental point of view) will be recommended. Similarly, alternative resources required for the project works shall be assessed including use of local resources.

CHAPTER 9: IMPACTS MITIGATION MEASURES

To overcome any adverse impacts by the project, the team will suggest appropriate site specific measures to avoid, reduce, mitigate, and/or compensate for all evaluated impacts. The basic philosophy of mitigation is to outline measures appropriate to mitigate the adverse impacts to the level required by National Standards and Guidelines; or to reduce the impacts to what may be considered as tolerable level, or as indicated by the National Standards where available. Therefore, the proposed mitigation measures will be in commensurate with the level of impact and compatible with the related existing laws of Nepal. Measures will be proposed based on nature of environmental impacts and components of environment that is affected, appropriateness and cost analysis. Each of the identified adverse impacts will be evaluated in detail and cost effective mitigation measures shall be suggested to avoid and/or minimize the adverse impacts. The criteria of such evaluation will be included in the EIA report. Furthermore, enhancement measures shall be proposed to enhance or augment beneficial impacts due to implementation of the project.

Since environmental impacts may not need all four measures, specific measures proposed shall be based on the nature of identified impacts and components of affected environment. For Avoidance or Preventive measures proposed shall ensure that their implementation or compliance will be ensured environmentally sound project construction and operation. Organizational set up will also be identified with responsibilities of each institution for the mitigation activities. The cost for mitigation and enhancement measures will be provided separately for both construction and operation stages for Physical Environment, Biological Environment, Socioeconomic and Cultural Environment.

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) will be developed to ensure the implementation of environmental protection measures and make project environmental friendly and sustainable. It will include aspects that should be implemented during construction and operation phases of the project detailing (i) what to implement, (ii) when to implement, (iii) where to implement, (iv) what technique/method to be employed, and (v) who is responsible.

Different alternatives of design and project site will be analyzed during feasibility and detail project study report stage for avoidance and preventive measures. A monitoring unit under Environmental Management Program will be established to oversee the implementation and compliance recommended by EIA report. Steps for necessary co-ordination that is required in implementing Preventive, Avoidance and Mitigation Measures with – local, province and central level institutions – as well as contractors, proponent, and consultant will be proposed. Organization chart of the monitoring unit for implementation of the mitigation measures, with a clear provision of mitigation will be proposed. Those mitigation measures that can be or are part of contractual obligation for project construction will be clearly identified; Mechanisms of ensuring implementation of those mitigation measures as compliance of contractors will be proposed. In order check if the contractors complied with the implementation of proposed preventive, avoidance and mitigation measures, which fall under the responsibility of the contractor a written agreement, will be signed with the contractors.

The cost of mitigation and enhancement measures will be provided separately differentiating into Construction Phase and Operation Phase for Physical Environment, Biological Environment and Socio economic and Cultural Environment. Enhancement measure will be proposed for heightening benefits accrued from the project.

The broad EMP will be elaborated into a comprehensive environmental management action plan (EMAP) considering the following:

1) Target (what is aimed to achieve through EMAP);
2) Actions:
- Elements of actions that construction contract or other assigned follow,
- Examples of specific action to be included (mitigation chapter / sections will be referenced)
3) Monitoring and Reporting:
- List of activities that require measurement and reporting
- Identification of – parameters, indicators, methods, location, frequency, (relevant monitoring section will be used),

- Identification of reporting authority to whom to report and reporting interval

4) Corrective Action and Reporting:
- Identification of incidences of noncompliance,
- In case of noncompliance, identification of responsible person of the contractor to take necessary corrective actions

5) Reporting in case of noncompliance:
- Cause of non-compliance,
- Action to be taken for re-compliance,
- Mechanism and necessary actions to ensure compliance,

6) Relevant legislation and standards to observe and follow.

EMAP will cover the following:

- Spoil Management Plan,
- Pollution Abatement Plan (Pertaining to –Air quality; Water Quality and Solid Waste),
- Construction Site and Temporary Facilities Rehabilitation Management Plan,
- Terrestrial Ecology: Habitat Protection, Restoration, and Management Plan,
- Occupational Health and Safety Management Plan,
- Emergency Preparedness and Management Plan,
- Public Health Safety Management Plan
- Project Information Management Plan
- Public Grievances Redress Management Plan

Furthermore, the EIA report shall also include Environmental Management Action Plan (EMAP) with responsible agency/party to carry out environmental mitigation activity, the location of mitigation implementation, methods, time schedule and estimated amount. The EIA report shall define organizational set up to carry out these activities.

The EMAP matrix will be as follows:

Table 19: EMAP Matrix

Positive Impact Augmentation Measures							
SN	Positive Impacts	Augmentation Measures	Implementation Site	Implementation Time	Cost	Implementing Institution	Remarks
Negative Impact Mitigation Measures							
SN	Negative Impacts	Mitigation Measures	Implementation Site	Implementation Time	Cost	Implementing Institution	Remarks

CHAPTER 11: ENVIRONMENTAL MONITORING PLAN

EPR 2020 prescribes for a comprehensive environmental monitoring plan to check the implementation of mitigation measures in the manner described in an EIA report.

Environmental monitoring plan will form part of an EIA as it generates useful information and improves the quality of implementation of mitigation measures. Environmental Monitoring Plan will be prepared with respect to the environmental parameters, monitoring indicators and monitoring methods, location of monitoring, schedule of monitoring and responsible agencies or person for monitoring. Monitoring parameters will be selected based on end-of-pipe monitoring rather than ambient monitoring. The monitoring plan will also include the estimated cost for monitoring. The monitoring plan will be prepared covering Compliance Monitoring and Impact Monitoring and if necessary, Baseline Condition of Monitoring. The parameters and indicators will be coherent with the proposed mitigation measures and will be quantified as far as possible. The monitoring methods may include observation, photograph, inspection, interview, measurement, sampling analysis, and record inspection.
EIA reports shall contain plans for;

i) Baseline Monitoring: To assess the changes in environmental baseline conditions just prior to commencement of project construction with reference to the baseline conditions provided in the EIA report.
ii) Impact monitoring: To assess the changes (beneficial or adverse) in the various component of the environment in comparison to the baseline conditions. Also, impact monitoring would help to identify impacts those may have been overlooked by the EIA study.
iii) Compliance Monitoring: To assess compliance activities of the responsible parties (including contractors, employer, consultant and other stakeholders) in complying the environmental protection matters mentioned in the EIA report.

The baseline and impact monitoring plans shall indicate parameter, indicator, schedule, location, and methods. Compliance monitoring plans shall indicate parameter, indicator, schedule and methods. An end-of-pipe based monitoring plan shall be developed rather than an ambient level monitoring. The cost of monitoring, activities and manpower requirements to carry out the proposed activities and organizational set up to carry out the proposed monitoring activities shall be included in the EIA report.

Table 20: Proposed Monitoring Plan Matrix

S. N.	Parameters	Verifiable Indicators	Verification Methods	Schedule	Cost	Responsible Monitoring Agency
Baseline Monitoring						
Compliance Monitoring						
Impact Monitoring						

CHAPTER 12: ENVIRONMENTAL AUDITING

The environmental auditing is the integral part of EPR, 2020. It obliges MoFE to conduct environmental auditing two years after the commencement of service, distribution and production relating to the implementation of a proposal. During the study, an auditing plan will be prepared to assess the effectiveness of the implemented mitigation and compensatory measures. The auditing plan will describe parameter and indicators to be measured, the required sampling stations, the frequency of sampling and methods and responsible authority to carry out auditing. The rationality and objectives of conducting auditing programs will be explained in the EIA report. The study will incorporate the cost for auditing works including requirement of the manpower. The organizational set-up for environmental auditing will also be suggested.

CHAPTER 13: DISASTER RISK REDUCTION PLAN

There may be various disasters such as landslide, flood, GLOFs and other natural as well as human induced disasters. The EIA report will cover the disaster risk issues raised during construction and operation of the proposed project. It will address the risk of these disasters with proper plan. Thus disaster risk reduction (DRR) plan will be prepared to address the risks of disaster if found relevant during EIA study.

CHAPTER 14: ANNEXES

The report format will be as per Schedule 12 pertaining to rule 7 (5) of EPR 2020. EIA report will also include relevant information, references, annexes, map, photo, tables, charts, graphs and questionnaires, as relevant and applicable in the final EIA report. The map of the project will clearly indicate all project activities. The references material will be listed indicating Author, Date of Publication, title of the material quoted, Name and publication or journal which is quoted, year, volume, number and the page numbers. The proponent will conduct the public hearing at the project site after the preparation of the draft EIA report in accordance with the provision of the EPR, 2020 with evidence shown. The report will include the executive summary in Nepali language.

The following will be attached in the appendix of the final EIA Report:

- ToR of EIA, with Approval letter
- Abstract of cost,
- Environmental checklist and survey questionnaire,
- Public notices,
- Deed of enquiry (muchulka),
- List of persons contacted,
- Recommendation letters from Rural Municipalities and other Concerned Organizations
- Database on existing condition,
- Meeting minute of public hearing meeting
- Affected structure
- Drawings, Maps and Exhibits
- Relevant Photographs

CHAPTER 15: EIA REPORT TEMPLATE

The report format will be as per Schedule 12 pertaining to rule 7 (5) of EPR 2020.

CHAPTER 16: REFERENCES

CED, 2021. Detail Feasibility Study of Amadablam Mini Hydro Subproject, Kathmandu, Nepal.

GoN, 2019. Environment Protection Act, Ministry of Forest and Environment, Kathmandu, Nepal.

GoN, 2020. Environment Protection Regulation, Ministry of Forest and Environment, Kathmandu, Nepal.

HMGN, 1993.National Environmental Impact Assessment Guidelines, Nepal Gazette Volume, 45 Number 19 Kathmandu, Nepal

International Centre for Integrated Mountain Development (ICIMOD) and Government of Nepal (GoN), Ministry of Environment, Science and Technology (MoEST) 2007. Biodiversity Resource Book Protected Areas, Ramsar Sites, and World Heritage Sites. Kathmandu, Nepal.

KPLRM, 2078 (BS). Working Procedure for Brief Environmental Study and Initial Environmental Examination, Khumbu Pasang Lhamu Rural Municipality. Khumbu Pasang Lhamu Rural Municipality. Solukhumbu, Nepal

PG 2020. Province No.1 Environmental Protection Act. Provincial Government. Biratnagar. Nepal

PG 2020. Province No.1 Environmental Protection Rules. Provincial Government. Biratnagar. Nepal

Polunin, O. & Stainton, A. 1984. Flowers of the Himalaya. New Delhi, India: Oxford University Press.

Press, J. R., Shrestha, K. K. & Sutton, D. A. 2000. Annotated checklist of the flowering plants of Nepal. London: The Natural History Museum.

Shrestha, K. 1998. Dictionary of Nepalese plant names. Kathmandu, Nepal: Mandala Book Point.

Stainton, A. 1988. Flowers of The Himalaya: a supplement. New Delhi, India: Oxford University Press.

Uprety, B.K. 2003. Safeguarding the resources Environmental Impact Assessment process and Practice. Utara Uprety, Kathmandu.

Annex I: Company Registration Certificate

नेपाल सरकार
उद्योग, वाणिज्य तथा आपुर्ति मन्त्रालय
कम्पनी रजिष्ट्रारको कार्यालय
कम्पनी दर्ता प्रमाण-पत्र

दर्ता नं: २१४५८०/७५/०७६

श्री अमादब्लम मिनि हाईड्रो
नामको प्राइभेट लिमिटेड कम्पनी संम्वत् २०७६ साल बैशाख महिना २४ गते रोज ३ मा दर्ता भएको हुनाले कम्पनी ऐन, २०६३ को दफा ५ को उपदफा (१) बमोजिम यो प्रमाण-पत्र दिइएको छ।

स. रजिष्ट्रार
सहायक रजिष्ट्रार

मिति: २०७६-०१-२५

Government of Nepal
Ministry of Industry, Commerce & Supplies
Office of the Company Registrar

Registration No: 214580/75/076

CERTIFICATE OF INCORPORATION OF COMPANY

This Certificate of Incorporation has been issued to M/s Amadablam Mini Hydro Private Limited having incorporated it on the 7 day of May, 2019 pursuant to sub-section (1) of section 5 of the Companies Act, 2006.

Asst. Registrar

Date: 2019-05-08

शर्त: कम्पनी संस्थापनलाई मात्र कम्पनीको उद्देश्य कार्यान्वय गर्न इजाजत प्राप्त गरिएको नमानिने हुनाले कानून अनुसार लिनुपर्ने अनुमति सम्बन्धित निकायबाट लिएर मात्र कम्पनीको उद्देश्य अनुसार कारोबार गर्नु पर्नेछ ।

नेपाल सरकार
अर्थ मन्त्रालय
आन्तरिक राजस्व विभाग

स्थायी लेखा नम्बर (PAN) दर्ता प्रमाण पत्र

स्थायी लेखा नम्बर :
आन्तरिक राजस्व कार्यालय :

कारोबारको नाम : अमादब्लम मिनि हाईड्रो प्रा.लि.

करदाताको प्रकार : प्राइभेट लिमिटेड

ठेगाना :

कर अधिकृत

Annex II: Selection Letter of AMHPL

SCF LOAN NUMBER TF0A8336
SCF GRANT NUMBER TF0A8382

PROJECT AGREEMENT

AGREEMENT dated April 22, 2019, entered into between INTERNATIONAL DEVELOPMENT ASSOCIATION ("World Bank"), acting not in its individual capacity but solely in its capacity as an implementing entity of the Scaling-up Renewable Energy Program ("SREP") under the Strategic Climate Fund ("SCF") and ALTERNATIVE ENERGY PROMOTION CENTRE ("Project Implementing Entity") ("Project Agreement") in connection with: (A) the Strategic Climate Fund Loan Agreement ("SCF Loan Agreement") of same date between NEPAL and the World Bank; and (B) the Strategic Climate Fund Grant Agreement ("SCF Grant Agreement") of the same date between NEPAL and the World Bank. The World Bank and the Project Implementing Entity hereby agree as follows:

ARTICLE I — STANDARD CONDITIONS; DEFINITIONS

1.01. The Standard Conditions, as defined in the Appendix to the SCF Loan Agreement for the Loan, and as defined in the SCF Grant Agreement for the Grant, (collectively "Standard Conditions") constitute an integral part of this Agreement.

1.02. Unless the context requires otherwise, the capitalized terms used in this Agreement have the meanings ascribed to them in the SCF Loan Agreement (except for the purpose of the Grant, the term "Borrower" used in this Agreement is read to mean the "Recipient" and the term "Loan" is read to mean the "Grant") or the Standard Conditions.

ARTICLE II — PROJECT

2.01. The Project Implementing Entity declares its commitment to the objectives of the Project. To this end, the Project Implementing Entity shall carry out the Project in accordance with the provisions of Article II of the Standard Conditions, and shall provide promptly as needed, the funds, facilities, services and other resources required for the Project.

2.02. Without limitation upon the provisions of Section 2.01 of this Agreement, and except as the World Bank and the Project Implementing Entity shall otherwise agree, the Project Implementing Entity shall carry out the Project in accordance with the provisions of the Schedule to this Agreement.

EFT Estd. 2010

Amodiaham Mini Hydro Pvt. Ltd. Kathmandu

SCF LOAN NUMBER TF0A8336
SCF GRANT NUMBER TF0A8382

Project Agreement

(Private Sector-led Mini-grid Energy Access Project)

between

INTERNATIONAL DEVELOPMENT ASSOCIATION
acting as an implementing entity of the Scaling-up Renewable Energy Program under the Strategic Climate Fund

and

ALTERNATIVE ENERGY PROMOTION CENTRE

Dated April 22 ,2019

ARTICLE III — REPRESENTATIVE; ADDRESSES

3.01. The Project Implementing Entity's Representative is its Executive Director.

3.02. The World Bank's Address is:

International Development Association
1818 H Street, NW
Washington, DC 20433
United States of America

Telex:	Facsimile:
248423(MCI)	1-202-477-6391

3.03. The Project Implementing Entity's Address is:

Khumalsar Heights, Lalitpur, Nepal
Post Box: 14364

Telephone:	Facsimile:
+9771-5539390 5539391	+9771-5542397 5539392

AGREED at Kathmandu, Nepal, as of the day and year first above written.

INTERNATIONAL DEVELOPMENT ASSOCIATION acting as an implementing entity of the Scaling-up Renewable Energy Program under the Strategic Climate Fund

By: _____
Authorized Representative

Name: Biggan Pradhan

Title: Acting Country Manager

ALTERNATIVE ENERGY PROMOTION CENTRE

By: _____
Authorized Representative

Name: Madhusudan Adhikari

Title: Executive Director

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
वैकल्पिक ऊर्जा प्रवर्द्धन विकास समिति
वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र

पो.ब.नं. १४३६४, काठमाडौं
Web: www.aepc.gov.np
खुमलटार, ललितपुर

पत्र संख्या: 076/077
चलानी नं: 1214

मिति: २०७६ १० १६

श्री आमादब्लम मिनि हाइड्रो प्रा. लि.
तिलगंगा - ८, काठमाडौं ।

विषय: संस्था/कम्पनी तथा परियोजना छनौट गरीएको सम्बन्धमा ।

प्रस्तुत विषयमा यस केन्द्रको मिति २०७६ ०८ ११ गते प्रकाशित सूचना अनुसार त्यस संस्था कम्पनीले यस केन्द्र अन्तर्गत सञ्चालित नेपाल मिनी ग्रिड इनर्जी एक्सेस आयोजनामा सहभागी भई सोलुखुम्बु जिल्लाको खुम्बु पासाङल्हामु गाउपालिका - ४ मा आमादब्लम मिनि हाइड्रो परियोजना (६०० किलोवाट) निर्माण तथा स्थापना गरी स्थानीय उपभोक्ताहरूलाई विद्युत सेवा प्रदान गर्नका साथै आयमूलक क्रियाकलापहरू सञ्चालन गर्नका लागि सम्बन्धित गाउपालिकाको सिफारिस साथ आवश्यक सम्पूर्ण कागजातहरु सहित प्रस्ताव पेश गर्नु भएकोमा यस केन्द्रको मिति २०७६ ०९ २३ गतेको निर्णयानुसार त्यस संस्था कम्पनी तथा परियोजना छनौट गरीएको व्यहोरा जानकारी गराइन्छ ।

यस केन्द्र आयोजनामा यथाशिघ्र समन्वय गरी प्रस्तावित परियोजनाको स्थलगत प्राविधिक, वातावरणीय तथा सामाजिक प्रमाणीकरण (Technical Validation, Environmental and Social Screening) गराउनहुन समेत जानकारी गराइन्छ ।

सन्तोष गौतम
आयोजना प्रबन्धक

बोधार्थ:
श्री खुम्बु पासाङल्हामु गाउपालिका,
चौरीखर्क, सोलुखुम्बु ।

Eco Friend International
EFI
Estd. 2010

Amadablam Mini Hydro Pvt. Ltd.
Kathmandu

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाई मन्त्रालय
वैकल्पिक ऊर्जा विकास समिति
वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र

फोन : (९७७) १-४४९८०१३, ४४९८०१४, ४४९८०१५
फ्याक्स : (९७७) १-४४९८०१०
वेब : www.aepc.gov.np
पो.ब.नं. १४३६४, काठमाडौं
मध्यबानेश्वर, काठमाडौं

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाई मन्त्रालय
वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र
२०५३

प.सं. ०७८/०७९
च.नं.: १३०२

नेपाल सरकार
ऊर्जा जलस्रोत तथा सिंचाई मन्त्रालय
दर्ता नं. ५४८६
मिति २०७८/२/१२

मिति: २०७९/०२/१०

श्रीमान् सचिव ज्यू,
ऊर्जा, जलस्रोत तथा सिचाइ मन्त्रालय,
सिंहदरबार, काठमाडौ, नेपाल ।

विषय: आवश्यक सहयोग गरिदिने सम्बन्धमा ।

तहाँ मन्त्रालयको मातहतमा रही यस केन्द्रले नेपालमा ऊर्जाको आवश्यकताहरू पूरा गर्न नवीकरणीय ऊर्जा प्रविधिको प्रयोगलाई विभिन्न दातृ निकायहरू समेतको सहयोगमा प्रवर्द्धन गर्दै आईरहेको तथ्य विदितै छ । यस केन्द्रले नेपाल सरकारको अनुदान तथा विश्व बैंकको ऋण र अनुदान सहयोगमा साझेदार निजी ऊर्जा सेवा प्रदायक कम्पनीहरू र साझेदार बैंकहरू संग "नेपाल मिनी ग्रिड ईनर्जी एक्सेस आयोजना" कार्यान्वयन गरिरहेको छ । यस आयोजनाको मुख्य उद्देश्य निजी ऊर्जा सेवा प्रदायक कम्पनीहरूको परिचालन गरी नवीकरणीय ऊर्जा मिनी ग्रिडहरूबाट राष्ट्रिय प्रसारणको पहुँच नभएका ग्रामिण क्षेत्रहरुमा विद्युतीकरण गर्नु रहेको छ ।

यसै सन्दर्भमा अमादब्लम मिनी हाईड्रो प्रा. लि. लाई सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गाउँपालिकामा ९११ किलोवाट क्षमताको अमादब्लम मिनी हाईड्रो जलविद्युत परियोजना निर्माण तथा कार्यान्वयन गर्नका लागि साझेदार निजी ऊर्जा सेवा प्रदायक कम्पनीको रूपमा छनौट गरिएको छ । उक्त परियोजना स्थल सगरमाथा राष्ट्रिय निकुञ्ज क्षेत्र भित्र पर्ने भएकोले नेपाल सरकारको वातावरण संरक्षण नियमावली, २०७७ अनुसार सो परियोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) गर्नुपर्ने र विश्व बैंकको आवश्यकता अनुसार वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) गर्नुपर्ने आवश्यकता रहेको छ । प्रस्तावित परियोजना स्थल नेपालको प्रमुख पर्यटकीय गन्तव्य स्थल भित्र पर्ने भएकाले तथा विद्यमान स-साना क्षमताका लघु जलविद्युतहरुले यस क्षेत्रको ऊर्जाको माग पूरा गर्न सक्ने अवस्था नभएकाले, मानव स्वास्थ्य र वातावरणमा प्रतिकुल असर पार्ने दाउरा र गुईठा जस्ता जैविक इन्धनहरुको वर्तमान अव्यवस्थित प्रयोगलाई कम गर्ने तथा भरपर्दो दक्ष/कुशल ऊर्जा प्रणालीको तत्काल आवश्यकता देखिन्छ । साथै उक्त परियोजना छनौटका क्रममा गरिएको प्रारम्भिक वातावरणीय तथा सामाजिक अध्ययन (Environment & Social Screening) ले पनि राष्ट्रिय प्रसारणमा पहुँच नभएको उक्त क्षेत्रका लागि नवीकरणीय ऊर्जा मिनी ग्रिड एक मात्र दिगो र स्वच्छ ऊर्जाको विकल्प भएको र परियोजना संग सम्बन्धित वातावरणीय तथा सामाजिक प्रभावहरू पनि न्यून रहेको जानकारी गराउदछ । तसर्थ, प्रस्तावित परियोजनाले प्रकृति तथा वातावरण संरक्षण र जनस्वास्थ्यलाई समेत सहज र समृद्ध बनाउन प्रत्यक्ष वा अप्रत्यक्ष रूपमा महत्वपूर्ण भूमिका खेल्नेछ भन्ने विश्वासका साथ सो परियोजनाको लागि तयार गर्नुपर्ने EIA को स्कोपिङ प्रतिवेदन स्वीकृतिको लागि आवश्यक प्रक्रिया अगाडि बढाइ सहयोग गरिदिनुहुन अनुरोध छ ।

....
डा. मधुसुदन अधिकारी
कार्यकारी निर्देशक

बोधार्थ: अमादब्लम मिनी हाईड्रो प्रा. लि. ।

Amadablam Mini Hydro Pvt. Ltd.
Kathmandu

Eco Friendly
Estd. 2010

Annex III: Technical Clearance Letter from DoED

नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
विद्युत विकास विभाग
(..........अनुमतिपत्र..महाशाखा..............)

फोन नं: [illegible]
फ्याक्स [illegible]
पोष्ट बक्स नं. २५०७
सानोगौचरण
काठमाडौं, नेपाल

पत्र संख्या :-२०७६/०७७
चलानी : 1120
मिति २०७६/१०/१३

विषय:- Technical Clearance उपलब्ध गराइएको सम्बन्धमा ।

श्री खुम्बु पासाङल्हामु गाउँपालिका
गाउँ कार्यपालिकाको कार्यालय,
चौरीखर्क,सोलुखुम्बु ।

प्रस्तुत विषयमा तहाँको पत्र संख्या २०७६/०७७ , च.नं.३०८ को प्राविधिक परामर्श(सफारी) सम्बन्धी पत्र प्राप्त भई व्यहोरा अवगत भयो ।

प्रस्तावित आमादब्लम मिनी जलविद्युत आयोजना (off-grid) को लागि तहाँबाट माग भएको Technical Clearance सम्बन्धमा कारवाही हुँदा विभागको Database अनुसार अन्य आयोजनाहरु संग दोहोरो पर्ने नदेखिएको तथा सो आयोजनाको क्षमता प्रोब्याबिलिटी अफ एक्सीडेन्स Q४० मा १(एक)मे.वा. भन्दा कम देखिएकोले प्रचलित कानुन अनुसार विकास गर्न प्राविधिक रुपमा बाधा नपर्ने हुँदा तपसिल बमोजिमको सर्वेक्षण क्षेत्रमा Technical Clearance उपलब्ध गराइएको व्यहोरा विभागको मिति २०७६/१०/०५को निर्णयानुसार जानकारी गराइन्छ । साथै उक्त आयोजना विकास सम्बन्धी यहाँ बाट भए गरेको निर्णय कार्यान्वयनको जानकारी यस विभागलाई उपलब्ध गराइदिनु हुन अनुरोध छ ।

तपसिल:
अक्षांश: २७° ५१' ४०" देखि २७° ५०' ५०" सम्म
देशान्तर: ८६° ४९' १५" देखि ८६° ४८' ००" सम्म

(प्रदिप कुमार राउत)
इन्जीनियर

बोधार्थ:
१.श्रीमान महानिर्देशकज्यु,विद्युत विकास विभाग
२.श्री आमादब्लम मिनी हाइड्रो प्रा.लि. ,तिलगंगा ,काठमाडौं,९८०१०६५९३८

Estd. 2010 Nepal
Amadablam Mini Hydro Pvt. Ltd. Kathmandu

Annex IV: Generation License from RM

खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
गाउँ कार्यपालिकाको कार्यालय, चौरीखर्क, सोलुखुम्बु, १ नं. प्रदेश नेपाल
Office of the Rural Municipal Executive, Chaurikharka, Solukhumbu, 1 No. Province, Nepal

Visit Nepal 2020

प.सं. ०७६/०७७
च.नं. ५८८

मिति- २०७५/१०/२१

विषय :- एक मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो पावरको इजाजत पत्र दिइएको सम्बन्धमा ।

श्री आमाडब्लम मिनी हाइड्रो प्रा.लि.,
डिल्लीबजार- ८, काठमाण्डौं ।

वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्रको अनुदान सहयोगमा अक्षांश २७° ५१' ४०" देखि २७° ५० ' ५०" सम्म तथा देशान्तर ८६° ४९' १५" देखि ८६° ४८' १५" देखि ८६° ४८' ०0" अक्षांशमा रहेको श्री आमाडब्लम मिनि हाइड्रोको विद्युत विकास विभाग काठमाण्डौंबाट Technical Clearance समेत प्राप्त भई इजाजत प्राप्तिका लागि यस कार्यालयमा पेश भएको हुँदा यस कार्यालयको मिति २०७५/१०/२३ को निर्णयानुसार प्रोब्याबिलिटी अफ एक्सीडेन्स Q80 मा १ मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो सञ्चालन गर्न यो इजाजत पत्र प्रदान गरिएको व्यहोरा अनुरोध छ ।

मिनोद भट्टराई
प्रमुख प्रशासकीय अधिकृत

बोधार्थ
श्री वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र,
खुमलटार, ललितपुर ।
श्री विद्युत विकास विभाग,
काठमाण्डौं ।

खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality

प.स ०७६।०७७
च.नं: ५८७/१०८०

मिति:२०७७।०३।२९

विषय : आयोजनाको क्षेत्र (Coordinates) संशोधन गरिएको सम्बन्धमा ।

श्री आमादाब्लम मिनी हाइड्रो प्रा. लि.
[illegible] - ८, काठमाडौं ।

मिती २०७५।१०।२३ मा यस कार्यालयबाट जारी भएको एक मेगावाट भन्दा कम क्षमताको मिनी हाइड्रो पावरको इजाजत पत्रमा आयोजनाको क्षेत्र (Coordinates) अक्षांश २७° ५१' ४०" देखि २७° ५०' ५०" सम्म देशान्तर ८६° ४९' १५" देखि ८६° ४८' ००" भएकोमा हाल तहाँको पत्रानुसार विस्तृत संभाव्यता अध्ययनले देखाएअनुसारको निम्न बमोजिम कायम रहने गरी अनुमतिपत्रमा क्षेत्र (Coordinates) संशोधन गरिएको छ ।

पूर्व : ८६° ४९' १९" पूर्वी देशान्तर, पश्चिम: ८६° ४७' ४९" पूर्वी देशान्तर, उत्तर : २७° ५१' ४०" उत्तरी अक्षांश दक्षिण :२७° ५०' ५०" उत्तरी अक्षांश

(विनोद भट्टराई)
प्रमुख प्रशासकीय अधिकृत

बोधार्थ
श्री वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र,
खुमलटार, ललितपुर ।
श्री विद्युत विकास विभाग,
काठमाडौं ।

E-mail: [illegible]

IX | Page

Annex V: Consent Letter from MoFE for EIA Study

पत्रोत्तरमा पत्र संख्या मिति उल्लेख हुन अनुरोध छ ।

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
वातावरण तथा जैविक विविधता महाशाखा

EX: पो.ब.नं. ३९८७
सिंहदरबार, काठमाडौं

पत्र संख्या:- २९३
चलानी नं.:-
प्राप्त पत्र संख्या र मिति: जैविक विविधता/२०७८/०७९

मिति २०७८/६/२४

विषय: वातावरणीय प्रभाव मूल्यांकन अध्ययन गर्ने सहमति सम्बन्धमा ।

श्री अमादब्लम मिनी हाइड्रो प्रा.लि,
बिलगंगा-८, काठमाण्डौं ।

प्रस्तुत विषयमा तहाँ कम्पनीबाट प्रवर्द्धन गरिने सोलुखुम्बु जिल्लामा सगरमाथा राष्ट्रिय निकुञ्ज क्षेत्र भित्र पर्ने अमादब्लम मिनी जलविद्युत आयोजनाको लागि वातावरणीय प्रभाव अध्ययन गर्न सहमति माग भएको सम्बन्धी फाइलमा कार्वाही हुँदा निम्न बमोजिमका शर्तहरुको पूर्ण पालना गर्ने गरी वातावरणीय प्रभाव मूल्यांकन अध्ययन गर्न सहमति दिने भनि वन तथा वातावरण मन्त्रालय (सचिवस्तर) बाट मिति २०७८/६/२० मा निर्णय भएको व्यहोरा अनुरोध छ ।

