

Initial Environmental Examination (Updated)

October 2019

Nepal: Electricity Transmission Expansion and Supply Improvement Project

Tamakoshi (New Khimti)-Kathmandu 200/400 kV and 132 kV Transmission Lines

Prepared by Nepal Electricity Authority for the Asian Development Bank.

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Nepal Electricity Authority

(Government of Nepal Undertaking)

Project Management Directorate

Social Safeguard and Environmental Management Department



Our Ref. No.: 31-078/79

Date: August 30, 2021

Mr. Arnaud Cauchois
Country Director
Nepal Resident Mission,
Asian Development Bank
Metro Park Building,
Lazimpat, Kathmandu

Subject: Submission of Updated approved IEE of TKTLP for disclosure on website
(Project No. 41155-013)

Dear Sir,

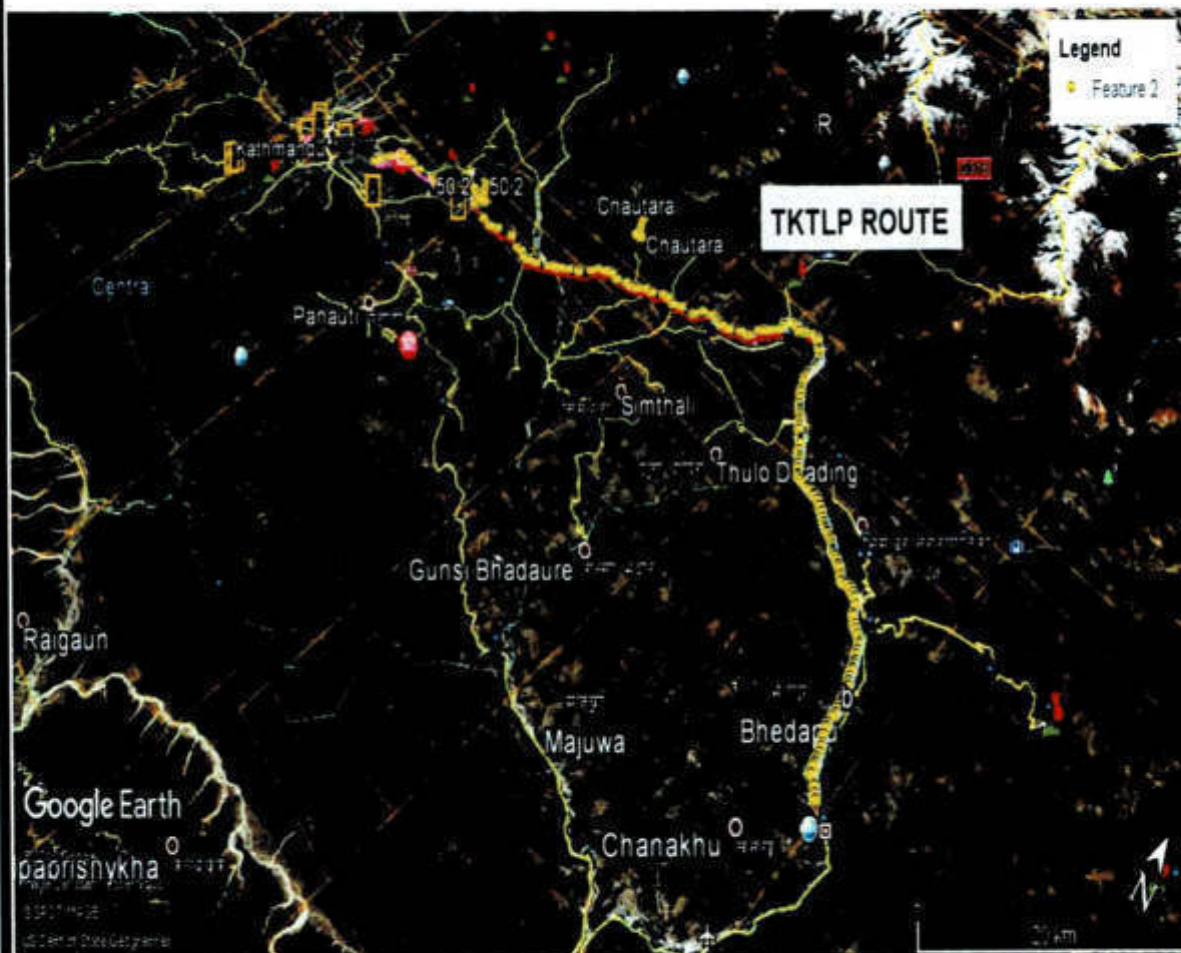
Please find the attached scan copy of approved Updated Initial Environmental Examination (U-IEE) Report with Appendix (PDF file -2) of Tamakoshi- Kathmandu 220/400 kV Transmission Line Project Double Multi Circuit (TK-TLP) components for your kind information and disclosure on website as per ADB Safeguards Policy Statement 2009.

Sincerely yours,

Rajan Rishi Kadel
Director

Cc:

To the Deputy Managing Director,
Project Management Directorate, NEA



**UPDATED INITIAL ENVIROMENTAL EXAMINATION (U-IEE)
OF
TAMAKOSHI-KATHMANDU 220/400 kV TL PROJECT
Double& Multi Circuit**

SUBMITTED TO:

**Ministry of Energy, Water resources and Irrigation
Singhadurbar, Kathmandu**

THROUGH:

**Department of Electricity Development
Sanogaucharan, Kathmandu**

Prepared and Submitted by:

**NEPAL ELECTRICITY AUTHORITY
PROJECT MANAGEMENT DIRECTORATE
Tamakoshi-Kathmandu 220/400 KV TL Project
Kharipati, Bhaktpur**

October, 2019



कार्यकारी सांराँश

१.० आयोजनाको प्रस्तावक तथा अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण अध्ययनको क्रममा संलग्न संस्था

नेपाल विद्युत प्राधिकरण (ने.वि.प्रा.), प्रस्तावित तामाकोशी काठमाण्डौ २२०/४०० के.भी. प्रसारण लाइन आयोजनाको प्रस्तावक हो । ने.वि.प्रा.को स्थापना वि.स.२०४२ साल भाद्र १ मा भएको हो र यो नेपाल सरकारको पूर्ण स्वामित्वमा रहेको एक संगठित संस्था हो । प्रस्तावित २२०/४०० के.भी. प्रसारण लाइन आयोजनाको प्रारम्भिक वातावरणीय अध्ययन प्रतिवेदन मिति २०७३/०२/०६ गते तत्कालिन उर्जा मन्त्रालय बाट स्वीकृत भईसकेको छ । उर्जा मन्त्रालय, विद्युत विकास विभाग (महानिर्देशकस्तर)को यस आयोजना निर्माण गर्ने विद्युत प्रसारणको अनुमतिपत्र प्राप्त भएको हो जसको अवधि २०९९/०७/२६ सम्म बहाल रहेको छ । यस आयोजनाबाट निर्माण हुने प्रसारण लाईनको पुर्व निर्धारित Route परिवर्तन भएको छैन । स्वीकृत IEE मा रहेको कुल रुख संख्या २६०६१ र वन क्षेत्रको जग्गा भोगाधिकार तथा रुख कटान हेतु तयार पारिएको रुख विरुवा लगत रिपोर्टमा कुल रुख संख्या ३५२३१ रहेको छ जुन स्वीकृत IEE रिपोर्टमा उल्लेखित रुख विरुवाको संख्या भन्दा ९१७० ले बढ्न गएको छ । उक्त रुख संख्या बढ्नुको कारण सिन्धुपाल्चोक जिल्लाको जलबिरे सब-डिभिजन वन कार्यालय अन्तर्गत आयोजनाको ROW मा पर्ने रुख संख्या IEE प्रतिवेदनमा उल्लेखित संख्या भन्दा रुख विरुवा लगत रिपोर्टमा वृद्धि हुँदा हुन गएको हो । तसर्थ यो अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण(Updated IEE) तयार गर्नु परेको छ । अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण यस आयोजनाले विद्युत विकास विभागको मिति २०७६/०४/२० को पत्रानुसार तयार गरिएको छ ।

२.० आयोजना सम्बन्धी विवरण

तामाकोशी-काठमाण्डौ २२०/४०० के.भी. प्रसारण लाईन आयोजनाले तामाकोशी तथा त्यस क्षेत्रमा रहेका अन्य नदिहरुमा निर्माणधिन अवस्थामा रहेका विभिन्न जलविद्युत आयोजनाहरुबाट उत्पादित विद्युतलाई राष्ट्रिय प्रसारण लाईनमा जोड्ने लक्ष्य लिएको छ ।

प्रस्तुत आयोजना २ खण्डमा विभाजन गरिएको छ खिम्ती-बाहबिसे र बाहबिसे-काठमाण्डौ । खिम्ती-बाहबिसे खण्डको प्रसारण लाईन रामेछाप जिल्लाको फुलासी गा.वि.स मा निर्माणधिन सबस्टेशनबाट शुरु भई दोलखा तथा सिन्धुपाल्चोक जिल्लाका विभिन्न नगरपालिका तथा गा.वि.सहरु पार गर्दै बाहबिसे सबस्टेशनमा गएर टुङ्गिने छ । प्रसारण लाईनको यस खण्डमा दोलखा जिल्लाको पुरानो १ नगरपालिका तथा ७ गा.वि.स.हरु तथा सिन्धुपाल्चोक जिल्लाका ५ गा.वि.स हरू पर्दछन् । समग्रमा प्रसारण लाईनको यस खण्डमा रामेछाप, दोलखा र सिन्धुपाल्चोक जिल्लाका १३ गाविस हरू तथा १ नगरपालिका परेका छन् । त्यसैगरी दोलखा जिल्लाको मागापौवा गाविस र सिन्धुपाल्चोक जिल्लाको टौथली गाविस भएर प्रसारण लाईन आयोजना जानेछ तर उक्त गाविसहरुमा कुनैपनि एंगल टावरहरु रहने छैनन् ।



त्यसैगरि बाह्रबिसे-काठमाण्डौ खण्डको प्रसारण लाईनसिन्धुपाल्चोक जिल्लाको बाह्रबिसे सबस्टेशन बाट शुरु भई सिन्धुपाल्चोक, काभ्रेपलाञ्चोक, भक्तपुर तथा काठमाण्डौ जिल्लाका विभिन्न पुरानो गाविस तथा नगरपालिकाहरु पार गर्दै भक्तपुर जिल्लाको चाँगुनारायण सबस्टेशनमा गएर टुङ्गिने छ । प्रसारण लाईनको यस खण्डमा सिन्धुपाल्चोक जिल्लाको ८ गा.वि.स.हरु, काभ्रेपलाञ्चोक जिल्लाका ४ गा.वि.स.हरु, भक्तपुर जिल्लाका २ नगरपालिकाहरु तथा काठमाण्डौ जिल्लाको १ नगरपालिका पर्दछन्। समग्रमा प्रसारण लाईनको यस खण्डमा सिन्धुपाल्चोक, काभ्रेपलाञ्चोक, भक्तपुर तथा काठमाण्डौ जिल्लाका १२ गाविस हरू तथा ३ नगरपालिका हरू परेका छन् । यो आयोजना निर्माण क्रम रहेको हुनाले प्रसारण लाइन आयोजनाको निर्माण १२ महिनाको सम्पन्न हुने छ ।

प्रारम्भिक वातावरणीय परिक्षण				अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण		
विकास क्षेत्र	अन्चल	जिल्ला	ग.वि.स./नगरपालिका	प्रदेश	जिल्ला	गाउँपालिका/नगरपालिका
मध्यमाञ्चल	जनकपुर	रामेछाप	फुलासी	३	रामेछाप	मन्थली
	जनकपुर	दोलखा	मेलुंग,भेडापु,ध्यागन्सुकाठोकर पवटी,फस्कु,मागापौवा,भीमेधर बोच लाकुरीडाँडा		दोलखा	मेलुंग सेलुंग भीमेधर
	बागमती	सिन्धुपाल्चोक	पिस्कर,चोकटी,कर्णली,टौथली बाह्रबिसे,राम्चे,मांखा,फुलपिनडाँडा कदमबास,इर्खु,ठुलोसिरुवारी भोटसिपा		सिन्धुपाल्चोक	त्रिपुरासुन्दरी बाह्रबिसे बलेफी चौतारा इन्द्रावती
	बागमती	काभ्रेपलाञ्चोक	चन्डेनी मण्डन,महादेवस्थान,नयाँ गाउँ,बालुवापाटी		काभ्रेपलाञ्चोक	मण्डनदेउपुर
	बागमती	भक्तपुर	महामन्जुश्री-नगरकोट, चाँगुनारायण		भक्तपुर	चाँगुनारायण
	बागमती	काठमाडौं	शंखरापुर		काठमाडौं	कागेश्वरी शंखरापुर



३.० अध्ययन विधि

वातावरण संरक्षण ऐन, २०५३ (शंसोधन,सहित) र राष्ट्रिय वातावरणीय प्रभाव मूल्याङ्कन (EIA) निर्देशिका, २०५०को अधिनमा रही यस आयोजनाको अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदन तयार गरिएको छ। नेपाल सरकारले विभिन्न समयमा लिएको कानूनी प्रकृया, स्थलगत अध्ययन, स्थानिय जनतासंगको अन्तरकृया आदि यस प्रतिवेदन तयारको सद्दभमा लिइएका सामग्रीहरु हुन् ।

अध्ययनको क्रममा भौतिक वातावरण अध्ययन अन्तर्गत हावापानी, भौगोलिक अवस्था, भू-उपयोग सम्बन्धी तथ्याङ्कको प्रयोग गरिएको छ भने जैविक वातावरणमा वन्यजन्तु र वनस्पति सम्बन्धि तथ्याङ्कहरु प्रयोग गरिएको छ। त्यस्तै सामाजिक आर्थिक तथा सांस्कृतिक वातावरणको अध्ययनको लागि जनसंख्या, धर्म, संस्कृति, जाति, पूर्वाधार आदि तथ्याङ्कहरुको सहायता लिइएको छ। यसका साथै सहभागितामुलक ग्रामिण लेखाजोखा (PRA) र मुख्य सूचनादातासंग अन्तर्वार्ता(KII) तथा अनौपचारिक छलफल जस्ता विधिहरुको पनि प्रयोग गरिएको छ। आयोजनाको बारेमा जानकारी सम्बन्धि सार्वजनिक सूचना गोरखापत्र दैनिकमा मिति २०७६।०४।२७ मा प्रकाशित गरिएको छ।

४.० वातावरणसम्बन्धी ऐन, नियम तथा कानुनी प्रावधानहरु

प्रस्तुत प्रतिवेदन तयार गर्ने क्रममा वातावरण संरक्षणसंग सम्बन्धित विद्यमान नीति, नियम, ऐन, कानून तथा निर्देशिकाहरुको पुनरावलोकन गरिएको छ । तसर्थ आयोजना कार्यान्वयन गर्दा प्रस्तावकले वातावरण संरक्षणसंग सम्बन्धित विद्यमान नीति, नियम, ऐन, कानून तथा निर्देशिकाहरुमा तोकिएका मापदण्डहरुलाई विशेष रुपमा ध्यान दिनेछ । यस बाहेक आयोजना कार्यान्वयनको क्रममा माथि उल्लेखित कानुनी प्रावधानका अतिरिक्त अन्य ऐन नियमको आवश्यकता भएको खण्डमा आयोजना प्रवन्धकले सो को पनि पालना गर्ने छ । यस आयोजना अध्ययनको क्रममा विद्युत तथा जलश्रोत संग सम्बन्धित नीति, ऐन, नियमावली, तथा निर्देशिकाहरु जस्तै जलविद्युत विकास नीति २०४८, विद्युत ऐन २०४९, जलश्रोत नियमावली २०५०, विद्युत नियमावली २०५० आदिको पुनरावलोकन गरिएको छ । त्यसै गरी वातावरण संरक्षण ऐन २०५३, वातावरण संरक्षण नियमावली २०५४ (हालसम्मको संशोधित), जग्गा प्राप्ति ऐन २०३४, वन ऐन २०४९, वन नियमावली २०५१, स्थानिय स्वायत्त शासन ऐन २०५५, स्थानिय स्वायत्त शासन नियमावली २०५६, वातावरणीय प्रभाव मूल्याङ्कन सम्बन्धी राष्ट्रिय निर्देशिका २०४९, वन पैदावार संकलन तथा बिक्री वितरण सम्बन्धि निर्देशिका २०५७, अन्तर्राष्ट्रिय श्रम संगठनको महासन्धि नम्बर १६९ विद्युत नियमन आयोग ऐन २०७४, विद्युत नियमन आयोग ऐन २०७५, वातावरण परिवर्तन नीति २०७६ आदि जस्ता महत्वपूर्ण ऐन, नियमहरु अध्ययन प्रतिवेदन तयार गर्ने क्रममा पुनरावलोकन गरिएको छ ।

५.० आयोजना क्षेत्रको विद्यमान वातावरणीय अवस्था

५.१ भौतिक वातावरण

खिम्ती-बाह्रबिसे खण्ड

४२.६३८ कि.मी. लामो प्रस्तावित प्रसारण लाइन आयोजनाको यस खण्ड नेपालको केन्द्रिय भागको मध्य पहाडी भूभाग भएर जान्छ । यस आयोजना क्षेत्रको उचाइ समुन्द्री सतहबाट ६३९ मीटर (शितली, फुलासी) देखि २७१९ मीटर (दोबाटो, लाकुरी डाँडा) सम्म रहेको छ । आयोजनाको उद्गमस्थल घुमाउने, फुलासीको उचाई ६५३ मीटर तथा अन्तिम बिन्दु सानो पलाटी, बाह्रबिसेको उचाई १४१५ मीटर रहेको छ ।

बाह्रबिसे-काठमाण्डौ खण्ड

५५.७२२ कि.मि. लामो प्रस्तावित प्रसारण लाइन आयोजनाको यस खण्ड नेपालको केन्द्रिय भागको मध्य पहाडी भूभाग भएर जान्छ । यस आयोजना क्षेत्रको उचाइ समुन्द्री सतहबाट ७२३ मीटर (चन्देनी) देखि १८२० मीटर (वालुवापाटी, देउपुर) सम्म रहेको छ । आयोजनाको उद्गमस्थल सानो पलाटी, बाह्रबिसे को उचाई १४१५ मीटर तथा अन्तिम बिन्दु चाँगुनारायण नगरपालिकाको उचाई १३५२ मीटर रहेको छ । चाँगुनारायण सबस्टेसन बाट ४ कि.मि. को १३२ के.भी मल्टी सर्किट लाईन मनाहोरा कोरिडोर हुदै दुवाकोट स्थित रहेको १३२ के.भी. प्रसारण लाईनमा जोडिने छ । जुन मल्टी सर्किटले कुनै किसिमको सामाजिक, आर्थिक तथा वातावरणमा प्रतीकुल प्रभाव पार्ने छैन ।

आयोजना क्षेत्रको जमिनको प्रकार मुख्यतः खेतीयोग्य जमिन, जंगल (सामुदायिक, सरकारी तथा निजी), चरण क्षेत्र, बाँझो जमिन आदि रहेको छ । यस प्रसारण लाईनले विशेष गरेर घना बस्ती, घना जंगल, मुख्य संरचनाहरू तथा संरक्षित क्षेत्रहरूलाई सकेसम्म छुलेको छ । त्यसैगरी प्रसारण लाईन क्षेत्रभित्र पर्ने अन्य जमिनका प्रकारहरूमा खोला तथा खोल्सीहरू, सडकहरू, खोलाका किनारा, प्रसारण तथा वितरण लाईनहरू आदि पर्दछन् । आयोजना स्वीकृत IEE प्रतिवेदन अनुसार ६४.०६७% खेतीयोग्य जमिन, १८.२८३% जंगल तथा बाँकी १७.६५ बाँझो जमिन, झाडी, घासे मैदान, सडक तथा खोला भएर जान्छ । त्यसैगरी आयोजनाको Updated IEE अनुसार ६९.८७% भाग खेतीयोग्य जमिन, २१.९२% भाग जंगल तथा बाँकी ८.२१४% भाग बाँझो जमिन, झाडी, घासे मैदान, सडक तथा खोला क्रसिड भएर जान्छ ।

५.२ जैविक वातावरण

स्वीकृत IEE प्रतिवेदन अनुसार आयोजनाको १२९ बटा मध्ये २६ बटा एंगल टावर जंगल पर्दछ जसले ०.५८५ हे. जमिन ओगट्दछ । त्यसैगरी Updated IEE अनुसार आयोजनाको १२९ बटा एंगल टावर र २९८ सस्पेन्स टावर मध्ये ३० बटा एंगल र ४० बटा सस्पेन्स टावर गरी जम्मा ७० बटा टावर जंगल क्षेत्रमा पर्दछ जसले ८.५७५ हे. जमिन ओगट्दछ । टावर प्याडको साईज ३५मि. x ३५मि. लिएको कारण टावरले ओगट्ने जग्गा बढ्न गएको छ । आयोजना क्षेत्रमा भौगोलिक अवस्था, हावापानी माटो आदिको भिन्नताको कारणले यहाँको वन र वनस्पतिमा पनि विविधता पाइएको छ । यस क्षेत्रमा उष्ण र समसितोष्ण क्षेत्रमा पाइने वन पाईन्छ । आयोजना क्षेत्रमा पाइने प्रमुख वनस्पतिहरूमा खोटे सल्ला, उत्तिस, चिलाउने, बाझ, साल, क्यामुनो, पतुला सल्ला आदि रहेका छन् भने विभिन्न

औषधिमुलक बुट्यानहर जस्तै लोक्ता, अर्गेली, कुरिलो, नागबेली, चिराइतो, अमला आदि पनि आयोजना क्षेत्रमा प्रशस्त मात्रामा भेटिएका छन्।

वनस्पतिहरूको अतिरिक्त आयोजना क्षेत्रमा विभिन्न प्रजातिका जंगली जनावर, चरा, सरिसृप आदिको पनि पहिचान गरिएको छ । चितुवा, स्याल, लंगुर, रतुवा मृग, बँदेल, मलसाप्रो, बाँदर, जंगली विरालो, आदी यस क्षेत्रमा पाइने प्रमुख जंगली जनावरहरू हुन भने मैना, काग, ढुकुर, भैँरो, तिन्ना, कालिज, कोइली, सुगा, बाँज, गौथली, लामपुछ्रे आदी आयोजना क्षेत्रमा पाइने चराहरू हुन् । संरक्षित स्तनधारी जनावर सलक पनि यस आयोजना क्षेत्रभित्र पर्दछ । त्यसैगरि प्रसारण लाईन आयोजना क्षेत्रभित्र पर्ने नदिहरूमा कत्ले र असला माछाहरू पाईएका छन् ।

IEE प्रविवेदन अनुसार आयोजनाको ५ जिल्लाहरूमा कुल १६६७ वटा सामुदायिक वनहरू पर्दछ जसमध्ये ५१ वटा सामुदायिक वनहरू आयोजनाको एंगल टावर तथा ROW मा पर्दछन् । त्यसैगरि सरकारी वनहरू सिन्धुपाल्चोक जिल्लामा (२ वटा) तथा काभ्रेपलाञ्चोक जिल्लामा (२ वटा) मा पर्दछन्।

Updated IEE मा यस आयोजनाको ५ जिल्लाहरूमा कुल १६६७ वटा सामुदायिक वनहरू पर्दछ जसमध्ये ५३ वटा सामुदायिक वनहरू आयोजनाको एंगल टावर तथा ROW मा पर्दछन् । त्यसैगरि सिन्धुपाल्चोक जिल्ला मा २ वटा सरकारी वन तथा २ वटा कबुलियत वन मा एंगल टावर तथा ROW पर्दछन्।

५.३. सामाजिक, आर्थिक तथा साँस्कृतिक वातावरण

आयोजना प्रभावित जिल्लाको कुल क्षेत्रफल १४६५१ वर्ग कि.मी. रहेको छ । नेपालको जनगणना २०६८ अनुसार आयोजना प्रभावित जिल्लाहरूको कुल जनसंख्या ३१,०७,८२९ रहेको छ जसमा पुरुष १५,६९,५६१ तथा महिला १५,३८,२६८ रहेको छ जुन राष्ट्रको कुल जनसंख्याको ११.७३% रहेको छ । आयोजना प्रभावित जिल्लाको कूल घरधुरी तथा औसत घरधुरी संख्या क्रमशः ७,४१,९८६ तथा ४.३७ रहेको छ । त्यसैगरि साक्षरता दर (६ वर्ष तथा माथिका) ७०% रहेको छ।

प्रस्तावित आयोजना क्षेत्रमा रहेका प्रभावित गाउँपालिका तथा नगरपालिकाहरूको कुल जनसंख्या २१,५७८४ रहेको छ । जसमध्ये पुरुष १०१८२३२ महिला ११३९६१ छन् । आयोजनाबाट प्रभावित ६ जिल्लाको कुल जनसंख्या मध्ये गाउँपालिका तथा नगरपालिकाहरूको जनसंख्या ६.९४% रहेको छ । त्यस्तै आयोजना क्षेत्रको कुल घरधुरी संख्या ५०३६७ रहेको छ भने औसत घरधुरी संख्या ४.२८ रहेको छ ।