शर्तहरु

१) प्रस्तावित आयोजनाको वातावरणीय प्रभाव मूल्यांकन अध्ययन प्रतिवेदन तयार गर्दा UNESCO को Operational guidelines, विश्व सम्पदा सूचिमा सूचिकृत सगरमाथा राष्ट्रिय निकुञ्ज सम्बन्धी उपलब्ध विवरण, स्थलगत अध्ययनको क्रममा संकलन गरिने तथ्य र तथ्यांकको आधारमा विषय विज्ञबाट वस्तुगत विश्लेषण गरी/गराई सगरमाथा राष्ट्रिय निकुञ्ज विश्वव्यापी महत्वको सम्पदा भएको हुँदा यसमा पर्ने प्रभाव सम्बन्धमा अध्ययन प्रतिवेदनमा स्पष्ट रुपमा उल्लेख गर्नुपर्ने ।
२) वातावरणीय प्रभाव मूल्यांकन प्रतिवेदन उपर UNESCO, WHC बाट प्राप्त हुने राय सुझाव प्रतिवेदनको अभिन्न अङ्ग हुनुपर्ने ।
३) वातावरणीय अध्ययन गर्दा सगरमाथा राष्ट्रिय निकुञ्ज कार्यालयका अधिकृतस्तरका प्राविधिक कर्मचारीलाई अनिवार्य संलग्न गराउने र साथै कार्यालयका कर्मचारीहरु, व्यवस्थापन समितिका पदाधिकारीहरु र स्थानिय सरोकारवालाहरुसँग अनिवार्य अन्तर्क्रिया गरी प्राप्त राय सुझाव र कार्यालयसँग नियमित रुपमा राय परामर्श लिने साथै कार्यालयबाट प्राप्त हुने राय/सुझाव अन्तिम प्रतिवेदनको अङ्ग हुनेगरी समावेश गर्ने व्यवस्था मिलाउनु पर्ने ।
४) वातावरणीय अध्ययन गर्दाको सबै चरणहरुमा सगरमाथा राष्ट्रिय निकुञ्ज, मध्यवर्ती क्षेत्र व्यवस्थापन समितिको सहभागिता सुनिश्चित गर्ने ।
५) अध्ययनको क्रममा स्थानीय जनता र सरोकारवाला निकायहरुबाट उठान भएका आर्थिक, सामाजिक, जैविक प्रभाव सम्बन्धी सवालहरु सम्बोधन गर्ने सम्बन्धमा अवलम्बन गर्नुपर्ने न्यूनीकरण उपायहरु प्रतिवेदनको अभिन्न अङ्गको रुपमा समेटिनुपर्ने ।
६) आयोजना निर्माण क्षेत्र वन्यजन्तुको प्रमुख बासस्थान (Ecological Hotspot) नपर्ने गरी अध्ययन गर्नुपर्ने ।
७) वातावरणीय अध्ययन गर्दा विभिन्न विकल्पहरु अध्ययन गरी ती विकल्पहरु मध्ये तथ्य र तथ्याङ्कको आधारमा जैविक विविधता र समग्र वातावरणमा न्यून नकारात्मक प्रभाव पुर्‍याउने विकल्पको छनौट गरी प्रतिवेदन तयार गर्नुपर्ने ।
८) अध्ययन टोलीमा वन्यजन्तु, वन तथा वातावरण विज्ञ र जैविक विविधता विज्ञ अनिवार्य सहभागी गराइ आयोजनाले स्थस क्षेत्रका रैथाने वन्यजन्तुहरुको बासस्थान र विभिन्न मौसममा बसाइसराइ गरी आउने जाने वन्यजन्तुहरुलाई कस्तो नकारात्मक प्रभाव पर्ने हो र त्यसका न्यूनिकरण र विकल्पका उपायहरु सम्बन्धी विस्तृत अध्ययन गरी यथार्थपरक र मापनयोग्य तथा प्रतिफलमूलक कार्यक्रम र बजेट वातावरण व्यवस्थापन योजनामा प्रस्ताव गर्ने व्यवस्था हुन ।
९) प्रस्तावित आयोजनाको लागि निर्माण गर्न प्रस्ताव गरिएका संरचनाहरुको GPS कोअर्डिनेट सहित GIS प्रविधि समेत प्रयोग गरी तयार गरिएको टोपोनक्सा प्रतिवेदनमा समावेश भएको हुनुपर्ने ।
१०) आयोजना निर्माणका लागि Biodiversity Hotspot नपर्ने गरी स्थानको अध्ययन हुनुपर्ने साथै वन, वन्यजन्तु, वनस्पति, स्थानिय वातावरण र प्राकृतिक सौन्दर्यताका साथै सो क्षेत्रको आर्थिक, सामाजिक, धार्मिक र पुरातात्विक महत्वका सम्पदामा आयोजना निर्माण कार्यबाट कम भन्दा कम नकारात्मक प्रभाव गर्ने कम्तिमा ३ वटा विकल्पको अध्ययन हुनुपर्ने ।

फोन : ४२११७५०, फ्याक्स: ४२११८६८

Mini Hydro Pvt. Ltd. Kathmandu

प्रस्तावना यस संस्था लिखि उपलब्ध हुन आवश्यक छ ।

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
फोन नं.४१६८७०
सिंहदरबार, काठमाण्डौं

पत्र संख्या:-
चलानी नं.:-४१३
प्राप्त पत्र संख्या र मिति:-

१) संलग्न जैवविविध भौतिक पूर्वाधारहरु निर्माण तथा सञ्चालन सम्बन्धी कार्यनीति-२०६५ को बुँदा ५ र १ मा गरेको व्यवस्था बारे अध्ययन हुन ।

२) राष्ट्रिय निकुञ्जको जैवविविध अन्य कुनै क्रियाकलाप र निर्माणका कार्य हुन नपाउने गरी राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण ऐन, २०२९ दफा (६) बमोजिम राष्ट्रिय निकुञ्ज नियमावली-२०३६ नियम (३०) र संलग्न जैव विविध भौतिक पूर्वाधारहरु निर्माण एवं सञ्चालन सम्बन्धि कार्यनीति २०६५ को कार्यनीतिको उद्देश्य (क) र कार्यनीति प्रयोग गर्नुपर्ने अवस्था (क) को व्यवस्था अनुरुप वातावरण संरक्षण ऐन २०७६ र वातावरण संरक्षण नियमावली २०७७ अनुसार हुनेगरी प्रस्तावित कार्यक्रमको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन हुनुपर्ने ।

.....
(जानेन्द्र कायस्थ)
(स.व.अ.)

बोधार्थ:
श्री राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग, बबरमहल, काठमाण्डौं ।
श्री सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय, मान्ने, सोलुखुम्बु ।

Annex VI: Construction Schedule

AMADABLAM HYDRO POWER SUBPROJECT IMPLEMENTATION SCHEDULE

	Particulars	1st Year												2nd Year												3rd Year											
		Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	Pre-construction Works																																				
I	Feasibility Study																																				
II	EA/EIA Study																																				
III	Financial Closure																																				
IV	Land Acquisition																																				
V	Tendering and coordination																																				
2	Detailed Engineering Drawing & Design																																				
I	Complete Civil Drawing (Water way and Head works)																																				
II	Complete Civil Drawing (PH Machine Foundation)																																				
III	HM Design drawing																																				
3	Civil Construction																																				
I	Preparatory works																																				
II	Procurement and Transportation of Construction Materials																																				
III	Diversion weir																																				
IV	Approach Canal																																				
V	Gravel Trap																																				
VI	Desander basin and Head pond																																				
VII	Penstock Alignment Works																																				
VIII	Powerhouse Construction																																				
IX	Tailrace																																				
4	Hydro-Mechanical work																																				
I	LC opening																																				
II	Steel Fabrication																																				
III	Expansion joint and Gates work Order																																				
IV	Expansion joint and Gates Fabrication																																				
V	Pipe transportation to site																																				
VI	Pipe erection																																				
5	Electro-Mechanical works																																				
I	LC opening																																				
II	Design & Drawing																																				
III	Fabrication of machine																																				
IV	Factory Inspection Visit																																				
V	M/c Delivery start																																				
VI	Complete arrival to site																																				
VII	EM erection																																				
6	Transmission and Distribution																																				
I	LC opening																																				
II	Transmission Network Setup																																				
III	Distribution Network Setup																																				
7	Testing and Commissioning																																				

Annex VII: Vegetation Survey Form

HERBS

Date: _____ Time: _____

Plot No: _____ Forest Name: _____

Area of the quadrate: _____ Location: _____

SN	Common Name of Species	No. of Saplings	Height	Coverage (%)	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

14					
15					

Shrubs

Date: _____ Time: _____

Plot No: _____ Forest Name: _____

Area of the quadrate: _____ Location: _____

SN	Common Name of Species	No. of Saplings	Height	Coverage (%)	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

11					
12					
13					
14					
15					

TREES

Date: _____ Time: _____

Plot No: _____ Forest Name: _____

Area of the quadrate: _____ Location: _____

SN	Common Name of Species	DBH (cm)	Height (m)	No. Saplings	No. of Seedlings	Crown Coverage (%)	Remarks
1							
2							
3							
4							
5							
6							
7							
8							
9							

Annex VIII: Vegetation Characteristics Calculation Formulae

Density:

$$Density\ (No./ha) = \frac{I}{AXN} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

Where,

I = Total number of individuals

A = Area of each sampling plot

N = Total number of plots

$$RelativeDensity\ (\%) = \frac{D}{TD} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots \text{(ii)}$$

Where, D = Density of an individual species; TD = Total density of all species

Frequency:

$$Frequency\ (\%) = \frac{E}{N} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

Where,

E = Encounter (Total Number of plots in which an individual species occurred)

N = Total number of plots

$$RelativeFrequency\ (\%) = \frac{F}{TF} X100 \ldots\ldots\ldots\ldots \text{(iv)}$$

Where, F = Frequency of an individual species; TF = Total frequency of all species

Coverage:

$$Coverage\ (\%) = CI \ldots\ldots\ldots\ldots\ldots\ldots \text{(v)}$$

Where,

CI = Coverage of an individual species in a sampling plot

$$RelativeCoverage\ (\%) = \frac{TCI}{TC} X100 \ldots\ldots\ldots\ldots \text{(vi)}$$

Where, TCI = Total coverage an individual species; TC = Total coverage of all species

Importance Value Index:

$$IVI = RD + RF + RBA \text{ or } RC \ldots\ldots\ldots\ldots\ldots\ldots \text{(vii)}$$

Where,

RD = Relative Density

RF= Relative Frequency

RBA = Relative Basal Area (for tree)

RC= Relative Coverage (for shrubs and herbs)

Basal Area:

$$BasalArea(m^2) = \frac{\pi d^2}{4} \ldots\ldots\ldots\ldots\ldots\ldots \text{(viii)}$$

Where,

d (m) = diameter at breast height of an individual tree

$$RelativeBasalArea\ (\%) = \frac{TIBA}{TBA} X100 \ldots\ldots\ldots \text{(ix)}$$

Where, TIBA = Total basal area of an individual tree; TBA = Total basal area of all trees

Tree Volume:

Basal area and height were measured for calculation of standing trees trunk volume. This is estimated as

$$TreeVolume = \frac{BA \times H}{2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(x)}$$

Where, BA was basal area at 1.3-meter height, which is πr^2, where r is radius (in meter) at 1.3 m height of the tree and H = height (in meter) of the tree (DoF 2061).

Annex VII: Vegetation Loss and Valuation

Name of Project:
District:
Rural Municipality/Municipality:
Area of Forest:
Description of Forest Resources:

(a) Tress

SN	Species	Diameter (Inch)	Height (Ft.)	Forest Resources that might be obtainable		Price	GPS Coordinate	Remarks
				Timber (Cu. Ft.)	Fuelwood (Cu. Ft.)			

(b) Poles

SN	Species	Diameter (Inch)	Height (Ft.)	Forest Resources that might be obtainable		Price	GPS Coordinate	Remarks
				Timber (Cu. Ft.)	Fuelwood (Cu. Ft.)			

(c) Sapling and Seedling

SN	Species	Number	Fuelwood (Cu. Ft.)	Price	GPS Coordinate

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Eco Friend Information EFI Pvt. Ltd. 2010

Annex IX: Checklist for Wildlife

WILDLIFE AND BIRDS

Name of Respondent: ..... Sex: ..... Age: .....Yrs
Institution: ..... Position: ..... Address: .....
ID Number:

SN	Wildlife/Bird	Mammal/Reptile/Bird	Frequency		Remarks
			Regular	Rare	

XX

LIST OF AQUATIC ANIMALS

Name of Respondent: ..... Sex: ..... Age: .....Yrs

Institution: ..... Position: ..... Address:

.....Location:

.....

ID Number:

SN	Aquatic Animal	Fish/Others	Frequency		Remarks
			Regular	Rare	

Annex IX: Socio-Economic and Cultural Survey Form

आयोजनाबाट प्रभावितक्षेत्रको घरधुरी सर्वेक्षण:

१. घरमुलीको नाम: **२. ठेगाना:**

३. शिक्षा: **४. मुख्य पेशा:**

५. घरको जनसंख्या तथा अन्य विवरण:

क्र.सं.	नाता	लिंग	उमेर	शिक्षा	पेशा	कैफियत

६. आम्दानीको श्रोतहरु:

क्र. सं.	श्रोत	वार्षिक आम्दानी (रु.)	कैफियत
१.	कृषि तथा पशुपालन		
२.	जागिर		
३.	वैदेशिक रोजगार		
४.	व्यापार व्यवसाय		
५.	अन्य....		
६.	अन्य....		

७. कृषि तथा पशुपंक्षी सम्बन्धि विवरण

७.१ जग्गाको क्षेत्रफल:

७.२ मुख्य बाली तथा उत्पादन:

क्र.सं.	बाली	लगाएको क्षेत्रफल	गत वर्षको उत्पादन (के.जी.)	खाद्यान्नको उपलब्धता (१=वर्षभरि पुग्ने;२= ९ महिना सम्म पुग्ने; ३= ६ महिनासम्म पुग्ने; ४= ३ महिनासम्म वा ३ महिना भन्दा कम पुग्ने)	कैफियत (बेचबिखन गरि आम्दानी लिने गरेको छ छैन उल्लेख गर्ने)

*तथ्यांक ऐन २०७९ अनुसार व्यक्तिगत विवरण गोप्य राखिने छ ।

७.३ पशुपंक्षी

क्र.सं.	पशुपंक्षी	संख्या	कैफियत (बेचबिखन गरि आम्दानी लिने गरेको छ छैन उल्लेख गर्ने)

८. संघसंस्थासंगको संलग्नता

क्र.सं.	संस्थाको नाम	सदस्यता छ/छैन

९. खानेपानी, सरसफाई तथा स्वास्थ्य

९.१ खानेपानीको श्रोत:

९.२ चर्पी भए/नभएको ....., भए, चर्पीको प्रकार .....

९.३ गत २ बर्षमा परिवारमा बिरामी भए/नभएको, यदि भएको भए,

क्र.सं.	बिरामीको नाम	उमेर	रोगको नाम	रोग लागेको समय	उपचार गरेको स्थान

१०. इन्धन

१०.१ उज्यालोको लागि: १०.२ खाना पकाउन:

१०.३ दाउरा प्रयोग भए त्यसको श्रोत .....

११. धर्म तथा संस्कृति:

११.१ धर्म .....

११.२ चाडपर्वहरु

.....

समाप्त

उपभोक्ताको जातजाति तथा सामाजिक स्तर

क्र. सं.	उपभोक्ताको नाम	लिङ्ग	ठेगाना (टोल, वडा, गाउँपालिका)	जातजाति					[3] आर्थिक स्तर				सामाजिक स्तर					शारीरिक अवस्था	
				दलित	जनजाति	ब्राम्हण/क्षेत्री/ठकुरी	मुसलमान	अन्य	अति गरिब	गरिब	मध्यम वर्ग	सम्पन्न	एकल महिला	विपति पिडित	लोपोन्मुख जाति	पिछडिएको वर्ग	द्वन्द्व पिडित	शारीरिक/मानसिक रुपले असक्त	एच.आई.भी.

[3] अति गरिब= बढीमा ३ महिना सम्म खान पुग्ने; गरिब= ३ -६ महिना सम्म खान पुग्ने; मध्यम वर्ग= ६-९ महिना सम्म खान पुग्ने; सम्पन्न= वर्ष भरि खान पुग्ने

XXIV

Consumer Details on Energy Requirement

Ref. No	Consumer Detail (Name, Contact no., Owner)	GPS Address (Degree decimal)		No. of Mem bers		No. of Rooms, Dining, Bathroom	Existing Tariff rate per Unit Amount per month Expected Rate/Unit (Nrs.Unit/	Existing Energy Source (solar, MHP, Other)	Lights (No1, Watts)		Television (No, Watts)		Oven/Induction (No, Watts)		Deep Fridge Refrigerator (No, Watts)		Rice Cooker (No, Watts)		AC/ Heater (No, Watts)		Mixer/Grinder (No, Watts)		Water Pump (No, Watts)		Others (No, Watts)	
		Easting	Northing	Male	Female				Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional	Existing	Additional

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Consumer Details on Religious, Social, Cultural, Institution Affiliation and Economic Activities

Ref No.	Religion/ Festivals	Mother tongue	Migration (from where When Why)	Occupation (Agri, Job, Remittance, Business, Other)	Education	Land Ownership and area	Major Crops with area and last year production	Domestic animals	Affiliation to local NGOs/INGOs	Source of Energy (Wood/LPG /Kerosene) Per month	Water Source/ Toilet status	Major Illness in past 2 years

Annex X: Photographs

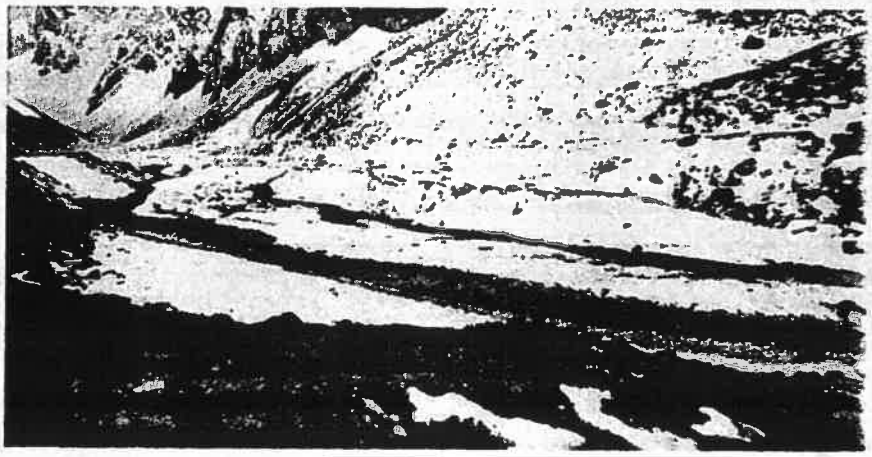

Figure 1: Cholunche River

Date: March 9, 2020
Place: Intake Area of Cholunche Khola, Pangboche
Time: 2:00 PM

Figure 2: Weir, Gravel Trap (GT) and Desilting Basin(DB) Location

Date: March 9, 2020
Place: Intake Area of Cholunche Khola, Pangboche
Time: 2:00 PM

Figure 3 Penstock Route

Date: March 9, 2020
Place: Along the Proposed Penstock Route through Left Bank of Cholunche Khola, Pangboche
Time: 1:30 PM

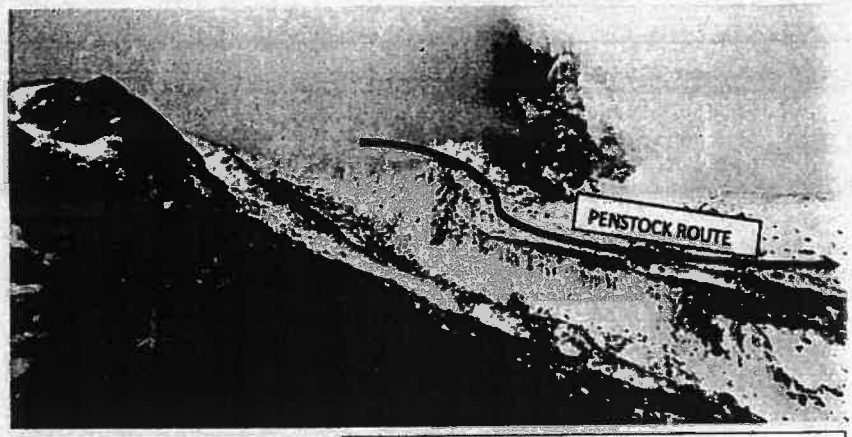

Figure 4 : Penstock Route

Date: March 9, 2020
Place: Along the Proposed Penstock Route through Left Bank of Cholunche Khola, Pangboche
Time: 1:00 PM

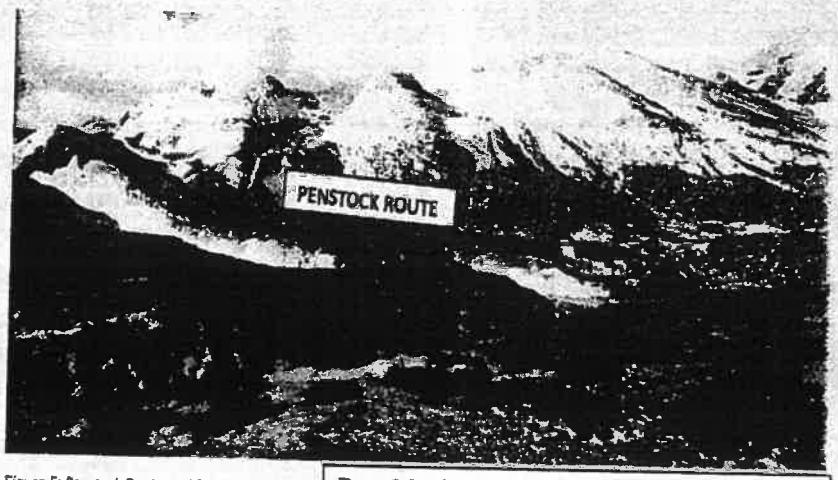

Figure 5: Penstock Route and Powerhouse (PH)

Date: March 9, 2020
Place: Along the Proposed Penstock Route and Power House, Pangboche
Time: 10:00 AM

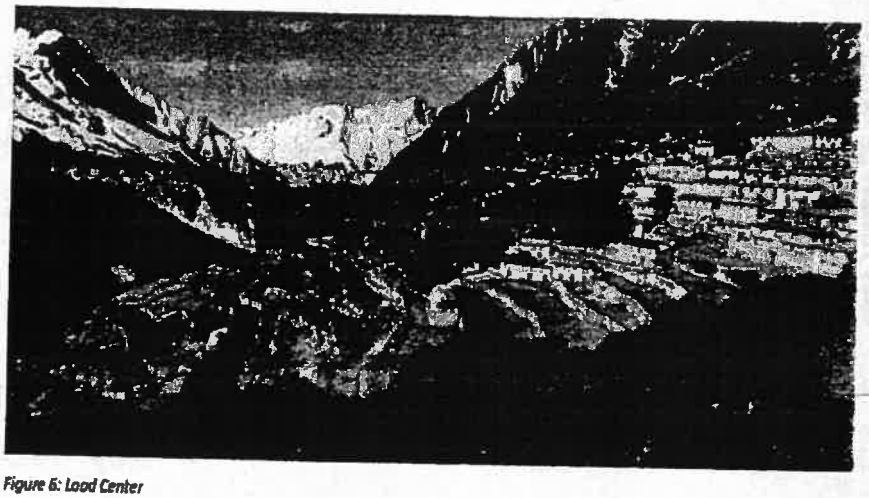

Figure 6: Load Center

Date: March 9, 2020
Place: Upper Pangboche
Time: 9:00 AM

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Eco Friendly Environmental Consultancy Pvt. Ltd.

Figure 7 : Survey Team

Date: March 10, 2020
Place: Intake of Area of Cholunche Khola
Time: 3:00 PM

Figure 8 : Community Interaction

Date: March 8, 2020
Place: Pangboche Gumba
Time: 3:00 PM

XXX

ANNEX VI: WATER QUALITY

NEPAL ACADEMY OF SCIENCE & TECHNOLOGY
CENTRAL OFFICE
NAST

Environment and Climate Study Laboratory

Water Analysis Report

Date: 2078-08-16

Date Received: 2078-08-05
Received From: Khumbu Pasang Lamu
Source: Cholunche khola
Location: Sohukhumbu
Lab Code: 078/08/15

S.N.	Parameters	Test Results	Standards #
	Physical Tests		
1.	Temperature (°C)	18.5	
2.	pH	8.05	6.5-8.5*
3.	Conductivity (µS/cm)	21	1500
4.	Turbidity (NTU)	1.75	5(10)
5.	Total Dissolved Solids (mg/L)	10.29	
6.	Total Suspended Solids (mg/L)	28	
	Chemical Tests		
7.	Total Hardness (as $CaCO_3$)	12	500 mg/L
8.	Chloride Content (mg/L)	2.84	250 mg/L
9.	Iron Content (mg/L)	0.1	0.3(3) mg/L
10.	Arsenic Content (mg/L)	ND	0.05 mg/L
11.	Ammonia (mg/L)	ND	1.5 mg/L
12.	Nitrate (mg/L)	2	50 mg/L
13.	Dissolved Oxygen (mg/L)	7.6	
14.	Biological Oxygen Demand (mg/L)	1.2	
15.	Chemical Oxygen Demand (mg/L)	ND	
	Microbiological Test		
16.	Total Coliform Count	20↑	0/100 mL

Nepal Drinking Water Quality Standard, 2062
*These Values show lower and upper limit
ND- Non- Detected >-Greater than
( ) refers the acceptable values only when alternatives is not available.

Comments:
The water sample contains total coliform count beyond the standard at the time of analysis.

Approved by
Tista

Dr. Tista Prasai Joshi
Scientific Officer

Notes:

- The result refers only to the parameters tested for the sample received in the laboratory for analysis.
- The reproduction of this report wholly or partially cannot be used as evidence in the court of law and should not be used in any advertising media without the written approval of the laboratory

Address : Khumaltar, Lalitpur, Nepal, GPO Box 3323 Kathmandu, E-mail: info@nast.gov.np
Telephone: 977-1-5547715, 5547720,5547721,5553132 Fax: +977-1-5547713

NEPAL ACADEMY OF SCIENCE & TECHNOLOGY

CENTRAL OFFICE

NAST

Environment and Climate Study Laboratory

Water Analysis Report

Date: 2078-08-16

Date Received: 2078-08-05
Received From: Khumbu Pasang Lamu
Source: Pangboche drinking water supply
Location: Pangboche
Lab Code: 078/08/17

S.N.	Parameters	Test Results	Standards #
	Physical Tests		
1.	Temperature (°C)	18.5	
2.	pH	7.70	6.5-8.5*
3.	Conductivity (µS/cm)	36	1500
4.	Turbidity (NTU)	0.56	5(10)
5.	Total Dissolved Solids (mg/L)	18.02	
6.	Total Suspended Solids (mg/L)	2	
	Chemical Tests		
7.	Total Hardness (as $CaCO_3$)	16	500 mg/L
8.	Chloride Content (mg/L)	5.68	250 mg/L
9.	Iron Content (mg/L)	ND	0.3(3) mg/L
10.	Arsenic Content (mg/L)	ND	0.05 mg/L
11	Ammonia (mg/L)	ND	1.5 mg/L
12.	Nitrate (mg/L)	2	50 mg/L
13.	Dissolved Oxygen (mg/L)	8.08	
14.	Biological Oxygen Demand (mg/L)	2.02	
15.	Chemical Oxygen Demand (mg/L)	52	
	Microbiological Test		
16.	Total Coliform Count	>300↑	0/100 mL

Nepal Drinking Water Quality Standard, 2062
*These Values show lower and upper limit

ND- Non- Detected >-Greater than
( ) refers the acceptable values only when alternatives is not available.

Comments:
The water sample contains total coliform count beyond the standard at the time of analysis.

Approved by

Dr. Tista Prasai Joshi
Scientific Officer

Notes:

- The result refers only to the parameters tested for the sample received in the laboratory for analysis.
- The reproduction of this report wholly or partially cannot be used as evidence in the court of law and should not be used in any advertising media without the written approval of the laboratory

Address : Khumaltar, Lalitpur, Nepal, GPO Box 3323 Kathmandu, E-mail: info@nast.gov.np
Telephone: 977-1-5547715, 5547720,5547721,5563132 Fax: +977-1-5547713

ANNEX VII: SOUND QUALITY

ANNEX VIII: CHECKLIST USED FOR AGROBIODIVERSITY

Date:

Name of Respondent:..... Sex:..... Age:..... Yrs:.....

Institution:.....Position:.....Address:.....

SN	Name of Plants/Crops	Uses			
		Food (Cereals/Pulses/Oil seed)	Fruits	Vegetables	Spices

ANNEX IX: CHECKLIST USED FOR WILDLIFE

Check List
WILDLIFE AND BIRDS

Date:

Name of Respondent: ..... Sex: ..... Age: .....Yrs
Institution: ..... Position: ..... Address:
.....
ID Number:

SN	Wildlife/Bird	Mammal/Reptile/Bird	Frequency		Remarks
			Regular	Rare	

Note:.....
.....
.....

ANNEX X: HOUSEHOLD SURVEY FORM

प्रभावित क्षेत्रको घरधुरी सर्वेक्षणः

१. घरमुलीको नामः

२. ठेगानाः

३. शिक्षाः

४. मुख्य पेशाः

५.. धर्म : .....

६. मातृभाषा : ..

७. वसाई सराई गरी आएको भए , क) कहाँबाट

ख) कतिवर्ष पहिले

ग) वसाई सरी आउनुको कारण

८. घरको जनसंख्या तथा अन्य विवरणः

क्र.सं.	नाता	लिंग	उमेर	शिक्षा	पेशा	कैफियत

९. आम्दानीको श्रोतहरुः

क्र. सं.	श्रोत	बार्षिक आम्दानी (रू.)	कैफियत
१.	कृषि तथा पशुपालन		
२.	जागिर		
३.	बैदेशिक रोजगार		
४.	व्यापार ब्यबसाय		
५.	अन्य....		
६.	अन्य....		

१०. कृषि तथा पशुपंछी सम्बन्धि विवरण

१०.१ जग्गाको छेत्रफलः

१०.२ मुख्य बाली तथा उत्पादनः

क्र.सं.	बाली	लगाएको छेत्रफल	गत बर्षको उत्पादन (के.जी.)	खाध्यान्नको उपलब्धता (१=बर्षभरि पुग्ने;२= ९ महिना सम्म पुग्ने; ३= ६ महिनासम्म पुग्ने; ४= ३ महिनासम्म पुग्ने)	कैफियत (बेचबिखन गरि आम्दानी लिने गरेको छ छैन उल्लेख गर्ने)

१०.३ पशुपंक्षी

क्र.सं.	पशुपंक्षी	संख्या	कैफियत (बेचबिखन गरि आम्दानी लिने गरेको छ छैन उल्लेख गर्ने)

११. संघसंस्थासंगको संलग्नता

क्र.सं.	संस्थाको नाम	सदस्यता छ/छैन

१२. खानेपानी, सरसफाई तथा स्वास्थ्य

१२.१ खानेपानीको श्रोतः

१२.२ चर्पी भए/नभएको ....., भए, चर्पीको प्रकार .....

१२.३ गत २ बर्षमा परिवारमा बिरामी भए/नभएको, यदि भएको भए,

क्र.सं.	बिरामीको नाम	उमेर	रोगको नाम	रोगलागेको समय	उपचार गरेको स्थान

१३. इन्धन

१३.१ उज्यालोको लागिः

१३.२ खाना पकाउनः

१३.३ दाउरा प्रयोग भए त्यसको श्रोत .....

१४. धर्म तथा संस्कृतिः

१४.१ धर्म .....

१४.२ चाडपर्वहरु

.....

समाप्त

ANNEX XI: SETTLEMENT INFORMATION FORM

बस्तीको जानकारी:

१ ठेगानाः

२ बस्तीको नामः

३. घरधुरी संख्याः

४. जनसंख्याः

५. मुख्यजातजातिहरुः

क्र. सं.	जातजाति	प्रतिशत	कैफियत

६ . पेशा

क्र. सं.	मुख्य पेशा	प्रतिशत	सहायक पेशा	प्रतिशत
	कृषि तथा पशुपालन			
	ज्याला मजदुरी			
	व्यापार			
	घरेलु उधोग			
	सरकारी तथा गैर-सरकारी सेवा			
	बैदेशिक रोजगार			
	अन्य (उल्लेख गर्ने)			

७. जमिन सम्बन्धि जानकारी

	जमिन को क्षेत्रफल							
	भूमिहीन	१ रोपनी भन्दा कम	१-५ रोपनी	५-१० रोपनी	१०-१५ रोपनी	१५-२० रोपनी	२०-५० रोपनी	>५० रोपनी
घर धुरी संख्या								

८. खाध्यान्नको अवस्था

	खाध्यान्नको उपलब्धता					
	३ महिना भन्दा कम	३ महिना सम्म	३-६ महिना	६-९ महिना	९-१२ महिना	१ वर्षाभन्दा बढि
घरधुरी संख्या						

९. मुख्यबाली

अन्न	

नगदेबाली	

१०. बस्तुभाउ (घरपालुवा जनावर)

बस्तुभाउ	संख्या	बस्तुभाउ	संख्या
गाइ		सुँगुर	
गोरु		खरायो	
भैसी		माछापालन (घरधुरी)	
घोंडा		मौरीपालन (घरधुरी)	
बाख्रा		कुखुरा	
भेंडा		अन्य भएमा उल्लेख गर्ने	

११. नजिकैको बजार:

१२. स्थानीय सरकारी, गैर-सरकारी, व्यक्तिगत तथा सेवा प्रदायक संघसस्था तथा पुर्बाधारहरु, धार्मिक, सांस्कृतिक तथा पुरातात्विक सम्पदाहरु र अन्य संस्थाहरु:

क्र.सं.	नाम	ठेगाना	संख्या	कैफियत
१.	**स्वाथ्य**			
१.१	अस्पताल			
१.२	प्राथमिक स्वास्थ्य चौकी			
१.३	स्वास्थ्य चौकी			
१.४	उपस्वास्थ्यचौकी			
२.	**शिक्षा**			
२.१	क्याम्पस			
२.२	उच्च मा. वि.			
२.३	मा. वि.			
२.४	नि. मा. वि.			
२.५	प्रा. बि.			
३.	**संचार**			
३.१	मोबाइल			
३.२	ल्याण्डलाइन			
३.३	स्काई/CDMA			
३.४	हुलाक			
३.५	इन्टरनेट			
४.	**उद्योग तथा बाणिज्य**			
४.१	होटल तथा लज			
४.२	रेस्टुरेन्ट तथा चिया पसल			
४.३	खाध्य पसल			
४.४	स्टेशनरी तथा पुस्तक पसल			

क्रमशः

क्र.सं.	नाम	ठेगाना	संख्या	कैफियत
४.५	औषधि पसल			
४.६	अन्य भए उल्लेख गर्ने			
५.	**विधुत्**			
५.१	मिनी/माइक्रो-हाइड्रो			
५.२	राष्ट्रिय प्रसारण			
५.३	सोलार			
५.४	अन्य भएमा उल्लेख गर्ने			
६.	**खानेपानी**			
६.१	धारा			
६.२	कुवा तथा मुहान (संख्या)			
७.	**सिंचाईको अवस्था**			
७.१	सिंचाई भएको जमिन (रोपनी/हे./कट्ठा)			
७.२	सिंचाई नपुगेको जमिन (रोपनी/हे./कट्ठा)			
८.	**अन्य भौतिक पुर्बाधार**			
८.१	माइक्रोहाइड्रो (संख्या तथा क्षमता)			
८.२	पानी मिल (संख्या)			
८.३	झोलुंगे पुल (संख्या)			
८.४	काठे पुल (संख्या)			
८.५	अन्य पुल भएमा उल्लेख गर्ने			
९.	**उद्योग**			
९.१	सिलाई बुनाई			
९.२	अन्न कुटानी पिसानी मिल			
९.३	अन्य उद्योग भएमा उल्लेख गर्ने			
१०.	**आर्थिक कारोबार गर्ने संस्था**			
१०.१	बैंक			
१०.२	सहकारी			
१०.३	फाइनान्स			
११.	**सार्बजनिक सम्पति**			
११.१	घाट			
११.२	खेलमैदान			
११.३	हाट बजार			
११.४	सामुदायीक केन्द्र			
११.५	मन्दिर			
११.६	गुम्बा/मस्जिद/चर्च			
११.६	पुरातत्तिक सम्पदा			
११.७	अन्य केहि भएमा उल्लेख गर्ने			

१३. मुख्य चाडपर्वहरुः

१४. योजनाले प्रत्यक्ष असर पार्ने क्षेत्रहरु

क्षेत्र	ठेगाना	दुरी
घर (संख्या):		
खेतीयोग्य जमिन (क्षे.):		
बन (नाम र क्षे.):		
मन्दिर/गुम्बा/मस्जिद/चर्च (नाम):		
पानीका श्रोत		
झोलुंगे पुल		
कुलो		
अन्य भौतिक पुर्बाधार भएमा उल्लेख गर्ने		

ANNEX XII: CHECKLIST USED FOR NTFPS

Check List Date:

PLANT RESOURCES

Name of Respondent: ..... Sex: ..... Age: .....Yrs

Institution: ..... Position: ..... Address: .....

SN	Name of plants	Uses			Others
		Fuel-wood	Fodder	Medicine	

Note:.....

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ANNEX XIII: NOTICE PUBLICATION FOR PUBLIC HEARING

आमादब्लम मिनी हाईड्रो प्रा.लि.

काठमाडौं-८, तिलगंगा, बागमती प्रदेश, नेपाल

आमादब्लम मिनी जल-विद्युत परियोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयारी गर्ने सम्बन्धि

सार्वजनिक सुनुवाईको लागि सार्वजनिक सूचना

(प्रथम पटक प्रकाशित मितिः २०७९/१०/११ गते)

आमादब्लम मिनी हाइड्रो प्रा. लि. बाट नेपालको प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४, सगरमाथा राष्ट्रिय निकुन्ज क्षेत्र भित्र पर्ने चोलुन्चे खोलाको पानीबाट नदी प्रवाहमा आधारित (RoR) रहेर ९११ किलो वाट (कि.वा.) विद्युत निकाल्ने योजना रहेको छ। समुद्री सतहबाट ४४२२ मिटर (मि.) उचाईमा बाँध बाँधेर प्रति सेकेन्ड ०.२५ घन मिटर (घ.मि.) पानीलाई २९३० मि. लामो पेनस्टक पाइप मार्फत् समुद्री सतहबाट ३९५१.१८ मि. उचाईमा रहेको विद्युतगृहमा रहेको ४८५ कि.वा. क्षमताको २ वटा टर्बाइनमा खसाली वार्षिक उर्जा ७२२५७८१.७६ कि.वा. घण्टा उत्पादन गर्ने लक्ष्य रहेको छ। यस जलविद्युत आयोजनाको डिजाईन डिस्चार्ज ०.२५ घन मिटर प्रति सेकेन्ड, ग्रस हेड ४७१.८७ मि. र नेटहेड ४४८.८६ मि. रहेको छ। प्रस्तावित आयोजनाका संरचनाहरु अन्तर्गत हेडवर्क, ग्रावेल ट्राप, डिस्यानडिंग बेसिन, पेनस्टक पाईप, विद्युतगृह र टेलरेस पाइप चोलुन्चे खोलाको बायाँ तर्फ रहने छन्। प्रस्तावित परियोजनाबाट उत्पादित विद्युत ४० कि.मि. लामो ११ के.भी.को प्रसारण लाईनबाट स्थानीय वासीहरुलाई वितरण गरिनेछ। यस आयोजनाको अनुमानित कुल लागत रु. ६१,८९,०१,६३८.८९ रहेको छ भने प्रति कि.वा. लागत रु. ६७,९३,३६५.१४ रहेको छ। नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ तथा वातावरण संरक्षण नियमावली २०७७ अनुसार वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्दा सार्वजनिक सुनुवाई गर्नुपर्ने भएकाले सोहि बमोजिम निम्न मिति, समय र स्थानमा सार्वजनिक सुनुवाई कार्यक्रम आयोजना गरिने भएको हुनाले उक्त कार्यक्रममा सहभागी भई आफ्नो अमुल्य राय सुझाव एवं प्रतिक्रिया प्रदान गरिदिनुहुन सम्बन्धित सबैको जानकारीको लागि यो सूचना प्रकाशित गरिएको छ।

सार्वजनिक सुनुवाई कार्यक्रम	आयोजक:
स्थान : पाङ्बोचे गुम्बा, पाङ्बोचे, खुम्बु पासाङ्ल्हामु गा.पा.-४, सोलुखुम्बु मिति : २०७९/१०/१८ गते, बुधबार समय : बिहान १० बजे	आमादब्लम मिनी हाईड्रो प्रा. लि. काठमाडौं-८, तिलगंगा बागमती प्रदेश, नेपाल

ANNEX XIV: DEEDS OF PUBLIC NOTICE AFFIXATION FOR PUBLIC HEARING

༄༅། །ཁུམ་བུ་པ་སངས་ལྷ་མོ་གུ་ཨེན་པི་ཀ།

खुम्बु पासाङल्हामु गाउँपालिका

Khumbu Pasanglhamu Rural Municipality

४ नं.वडा कार्यालय, खुम्जुङ, सोलुखुम्बु, १ नं. प्रदेश नेपाल

Ward No. 4 Office, Khumjung, Solukhumbu, 1 No. Province, Nepal

प.सं.:०७९/०८०

च.नं.:२२५

मिति : २०७९/१०/१५

खुम्बु पासाङल्हामु गाउँपालिका ४ नं. वडा कार्यालय खुम्जुङ, सोलुखुम्बु १ नं. प्रदेश, नेपाल

श्री आमादव्लम मिनी हाइड्रो प्रा. लि.

तिलगंगा-८, काठमाडौं,

बाग्मती प्रदेश,नेपाल ।

बिषय: <u>सुचना टाँस गरिएको सम्बन्धमा ।</u>

प्रस्तुत बिषयमा आमादव्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमादव्लम मिनी हाइड्रो आयोजना ९११ किलोवाटको विद्युत उत्पादन तथा ११ केभी सिङ्गल सर्किट प्रसारण लाईन आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्नको लागि नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ तथा वातावरण संरक्षण नियमावली २०७७ बमोजिम सार्वजनिक सुचना जारि गरि सो प्रस्ताव सम्बन्धि राय सुझाव लिने सम्बन्धि त्यस कार्यालय बाट प्राप्त सार्वजनिक सुचनाको प्रतिलिपि थान १ यस सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं.४ मा रहेको यस कार्यालयको सुचना पाटीमा आज मिति २०७९।१०।१५ गते दिनको १:०० बजे टाँस गरि जानकारीका लागि त्यहाँ कार्यलयमा पठाईएको छ ।

दावा गेल्जे शेर्पा

वडा सचिव

दावा गेल्जे शेर्पा

वडा सचिव

E-mail: kplrmegovernancew4@gmail.com

नेपाल सरकार

वन तथा वातावरण मन्त्रालय

राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग

सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय

नाम्चे,सोलुखुम्बु

प.सं. :- ०७९ /८०

च.नं. १८९

मिति:- २०७९/१०/१७

विषय :- सूचना टाँस गरिएको सम्बन्धमा ।

श्री अमादब्लम मिनी हाइड्रो प्रा.लि.

काठमान्डौ- ८ तिलगंगा,बागमती प्रदेश ।

प्रस्तुत् विषयमा त्यस कार्यालयको च.न.AMH/07910/77 मिति २०७९/१०/१६ गतेको प्राप्त पत्रसाथ संलग्न त्यस कार्यालय प्रस्तावक रहेको अमादब्लम मिनी हाइड्रो आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्ने सिलसिलामा मिति २०७९/१०/१८ गते पाँडबोचेमा हुने सार्वजनिक सुनुवाई सम्बन्धि सूचना थान -१ (एक) यस कार्यालयको सूचना पाटीमा मिति २०७९/१०/१६ गते टाँस गरिसकिएको व्यहोरा जानकारीका लागि अनुरोध छ ।

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भूमिराज उपाध्याय

प्रमुख संरक्षण अधिकृत

Sagarmatha National Park

BUFFER ZONE MANAGEMENT COMMITTEE
मध्यवर्ती क्षेत्र व्यवस्थापन समिति

नाम्चे, सोलुखुम्बु

पत्र संख्या : ०८९/८०
चलानी नं. : ८

मिति: २०७९/१०/१६

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषय: सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणिय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेधन तयर गर्नको लागि जारी गरिएको सार्वजानिक सुनुवाईको सूचनाको प्रतिलिपी थान १ यस सगरमाथा राष्ट्रि निकुञ्ज मध्यवर्ती क्षेत्र व्यवस्थापन समितिको सूचना पाटीमा आज मिति २०७९/१०/१६ गतेको दिन मध्यन्न १२ वजे हामीहरूको रोहबरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, छुकुङ बस्ने वर्ष ३३ का श्री तेन्जीङ जाङबु शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, खुन्दे बस्ने वर्ष २५ का श्री निमा तेम्बा शेर्पा

इति सम्वत २०७९/१०/१६ गते रोज २ शुभम् ।

छिमी छिरीङ शेर्पा
अध्यक्ष

सगरमाथा राष्ट्रिय निकुञ्ज
खुम्बियूल्हा मध्यवर्ती क्षेत्र उपभोक्ता समिति

लालीगुँरास मध्यवर्ती क्षेत्र उपभोक्ता समूह

Laliguras Buffer Zone User Group, Khumjung-9

खुम्जुङ-९, सोलुखुम्बु, नेपाल

पत्र संख्याः
चलानी नं.

मितिः २०७९/१०/१६

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषयः सूचना टाँस गरिएको सम्वन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाका वातावरणिय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेधन तयर गर्नको लागि जारी गरिएको सार्वजानिक सुनुवाईको सूचनाको प्रतिलिपी थान १ यस खु.पा.गा.पा. वडा नं ४ मा अवस्थित यस श्री लालीगुराँस मध्यवर्ती क्षेत्र उपभोक्त समूहका सूचना पाटीमा आज मिति २०७९/१०/१६ गतेको दिन मध्यन्न १२ बजे हामीहरूको रोहबरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ५० का श्री [illegible]

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ४१ का श्री [illegible] गेल्जेन शेर्पा

इति सम्बत २०७९/१०/१६ गते रोज २ शुभम् ।

Govt. Regd.: 2052/053/057
MMDC: 2419

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पाङबोचे गुम्बा व्यवस्थापन समिति

Pangboche Monastery Management Committee

Khumbu Pasang Lhamu Rural Municipality-4, Pangboche, Solukhumbu, Nepal

प.सं. ०७८/८०
च.नं.

मिती : २०७८-१०-१६

श्री आमाडब्लम मिनी हाइड्रो प्रा.लि
टोखा - ८ काठमाडौं
बागमती प्रदेश काठमाडौं

विषय :- सूचना टाँस गरेको सम्बन्धमा

लिखितम आमाडब्लम मिनी हाइड्रो प्रा.लि काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा.लि आयोजना, ९११ किलोवाटको विद्युत उत्पादन तथा ११ के भी सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजनिक सूचनाको प्रतिलिपी थान - १ यस खु.पा.गा.पा वडा नं. ४ मा अवस्थित यस पाल-रिबु गुम्बा, कुम्जुङ पाङबोचेका सूचना पाटीमा आज मिति २०७८-१०-१६ गतेका दिन मध्यान्ह १२ बजे हामीहरूको रोहबरमा टाँस गरी यो मुचुल्का सहीछाप गरी दियौं।

तपसिल

सोलुखुम्बु जिल्ला खु.पा.गा.पा वडा नं.४ पाङबोचे बस्ने वर्ष ३५ को नाम श्री छेतेन दोर्जी शेर्पा Dorjee

सोलुखुम्बु जिल्ला खु.पा.गा.पा वडा नं. पाङबोचे बस्ने वर्ष २८ का नाम श्री दावा छिरी शेर्पा [signature]

इति सम्वत २०७८-१०-१६ रोज ४ शुभम्

सगरमाथा राष्ट्रिय निकुञ्ज

खुम्बियूल्हा मध्यवर्ती क्षेत्र उपभोक्ता समिति

Khumbila Buffer Zone User Committee, Khumjung

खुम्जुङ, सोलुखुम्बु, नेपाल

पत्र संख्या ०८३/८०

चलानी नं ८५

मिति: २०७९/१०/१६

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
वागमती प्रदेश, नेपाल ।

विषय: सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणिय प्रभाव मूल्याङ्न अध्ययन प्रतिवेधन तयर गर्नको लागि जारी गरिएको सार्वजानिक सुनुवाईको सूचनाको प्रतिलिपी थान १ यस खुम्बियुल्हा मध्यवर्ती क्षेत्र उपभोक्ता समितिको सूचना पाटीमा आज मिति २०७९/१०/१६ गतेको दिन मध्यन्न १२ वजे हामीहरूको रोहवरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, छुकुङ वस्ने वर्ष ३३ का श्री तेन्जीङ जाङ्बु शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, खुन्दे वस्ने वर्ष २५ का श्री निमा तेम्बा शेर्पा

इति सम्वत २०७९/१०/१६ गते रोज २ शुभम् ।

छिरी छिरीङ शेर्पा
अध्यक्ष

सगरमाथा राष्ट्रिय निकुञ्ज
खुम्बियूल्हा मध्यवर्ती क्षेत्र उपभोक्ता समिति

सगरमाथा मध्यवर्ती क्षेत्र उपभोक्ता समूह

Sagarmatha Buffer Zone User Group, Khumjung-7

खुम्जुङ-७, सोलुखुम्बु, नेपाल

पत्र संख्या: ८६
चलानी नं. २०६९/७०

मिति- २०६९/१०/१६

श्री आमाडब्लम गिरी हाइड्रो प्रा. लि.
तिलगंगा ०८ काठमाडौं
बागमती प्रदेश काठमाडौं

विषय- सूचना टाँस गरिएको सम्बन्धमा

निवेदक आमाडब्लम गिरी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम गिरी हाइड्रो आयोजना ९११ किलोवाटको विद्युत उत्पादन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजनिक सुनुवाइको सूचनाको प्रतिलिपि प्रति १ यस खुम्बु पासाङल्हामु गाउँ पालिका वडा नं. ४ मा रहेका सगरमाथा मध्यवर्ती क्षेत्र उपभोक्ता समूहको सूचना पाटीमा आज मिति २०६९/१०/१६ गतेका १२ बजे हामीहरूको रोहवरमा टाँस गरि यो मुचुल्का सही छाप गरि दियौं।

तपशिल

उप. छ्याङ - ओङ्छु हुविङ शेर्पा

इति सम्बत २०६९/१०/१६ गते रोज २ शुभम्

खुम्बु पासाङल्हामु गाउँपालिका

Khumbu Pasanglhamu Rural Municipality

स्वास्थ्य चौकी, खुमजुङ, पाङबोचे

सोलुखुम्बु

प्रदेश नं. १, नेपाल

च.नं.:- १८.

प.स.:- २०७६।०८०

मिति: २०७६।१०।१६

श्री आमादब्लम मिनी हाइड्रो प्रा.लि.
दिल्लीबजार-०८, काठमाडौं।
बागमती प्रदेश, काठमाडौं

विषय:- सूचना टाँस गरिएको सम्बन्धमा।

लिखितम आमादब्लम मिनी हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमादब्लम मिनी हाइड्रो आयोजना ६११ किलोवाटको विद्युत उत्पादन तथा ११ केभी थिंग्नग सबस्टेशन प्रसारण लाइन आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नको लागि जारी गरिएको सार्वजनिक सुनुवाईको सूचनाको प्रतिलिपि थान-१ यस खुम्बु पासाङल्हामु गाउँपालिकाको वडा नं ४ मा रहेको स्वा. चौकी खुम्जुङ, पाङबोचेको सूचना पाटीमा आज मिति २०७६।१०।१६ गते दिनको १२ बजे हामीहरूको रोहबरमा [illegible] टाँस गरी यो मुचुल्कामा सही छाप गरी दियौं।

तपसिल

सोलुखुम्बु जिल्ला, सोलुदुधकुण्ड नगरपालिका वडा नं. ०८ [illegible] बस्ने बर्ष ३५ का नाम श्री सुरुराज तामाङ।

रामेछाप जिल्ला, उमाकुण्ड गाउँपालिका वडा ४ बस्ने [illegible] बर्ष ३२ का श्री पूर्णकला नगार

इति सम्वत २०७६।१०।१६ गते रोज २ शुभम्

श्री आमाडब्लम मिती हाइड्रो प्रा.लि. मिति: २०७९-१०-१६
लिल गंगा ०८, काठमाडौं
बागमती प्रदेश, काठमाडौं

विषय: सूचना टाँस गरिएको सम्बन्धमा।

लिखितम आमाडब्लम मिती हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिती हाइड्रो प्रा.लि. आयोजना १११ किलोवाट का विद्युत उत्पादन तथा ११ के.भी. सिंगल सर्किट प्रसारण लाइन आयोजना को वातावरणीय प्रभाव मूल्यांकन अध्ययन प्रतिवेदन प्रतिलिपि थान -१ यस खु.पा.गा.पा. वडा नं. ४ मा अवस्थित यस आमाडब्लम युवा क्लब को सूचना पाटी मा आज मिति २०७९/१०/१६ गते का दिन मध्यान्ह १२ बजे हामी हरुको रोहवर मा टाँस गरियो मुचुल्का सहि छाप गरि दियौं।

तपसिल

सोलुखुम्बु जिल्ला खुम्बु पसाङ. ल्हामु गा.पा. वडा नं. ४ पाङबोचे बस्ने वर्ष २५ का नाम श्री कुङा ग्यालु शेर्पा

सोलुखुम्बु जिल्ला खुम्बु पसाङ. ल्हामु गा.पा. वडा नं. ४ पाङबोचे बस्ने वर्ष २८ का नाम श्री दोर्जी ग्येलेन शेर्पा

इति सम्बत २०७९-१०-१६ रोज शुभम्

दर्ता नं.

༄༅། སྤང་ཆེ་སྦས་ཡུལ་བུ་མོ་ཚོགས་པ།

पाङबोचे बेयूल महिला समूह

Pang Boche Beyul Women Group

खुम्बु पासाङ ल्हामु गाउँपालिका ४, पाङबोचे

च.नं. ०२
पत्र सं.

श्री आमा दब्लम मिनि हाइड्रो प्रा.लि.
तिलगंगा ०८, काठमाडौं
बागमति प्रदेश, काठमाडौं

मिति : २०७६/१०/१६

विषय:- सूचना टाँस गरिएको सम्बन्धमा

लिखितम आमा दब्लम मिनि हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमा दब्लम मिनी हाइड्रो आयोजना ३११ किलोवाटको विद्युत उत्पादन तथा ११ के.भी सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नको लागि जारी गरिएको सार्वजनिक सुनुवाईको सूचनाको प्रतिलिपि थान-१ यस खुम्बु पा.गा.पा.को वडा नं. ४ मा रहेको पाङबोचे बेयुल महिला समूहको सूचना पाटीमा आज मिति २०७६/१०/१६ गते दिनको १२ बजे हामीहरूको रोहवरमा टाँस गरि यो मुचुल्का सही छाप गरि दियौं।

तपसिल

सोलुखुम्बु जिल्ला, खुम्बु पासाङल्हामु गा.पा. वडा-४ बस्ने
पाङबोचे बेयुल महिला समूह अध्यक्ष: फुरा याङजी शेर्पा

सदस्य: छिरिङ ल्हामु शेर्पा

सदस्य: पासाङ डोमा शेर्पा

इति सम्वत् २०७६/१०/१६ गते रोज शुभम्

160

Regd. No.:-450
PAN No.: 605130828

श्री फोर्चे ठाङ्करी छोलिङ गुम्बा
SHREE PHORTSE THANGRI CHHOLING GUMBA
खुम्बु पासाङल्हामु गा.पा.-8, फोर्चे, सोलुखुम्बु

प.सं.:
च.नं.:

मितिः २०७९/१०/१६

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषयः सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाका वातावरणिय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेधन तयर गर्नको लागि जारी गरिएको सार्वजानिक सुनुवाईको सूचनाको प्रतिलिपी थान १ यस खु.पा.गा.पा. वडा नं ४ मा अवस्थित यस श्री फोर्चे ठाक्री छोलिङ गुम्बाका सूचना पाटीमा आज मिति २०७९/१०/१६ गतेको दिन मध्यन्न १२ बजे हामीहरूको रोहबरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिलः

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ५७ का श्री पेम्बा रिता शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ४२ का श्री ल्हाक्पा नुरु शेर्पा

इति सम्बत २०७९/१०/१६ गते रोज २ शुभम् ।

ANNEX XV: BROADCASTING CERTIFICATE FROM FM RADIO

"उज्जवल भविष्यको लागि छायाँ अभियान" दर्ता नं. एफ.एम. ११४/०७१

सामुदायिक रेडियो सोलु एफ.एम. १०१.२ मेगाहर्ज
Community Radio Solu FM 101.2 MHz

च.नं.२०/०७९/८०

मिती २०७९/११/११

श्री आमादब्लम मिनी हाईडो प्रा.लि.
काठमाडौं ८ तिलगंगा नेपाल ।

विषय : सुचना प्रसारण तालिका

प्रस्तुत विषयमा त्यसमा सस्थाबाट प्राप्त यस सामुदायिक रेडियो सोलु एफ.एम १०१.२ मेगाहर्ज मार्फत्त तपशिलको समयमा प्रशारण भएको जानकारी गराईन्छ ।

तपशिल

क्र.श	बिहान	दिउँसो	बेलुका
१	६:१० ६:५०, ७:३१, ७:५७, ८:१०, ८:४५, ९:१३, ९:५३, १०:१३, १०:५०, ११:१७,	१२:२०, १२:४८ २:२१, २:४९, ३:१४, ३:५६, ४:९,	६:१०, ६:५४, ७:३१, ७:५७, ८:१०, ८:५५, ९: २०

(यप सहयोग र सहकार्यको अपेक्षा सहित ।)

पवित्रा राई
बजार सहायक

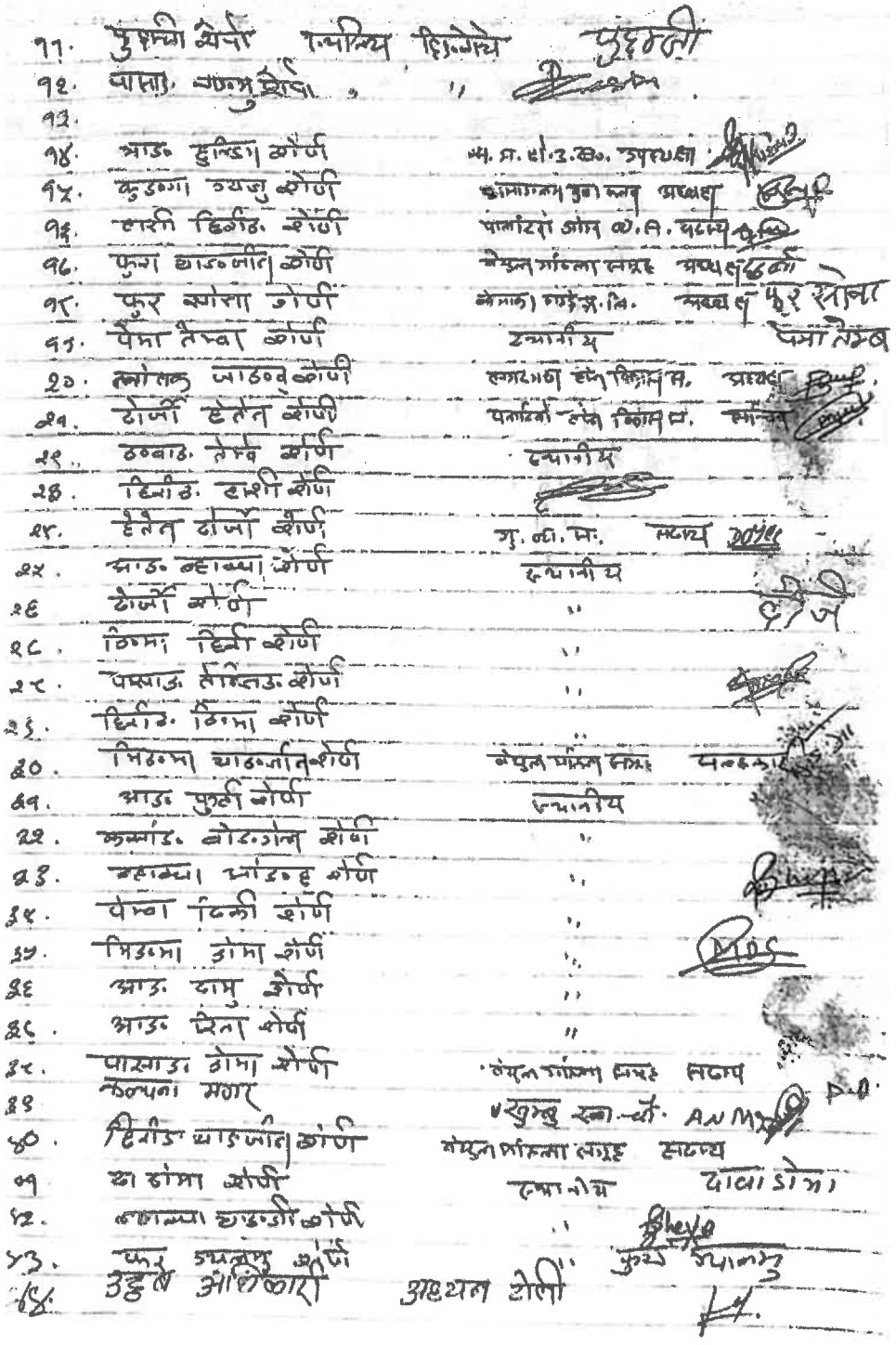
ANNEX XVI: MEETING MINUTES OF PUBLIC HEARING

नेपाल सरकार वैकल्पिक उर्जा प्रवर्द्धन केन्द्र तथा विश्व बैंकको प्राविधिक तथा आर्थिक सहयोगमा चोलुन्चे खोला, आमादब्लम मिनि हाइड्रो प्रा.लि बाट प्रदेश नं १ सोलुखुम्बु जिल्लाको खुम्बु पासाङल्हामु गा.पा. वडा नं ४ रहेको चोलुन्चे खोलाको पानीबाट ३११ कि.वा क्षमताको विद्युत उत्पादन योजना रहेको र उक्त परियोजनाको खुम्बु पासाङल्हामु गा.पा.को संक्षिप्त वातावरणीय अध्ययन तथा प्रारम्भिक वातावरणीय परिक्षण कार्यविधि २०६८ तथा नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ तथा वातावरण संरक्षण नियमावली २०७७ अनुसार वातावरणीय प्रभाव मुल्यांकन (EIA) गर्दा सार्वजनिक सुनुवाई गर्नुपर्ने कारणले गर्दा आज मिति २०७७ साल माघ २८ गतेका दिन सोलुखुम्बु जिल्लाको खुम्बु पासाङल्हामु गा.पा. वडा नं ४ को पाङबोचेमा अवस्थित पालारियो गुम्बामा बुधबारको दिन समय बिहान १०:०० बजे निम्नलिखित उपस्थितिमा सम्पन्न भयो। खुम्बु पासाङल्हामु गा.पा वडा नं ४ को अध्यक्ष श्री लक्ष्मण अधिकारीको अध्यक्षतामा तथा श्री