यस आयोजना क्षेत्रमा रहेका मुख्य जातजातीहरूमा क्षेत्री (२५.५४%), तामाङ (२१.३६%), नेवार (१९.७०%), बाहुन (१५.३४%) आदि रहेका छन् जसले आयोजना क्षेत्रको कुल जनसंख्याको महत्वपूर्ण हिस्सा (८१.९४%) ओगटेका छन् । यस क्षेत्रमा नेपालीभाषा बोल्नेको जनसंख्या सबैभन्दा बढि (६१.८२%) रहेको छ भने त्यसपछि तामाङ, नेवार, थामी, दनुवार तथा अन्य भाषा बोल्ने जनसंख्या पनि उल्लेखनिय मात्रामा रहेका छन् ।

आयोजना क्षेत्रको औसत साक्षरता दर ६३.२९% रहेको छ जसमा पुरुष साक्षरता ७२.५४ तथा महिला साक्षरता ५५.४५% रहेको छ । प्रमुख पेशा जिविकोपार्जन तथा व्यवसायिक खेती रहेको छ । काभ्रेपलाञ्चोक जिल्ला खाद्यान्न बाली तथा तरकारी खेतीको लागि प्रसिद्ध छ ।



५.३.१ आयोजना प्रभावित परिवारहरू

आयोजनाबाट प्रत्यक्ष प्रभावित हुने परिवारहरू मध्ये १९७ घरधुरीहरूको सामाजिक, आर्थिक तथा सांस्कृतिक अवस्था बारे विश्लेषण गरिएको छ । नमुना छनौट गरिएका १९७ घर परिवारको कूल जनसंख्या ११७०मध्ये ५९९ (५१.९७%) पुरुष र ५७१ (४८.८०%) महिला रहेका छन्। त्यस्तै औषत घरधुरी संख्या ५.९ रहेको छ। आयोजनाबाट प्रभावित परिवारहरूको प्रमुख धर्म हिन्दु तथा बौद्ध रहेको छ जसमा हिन्दु धर्म मान्ने घरधुरी ८५.७९% तथा बौद्ध धर्म मान्ने घरधुरी १३.७१% रहेका छन्। सर्वेक्षण गरिएका कुल जनसंख्याको करिब ८४.१९% साक्षर जनसंख्या पाइयो जसमा पुरुष साक्षरता ८९.८२% र महिला साक्षरता ७८.२८% रहेको छ। नमुना अध्ययन गरिएका घरपरिवारहरू अधिकांश कृषि तथा कृषिसंग सम्बन्धित कार्यमा नै संलग्न रहेको पाइन्छ। यस क्षेत्रमा करिब ३५.७६% जनसंख्या कृषिमा आश्रित रहेको देखिन्छ। त्यसैगरी कृषिका अतिरिक्त सेवा (११.०५%), दैनिक ज्याला मजदुरी (मुलुक भित्र ९.८८% तथा मुलुक बाहिर ८.१९%), विद्यार्थी (२२.५०%), व्यापार व्यवसाय (६.११%) तथा घरायसी काम (६.२४%) विशेष नै अध्ययन क्षेत्रको प्रमुख कार्यको रूपमा रहेको छ। धान, मकै, कोदो तथा आलु उनीहरूको जग्गामा उत्पादन हुने प्रमुख बालीहरू हुन्।

आयोजना प्रभावित क्षेत्रको घरधुरी सर्वेक्षण अनुसार औसत वार्षिक आम्दानी रु. ३,९९,७८३।- प्रति परिवार छ जहाँ आम्दानीको श्रोतमा कृषि तथा पशुपालन रहेको छ। आम्दानी को अन्य श्रोत अन्तर्गत रेमिट्यान्स, सेवा, व्यापार, दैनिक ज्याला मजदुरी तथा वृद्ध भत्ता आदि पर्दछन्। त्यसैगरी सर्वेक्षण गरिएको घरधुरीहरूको वार्षिक औषत खर्च रु. ३,२९,२२०।- रहेको छ। आम्दानी र खर्चको तरिका हेर्दा वार्षिक औसत बचत रु. ७०,५६३।- प्रति परिवार देखिन्छ।

६.० वातावणीय प्रभाव

६.१ भौतिक वातावरण

आयोजनाको निर्माणको चरणमा स्थायी र अस्थायी रूपमा लिइने जग्गा नै प्रस्तावित आयोजनाको भौतिक वातावरणमा पर्ने प्रमुख प्रभावको रूपमा लिइएको छ। IEE प्रतिवेदन अनुसार आयोजनाले कूल ४७०.९२१८ हेक्टर जग्गा टावर निर्माण, सबस्टेशन निर्माण, क्याम्प निर्माण, ROW तथा अन्य अस्थायी प्रयोजनको लागि अधिग्रहण गरिने छ। यसरी अधिग्रहण गरेको जमिन मध्ये २५.८५७५ हे. स्थायी रूपमा सबस्टेशन, तथा टावर प्याडको लागि लिनेछ भने बाँकी ४४५.०६४३ हे. प्रसारण लाईनको ROW को लागि लिईने छ। प्रसारण लाईन भरि जम्मा १२९ बटा एंगल टावर तथा १९८ बटा सस्पेन्सन टावरहरू निर्माण हुनेछन् र प्रत्येक टावरले १५ मि. x १५ मि. अर्थात ०.०२२५ हे. को क्षेत्रफल ओगट्ने छ। समग्रमा ९३ बटा एंगल टावर खेतीयोग्य जमिनमा, २६ बटा जंगलमा तथा बाँकी १० बटा अन्य ठाउँमा रहने छन्। त्यस्तै १४२ बटा सस्पेन्सन टावर खेतीयोग्य जमिनमा तथा ४० बटा सस्पेन्सन टावर जंगलमा रहने छन् भने बाँकी १६ बटा अन्य भूभागमा पर्दछन्। आयोजनाले कूल ४७०.९२१८ हेक्टर जग्गा टावर निर्माण, सबस्टेशन निर्माण, क्याम्प निर्माण, च्यङ् तथा अन्य अस्थायी प्रयोजनको लागि अधिग्रहण गरिने छ। त्यसैगरी Updated IEE मा अधिग्रहण गरेको जमिन मध्ये ५८.५५७५ हे. स्थायी रूपमा सबस्टेशन, तथा टावर प्याडको लागि लिनेछ भने बाँकी ४१२.३६४३ हे. प्रसारण लाईनको ROW को लागि लिईने छ। प्रसारण लाईन भरि जम्मा १२९ बटा एंगल टावर तथा १९८ बटा



सस्पेन्सन टावरहरू निर्माण हुनेछन् र प्रत्येक टावरले ३५ मि. x ३५ मि. अर्थात ०.१२२५ हे. को क्षेत्रफल ओगट्ने छ । समग्रमा ८९ वटा एंगल टावर खेतीयोग्य जमिनमा, ३० वटा जंगलमा तथा बाँकी १० वटा अन्य ठाउँमा रहने छन् । त्यस्तै १४२ वटा सस्पेन्सन टावर खेतीयोग्य जमिनमा तथा ४० वटा सस्पेन्सन टावर जंगलमा रहने छन् भने बाँकी १६ वटा अन्य भूभागमा पर्दछन् ।

६.२ जैविक वातावरण

IEE प्रतिवेदन अनुसार प्रसारण लाइन निर्माणको क्रममा जम्मा १२६.४ हेक्टर वन क्षेत्रको जग्गा आवश्यक पर्ने हुन्छ । आयोजनास्थलमा गरिएको स्थलगत निरीक्षणको आधारमा कूल १२९ एंगल टावरहरू मध्ये २६ एंगल टावर जंगल क्षेत्रमा पर्दछन् जसले ०.५८५ हे. जमिन ओगट्ने छ । तथा आयोजना निर्माणको चरणमा १८,२८४ पोलहरू तथा ७,७७७ रुखहरू कटान गर्नुपर्ने देखिन्छ । त्यसैगरी Updated IEE अनुसार प्रसारण लाइन निर्माणको क्रममा जम्मा १०३.२२०२ हेक्टर वन क्षेत्रको जग्गा आवश्यक पर्ने हुन्छ । आयोजनास्थलमा गरिएको स्थलगत निरीक्षणको आधारमा कूल १२९ एंगल टावरहरू मध्ये ३० एंगल टावर जंगल क्षेत्रमा पर्दछन् जसले ३.६७५ हे. जमिन ओगट्ने छ । तथा आयोजना निर्माणको चरणमा १३,४४३ पोलहरू तथा २१,७८८ रुखहरू कटान गर्नुपर्ने देखिन्छ । हटाउनु पर्ने रुखका मुख्य प्रजातिहरूमा साल, सल्ला, चिलाउने, उत्तिस तथा क्यामुना, बोट धायरो आदि पर्दछन् । आयोजना निर्माण र संचालन अवधिमा त्यस क्षेत्रका वन्यजन्तु, पशुपंक्षी हरूको वासस्थान तथा संख्यामा पनि केही मात्रामा असर पर्न जाने देखिन्छ ।

६.३ आर्थिक, सामाजिक तथा सांस्कृतिक वातावरण

प्रस्तावित आयोजना निर्माण गर्दा उक्त आयोजनाले जमिन, वालीनाली घर तथा अन्य संरचनामा उल्लेख प्रभाव पार्ने देखिन्छ । कुल १९७ घरधुरीहरूको सर्वेक्षण गरिएकोमा आयोजनाको कार्यान्वयनबाट १८३ घरधुरीहरूलाई आयोजनाको विभिन्न पुर्वाधारहरूको निर्माणको क्रममा प्रत्यक्षरूपमा असर पर्ने देखिन्छ । तर यी घरधुरी हरूमा सस्पेन्सन टावरको निर्माणबाट प्रभाव पर्ने घरधुरी समेटिएको छैन । सर्वेक्षण गरिएको घरधुरीहरू मध्ये २० घरधुरी हरूको ३० संरचनाहरू (२० घर तथा १० गोठ) हटाउनुपर्ने हुन्छ ।

Updated IEE अनुसार करिब १०२.३६ कि.मी. लामो प्रसारण लाईन आयोजनाले ३२९.०२०७ (६९.८७%) हेक्टर खेतीयोग्य जमिन प्रभाव पार्नेछ । उक्त जमिन मध्ये ५८.५५७५ हे. जमिन स्थायी रूपमा (एंगल टावर तथा सस्पेन्सन टावर तथा सबस्टेशन निर्माणको लागि अधिग्रहण गरिनेछ । आयोजनाले निर्माण गर्न लागेको कूल १२९ एंगल टावर तथा १९८ सस्पेन्सन टावरहरू मध्ये २३१ (८९ एंगल तथा १४२ सस्पेन्सन) टावर व्यक्तिगत खेतीयोग्य जमिनमा पर्नेछन् । यी टावरहरूले कुल २८.२९७५ हे. क्षेत्रफल ओगट्ने छन् । आयोजनाको निर्माण संचालनबाट आयोजनाले अधिग्रहण गर्ने जमिनबाट प्रभावित घरधुरीहरूको वार्षिक १२९.७४ मे. टन अन्नबाली पूर्णरूपमा क्षति हुने देखिन्छ भने कुल १५३१.७९ मे.टन अन्नबाली प्रसारण लाईनको तार तान्ने कार्य गर्दा नष्ट हुने देखिन्छ ।



७.० प्रभाव न्यूनीकरणका उपायहरू

७.१ भौतिक वातावरण

भौतिक वातावरणमा पर्ने प्रभावलाई न्यूनीकरण गर्नको लागि सकभर कम जमिन तथा बस्तिहरूमा क्षति पुग्ने गरी आयोजनाको निर्माण गर्ने उपायहरूको अवलम्बन गरिने छ । टावर तथा सबस्टेशन निर्माणको क्रममा निस्किएको माटोलाई निर्माण पश्चात पूर्ववत् रूपमा राख्नका साथै टावर निर्माणपूर्व सो स्थानको स्थिरताको पनि अध्ययन गरिने छ । त्यसैगरी अति संवेदनशील स्थानहरूमा छुट्टै बनावट (Design)को टावरहरूको निर्माण गरिनेछ । अस्थिर तथा भिरालो जमिनमा टावर निर्माण प्रतिबन्ध गरिनेछ भने पहिरोहरू बाट बच्न यस्ता स्थानहरूमा आवश्यकतानुसार बृक्षारोपण कार्य पनि गरिनेछ । त्यसैगरी आवश्यकतानुसार बायो ईन्जिनियरिङ कार्य पनि गरिनेछ ।

७.२ जैविक वातावरण

आयोजना निर्माण गर्दा जैविक वातावरणलाई पनि असर गर्दछ । आयोजना निर्माण गर्दा वन क्षेत्रका रुखहरू हटाउनु पर्ने हुन्छ । यसबाट पर्ने नकारात्मक प्रभाव न्यूनीकरण गर्नको लागि खास गरी कम रुखहरू काटिने गरी आयोजनाको कार्य सम्पन्न गरिने छ भने काटिएका रुखहरूको क्षतिपूर्ती स्वरूप विभिन्न प्रजातिका विरुवाहरूको बृक्षारोपण गर्न बृक्षारोपण कार्यक्रम संचालन गर्नुपर्ने हुन्छ । यसको सम्पुर्ण लागत खर्च प्रस्तावक स्वयंले बेहोर्ने छ । आयोजनाका कारिन्दाहरूलाई अवैध शिकार निरुत्साहन गर्न कडा प्रतिबन्ध लगाईने छ भने वनजंगल तथा वन्यजन्तु संरक्षण, जैविक विविधता, र यसको महत्वको सम्बन्धमा सचेतना कार्यक्रम संचालन गरिनेछ ।

७.३ आर्थिक सामाजिक तथा सांस्कृतिक वातावरण

जग्गाको क्षतिपूर्ती

IEE मा स्थायी रूपमा अधिग्रहण वा उपयोग गरीने जमिनको क्षतिपूर्तीको लागि करीव रु ८६,५३,६२,०५७।- खर्च हुने देखिएको थियो । U-IEE अनुसार स्थायी रूपमा अधिग्रहण वा उपयोग गरीने जमिनको क्षतिपूर्तीको लागि करीव रु ९९,३०,३५,८६२।- खर्च हुने देखिन्छ । आवश्यक जग्गा 'जग्गा प्राप्ति ऐन २०३४' तथा प्रभावित परिवार तथा आयोजनाविच को आपसी समझदारीमा अधिग्रहण गरिनेछ ।

उत्पादन क्षतिपूर्ती

आयोजना निर्माणको क्रममा वालीनालीहरूलाई क्षति पुग्ने देखिन्छ । जम्मा १६६१.५३ मे. टन खाद्यान्न नष्ट हुने देखिन्छ । उक्त खाद्यान्न क्षतिपूर्तीको लागि जम्मा रु ५,९०,८८,८५०।- खर्च हुने देखिन्छ ।

संरचना क्षतिपूर्ती

कतिपय घर र अन्य संरचनाहरू पनि आयोजना निर्माणको चरणमा हटाउनु पर्ने हुन्छ जम्मा ३० संरचनाहरू प्रस्तावित आयोजना कार्यन्वयन गर्दा हटाउनु पर्ने देखिन्छ । यसको लागि उचित क्षतिपूर्तीको व्यवस्था गरिने छ । प्रभावित परिवारहरूमा पर्ने असरलाई न्यूनीकरण गर्न अस्थायी रोजगारीको पनि व्यवस्था गरिनेछ ।



स्वास्थ्य, सरसफाई तथा सुरक्षा

आयोजनाबाट प्रभावित क्षेत्रको स्वास्थ्य, सरसफाई तथा सुरक्षा अवस्थामा पर्ने प्रभावको बारेमा सर्वसाधारण हरूलाई जानकारी दिनको लागि सचेतनामुलक कार्यक्रमहरु संचालन गरिनेछ।

क्षमता अभिवृद्धी कार्यक्रम

आयोजना प्रभावित परिवारहरुलाई विभिन्न क्षमता अभिवृद्धीमुलक कार्यक्रमहरु जस्तै वायरिङ, ड्राइभिङ, अटोमोबाइल रिपेरेटिङ, इलेक्ट्रिक तथा मेकानिकल तालिमहरु तिनीहरुकै समुदायमा दिएर उनीहरुको क्षमता अभिवृद्धी गर्न मद्दत गरिने छ।

विद्यालय सहयोग कार्यक्रम

प्रभावित क्षेत्रको एउटा माध्यमिक विद्यालयलाई वित्तीय सहयोग प्रदान गरिनेछ। यस्तो सहयोग कम्प्युटर खरिद, पुस्तकालय स्थापना, खानेपानीको व्यवस्था, महिला शौचालयको निर्माण तथा स्कुल खेल मैदानको विकास जस्ता कार्यहरुमा प्रदान गरिनेछ।

८.० वातावरणीय अनुगमन

आयोजनाको प्रभावकारी निर्माण गर्नको लागि वातावरण न्यूनिकरणका कार्यक्रमहरु, अनुगमन योजना, सरोकारवालाले उठाएका विभिन्न समस्याहरु आदि समाधान गर्नको लागि एउटा वातावरणीय व्यवस्थापन इकाइ (EMU) को गठन गरिसकिएको छ। यस इकाइमा वातावरण तथा सामाजिक अध्ययन विभागका विभिन्न क्षेत्रका विशेषज्ञहरुको साथै आवश्यकता अनुसार स्थानीय स्तरमा रहेका व्यक्तिहरुलाई समेत संलग्न गरीने छ।

९.० निष्कर्ष

यस अद्यावधिक प्रारम्भिक वातावरणीय अध्ययन प्रतिवेदनमा उल्लेख भए अनुसार आयोजनाको कार्यान्वयनको लागि ४७०.९२१८ हे. जमिनको आवश्यकता पर्दछ। करिब १३,४४३ पोलहरु र २१,७८८ रुखहरुकटान गर्नु पर्नेछ। कुल वातावरणीय व्यवस्थापन लागत रु १,२०,०१,१४,९४३।- लाग्ने अनुमान गरिएको छ। जुन लागतमा क्षती न्यूनिकरणका कार्यक्रमहरुको साथसाथै अनुगमन कार्य पनि समावेश गरीएको छ। उक्त लागत आयोजनाको कूल लागतको ११.४३%ले हुन आउँछ।

यस प्रारम्भिक वातावरणीय अध्ययन प्रतिवेदनमा उल्लेख भए अनुसार आयोजनाको कार्यान्वयनको लागि ४७०.९२१८ हे. जमिनको आवश्यकता पर्दछ। करिब १३,४४३ पोलहरु र ७,७७७ रुखहरुकटान गर्नु पर्ने थियो। कुल वातावरणीय व्यवस्थापन लागत रु १,०४,२७,५४,११८।- लाग्ने अनुमान गरिएको छ। जुन लागतमा क्षती न्यूनिकरणका कार्यक्रमहरुको साथसाथै अनुगमन कार्य पनि समावेश गरीएको थियो। उक्त लागत आयोजनाको कूल लागतको ९.९३%ले हुन आएको थियो।

प्रस्तुत प्रस्तावको कार्यान्वयन गर्दा माथि प्रस्तुत गरिएको न्यूनिकरणका उपायहरु र अनुगमन योजना अनुसार गरिएको खण्डमा यो आयोजना सामाजिक र वातावरणीय दृष्टिकोणले उपयुक्त देखिन्छ।



Executive Summary

1.0 Introduction

The project proponent is the Nepal Electricity Authority (NEA). NEA is a public undertaking of the Government of Nepal and was established in August 16, 1985 (Bhadra 1, 2042 BS) under the Nepal Electricity Authority Act, 2042. IEE report has been approved of this project on 2073/02/06 by ministry of energy. The Ministry of Energy (MoEn), Department of Electricity Development (Director General's level) has granted a construction license for construction of project. Update IEE is prepared by this project on the basis of DOED's letter dated 2076/04/20 and motto of U-IEE preparation is no of tree increased in tree enumeration report which is prepared for purpose of uses of forest land and forest clearance than approved IEE by 9170. No of tree increased only in Jalbire sub division forest office's coverage area.

2.0 Project Description

Tamakoshi-Kathmandu 220/400 kV Transmission Line Project has been proposed for the power evacuation from the planned HEPs in Tamakoshi and others river in the project area. Current policies of Government of Nepal emphasize the need of environmentally sound and socially sustainable development of power projects in the country.

The project is divided into two sections. The TL of Khimti-Barhabise Section starts from substation at Phulasi VDC of Ramechhap District and immediately enters into Melung VDC of Dolakha District. In Dolakha District, the alignment passes through old 7 VDCs and 1 Municipality, and 5 VDCs of Sindhupalchowk District. Altogether 13 VDCs and 1 municipality of 3 District (Ramechhap, Dolakha and Sindhupalchowk) are taken for IEE study. There are two VDCs namely, Magapauwa (Dolakha district) and Tauthali (Sindhupalchowk), from where alignment passes but AP not set on the land.

Similarly, the TL of Barhabise-Kathmandu Section starts from substation at Barhabise VDC of Sindhupalchowk District. The alignment passes through old 8 VDCs of Sindhupalchowk, 4 VDCs of Kavrepalanchowk, 2 municipalities of Bhaktapur and 1 municipality of Kathmandu District. Altogether 12 VDCs and 3 municipalities of 4 districts (Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu) are taken for U-IEE study. The construction period is of 12 months from now because construction work of line began already.

3.0 Study Methodology

The U-IEE process follows the Environment Protection Rules, 1997, and amendment made on 2009 (2065/11/26) and National EIA Guidelines, 1993. This U-IEE is prepared in accordance with the legal requirements of GoN, based on field studies and consultation with local people and officials. For the physical environment, data on climate, geology and land were taken. Likewise, in socio-economic and cultural environment data on population, ethnicity, religion and religious sites, infrastructure, etc are used for the study Which is same as per IEE report. A public notice has been published in Gorkhapatra Daily in 2076/04/28. As well, an interaction meeting was held at the project site.

4.0 Review of Policy and Legal Provisions

The proponent will be responsible for fulfilling the provisions of all relevant acts, rules/regulations policies, guidelines and conventions while implementing the project. Water Resources Act (1992), Electricity Act (1992), Water Resource Regulations (1993), Electricity Regulation (1993), Hydropower Development Policy (1992), etc were studied while preparing the report. In addition, important Acts and Regulations like EPA (1996) and EPR (1997) and its amendments, Land Acquisition Act 1977, Forest Act (1993), and Forest Rules (1995), Local Self



Governance Act (1999) and Regulation (2000), National Environmental Impact Assessment Guidelines (1993), Forest Produce, Collection and Sales Distribution Guidelines (2000), electricity regulatory commission act 2074, electricity regulatory commission regulation 2075, Environment change policy 2076 etc were also extensively reviewed while preparing the report.

5.0 Existing Environmental Condition

5.1 Physical Environment

The project has been divided into two section and discuss and follows;

Khimti-Barhabise Section

The proposed route of this section of length 42.638 km traverses through the Middle Mountain and hills. The alignment runs through several topographic features comprising of rugged hills with mild and steep slope, undulating land forms and flat terrain near those bajar. The altitudinal variation of the TL is between 2719 masl to 639 masl at Dobate, Lakuri Dada old VDC and Sitali, Phulasi VDC respectively. The altitude of the starting point at Ghumaune, Phulasi old VDC is 653 masl and terminal point of the TL at Sano Palati, Barhabise is 1415 masl.

Barhabise-Kathmandu Section

The proposed route of this section of length 55.722km traverses through the Middle Mountain and hill. The alignment runs through several topographic features comprising of rugged hills with mild and steep slope, undulating land forms and flat terrain. The altitudinal variation of the TL is between 1820 masl to 723 masl at Baluwapati Deupur old VDC and Chandeni old VDC respectively. The altitude of the starting point at Barhabise Municipality is 1415 masl and terminal point of the TL at Changunarayan Municipality is 1352 m. 4 km line of 132 kV multi circuit starts from changunarayan substation and tapped in existing 132 kV line at Duwakot. it is located in Manhara corridor. it will not impact any socio-economic and environment.

The main land use pattern of the project area is cultivated land, forest (community, government and private), grazing land and barren land. The alignment avoids densely populated areas, major structures, protected areas and dense forests. The other land uses along the alignment consists of road crossings, rivers, rivulets, river beaches and TL. According to IEE report, route of alignment passes through 64.067% cultivated land, 18.283% forest land and 17.65 % other lands. While during U-IEE, along the alignment, approximately 69.87 % of the TL alignment passes through the cultivated land, 21.92% through forest and 8.214% through others (barren land, bush, grassland, cutting cliff, sand, water body, road crossings and river crossings, etc.).

5.2 Biological Environment

Tree species are well represented by the deciduous and evergreen types. Major plants species found are Khote salla (*Pinus roxburghii*), Uttish (*Alnus nepalensis*), Chilaune (*Schima wallichii*), Bajh (*Quercus sps*), Sal (*Shorea robusta*) Kyamuno (*Cleistocalyx operculata*), Patula salla (*Pinus patula*) etc. Likewise, main non-timber forest products (NTFPs) including medicinal herbs found are Lokta (*Daphne bholua*), Argeli (*Edgeworthia grdeneri*), Kurilo (*Asparagus sp.*), Nagbeli (*Lycopodium sp.*), Chirayito (*Swertia chirayita*), Amala (*Embllica officinalis*), etc.

Mammals such as Salak (*Manis pantadactyla*), Barking deer (*Muntiacus muntjak*), Jackal (*Canis aureus*), Leopard (*Panthera pardus*), Porcupine (*Hystrix Indica*), Rhesus Monkey (*Macaca mulata*), Malsapro (*Martes flavigula*), Squirrel (*Fuinambulas palmaurum*) etc. are reported in the forest of project affected area.



Kalij (*Lophura leucomelana*), Common Myna (*Acridotheres tristis*), House Swift (*Apus affinis*), House Crow (*Corvus splendens*), Spotted Dove (*Streptopelia chinensis*) and House Sparrow (*Passer domesticus*). Cuckoo (*Eudynamis sp.*), etc are reported bird species along the forest of project area. Katile (*Neolissocheilus hexagonolepis*) and Asla (*Schizothorax sp.*) are the fish found along the rivers where from TL RoW passes.

Based on IEE report, proposed TL alignment, out of 129 angle points (APs), 26 are Aps located in the forest which will require 0.585 ha forest area (area occupied by each tower pad = 15 m X 15 m).

Total number of community forests (CFs) in five districts is 1,667, out of which there are 51 community forest along the AP and TL RoW. Likewise 2 leasehold forest in Sindhupalchowk only and 2 government forest in each Sindhupalchowk and Kavrepalanchowk.

In U-IEE report, the proposed TL alignment, out of 129 angle points (APs) and 298 suspension tower, 30 are AP and 40 suspension SP located in the forest which will require 8.575 ha forest area (area occupied by each tower pad = 35 m X 35 m).

Total number of community forests (CFs) in five districts is 1,667, out of which there are 53 community forest along the AP and TL RoW. Likewise, leasehold forests (LHF) are affected in Sindhupalchowk district only where total number of LHF is 396. In addition, there are 2 government forests in Sindhupalchowk district and 2 LHF in Sindhupalchowk district.

The project site does not fall in national park, environmentally sensitive area, wildlife sanctuary area, buffer zone and conservation area.

5.3 Socio-economic and Cultural Environment

The total area of 6 districts is 14,651 Sq. km. According to the data of CBS 2011, the total population of the six districts is 31,07,829 with 15,69,561 male and 15,38,268 female which occupies 11.73% of the total population of the country (2,64,94,504). The average population density of six districts is 1263 (persons/km²). There are 7,41,986 HHs and the average household size of the six districts is 4.37. Similarly, the average literacy rate of the six districts is 70%.

The proposed alignment traverses through the different Rural municipalities and municipalities of six districts of province 3 of Nepal. According to the National Population Census 2011, the total population of the project VDCs/ Municipalities is 215784 with 101823 (47.19%) males and 113961 (52.81%) females. The female population is higher as compared with the male population. The population of the project RMs/Municipalities covers only 6.94% of the total population of the project affected districts (3107829). The total number of households is 50367 with average household size 4.28.

The main settlements of the old VDCs/Municipalities through which the TL passes are Milti bazaar-Sitali, Tinkhoriya gau, Matyangri basti, Khanigaun, Kalleri basti, Kaichale gaun, Odare gaun, Gurung gaun, Kiratechhap basti, Thapa basti, Syasi, Okhre, Gagrenbari, Swara gaun, Tallo pakha gaun, Phulbarighumti, Kharidhunga, Beshi tole, Kuwapani basti, Kotabari gaun, Gairi gaun, Kamitar Tole, Chimling Besi gaun and others. The dominant caste groups in the project area are Chhetri (25.54%), Tamang (21.36%), Newar (19.70%) and Brahmin Hill (15.34%) which covers 81.94% of the total population. Nepali (61.82%) is the main language widely spoken in the project area. Beside this, Tamang followed by Newar, Thami, Danuwar and others are main language used in project area.

The average literacy rate of the project area is 63.29% consisting 72.54% male and 55.45% female literacy rate. Women literacy is very low in comparison in male. The major occupation of the people of the project area is subsistence as well as professional farming. Kavrepalanchowk district is the pocket area for food crops and vegetable farming. The rest of the people are engaged in remittance, business, government service, labor, agro-based industries, livestock and poultry farming, etc. Health service in the project area is delivered through the existing sub-health post and health post in RM

5.3.1 Profile of the Project Affected Families

Households survey of 197 households from project affected RMs/Municipalities have been conducted. The surveys reveal that the total population of the project affected sample household is 1170 of which 599 (51.97%) are male and 571 (48.80%) are female. Similarly, the average HH size and sex ratio of the project affected households are 5.9 and 1.05 respectively. Hinduism and Buddhism are the two main religions followed by project affected households. The majority of the project affected households 85.79% are Hindu followed by Buddhist 13.71%.

Agriculture is the main occupation of the surveyed households. About 35.76% of the surveyed households have adopted agriculture as a main occupation. The percentage of households occupied other than agriculture is service; inside the country (11.05%), Labour wage 18.07 % (9.88%, inside the country and 8.19%, outside the country), students (22.50%) business and small industry (6.11%) and households work (6.24%).

From the household survey, it is revealed that 84.19% of the surveyed populations are literate with male literacy rate 89.82 % and female literacy rate 78.28%. Households survey shows that hundred percent of the sampled households have their own land for cultivation. The average land holding size of the surveyed households is estimated to be 0.711ha

Households survey shows that the total average annual income of the surveyed households is NRs. 3,99,783. Of the total income share of agriculture and animal husbandry is highest i.e. NRs. 1,05,096 (26.29%) followed by remittance (23.11%), service (20.58%), business (15.33%), daily wages/porter (10.70%) and others. The average expenditure of the surveyed households is NRs. 3,29,220. The share of expenditure on non-food item is higher i.e. 51.33% as compared to food item (48.67%).

From the households' survey, the total production of paddy, maize, millet and potatoes are 186.180 MT, 70.040 MT, 36.460 MT and 151.470 MT respectively. Similarly, the average yield of paddy, maize, millet and potatoes are 3.06 MT/ha, 1.92 MT/ha, 1.17 MT/ha and 7.66 MT/ha respectively. On the average, 89.34% of the surveyed households have their own toilet for defecation. Similarly, nearby forest area and open field are used by only 10.66% households respectively. Management of solid waste disposal is seems to be satisfactory in the surveyed households

6.0 Impact Assessment

6.1 Physical Impacts

According to Approved IEE report, the land interference during construction of the project is related to the substation. This may result in the change in landscape. No other change in topography is envisaged during this phase. The project will require 470.9218ha land for the placement of tower pads (angle and suspension), substations and RoW of the TL and temporary facilities. Out of this, 25.8575 ha land will be permanently acquired and 445.0643 ha will be restricted as RoW. The total number of angle towers will be 129 and the number of suspension tower is estimated as 198. Towers will typically require an area of 15m x 15m which



is equal to 0.0225 ha per tower. Altogether 93, 26 and 10 number of APs are located on cultivated land, forest area and others area whereas 142 suspension towers are located in cultivated land followed by 40 towers in forest.

While in Updated IEE report, the land interference during construction of the project is related to the substation. This may result in the change in landscape. No other change in topography is envisaged during this phase. The project will require 470.9218ha land for the placement of tower pads (angle and suspension), substations and RoW of the TL and temporary facilities. Out of this, 58.5575 ha land will be permanently acquired and 412.3643 ha will be restricted as RoW. The total number of angle towers will be 129 and the number of suspension tower is estimated as 198. Towers will typically require an area of 35m x 35m which is equal to 0.1225 ha per tower. Altogether 89, 30 and 10 number of APs are located on cultivated land, forest area and others area whereas 142 suspension towers are located in cultivated land followed by 40 towers in forest.

During the construction period, water from nearby streams and irrigation canals will be used construction, and other purposes. Soil disturbances due to construction activities of tower pads, the generation of solid wastes and chemicals such as cement slurry, construction materials and human wastes may deteriorate the water quality of nearby river and streams

6.2 Biological Environment

According to IEE report, total forest area required is 126.4ha, 26 Aps located in forest out of 129 angle tower which require 0.585 ha (area required by each tower pad = 15m*15m). No of Vegetation in RoW is 260269 (no of pole = 18,284 & no of tree = 7,777).

In the U-IEE, the total forest area falling under the RoW of TL alignment including area occupied by APs is 103.2202 ha. Based on the available detailed survey report of the proposed TL alignment, out of 129 angle points (APs) 30 are located in the forest which will require total ha forest area (area occupied by each tower pad = 35 m X 35 m). Based on the total enumeration of forest vegetation in AP and under RoW of TL, total of 13,443 poles and 21,788 trees of different species will be removed. Main dominant species are Sal (*Shorea robusta*), Salla (*Pinus roxburghii*), Chilaune (*Schima wallichii*) and Uttis (*Alnus nepalensis*). Other tree species are Kyamuna (*Cleistocalyx operculata*), Bot dhayaro (*Lagerstroemia sp.*) etc.

Since there will be small number of outsider work force involved in the project construction, collection and sale of NTFPs by workers will be negligible. The possible adverse impacts on wildlife and avifauna population during the project construction phase are possibility of hunting and poaching by labour force and disturbance in the migratory movement of mammals and birds.

6.3 Socio-economic and Cultural Environment

Household survey of 197 HHs has been conducted. Out of these 183 HHs will be affected by the project and remaining 14 HHs fall under the RoW but they were demolished due to the earthquake of April, 2015. Out of total surveyed HHs, 20 households will lose their structures. A total of 30 structures (20 houses, 10 cow shed) will be affected due to implementation of the project. These data are same in IEE and U-IEE

According to IEE report, cultivated land required is 308.4467 (65.5%) and permanent land required is 23.785 ha (land required for substation and tower pad)

While in Updated IEE, the project will acquire 329.0207 (69.87%) ha of cultivated land along 102.36 km route. Approximately 4 km extend as multicircuit 132 kV TL in after Changunarayan substation in manhora river corridor for tapping purpose. Out of total, 58.5575 ha is permanent



land (land required for angle tower, suspension towers and substation area). Out of total towers (angle and suspension towers), 231 towers will be located in cultivated land. Area occupied by these towers is 28.2975 ha. All the three Substations are located in cultivated land. On the basis of this, total annual crop loss of project affected HHs is 129.74 MT. Similarly, about 1531.79 MT of crops (paddy 708.80MT, maize 307.531MT, millet 190.19 MT and potato 325.27 MT) will be lost due to the construction of TL.

7.0 Mitigation and Enhancement Measures

7.1 Physical Environment

Proper management of the muck volume will be done. The muck generated during the excavation of tower pads and substation will be used for backfilling and the area will be restored. The stability of the tower locations will be examined before excavation and special foundation design will be selected for the susceptible locations. Erection of tower foundation in the unstable land and/or in steep slopes will be avoided. Re-vegetation and slope maintenance will be carried out in the disturbed areas to avoid erosion. Bio-engineering with combination of retaining structures will be done as per the requirement. The construction and operation of the TL will not have significant impact on the air quality of the project impact area. Vehicle utilized for construction will be complied with GoN mass emissions standards.

7.2 Biological Environment

Plantation program will be carried out as compensation of tree felling along the RoW and Awareness raising program will be conducted for local people, workers and CFUG members of the project area about the importance of biodiversity, forest, wildlife and bird conservation, plantation and economic importance of forest and its role in rural livelihood improvement, existing rule regulations etc. The project proponent will provide kerosene to the project workers to minimize the loss of forest.

The project workers will strictly be prevented from hunting and poaching and any other kind of illegal activities related to hunting and poaching. Informative and warning sign will be placed at relevant construction sites.

7.3 Socio-economic and Cultural Environment

Compensation for land

The total compensation for the land to be acquired and utilized by the project is estimated to be NRs. 99,30,35,862. The required land will be acquired according to the Land Acquisition Act, 2034 BS and with mutual understanding between the affected families and the proponent.

Compensation of loss of crops

The total compensation for the loss of 1661.53 MT is estimated to be NRs. 5,90,88,850 only.

Compensation for structures

Compensation for 30 structures will be compensated and short-term employment opportunity will be given to local people to reduce the impact due to influx.

Health, Sanitation and Safety Program

An awareness program will be conducted in the project area to alert local people to the potential dangers related to health, sanitation and safety. This program will be targeted to the people residing in and around the vicinity.

Skill Development Program

The project affected people will be benefited from skill development program on house wiring, driving, automobile repairing and maintenance and other electrical and mechanical works in their own localities.

School Support Program

Financial support will be provided to a high school in the project area. Support will be provided for purchase of computer, library establishment, drinking water facility, ladies toilet construction, and extension of school play-ground.

8.0 Environment Monitoring

In order to implement the project smoothly, the mitigation program, monitoring plan, issues of public concern and other relevant issues, an Environmental Monitoring will be done. Under this plan a Unit will be formed which will do the day to day monitoring works. The Unit will consist of experts from ESSD and other qualified personnel from the local market if required.

9: Conclusion

The total cultivated land requirement will be approximately 470.9218 ha. Total of 13,443 poles and 21,788 tree of different species will be removed. There will be no direct impact on biological environment. In terms of the loss of land and assets various mitigation and enhancement measures have been proposed during the construction and operation phase of the project. According to U-IEE, the total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs 1,20,01,14,943 which is 11.43% of the total project cost.

In approved IEE report, the total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs 1,04,27,54,118 which is 9.93% of the total project cost.

The U-IEE study concludes that construction of the proposed Tamakoshi-Kathmandu 220/400 kV Transmission Line Project is environmentally and socially feasible if the proposed mitigation measures and monitoring plans are implemented.



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ABBREVIATIONS AND ACRONYMS

AP	:	Angle Point
BS	:	Bikram Sambat (Nepali Era)
CBO	:	Community Based Organization
CFUG	:	Community Forest Users' Group
CITES		Convention on International Trade of Endangered Species of Wild Fauna and Flora
DDC	:	District Development Committee
DIA	:	Direct Impact Area
DoED	:	Department of Electricity Development
EIA	:	Environmental Impact Assessment
EMF	:	Electromagnetic Field
EMP	:	Environmental Management Plan
EPA	:	Environment Protection Act, 1997
EPR	:	Environment Protection Rules, 1997
ESSD	:	Environment and Social Studies Department
TKTLP	:	Tamakoshi-kathmandu 220/400 KV Transmission Line Project
GoN	:	Government of Nepal
GIS	:	Geographical Information System
GRC	:	Grievance Redress Cell
GRM	:	Grievance Redress Mechanism
HHs	:	Households
IIA	:	Indirect Impact Area
KII	:	Key Informant Interview
kV	:	Kilovolt
LHF	:	Lease Hold Forest
MW	:	Mega Watt
MoEn	:	Ministry of Energy
MoFSC	:	Ministry of Forest and Soil Conservation
MoSTE	:	Ministry of Science, Technology and Environment

NEA	:	Nepal Electricity Authority
NGO	:	Non Governmental Organization
PAF	:	Project Affected Family
PRA	:	Participatory Rural Appraisal
RoW	:	Right of Way
RRP	:	Resettlement and Rehabilitation Plan
SPAF	:	Seriously Project Affected Family
TL	:	Transmission Line
ToR	:	Terms of Reference
VDC	:	Village Development Committee



1. INTRODUCTION

1.1 Proponent

The Nepal Electricity Authority (NEA) is the proponent of the proposed Tamakoshi Kathmandu 400 kV Transmission Line Project. NEA is a semi-government organization established in 2042 B.S. (1985 AD) and is responsible in generating, transmitting and distributing adequate, reliable and affordable power by planning, constructing, operating and maintaining all generation, transmission and distribution facilities in Nepal's power system (both interconnected and isolated).

The Ministry of Energy (MoEn), DOED has granted a Transmission Line license for the construction of line and operation of line. The Transmission line license was issued on B.S. 2074/07/27 and is valid till B.S. 2099/07/26. A copy of Transmission Line license has been attached in Appendix-A.

The contact address of the project proponent is as follows:

Nepal Electricity Authority,
Durbarmarg, Kathmandu
Phone No. : 01-4153025
Fax No.: 01-4153040
Email : kk400kv@gmail.com

1.2 Organization Responsible for Preparation of Updated Initial Environmental Examination (IEE)

Environment and Social Studies Department (ESSD) of NEA executes all activities related to the environmental aspects of projects studied, designed, and constructed or operated by NEA. This department is commercial working in close association with national and international consulting companies in conducting EIAs, IEEs, monitoring and implementing mitigation measures and environmental auditing of hydroelectric, transmission line and distribution line projects.

Being the concerned department, ESSD has prepared the Initial Environmental Examination (IEE) report of this Project. The Updated IEE Report is prepared by Tamakoshi Kathmandu 220/400 KV TL project as per approved IEE Report by MoEn on B.S. 2073/2/24, Tree Enumeration Report approved by project concerned Division Forest office and MOU between TKTLP and Environment and Social Studies Department, NEA.

The contact address of the organization responsible for the preparation of Updated IEE is:

Tamakoshi-Kathmandu 220/400 KV transmission Line Project,
Project Management Directorate,
Nepal Electricity Authority,
Kharipati, Bhaktapur
Phone No.: 01 66 200 16
Email: tk@Nea.org.np



1.3 Rationality for Conducting IEE

Schedule -1 of Environment Protection Rules, 1997 lists proposal requiring IEE. As per the Environment Protection Rules (EPR), 1997 and the subsequent amendment (published in 2066/10/13 BS on Nepal Gazette) an Initial Environmental Examination (IEE) is mandatory for transmission line (TL) of voltage level of 132 kV or above. Since Tamakoshi-Kathmandu TL project is of 400 kV capacity, it needs an IEE for execution. Further, about 126.4 ha of forest land will be affected due to the project implementation.

The project area does not lie in the national park, wildlife reserve, buffer zone, conservation Area, wetlands, historically and archaeologically important sites and or environmentally sensitive/ fragile areas.

1.4 Rationality for Conducting Updated IEE

Rational study shows comparison between IEE report verified by ministry of energy And Tree Enumeration Report Verified by Division forest office of project concerned districts Dolakha, Sindupalchowk, Kavrepalanchowk, Kathmandu and Bhaktapur.

Tamakoshi-Kathmandu 400 K.V. Transmission Line Project has been proposed for the power evacuation from the planned HEPs in Tamakoshi River and other river in project area .Current policies of government of Nepal emphasize the need of environmentally sound and socially sustainable development of power projects in the country.

The alignment of transmission line passes through one old VDC of Ramechhap district, 8 old VDCs and 1 Municipality of Dolakha district, 12 old VDCs of Sindhupalchowk district, 4 old VDCs of kavrepalanchowk, 1 municipality of Kathmandu district and 2 Municipality of Bhaktapur district length of 90 km 400 kv, 10 Km 132 Double circuit and 132 kv Multi Curcuit. There is no change in route of alignment but covered area of forest reduced to 103.2202 hectare comparison of IEE report 126.3942 hectare. Reduction of forest-covered area is due to 400 kV line in 4 district and 132 kV line in Kathmandu and Bhaktapur District and Forest Area was taken by sampling method during preparation of IEE. Previously which was 400 kV line through out of six district and ROW of 400 kV line is 46 meter and Row of 132 kV is 18 meter.

There is also change in no of tree in tree enumeration report verified by division forest office of five district than IEE report. According to IEE report, no of trees and pole are 26061 but in tree enumeration report (verified by Division Forest Office), no of trees and pole are 35231. This increment change, in no of tree and pole is because of no of tree and pole was counted by sampling but during construction phase of transmission line no of pole and tree has been counted exactly by marking of trees and pole and converting of regeneration into pole and pole into tree after two years period of IEE report approval. Tree marking and tree enumeration report is prepared after two year of IEE report approval. Delay in starting of tree marking and tree enumeration report is because of consumption of time in design, preparation of tender document, opening of tender and lack of coordination between contractor and sub division forest office of affected project area.

1.5 Objective of Updated IEE Study

The general objective of the study is to prepare an IEE Report in order to implement the proposed Tamakoshi-Kathmandu 400 kV Transmission Line Project in an environmentally sound manner. The specific objectives of the study are:

- To establish the physical, biological and socioeconomic and cultural baseline conditions of the project area;



- To identify beneficial and adverse environmental impacts of the project during construction and operation phases;
- To analyze the impacts in terms of the magnitude, extent and duration;
- To suggest mitigation measures for adverse impacts and enhancement measures for beneficial impacts;
- To prepare environmental monitoring plan;
- To involve public in the decision-making process related to the environment; and
- To provide information to the decision makers regarding further action and about the environmental implications due to the development of the proposed project.
- To show differentiate between approved IEE and U-IEE in terms of silent feature, no of tree and forest area.

1.6 Structure of the Report

The Updated IEE is prepared into one volumes based on IEE Reports and tree enumeration report approved by division Forest Office. The Updated IEE Report is divided into Nine chapters. Chapter-2 contains a brief description of the project, including the TL and substations, construction planning and project area delineation. Chapter-3 discusses about the data requirement and the methodology adopted for the collection of data on physical, biological, socioeconomic and cultural environment of the area. This chapter also highlights the techniques used for data analysis and impact assessment. Chapter-4 deals with the national acts, policies, rules and guidelines referred while preparing the report.

The existing environmental conditions of the project area with respect to physical, biological and socio-economic and cultural environment is given in Chapter-5. Chapter-6 highlights the positive and adverse impacts likely to occur due to implementation of the project. The mitigation and enhancement measures are presented in chapter-7. Chapter-8 deals with the environmental monitoring plan, Chapter-9 conclusion of the study.

2.1 Project Location

The proposed project is located in Central Development Region of Nepal (Figure 2.1). The project is located in Middle Mountain and Hilly region of Nepal. The TL of Khimti-Barhabise Section starts from substation at Phulasi VDC of Ramechhap District and immediately enters into Melung VDC of Dolakha District. In Dolakha District, the alignment passes through 7 VDCs and 1 Municipality, and 5 VDCs of Sindhupalchowk District. Altogether 13 VDCs and 1 municipality of 3 District (Ramechhap, Dolakha and Sindhupalchowk) are taken for IEE study. There are two VDCs namely, Magapauwa (Dolakha district) and Tauthali (Sindhupalchowk), from where alignment passes but Angle Point (AP) not set on the land.

Similarly, the TL of Barhabise-Kathmandu Section starts from substation at Barhabise VDC of Sindhupalchowk District. The alignment passes through 8 VDCs of Sindhupalchowk, 4 VDCs of Kavrepalanchowk, 2 municipalities of Bhaktapur and 1 municipality of Kathmandu District. Altogether 12 VDCs and 3 municipalities of 4 Districts (Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu) are taken for IEE study. The VDCs along the TL route are listed in comparison of Aproved IEE and U-IEE's salient features (Table 2-1) below and TL route alignment map has been presented in Figure 2.2 and Figure 2.3.