को प्रमुख आतिथ्यतामा स्थानीय, सरोकारवाला, संघसंस्था का प्रतिनिधि, प्रस्तावक, तथा अगुवाहरुको उपस्थितिमा निम्नलिखित निर्णयहरु पनि भयो।

उपस्थिति :

क्र.सं.	नाम/लिङ्ग	ठेगाना/संस्था/पद	हस्ताक्षर
१.	लक्ष्मण अधिकारी	खु.पा.ला.गा.पा.४ - अध्यक्ष	
२.	छिमी छिरिङ शेर्पा	म.स.०य.स. - अध्यक्ष	
३.	मिङ्मा काजी छिरिङ	स.रा.नि.	
४.	रमेश खत्री	खु.पा.गा.पा.४ वडा प्राविधिक	
५.	तेन्जिङ वाङ्चु शेर्पा	खु.प.ग्रा.उ.स. लोबर	
६.	तेन्जिङ डोमा शेर्पा	ब्यागिप	
७.	काजी डोमा शेर्पा	" "	
८.	सोनाम लोमास तेन्जेन शेर्पा	फोर्चे	
९.	फुरा थाङ्जी शेर्पा	फोर्चे	
१०.	तेम्बा शेर्पा	डुगुङ	



४७. उमेश अधिकारी — अध्यक्ष नटोली — [signature]
४८. दाव १९२२० ९७ २।५। — पाउवाँच टोल विकास सल्याण — [signature]
४८. मुकुन्द नाम२०
४९. पिर्सा द्वि२८- — मेउफ
[signature]

छलफलमा उठेका सवालहरू:-

१. प्रभावित क्षेत्रका स्थानीय बासिन्दाहरूलाई रोजगारी प्राथमिकताका साथ दिनुपर्ने ।
२. कोतके, पाउवाँचे, दिक्रीला र स्थानीयको लागि लगानीको लागि अवसर दिनुपर्ने ।
३. प्रभावित क्षेत्रका स्थानीयलाई न्यूनतम शुल्कमा विद्युत उपलब्ध गराउनुपर्ने ।
४. सन्ध्या हुँदै बत्तीमा कुहिरो नदेखिने गरी बिजुली बत्ती उपलब्ध गराउन व्यवस्था गरिदिन भनेर अनुरोध ।
५. पर्यटकीय, स्थानीय समस्या को हिसाबले यथाशिघ्र विद्युत परियोजना संचालनमा ल्याउनुपर्ने ।
६. वातावरणीय रूपमा प्रभाव भएता पनि न्यूनीकरणका उपाय अवलम्बन गर्न सकिने, विद्युत विना यस क्षेत्रको पनि कुनै भएकोले सम्पूर्ण उपाय अपनाएर यस परियोजना कार्यान्वयन हुनुपर्नमा जोड दिँदै गर्नुपर्ने ।

[signature]

ANNEX XVII: PUBLIC NOTICE FOR COMMENTS AND SUGGESTIONS

AMADABLAM MINI HYDRO PVT. LTD

चलानी नं.: AMH /07910/106 मिति: २०७९/१०/२०

श्री ..... कार्यालय,

प्रदेश नं. १, सोलुखुम्बु

बिषय: सार्वजनिक सूचना टाँस गरि सूचना टाँसको मुचुल्का तथा राय सुझाव भए पठाई दिने बारे।

उपरोक्त सम्बन्धमा १ नं. प्रदेश, सोलुखुम्बु जिल्ला खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४ मा आमादब्लम मिनी हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमादब्लम मिनी हाइड्रो आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्ने शिलसिलामा नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ तथा वातावरण संरक्षण नियमावली २०७७ बमोजिम सार्वजनिक सुचना जारि गरि सो प्रस्ताव सम्बन्धि राय सुझाव लिन आवश्यक भएकोले यो सार्वजनिक सूचना प्रकाशन गरिएको छ र तहाँको कार्यालयको सुचना पाटीमा सुचना टाँस गरि त्यसको जानकारी पठाई दिनुहुन साथै यो सार्वजनिक सूचना प्रकाशन भएको मितिले सात दिन भित्र देहायमा उल्लिखित ठेगानामा आई पुग्ने गरि लिखित राय सुझाव उपलब्ध गराई दिन हुन अनुरोध गरिन्छ।

संलग्न

(१) सार्वजनिक सूचना थान -१

Amadablam Mini Hydro Pvt. Ltd. Kathmandu

भवदीय

सम्राट राज सत्याल
आयोजना प्रवन्धक

Tilganga - 8 , Kathmandu, Nepal
+977 - 1 - 4465 888
P.O BOX No. 20

आमादब्लम मिनी जलविद्युत परियोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयारी सम्बन्धि सार्वजनिक सूचना

(प्रथम पटक प्रकाशित मिति:२०७९/१०/२० गते)

प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४ मा नेपाल सरकार, वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र तथा विश्व बैंकको आर्थिक तथा प्राविधिक सहयोगमा आमादब्लम मिनी हाइड्रो प्रा. लि. द्वारा देहाय बमोजिमको प्रस्ताव कार्यान्वयन गर्न लागिएको छ ।

प्रस्तावकको नाम र ठेगाना	आमादब्लम मिनी हाईड्रो प्रा. लि. काठमाडौं-८, तिलगंगा बागमती प्रदेश, नेपाल ईमेलः amadablammminihydro@gmail.com फोन नं.:०१-४४६४२२२, ०१-४४६४३३३
प्रस्तावको व्यहोरा	नेपालको प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४, सगरमाथा राष्ट्रिय निकुन्ज क्षेत्र भित्र पर्ने चोलुन्चे खोलाको पानीबाट नदीप्रवाहमा आधारित (RoR) रहेर ९११ किलो वाट (कि.वा.) विद्युत निकाल्ने योजना रहेको छ । समुद्री सतहबाट ४४२२ मिटर (मि.) उचाईमा बाँध बाँधेर प्रति सेकेन्ड ०.२५ घन मिटर(घ.मि.) पानीलाई २९३० मि. लामो पेनस्टक पाइप मार्फत् समुद्री सतहबाट ३९५१.१८ मि .उचाईमा रहेको विद्युतगृहमा रहेको ४८५ कि.वा. क्षमताको २ वटा टर्बाइनमा खसाली वार्षिक उर्जा ७२२५७८१.७६ कि.वा. घण्टा उत्पादन लक्ष्य रहेकोछ। यस जलविद्युत आयोजनाको डिजाईन डिस्चार्ज ०.२५ घन मिटर प्रति सेकेन्ड, ग्रस हेड ४७१.८७ मि .र नेटहेड ४४८.८६ मि. रहेकोछ। प्रस्तावित आयोजनाका संरचनाहरु अन्तर्गत हेडवर्क, ग्रावेल ट्राप, डिस्यानडिंग बेसिन, पेनस्टक पाईप, विद्युत गृह र टेलरेस पाइप चोलुन्चे खोलाको बायाँ तर्फ रहने छन्। प्रस्तावित परियोजना बाट उत्पादित विद्युत ४० कि.मि .लामो ११ के.भी. को प्रसारण लाईनबाट स्थानीयवासीहरुलाई वितरण गरिनेछ। यस आयोजनाको अनुमानित कुल लागत रु. ६१,८९,०१,६३८.८९ रहेको छ भने प्रति कि.वा. लागत रु. ६७,९३,३६५.१४ रहेको छ।
प्रभाव पर्न सक्ने क्षेत्र जिल्ला/गा.पा.	सोलुखुम्बु जिल्ला, खुम्बु पासाङ्ल्हामु गा.पा.-४

माथि उल्लेखित प्रस्तावको वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन गर्ने क्रममा सो क्षेत्रहरुको भौतिक तथा रासायनिक प्रणाली, जैविक प्रणाली, सामाजिक-आर्थिक प्रणाली र सांस्कृतिक प्रणालीमा के कस्तो प्रभाव पर्दछ भनि यकिन गर्न यस खुम्बु पासाङ्ल्हामु गाउँपालिका, वडा समिति, विद्यालय, स्वास्थ्य संस्था तथा सरोकारवाला व्यक्ति वा संस्थाको राय सुझाव लिन आवश्यक भएकोले यो सार्वजनिक सूचना प्रकाशन भएको मितिले सात दिन भित्र देहायमा उल्लिखित ठेगानामा आई पुग्ने गरि लिखित राय सुझाव उपलब्ध गराई दिन हुन अनुरोध गरिन्छ ।

प्रस्तावको नाम र ठेगाना	परामर्शदाताको नाम र ठेगाना
आमादब्लम मिनी हाईड्रो प्रा. लि. काठमाडौं-८, तिलगंगा, बागमती प्रदेश, नेपाल ईमेलः amadablammminihydro@gmail.com फोन नं.:०१-४४६४२२२, ०१-४४६४३३३	ईको फ्रेण्ड इन्टरनेशनल प्रा.लि. ललितपुर-२, सानेपा, बागमती प्रदेश, नेपाल इमेल:ecofriend.nepal@gmail.com फोन नं.:९८५११२७८६७

Amadablam Mini Hydro Pvt. Ltd. Kathmandu

ANNEX XVIII: DEEDS OF PUBLIC NOTICE AFFIXATION FOR SUGGESTIONS

खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
४ नं. वडा कार्यालय, खुम्जुङ, सोलुखुम्बु, १ नं. प्रदेश नेपाल
Ward No. 4 Office, Khumjung, Solukhumbu, 1 No. Province, Nepal

प.सं.: ०७९/०८०
च.नं.: २६६

मिति: २०७९/१०/२४

मिति:

श्री आमादब्लम मिनी हाइड्रो प्रा.लि.

तिलगंगा-८, काठमाडौँ

बाग्मती प्रदेश , नेपाल

बिषय: सूचना टाँस गरिएको सम्बन्धमा।

लिखितम आमादब्लम मिनी हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमादब्लम मिनी हाइड्रो आयोजना ९११ किलोवाटको विद्युत उत्पादन तथा ११ केभी सिङ्गल सर्किट प्रसारण लाईन आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्नको लागि नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ तथा वातावरण संरक्षण नियमावली २०७७ बमोजिम सार्वजनिक सुचना जारि गरि सो प्रस्ताव सम्बन्धि राय सुझाव लिने सम्बन्धि त्यस कार्यालय बाट प्राप्त सार्वजनिक सुचनाको प्रतिलिपि थान १ यस सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं. ४ मा रहेको यस कार्यालयको सुचना पाटीमा आज मिति २०७९/ १० / २२..बजे हामीहरुको रहोबरमा टाँस गरि यो मुचुल्का सहिछाप गरिदियौं।

तापासिलः

सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं. ४ बस्ने बर्ष..४०...को .... ग्याङजी शेर्पा

सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं. ४ बस्ने बर्ष..३३...को .... लाक्पा डिकी शेर्पा

सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं. ४ बस्ने बर्ष..........को ....

सोलुखुम्बु जिल्ला खुम्बु पासाङ्गल्हामु गा.पा. वडा नं. ४ बस्ने बर्ष..........को ....

इति सम्वत् .... साल ....महिना............ गते रोज .... शुभम्

रोहवर : वडा अध्यक्ष
लक्ष्मण अधिकारी

लक्ष्मण अधिकारी
वडा ४ वडा अध्यक्ष
खुम्बु पासाङल्हामु गाउँपालिका

फोन नं. ०३८-५४०३६३
Tel: 00977 38 540363, E-mail: ito.khumbupasanglhamumun@gmail.com | www.khumbupasanglhamumun.gov.np

Sagarmatha National Park

BUFFER ZONE MANAGEMENT COMMITTEE
मध्यवर्ती क्षेत्र व्यवस्थापन समिति

पत्र संख्या : ०८५/८०
चलानी नं. : ८

मिति: २०७९/१०/२४

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषय: सूचना टांस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजानिक सूचनाको प्रतिलिपी थान १ यस सगरमाथा राष्ट्रिय निकुञ्ज मध्यवर्ती क्षेत्र व्यवस्थापन समितिको सूचना पाटीमा आज मिति २०७९/१०/२४ गतेको दिन मध्यन्न १२ बजे हामीहरूको रोहबरमा टांस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, छुकुङ बस्ने वर्ष ३३ का श्री तेन्जीङ जाङबु शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, खुन्दे बस्ने वर्ष २५ का श्री निमा तेम्बा शेर्पा

इति सम्वत २०७९/१०/२४ गते रोज ३ शुभम् ।

छिमी छिरिङ शेर्पा
अध्यक्ष

Govt. Regd.: 2052/053/057
MMDC: 2419

༄༅། །དཔལ་རི་བོ་གསང་སྔགས་ཆོས་གླིང་དགོན་པ།

पाङबोचे गुम्बा व्यवस्थापन समिति

Pangboche Monastery Management Committee

Khumbu Pasang Lhamu Rural Municipality-4, Pangboche, Solukhumbu, Nepal

प.सं. ०३/८०
च.नं.

मिति: २०७८-१०-२४

श्री. आमाडब्लम मिनी हाइड्रो प्रा.लि.
तिनकुने - ८ काठमाडौं
बागमती प्रदेश काठमाडौं

विषय: सूचना टाँस गरीएको सम्बन्धमा

लिखितम सोलुखुम्बु आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. आयोजना ३११ किलोवाटको विद्युत उत्पादन तथा ११ के.भी सिङ्गल सर्किट प्रसारण लाइन सयोजनाको वातावरणीय प्रारम्भिक मूल्यांकन अध्ययन प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजनिक सूचनाको प्रतिलिपि पान-१ प्रति खु.पा.गा.पा वडा नं. ४ मा अवस्थित पाङ पाङ रिवु गुम्बा खुम्बु पाङबोचेमा सूचना पाटीमा आज मिति २०७८-१०-२४ गतेका दिन मध्यान्ह १२ बजे हामीहरुको रोहबरमा टाँस गरी यो मुचुल्कामा सही छाप गरी दियौं।

तपशिल

सोलुखुम्बु जिल्ला खु.पा.गा.पा वडा नं. ४ पाङबोचे बस्ने वर्ष ३९ का नाम श्री छेतेन दोर्जी शेर्पा [signature]

सोलुखुम्बु जिल्ला खु.पा.गा.पा वडा नं. ४ पाङबोचे बस्ने वर्ष ४८ का नाम श्री दावा छिरी शेर्पा [signature]

इति सम्वत २०७८-१० - २४ रोज २ शुभम

Regd. No.:-450
PAN No.: 605130826

श्री फोर्चे ठाक्री छोलिङ गुम्बा
SHREE PHORTSE THAKRI CHHOLING GUMBA
खुम्बु पासाङल्हामु गा.पा.-8, फोर्चे, सोलुखुम्बु

प.सं.:
च.नं.:

मितिः २०७९/१०/१६

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषयः सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण लाइन आयोजनाका वातावरणिय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेधन तयर गर्नको लागि जारी गरिएको सार्वजानिक सुनुवाईको सूचनाको प्रतिलिपी थान १ यस खु.पा.गा.पा. वडा नं ४ मा अवस्थित यस श्री फोर्चे ठाक्री छोलिङ गुम्बाका सूचना पाटीमा आज मिति २०७९/१०/१६ गतेको दिन मध्यन्न १२ बजे हामीहरूको रोहबरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिलः

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ५७ का श्री पेम्बा रिता शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ४२ का श्री ल्हाक्पा नुरु शेर्पा

इति सम्वत २०७९/१०/१६ गते रोज २ शुभम् ।

सगरमाथा राष्ट्रिय निकुञ्ज

खुम्बियूल्हा मध्यवर्ती क्षेत्र उपभोक्ता समिति

Khumbila Buffer Zone User Committee, Khumjung

खुम्जुङ, नेपाल

पत्र संख्या: ०८९/८०

चलानी नं ८६

मिति: २०७९/१०/२४

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषय: सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजानिक सूचनाको प्रतिलिपी थान १ यस खुम्वियुल्हा मध्यवर्ती क्षेत्र उपभोक्ता समितिको सूचना पाटीमा आज मिति २०७९/१०/२४ गतेको दिन मध्यन्न १२ वजे हामीहरूको रोहवरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, छुकुङ वस्ने वर्ष ३३ का श्री तेन्जीङ जाङबु शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, खुन्दे वस्ने वर्ष २५ का श्री निमा तेम्बा शेर्पा

इति सम्वत २०७९/१०/२४ गते रोज ३ शुभम् ।

छिमी छिरीङ शेर्पा
अध्यक्ष

सगरमाथा राष्ट्रिय निकुञ्ज

खुम्बियूल्हा मध्यवर्ती क्षेत्र उपभोक्ता समिति

सगरमाथा मध्यवर्ती क्षेत्र उपभोक्ता समूह

Sagarmatha Buffer Zone User Group, Khumjung-7

खुम्जुङ-७, सोलुखुम्बु, नेपाल

पत्र संख्याः ८६

चलानी नं. ०७९/०८०

मिति - २०७९/१०/२८

श्री आमाडब्लम हिमी हाइड्रो प्रा० लि०

तिलगंगा - ८ काठमाडौं

वागमती प्रदेश, काठमाडौं

विषय - सूचना टाँस गरेको सम्बन्धमा

निवेदक आमाडब्लम हिमी हाइड्रो प्रा० लि० काठमाडौं प्रस्तावक रहेको आमाडब्लम हिमी हाइड्रो प्रा० लि० आयोजना ३११ किलोवाट का विद्युत उत्पादन तथा ११ के भी सिङ्गल सर्किट प्रसारण लाइन आयोजनाको वातावरणीय प्रभाव मुल्याङ्कन अध्ययन प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजनिक सूचनाको प्रतिलिपी थान १ यस खु० पा० गा० पा० वडा नं ४ मा अवस्थित यस स० म० क्षे० उ० समूहका सूचना पाटीमा आज मिति २०७९/१०/२८ गतेका दिन मध्यान १२ बजे हामीहरूको रोहवरमा टाँस गरिएको यो मुचुल्का सही छाप गरि दियौं।

स० म० क्षे० उ० समूह

उप-अध्यक्ष आङ छुल्टिम शेर्पा

इति सम्वत २०७९/१०/२८ गते रोज २ शुभम्

श्री फोर्चे ठाक्री छोलिङ गुम्बा
SHREE PHORTSE THAKRI CHHOLING GUMBA
खुम्बु पासाङल्हामु गा.पा.-४, फोर्चे, सोलुखुम्बु
Regd. No.: 459
PAN No.: 605130825

160

प.सं.:
च.नं.:

मिति: २०७९/१०/२४

श्री आमाडब्लम मिनी हाइड्रो प्रा. लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश, नेपाल ।

विषय: सूचना टाँस गरिएको सम्बन्धमा ।

लिखितम आमाडब्लम मिनी हाइड्रो प्रा. लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा. लि. को आयोजना ९११ किलोवाटका विद्युत उत्पदन तथा ११ के.भी. सिङ्गल सर्किट प्रसारण प्रतिवेदन तयार गर्नका लागि जारी गरिएको सार्वजानिक सूचनाको प्रतिलिपी थान १ यस खु.पा.गा.पा. वडा नं ४ मा अवस्थित यस श्री फोर्चे ठाक्री छोलिङ गुम्बाका सूचना पाटीमा आज मिति २०७९/१०/२४ गतेको दिन मध्यन्न १२ बजे हामीहरूको रोहबरमा टाँस गरि यो मुचुल्क सही छाप गरी दियौं ।

तपसिल:

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ५७ का श्री पेम्बा रिता शेर्पा

सोलुखुम्बु जिल्ला खु.पा.गा.पा. वडा नं. ४, फोर्चे बस्ने वर्ष ४२ का श्री ल्हाक्पा नुरु शेर्पा

इति सम्बत २०७९/१०/२४ गते रोज ३ शुभम् ।

Regd. No: 06/068/069.

आमाडब्लम युवा क्लब
AMADABLAM YOUTH GROUP
Khumbu Pasang Lhamu Rural Municipality-4, Pangboche

मिति: २०७९-१०-२४

श्री आमाडब्लम मिनि हाइड्रो प्रा.लि.
तिलगंगा ०८, काठमाडौं
बागमति प्रदेश, काठमाडौं

विषय: सुचना टाँस गरिएको सम्बन्धमा

लिखितम आमाडब्लम मिनी हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो प्रा.लि. आयोजना ५११ किलोवाट को विद्युत उत्पादन तथा ११ केभि सिङ्गल सर्किट प्रसारण लाइन आयोजनाका वातावरणीय प्रभाव मूल्यांकन अध्ययन प्रतिवेदन उपर लिखित ध्यान - १ चरण खु.पा.गा.पा. वडा नं. ४ मा अवस्थित चरण आमाडब्लम युवा क्लबको सुचना पाटीमा आज मिति २०७९/१०/२४ गतेको दिन अध्यक्ष वडा सदस्यहरुको रोहवरमा टाँस गरि यो मुचुल्का सहिछाप गरिदियौं।

तपसिल
सोलुखुम्बु जिल्ला सोलुखुम्बु खु.पा.गा.पा. वडा नं. ४ पाङबोचे बस्ने वर्ष २९ का नाम श्री कुङ्गा ग्यालु शेर्पा (सही)

सोलुखुम्बु जिल्ला सोलुखुम्बु खु.पा.गा.पा. वडा नं. ४ पाङबोचे बस्ने वर्ष २६ का नाम श्री नोर्जी देन्ला शेर्पा (सही)

इति सम्वत २०७९-१०-२४ रोज ३ शुभम्।

दर्ता नं.

༄༅། པང་ཆེ་སྦས་ཡུལ་བུ་མོ་ཚོགས་པ།

पाङबोचे बेयूल महिला समूह

Pang Boche Beyul Women Group

खुम्बु पासाङ ल्हामु गाउँपालिका ४, पाङबोचे

च.नं. ०२
पत्र सं.

मिति : २०७३/१०/२४

श्री आमाडब्लम मिनि हाइड्रो प्रा.लि.
तिलगंगा ०८, काठमाडौं
बागमति प्रदेश, काठमाडौं

विषय:- सुचना टाँस गरिएको सम्बन्धमा

लिखितम आमाडब्लम मिनि हाइड्रो प्रा.लि. काठमाडौं प्रस्तावक रहेको आमाडब्लम मिनी हाइड्रो आयोजना ९९९ किलोवाटको विद्युत उत्पादन तथा ११ केभी सिङ्गल सर्किट प्रसरण लाइन आयोजनाको वातावरणीय प्रभाव मूल्यांकन अध्ययन प्रतिवेदन तयार गर्नको लागि जारी गरिएको सार्वजनिक सुनवाइको सुचनाको प्रतिलिपि थान-१ यस खुम्बु पासाङल्हामु गाउँपालिकाको वडा नं ४ रहेको पाङबोचे बेयुल महिला समूह पाङबोचेको सुचना पाटीमा आज मिति २०७३/१०/२४ गतेका दिन १२ बजे हामीहरुको रोहबरमा टाँस गरि यो मुचुल्का सही छाप गरि दियौं।

तपसिल

सोलुखुम्बु जिल्ला खुम्बु पासाङल्हामु गा.पा. वडा ४ को पा.बेयुल महिला समूह अध्यक्षा : फुरा पाङ्जी शेर्पा

" " " सदस्या : छिरिङ ल्हामु शेर्पा

" " " सचिव/सदस्या : पासाङ डोमा शेर्पा

इति सम्वत २०७३/१०/२४ गते रोज शुभम्

ANNEX XIX: PUBLICATION OF PUBLIC NOTICE FOR COMMENTS AND SUGGESTIONS

शुक्रवार, २० माघ २०७९ | Friday, 3 February 2023 आर्थिक अभियान

आमादब्लम मिनी जलविद्युत परियोजनाको वातावरणीय प्रभाव मुल्याकन अध्ययन प्रतिवेदन तयारी सम्बन्धि सार्वजनिक सूचना

(प्रथम पटक प्रकाशित प्रकाशन मितिः २०७९/१०/२० गते)

प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४ मा नेपाल सरकार, वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र तथा विश्व बैंकको आर्थिक तथा प्राविधिक सहयोगमा आमादब्लम मिनी हाइड्रो प्रा.लि. द्वारा देहाय बमोजिमको प्रस्ताव कार्यान्वयन गर्न लागिएको छ।

प्रस्तावकको नाम र ठेगाना	आमादब्लम मिनी हाईड्रो प्रा. लि. काठमाडौं-८, तिलगंगा, बागमती प्रदेश, नेपाल ईमेलः amadablammminihydro@gmail.com फोन नं.: ०१-४४६४२२२, ०१-४४६४३३३
प्रस्तावको व्योहरा	नेपालको प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४, सगरमाथा राष्ट्रिय निकुन्ज क्षेत्र भित्र पर्ने चोलुन्चे खोलाको पानीबाट नदीप्रवाहमा आधारित (RoR) रहेर ९११ किलोवाट (कि.वा.) विद्युत निकाल्ने योजना रहेको छ। समुद्री सतहबाट ४४२२ मिटर (मि.) उचाईमा बाँध बाँधेर प्रति सेकेन्ड ०.२५ घनमिटर (घ.मि.) पानीलाई २९३० मि. लामो पेनस्टक पाइप मार्फत् समुद्री सतहबाट ३९५१.१८ मि. उचाईमा रहेको विद्युतगृहमा रहेको ४८५ कि.वा. क्षमताको २ वटा टर्बाइनमा खसाली वार्षिक उर्जा ७२२५७८१.७६ कि.वा. घण्टा उत्पादन लक्ष्य रहेको छ। यस जलविद्युत आयोजनाको डिजाईन डिस्चार्ज ०.२५ घन मिटर प्रति सेकेन्ड, ग्रस हेड ४७१.८७ मि. र नेटहेड ४४८.८६ मि. रहेको छ। प्रस्तावित आयोजनाका संरचनाहरु अन्तर्गत हेडवर्क, ग्रावेल ट्राप, डिस्यानडिंग बेसिन, पेनस्टक पाईप, विद्युत गृह र टेलरेस पाइप चोलुन्चे खोलाको बायाँ तर्फ रहने छन्। प्रस्तावित परियोजनाबाट उत्पादित विद्युत ४० कि.मि. लामो ११ के.भी.को प्रसारण लाईनबाट स्थानीयबासीहरुलाई वितरण गरिनेछ। यस आयोजनाको अनुमानित कुल लागत रू. ६१,८९,०१,६३८.८९ रहेको छ भने प्रति कि.वा. लागत रू. ६७,९३,३६५.१४ रहेको छ।
प्रभाव पर्ने सक्ने जिल्ला/गा.पा.	सोलुखुम्बु जिल्ला, खुम्बु पासाङ्ल्हामु गा.पा.-४

माथि उल्लिखित प्रस्तावको वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन गर्ने क्रममा सो क्षेत्रहरुको भौतिक तथा रासायनिक प्रणाली, जैविक प्रणाली, सामाजिक-आर्थिक प्रणाली र सांस्कृतिक प्रणालीमा के कस्तो प्रभाव पर्दछ भनि यकिन गर्न यस खुम्बु पासाङ्ल्हामु गाउँपालिका, वडा समिति, विद्यालय, स्वास्थ्य संस्था तथा सरोकारवाला व्यक्ति वा संस्थाको राय सुझाव लिन आवश्यक भएकोले यो सार्वजनिक सूचना प्रकाशन भएको मितिले सात दिन भित्र देहायमा उल्लिखित ठेगानामा आई पुग्ने गरि लिखित राय सुझाव उपलब्ध गराई दिन हुन अनुरोध गरिन्छ।

राय सुझावको लागि पत्राचार गर्ने ठेगानाः

प्रस्तावकको नाम र ठेगाना	परामर्शदाताको नाम र ठेगाना
आमादब्लम मिनी हाईड्रो प्रा. लि. काठमाडौं-८, तिलगंगा, बागमती प्रदेश, नेपाल ईमेलः amadablammminihydro@gmail.com फोन नं.: ०१-४४६४२२२, ०१-४४६४३३३	ईको फ्रेण्ड इन्टरनेशनल प्रा.लि. ललितपुर-२, सानेपा, बागमती प्रदेश, नेपाल इमेलः ecofriend.nepal@gmail.com फोन नं.: ९८५११२७८६७

आमादब्लम मिनी जलविद्युत परियोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयारी सम्बन्धि सार्वजनिक सूचना

(प्रथम पटक प्रकाशित मिति: (२०८०/१०/०८ गते)

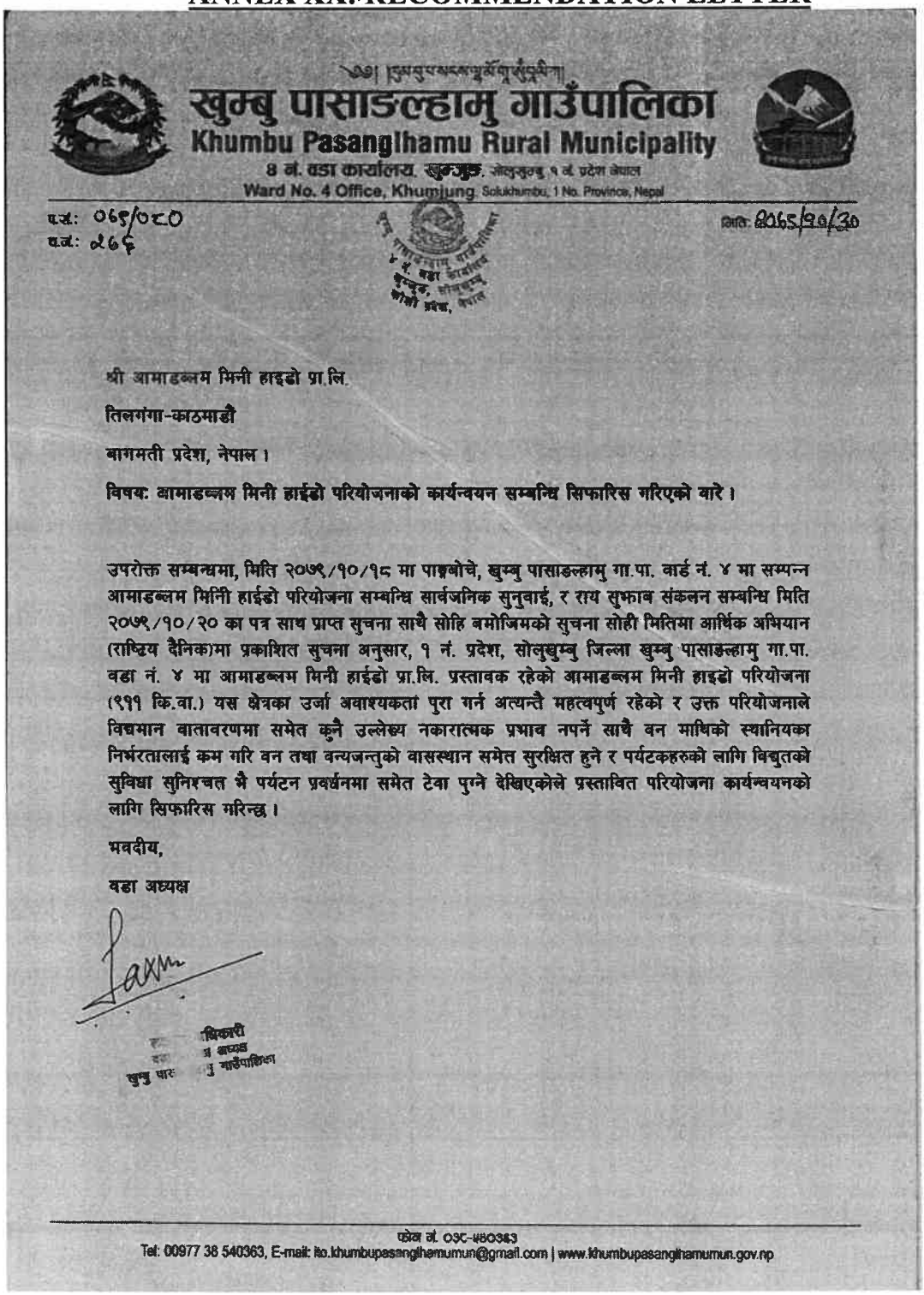
कोशी प्रदेश सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४ मा नेपाल सरकार, वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र तथा विश्व बैंकको आर्थिक तथा प्राविधिक सहयोगमा आमादब्लम मिनी हाइड्रो. लि. द्वारा देहाय बमोजिमको प्रस्ताव कार्यान्वयन गर्न लागिएको छ ।