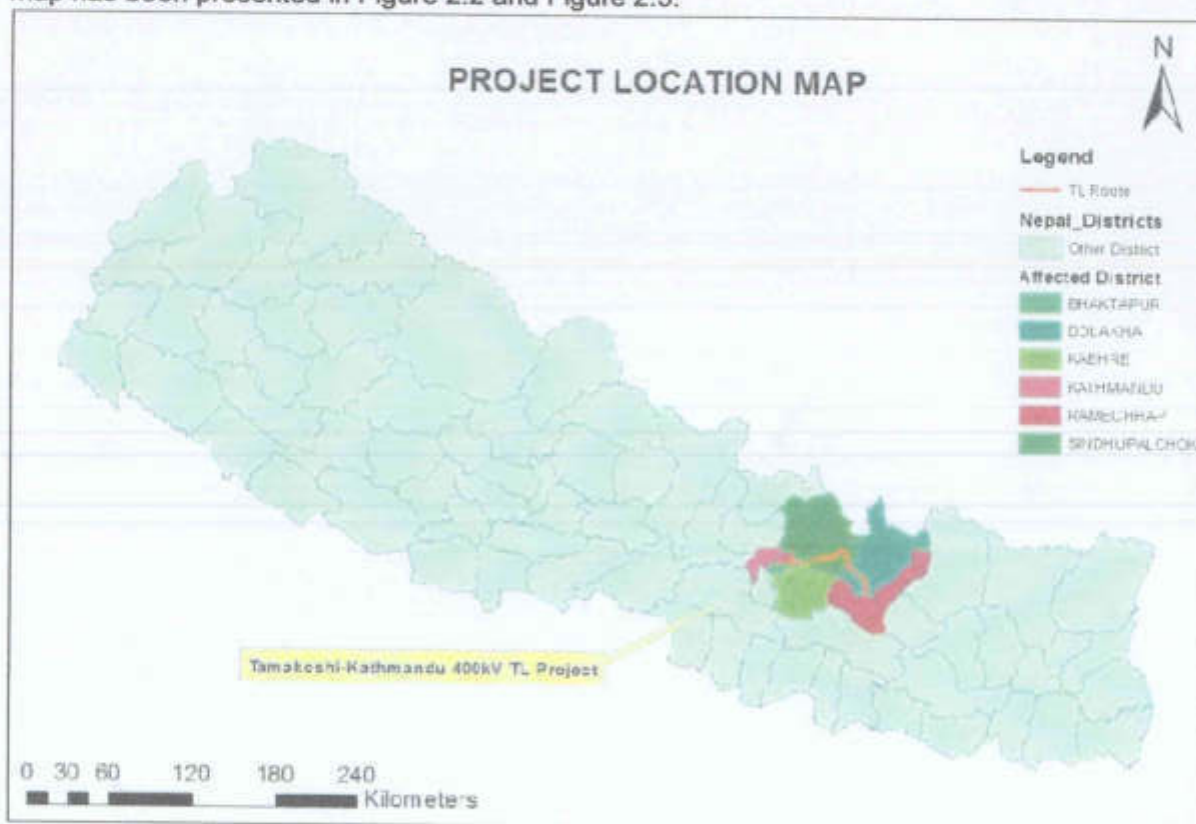


Figure 2.1: Project Location Map

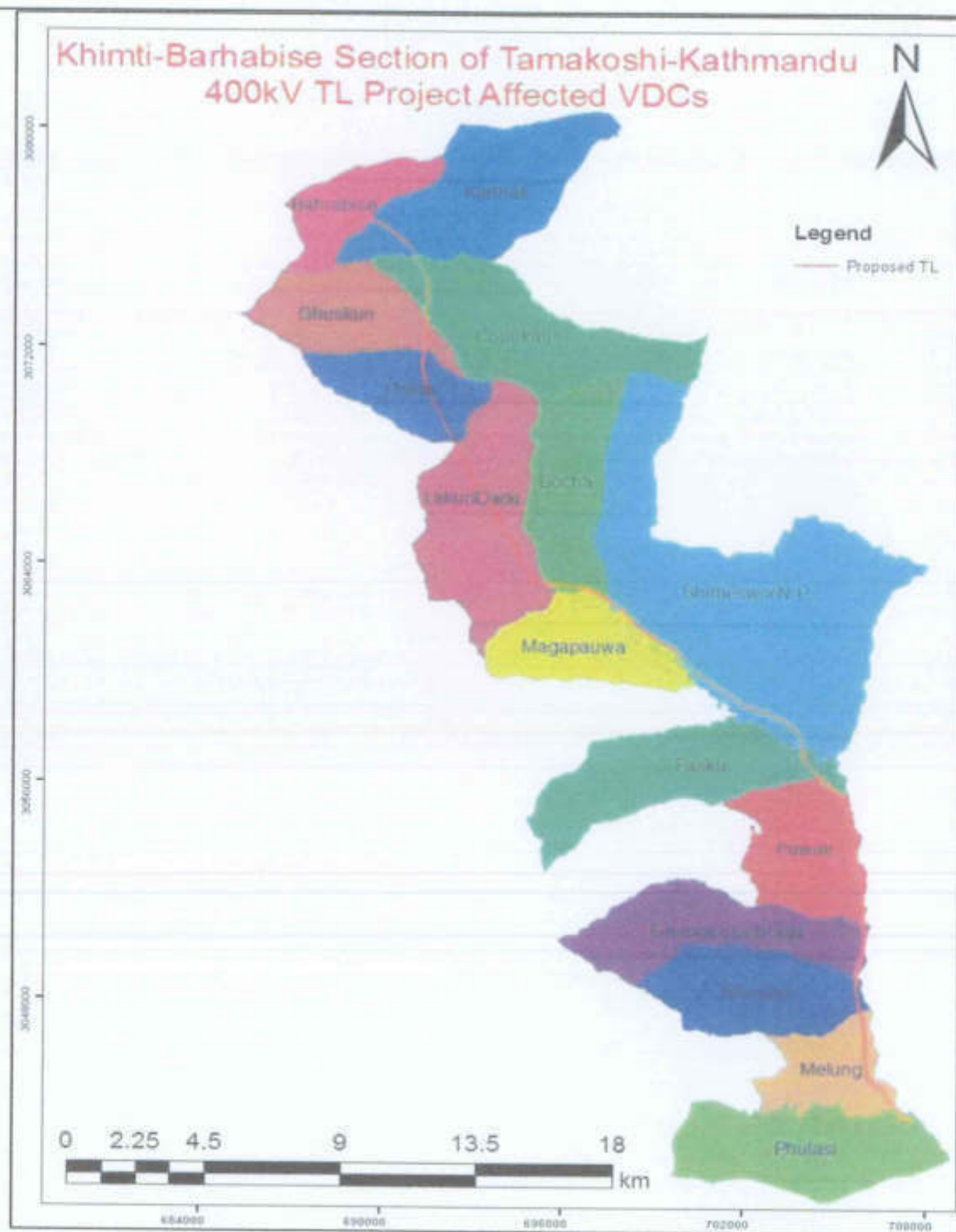


Figure 2.2: Project Affected VDCs of Khimti-Barhabise Section

Barhabise-Kathmandu Section of Tamakoshi-Kathmandu 400 kV TL Project Affected VDCs

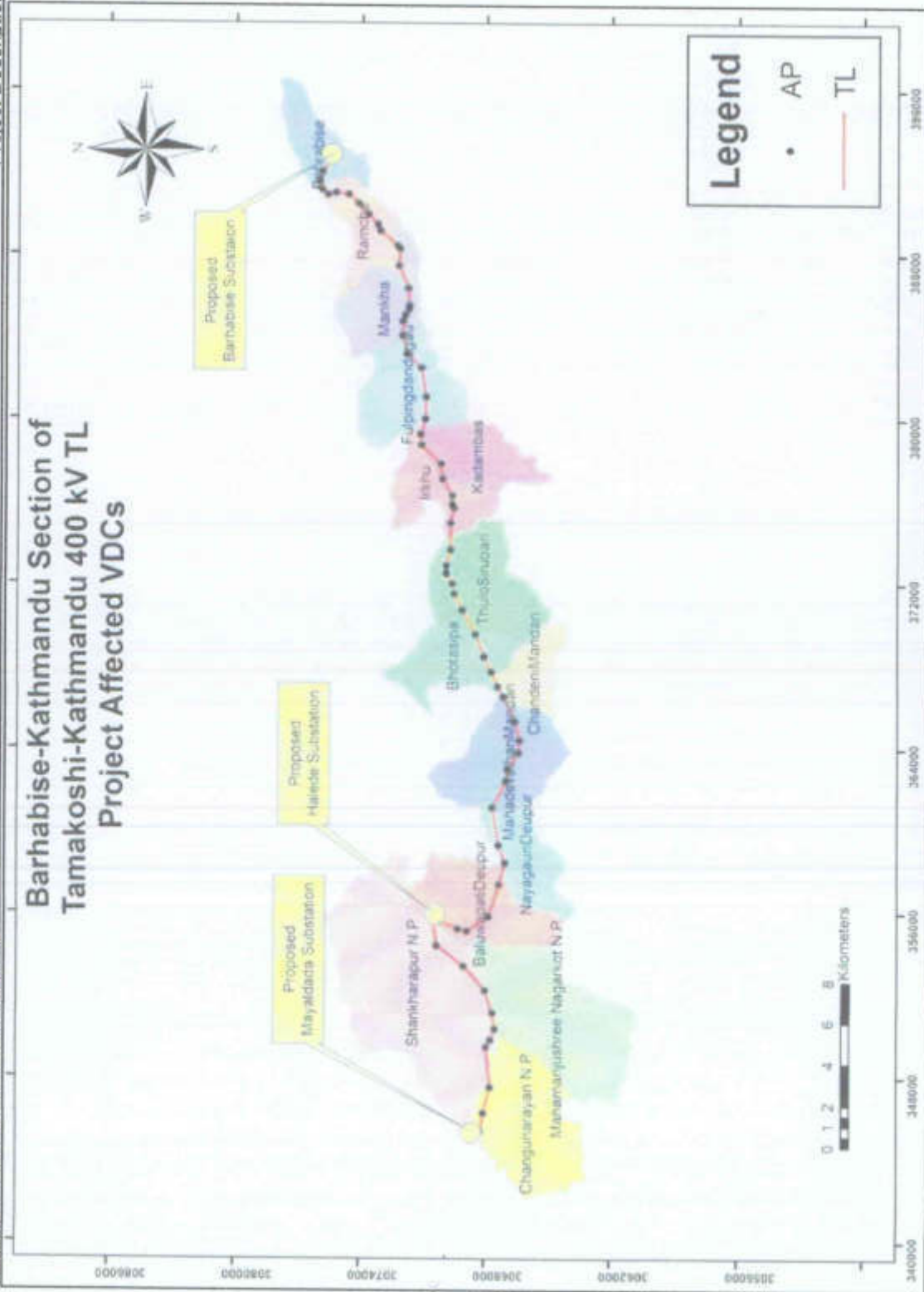


Figure 2.3: Project Affected VDCs Barhabise-Kathmandu Section

Tamakoshi-Kathmandu 220/400 kV TL Project

Project Description

Some storage projects like Indrawati (91.2 MW), Tamakoshi-3 (330 MW) and Sunkoshi-3 (536 MW) are proposed in and around the project area. The dam sites of proposed Indrawati and Tamakoshi-3 storage hydroelectric projects are located at upstream of the proposed transmission line whereas Sunkoshi-3 Storage project lies downstream of the alignment. According to Nationwide Master Plan Study on Storage Type Hydroelectric Power Development in Nepal (2014), the Full Supply Level of the project with dam height of 140m is at 700m creating total reservoir area of 30.1 km². The proposed alignment crosses the reservoir area of Sunkoshi-3 storage project at the back water area which is between AP 39 and AP 40 of Barhabise-Kathmandu section. The elevations of AP 39 and AP 40 are 789m and 723m respectively which is higher than the elevation of water level of reservoir (700m). In addition to this, the tower height (of approximately 45m) further increases the clearance. Thus the clearance between transmission line and water level of reservoir is about 68m, which is more than minimum ground clearance as mentioned in salient features of Table 2-1. The following map shows Tamakoshi-Kathmandu 220/400 kV TL alignment with respect to the proposed dam site of Sunkoshi-3 and Tamakoshi-3 Storage Project.

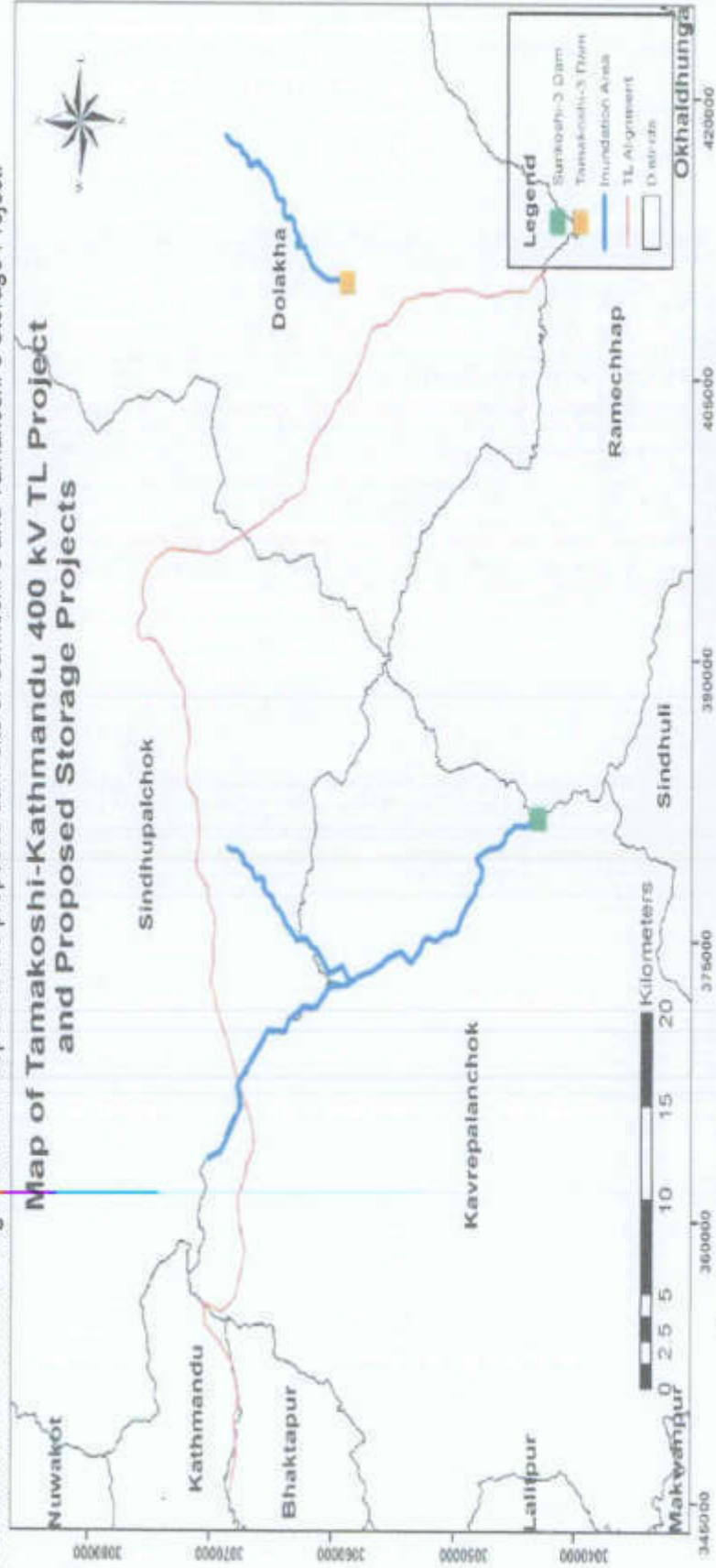


Figure 2.4: Map of Tamakoshi-Kathmandu 220/400 kV TL Project and Proposed Storage Projects

2.2 Salient Features

The total length of the proposed Khimti-Barhabise Section TL and Barhabise-Kathmandu Section TL is 42.638 km and 56.638km respectively and the voltage level will be 400 kV. Under Barhabise-Kathmandu section 10 km 132 kv and 4 km 132 kv multicircuit added from changunarayan substation to duwakot for tapping in existing 132 kv TL. The proposed TL will be double circuit. The vertical double circuit configuration tower will have an average height of 40 m and the standard tower base dimensions will be 35m x 35m (for 400 kV) and 15mx15m(for 132kv) from center to center of each tower leg foundation/ footing. Steel tower leg and body extensions will be utilized to reduce foundation excavation on slopes and provide greater tower foundation structural security.

The right of way (RoW) of the proposed transmission line is 23 meters on each side from the centerline for 400 kV applied in NEA as per the Electricity Regulation, 2050 (1993). The TL design features are given in Table 2-1 below:

Table 2-1: Comparison Project Features of Tamakoshi-Kathmandu TL Project

Features	Description at Approved IEE		Description at U-IEE	Reason for change
General				
Name of Project	Tamakoshi-Kathmandu 400 kv TL Project		Tamakoshi-kathmandu 220/400 kv TL project	Initially charge in 220 kv
Region/Province	Central Development Region		Province 3	
Impact Area	Zone	Districts	VDCs/ Municipality*	RM/Municipality
	Janakpur	Ramechhap	Phulasi (फुलसी)	Manthali Municipality
		Dolakha	Melung (मेलुङ्ग), Bhedapu (भेदपु), Ghang (घाङसुकाठोकर), Pawati (पवटी), Fasku (फास्कु), Magapauwa (मागापौवा), Bhimeswor (भिमेश्वर)*, Bocha (बोच), Lakuri Dada(लाकुरीडाडा)	Melung RM Selung RM Bimeshowr Municipality

Impact Area	Bagmati	Sindhupalchowk	Piskar (पिस्कर), Chokati (चोकटी), Karthali (कारथली), Tauthali (टौथली), Barhabise (बाहबिसे), Ramche (राम्चे), Mankha (माङ्खा), Fulping Danda (फुलपिनडाँडा), Kadambas (कदम्बास), Irkhul (इर्खु), Thulo Sirubari (ठूलोसिरुबारी), Bhotasipa (भोटसिपा)	Tripura Sundari RM Barhabise Municipality Balephi RM Chautara Sanga Chaukgadi Municipality Indrawati RM
Impact Area	Bagmati	Kavrepalanchowk	Chandeni Mandan (चण्डेनी मण्डन), Mahadevsthan Mandan (महादेवस्थान), Nayagaun (नयाँ गाँउ), Baluwapati (बालुवापाटी)	Mandan Deupur Municipality
	Bhaktpur	Mahamanjushree-Nagarkot Changunarayan (चंगुनारायण)*		Changunarayan Municipality
	Kathmandu	Shankharapur (शंखरापुर)*		Shankharapur Municipality Kageswari Manhora Municipality

Tamakoshi-Kathmandu 220/400 kV TL Project

Project Description

<i>Initial point</i>	AP 0 lies at Ghumaune village, Phulasi VDC, Ramechhap District for Khimti-Barhabise Section and AP 0 lies at Sano Palati village, Barhabise VDC, Sindhupalchowk District for Barhabise-Kathmandu Section	Initial point at Manthali Municipality(Khimti-Barhabise)	
<i>Terminal point</i>	New Substation proposed at Barhabise VDC of Sindhupalchowk District and New Substation proposed at Mayaldada substation at Changunarayan Municipality, Bhaktapur District.	Terminal Point at Barhabise Municipality(Khimti-Barhabise)	
No of major highway crossing	4	No change	
No. of major river crossings	10	No change	
No. of 132 kV line crossings	2	No change	
No of 66 kV line crossings	1	No change	
No of 33 kV line crossings	2	No change	
No of 11 kV line crossings	42	No change	
Distribution lines	31	No change	
<i>Design features</i>			
Line length	98.36 km.	98.36 km (400kV& 132 kV) and 4 km multicircuit	Multi circuit extended in Bhaktpur district
Nominal System Voltage	400 kV	400 kV	
Circuit	Double circuit	Double circuit(98.36Km)&Multi circuit(4km)	
Nominal span	300 m	No change	

Tamakoshi-Kathmandu 220/400 kV TL Project		Project Description	
Number of Angle Tower	129	No change	
Number of Suspension Tower	198	No change	As per design of foundation
Foundation Area	225m ² (approx. average per foundation)	1225m ² (approx. average per 400 kv line foundation) 225 m ² (approx. average per 132 kv line foundation)	Technical reason for ground clearance
Ground Clearance	8.8 m	9 m	132 kv in Kathmandu valley due to congestion
Voltage at normal operating condition	400 kV	400 kV & 132 Kv (400 kv line initially charge in 220 kv)	Nea regulation
Right-of-Way	46 m	46 m for 400 kv & 18 m for 132 kv	Nea regulation
Substation			
New Substation		Barhabise municipality (Sindhupalchowk), Lapsephedi (Kathmandu) and Changunarayan Municipality (Bhaktapur)	

2.3 Project Accessibility

The proposed Khimti-Barhabise Section is accessible from the existing Jiri Highway and B.P Highway. The proposed Barhabise-Kathmandu Section is accessible from the existing PipalbotSakhu road, Dolalghat-Chautara road and Araniko Highway. Most stretch of the TL route is accessible through earthen and gravel road joining these highways.

AP 0 to AP 1 (Phulasi Section)

The alignment starts from station AP 0 located at the right bank of Tamakoshi River at Phulasi VDC of Ramechhap district. From AP 0 the alignment heads North West towards AP 1 which is situated on a cultivated land at same village. The length of the alignment between AP 0 and AP 1 is 0.313 km.

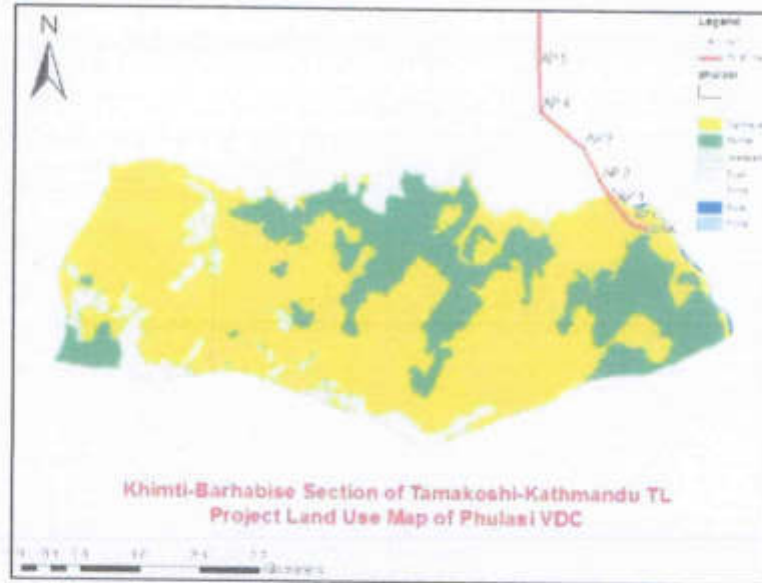


Figure 2.6: Land Use Map of Phulasi VDC

AP 3 to AP 7 (Melung Section)

From AP 1, the alignment almost heads straight towards North West and meets AP 2 located on cultivated land. There are total of 6 APs located within Melung VDC. The length of the alignment between AP 2 and AP 7 is 3.516 km.

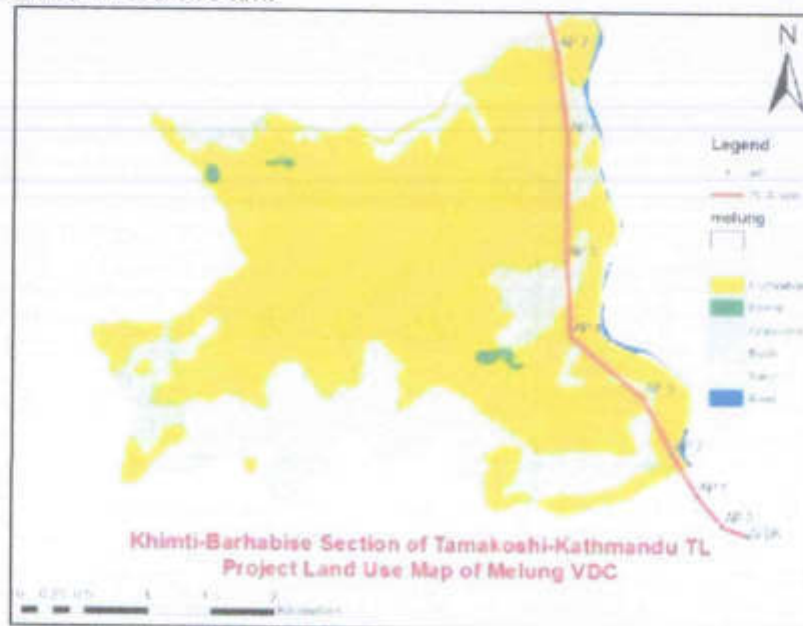


Figure 2.7: Land Use Map of Melung VDC

AP 8 (Bhedapu Section)

From AP 7, the alignment turns left more towards North West and meets AP 8 located on cultivated land. There is only 1 AP located within Bhedapu VDC.

AP 9 to 12 (Ghang Sukathokar Section)

From AP 8, the alignment almost heads straight towards North and meets AP 9 located on cultivated land. There are total of 4 APs located within Ghang Sukathokar VDC. The length of the alignment between AP 9 and AP 12 is 2.009 km.

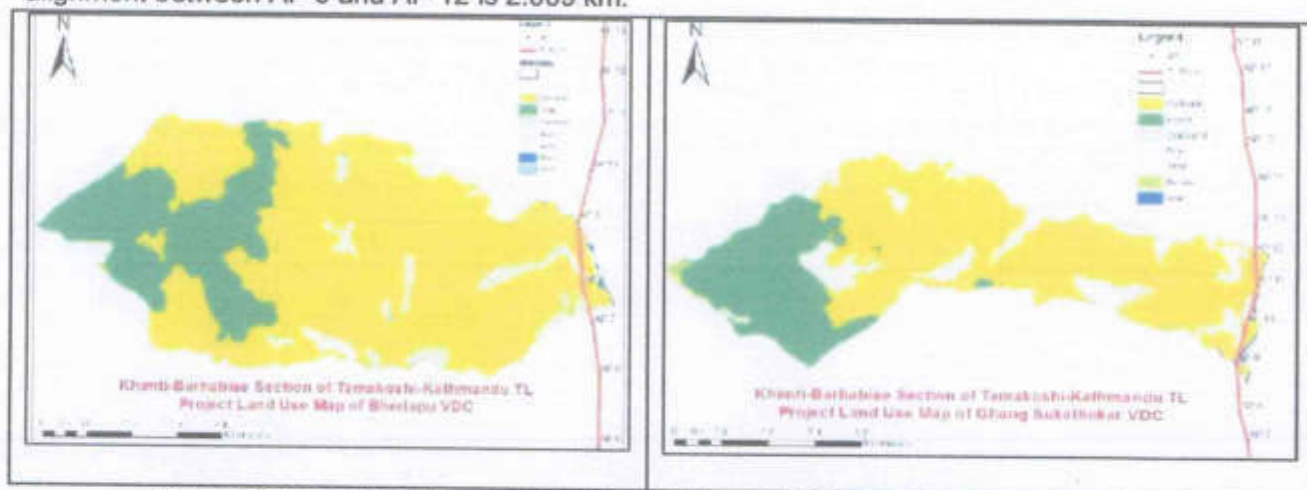


Figure 2.8: Land Use Map of (a) Bhedapu VDC and (b) Ghang Sukathokar VDC

AP 13 to AP 20 (Pawati Section)

From AP 12, the alignment almost heads straight towards North and meets AP 13 located on cultivated land. There are total of 8 APs located within Pawati VDC. The length of the alignment between AP 13 and AP 20 is 4.175 km.

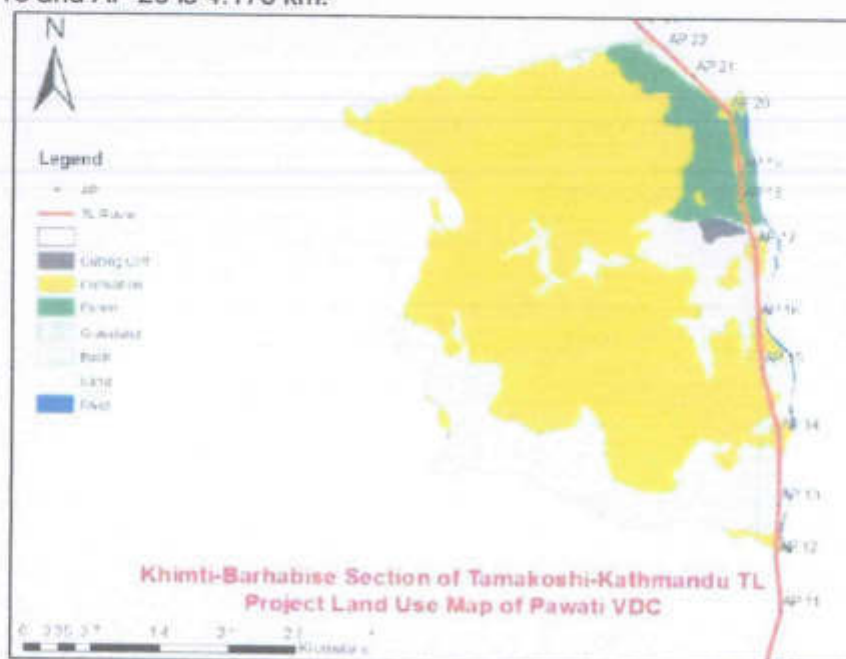


Figure 2.9: Land Use Map of Pawati VDC

AP 21 to AP 24 (Fasku Section)

From AP 20, the alignment turns left towards North West and meets AP 21 located on Saute Community Forest. There are total of 4 APs located within Fasku VDC. The length of the alignment between AP 21 and AP 24 is 1.439 km.

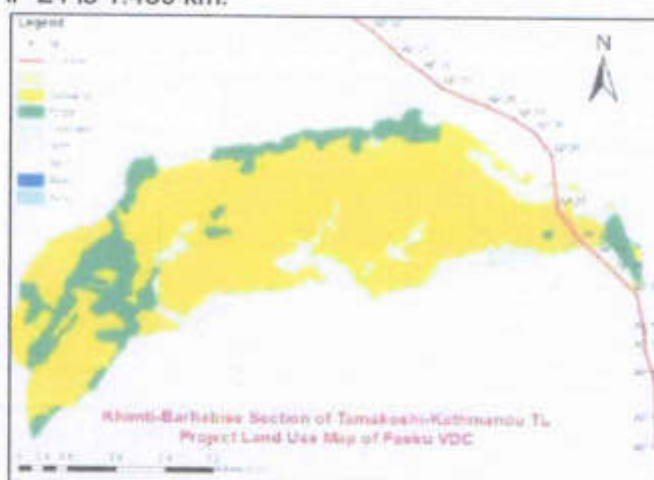


Figure 2.10: Land Use Map of Fasku VDC

AP 25 to AP 40 (Bhimeswor Section)

From AP 24, the alignment turns right towards North and meets AP 25 located on Barren Land. There are total of 16 APs located within Bhimeswor Municipality. The length of the alignment between AP 25 and AP 40 is 7.976 km.

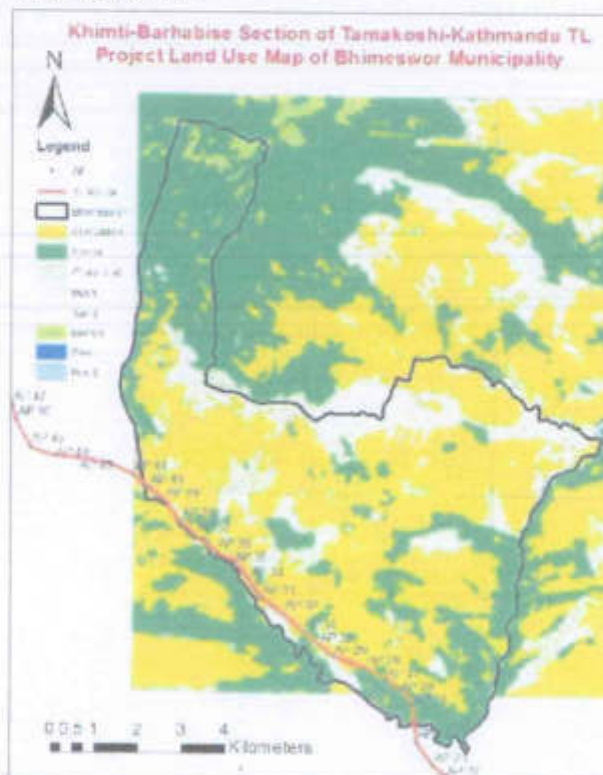


Figure 2.11: Land Use Map of Bhimeswor Municipality

AP 41 to AP 42.638 (Bocha Section)

From AP 40, the alignment turns left towards North West and meets AP 41 located on Cultivated Land. There are total of 4 APs located within Bocha VDC. The length of the alignment between AP 41 and AP 42.638 is 1.847 km.

AP 45 to AP 53 (Lakuri Dada Section)

From AP 42.638, the alignment turns right towards North West and meets AP 52 located on Barren Land. There are total of 9 APs located within Lakuri Dada VDC. The length of the alignment between AP 45 and AP 53 is 5.493 km.

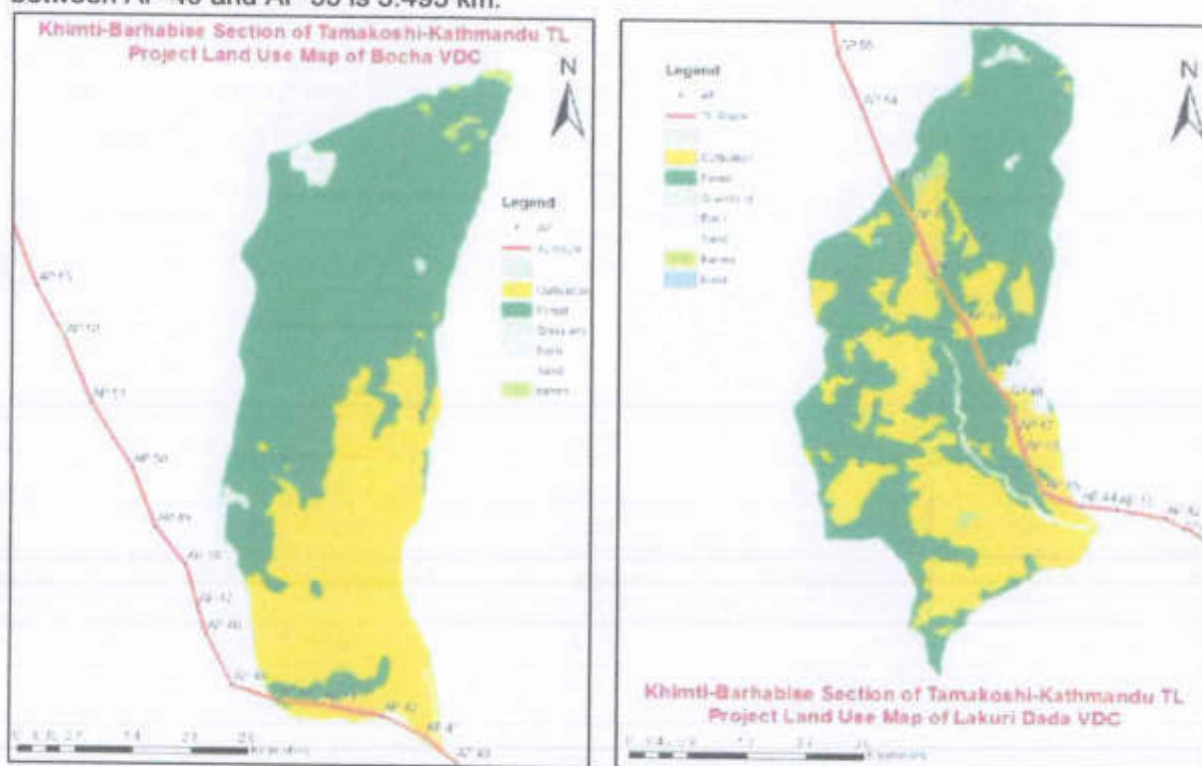


Figure 2.12: Land Use Map of (a) Bocha VDC and (b) Lakuri Dada VDC

AP 54 to AP 56.722 (Piskar Section)

From AP 53, the alignment heads straight towards North West and meets AP 54 located on Cultivated Land. There are total of 3 APs located within Piskar VDC. The length of the alignment between AP 54 and AP 56.722 is 1.99 km.

AP 57 (Dhuskun Section)

From AP 56.722, the alignment turns right towards North and meets AP 57 located on Barren Land.

There is only 1 AP located within Dhuskun VDC.

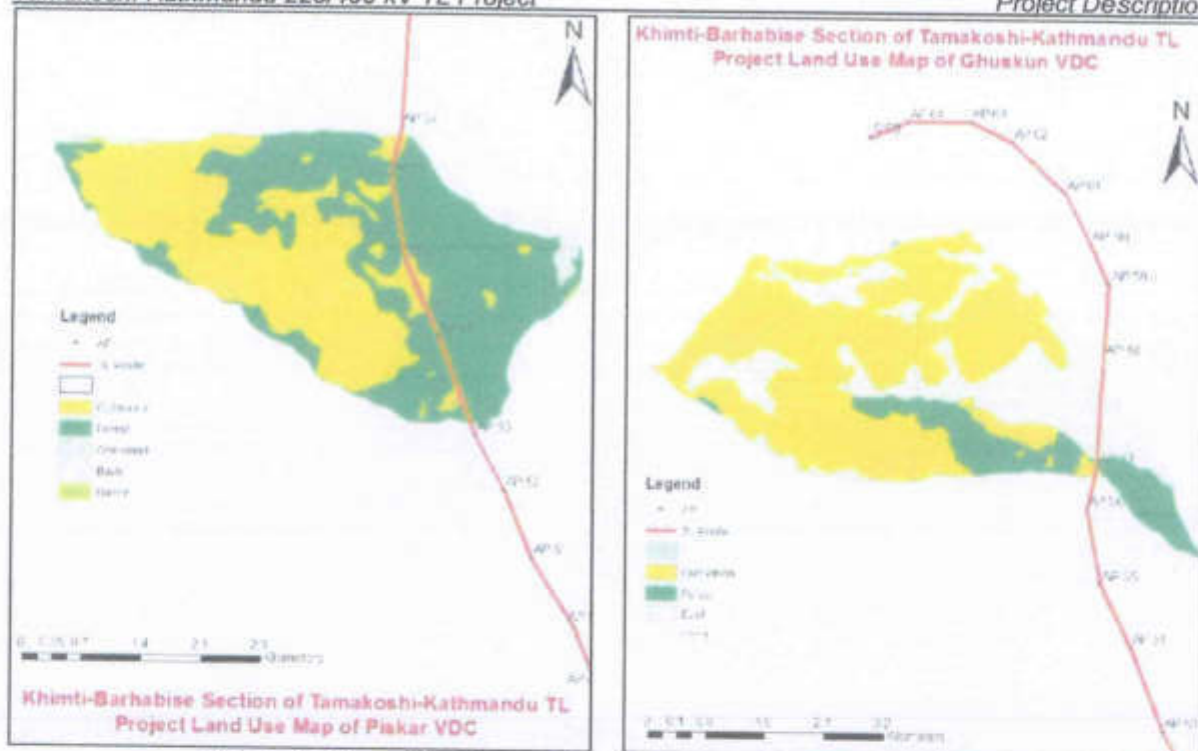


Figure 2.13 Land Use Map of (a) Piskar VDC and (b) Dhuskun VDC

AP 58 to AP 60 (Chokati Section)

From AP 57, the alignment heads straight towards North and meets AP 58 located on Cultivated Land. There are total of 3 APs located within Chokati VDC. The length of the alignment between AP 58 and AP 60 is 1.618 km.

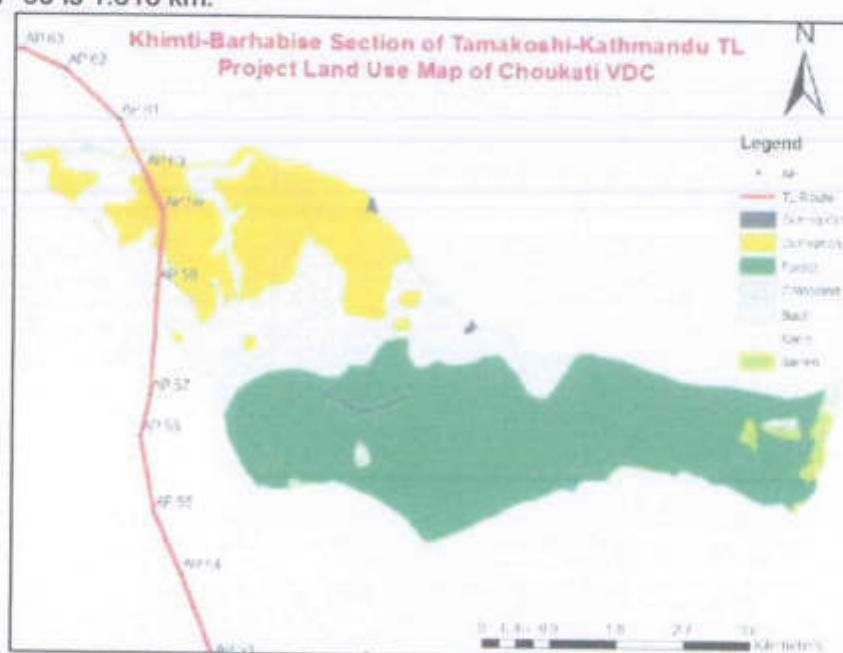


Figure 2.14: Land Use Map of Chokati VDC

AP 61 to AP 62 (Karthali Section)

Updated IEE Report

From AP 60, the alignment heads straight towards North West and meets AP 61 located on Cultivated Land. There are total of 2 APs located within Karthali VDC. The length of the alignment between AP 61 and AP 62 is 1.002 km.

AP 63 to AP 64 (Barhabise Section)

From AP 62, the alignment turns left towards West and meets AP 63 located on Cultivated Land. There are total of 2 APs located within Barhabise VDC. The length of the alignment between AP 63 and AP 64 is 2.218 km. Substation also lies within this VDC.

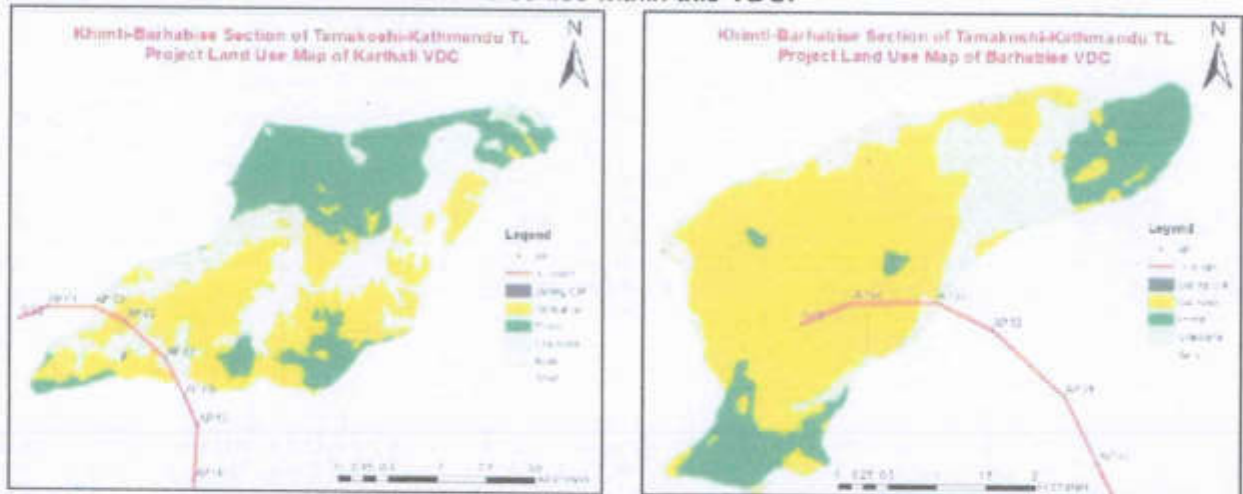


Figure 2.15: Land Use Map of (a) Karthali VDC and (b) Barhabise VDC

2.4.1.2 Barhabise-Kathmandu Section

Barhabise Section

The alignment starts from proposed substation located at Barhabise, Sindhupalchowk District. From S/S, the alignment heads towards North by crossing cultivated land to AP 2 that is also situated on a cultivated land. The length of the alignment in this section is 1.481 km.

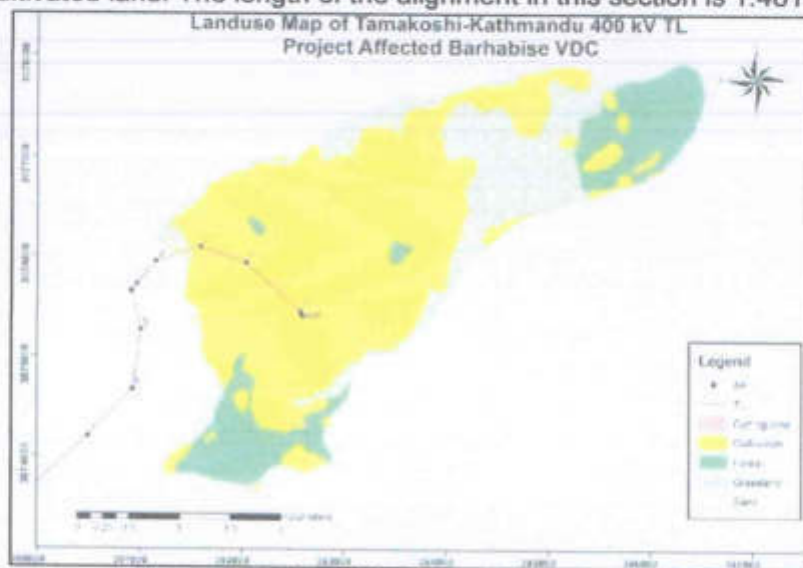


Figure 2.16: Land Use Map of Barhabise VDC

Ramche Section

From AP 2, the alignment heads towards South-West and crosses Araniko highway and Bhotekoshi River and meets AP 3 located on cultivated land. There are total of 9 APs located within Ramche VDC. The alignment in this section crosses cultivated land and grassland. The length of the alignment in this section is 5.048 km.

Mankha Section

From AP 10, the alignment turns left more towards South-West and meets AP 11 located on cultivated land. There are all together 8 APs located within Mankha VDC. The alignment length in this section is 4.69 km.

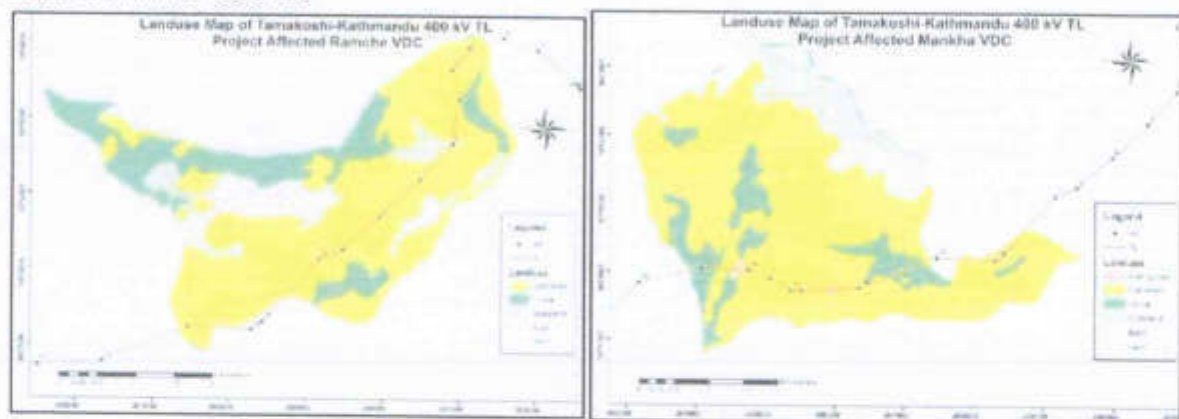


Figure 2.17: Land Use Map of (a) Ramche VDC and (b) Mankha VDC

Fulping Dandagau Section

From AP 19, the alignment almost heads straight towards West and meets AP 20 located on cultivated land. There are total of 4 APs located within Fulping Dandagau VDC. In this section, the alignment crosses cultivated land and forest which finally joins at AP 23 located at forest. The length of the alignment along the section is 4.505 km.

Kadambas Section

From AP 23, the alignment almost heads towards North-West and only TL traverse along Kadambas VDC. The length of the alignment in this section is 1.342 km.

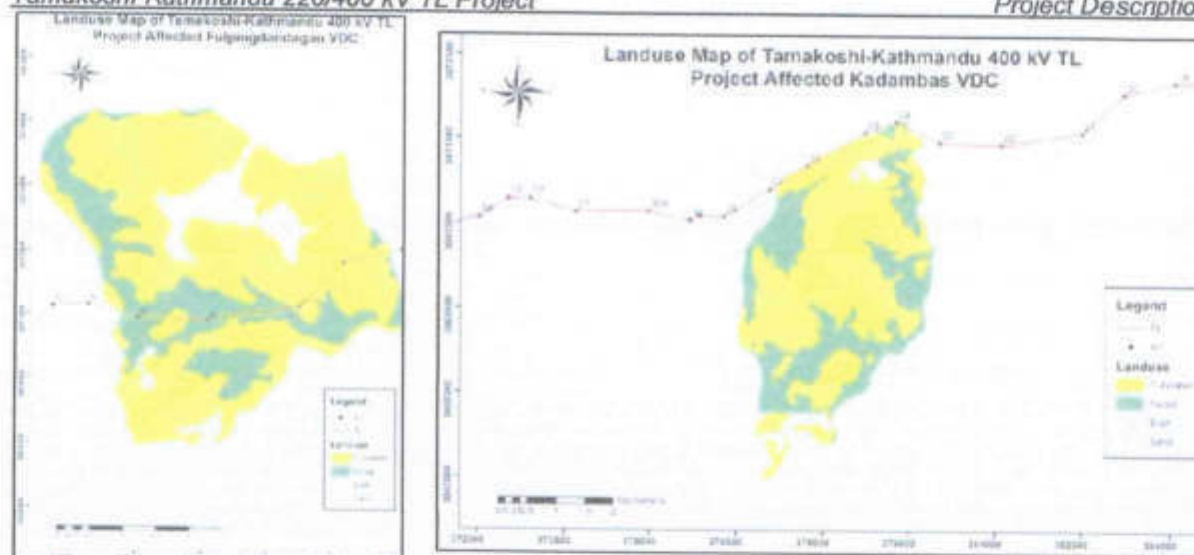


Figure 2.18: Land Use Map of (a) Fulping Dada VDC and (b) Kadambas VDC

Irkhu Section

From AP 23, the alignment turns right towards South-West and meets AP 24 located on cultivated land. There are total of 8 APs located within Irkhu VDC. The length of the alignment in this section is 4.647 km.

ThuloSirubare Section

From AP 30A, the alignment head towards West and meets AP 31 located on Cultivated Land. There are total of 6 APs located within ThuloSirubare VDC. The length of the alignment in this section is 5.022 km.