प्रस्तावकको नाम र ठेगाना	आमादब्लम मिनी हाईड्रो.लि. काठमाडौं-८, तिलगंगा बागमती प्रदेश, नेपाल ईमेल: amadablammhydro@gmail.com फोन नं.: ९८०१८४२३४४
प्रस्तावको व्यहोरा	नेपालको प्रदेश नं. १ सोलुखुम्बु जिल्लाको खुम्बु पासाङ्ल्हामु गा.पा. वडा नं. ४, सगरमाथा राष्ट्रिय निकुन्ज क्षेत्र भित्र पर्ने चोलुन्चे खोलाको पानीबाट नदी प्रवाहमा आधारित (RoR) रहेर ९११ किलो वाट (कि.वा.) विद्युत निकाल्ने योजना रहेको छ। समुद्री सतहबाट ४४२२ मिटर (मि.) उचाईमा बाँध बाँधेर प्रति सेकेन्ड ०.२५ घन मिटर (घ.मि.) पानीलाई २९३० मि. लामो पेनस्टक पाइप मार्फत् समुद्री सतहबाट ३९५१.१८ मि. उचाईमा रहेको विद्युतगृहमा रहेको ४८५ कि.वा. क्षमताको २ वटा टर्बाइनमा खसाली वार्षिक उर्जा ७२२५७८१.७६ कि.वा. घण्टा उत्पादन लक्ष्य रहेको छ । यस जलविद्युत आयोजनाको डिजाईन डिस्चार्ज ०.२५ घन मिटर प्रति सेकेन्ड, ग्रस हेड ४७१.८७ मि. र नेटहेड ४४८.८६ मि. रहेको छ। प्रस्तावित आयोजनाका संरचनाहरु अन्तर्गत हेडवर्क, ग्रावेल ट्राप, डिस्यानडिंग बेसिन, पेनस्टक पाईप, विद्युत गृह र टेलरेस पाइप चोलुन्चे खोलाको बायाँ तर्फ रहने छन् । प्रस्तावित परियोजना बाट उत्पादित विद्युत ४० कि.मि. लामो ११ के.भी. को प्रसारण लाईनबाट स्थानीयबासीहरुलाई वितरण गरिने छ । यस आयोजनाको अनुमानित कुल लागत रु. ६१,८९,०१,६३८.८९ रहेको छ भने प्रति कि.वा. लागत रु. ६,७९,३६५.१४ रहेको छ ।
प्रभाव पर्न सक्ने क्षेत्र जिल्ला/गा.पा.	सोलुखुम्बु जिल्ला, खुम्बु पासाङ्ल्हामु गा.पा.-४

माथि उल्लेखित प्रस्तावको वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन गर्ने क्रममा सो क्षेत्रहरुको भौतिक तथा रासायनिक प्रणाली, जैविक प्रणाली, सामाजिक-आर्थिक प्रणाली र सांस्कृतिक प्रणालीमा के कस्तो प्रभाव पर्दछ भनि यकिन गर्न यस खुम्बु पासाङ्ल्हामु गाउँपालिका, वडा समिति, विद्यालय, स्वास्थ्य संस्था तथा सरोकारवाला व्यक्ति वा संस्थाको राय सुझाव लिन आवश्यक भएकोले यो सार्वजनिक सूचना प्रकाशन भएको मितिले सात दिन भित्र देहायमा उल्लिखित ठेगानामा आई पुग्ने गरि लिखित राय सुझाव उपलब्ध गराई दिन हुन अनुरोध गरिन्छ ।

प्रस्तावको नाम र ठेगाना	परामर्शदाताको नाम र ठेगाना
आमादब्लम मिनी हाईड्रो. लि. काठमाडौं-८, तिलगंगा, बागमती प्रदेश, नेपाल ईमेल: amadablammhydro@gmail.com फोन नं.: ९८०१८४२३४४	**ईको फ्रेण्ड इन्टरप्रेजस प्रा.लि.** ललितपुर-२, सानेपा, बागमती प्रदेश, नेपाल इमेल: ecofriend.nepal@gmail.com फोन नं.: ९८५११२७८६७

ANNEX XX: RECOMMENDATION LETTER



खुम्बु पासाङल्हामु गाउँपालिका
Khumbu Pasanglhamu Rural Municipality
४ नं. वडा कार्यालय, खुम्जुङ, सोलुखुम्बु, १ नं. प्रदेश नेपाल
Ward No. 4 Office, Khumjung, Solukhumbu, 1 No. Province, Nepal

च.नं: ०६९/०८०
च.नं: २६६

मिति: २०६५/१०/३०

श्री आमाडब्लम मिनी हाईडो प्रा.लि.

तिलगंगा-काठमाडौं

बागमती प्रदेश, नेपाल।

विषय: आमाडब्लम मिनी हाईडो परियोजनाको कार्यन्वयन सम्बन्धि सिफारिस गरिएको बारे।

उपरोक्त सम्बन्धमा, मिति २०७९/१०/१८ मा पाइबोचे, खुम्बु पासाङल्हामु गा.पा. वार्ड नं. ४ मा सम्पन्न आमाडब्लम मिनी हाईडो परियोजना सम्बन्धि सार्वजनिक सुनुवाई, र राय सुझाव संकलन सम्बन्धि मिति २०७९/१०/२० का पत्र साथ प्राप्त सुचना साथै सोहि बमोजिमको सुचना सोही मितिमा आर्थिक अभियान (राष्ट्रिय दैनिक)मा प्रकाशित सुचना अनुसार, १ नं. प्रदेश, सोलुखुम्बु जिल्ला खुम्बु पासाङल्हामु गा.पा. वडा नं. ४ मा आमाडब्लम मिनी हाईडो प्रा.लि. प्रस्तावक रहेको आमाडब्लम मिनी हाईडो परियोजना (९११ कि.वा.) यस क्षेत्रका उर्जा अवाश्यकता पुरा गर्न अत्यन्तै महत्वपुर्ण रहेको र उक्त परियोजनाले विद्यमान वातावरणमा समेत कुनै उल्लेख्य नकारात्मक प्रभाव नपर्ने साथै वन माथिको स्थानियका निर्भरतालाई कम गरि वन तथा वन्यजन्तुको वासस्थान समेत सुरक्षित हुने र पर्यटकहरुको लागि विद्युतको सुविधा सुनिश्चत भै पर्यटन प्रवर्धनमा समेत टेवा पुग्ने देखिएकोले प्रस्तावित परियोजना कार्यन्वयनको लागि सिफारिस गरिन्छ।

भवदीय,

वडा अध्यक्ष

फोन नं. ०९८-४८०३६३
Tel: 00977 38 540363, E-mail: ito.khumbupasanglhamumun@gmail.com | www.khumbupasanglhamumun.gov.np

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग

सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय

प.सं. :- ०७९ /८०
च.नं. :-

नाम्चे,सोलुखुम्बु
मिति:- २०८०/०३ /१३

विषय :- सिफारिस गरिएको सम्बन्धमा ।

श्री आमादब्लम मिनी हाइड्रो प्रा.लि.
तिलगंगा-८, काठमाडौं
बागमती प्रदेश , नेपाल

प्रस्तुत बिषयमा प्रस्तावक आमादब्लम मिनी हाइड्रो प्रा. लि. ले सोलुखुम्बु जिल्ला स्थित खुम्बु पासाङल्हामु गाँउ पालिका वडा न. ४ मा आमादब्लम मिनी जलविद्युत परियोजना (९११ कि.वा) को वातावरणीय प्रभाव मुल्यांकन तयारीको क्रममा यस कार्यालयको प्रतिनिधि सहित गरेको स्थलगत अध्ययन, मिति २०७९ साल माघ १८ गते गरेको सार्वजनिक सुनुवाई तथा मिति २०७९ माघ २० गते आर्थिक अभियान राष्ट्रिय दैनिक पत्रिकामा प्रस्तावित परियोजनाले वातावारणको विभिन्न अवयवहरूमा पार्न सक्ने सकारात्मक तथा नकारात्मक प्रभावहरुका साथै आवश्यक राय-सुझावको लागि प्रकाशित सूचनालाई समेत आधारमानी हेर्दा प्रस्तावित प्रस्तावले नकारात्मक भन्दा सकारात्मक प्रभाव पार्ने प्रस्ट देखिन्छ ।उक्त परियोजनाले स्वच्छ ऊर्जा उत्पादन गरि वन माथिको स्थानीयको निर्भरतालाई कमि गरि वन, वन्यजन्तुको बासस्थान, स्थानिय वातावरण तथा आय आर्जनमा समेत सकारात्मक प्रभाव पर्ने साथै यस सगरमाथा राष्ट्रिय निकुन्जको जैविक विविधता संरक्षणमा पनि प्रत्यक्ष रुपमा टेवा पुग्ने देखिएकोले प्रस्तावित परियोजना कार्यान्वयनको लागि सिफारिस गरिएको छ ।

बोधार्थ

राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग
बबरमहल, काठमाडौं ।

२०८०/३/१३

भूमिराज उपाध्याय
प्रमुख संरक्षण अधिकृत

भूमिराज उपाध्याय
प्रमुख संरक्षण अधिकृत

Sagarmatha National Park

BUFFER ZONE MANAGEMENT COMMITTEE
मध्यवर्ती क्षेत्र व्यवस्थापन समिति

पत्र संख्या : ०८९/८०
चलानी नं ९

मिति : २०७९/१०/३०

श्री आमादब्लम मिनी हाइड्रो प्रा.लि.
काठमाडौं-८, तिलगंगा
बागमती प्रदेश, नेपाल

विषय : आमादब्लम मिनी हाइड्रो परियोजनाको कार्यान्वयन सम्बन्धि सिफारिस गरिएको बारे ।

उपरोक्त सम्बन्धमा, मिति २०७९/१०/१८ मा पाइयोचे, खुम्बु पासाङल्हामु गा.पा. वार्ड नं. ४ मा सम्पन्न आमादब्लम मिनी हाइड्रो परियोजना सम्बन्धि सार्वजनिक सुनुवाई र राय सुझाव संकलन सम्बन्धि मिति २०७९/१०/२२ मा "आर्थिक अभियान" मा (राष्ट्रिय दैनिक) प्रकाशित सूचना र यस कार्यालयको सूचना पेटिकामा टाँस गरिएको सूचना अनुसार, १ नं. प्रदेश, सोलुखुम्बु जिल्ला खुम्बु पासाङल्हामु गा.पा. वार्ड नं. ४ मा आमादब्लम मिनी हाइड्रो प्रा.लि. प्रस्तावक रहेको आमादब्लम मिनी हाइड्रो परियोजना (९११ कि .वा) यस क्षेत्रको उर्जा आवश्यक्ता पुरा गर्न अत्यन्तै महत्वपुर्ण रहेको उक्त परियोजनाले विद्यमान वातावरणमा समेत कुनै उल्लेख्य नकरात्मक प्रभाव नपर्ने साथै वन माथिको स्थानियको निर्भरतालाई कम गरि वन तथा वन्यजन्तुको बासस्थान समेत सुरक्षित हुने र पर्यटकहरुको **लागि विद्युतको सुविधा** सुनिश्चित भै पर्यटन प्रवंधनमा समेत टेवा पुग्ने देखिएकोले **प्रस्तावित परियोजना कार्यान्वयनको** लागि सिफारिस गरिन्छ ।

छिमी छिरीङ शेर्पा
अध्यक्ष

ANNEX XXI: SUGGESTIONS FROM UNESCO WHS

फोन नं. ४२२०८५०
४२२०९१२
४२२७९२६
फ्याक्स ४२२७६७५

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग
(व्यवस्थापन शाखा)

पो.ब.नं. - ८६०
बबरमहल, काठमाडौं
Email: info@dnpwc.gov.np
http://www.dnpwc.gov.np

संकेत नं :
पत्र संख्या :-२०८०/०८१ /१९६०
चलानी नं : १२०३

मिति: २०८०/८/१८

विषयः राय प्रतिक्रिया सम्बन्धमा ।

श्री Amadablam Mini Hydro Pvt. Ltd.
तिलगंगा-८, काठमाडौं

१. प्रस्तुत विषयमा तहाँ लिमिटेडबाट मिति २०८०/३/१७ (7th July 2023) को पत्रसाथ प्राप्त सगरमाथा राष्ट्रिय निकुञ्जमा पर्ने खुम्बु पासाङ ल्हामु गाउँपालिका वडा नं. ४ मा प्रस्तावित Amadablam Mini Hydro Sub-Project (911 KW) को वातावारिणीय प्रभाव मुल्यांकन प्रतिवेदनको मस्यौदा संलग्न राखी UNESCO मा राय सुझावको लागि पत्राचार गरिएको ।

२. सो सम्बन्धमा Culture Sector, World Heritage Center Ref: CLT/WHC/APA/RL/23/107 मिति १० November को पत्रबाट वातावारिणीय प्रभाव मुल्यांकन प्रतिवेदनको मस्यौदामा UNESCO द्वारा प्रेषित राय सुझाव पाना-३ आवश्यक कार्यार्थ यसै साथ संलग्न राखी पठाइएको व्यहोरा मिति २०८०८/१८ को विभागीय निर्णयानुसार अनुरोध छ ।

२०८०।८।१८

....
नुरेन्द्र अर्याल
व्यवस्थापन अधिकृत

बोधार्थः
श्री वन तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

श्री संरक्षण शिक्षा शाखा
राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग
बबरमहल, काठमाडौं

unesco

Ms Sita Basnet
Counsellor, Chargé d'Affaires a.i.
Deputy Permanent Delegate of Nepal to UNESCO
Ambassade du Népal
45 bis, rue des Acacias
75017 Paris

10 November 2023

Culture Sector
World Heritage Centre

Ref: CLT/WHC/APA/HG/RL/23/107

Subject: State of Conservation of the World Heritage property 'Sagarmatha National Park'

Dear Ms Basnet,

The World Heritage Centre received your authorities' email together with a letter on 16 July 2023 concerning the draft Environmental Impact Assessment (EIA) for the proposed Amadablam Mini Hydro Subproject (AMHP) within the 'Sagarmatha National Park' (SNP) World Heritage property in Nepal. This information was shared with IUCN, the Advisory Body to the World Heritage Committee for natural heritage, for its review and comments.

Recalling also that a feasibility study for this project was submitted, and reviewed by IUCN, in 2021, please find below the IUCN Technical Review of the aforementioned project for your ease of follow-up action.

1. **Mitigation and Assessment of alternatives**

The 2021 IUCN review of the feasibility study noted that the study was missing the consideration of avoidance in its assessment of alternatives in line with the order of preference in a mitigation hierarchy. The EIA similarly does not specify whether avoidance (e.g. a "no-project" option) or an alternative location outside of the World Heritage property were considered. However, the EIA presents alternative options that were considered within the project area, including solar and wind technology (considered less efficient than hydro and not compatible with the scenic values of the property), and alternative locations upstream and downstream (within the property). It is noted that the final decision on design and location include measures such as avoiding construction in forest areas and alignment of the penstock to avoid tree cutting, as well as the alignment of transmission and distribution lines with existing trails to avoid vegetation areas. The proposed mitigation of potential impacts on the scenic values includes to bury transmission lines, distribution lines, and the penstock underground, as well as the immediate rehabilitation of quarrying required for construction. Therefore, IUCN considers that while options within the proposed project area are included in the EIA, the State Party could be requested to provide clarification on whether a location outside of the property was considered.

2. **Consideration of impacts on OUV**

The IUCN recommendation provided in 2021 highlighted that it is critical to use the full Statement of Outstanding Universal Value (OUV), as adopted by the World Heritage Committee (https://whc.unesco.org/en/list/120), to assess whether the project is compatible with the protection of OUV, and that an ESIA would need to assess potential impacts in detail in relation to the values and attributes that convey the OUV.

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The draft EIA includes a specific chapter on impacts to the integrity of protected areas and Outstanding Universal Values (see 7.1.1.9), which refers to potential visual impacts on the scenic values, whilst noting that other important factors such as Red Panda and Himalayan Musk Deer, as well as aquatic flora and fauna, poaching, or reduced river flow, invasive species and tourism revenue, are covered separately (7.1.1.7 Biological Environment). Specifically, regarding the visual impact on the OUV of the property, the measures proposed to avoid forest areas, immediately rehabilitate extraction/quarry sites, and locate transmission lines, distribution lines, and penstock underground, are positive. However, information on the visual impact of other permanent structures such as the reservoir, 100m Gabion to stabilise the slope, intake, power house and staff quarters, is very limited. IUCN recommends that the World Heritage Centre request the State Party to provide details in relation to the impacts and mitigation measures to reduce the long-term visual impacts of such structures.

The brief section referring to impacts on the SNP (p.77) raises the potential risk of workers introducing invasive alien plants, increased risk of poaching, and a disruption to tourism during the construction period which would *"place an increased burden on management and could also have a financial impact through reduce tourist park entry fees."* Although mitigation measures are proposed to address poaching, such measures should also address the potential impacts of invasive species, as well as tourism and revenue generation for the management authority and local communities.

Regarding potential impacts of altered river morphology resulting from the project, the EIA outlines that there would be reduced flow for around 3km and the diversion will eventually result in *"some impacts on the downstream dewatered zone. Low volume of water is likely to increase the temperature in the dewatered zone. The change in flow during wet season is not considered significant but in dry period (2 months) the flow will be reduced which might cause adverse impact on river morphology."* It is unclear on what basis the mitigation measure *"to maintain a minimum environmental flow of 50% of the mean monthly flow during operation to sustain the aquatic life of Cholunche Khola"* is proposed, and IUCN therefore also recommends that the World Heritage Centre request the State Party to provide this clarification.

Regarding cumulative impacts, the EIA states the screening process concluded that a cumulative impact assessment is not necessary since there is no existing/planned hydropower and irrigation project in Cholunche Khola. However, the EIA also refers to three existing micro-hydro projects (Tengboche, Pangboche and Phorche) within the project area. It is therefore unclear whether there would be any cumulative impacts of a new hydropower project when taking into consideration also the existing projects.

Noting more generally the potential impacts of pollution identified during construction, e.g. erosion, waste spoil and chemical management, it is critical to avoid negative impacts on the river, its water quality and its users (wildlife and local communities).

3. Importance of stakeholder consultations

The EIA includes reference to local communities being consulted on information such as fish species or energy requirements, and while the energy generation from the project is intended to serve the local residents including indigenous communities, it is nonetheless important to demonstrate that the local communities are fully consulted on the overall project. IUCN recalls the importance of stakeholder consultations, particularly with local communities, and of ensuring that free, prior and informed consent of the indigenous peoples is obtained before decisions on the project are made, and that the outcomes of the consultations feed into decision-making.

4. **New Guidance and Toolkit for Impact Assessments in a World Heritage Context**

IUCN also takes this opportunity to highlight that the new *Guidance and Toolkit for Impact Assessments in a World Heritage Context* published in 2022 replaces the *IUCN World Heritage Advice Note* and should be used for impact assessments going forward. The new Guidance provides principles and practical tools (e.g. on how to identify attributes of OUV) to support best-practice impact assessment and decision-making in relation to World Heritage. Further guidance and training is also available through the World Heritage Leadership Programme.

5. **Hydropower within the World Heritage property**

Whilst noting that this project is a 'mini-hydro' run-of-river project with a 911kW capacity, it is important to recall the third-party concerns transmitted to the State Party in February 2023 which referred to the construction of a larger *"30MW"* hydropower project within the property including *"massive construction works"*, *"felling trees"* and *"a massive fire"*, and to which the State Party responded (April 2023) that the SNP Office *"clearly states that physical contruction of Hydro Powerproject is going on at Chaurikherka and Lukla area according to the approved Initial Environmental Examination Report. All the construction work at the site is under the control of Park Warden and according to the prevailing laws"*.

Noting also that the EIA text on cumulative impact assessment does not refer to a larger hydropower project within the property, it would be important that the State Party provides further clarification on this other project. Specifically, it is recalled that the World Heritage Committee requested in Decision **45 COM 7B.87** for the State Party **to halt construction and to submit the Initial Environmental Examination Report (IEER)** for this project to the World Heritage Centre (by no later than 1 December 2023).

Should you have any question or require further information, please do not hesitate to contact my colleagues Ms Himalchuli Gurung, Chief of Asia and the Pacific Unit of the World Heritage Centre (h.gurung@unesco.org) and Mr Roland Lin (r.lin@unesco.org), Project Officer.

The UNESCO World Heritage Centre and IUCN remain available for further technical guidance as required.

Thanking you for your continuous collaboration and support in the implementation of the *World Heritage Convention*, I remain.

Yours sincerely,

Lazare Eloundou Assomo
Director

Enc.

cc: Nepal National Commission for UNESCO
National Focal Points for World Heritage
IUCN
UNESCO Field Offices in Kathmandu and New Delhi

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UNESCO's Response on EIA of Amadblam Mini Hydro Subproject (911 KW)

1) Mitigation and Assessment of Alternatives

No Project Option

Figure 1 shows Sagarmatha National Park (SNP) boundary and Sub project location. Similarly Figure 2 shows Sagarmatha National Park (SNP) boundary, Sub Project location and Load Center boundary. A mini hydro power station at Thame, operated by Khumbu Bijuli Company sells its electricity to Namche, Thame, Purte and Khumjung. This power generated from this plant is not sufficient to be distributed to other parts of Khumbu Region. The load centers of the proposed subproject are not accessible by national grid. At present, existing 3 micro hydro plants (35 kW, 25 kW and 50 kW capacity) and some individual small solar home systems are main source of electricity in the subproject area which cannot fulfill mere lighting demand of the households. These plants are not running in full capacity, as all the plants are more than 10 years old, regular repair and maintenance is needed annually. Subproject area is a touristic area in high altitude and the gateway of Mt. Everest, the energy from these plants cannot fulfill the space heating and indoor cooking electricity demand. For cooking purpose they are mostly dependent on high priced LPGs, kerosene and scarce fuel wood. The cost of petroleum fuel increases by 200-300% in these regions compared to general market rates due to remoteness of location. Subproject area is within the conservation area thus fuel wood is not easily available for cooking and heating. Electrification through solar power and wind are not feasible in this reason due to less energy yield and low battery life.

The proposed Amadablam Mini Hydro Subproject aims to distribute electricity in the vicinity of Pangoboche, Dingboche, Chukung, Lobuche and Dole. A "No Project" option which proposes a project location outside the national park boundary will not be financially feasible. Overhead transmission line is not allowed inside the SNP region and underground transmission line from project location outside the SNP boundary will result in a very high project cost. Proposed sub project is itself costly (3 times higher than average project cost) compared to other projects constructed in other parts of Nepal. The main reason for high cost is inaccessibility to project location by road head and therefore high transportation cost. Even costlier option will be choosing a project location away from load distribution center (NO project option).

Furthermore, there are no feasible alternatives outside the SNP boundaries to generate power below 1 MW. Potential River for power generation outside SNP boundary is Dudhkoshi River. Power potential of Dudhkoshi River is very huge and there are several ongoing studies for hydropower development from this river. All the potential projects are in feasibility study stage and development of such large project will take significant amount of time (More than 10 years). Furthermore, due to the remoteness of our proposed load centers (Pangoboche, Dingboche, Chukung, Lobuche and Dole) there are no concrete plans to develop a project aimed at distributing electricity at this region. As mentioned above it will be very costly to generate electricity far away from the load centers and then transmit the electricity via underground transmission and distribution system.

Khumbu regions attracts thousands of tourist all over the world and recognizing the economic importance of the this region, Government of Nepal, Ministry of Energy, Water Resources and Irrigation, has allocated a subsidy of NPR 128,307,000.00 (21 % of Total Project Cost) for this subproject through Alternative Energy Promotion Center (AEPC) . Alternative Energy Promotion Centre (AEPC) is a Government institution established on 3rd November 1996, with the objective of developing and promoting renewable/alternative energy technologies to meet the energy needs in Nepal

SECF(https://www.nrepnepal.com/se-challenge-fund/) is a Viability gap based Sustainable Energy Challenge Fund mechanism which has recently been established within Central Renewable Energy Fund (CREF) of AEPC with the support from British Embassy Kathmandu funded Nepal Renewable Energy Programme (NREP). The Nepal Renewable Energy Programme (NREP) is a Government of Nepal Programme with financial assistance of the British Embassy in Kathmandu (https://www.nrepnepal.com/). NREP aims to significantly increase private sector investment in the distributed sustainable energy market. It is implemented by the Alternative Energy Promotion Centre and a consortium led by DAI Global UK that includes Winrock International as an implementing partner.

Amadablam Mini Hydro Project is eligible for SECF, Viability Gap fund (VGF) which amounts to NPR 170,050,000.00 (27.48 % of Total Project Cost).

Although the project is costly, recognizing it economic value to the local Sherpa community and the positive impact to the tourism sector in this region, all above mentioned efforts are

made by the government and non-governmental agencies to make the project financially feasible. Choosing an even costlier option to build a plant outside the national park boundary will jeopardize the subproject construction efforts.

Subproject also proposes a feasible and reliable solution for energy supply to the local Sherpa community residing on the subproject location. They mostly rely on the costlier fossil fuels. Also the dependency on firewood would also be drastically reduced.

The subproject has also not proposed in construction of new road head to access the project location. The high project cost is because all the equipment required for the subproject is to be airlifted.

Furthermore, not even a single tree is cut down during project construction. Hence the environmental impact is kept to the minimum.

Hence proposed subproject location is the best suitable alternative for providing electricity for the proposed load centers.

2. Consideration of Impacts on OUV

Mitigation measures for 100 m Gabion, Intake, Power house and Staff Quarter

100 m Gabion

- Native flora can be planted around and on the gabion structure
- Using creeping plant or ground covers, which can hide the gabion structure
- Selecting stones or filling materials that matches the colors and texture of the surrounding landscape
- Avoiding materials that contrast sharply with the natural environment, which can also reduce the visual impacts

Intake

- To mitigate the visual impact, implement a substantial landscaping plan utilizing native vegetation surrounding the intake area
- Adding grasses, trees, and shrubs to the landscape can aid in blending the structure

Power house and Staff Quarter

- Design buildings with low profiles and earth-toned colors to blend in with the natural surroundings
- Use of materials that match the local landscape and minimize the visual impact
- Consider green roofs or living walls to further integrate the structures with the surroundings
- Plant native vegetation around the power house and staff quarters to create a natural visual barrier

Mitigation measures for Impacts on SNP

Invasive Alien Species

- Raise awareness about the ecological and economic consequences of invasive species
- Provide education and training programs for migrant laborers about the importance of not bringing or planting invasive alien plants
- Develop and enforce landscaping guidelines that prohibit the use of known invasive alien plant species
- Promote the use of native plants in landscaping projects to enhance biodiversity and ecosystem resilience.
- There is a Nepal Army check post at Jhorsalle which is the entry point of Sagarmatha National Park. A through check is done by Nepal Army to avoid the entry of any foreign species (Alien Plants) inside national park. Through checking of porters, mules and random body search for suspicious individuals is carried out by Nepalese army at the check post to control poaching. It is also forbidden to take any flora, fauna or other species from inside the national park. Hence all the migrant workers will also be thoroughly checked by Nepal army at the Jhorsalle checkpost.

Tourism and Revenue Generation

- Establish financial support mechanisms, such as grants or subsidies, to assist local businesses that may experience a temporary decline in revenue due to the construction
- Implement a rapid response system to address any unexpected issues or concerns raised by tourists or local communities during the construction period.

- Most of the components (Intake, Penstock, and Powerhouse) do not exist on the trekking trail of the tourists visiting the Everest region. Construction at the project location will cause no sound or visual pollution to the visitors.
- The transmission and distribution (T&D) cable lay outing has to be done on the trekking trail. As only a minor section (1m longitudinal length out of 3m road) is to be excavated construction signs will be kept during the working hours and it will be ensured that the cable layout works do not affect the walking tourists. Furthermore cable lay outing is also done during off seasons where tourist flow is minimum or almost nil to maintain minimum disturbance during trekking season.

50% e-flow

According to "Directive on Physical Infrastructure Construction and Operation in Conservation Areas, 2065" At least 50% of the available monthly discharge should be released to river/stream in order to generate electricity using river/stream in National Parks and Conservation area. Hence, Amadablam Mini Hydro Subproject is planned to develop 911 kW capacity releasing 50% of minimum monthly flow as per the directive.

Cumulative Impacts

The three existing micro hydro do not lie on Cholunche river. Furthermore these micro hydro plants are running under capacity as they have crossed their designed lifespan (15 years). These micro hydro plants are not able to fulfill the existing energy demand of the region. Due to lack of reliable source of energy this region has relied on very expensive fossil fuel options (LPG and kerosene) to meet their energy demand. These fossil fuels are not environment friendly. Hence proposed sub project is the only project to be constructed along the bank of Cholunche River, which provides a feasible solution for growing energy demand in the region with a locally generated and reliable power plant. Its potential impacts on river, its water quality and its users have been thoroughly studied and mitigation measures have been provided in the EIA report.

3. Importance of Stakeholder Consultation

Environmental Impact Assessment (EIA) is prepared for Amadablam Mini Hydro Subproject (911 kW) as per the requirement of Environment Protection Act (EPA) 2019 and Environment Protection Rule (EPR) 2020 of Government of Nepal (GoN). In accordance to GoN legislation

requirement Scoping Document (SD) and Terms of Reference (ToR) for EIA should be carried out after completion of the project screening.

Consequently, during the preparation of SD and ToR, a public notice was published in the national daily newspaper"Arthik Abhiyan"on 18/07/2078 (4 November 2021) to inform the local public and the stakeholders about the subproject and seeking comments/opinions/suggestions and feedback as required by the prevailing law. The notice was affixed at the public entities and circulated various organizations and institutions of the subproject areas to gather comments/opinions/suggestions and feedback on the potential adverse and beneficial environmental and social impacts of the subproject. After receiving the comments/opinions/suggestions from local indigenous people and relevant stakeholders, the SD and ToR for EIA were prepared. Approval for these documents was subsequently received from Ministry of Forest and Environment (MoFE) on 19/08/2079 (5 December 2022).

In accordance with the approved SD and ToR of EIA for Amadablam Mini Hydro Subproject, EIA report has been prepared conducting consultation with local indigenous people, Sagarmatha National Park, NGOs, Women Groups, Buffer Zone Management Committees and Department of National Parks and Wildlife Conservation (DNPWC). As provisioned in EPR, public hearings were carried out at Upper Pangboche 18/10/2079 (1 Feb. 2023) with an objective of obtaining comments/opinions/suggestions and disseminating information of subproject. Subsequent to gathering of comments/opinions/suggestions from the local indigenous people and other stakeholders EIA was prepared and submitted to GoN for its approval.

Therefore, as per the GoN legislation provision, every effort has been made to ensure that local indigenous people were consulted and obtained necessary approval before decision on the project are made. The outcomes of these consultations have integrated into the decision making process with the development of appropriate environmental and social management plans.

Regarding the Free prior and informed consultation (FPIC), GoN legislations do not explicitly mention the FPIC, rather emphasizes consultation. As the subproject is supported by World Bank (WB) and this Project/Mini Grid Energy Access Project (MGEAP) was approved from WB before enactment of Environmental and Social Framework (2018). The applicable guidelines for this project/ MGEAP are WB Operational Policies (OP) and Environmental and Social Management Framework (ESMF) prepared for this project. The following table

provides a review whether the subproject would require FPIC process as provisioned in WB OP requirement;

Potential Adverse Impacts	Analysis
Impacts on lands and natural resources subject to traditional ownership or under customary use	In the subproject area majority of communities people are from indigenous people (Sherpa). However, the subproject development activities do not use or impact on a traditional or customary land ownership by indigenous people. **Therefore, FPIC is not triggered in the subproject's infrastructures area.**
Relocation of Indigenous Peoples from lands and natural resources subject to traditional ownership or under customary use	The subroject does not trigger such relocation. **FPIC is not triggered in the Subproject's infrastructures area.**
Significant impacts on critical cultural heritage that is essential to the identity and/or cultural, ceremonial, or spiritual aspects of Indigenous Peoples lives, including natural areas with cultural and/or spiritual value such as sacred groves, sacred bodies of water and waterways, sacred trees, and sacred rocks	The subproject does not affect any critical cultural heritage that would be specific to the Sherpa communities in the area where infrastructures will be built. **FPIC is not triggered in the Subproject's infrastructures area.**
Use of cultural heritage, including knowledge, innovations or practices of Indigenous Peoples for commercial purposes	The Subproject's infrastructure components do not make such use. **FPIC is not triggered**

5. Hydropower within the World Heritage Property

According to "Directive on Physical Infrastructure Construction and Operation in Conservation Areas, 2065" GoN/MoF&SC, Clause No. 5, Hydropower plants with a capacity of less than 1 MW may be built within National Parks to provide electricity for local residents; but, they are not permitted to be connected to the national grid. Therefore, it is intended to develop the 911 kW capacity of the Amadablam Mini Hydro Subproject in order to supply energy to 451 local

families in 19 local communities of Ward No. 4 of Khumbu Pasanglhamu Rural Municipality situated inside the National Park area. The plant will be operated in isolated mode i.e. it is not connected to national grid.

The distance of Amadablam Mini Hydro Subproject from Lukla to subproject site area via Namche Bazaar is about 35 km and requires about 5 days to travel on foot. Also, distance from Lukla to Chaurikharka is 9 km. Hence distance from Chaurikharka to Subproject location is 26 km. Regarding construction of "30 MW" hydropower project, power will be connected to the national grid, where, Clauses No. 5 mentioned above does not trigged in this 30 MW ongoing project.

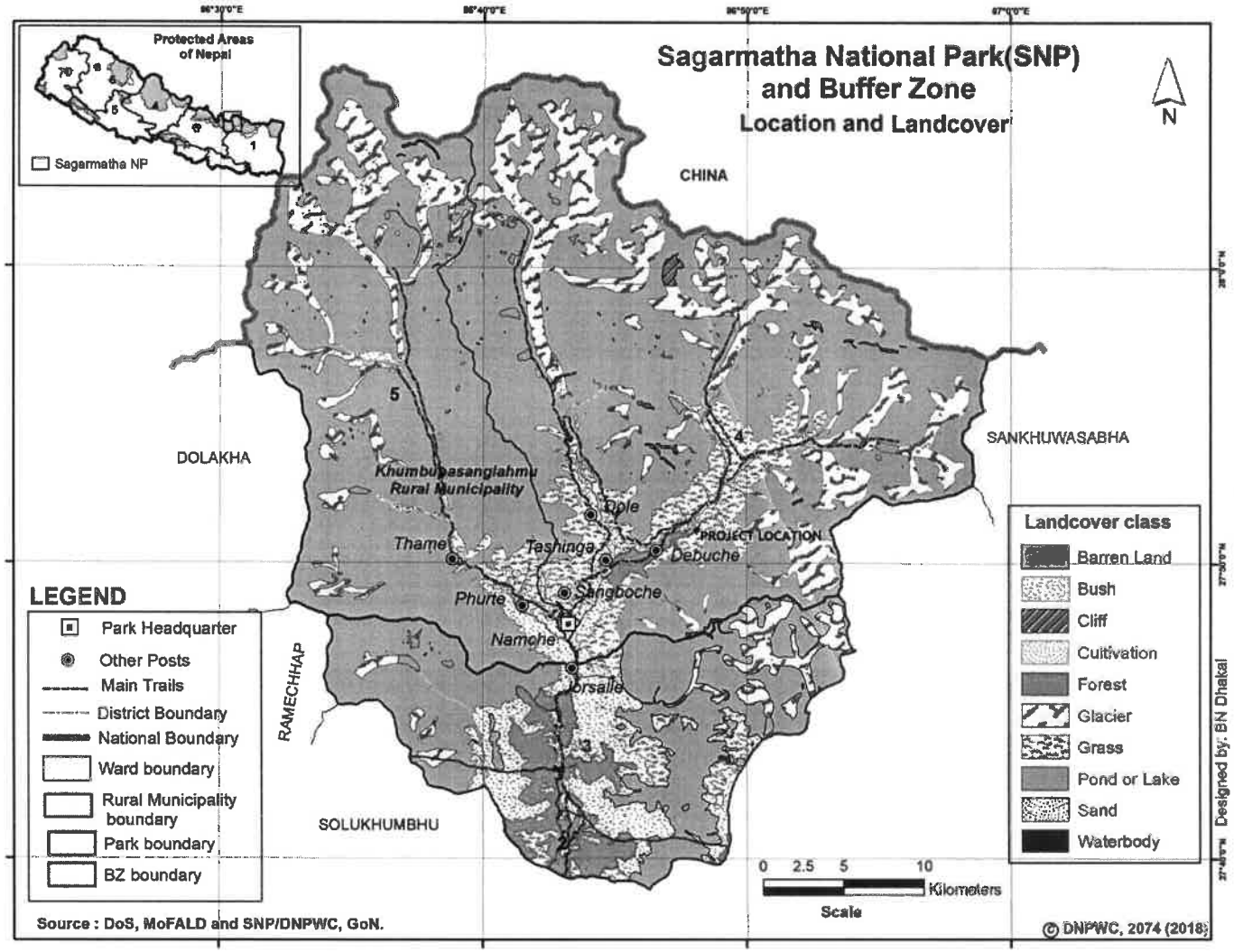

Figure 1: Picture showing SNP boundary and Project Location

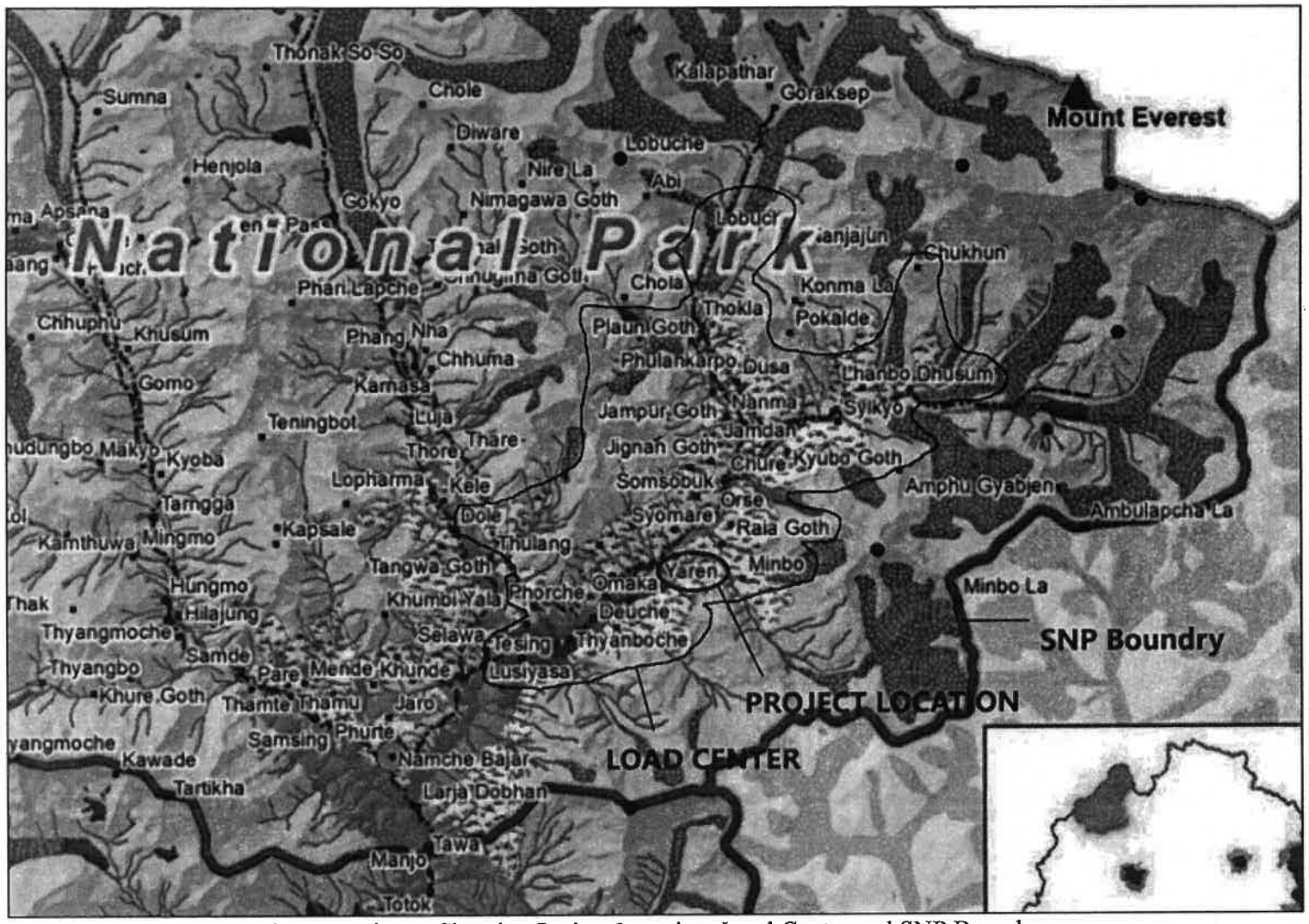

Figure 2: Picture Showing Project Location, Load Center and SNP Boundary

Figure 3: Map of SNP boundary and project location

ANNEX XXII: STAKEHOLDERS MEETING MINUTES

Project	Nepal Mini Grid Energy Access Project (MGEAP)
Venue	AEPC Office, Ambika Marg, Mid Baneshwor
Date	18 September 2022, Sunday
Time	8:00 – 9:00 AM
Title	Consultation meeting with AEPC/MGEAP, Khumbhu Pasang Lhamu Rural Municipality, Sagarmatha National Park (SNP), Buffer Zone Management Committee, and ESCOs (Amadablam Mini Hydro Pvt. Ltd. and Monjo Khola Pvt. Ltd.)
Participants	**Khumbhu Pasang Lhamu Rural Municipality (RM):-** 1. Mingma Chhiri Sherpa, Chairperson **Sagarmatha National Park (SNP):-** 1. Bhumi Raj Upadhyay, Chief Conservation Officer 2. Bishnu Raikaya, Information Officer & Conservation Officer **Buffer Zone Management Committee (BZMC):** 1. Chhimi Tshering Sherpa, Chairperson **AEPC/MGEAP (PMT):-** 1. Chaitanya Prakash Chaudhary, Project Manager 2. Dr. Anooja Joshi, Sr. Environmental Safeguard Expert 3. Laxman Khatiwada, Procurement Expert 4. Sunita Khatiwoda, Environmental Safeguard Expert 5. Shiva Hari Budhathoki, Social Safeguard Expert **Energy Service Company (ESCO):-** 1. Samrat Raj Satyal, Project Manager (Amadablam Mini Hydro Pvt. Ltd. and Monjo Khola Pvt. Ltd.)

Purpose of the meeting:

- Discussion on the availability of Fish and Herpetofauna in Monjo River at Monjo village and Cholunche River at Pangboche Village
- Discussion on critical habitat in Monjo Khola Mini Hydro Subproject area and Amadablam Mini Hydro Subproject area.
- Discussion on the impact in dewatered zone of both subprojects (The river stretch of about 1.3 km between the proposed intake and confluence between Dudhkoshi River and Monjo Khola site and the river of stretch of about 3.5 km between the proposed headworks and confluence between Imja Imja and Cholunche Khola)
- Others

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Main point of discussion:

Following points were discussed and agreed during the meeting:

- A discussion was conducted on the presence of fishes in both Monjo Khola (Monjo Village) and Cholunche Khola (Panghoche Village) with the representative of RM, SNP, and BZMC. As per the discussion, there is no availability of fishes in the both rivers which could be mainly due to high slop gradient with series of tall natural water falls (mainly fall located in Khari Khola near Bupsa in Ward No. 1 of Khumbu Pasanglhamu Rural Municipality, appox. 20 km arial distance from the Subproject site of Monjo Khola MHP), high altitude and cold & freezing water. Mr. Bhumi Raj Upadhyay, Chief Conservation Officer of SNP also mentioned that the *"Sagarmatha National Park and its Buffer Zone Management Plant 2016 – 2020, Section 5.3.2.2"* published by Government of Nepal's Institution SNP, also highlight that there is no evidence of aquatic life in the river systems around the both subproject areas. They also confirmed the observation of local people living in the nearest settlements of both subproject areas, that the local people have not seen fishes in both rivers till date. According to the representative from RM, SNP and BZMC, the nearest point from the both subprojects where the fishes can be found is Khari Khola, Ward No. 1 of Pasanglhamu RM, downstream of the waterfall, which is approx. 20 km away from Monjo Khola (Monjo Khola Mini Hydro Subproject Site) and approx. 35 km away from Cholunche Khola (Amadablam Mini Hydro Subproject Site).

During the meeting the participants shared following historical and local experience information data:

1. Till now there is no information regarding existence of fish in those areas. No local people have seen fish in Monjo Khola and Cholunche Khola.
2. It was also shared that as the water is cold, the nutrition opportunity for fish is approximately non-existence because of which fish cannot survive and no fish is available.
3. During COVID-19 pandemic, local believed that PAHA (Himalayan toad found in the river) that increases immunity and strength, so catching PAHA by local was very popular and common. Most of the local young were engaged in catching PAHA in those rivers and during that also no fish was found or caught and this also further confirms that there is no fish in those areas.

With these evidences and report of SNP, the participants of meeting recommended that there is strong evidence and experience of not having fish in Chouncne Khola and Monjo Khola.

- It is also discussed in the meeting that whether the development of both subprojects' components impact on the habitat of any endangered species or not. As Mr. Bhumi Raj Upadhyay and Bishnu Rokaya from SNP and Chhimi Tshering Sherpa from BZMC have visited and observed both subprojects development areas, they have confirmed that the subprojects components do not fall in the route of any migratory birds. Though some

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mammals like Jharal, Himalayan Musk Deer, Himalayan Black Bear, Snow Leopard and Red Panda are seen in some parts of national parks and in its buffer zone area, they are moving animals and are not territorial in both subproject areas.

- A discussion was conducted on the potential adverse impact that might be caused by only 10% release of water (as per GoN policy) in the river stretch of about 1.3 km between the proposed intake and confluence between Dudhkoshi River and Monjo Khola which has been identified as a dewatered zone for Monjo Khola Mini Hydro Subproject. Mr. Mingma Chhiri Sherpa, Chairperson of the Khumbu Pasanglhamu Rural Municipality confirmed that the water in this segment of river is not used for drinking, irrigation and not any livelihood purposes by local communities. The source of water supply for drinking, irrigation and other uses is from Jorsalle (Chhu Thal Thal spring). In addition, Mr. Bhumi Raj Upadhyay reiterated that there is not presence of any fishes in Monjo Khola so that impacts on fishes and other aquatic life due to the reduction of river flow in dewatered zone is not envisaged.

- A discussion was conducted on the potential impact that might be caused by 50% release of water (as GoN Policy) in river section of about 3.5 km between the proposed headworks and confluence between Imja Khola and Cholunche Khola for Amadablam Mini Hydro Subproject. Chairperson of the Khumbu Pasanlahamu Rural Municipality that there is not the presence of any human settlement near the Cholunche Khola and the river water is not used for drinking, irrigation and other livelihood purposes. Moreover, Mr. Bhumi Raj Upadhyay and Bishnu Rokaya reiterated that there is no presence of any fishes in Cholunche Khola so that impacts on fishes and other aquatic life due to the reduction of river flow in dewatered zone is not envisaged.

- AEPC/MGEAP has informed and discussed about the progress status of both subprojects and requested RM, SNP, and BZMC to support in the days to come for the effective implementation of the project.

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Photo of Participants in meeting

ANNEX XXIII: AGREEMENT PAPER WITH EXISTING MICRO HYDRO

सम्झौता पत्र

आज मिति २०७८/८/१२ का दिन यस पाथिभरा याङवरक गाउँपालिका सोलुखुम्बु जिल्ला प्रदेश नम्बर १ वडा नम्बर ३ स्थित आमादब्लम मिनि हाइड्रो प्रा.लि. (पहिलो पक्ष) र हाल सञ्चालनमा रहेको पाङबोचे माइक्रो जलविद्युत (१५ कि.वा.) आयोजनाको उपभोक्ता समिती तथा उपभोक्ताहरु (दोस्रो पक्ष) बीच आमादब्लम मिनि हाइड्रो प्रा.लि.ले प्रवर्द्धन गर्न लागेको आमादब्लम मिनि हाइड्रो (९११ कि.वा.) को प्रवर्द्धन तथा व्यवस्थापन सम्बन्धमा दुवै पक्ष बीच निम्न लिखित शर्तहरुमा छलफल भई सहमति भयो।

बुँदाहरु :

१. यस प्रस्तावित आमादब्लम मिनि हाइड्रो (क्षमता ९१२ कि.वा.) आयोजनको निर्माण पछि हाल सञ्चालनमा रहेको पाङबोचे माइक्रो जलविद्युत (१५ कि.वा.) आयोजनाको वितरण क्षेत्र ल प्रभावित गर्ने हुनाले उक्त प्रस्तावित आमादब्लम मिनि हाइड्रो (९११ कि.वा.) सञ्चालनमा आ पछि हाल सञ्चालनमा रहेको पाङबोचे माइक्रो जलविद्युत (क्षमता १५ कि.वा.) द्वारा उत्पादि विद्युत आमादब्लम मिनि हाइड्रो (क्षमता ९११ कि.वा.) लाई बिक्रि गर्न पाङबोचे माइक्र जलविद्युत (क्षमता १५ कि.वा.) आयोजना मन्जुर गर्दछ। उक्त विद्युतको वद्युत बिक्रि दर नेपा विद्युत प्राधिकरणद्वारा ROR आयोजनाहरुलाई उपभोगका आधारमा हिउद र वर्षा याम निर्धारण गरिए अनुसार हुनेछ जुन व्यवस्था तल दिए बमोजिमको छ।

Season	Rate
Wet (Jestha 16 – Mangsir 15)	Rs. 4.80/Kwh
Dry (Mangsir 16 – Jestha 15)	Rs. 8.40 /Kwh

यसै सम्झौताको माध्यमबाट उक्त आयोजना बाट उत्पादित विद्युत को वितरणको जिम्मा आमादब्लम मिनि हाइड्राको हुनेछ। सो करामा पाङबोचे माइक्रो जलविद्युत (क्षमता १५ कि.वा. आयोजनाको उपभोक्ता समिती तथा उपभोक्ताहरुको पूर्ण सहमती छ।

२. शर्त नं. १ बमोजिम पाङबोचे माइक्रो जलविद्युतको सम्पूर्ण संरचना सहित आयोजनाको व्यवस्थापकिय जिम्मा पाङबोचे माइक्रो जलविद्युत स्वयंको हुनेछ।

फुर सीता

३) हालको आयोजनाहरुको सञ्चालन तथा व्यवस्थापन साथै विस्थापनको लागि उ आयोजनाहरुले सहयोगकर्ता (donor) को सहमति आवश्यक भए स्वयमले लिनुपर्ने प्रस्तावित आयोजनाले भविष्यमा सहयोग कर्ता (donor) बाट आउने कुनै पनि किसिमक माग दावि तथा क्षतिपूर्ति बेहोर्ने छैन ।

३) प्रस्तावित आयोजनाको निर्माणको क्रममा आवश्यक पर्ने विद्युत सविक आयोजनाले माथि बु नं १ मा उल्लेखित दरमा उपलब्ध गर्ने तथा निर्माण, प्रवर्द्धन र सचालनको लागी य सम्झौताका सम्पूर्ण पक्षहरुबाट आवश्यक सहयोग गर्ने प्रतिबद्धता व्यक्त गर्दछन् ।

४) यस आयोजनाले विद्युत वितरण गर्न थालेपछि आयोजनाले निर्धारण गरेको दरमा विद्युत खरी गर्ने सहमति भयो ।

५) पाङबोचे माइको जलविद्युत (१५ कि.वा) आयोजनाले बेहोर्नु पर्ने कुनै पनि दायित्व नरहेको भविष्यमा कुनै दायित्व बापत दावि आएमा त्यसको जिम्मा प्रस्तावित आमादब्लम मिनि हाईड्रो आयोजनाले लिने छैन । उक्त दायित्वको फरफारकको जिम्मा स्वयम् पाङबोचे माइक जलविद्युत (१५ कि.वा) आयोजनाको उपभोक्ता समितीले लिनु पर्ने छ ।

६) यो सम्झौता अनुसार भविष्यमा कुनैपनि विवाद उत्पन्न भएमा दुई पक्ष मिलेर सहमति गरिनेछ , दुवै पक्ष बीच सहमति नभएमा नेपालको विद्यमान कानून अनुसार सहमति गरिनेछ ।

७) यो सम्झौता आजको मितीबाट लागू हुनेछ र आयोजना सचालन रहुन्जेल सम्म प्रभावकारी रहनेछ ।

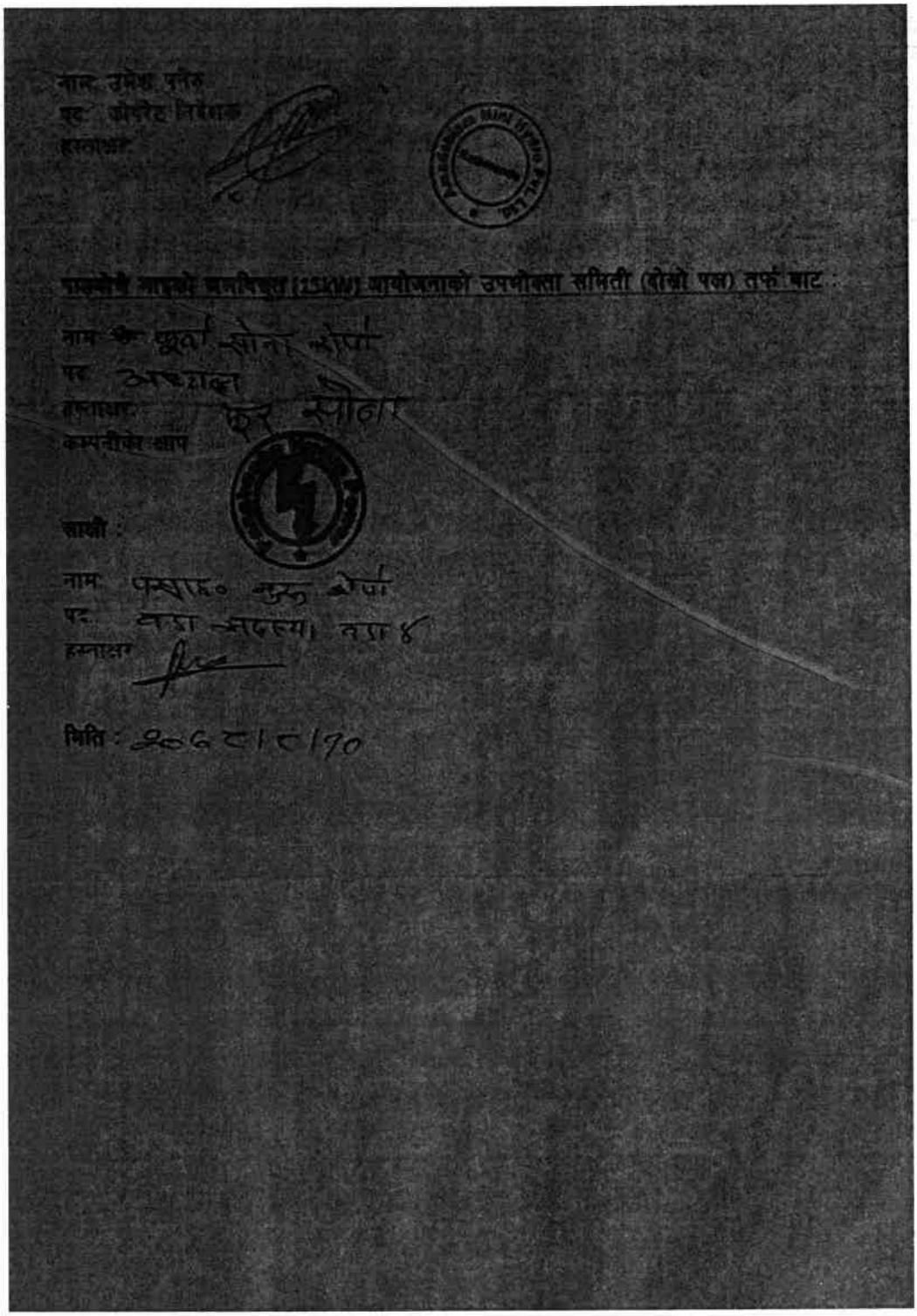
आमादब्लम मिनि हाईड्रो प्रा.लि (पहिलो पक्ष) तर्फ बाट :

नाम: ल्हाक्पा सोनाम शेर्पा
पद: अध्यक्ष
हस्ताक्षर:
कम्पनीको छाप:

Amadablam Mini Hydro Pvt. Ltd.

साक्षी :

मुर सिंना



नाम: उमेश पौडेल
पद: डाइरेक्टर
हस्ताक्षर:

माथिको माइक्रो जलविद्युत (15kW) आयोजनाको उपभोक्ता समिति (दोस्रो पक्ष) तर्फ बाट :

नाम: श्री पूर्ण सोना शेर्पा
पद: अध्यक्ष
हस्ताक्षर: फुर सोना
कम्पनीको छाप:

साक्षी :

नाम: पसाङ मुक्कु शेर्पा
पद: वडा सदस्य, वडा ४
हस्ताक्षर:

मिति: २०८२।८।१७

सम्झौता पत्र

आज मिती २०७८/८/१६ का दिन गाउँपालिका प्रदेश नम्बर ३ वडा नम्बर ४ स्थित आमादब्लम मिनि हाईड्रो प्रा.लि. (पहिलो पक्ष) र हाल सचालनमा रहेको पोर्त्से माइक्रो जलविद्युत (क्षमता ५० कि.वा.) आयोजनाको उपभोक्ता समिती (दोस्रो पक्ष) बीच आमादब्लम मिनि हाईड्रो प्रा.लि. ले प्रवर्दन गर्न लागेको आमादब्लम मिनि हाईड्रो (क्षमता ९१२ कि.वा.) को प्रवर्दन तथा व्यवस्थापन सम्बन्धमा दुवै पक्ष बीच निम्न लिखित शर्तहरुमा छलफल भई सहमति भयो ।

बुँदाहरु :

१) यस प्रस्तावित आमादब्लम मिनि हाईड्रो (क्षमता ९१२ कि.वा.) आयोजनाले निर्माण पछि हाल सचालनमा रहेको पोर्त्से माइक्रो जलविद्युत (क्षमता ५० कि.वा.) को वितरण क्षेत्र लाई प्रभावित गर्ने हुनाले उक्त प्रस्तावित आमादब्लम मिनि हाईड्रो (क्षमता ९१२ कि.वा.) सचालनमा आए पछि हाल सचालनमा रहेको पोर्त्से माइक्रो जलविद्युत (क्षमता ५० कि.वा.) द्वारा उत्पादित विद्युत आमादब्लम मिनि हाईड्रो (क्षमता ९१२ कि.वा.) लाई बिक्रि गर्ने पोर्त्से माइक्रो जलविद्युत (क्षमता ५० कि.वा.) आयोजना मन्जुर गर्दछ । उक्त विद्युतको बद्युत बिक्रि दर नेपाल विद्युत प्राधिकरणद्वारा ROR आयोजनाहरुलाई उपभोगका आधारमा हिउद र वर्षा याममा निर्धारण गरिए अनुसार हुनेछ जुन व्यवस्था तल दिए बमोजिमको छ ।

Season	Rate
Wet (Jestha 16 – Mangsir 15)	Rs. 4.80/Kwh
Dry (Mangsir 16 – Jestha 15)	Rs. 8.40 /Kwh

यसै सम्झौताको माध्यमबाट उक्त आयोजना बाट उत्पादित विद्युत को वितरणको जिम्मा आमादब्लम मिनि हाईड्रोको हुनेछ । सो क्रामा पोर्त्से माइक्रो जलविद्युत (क्षमता ५० कि.वा.) आयोजनाको उपभोक्ता समिती तथा उपभोक्ताहरुको पुर्ण सहमती छ ।

२) शर्त नं १ बमोजिम पोर्त्से माइक्रो जलविद्युतको सम्पुर्ण सरचना सहित आयोजनाको व्यवस्थापकिय जिम्मा पोर्त्से माइक्रो जलविद्युत स्वयको हुनेछ ।

पार्वतीकुण्ड नगरपालिका

Amadablam Mini Hydro Pvt. Ltd.