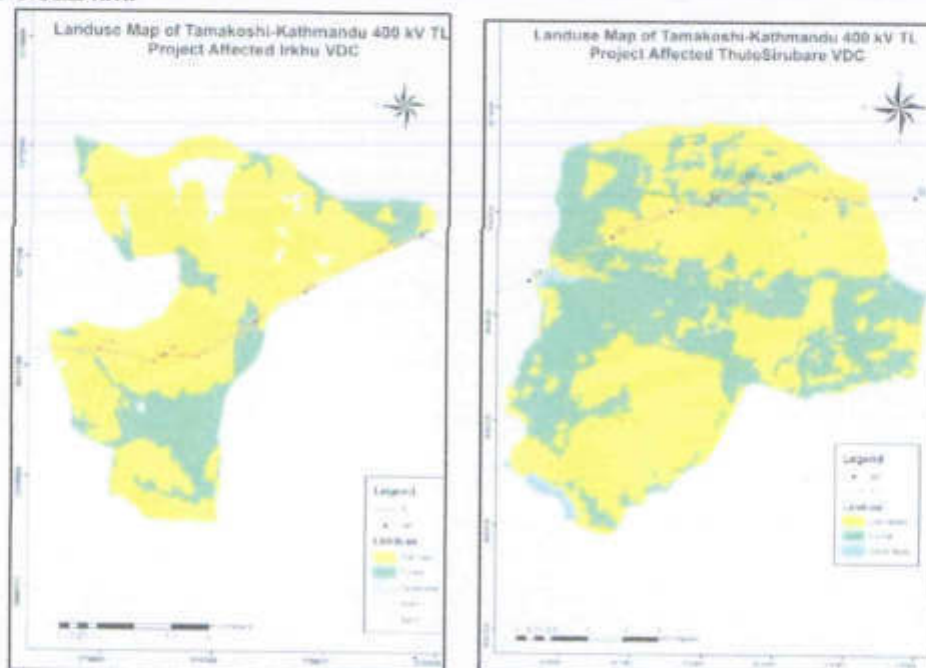


Figure 2.19: Land Use Map of (a) Irkhu VDC and (b) ThuloSirubare VDC

Bhotasipa Section

From AP 36, the alignment moves straight towards South-West and meets AP 37 located on Cultivated Land. There are total of 3 APs located within Bhotasipa VDC. The length of the alignment in this section is 2.352 km.

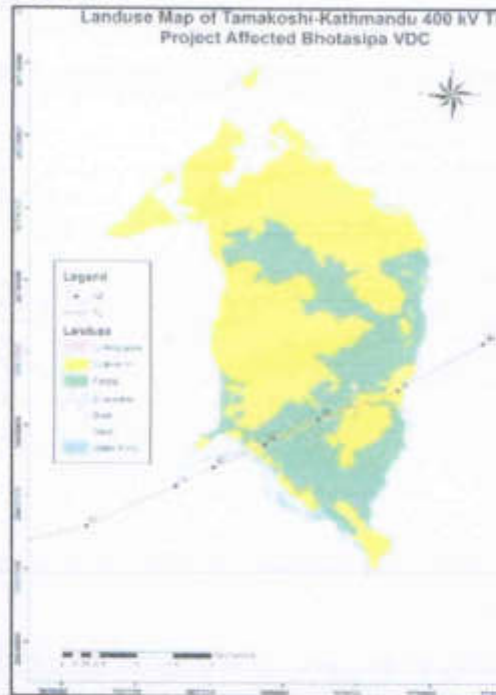


Figure 2.20: Land Use Map of Bhotasipa VDC

ChandeniMandan Section

From AP 39, the alignment moves straight towards South-West and meets AP40 located on Cultivated Land. There are 2 APs located within ChandeniMandan VDC. The alignment crosses Indrawati River and Cultivated Land. The length of the alignment in this section is 1.528 km.

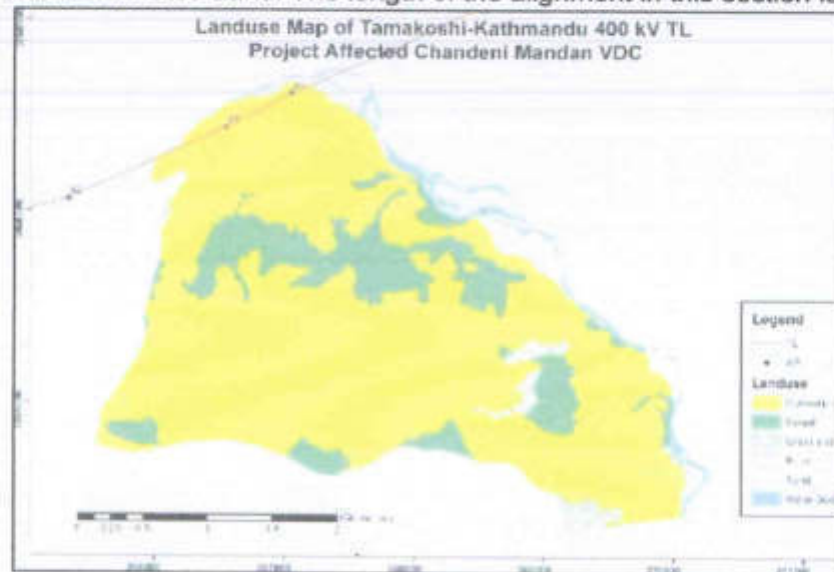
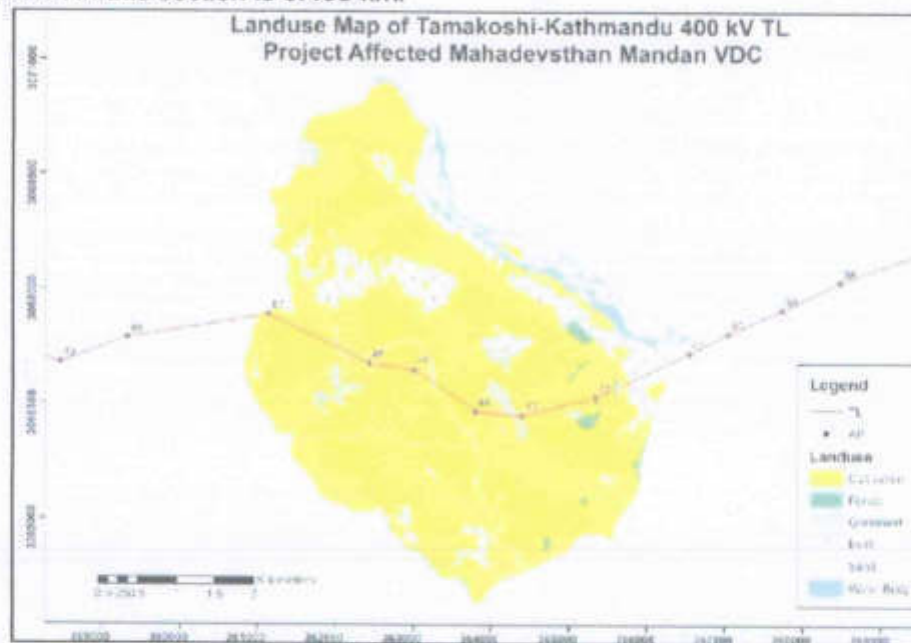


Figure 2.21: Land Use Map of ChandeniMandan VDC**MahadevstanMandan Section**

From AP 41, the alignment heads straight towards South-West and meets AP 42 located on Cultivated Land. There are total of 6 APs located within MahadevstanMandan VDC. The length of the alignment in this section is 5.403 km.

**Figure 2.22: Land Use Map of MahadevstanMandan VDC****NayagaunDeupur**

From AP 47, the alignment turns left towards South-West and meets AP 48 located on Cultivated Land. There are 2 APs located within NayagaunDeupur VDC. The length of the alignment in this section is 2.828 km.

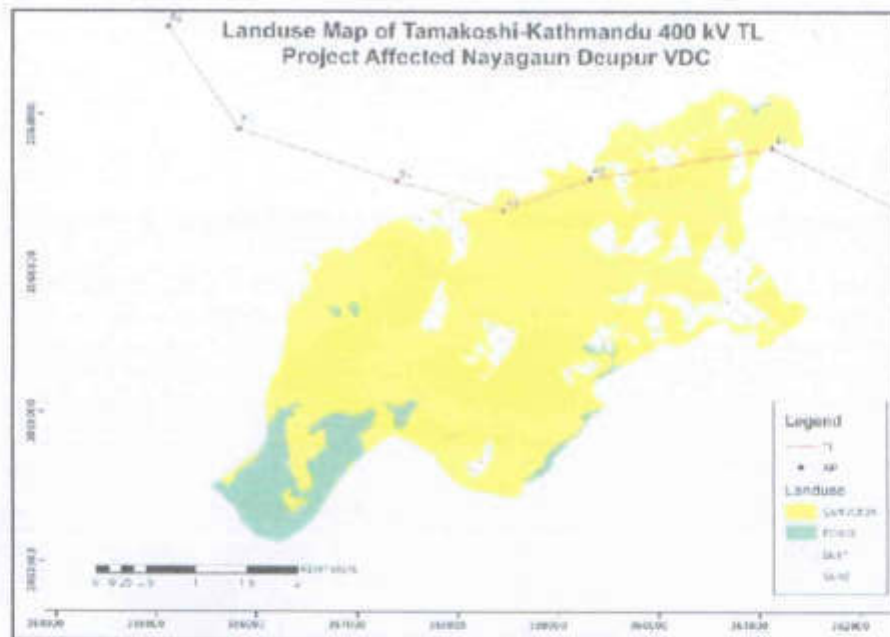


Figure 2.23: Land Use Map of Nayagaun Deupur VDC

Baluwapati Deupur Section

From AP 49, the alignment heads towards North-West and meets AP 50 located on Cultivated Land. There are total of 4 APs and 2 SS point located within Baluwapati Deupur VDC. The length of the alignment in this section is 5.58 km.



Figure 2.24: Land Use Map of Baluwapati Deupur VDC

Shankharapur Section

From AP SS, the alignment heads towards West and meets AP 54 located on Cultivated Land. There are total of 4 APs located within Shankharapur Municipality. The length of the alignment within this section is 6.324 km. This municipality was recently formed by merging six VDCs (Nanglebhare, Lapsipedi, Suntola, Pukhulachi, Bajrayogini and Indryani).

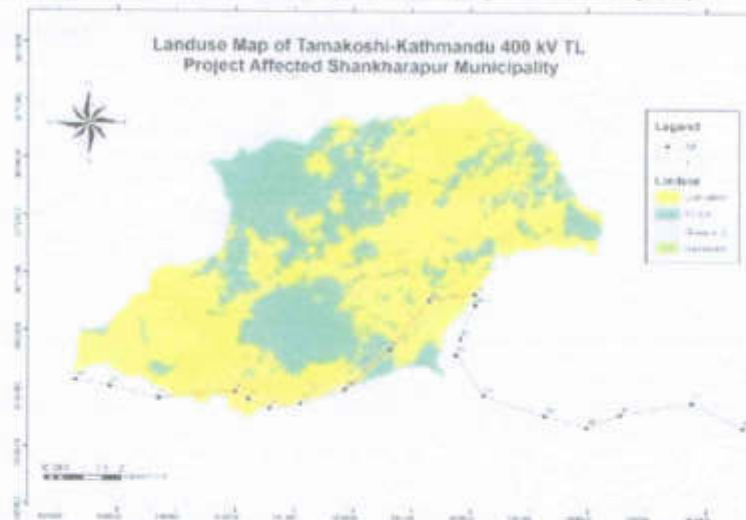


Figure 2.25: Land Use Map of Shankharapur Municipality

Mahamanjushree-Nagarkot Section

From AP 55, the alignment heads towards South-West and meets AP 56.722 located on Cultivated Land. There are total of 3 APs located within Mahamanjushree-Nagarkot Municipality. The length of the alignment is 2242 km. This municipality was recently formed by merging four VDCs (Tathali, Sudal, Bageshewari and Nagarkot).

Changunarayan Section

From AP 60, the alignment heads towards South-West and meets AP 61 located on Barren Land. There are total of 2 APs and 1 SS point located within Changunarayan Municipality. The length of the alignment within this section is 2.729 km. This municipality was recently formed by merging four VDCs (Chhaling, Jhaukhel, Changunarayan and Duwakot). 4 km multicircuit 132 kv line From Changunarayan to Duwakot.

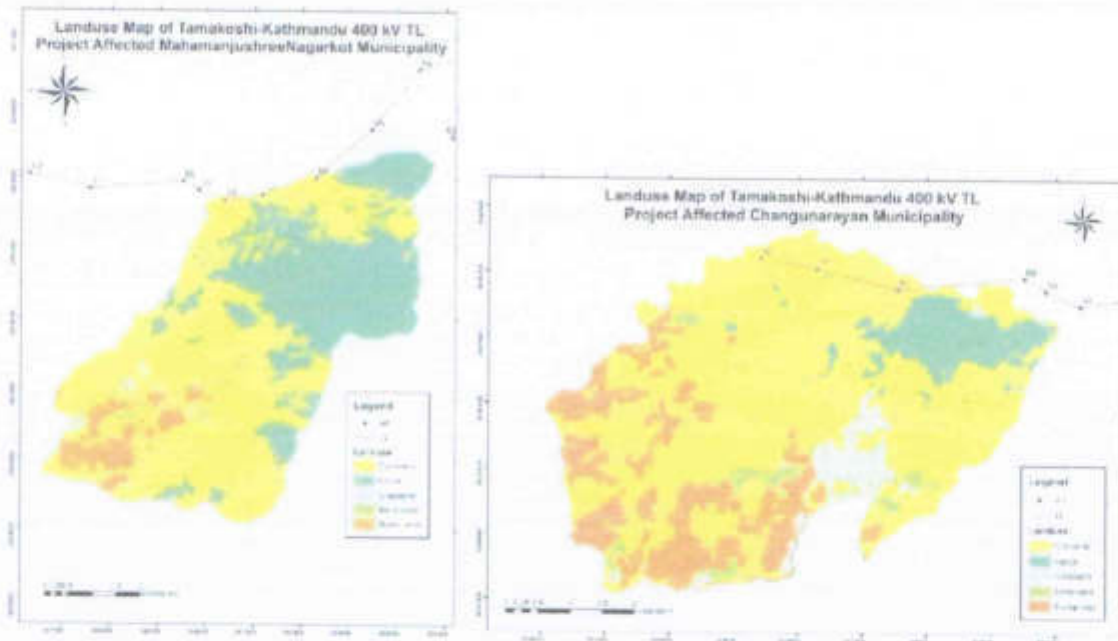


Figure 2.26: Land Use Map of (a) Mahamanujushree-Nagarkot Municipality and (b) Changunarayan Municipality

2.4.2 Substation

The Tamakoshi-Kathmandu 220/400 kV TL starts from the proposed New Khimti substation at Phulasi VDC of Ramechhap and joins the Barhabise Substation at Barhabise VDC of Sindhupalchowk district. From Barhabise substation, the TL connects with the Lapsephedi Substation at Shankharapur Municipality of Kathmandu district and finally terminates at Changunarayan substation in Changunarayan Municipality of Bhaktapur district. Out of these four substations, the Tamakoshi-Kathmandu 220/400 kV TL Project comprises only three substations (Barhabise, Lapsephedi and Changunarayan). The remaining New Khimti Substation is a component of Khimti-Dhalkebar 220 kV TL Project and shall be constructed accordingly.

The Barhabise substation shall acquire about 8ha of land whereas Lapsephedi substation and Changunarayan Substation shall acquire 7.5 ha and 3 ha respectively. All of these substation are located on cultivated land.

2.5 Project Area Delineation

For the IEE of the proposed project, the project area is defined as the area for the construction of a 400 kV TL alignment, and a Substation as well as the area that will be impacted due to the construction and operation of the project. This area mainly includes 1 VDC of Ramechhap, 7 VDCs and 1 municipality of Dolakha and 5 VDCs of Sindhupalchowk district respectively of Khimti-Barhabise Section and 8 VDCs of Sindhupalchowk, 4 VDCs of Kavrepalanchowk, 2 Municipalities of Bhaktapur and 1 municipality of Kathmandu of Barhabise-Kathmandu Section. The project area does not lie in the national park, wildlife reserve, buffer zone, conservation area, historically and archaeologically important sites and/or environmentally sensitive/ fragile areas. The study area is divided into two parts on the basis of the proximity and magnitude of impacts.

2.5.1 Core Project Area

The "Core Project Area" consists of the 46m Right-of-Way (RoW), encompassing 23m on each side of the alignment measured from its center line. The nearest settlement from the TL alignment and area occupied by the substations are also considered as the core area. This area is also defined as the "direct impact zone".

2.5.2 Surrounding Area

The term "Surrounding Area" indicates a greater area, which will directly or indirectly get influenced by the construction and operation of the project. This area includes all alignment encompassing VDCs and Municipalities of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu districts excluding areas mentioned under core project area. This area is also defined as the "indirect impact zone".

The term "project" indicates the Tamakoshi-Kathmandu 400kV TL and "Area" refers to the core project area and the surrounding area. The term "project area" is also referred to as the study area for the IEE. The affected VDCs are shown in Figure 2.2 and Figure 2.3.

2.6 Construction Planning

The implementation of proposed project comprises the construction of a new substation, tower foundation and erection of towers, stringing of conductor, testing and commissioning of the 90 km of 400 KV and 14 km of 132 KV TL.

2.6.1 Tower Foundation

The construction of tower foundation will be undertaken by manual labor assisted by the mechanical plant wherever possible. The Mechanical plant will be limited to small demountable steel skid framed concrete mixers, air compressors, air drills/chisels and tamping/compaction tools. Excavation and the concreting of the tower foundations will be carried out as per the design requirements and after necessary curing, the foundations will be backfilled with suitable material.

2.6.2 Erection of Galvanized Steel Towers

Galvanized steel lattice towers manufactured in the factory will be transported to the individual tower locations and will be erected manually by employing pulleys, wenchers, etc. into the tower foundations.

2.6.3 Insulator Fittings, Conductor and Ground Wire Stringing

Conductors, Optical Ground Wires (OPGW), insulators, hardware and necessary accessories will be transported manually to the tower locations. The fitting of insulators on the tower will be carried out manually. Stringing of conductors and OPGW will be carried out with the help of tensioners and other pulling devices as per the design requirements.

2.6.4 Transportation

Primary site access for the project construction will be gained from Jiri and B.P Highway for Khimti-Barhabise Section and from Pipalbot-Sakhu road, Dolalghat-Chautara road and Araniko Highway for Barhabise-Kathmandu Section. No permanent access roads will be constructed to tower sites from existing road. Existing feeder roads and tracks will be used for construction and maintenance where available. The construction material up to the nearest road head will be carried out through vehicle and later it will be transported manually up to the individual tower location.

2.6.5 Spoil Dumping Site

Since the construction of TL towers requires clearing and excavation of fairly small areas at tower locations, construction work will not require spoil dumping sites. The spoil will be filled up and compacted in the tower base area. Similarly, spoil generated from the substation construction will be used to the switchyard location where borrowed earth materials have to be filled and compacted for the site grading.

2.6.6 Construction Materials

The materials required for civil construction works related to the TL and substation will be:

- Steel reinforcement
- Cement
- Coarse aggregate
- Fine aggregates (sand)

The main materials required for construction works related with the transmission line and substation will be Cement, sand and aggregates; Steel reinforcement. Steel reinforcing bars and cement can be acquired from local manufacturers or can also be imported. Coarse aggregates will be produced at site from excavated materials or purchased from the nearby market. Likewise, fine aggregates will be collected from major quarries along riverbanks, the excavated foundation material can be used as a backfill material required for the foundation construction.

Approximately, 5998.3 metric tons of cement shall be required for this project. Similarly, coarse and fine aggregates required for this project shall be taken from Tamakoshi River, Sunkoshi and Indrawati River or nearby sources. About 9587.52 cubic meters of fine aggregates and 19175.04 cubic meters of coarse aggregates shall be necessary for the project. Steel is required for construction of substation, quarters, tower foundations and tower itself. About 16467.5 metric tons of steel shall be required for this project.

2.6.7 Employment

Local people those are affected by the project implementation will be encouraged for employment. As far as possible, local semi-skilled and unskilled labor will be used for construction activities and transportation of materials. Altogether about 400 people will be employed during the construction of the project, which includes unskilled, semi-skilled and skilled manpower.

2.7 Project Schedule

The estimated completion period of the project including both section is 40 months. The construction work of TL will primarily be carried out during the dry season when ground conditions are essentially dry and river flows low to allow easy movement of materials and construction of towers. Construction activities during the monsoon season will primarily be restricted to stringing of conductors, although this activity may also be restricted by the weather. However, the construction work of the substation will be conducted throughout the year.

Table 2-2: Construction Schedule

S. N	Activities	Time												Remarks	
		FY 2073/74			FY 2074/75			FY 2075/76			FY 2076/77 & 77/78				
		Jan. Apr.	May Aug.	Sept. Dec.	Jan. Apr.	May Aug.	Sept. Dec.	Jan. Apr.	May Aug.	Sept. Dec.	Jan. June	July. Dec.	Jan. June		July. Dec.
1	Completion of IEE														C
2	Completion of U-IEE														R
3	Preparation of Biddocuments and publication of IFB														C
4	Selection and mobilization of Contractor														C
5	Land acquisition for substation														C
6	Check Survey by Contractor, tower spotting of TL														C
7	Clearance from forest authority for tree cutting														R
8	Design, drawing approval and Construction of TL														R
9	Approval of design, drawings by Project and Construction of substation														R
10	Testing, commissioning of Transmission Line and substation														R
11	Project Handover														R
12	Project Operation														R

C= Completion of work

R= Remaining Work

3. STUDY METHODOLOGY

The IEE process follows the Environment Protection Rules 1997, and its amendments 2009 (2065/11/26) and National EIA Guidelines 1993. IEE Report is prepared in accordance with the legal requirements of GoN, based on approved ToR, field study, consultation with local people/stakeholders and officials.

3.1 Desk Study and Literature Review

Review of IEE Reports of similar types of hydropower projects, district level annual reports, and other pertinent literatures was done. Topographical and land use maps of the area including the Google Earth map were studied for field study. The major reports consulted are: Districts profile of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu districts published by the District Development Committees; National Population and Housing Census 2011, published by Central Bureau of Statistics, GoN; Village Development Committee Profiles; Feasibility Report of Tamakoshi-Kathmandu 220/400 kV TL and Survey Report. On the basis of the reviewed information regarding the project areas, data gaps were identified and the methodology described in this chapter was developed to collect other relevant information required for the IEE. All the issues highlighted in IEE document were given emphasis during the Updated IEE.

Information on climate, geology and hydrology were taken from the Feasibility Report prepared for this project. Review of topographical map and land use map was done to identify the land use patterns of the area. The details of different topographical maps used during the study period are given in following table.

Table 3-1: Details of Topographic Maps of Project Area

S.No.	Name of Topographic Sheet	Sheet No.	Scale
1	Barhabise	2785-04	1:50,000
2	Dadapakhar	2785-02	1:50,000
3	Dolalghat	2785-06A	1:25,000
4	Banepa	2785-07A	1:25,000
5	Bhaktapur	2785-04A	1:25,000
6	Manthali	2786-09A	1:25,000
7	Melun	2786-05C	1:25,000
8	Charikot	2786-05A	1:25,000

The general information of the forest area, types and community forest of the district was collected by review of publication of District Forest Office of. Socio-economic and cultural data, such as population of project district and VDCs, households size, male-female ratio, infrastructures, ethnicity, religion etc. were derived from Population and Housing Census, 2011. District Profile of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu district and profiles of the affected VDCs were reviewed for the required socioeconomic data.

On the basis of the reviewed information with respect to the project, data gaps were identified and the methodology described in following sections of this chapter was developed to collect other relevant information required for IEE study.



While carrying out the IEE, literature, review on topographic maps, land use maps, CBS publications, project technical reports and other TL project related environmental reports have been extensively carried out.

The following documents which were considered to be relevant for the study were reviewed:

- 1:25,000 scale topographical maps prepared by the Department of Survey, GoN.
- 1:100000 scale district map of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Kathmandu and Bhaktapur Districts
- Detail Survey Report of Khimti-Barhabise 400 kV TL project and Barhabise-Kathmandu 400 kV TL project prepared by Engineering Service Directorate, Project Development Department, NEA
- IEE Report of Koshi Corridor 400 kV TL, Chilime-Trishuli 220 kV TL and Samundratar Trishuli 132 kV TL projects.
- ToR of Tamakoshi-Kathmandu 220/400 kV TL project.
- Regional Geological Maps and previous geological reports of the Nepal.
- Population Census, Central Bureau of Statistics, GoN/ Nepal, 2011.
- District Profile of Affected District, District Information Centre.
- Demographic Profile of Nepal 2013/14.
- Profiles of Concerned VDCs and Municipalities.
- Forest Act, 2049, and Forest Regulation, 2051
- Guidelines for Community Forestry Development Program, 2009 □ Google Earth, the online software for verifying the TL alignment.

On the basis of the reviewed information with respect to the project, data gaps were identified and the methodology described in following sections of this chapter was developed to collect other relevant information required for IEE study.