४) प्रस्तावित आयोजनाको निर्माणको क्रममा आवश्यक पर्ने विद्युत सम्बन्धी आयोजनाले माथि बुंदा नं. १ मा उल्लेखित दरमा उपलब्ध गर्ने तथा निर्माण, प्रवर्द्धन र संचालनको लागी यस सम्झौताका सम्पूर्ण पक्षहरुबाट आवश्यक सहयोग गर्ने प्रतिबद्धता व्यक्त गर्दछन् ।

५) यस आयोजनाले विद्युत बितरण पर्ने बालेपाटि आयोजनाले निर्धारण गरेको दरमा विद्युत खरीद बिक्रि गर्ने सहमति भयो ।

६) पोर्त्से माइको जलविद्युत (क्षमता ५० कि.वा.) आयोजनाले बेहोर्नु पर्ने कुनै पनि दायित्व नरहेको र भविष्यमा कुनै दायित्व बापत दावि आएमा त्यसको जिम्मा प्रस्तावित आमादब्लम मिनि हाईड्रो आयोजनाले लिने छैन । उक्त दायित्वको फरफारकको जिम्मा स्वयम् पोर्त्से माइको जलविद्युत (क्षमता ५० कि.वा.) आयोजनाको उपभोक्ता समितीले लिन् पर्ने छ ।

७) यो सम्झौता अनुसार भविष्यमा कुनैपनि विवाद उत्पन्न भएमा दुई पक्ष मिलेर सहमति गरिनेछ । दुवै पक्ष बीच सहमति नभएमा नेपालको विद्यमान कानून अनुसार सहमति गरिनेछ ।

८) यो सम्झौता आजको मितिबाट लागु हुनेछ र आयोजना संचालन रहुन्जेल सम्म प्रभावकारी रहनेछ ।

आमादब्लम मिनि हाईड्रो प्रा.लि (पहिलो पक्ष) तर्फ बाट:

नाम: ल्हाक्पा सोनाम शेर्पा
पद: अध्यक्ष
हस्ताक्षर:
कम्पनीको छाप:

साक्षी :

नाम: उमेश पनेरु
पद: कोर्पोरेट निर्देशक
हस्ताक्षर:

पाल्पा नाम्से

घोर्ले गाउँको जलविद्युत (क्षमता ५० कि.वा.) आयोजनाको उपभोक्ता समिती (दोश्रो पक्ष) तर्फ बाट:

नाम: [illegible]

पद: [illegible]

हस्ताक्षर: [illegible]

कम्पनीको छाप :

साक्षी :

नाम:

पद:

हस्ताक्षर:

मिति : २०६८/०८/१६

ANNEX XXIV: INVOLVEMENT OF SNP OFFICIAL DURING FIELD WORK AND PUBLIC HEARING

नेपाल सरकार
वन तथा वातावरण मन्त्रालय
राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग

सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय

नाम्चे, सोलुखुम्बु

पत्र संख्या: २०७८/७९
चलानी नं.: १८५०

मिति: २०७८/७/२६

विषय: वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन स्थलगत निरिक्षण गर्ने बारे।

स.सं.अ श्री विष्णु रोकाया
सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय, नाम्चे, सोलुखुम्बु।

प्रस्तुत विषयमा राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभागको च.नं. ८८९ मिति २०७७/०७/१८ गतेको प्राप्त पत्र तथा आमादब्लम मिनी हाइड्रो प्रा.लि. च.नं. ४०/२०७८/७९ मिति २०७८/०७/१८ गतेको प्राप्त पत्रानुसार यस राष्ट्रिय निकुञ्ज भित्र पर्ने खुम्बु पासाङ ल्हमु गा.पा. वडा नं. ४ मा आमादब्लम मिनी हाइड्रो आयोजनाको वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययनको साथै क्षेत्र निर्धारण (scoping) गर्ने कार्यक्रम वन तथा वातावरण मन्त्रालय, वातावरण तथा जैविक विविधता वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन सम्बन्धि मिति २०७८/०६/२४ को पत्रानुसार यस कार्यालयको स.सं.अ. विष्णु रोकायालाई मिति २०७८/७/२७ देखि २०७८/८/३ गते सम्मको वातावरणीय प्रभाव मुल्यांकन (EIA) अध्ययन हुने स्थानमा यस कार्यालयको प्राविधिक कर्मचारी प्रतिनिधि खटाइएको व्यहोरा अनुरोध छ।

भूमिराज उपाध्याय

बोधार्थ:
श्री आमादब्लम मिनी हाइड्रो प्रा.लि. काठमाडौं-८, तिलगंगा :आवश्यक सहयोगका लागि अनुरोध छ।

WWW.sagarmathanationalpark.gov.np info@sagarmathanationalpark.gov.np snp.namche@gmail.com

नमूना कागजात

वन तथा वातावरण मन्त्रालय

राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग

सगरमाथा राष्ट्रिय निकुञ्ज कार्यालय

नाम्चे,सोलुखुम्बु

प.सं. :- ०७९ /८०
च.नं. १६१

मिति:- २०७९/१०/१६

विषय :- सहभागी हुन जाने सम्बन्धमा।

रेन्जर श्री मित्रकाजी तामाङ
स.रा.नि.का.नाम्चे, सोलुखुम्बु।

प्रस्तुत विषयमा यस निकुञ्ज भित्र पर्ने सोलुखुम्बु जिल्ला खुम्बु पासाङल्हामु गाउँ पालिका वडा न.४ मा अमादब्लम मिनी हाइड्रो प्रा.लि.काठमान्डौ प्रस्तावक रहेको अमादब्लम मिनी हाइड्रो आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्ने सिलसिलामा सो आयोजनाको तर्फबाट निम्न मिति समय र स्थानमा हुने सार्वजनिक कार्यक्रममा सहभागी हुन तपाईलाई मिति २०७९/१०/१७ गते देखि खटाइएको हुँदा त्यस तर्फ जानु भै आफ्नो राय सुझाव एवं प्रतिक्रिया प्रदान गर्नु हुन समेत अनुरोध छ।

सार्वजनिक सुनुवाई कार्यक्रम

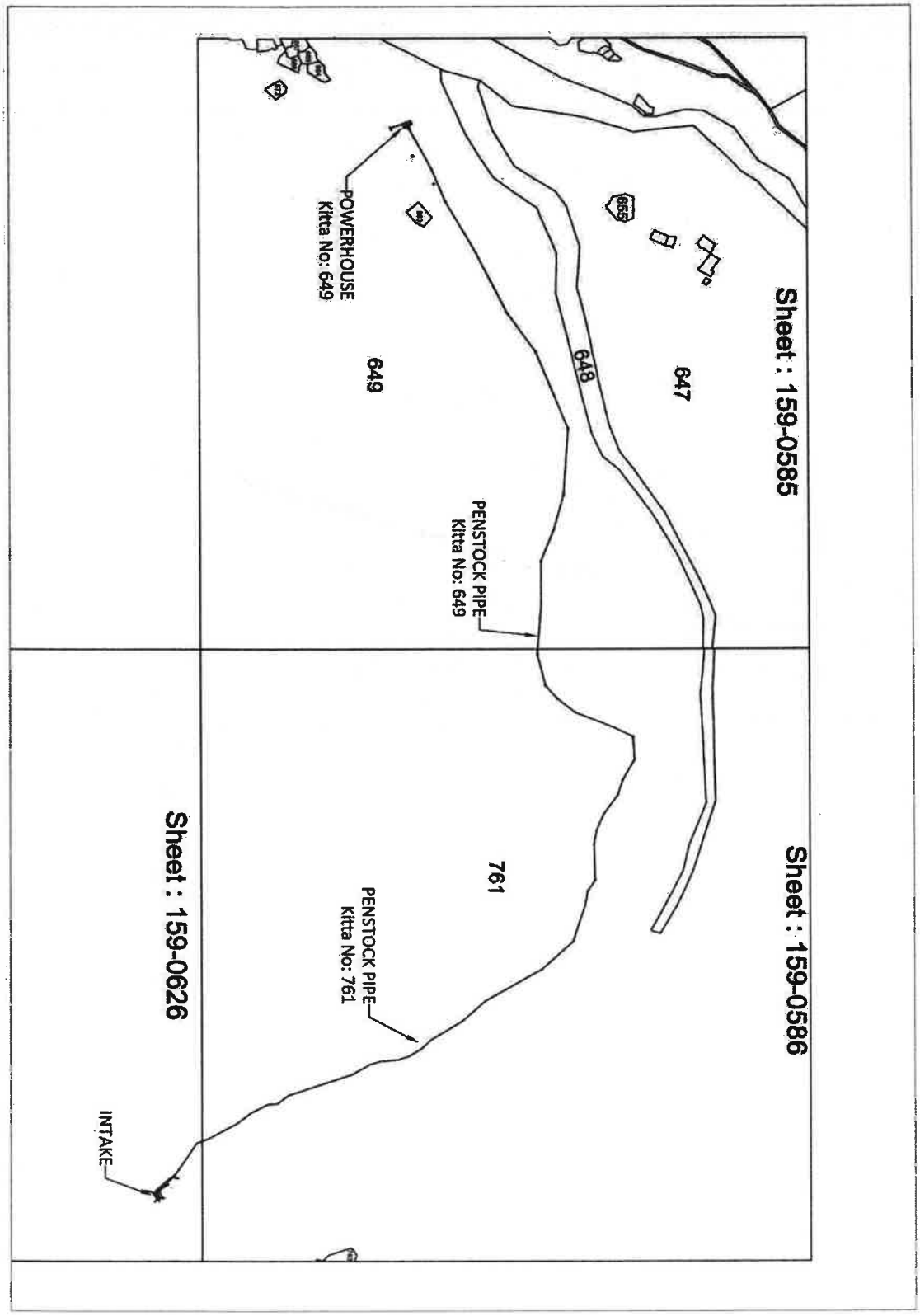
स्थान :- पाँडबोचे गुम्बा, खुम्बु पासाङल्हामु गाउँ पालिका वडा न.४,सोलुखुम्बु।
मिति :- २०७९/१०/१८ गते बुधबार।
समय :- बिहान १० बजे।

बोधार्थ

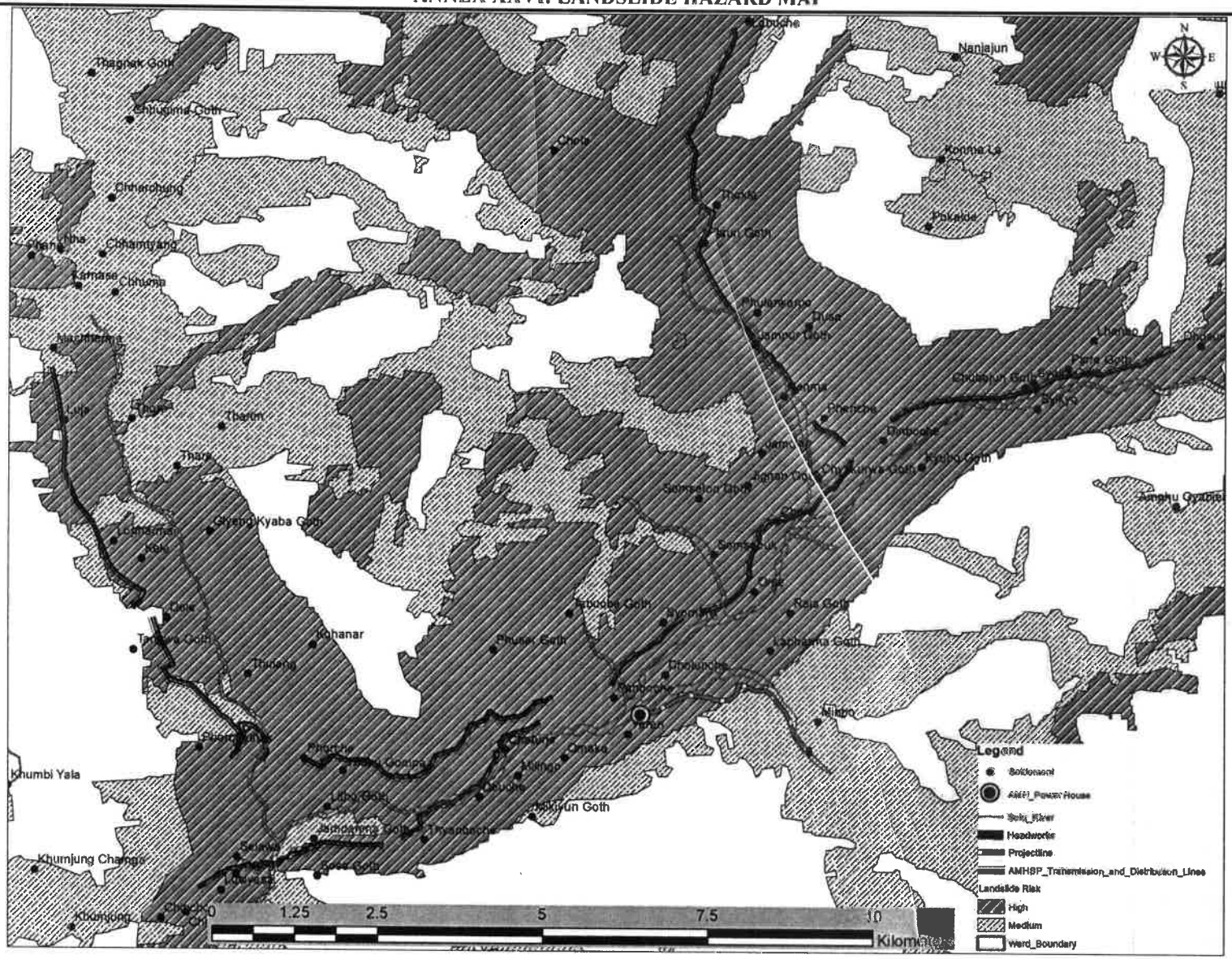
श्री अमादब्लम मिनी हाइड्रो प्रा.लि.
काठमान्डौ- ८ तिलगंगा,बागमती प्रदेश

भूमिराज उपाध्याय
प्रमुख संरक्षण अधिकृत

ANNEX XXV: PROJECT LAYOUT IN CADESTRIAL MAP

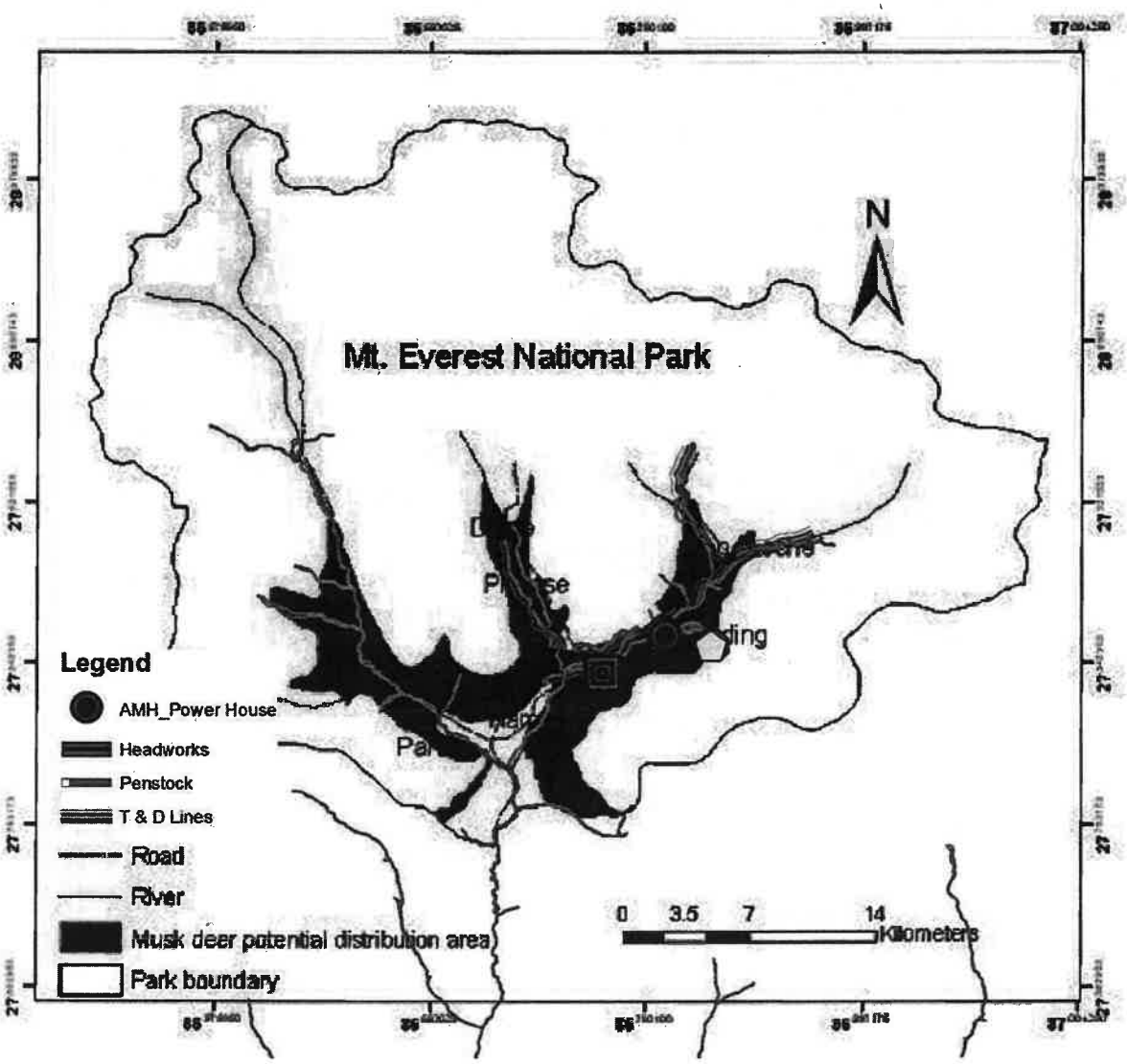


ANNEX XXVI: LANDSLIDE HAZARD MAP

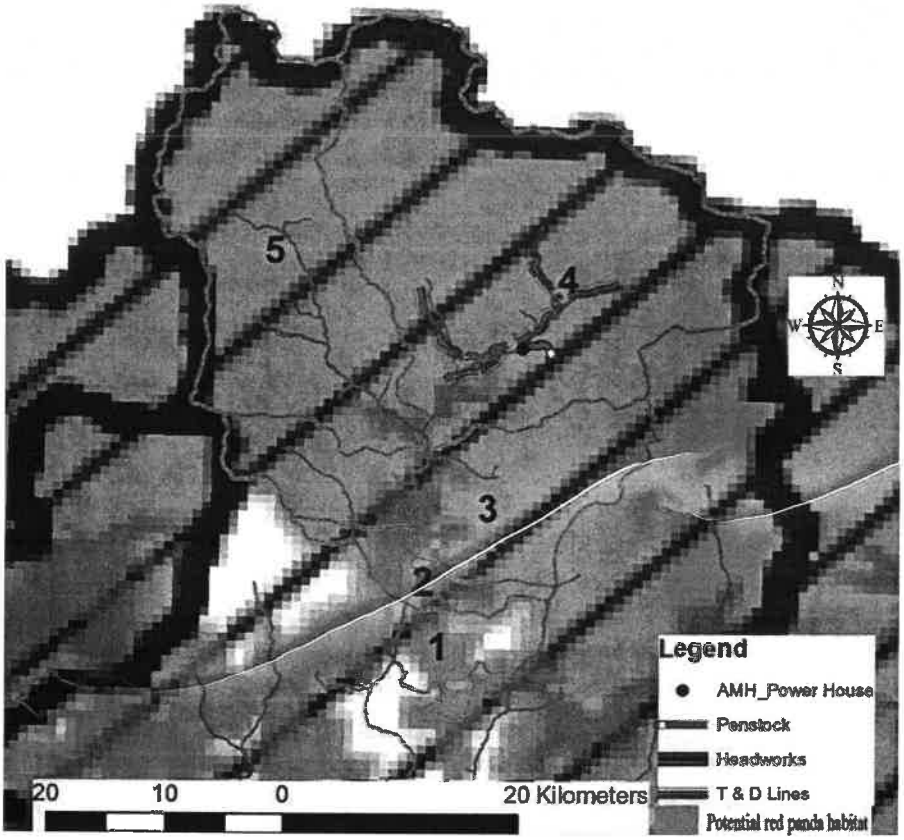


ANNEX XXVII: SPECIES DISTRIBUTION MAP

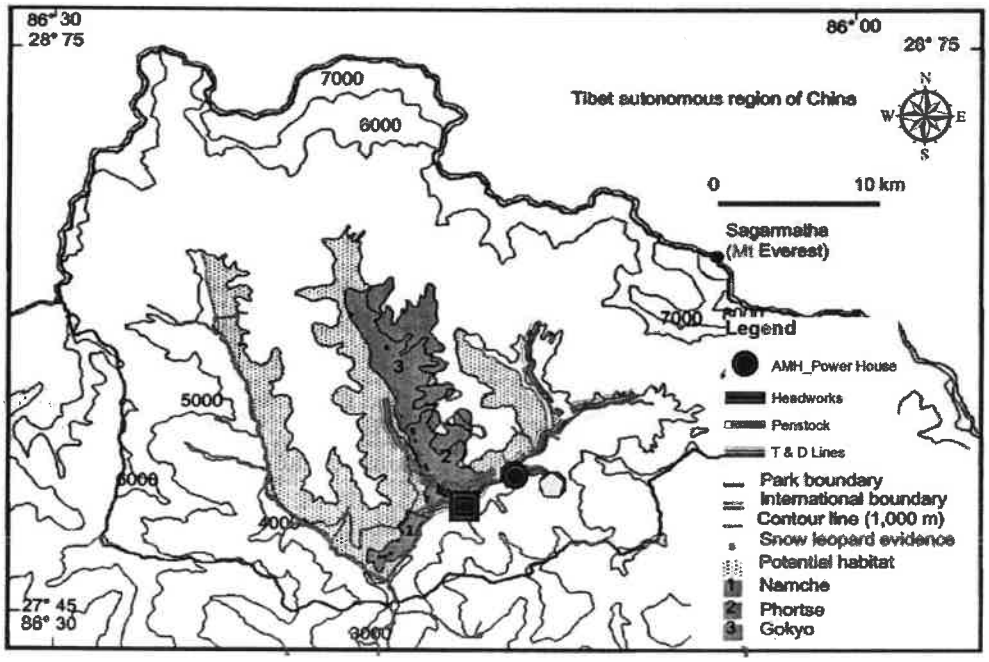
Musk Deer Potential Distribution Area



Red panda Potential Distribution Area



Snow Leopard Potential Distribution Area



ANNEX XXVIII: COMMENTS OF DoED AND RESPONSES

1. Written Comments/Suggestions

SN	Comments	Responses	Remarks
1	Revise the license for including transmission line, distribution and hydropower	Included in Annex I	
2	Recheck the language of the report.	Rechecked as possible and updated.	
3	Brief Report in Nepali should be included.	Attached in Annex III	
4	Recheck the recommendation from local level regarding the publication date.	Rechecked and updated -Annex XX	
5	पहिले मुचुल्का लिने त्यसपछि पत्रिकामा प्रकाशन गर्नु पर्ने हुन्छ ।	मुचुल्काको लागि सुचना पठाउने र पत्रिकामा सुचना निकाल्ने काम संग संगै भएको । पुनः मिति २०८०/१०/८ मा सूचना प्रकाशित गरिएको (Annex XIX)।	
6	Proponent लाई Pvt. Ltd. बाट Ltd. लेख्ने	Changed in whole documents.	
7	Update the name of Province	Updated in entire documents.	
8	Impact of airlift	Given in Chapter 7.1.3.1.1 (xvii)	
9	Add guidelines relating to UNESCO	Added in Chapter 4 (8.1)	
10	Analysis of 3 alternatives is missing. Give analysis in tabular form.	Incorporated in Chapter 6 Table No.: 33	
11	In legal rationality, add "national park" regard EIA approval from Ministry.	Mentioned National Park in rationality (Chapter 1.3)	
12	Area for Transmission lines is missing, area for transmission station, check its number.	Addressed in Table 9; No. of distribution box and transformer box has been updated and made uniformity.	
13	Show micro hydro in map and check its impact in EMP	Included map showing microhydo in report (Map 10) and the issue in EMP has been addressed (Table 46)	
14	Check royalty distribution , revenue distribution to province level	Addressed in Chapter 7.1.1.2 (iii)	
15	Specify land ownership in tabular form	Included Table 9	
16	Add technical team member eg. Hydropower and electrical engineer	Added in Table 1	

2. Written/Underlined Comments/Suggestions in Report

SN	Comments	Responses	Remarks
1	Recheck the language of the report.	Rechecked as possible and updated.	Addressed in Previous Comment 2
2	Brief Report in Nepali should be included.	Attached in Annex III	Addressed in Previous Comment 3
3	Clarify why the public notice of public hearing was published in National Daily Newspaper instead of Local Daily Newspaper.	No Local Daily Newspaper in the district	
4	पहिले मुचुल्का लिने त्यसपछि पत्रिकामा प्रकाशन गर्नु पर्ने हुन्छ।	मुचुल्काको लागि सुचना पठाउने र पत्रिकामा सुचना निकाल्ने काम संग संगै भएको। पुनः मिति २०८०/१०/८ मा सूचना प्रकाशित गरिएको (Annex XX)।	Addressed in Previous Comment 5
5	आयोजनाको आन्तरिक संरचना बिच आवतजावत गर्न आवश्यक पर्ने आन्तरिक पहुँच सडक यस EIA अध्ययनको दायरामा पर्ने वा नपर्ने प्रष्ट हुनु पर्ने। यदि पर्ने भएमा उक्त सडकलाई आवश्यक पर्ने जग्गाको क्षेत्रफल, स्वामित्व, र सडकको अन्य प्राविधिक बिषय र निर्माण सम्बन्धि सवाल यस EIA प्रतिवेदनमा समेट्नु पर्ने।	Addressed in Section 1.5	
6	SD/ToR स्विकृत पत्र, MOFE बाट EIA अध्ययन सहमती पत्र, तथा UNESCO बाट प्राप्त प्रतिक्रिया यस EIA प्रतिवेदनमा के-कसरी र प्रतिवेदनको कुन खण्डमा सम्बोधन गरियो प्रष्ट बुझिने गरि matrix बनाई यस EIA प्रतिवेदनको अभिन्न अङ्गको रुपमा राख्ने।	Attached with the Report	
	UNESCO's comments		
	Mitigation and Assessment of Alternatives	Given in Chapter 6	
	Consideration of Impacts on OUV	Given in 7.1.3.4	

SN	Comments	Responses	Remarks
	Stakeholder Consultations	Given in 3.2.3/3.5/3.6	
	New Guideline and Tool Kit for Impact Assessment in a world heritage context	Reviewed (Chapter 4: 8.1)	
	Hydropower within the World heritage property	There is no any other hydropower within the SNP till now.	
7	Project को component wise Land Table राख्ने र Cadastral Map मा Project Layout राख्ने । साथै Muck Disposal Site, Quarry Site Map मा देखाउने ।	Project को component wise Land Table, Table 9 मा राखिएको; Cadastral Map मा Project Layout राखिएको- Annex XXV; Muck Disposal Site, Quarry Site Given in Map 7.	
8	Landslide Hazard Map राख्ने ।	Annex XXVI	
9	TL/DL Underground गरिने भएकोले Muck Issue Seriously लेख्ने र Proper & Specific Mitigation Measure लेख्ने ।	Addressed in Section 7.1.3.1.1 (v)	
10	आयोजनालाई आवश्यक पर्ने वन क्षेत्र प्रयोग गरे वापत के गर्नेप्रष्ट आउनु पर्ने साथै जति वन क्षेत्र प्रयोग भएको छ सो बापत प्रति हेक्टर १६०० का दरले बृक्षारोपण गरिने बिषय आउनु पर्ने ।	Addressed in Section 8.2 (SN 1.1.1)	
11	Biodiversity Hotspot Mapping गरेर आयोजना स्थलबाट Critical Habitat Area कति टाढा पर्छ सो प्रस्तुत गर्दा राम्रो ।	Habitat Mapping of Major Wildlife (Snow Leopard/Musk Deer/Red Panda) has been given in Annex XXVII	
12	Approved ToR मा उठाइएका issues/impacts सबै सम्बोधन भए वा नभएको प्रस्ट पार्ने । यदि नभएको भए किन discard गरियो प्रस्ट पार्ने ।	Attached with the Report	
13	Change the Date (month) in front page	Changed in Front Page	
14	Recheck "there are no more OPs rather ESS of WB" [Page 40]	As the project was commenced, OPs were functional and OPs are followed for the project.	
15	Replace "World Heritage Advice Note: Environmental Assessment (18	When the study initiated, only the "World Heritage	

SN	Comments	Responses	Remarks
	Nov 2013): A step-by-step guidance on environmental assessment for world heritage properties" with " Guidance and Toolkit for Impact Assessment in World Heritage Context" published in 2022	Advice Note: Environmental Assessment (18 Nov 2013): A step-by-step guidance on environmental assessment for world heritage properties" was in existence, although review of recommended document was done.	
16	Page Arrangement in Page 43 [Chapter 5]	Made Correction (Chapter 5)	
17	Recheck IUCN Red list (Table 21/22/23)_page53/54	Rechecked	
18	How can you assure the low probability of GLOF from Nare Glacier? [Chapter 7.1.1.6.2 (i)-Page 74]	Explanation has been given in same Chapter.	
19	Survey License मा TL & DL पनि आउनु पर्ने ।	Added in Annex I	
20	मिति नमिलेको [Annex: XVIII-Recommendation Letter]	Amended the date (Now Annex XX)	

3. Terms and Condition/Suggestions given in Consent Letter for EIA Study

SN	Terms and Conditions/Suggestions	Responses	Remarks
१	प्रतावित आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयार गर्दा UNESCO को Operational Guidelines, विश्व सम्पदा सूचीमा सूचिकृत सगरमाथा राष्ट्रिय निकुन्ज सम्बन्धि उपलब्ध विवरण, स्थलगत अध्ययनको क्रममा संकलन गरिने तथ्य र तथ्यांकको आधारमा बिषय विज्ञबाट बस्तुगत विश्लेषण गरि/गराई सगरमाथा राष्ट्रिय निकुन्ज विश्वब्यापी महत्वको सम्पदा भएको हुँदा यसमा पर्ने प्रभाव सम्बन्धमा अध्ययन प्रतिवेदनमा प्रष्ट रुपमा उल्लेख गर्नु पर्ने ।	Addressed in Section 7.1.3.4	
२	वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन उपर UNESCO, WHC बाट प्राप्त हुने राय सुझाव प्रतिवेदनको अभिन्न अङ्ग हुनु पर्ने ।	Addressed all the comments and included in Annex XXI	
३	वातावरणीय अध्ययन गर्दा सगरमाथा राष्ट्रिय निकुन्ज कार्यालयका अधिकृत स्तरका प्राविधिक कर्मचारीलाई अनिवार्य संलग्न गराउने र साथै कार्यालयका कर्मचारीहरु, व्यवस्थापन समितिका	Ensurred the participation of SNP Staff in each activity (Annex	

SN	Terms and Conditions/Suggestions	Responses	Remarks
	पदाधिकारीहरु र स्थानीय सरोकारवालाहरु सँग अनिवार्य अन्तरक्रिया गरि प्राप्त राय सुझाव र कार्यालयसँग नियमित तवरमा राय परामर्श लिने साथै कार्यालयबाट प्राप्त हुने राय/सुझाव अन्तिम प्रतिवेदनको अङ्ग हुने गरि समावेश गर्ने व्यवस्था मिलाउनु पर्ने ।	XXIV) and taken suggestions from SNP (Annex XXII). All the concerns and suggestions were included in EIA report	
४	वातावरणीय अध्ययन गर्दाको सबै चरणहरुमा सगरमाथा राष्ट्रिय निकुन्ज, मध्यवर्ती क्षेत्र व्यवस्थापन समितिको सहभागिता सुनिस्चित गर्ने ।	Ensured during scoping, public hearing (Annex XVI), field study and also during consultation at Kathmandu (Annex XXII)	
५	अध्ययनको क्रममा स्थानीय जनता र सरोकारवाला निकायहरुबाट उठान भएका आर्थिक, सामाजिक, जौविक प्रभाव सम्बन्धि सवालहरु सम्बोधन गर्ने सम्बन्धमा अवलम्वन गर्नुपर्ने न्यूनीकरणउपायहरु प्रतिवेदनको अभिन्न अङ्गको रुपमा समेट्नु पर्ने।	Addressed the concerns and suggestions (For eg. Table 14)	
६	आयोजना निर्माण क्षेत्र वन्यजन्तुको प्रमुख वासस्थान (Ecological Hotspot) नपर्ने गरि अध्ययन गर्नु पर्ने ।	Taken in consideration during study; potential habitat distribution maps were also prepared and reviewed (Annex XXVII)	
७	वातावरणीय अध्ययन गर्दा विभिन्न विकल्पहरु अध्ययन गरि सो विकल्पहरु मध्ये र तथ्यांकको आधारमा जैविक विविधता र समग्र वातावरणमा न्यून नकारात्मक प्रभाव पुर्याउने विकल्पको छनौट गरि प्रतिवेदन तयार गर्नुपर्ने ।	Incorporated in Chapter 6 Table No.: 33	
८	अध्ययन टोलीमा वन्यजन्तु, वन तथा वातावरण विज्ञ र जैविक विविधता विज्ञ अनिवार्य सहभागी गराइ आयोजनाले त्यस क्षेत्रका रैथाने वन्यजन्तुहरूको आवतजावत र विभिन्न मौसममा बसाइसराइ गरी आउने जाने वन्यजन्तुहरुलाई कस्तो नकारात्मक प्रभाव पर्ने हो र त्यसका न्यूनीकरण र विकल्पका उपायहरु सम्बन्धि विस्तृत अध्ययन गरि यथार्थपरक र मापनयोग्य तथा प्रतिफलमूलक	Addressed the issues (Table 1/Section 7.1.3.2/8.2/Table 46)	

SN	Terms and Conditions/Suggestions	Responses	Remarks
	कार्यक्रम र बजेट वातावरण व्यवस्थापन योजनामा प्रस्ताव व्यवस्था गर्ने ।		
९	प्रस्तावित आयोजनाको लागि निर्माण गर्न प्रस्ताव गरिएका संरचनाहरुको GPS कोअर्डिनेट सहित GIS प्रविधि समेत प्रयोग गरी तयार गरिएको टोपोनक्सा प्रतिवेदनमा समावेश हुनु पर्ने ।	Given in Map 5	
१०	आयोजना निर्माणको लागि Biodiversity Hotspot नपर्ने गरि स्थानको अध्ययन हुनुपर्ने साथै वन, वन्यजन्तु, वनस्पति, स्थानीय वातावरण र प्राकृतिक सौन्दर्यताका साथै सो क्षेत्रको आर्थिक, सामाजिक, धार्मिक र पुरातात्विक महत्वका सम्पदामा आयोजना निर्माण कार्यबाट कम भन्दा कम नकारात्मक प्रभाव पर्ने बारे कम्तिमा ३ वटा विकल्पको अध्ययन हुनु पर्ने ।	Incorporated in Chapter 6 Table No.: 33	
११	संरक्षित क्षेत्र भित्र भौतिक पुर्वाधारहरु निर्माण तथा संचालन सम्बन्धि कार्यनीति -२०६५ को बुंदा ५ र ९ ले गरेको व्यवस्था बारे अध्ययन हुन ।	Reviewed accordingly.	
१२	राष्ट्रिय निकुन्जको क्षेत्रभित्र अन्य कुनै क्रियाकलाप र निर्माणका कार्य हुन नपाउने गरि राष्ट्रिय निकुन्ज तथा वन्यजन्तु संरक्षण ऐन २०२९ दफा (६), हिमाली राष्ट्रिय निकुन्ज नियमावली-२०३६ नियम (३०) र संरक्षित क्षेत्र भित्र भौतिक पुर्वाधारहरु निर्माण तथा संचालन सम्बन्धि कार्यनीति-२०६५ को कार्यनीतिको उद्देश्य (क) र कार्यनीति प्रयोग गर्नु पर्ने अवस्था (क) को व्यवस्था अनुरुप वातावरण संरक्षण ऐन २०७६ र वातावरण संरक्षण नियमावली २०७७ अनुसार हुनेगरी प्रस्तावित आयोजनाको वातावरणीय प्रभाव मुल्यांकन अध्ययन हुनुपर्ने ।	Reviewed accordingly.	

4. Terms and Condition/Suggestions given in ToR/SD Approval Letter for EIA Study

SN	Terms and Conditions/Suggestions	Responses	Remarks
१	वातावरणीय प्रभाव मुल्यांकन अध्ययनको क्रममा कुनै नयाँ थप सवाल पहिचान हुन आएमा तिनलाई समेत वातावरणीय प्रभाव अध्ययन प्रतिवेदनमा सम्बोधन गर्नु पर्दछ ।	Incorporated as possible in EIA report	
२	कार्यसूचीले औल्याएका सवालहरु अनुसार प्रभाव तथा प्रभाव न्यूनीकरणका उपायहरु क्रमवद्द रुपमा प्रस्तुत गर्नुपर्नेछ ।	Addressed as possible in EIA report.	
३	प्रस्ताव कार्यान्वयन तथा संचालनको सन्दर्भमा वातावरण सँग सम्बन्धित तथा सम्बन्धित क्षेत्रसंग सम्बन्धित ऐन, नियम,	Will be followed accordingly.	

SN	Terms and Conditions/Suggestions	Responses	Remarks
	निर्देशिका, मापदण्ड तथा परिपत्रहरुको पूर्णरुपमा पालना गर्नु पर्नेछ ।		
४	वातावरण व्यवस्थापन योजनामा सकारात्मक प्रभाव अभिबृद्दी र नकारात्मक प्रभाव न्यूनीकरणका उपायहरु के, कहाँ, कसरी, कसले र कहिले गर्ने बारे स्पष्ट उल्लेख भएको हुनुपर्ने ।	Addressed in Section 11.3 (Table 45/46)	
५	प्रस्तावित आयोजना निर्माण तथा संचालनको क्रममा निस्कने ठोस तथा तरल काम नलाग्ने चिजहरुको ब्यवस्थापन कसरी र कसले गर्ने भन्ने कुरा वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदनमा स्पष्ट रुपमा उल्लेख हुनु पर्नेछ ।	Issues are addressed in Section 7.1.3.1.1 [(viii)/ (xii)]/Section 7.1.3.1.2 (v)/Section 7.1.3.3.1 (iii)/Section 8.2 [1. Physical Env.- 1.1.12/1.2.4]	
६	वातावरणीय प्रभाव मुल्यांकन अध्ययन प्रतिवेदन तयारीको क्रममा गरिने सार्वजनिक सुनुवाईमा स्थानीय निकाय र सगरमाथा राष्ट्रिय निकुन्ज कार्यालयका प्रतिनिधि एवम् वन उपभोक्ता समुह र अल्पसंख्यक समुदायका प्रतिनिधि समेतको सहभागी गराएको सम्पुष्टि हुने कागजात संलग्न गर्नु पर्नेछ ।	Addressed the concerns (Annex XVI/ XXIV)	
७	सार्वजनिक सुनुवाईमा उठेका सवालहरुलाई माइन्युटिंग गरि सरोकारवालाहरुको हस्ताक्षर सहित प्रतिवेदनमा समावेश गर्नु पर्नेछ र ति सवालहरुको सम्बोधन हुनुपर्ने तथा यदि सम्बोधन नगरिने भएमा के कति कारणले सम्बोधन नहुने हो सो को उल्लेख गरिनु पर्नेछ ।	Minute in Annex XVI and Addressed the concerns (Table 14)	
८	प्रस्तावकले वातावरणीय प्रभाव अध्ययन प्रतिवेदन वातावरण संरक्षण ऐन २०७६ र वातावरण संरक्षण नियमावली २०७७ मा भएका व्यवस्था तथा वन तथा वातावरण मन्त्रालयको च.नं. २४३ मिति २०७८/०६/२४ को वातावरणीय प्रभाव मुल्यांकन अध्ययन सहमति पत्रमा उल्लेखित सर्तहरुको पूर्ण पालना गरि तयार पार्नु पर्नेछ ।	Addressed accordingly.	
९	स्थानीय निकायको सिफारिस संलग्न गर्दा सार्वजनिक सुनुवाइको मिति पश्चात हुनु पर्नेछ ।	Followed accordingly (Annex XX)	
१०	वातावरणीय प्रभाव अध्ययन प्रतिवेदनमा आयोजनाको विपद व्यवस्थापन सम्बन्धि कार्ययोजना समावेश गर्नु पर्नेछ ।	Addressed in Section 11.4	

ANNEX XXIX: COMMENTS OF MoFE AND RESPONSES

1. Main Comments and Responses

क्र. सं.	Comments	Responses/Remarks
१	आयोजनाको लागि आवश्यक पर्ने जग्गाको विवरण एकिन गरि लेख्नु पर्ने ।	Checked and updated all the land related information.
२	EIA अध्ययन सहमति तथा UNESCO बाट प्राप्त सुझाव कहाँ कसरी सम्बोधन गरिएको हो सो तालिका बनाई प्रतिवेदनमा संलग्न गर्नु पर्ने ।	Attached with the Report as Annex XXI
३	Construction time मा आवश्यक भएमा अरु समयमा पनि गर्न सक्ने प्रावधान राख्दा उपयुक्त हुने	Addressed in Concerned Chapter (8.2: 2.1.3)
४	Water Test Report मा coliform High देखिएकोले एकिन गरि उल्लेख गर्नु पर्ने	Addressed in Section 5.1.4.7 (d)
५	Plantation गर्ने Calculation को Data मिलाउनु पर्ने	Addressed in Section 8.2: 1.1.1
६	Freezing को कारणले Penstock Pipe मा आउने issue समेत समावेश गर्नु पर्ने र सो को व्यवस्थापनको विषय प्रष्ट पार्नु पर्ने	Has been addredded in Section 2.3
७	संरक्षण क्षेत्र भित्र भौतिक पूर्वाधार निर्माण, २०८० को कार्यविधि बमोजिम निर्माण गरिने कुरा review गरि सोहि अनुसार गर्नु पर्ने	Given in section 4.1 of Chapter 4.
८	जनशक्ति आवश्यकतामा करिब लेखिएको एकिन गरि Exact Calculate गरि लेख्नु पर्ने । Daily नलेखी Total लेख्नुपर्ने ।	Addressed the suggestion in Section 2.4.2 with Table 5; Section 7.1.1.1; Table 39 and other relevant places.
९	कोभिडका कारण हुने प्रभाव नराख्दा उपयुक्त हुने	Removed from the report
१०	Executive Summary र Text को विवरणमा एकरुपता हुनु पर्ने (५०% पानी छोड्ने तर खोला सुख्खा हुने समेत लेखिएको मिलाउनु पर्ने)	Corrected in the report
११	Household Survey कतिमा गरिएको हो सो खुलाउनु पर्ने	Addressed in Section 3.2.3
१२	FGD गरिएको कति जना संग गरिएको प्रष्ट पार्नुपर्ने । KII को समेत कतिजना संग तथ्यांक लिइएको र सो बाट प्राप्त भएको डाटा समेत Text मा हुनुपर्ने	Addressed in Section 3.2.3
१३	आयोजना संग आकर्षित हुने ऐन, नियम मात्र राख्नु पर्ने र किन आकर्षित हुन्छ लेख्नु पर्ने	Only relevant Act, Rules and Regulations have been written in Chapter 4.

क्र. सं.	Comments	Responses/Remarks
१४	Social Data को Caste/Ethnicity मा Frequency नराखी percentage मात्र राखिएको सच्याउनु पर्ने	Total number has been included in the respective chapter-5.3.4
१५	Social Data को baseline मा कतै RM र कतै Project Affected Household को मात्र रहेकोमा consistency राखी दुबैको राख्नु पर्ने	Data have been presented as per suggestion
१६	Figure number code गरिएको नमिलेको हुँदा प्रतिवेदन भर चेक गरि सच्याउनु पर्ने (Text मा र Figure no. मा एकरुपता)	Updated throughout the report
१७	९ वटा bufferzone को user group रहेको कुरा उल्लेख रहेको तर bufferzone नपर्ने लेखिएको प्रष्ट पार्नु पर्ने	The project area lies in SNP. There are many settlements in SNP and SNP had made the provision of buffer zone user groups for the locals residing inside SNP to involve in conservation activities.
१८	Issue को title vague नराखी specific हुनु पर्ने	Made specific as possible
१९	विद्युत विकास विभागबाट प्राप्त भएका रायसुझावहरु सम्बोधन गरिएको तालिका समेत प्रतिवेदन समावेश गर्नु पर्ने	Attached in Annex XXVIII
२०	Construction material daily basis मा कति संकलन/उत्खनन गर्ने हो सो प्रष्ट आउनु पर्ने	Addressed in 2.4.4
२१	Crusher Plant खोलाबाट कति दुरीमा हुने कुरा प्रष्ट पार्नुपर्ने	There is no plan for establishment of crusher plants. Aggregate will be prepared mannually.
२२	अनुसूची १२ रहेको कुरा रा.नि. व. सं. ऐनको review गरिएको Text मा विवरण के रहेको समेत खुलाउनु पर्ने	Not Clear: annex 12 of EPR 2020 is simply the EIA format; Review of National Parks and Wildlife Conservation Acts is in Chapter 4
२३	हिमाली रा. नि. नियमावली समेत review गर्नु पर्ने	Already in Section 3.2.13 of Chapter 4
२४	River मा dumping गर्ने कुरा लेखिएको सच्याउनु पर्ने	There is no such provision in report.
२५	Male and Female will be equally paid भनेर Text मा मिलाएर लेख्दा उपयुक्त हुने	Given in Section 8.1: 3.1.7
२६	निकुन्जको जग्गा प्रयोग गर्ने, सो को सट्टा भर्ना र Compensation को कुरा उल्लेख गर्नु पर्ने	Given in Section 8.1: 3.1.1
२७	Saliant Features मा Dewatered Zone राख्नु पर्ने र सो को विवरणमा एकरुपता हुनु पर्ने	Addressed in Table 2
२८	Quarry Site र spoil disposal site को coordinate एउटा नै रहेको प्रष्ट पार्नु पर्ने	Quarry site लाई नै rehabilitate गर्नलाई spoil disposal site पनि त्यहीं नै बनाएको

क्र. सं.	Comments	Responses/Remarks
२९	CSR को लागि activities र budget allocate गरेको विवरण खुलाउनु पर्ने	There is no provision of CSR in the proposed project due to size of project.
३०	EMP र Mitigation को टेबलको विवरणमा एकरुपता हुनु पर्ने	EMP र Mitigation को टेबलको विवरणमा एकरुपता कायम गरिएको
३१	Mitigation को Text मा shall be done को सट्टामा will be done लेख्दा उपयुक्त हुने	Incorporated the comments throughout the report
३२	PPE will be provided to workers भनेर लेख्नु पर्ने	Addressed in 7.2.3
३३	Bird relfector आवश्यक रहे/नरहेको प्रष्ट पार्नु पर्ने	Necessary in poles in river crossing
३४	Workers लाई कति frequently awareness program गर्ने हो सो प्रस्ट पार्नु पर्ने	Addressed in 8.2: 2.1.13
३५	EMP मा कहाँ गर्ने कुरा सबैमा प्रष्ट खुलाउनु पर्ने	Given in Table 45/46
३६	Spoil लाई segregate गरे पश्चात् के गर्ने कुरा उल्लेख गर्नु पर्ने	The report has clearly mentioned that spoils will be used for rebahilition of quarry sites and excess spoils will be safely disposed in spoil disposal sites.
३७	वन नियमावली, २०७९ review गर्नु पर्ने । संहिताको कार्यविधि समेत review गर्नु पर्ने	Reviewed Forest Regulation (Chapter 4, Section 3.2.1); Not clear about "संहिताको कार्यविधि"- कुन कार्य विधि हो?
३८	बर्षे भरि ५०% पानी छोड्ने लेखिएको Text सच्याउनु पर्ने	Corrected throughout the report.
३९	पेज ५३ मा वैज्ञानिक नाम लेख्दा spelling italize गर्नु पर्ने	Corrected in same section
४०	EIA Hydropower Guideline 2018 को mannual मा रहेको baseline data collection को अनुसार मिलाउनु पर्ने	Already followed the mannual while preparing the report.
४१	यस मिटिंगमा प्राप्त लिखित राय सुझाव यस माइन्यूटको अभिन्न अंग रहेको छ	Included in report as Annex XXIX

2. Comments and Responses (Post Raj Dhungana)

क्र. सं.	Comments	Responses/Remarks
१	रिपोर्ट स्पाइरल बाईन्डीङ गर्दा राम्रो हुने ।	Accepted
२	कार्यकारी सारांश पेज XI-XVII मा भएको आयोजनाको मुख्य बिशेषताहरुको विवरण छोटकरीमा राख्ने	Addressed the comments
३	कार्यकारी सारांश पेज XIX मा भएको भू-उपयोग ढांचा सम्बन्धि तथ्यांक सच्याउने	Corrected
४	कार्यकारी सारांश पेज XXI, ६.१ सकारात्मक प्रभावमा भएको रोजगार सम्बन्धि २०० अदक्ष र ८० दक्ष जनशक्ति सम्बन्धि तथ्यांकलाई पुनर्विचार गर्ने	Corrected
५	कार्यकारी सारांश पेज XXII, ६.२.३ सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा राखिएको "कोभिड-१९" हटाउने	Corrected
६	पेज २६, ३.२.३ सामाजिक, आर्थिक, तथा सांस्कृतिक वातावरणको घरधुरी प्रश्नावलिमा direct impact zone र indirect impact zone को परिभाषा रिपोर्टमा देखिंदैन सबैभन्दा पहिला यसको परिभाषा गर्नु पर्यो	Defined in ToR
७	पेज २६, ३.२.३ सामाजिक, आर्थिक, तथा सांस्कृतिक वातावरणमै उल्लेख गरिएका HHs Survey, Focus Group Discussion, र Key Informant Interview हरुमा HHs Survey कतिवटा घरमा गरियो? FGD कतिवटा गरियो ? र KII कतिजना संग गरियो स्पष्ट उल्लेख गरि ति बाट के कस्ता डाटा लिइयो समेत उल्लेख गर्नु पर्ने	Addressed in Section 3.2.3
८	रिपोर्टमा धेरै ठाउँमा data table मा Frequency नराखी Percentage मात्र राखिएको छ, यसमा पहिला Frequency राखेर मात्र data लाई Percentage मा राखेर देखाउनु पर्ने हुन्छ	Total number has been included in the respective chapter-5.3.4
९	रिपोर्टमा उल्लेख गरिएका basically, hardly, majority, nearly, some, approximately जस्ता generic word हटाउने	Incorporated the comments throughtout the report
१०	रिपोर्टमा सबै data table मा Source उल्लेख गर्ने	Addressed the suggestion

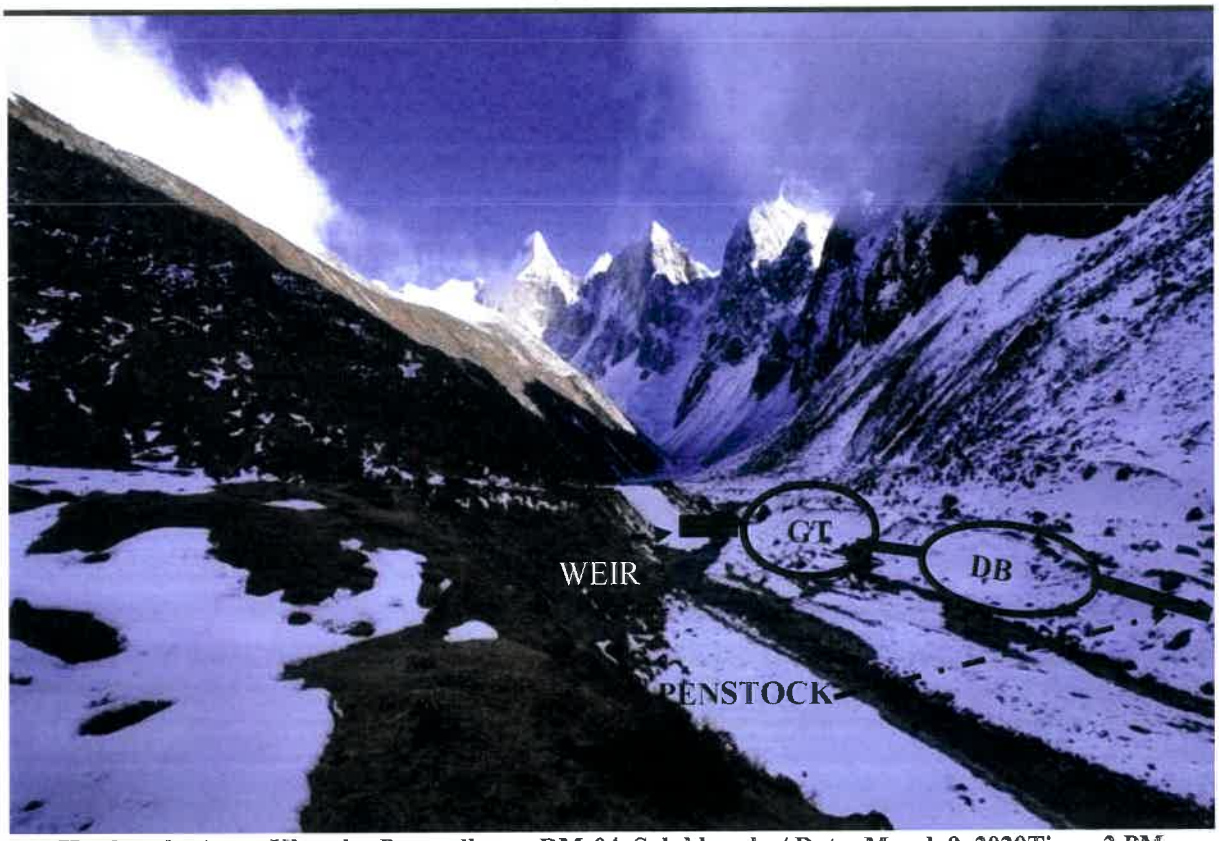
3. Comments and Responses (Anil KC)

SN	Comments	Responses/Remarks
1	Environmental Flow/riparion release is 50% of monthly flow, it is good but why 50% of the average monthly flow, is it result of study or taken from any reference, cite some where.	As the project site lies inside SNP, the environmental flow should maintain 50% of monthly flow(according to The working Policy for Construction and Operation of Physical Infrastructure within Protected Area (2009) .
2	Nepali Summary Language Problems,"तोकिएको क्षेत्रमा नै नचाहिने उत्खनन भण्डार गरिने छ", सुधार गरि वाक्य प्रष्ट हुनु पर्ला ।	Addressed in Nepali Executive Summary-7.2.1
3	IUCN-1993 and now EPR 2077 can also be taken as reference for Significance.	Addressed in Section 3.3 of Chapter 3.
4	Why 16 parameters for water quality, NDWQS is taken as reference or what else? 16 is focused, is there any other logics?	Yes, NDWQS was taken as reference.
5	Coliform presence is significance, better to put remarks on it, though doesnot matter to HP.	Addressed in Section 5.1.4.7 (d)
6	Sound dB is good but when. Self measured it would be fine to put the leg value (if possible/data available).	Addressed the comments in section 3.2.1 of Chapter 3; Leg could not be put at this time as it was not considered during field.
7	Slope stability (7.1.3.4), how it became beneficial, you may have missed something in writing, please review.	It is beneficial because the site is already unstable and the site will be made stable during project implementation, so it is beneficial.
8	Similarly 0634 ha land, it missed point and 1600 plants per hectare here gives big figure so if calculated (0.634*1600=1015) would be easy to consider. If possible give some suitable name for plants for plantation.	Addressed the comments in section 1.1.1 of Sction 8.2; Name of plants for plantation has not been given due to fact that this may narrow down the choice of plants while plantation.
9	Riverbed material extraction, shall be written, will follow the government norms and standards and with consensus from local level.	Addressed in section 2.4.4.
10	Impacts and effects of freezing and Thawing, possibility of blokage of pipes, obstruction of production can be issues missed, but if thesse are overcome by design standard, shall be reflected somewhere as temperature is almost below freezing point 9 month of the year)	Addressed the issue in section 2.3

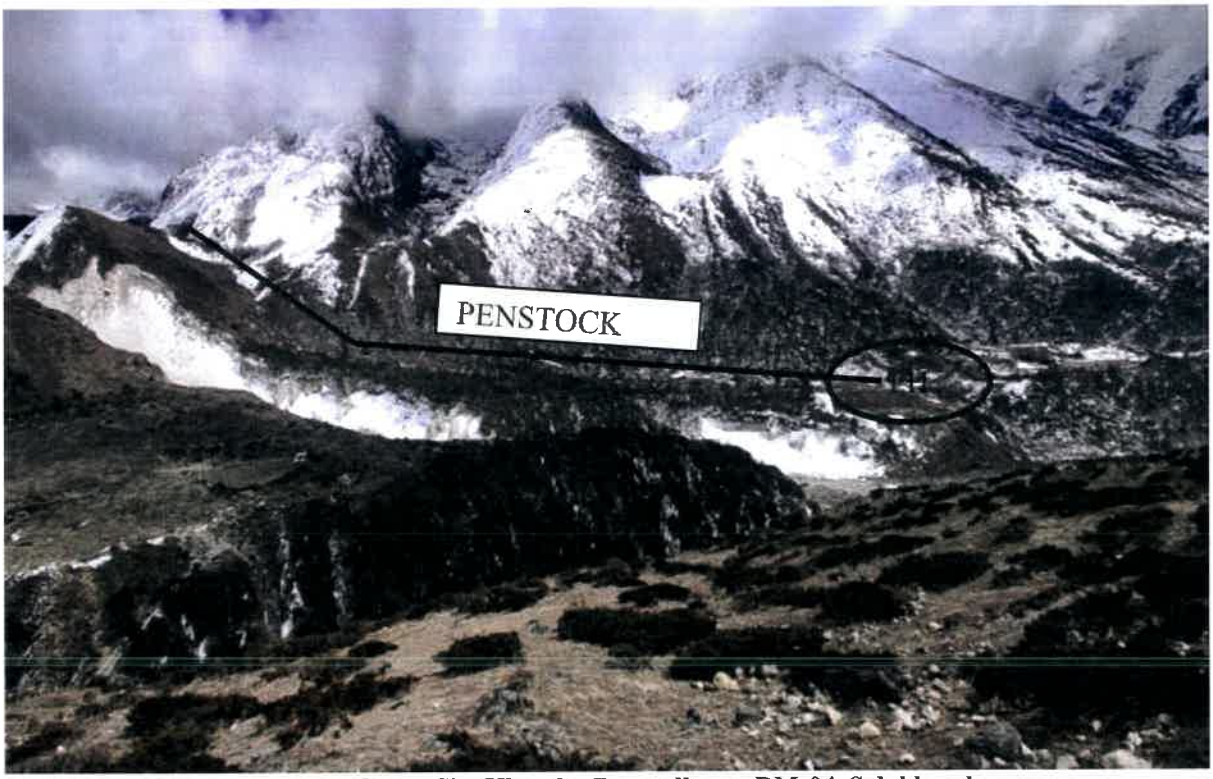
4. Comments and Responses (Pritika Pushpam)

क्र. सं.	Comments	Responses/Remarks
१	ठोस फोहोरलाई कम्पोष्ट गरिने भए कम्पोष्ट गरिने विधि तथा फोहोर मात्रा अनुरुप आवश्यक साधनहरु पनि उल्लेख गर्नु पर्ने	Addressed in 1.2.4 of Section 8.2
२	वायु, ध्वनिको लागि प्रयोग भएको विधि उल्लेख गर्नुहोस	Given in Section 3.2.1
३	वृक्षारोपणको हकमा कुल कति बिरुवा रोपिने भनेर अंकमा लेख्नु होस्	Addressed the comments in section 1.1.1 of Sction 8.2
४	Construction Material सम्बन्धि जानकारी प्रतिवेदनमा map र table मार्फत स्पष्ट नभएको	Given in Section 2.4.4/5
५	वन्यजन्तुलाई असर अनुगमन मात्र रहेको, wildlife friendly infrastructure हरुको निर्माण राख्न सकिने	There is no heavy physical infrastructure development in the proposed proposal. The laying of T & D lines and Penstock pipe underground itself could be the wildlife friendly infrastructure.
६	क्रसर प्लान्ट सम्बन्धि जानकारी (नदि बाटको दुरी, फोहोरपानी व्यवस्थापन प्रणाली) उल्लेख गर्नु पर्ने	There is no provision of crusher plants; gravels, pebbles and sand will be collected, segregated mannually
७	सार्वजनिक सुनुवाई कार्यक्रममा सहभागीको संख्या न्यून रहेको	This was mainly due to low population residing in the area due to cold during the public hearing time.

ANNEX XXX: PHOTOGRAPHS



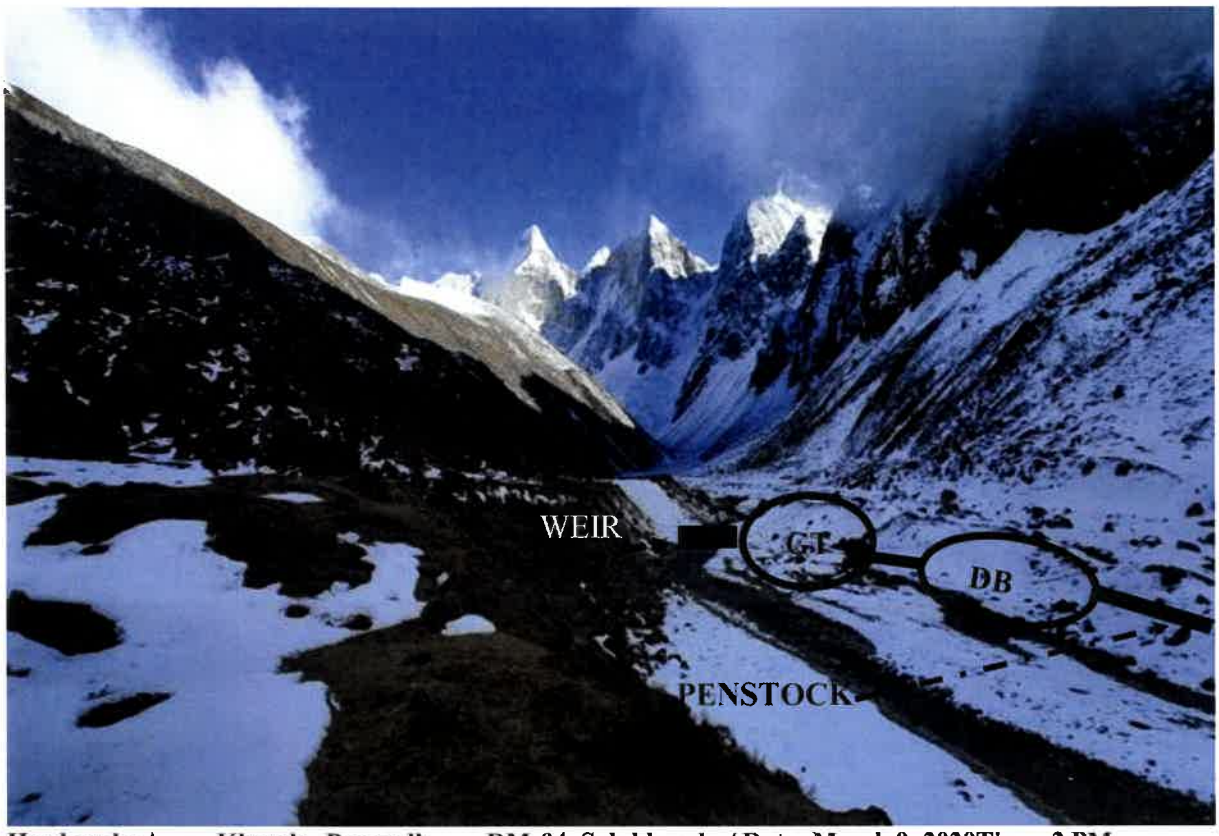
Headworks Area: Khumbu Pasanglhamu RM-04, Solukhumbu/ Date: March 9, 2020Time: 2 PM



Penstock Alignment and Powerhouse Site Khumbu Pasanglhamu RM-04, Solukhumbu
Date: March 9, 2020Time: 10 AM

Meeting at Phortse, Khumbu Pasanglhamu RM-04, Solukhumbu/ Date: March 7, 2020Time: 6 PM

Meeting at Pangboche: Khumbu Pasangkhamu RM-04, Solukhumbu/ Date: March 8, 2020 Time: 11 AM



Headworks Area: Khumbu Pasanglhamu RM-04, Solukhumbu/ Date: March 9, 2020Time: 2 PM

Penstock Alignment and Powerhouse Site Khumbu Pasanglhamu RM-04, Solukhumbu
Date: March 9, 2020Time: 10 AM (Photo Source: DFS Report)

Participants of Public Hearing at Pangboche Gumba, Khumbu Pasanglhamu RM-04, Solukhumbu, 2079/10/18, 10 am