3.2 Data Requirement, Collection Methods and Analysis

A team of experts specialized in engineering, forestry, and socioeconomics visited the project area in April and August 2015, to collect baseline information of the area, identify the likely impacts of the proposed project during construction and operation phases and inform stakeholders regarding the project. During this visit, the team visited the project site proposed for structures and facilities as well as settlements of the affected VDCs and collected required data on physical, biological and socio economic and cultural environment of the area. Topographical maps were referred for site investigations. The study team observed various assets and took GPS location point references and photographs to establish the baseline. The team also visited relevant government offices of the affected district to interact with concerned officials and collect necessary information and their concerns.

The study team has adopted a participatory approach with maximum involvement of different stakeholders of the project at the local and district levels to generate relevant information for the

IEE. The study team has maintained a close contact with the district level government relevant line agencies, VDC level key stakeholders and other stakeholders while conducting fieldwork for the IEE.

3.2.1 Physical Environment

3.2.1.1 Hydrology and Meteorology

The general climatological and meteorological information of the project impact area has been taken from the District Development Profile.

3.2.1.2 Geology

The regional geology around the project area highlighting geology has been covered in the IEE Report, as per the available information in the Feasibility Report. The stability of slopes and the presence of landslides, fan deposits and rock fall within the project area were evaluated mainly by site observations and from topographical maps. The local people were enquired about the occurrence of major landslides and soil erosion in the project area.

3.2.1.3 Land Use Pattern

Land use pattern of the study area was derived from review of topographical map, Google Image and GIS map of the area.

3.2.1.4 Data Requirement and Collection Methods

The following data were collected during the IEE study:

- Meteorological data: Maximum and Minimum Temperature and rainfall of the project area;
- Topographical data: Altitude and landscape
- Air, water and noise quality of the project area
- Physical setting: Physiographic location, river system, etc. of the project area
- Geological data: Rock type, soil type, slope stability, erosion, landslides, etc. of the project area
- Spoil materials: Total volume, volume to be used for construction, disposal volume, etc. □ Significant crossings along the alignment □ Land use pattern of the project area.

The following methodology has been used to collect the baseline data on each environmental domain:

- Collection of secondary data and review
- Field survey and investigation by the team of experts
- Observation
- Expert's judgments
- Checklist and households' survey
- Public/stakeholders consultation through group meetings/key person interview
- Impact assessment

An intensive field investigation from BS 2072/04/15 to BS 2072/05/01 along the proposed alignment was conducted to collect information on existing physical environment. During the field visit inspection of site condition of the angle points and other critical areas along the TL were done. Documents and other relevant literature were collected and reviewed.



The data on climate (temperature, rainfall, and moisture) was collected through secondary source; District Profile of Nepal, 2007/2008. The data on air, noise and water quality of the area has been collected through observation by subject expert during site visit. Geographic and geological data, such as topography, rock type and soil type, stability of the Angle Tower locations, soil erosion and other key environmental features were investigated and obtained from the Regional Geological Maps and previous geological reports of the Nepal and by general observation. Physical settings, land-use pattern and significant crossings were adopted from topographical maps and detail plan and profile of the alignment.

The type of land use and area calculation has been prepared with reference to the topographical maps, survey report provided by the Survey Department with field verifications. The obtained data of land-use pattern, river system and significant crossings along the alignment from the review of the topographical maps and plan and profile of the alignment has further been verified at site. Similarly, the numbers of structures under RoW, at substations area and near angle points were determined with the help of the plan and profile of the Final Survey Report with verifications at site. During the field visit the data on occurrences of slides and other information related to the physical environment were gathered by observation, group discussion and inquiring the local people.

3.2.1.5 Data Analysis

The collected data from the field visit was analyzed using different softwares like ArcGIS 10.2.1, AutoCAD, Google Earth by the study team in coordination with the project engineers and experts. Necessary maps and information thus generated were presented in the report. The beneficial and adverse impacts have been predicted and appropriate mitigation measures proposed to reduce the impacts.

3.2.2 Biological Environment

Following methodology was adopted to collect data on biological environment of the proposed project:

3.2.2.1 Desk Review

Secondary information was reviewed from the Community Forestry Monitoring and Annual Progress Reports of Kathmandu, Bhaktapur, Kavrepalanchowk, Sindhupalchowk and Dolakha DFOs; Management Information System (MIS) data base of Community Forestry Division of Department of Forest (DoF), Forest and Vegetation Types of Nepal published by Tree Improvement and Silviculture Component of DoF, Forest Resource Inventory Guidelines, 2061, Forest Act and Rules, Government Tree Cutting Procedures, 2074. Meeting was also held with concerned officials in the Ministry of Forest and Soil Conservation (MoFSC), DoF, DFO of Bhaktapur, Kathmandu, Kavrepalanchowk, Sindhupalchowk and Dolakha districts.

3.2.2.2 Field Survey

Half day orientation training was organized to brief about the inventory process, necessary formats, use of GPS for identification of angle point (AP) and transmission line (TL) alignment to

the concerned DFO staff and CFUG before conducting field survey. AP and TL alignment passing through the forest have been identified with the support of Environment and Social Safeguard Department (ESSD) team of Nepal Electricity Authority (NEA) using GPS, Technical Survey Report, topographical sheets (maps) of 1:25,000 and 1:50,000 scale of Department of Survey. Field survey was organized simultaneously in all Ilaka Forest Offices within the District starting from 12 to 31 August 2015.



Figure 3.1: Measurement of tree under TL in Sindhupalchowk district



Kathmandu

Total enumeration in each angle point (35mx35m) and under TL passing from the forest (46 m RoW) was done to assess the number and types of plants likely to be affected by the project. This has been done by the concerned District Forest Office (DFO) staff and community forest users group (CFUG) representative to involve them from the very beginning of the tree counting and cutting process. Field survey was done by forming a team at Ilaka Forest Office comprising of two forest guards (FG), one CFUG representative headed by Assistant Forest Officer (AFO). In addition, the proposed alignment and substation were visited by the Environmental and Forestry Specialist and ESSD team to collect baseline information and for impact prediction.

Forest survey was conducted in each AP and TL alignment to count each tree and pole measure height and diameter at breast height (dbh) for tree and pole and number each tree with enamel painting. Trees were not counted below 5" dbh according to annex-7 of forest regulation 2051



Figure 3.3: DBH measurement & tree numbering in Kavrepalanchowk

According to Forest Rules, 1995, trees having more than 11" diameter at breast height (dbh) are referred as tree and species having girth below 11" and above 5" are referred as pole and below 5" are regeneration which were not measured only counted. Trees are also classified in three classes based on their quality. Class 1 trees are green, dead or dying, standing or fallen with solid stem and without scar or disease, class 2 trees are green, dead or dying, standing or fallen with partly decayed from inside having 6' long two logs or one 10' long log and class 3 trees are those which don't fall in class 1 or 2.

3.2.2.3 Interaction with Community Forest User Group

During tree counting, representative from concerned CFUG has been involved and a letter of consent for the implementation of the proposed project through community forest has been obtained. Similarly, meetings, interviews and discussions were held with the members of CFUG and local peoples to collect information on the availability of flora and fauna, dependency of local people on forest



resources, availability of Non-Timber Forest Products

Figure 3.4: Interaction with CFUG of etc. Sindhupalchowk

3.2.2.4 Wildlife, Birds and Fishes

Information on wildlife, birds and fishes was collected through observation and consultation with local resource persons. During the field visit, indirect evidence such as droppings, pug marks, foot prints and scales of the animals were collected for identification purposes.

3.2.2.5 Data Analysis

Timber volume in cubic feet (cft) and fuel wood in chatta (20'x10'x5') was calculated using following formula according to Community Forestry Resource Inventory Guidelines:

Category	Timber (cft)	Fuel wood in chatta (20'x10'x5')
Class 1	$\frac{\pi d^2 \times \text{height} \times \text{form factor} \times 2}{4 \times 3 \times 144}$	$\frac{\pi d^2 \times \text{height} \times \text{form factor} \times 1}{4 \times 3 \times 144 \times 1000}$
Class 2	$\frac{\pi d^2 \times \text{height} \times \text{form factor} \times 1}{4 \times 2 \times 144}$	$\frac{\pi d^2 \times \text{height} \times \text{form factor} \times 1}{4 \times 2 \times 144 \times 1000}$
Class 3		$\frac{\pi d^2 \times \text{height} \times \text{form factor}}{4 \times 144 \times 1000}$

Note: Form factor is taken as 0.5

Based on the final data and on its analysis the impacts, both positive and negative, were identified and their magnitude predicted as well as benefit augmentation and mitigation measures were recommended.

3.2.3 Socio-economic and Cultural Environment

3.2.3.1 Data Requirement and Collection Method

The following types of data are acquired for IEE study:

- Socio-economic survey of project affected households whose land and house will be permanently acquired. Information on livelihood and property has also conducted;
- Demographic characteristics: Population distribution, migration pattern, age group distribution, etc.;
- Ethnicity and religion;
- Education and skill level: literacy rates, skills and skilled, manpower, etc.;
- Health and sanitation: information on sub-health post/health post, hospitals, main disease, incidence of water born disease and infectious disease such as HIV/AIDS;
- Gender, children, the elderly, poor and ethnic minorities;
- Land holding size and ownership
- Community infrastructures and service: drinking water, supply, irrigation, foot trails, transportation, electricity, telecommunication, etc.;
- Local institution and activities: government and non-government agencies, cooperatives, community based organizations;
- Other development activities;
- Cropping pattern, practices and production;
- Livestock raising;
- Estimation of loss of standing crops due to project construction, by crop type area and value.
- Local price information: land, agriculture and forest products, etc.;
- Economy: occupation, employment, agriculture and livestock production, non-timber forest products, trade and commerce, etc.;
- Land ownership: list of landowners likely to be affected by land acquisition and resettlement;
- Income and expenditure of the Project Affected Families (PAFs);
- Measurement and valuation of houses, cowsheds and other structures to be acquired by the project;
- Compensation rates for land, agriculture products, forest, houses and other private infrastructures; and
- Places of cultural importance; historic, religious or cultural sites in the project affected area and the special occasions of celebrations/gathering, including the relative importance of these sites (local, regional or national);
- Aesthetic value of the affected landscape;
- Attitude of the local people to the development and to this project; Cultural practices of the project area; and □ Religion wise population of the project area.

The socio-economic and cultural environmental survey of the people residing in the project affected area as defined in this section was carried out by using the methodology described in the following chronological order. Secondary data published by District Development Committee of

the concerned districts and Central Bureau of Statistics, Kathmandu was intensively used to draw the baseline information of moderate and low impact zones. However, the baseline information of high impact zone was collected from the field survey by using the appropriate techniques as mentioned in the subsequent sections.

3.2.3.2 Literature Review

Based on previous experiences and the review of relevant literature associated with IEE studies of various TL projects, demographic tables were developed. To fill these tables, a desk study was conducted in the office. All the relevant information associated with socio-economic and cultural environment was reviewed. On the basis of the reviewed information, data gaps were identified and the following techniques were used to generate the remaining data.

3.2.3.3 Identification of PAFs and SPAFs

The land owners of the Angle Towers/substation and the land owners/structure owners of the high impact zone have been identified. These identified families were considered as Project Affected Families (PAFs). In addition, the families losing their residence irrespective of their land holding size and other off farm income and the families losing more than 50% of land were identified as Seriously Project Affected Families (SPAFs).

3.2.3.4 Data Collection Tools

After identification of PAFs, their baseline information was collected by using the following techniques: census of affected households, Key Informant Interview, market survey for agricultural commodity and land price, informal meeting/discussion with district level government officials and local stakeholders and Photographs.

a. Households' Survey

Pre-tested questionnaires were designed and applied by a trained team of enumerators to solicit information from project affected families. Households' survey was conducted only for project affected families belonging to angle towers and structures falling in right of way. Altogether, 197 questionnaires were filled. The land owners belonging to tower points and substation area were identified through walkover survey and survey report and hence socio-economic status of them has been studied using questionnaires. Households' survey of landowners belonging to RoW of Way was not conducted in this stage. It will be finalized during detail design and check survey of the TL route.

The questionnaire has been designed especially to cover the sectors like demographic characteristics, basic health conditions, income and expenditure, availability of infrastructure facilities, water and energy related issues, information about project, attitude towards resettlement and expectations from the project.



Figure 3.5: Household Survey

b. Key Informant Interview (KII)

Key informant Interview was employed with social workers, businessmen, and teachers, representatives of political parties, former VDC Chairmen and intellectuals of the project area. The main objective of KIIs was to assess their views, concerns and expectation from the project and collect relevant information of the project area. The main objective of KIIs was to assess their views, concerns and expectation from the project and collect relevant information of the project area. Altogether 14 key informant interviews (KIIs) were conducted in project affected VDC/Municipality. The respondents of the KIIs were purposively selected for interviews. The KII was conducted using an in-depth interview guideline.

c. Market Survey

Market survey was conducted in the project VDCs to get the prevailing price of agricultural commodity, major construction materials, and wage rate. The market survey was conducted with the help of a checklist.

d. Meetings/ Consultations/ Public Participation

Informal meetings/consultations/public participations were conducted with relevant district level government officials at districts headquarters, and at local levels (VDC) with key stakeholders (VDC secretaries, teachers, representative of civil society organization, CFUGs and health workers. The purpose of the meeting/consultation was to inform them about the project, collect their concerns/expectations regarding the project such as project purpose, project type, impact area, likely impacts and potential opportunities due to project implementation and required information for the IEE.

The key issues and concerns raised by the local people are related to compensation, employment, implementation of mitigation and enhancement measures and community participation in the project activities. The key issues/concern raised by the local people during community consultations were summarized.



Figure 3.6: Informal Meeting/ Public Participation

e. Field Observation

Observation of the project site was made to obtain information on different socio-economic and cultural activities of the impact area. Religious and archaeological sites of the impact area were identified to assess the impact on these sites within the high, moderate and low impact zones. At the end of each day notes were written about the observations and a field diary was maintained. Project photographs were also taken during field investigation.

3.2.3.5 Data Analysis

The field data from each project affected VDCs were compiled edited and analyzed in Kathmandu using windows software like WORD and EXCEL. The analyzed data were then interpreted and discussed in appropriate sections of the IEE Report.

3.3 Impact Identification, Evaluation and Prediction

A logical, simple and systematic approach has been adopted for impact identification, evaluation and prediction. The impact has been identified for physical, biological, socio-economic, and cultural environment of the project area. The following tools have been used for impact identification:

- VDC Checklist, Key Informant Interview
- Households Questionnaire
- Table format for loss of land, crop production and property of the project affected families
- Expert's judgment

Topographic map of the route alignment has been used in predicting the impacts of the proposed T/L by analyzing the effect of project activities on the resources like existing infrastructures, rivers/rivulets, settlements, private land, forest, etc. present in the location. The expert's judgment

using past experiences of similar type of projects have been used to predict impacts. Wherever possible, impact predictions have been done quantitatively.

Field inventories before project implementation provide the baseline condition of resources. The assessment of impacts is based on the baseline environmental conditions of the affected area with the project activities in relation to spatial and temporal aspects in terms of magnitude, extent and duration using various environmental prediction methods. The impact has been predicted over a specified period and within defined area. Consequences of environmental impacts were interpreted in terms of local, regional and national contexts. The significant positive and adverse environmental impacts associated with the project components have been identified considering the impact zone. The magnitude, extent and duration of the impacts which were categorized according to the National EIA Guidelines, 1993 are given below:

Magnitude of Impacts

- Low Impact (L): If the value of the resources could be used with no or minimum inconvenience to the public
- Medium/Moderate Impact (M): If the value of the resources could be used with inconvenience to the public
- High Impact(H): If the value of the resources reduced far below publicly acceptable level

Extent Impacts

- Site Specific (S): The impact is limited within RoW then it is site specific one.
- Local (L): If the impact of the work extends to the adjoining wards and or within 100m up 300m from the TL or angle tower then it is termed as local.
- Regional (R): If the impact of the work extends to the entire district or further then it is termed regional.

Duration of the Impacts

- Short Term (ST): If the impacts last for 3 years after project initiation it is classified as short term. Construction phase impacts are mostly categorized under this category.
- Medium Term (MT): An impact that continues for more than 3 years but less than 20 years is considered as medium-term. The construction phase impacts which carry over for few years of operation falls under this category.
- Long Term (LT): An impact that lasts beyond 20 years is considered to be long term. The operation phase impacts are mostly categorized under this category.

3.4 Public Involvement

3.4.1 Public Consultation

Public consultation process was carried out by conducting group discussion, interaction meetings, and household survey among the local people/stakeholders, concerned VDCs and related official.s/agen esis of the project areas.

3.4.2 Recommendation Letters

As per EPR 1997, a 15 days public notice was published in Gorkhapatra National Daily on 2076/04/27 attachd in appendix C. The notice will consist of a statement regarding brief project information and request



to provide comments and suggestions within 15 days to the A team was mobilized in the field with copy of public notice along with cover letters to the concerned VDCs/Municipalities, CFUGs, district level line agencies and other local stakeholders. Copy of the sites and proof of deed (*Muchulkas*) collected. Similarly, recommendation letters collected from the affected VDCs. In addition, consent letter were collected from the affected CFUGs which is included in Tree enumeration Report. Summary of tree Enumeration Report distributed to the concerned division forest office and CFUGs and a copy of Updated IEE Report provided to District Forest Offices. Letter for Approved IEE attached in appendix D.

3.5 The Study Team

The following personnel were involved during the Updated IEE study of the proposed TL:

Table 3-2: List of persons involved in IEE study

S.N.	Name	Designation	Address	Phone No.
1	Nawraj Ojha	Project chief	NEA-TKTLP	01-6611580 01-6620016
2	Suraj Regmi	Asst. Manager	NEA-TKTLP	
3	Bhakti Timilsina	Asst. Director	NEA-ESSD	
4	Prakash Gaudel	GIS Expert, Environmentalist	NEA-ESSD	
5	Gajendra Yadav	Civil Engineer	NEA-TKTLP	
6	Youbraj Rawat	Electrical Engineer	NEA-TKTLP	
7	Mahendra Bhattarai	Expert	Consultant	

Beside the aforementioned study team, the experts from the project were also involved in providing the project's technical data/facts and figures and suggestions for the preparation of this Updated IEE Report. Forester, Biodiversity and wildlife experts of government sector has advised on studies phase. As well as Enumerators and field helpers were hired at the local level to assist the study team in collecting baseline on each environmental domain and other necessary field data. notice displayed in the project

4. REVIEW OF POLICY AND LEGAL PROVISIONS

4.1 Introduction

Nepal integrated environment aspects in all its development activities and projects only from early 1980s. Environment conservation was included in the policies since the Fifth Plan (1975/1980). The second milestone was taken during the Sixth Plan. The Sixth Plan under the environment and land use policy emphasized the integration of environmental aspects into the construction of large-scale development projects. Then finally, in the Seventh Plan it was stated that developmental programs would be implemented only after an approved EIA/IEE Report. The Eighth, Ninth and Tenth Five Year Plans have further emphasized the making of more effective EIA systems. The formulation of Sectorial Guidelines, promotion of participatory EIA/IEE system and inclusion of mitigation cost into the total project cost were some of the activities included in these three five year plans.

The prevailing Acts, Policies, Regulations and Guidelines, which are required for the construction and operation of TL projects in Nepal, have been reviewed as per the followings while preparing the present Updated IEE Report. The proponent will abide by any other laws besides those already mentioned in the documents that are attracted due to different activities that will be undertaken during project implementation.

Before, moving into the review of policy and legal provision, it is worthwhile to compare the changes in these provisions from the approved IEE with this U-IEE. The following table shows such comparison.

Table 4-1: comparative list of relevant Policies and Legislations

S.N.	Category	Approved IEE	U-IEE	Remarks
1	Constitution	Constitution Of Nepal 2072	Constitution Of Nepal 2072	No Change
2	Plan And Policy	Nepal environmental policy and Action Plan, 2050(1993) and 2055(1995)	Nepal environmental policy and Action Plan, 2050(1993) and 2055(1995)	No Change
		Forestry sector Policy, 2057(2000)	Forestry sector Policy, 2057(2000)	No Change
		Hydropower development policy 2058(2001)	Hydropower development policy 2058(2001)	No Change
		-	National forest Sector Policy, 2075	Added, New
		-	National Environment Change Policy, 2076	Added, New
		-	National Climate change Policy, 2076	Added, New
		-	15 th National periodic plan	Added, New
3	Acts	Environment Protection Act, 1997	Environment Protection Act, 1997	No Change
		Electricity Act, 1992	Electricity Act, 1992	No Change
		Water resources Act, 1992	Water resources Act, 1992	No Change
		Aquatic Animals Protection act, 1961	Aquatic Animals Protection act, 1961	No Change
		Land Acquisition Act, 1977	Land Acquisition Act, 1977	No Change

S.N.	Category	Approved IEE	U-IEE	Remarks
3	Acts	Forest Act,1993	Forest Act,1993	No Change
		Soil and Water Conservation Act,1982	Soil and Water Conservation Act,1982	No Change
		Labor Act,2049	Labor Act,2074	Change
		Child Labor (Prohibition and Regulation) Act,2056(2000)	Child Labor (Prohibition and Regulation) Act,2056(2000)	No Change
		-	संकटापन्न वन्यजन्तु तथा वनस्पतिको अन्तर्राष्ट्रिय व्यापार सम्बन्धी नियन्त्रण ऐन २०७३	Added
		-	Contribution Based Social Security Act 2017	Added,New
		-	मुलुकी देवानी संहिता ऐन,२०७४	Added,New
		-	विधुत नियमन आयोग ऐन,२०७४	Added,New
4	Rule and Regulation	Enviroment Protection Rules,1997	Enviroment Protection Rules,1997	No Change
		Electricity Regulation,1992	Electricity Regulation,1992	No Change
		Water resources Regulation,1992	Water resources Regulation,1992	No Change
		Forest Rules,2051(1995)	Forest Rules,2051(1995)	No Change
		Local Self Governance Regulation,1999	Local Self Governance Regulation,2016	Change
		-	Forest Rules,2051(19995)	Added
		-	Labour Rules,2075(2018)	Added
		-	Solid Waste Management Rules,2070(2013)	Added
		-	Contribution Based Social Security Regulation,2018	Added,New
		-	विधुत नियमन आयोग नियमावली,२०७५	Added,New
5	Guidelines And Convention	Biodiversity convention,1992	Biodiversity convention,1992	No Change
		National Enviroment Impact Assessment Guideline,1993	National Enviroment Impact Assessment Guideline,1993	No Change
		EIA Guidelines for Forestry Sector,1995	EIA Guidelines for Forestry Sector,1995	No Change
		Forest,Production,Collection and Sales distribution Guidelines,2057(1998)	Forest,Production,Collection and Sales distribution Guidelines,2057(1998)	
		Community Forest Guidelines,2058(2002)	Community Forest Guidelines,2058(2002)	No Change
		Community Forest Inventory Guidelines,2058(2002)	Community Forest Inventory Guidelines,2058(2002)	No Change
		शासकीय तथा आर्थिक सुधारको तत्काली कार्ययोजना, २०६१	शासकीय तथा आर्थिक सुधारको तत्काली कार्ययोजना, २०६१	No Change
		-	जग्गाको हदबन्दी छुट दिने सम्बन्धी आदेश,२०७४	Added,New
		-	Guideline for Licensing of electricity projects,2073	Added, New

4.2 The Constitution of Nepal, 2072 (2015)

The Article 30 states about the Right regarding clean environment which includes three parts. According to this article part 1, each person shall have the right to live in a healthy and clean environment. According to this article part 2, the victim of environmental pollution and degradation shall have the right to be compensated by the pollutant as provided for by law. According to this article part 3, provided that this Article shall not be deemed to obstruct the making of required legal provisions to strike a balance between environment and development for the use of national development works. The proposed project is a component of hydropower development project and it attracts the provisions made in Constitution of Nepal. Hence, it is mandatory to follow the Constitution of Nepal, 2072 (2015) in regards with environment conservation while implementing the project.

The Article 51 states about policy regarding the conservation, management and use of natural resources as follows:

- The State shall pursue a policy of making a sustainable use of biodiversity through the conservation and management of forests, fauna and flora, and by minimizing the negative impacts of industrialization and physical development by promoting public awareness on environmental cleanliness and protection.
- The State shall pursue a policy of keeping an environmental balance.
- The State shall pursue a policy of adopting appropriate ways of minimizing or stopping negative impacts on environment if it is there, or if there is a possibility of such an impact nature, environment, or biodiversity.
- The State shall formulate policies and enact laws on the basis of the principle of sustainable environment development based on pre-warning and pre-informed agreements regarding environmental protection. Those people who pollute the environment shall have to be responsible for their action.

4.3 Plan and Policy

4.3.1 Nepal Environmental Policy and Action Plan, 2050 (1993) and 2055 (1998)

Nepal Environmental Policy and Action Plan (NEPAP) were endorsed to further institutionalize environmental protection in the development processes. The NEPAP recognize that a growing number of people are exposed to pollute from industrial enterprises. The NEPAP identifies the following factors as contributing to this process:

- Industrial plan inappropriately cited close to population centers , Insufficient emphasis on fuel efficiency.
- Little, if any pollution abatement equipment used for reducing emission, and a total lack of industry pollution standards.

Hence, the NEPAP emphasizes the need for mitigating adverse environmental impacts to address urban and industrial development, air and water pollution and infrastructures development.

The Forest Sector Policy of Nepal such as the National Forestry Plan, 1976, Master Plan for the Forestry Sector, 1988, Periodic Five Year Plan and Forestry Sector Policy, 2057 (2000) have



emphasized people's participation in the forestry management. Nepal's main forest management is based on people's participation and various management models are underway. Similarly, Forestry Sector Policy, 2057 (2000) stresses on conservation of biodiversity, ecosystem and protection of land degradation by soil erosion, landslide, floods desertification and other ecological disturbances. The Public participation in forest management is sought through community forestry, collaborative forest management, leasehold forestry etc. The mitigation measures such as plantation, NTFP program and other social and community support program proposed by the project will be implemented by mobilizing the local people which is in line with the Forest Sector Policy.

The procedural guidelines for the use of forest land for other purpose stated that feasibility study will be carried out with no use of forest land to the extent possible. If it is not possible, the alternate will be considered with minimum use of forest land. This guideline also stated that the project proponent will be responsible for the plantation of 2 tree species for the loss of one tree and their management for 5 years and handing over to the concerned forest office of the district.

4.3.3 Hydropower Development Policy, 2058 (2001)

The Hydropower Development Policy was promulgated in 2001. The main objectives of the policy include producing clean energy through the development of hydroelectric projects and to help conserve the environment. It is stipulated that one of the policies is to extend the use of electricity for achieving a reduction in the utilization of fuel wood and to render necessary assistance in the conservation of forest and environment.

4.3.4 National Forest sector Policy 2075(2019)

The national Forest policy 2075 aims to strengthen the forest resources of Nepal. The main goal of this policy is to manage the forests along with conservation of biodiversity, conservation of sources and equal sharing and distribution of environmental services gained from conservation. The policy also aims at conservation of water, soil on basin level studying and conservation of forest sector. The policy also aims to promote forest based entrepreneurship, diversification, value addition through marketing, creation and promotion of green employment. It is also aims to reduce and mitigate the adverse impacts of climate related hazards and enhance climate change adaption measures and resilience in Nepal.

4.3.5 Climate Change Policy, 2067(2011)

The climate change policy Was approved by the GoN on jaunary 2011. main objectives of the policy include the promotion of the use of clean energy such as hydroelectricity, renewable and alternative energies and thereby increasing energy efficiency and encouraging use of green technology. Some of the major objectives of the policy are as follows.

- To establish a climate change center as an effective technical institution to address issues of climate change and also sthrengththen existng institutions.
- To implement climate adaptation-related programs and maximize the benefits by enchancing positive impacts and mitigating the adverse impacts.
- To reduce GHG emissions by promoting the use of clean enegy, such as hydro-electricity, renewable and alternative energies, and by increasing energy efficiency and encouraging the use of green technolo

- To enhance the climate adaption and resilience capacity of local communities for optimum utilization of natural resources and their efficient management.
- To adopt a low-carbon development path by pursuing climate-resilient socio-economic development.
- To develop capacity for identifying and quantifying present and future impacts of climate change change, adapting to climate risks and adverse impacts of climate change and
- To improve the living standard of people by maximum utilization of the opportunities created from the climate change-related conventions, protocols and agreements.

4.3.6 National Environment Change Policy 2076

National Environment change policy has talked about to maintain forest coverage area constant as per present context. It has provided some practical value of plantation after cutting of tree for national priority project. plantation should be in the 1:10 ratio after clearance of national vegetation which is carriable and applicable. it make easy to maintain forest coverage area.

4.3.7 15th Periodic National Plan

The 15th five-year periodic plan will be based on the slogan of 'Generating Prosperity and Happiness.' Economic growth will be between 9.4 percent 10.1 percent. At the end of five year periodic plan GDP of Nepal will be increased by 57.6 percent and this milestone can be touched by large contribution of industrial and agricultural sector.

4.4 Acts

4.4.1 Aquatic Animals Protection Acts, 2071 (1961)

This Act provided legislative protection of the habitats of aquatic species. Under this Act, it is offence to introduce poisonous, noxious or explosive material in to a water source or destroy any dam, bridge, fish ladder or water system the intent of catching or killing aquatic life. The Act was amended in 1988 to prohibit the use of unsafe pesticides.

4.4.2 Land Acquisition Act, 2034 (1977)

One of the important acts that have a bearing on the implementation mechanisms and mitigation adverse impacts of power projects is the Land Acquisition Act, 2034. This Act covers all aspects of land acquisition and compensation of land and other assets. It authorizes the government to acquire land for public purposes by providing compensation to the private landowners.

Land acquisition and compensation has not been a major issue in the rural electrification in the past because the area required for erection of a pole is so small that it has not been an issue. However, this study recommends providing appropriate cash compensation for the land acquired by the erection of the towers. The compensation paid under this Act will be given in cash. To decide the amount of the compensation, the Land Acquisition Act (1977) has made provisions for the constitution of a Compensation Fixation Committee (CFC). That committee consists of the CDO, Chief District Land Administration and Revenue Office, Project Chief or an officer designated by the CDO and the Representative of the DDCA's per the land Acquisition Act, 2034 (1977), it is mandatory to acquire the land prior to the implementation of the project. The provisions made here will be applied while acquisition of land. Cultivated land requires for the project will be acquired by direct negotiation with the land owners while the forest land will be acquired by taking approval from the government.

4.4.3 Soil and Watershed Conservation Act, 2039 (1982)

In order to manage watersheds of Nepal, the Soil and Watershed Conservation Act (SWCA), 1982 was enacted. The act is devoted to the protection of watersheds. Under Section 10 of The Act is relevant to the proposed project as the project will utilize the soil for tower foundation in different location. There is likely to impact on soil and watershed condition of the project area. Hence, the project is obliged to follow the Soil and Watershed Conservation Act, 2039 (1982) during project implementation.

4.4.4 Water Resources Act, 2049 (1992)

The objectives of the Water Resources Act, 2049 is to make legal arrangements for determining beneficial uses of water resources, preventing environmental and other hazardous effects thereof and also for keeping water resources free from pollution. The Act strives to minimize environmental damage to water bodies, especially lakes and rivers through environmental impact assessment studies and the proponents who wish to use water resources for various purposes should prepare Updated IEE Report before a license can be granted. The Act stipulates that soil erosion, flooding, landslides or any significant impact on the environment should be avoided in all uses of a water resource. The provisions made in Water Resources Act, 2049 (1992) is mandatory in case of the implementation of the proposed project. As per the provision, the environmental impact mitigation and enhancement measures have been proposed in view of environment conservation.

4.4.5 Electricity Act, 2049 (1992)

Electricity Act, 2049 is related to survey, generation, transmission and distribution of electricity. Electricity includes electric power generated from water, mineral oil, coal, gas, solar energy, wind energy etc. Under Section 3 of the Act it is stated that survey, generation, transmission or distribution of electricity without obtaining a license is prohibited. The Electricity Act, 2049 also contain provisions to minimize soil erosion, flood, air pollution and damage on environment while producing electricity and transmission of the power (Article 24). This Act is not relevant in case of transmission and distribution of generated electricity. The present study is only for hydropower generation excluding transmission component. NEA is responsible for electricity transmission and distribution.

4.4.6 Forest Act, 2049 (1993)

The Forest Act, 2049 (Amendment 2055) recognizes the importance of forests in maintaining a healthy environment. One of the major objectives of the enhancement and enforcement of the Forest Act is the promotion of a healthy environment.

The Act requires decision-makers to take account of all forest values, including environmental services and bio-diversity. It emphasizes the development and implementation of an approved work plan for different categories of forest, i.e. Community Forests, Leasehold Forests, Private Forests and religious forests This Act is relevant in case of the project will acquire forest land belonging to community, and national. It is mandatory to follow the Forest Act, 2049 (1992) while proposing the mitigation measures and also in implementation phase.

4.4.7 Labor Act, 2049 (1993)

This act is enforced by GoN in 2049/2/2. This Act classified below 15 years as child and 'anabolic' for the age group of above 14 years and below 18 years. The Act has also made provision of labor court and department of labor. The Act clearly mentions that the appointment letter should be

issued for all the employees which include their working hours, working time, wages and other benefits. The Act allows for the time bond contract for the manpower required for development work. The Act specifies that working hours for the Anabolic and women must be within 6 AM to 6 PM which clearly restrict to deploy women in night works. The Act also state that equal opportunity shall be given to women as men. Similarly working period for the other employees must not exceed 8 hours a day and 48 hours in a week. If some people work beyond that period, over-time allowances must be paid which is 150% of the normal per hour wages and such over-time must not exceed 4 hours in a day. According to this act the wage rate of the employees shall not be less than the rate fixed by the concerned offices of GoN.

4.4.8 Environment Protection Act, 2053 (1997)

Nepal has enacted a comprehensive and umbrella type Act, the Environment Protection Act, 1997 (EPA, 97) which is now enforced through appropriate regulatory measures. The EPA provides a legal basis for the concerned authorities for regulation an initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA). Section 3 of the Act requires the proponent to conduct an IEE or EIA in relation to the prescribed proposals. The Act uses the word proposal instead of Projects which makes the scope of the Act much broader in relation to environmental studies. Proponent includes any government, semi government or nongovernment agency or organization submitting an application for the approval of a proposal and possessing the responsibility to work according to such a proposal or implementing the proposal.

According to the provision in Section 6 (1) of the Act, the relevant agency is empowered to grant approval for the IEE and EIA report, only if it finds that no significant adverse effects will be caused to the environment by the implementation of the proposal. Implementation of any proposal without the approval of the relevant agency is prohibited by the Act. As per EPA, 1997, the proposed project has obligation to carry out IEE study prior its implementation.

4.4.9 Local Government operation Act, 2074 (2017)

As the local Self-Governance Act, 2055(1999) was scrapped after the implementation of new constitution, this act is enforced by GoN in 2074/06/29 accordingly. This act has paved a strong legal foundation towards institutionalizing executives, legislatives and quasi-judiciary practice of the newly formed local government. The legal mechanism has been enacted as per the article 296(1) of the constitution of Nepal so as to leverage local leadership and governance system. It has been introduced by upholding the spirit of local autonomy and full decentralization with the motive to distribute fruits of democracy in a proportional, inclusive and just manner. The act has stipulated several arrangements related to authorities, duties and responsibilities of local government.

4.4.10 Child Labor (Prohibition and Regulation) Act, 2056 (2000)

The Child Labor (Prohibition and Regulation) Act, 2056 is enacted and enforced adopting ILO Convention concerning Elimination of Worst Forms of Child Labor and Minimum Age Convention. This Act has defined the 'Child' as a person who has not achieved the age of 16 year. Article bans the employing a child below the age of 14 to work as a laborer and engaging a child in the hazardous and risky works listed in the Schedule of the Act.

The proponent is mandatory to follow the Child Labor (Prohibition and Regulation) Act, 2056 (2000) during the project implementation phase. The contractor may use child labor during construction period. Hence, the contractor will be instructed to follow the Child Labor (Prohibition and Regulation) Act, 2056 (2000).

4.4.11 संकटापन्न वन्यजन्तु तथा वनस्पतिको अन्तर्राष्ट्रिय व्यापार सम्बन्धी नियन्त्रण ऐन २०७३

This Act is enacted and enforced adopting convention on international trade in Endangered Speciaes of Wild Fauna and Flora, 1973 to which GON is a signatory state. The main objective of this Act is to implement CITES through protection of Endangered speciaes and controlling and regulating the wildlife trade. The Act has strictly prohibited the trade, use, farming, breeding or transport (export or import) of endangered speciaes of fauna or flora or their samples. However, the act has provided some flexibility in the above provision by obtaining licence.

4.4.12 Solid Waste Management Act, 2068 (2011)

Article 4 rests the responsibility of the solid waste management under the prescribed standards with the persons or institution that has generated the waste whereas article 5 mandates reduction of the waste at source. Article 9 makes the institution responsible to transport the solid waste to the waste disposal facility. The local body is made responsible for the monitoring of solid waste management by article 21. Article 38 stipulates discharge of solid waste without the consent of the local body as an offence and article 39 provides for the punishment/penalty in case of offence.

4.4.13 Contribution based Social Security Act 2017

The Social Security Act is enacted first time in Nepal on 2017, 08, 13. Government notification is required for the Social Security Act to be applicable to any industries, Business or services sector. The Social Security Act provides that the government publishes the notice in Nepal gazette prescribing the sector, industries, business, services or employer undertaking certain transaction to whom the Social Security Act applies.

4.4.14 मुलुकी देवानी संहिता ऐन, २०७४

To maintain the morality and financial interest of the public by maintaining law and maintaining good interest in the social and cultural fields, according to the complete provision of the law and order, Nepal government has endorsed the Muluki Dewani Samhuta Act 2074, which was implemented from Bhadra 1, 2075 BS. Eligibility for marriage 20 years for both male and female, Women can use maternal family name after marriage, Government approval a must for child adoption by foreigners, Widow can claim husband's property, husband can also file for divorce at court, One year cooling period on divorce application, Landlords cannot remove tenants without prior notice of 35 days are the major legal provisions ensured by Muluki Dewani Samhita Act 2074.

4.4.15 Electricity Regulatory Commission Act, 2074

The high-level body was formed to regulate generation and transmission of **electricity** along with fixing tariffs and implementing a National Grid Code to govern **power** sector in the country. It may be noted that the Government had introduced the **Electricity Regulatory Commission Act-2074** on September 5, 2017.

4.5 Rules and Regulations

4.5.1 Electricity Rules, 2050 (1993)

Regulations on electricity sectors have been formulated for the implementation of the provisions made in the Electricity Act, 2049. The Electricity Rules, 2050 emphasize environmental analysis,

which should include environmental mitigation measures to minimize adverse impacts likely to occur while developing hydro-electricity (Rule 12 and 13).

Rule 12 (f) and Rule (g) are related to the EIA/ IEE process which emphasize that the Updated IEE Report should include measures to be taken to minimize the adverse effects of the project on social, biological and physical environments and should also elaborate utilization of local labor, source of materials, benefits to the local people after the completion of the project, training to local people in relation to construction, maintenance and operation, facilities required for construction site and safety arrangements.

4.5.2 Water Resources Rules, 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. Rule 19 stipulates that the water resources committee shall publish a notice giving detail information about the project to the people.

4.5.3 Environment Protection Rules, 2054 (1997)

The Environment Protection Rules (EPR) was endorsed in June 1997 and was made under the provisions of the Environment Protection Act. The EPR has been amended several times and the recent was done in 2010/01/27. The recent amendment states that TL projects of capacity above 132 kV voltage level requires only IEE unless it traverses through protected area, buffer zone or national parks. The EPR adopts the environmental assessment criteria mentioned in the EIA guidelines. However, the EPR establishes the administrative framework for assessing, exhibition and determination of the EIA/IEE, in terms of issues needing to be addressed and the format/layout of the EIA/IEE document.

Under section (18) of EPA, any person who contravenes any of the provisions of the Act, or the Regulations or the guidelines issued under the Act, shall be punishable with a fine up to NRs 50,000. If a proposal is implemented without the approval of the Ministry of Environment (in case of IEE, Ministry of Energy) or relevant government agency, or the person implementing the proposal is not complying with the conditions of the approval or license, the authorized official is empowered to close down that activity and may impose fine of up to NRs. 100,000 on such person or organization. This Act is relevant to the proposed project. Under this Rules, the IEE study of the proposed project has to be carried out by the proponent and get approval from the Ministry of Energy prior to the project implementation.

4.5.4 Forest rules, 2051(1995)

Rule 65 of the Forest Rules stipulated that in case the execution of any project having national priority in any forest area causes any loss or harm to any local individuals or community the proponent of the project itself will bear the amount of compensation to be paid. Similarly, the entire expenses required for the cutting and transporting the forest products in a forest area should be borne by the proponent of the project.

4.5.5 Labour Rules, 2075(2018)

The labour Rule has been published in Nepal gazette on June 22, 2018 (Asar 08, 2075) with immediate effect and has repealed then labour rules, 1994 (2050) (previous labor rules). Major highlights of the labour rules have been briefly described in the following paragraphs.

It has set out the criteria for determining if any dispute arises on whether or not an employment is regular employment. Rule 3 of the labour rules provides for such criteria. It has also specified the additional matters to be covered under the employment contract. Rule 4 of the labour rules requires the employment contract to cover, a) nature of employment, b) primary work of the employee and his/her position, c) statement that the employees' service rule will be integral part, d) date, time, place of contract and its effective date, e) other important terms and conditions related to the work or services of the employee.

The employer can determine the work hours on the basis of the nature of the work of the entity. The notice of the work hours however, should be given to all the employees, it also provides that the employer may put the employee to work on rotation based on nature of its work. It seems that the labour rules envisage to put the employee in different shifts.

4.5.6 Solid Waste Management Rules, 2070(2013)

The solid waste management rules have been issued by the GON by exercising the power conferred by section 50 of the solid waste management act, 2068. Major highlights of the rules have been described in the following paragraphs.

- The local body shall, while fixing segregation at least of organic and non-organic solid waste at its source under section 6, have to make management and segregation of harmful or chemical waste separately. If it is prescribed as above, the individual, organization or agency generating such solid waste, shall have to make segregation as prescribed.
- The local body shall conduct programs for increasing people's awareness in relation to applying appropriate technology for making segregation through reduction of generation of solid waste at its source and management under sub-rule (1).
- No one shall discharge solid waste by mixing harmful, chemical, organic or inorganic waste with others waste. The arrangement for final discharge should only be made after processing of harmful, chemical, organic or inorganic waste into a general waste.
- After processing, if the harmful, chemical, organic or inorganic waste needs to be managed through the local body, any individual, organization or agency responsible for the management of the solid waste may make request to the local body for the management of the solid waste, and the local body may manage such solid waste by charging the required service fees.
- The collection, storage and transportation of harmful, chemical, organic or inorganic waste shall only be done so as to destroy the harmful, chemical, organic or inorganic waste shall only be done by applying a safe mode. The processing of harmful, chemical, organic or inorganic waste shall be done so as to destroy the harmful elements in such waste and

- the final discharge and disposal shall only be done if the treated waste has turned into a normal waste.

4.5.7 Contribution based social security regulation 2018

Nepal government has approved the contribution-based social security regulations on 11th November, 2018 and ensured the social security rights to labourers working in the country. The regulations have made arrangements for providing social security to the contributors. As per law, both employers and employees must mandatorily deposit their instalment for the scheme and it is applicable for all types of workers. The regulations have provisions for enlisting in the social security fund, the individuals drawing salary from the government fund, the labourers in the informal sector and self-employed individuals. This is a historical step towards achieving decent work for all. The scheme is set to initially include medical, health and maternity benefit; accidental and disability benefit; benefits for dependent family members and old-age benefit. The government plans to extend the scheme to workers in the informal sector soon.

4.5.8 Electricity Regulatory Commission Regulations, 2075

This regulation's main aim is to establish grid code conduct of national grid and international system in their standards. Similarly while designing code conduct of grid system there should be involvement of expert. Electricity tariffs should be fixation on basis of market analysis. Likewise electricity development investment and operation cost, loan interest cost and power purchase agreement.

4.6 Guidelines and Conventions

4.6.1 Biodiversity Convention, 1992

The convention contains a series of far reaching obligations related to the conservation of biological diversity and sustainable uses of its components. One of these obligations is the requirement for environmental study. The purpose of an environmental study in relation to biodiversity conservation is to identify in advance:

- The aspects of the project which is likely to have significant adverse effects on biological diversity at genetic, species and ecosystem level, and
- The steps to be taken to avoid or minimize significant adverse effects to ensure that the proposed project comply with existing environmental legislation.
- The GoN has included 17 species of plants and 39 species of wild animals in the protection list.

If the project area is in the core habitat of these species and project activity will likely to affect them, mitigation measures shall be proposed and be implemented to avoid and/ or mitigate the adverse impacts. Nepal is a party to the convention of Biological diversity and in accordance to the article 14, adequate attention should be given to minimize and or avoid the impacts.

4.6.2 National Environmental Impact Assessment Guidelines, 1993

The National EIA Guidelines, 1993 developed by the National Planning Commission in conjunction with IUCN, set out the process for the environmental review and management of infrastructure projects in all sectors and the respective roles of certain GoN agencies and project proponents. The guideline was part of a comprehensive program to develop the national and

sectorial guidelines for establishing a national system for Environmental Impact Assessment which was part of GoN's National Conservation Strategy. The EIA Guideline was endorsed by GoN on 27 September 1992 and gazette on 19 July 1993. The schedules attached to the Guidelines include:

Schedule 1: Projects requiring an IEE Report

Schedule 2: Projects requiring an EIA

Schedule 3: EIA based on project sites

Schedule 4: Projects requiring an IEE Report

Schedule 5: Format for Terms of Reference

Schedule 6 : Environmental Impact Report Format It is mandatory to follow the National Environmental Impact Assessment Guidelines, 2050 (1993) during the IEE study. Following the guidelines the environmental impact prediction and evaluation of the proposed project has been done on physical, biological and socio-economic and cultural environment of the project area. The guideline is used for analysis of significant issues.

4.6.3 EIA Guidelines for Forestry Sector, 1995

The GoN in keeping with the spirit of the National Environmental Impact Assessment Guidelines, 1993 framed EIA guidelines for the forestry sector in 1995. The Guideline aim to facilitate the sustainable use of forest resources for socio-economic development and meeting basic need to the community regarding the forest products, to make proposals socio culturally acceptable, economically feasible, and environmental friendly to conserve genetic resources and biodiversity and minimize environmental damage in forest areas and facilitate in identification of positive and negative impacts of programs to be implemented by other agencies in forest areas. The guideline emphasized the need of carrying out an EIA/IEE study of development projects and programs proposed for implementation in forest areas.

4.6.4 Forest, Production, Collection and Sales Distribution Guidelines, 2057 (1998)

The Clauses 3 to 10 of the Guidelines have specified various procedure and formats for getting approval for vegetation clearance, delineation of lands for vegetation clearance, evaluation of wood volume etc. and government offices and officials responsible for the approval, delineation and evaluation. These provisions have a direct relevance to the development of the project and need compliance to these provisions. These provisions have a direct relevance to the development of the project and need compliance to these provisions. It is obligation to the project for getting approval in view of vegetation clearance and evaluation of wood volume from district forest office prior to the construction phase.

4.6.5 Community Forest Guidelines, 2058 (2001)

This guideline has been prepared by including amendments of acts, rules by officials of GoN and related experts. Through these guidelines persons involved in the development and management of community forest like facilitators, User Groups, forester and managers etc. will get help to understand about the process and stages of development of community forest. Forest Users Group, forest officials, NGOs and INGOs are getting benefit by this guideline. Till date, more than 15000 Community Forests have been handed over to the Community Forest Users Groups.

4.6.6 Community Forest Inventory Guidelines, 2005

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 20m x 20m

size of quadrant for timber trees, 10m x10m for shrub and 5m x 5m for regeneration plots in the community forest. Plants having DBH (Diameter at breast height, i.e. 1.3m above ground) greater than 30 cm are considered as trees. Trees having DBH between 10 to 30 cm are categorized as pole and plants having less than 10 cm DBH belong to regeneration species.

4.6.7 शासकीय तथा आर्थिक सुधारको तत्कालीन कार्ययोजना, २०६९

This working plan was revised to speed up the hydropower development process. So, the plan states that until the installed capacity of the country reaches 5,000 MW, instead of doing compensatory plantation at the ratio of 1:25, it is said to do such plantation at the ratio of 1:2. But recent time plantation is same as before 2069.

4.6.8 जग्गाको हदबन्दी छुट दिने सम्बन्धी आदेश, २०७४

Nepal Government, ministry of land reform and management published a notice in section 67 number 29 Nepal gazette part 5 dated 2064/06/25, by using the authority given in article 12 of land reform act 2021, containing the provision to purchase more dissociated land by the education or health institution, hydropower, cultural, industrial work, work for agricultural industry and co-operative farming organization, if such industry or institutions need.

4.6.9 Guidelines, for licensing of Electricity Project, 2073(2017)

GoN has introduced new guidelines for licensing power project on January 2017. the guideline focuses briefly on the procedures for taking survey licence of production, generation and distribution of power project, its amendment, renewable and dissolution.

4.7 Convention on International Trade in Endangered Species of Wild Fauna & Flora

Nepal became a contracting party to the convention on June 18, 1975. That aims to control the trade of certain wildlife species to prevent further endangered of their survival. CITES classified species according to the following criteria:

- Species threatened with extinction
- Species which could become endangered.
- Species that are protected

As Nepal is party to the convention related to species conservation, attention should be given to evaluate the impacts of the project activities on meeting their obligation. It is relevant to IEE study that species protection list could also be used to evaluate the significant of the identified and predicted impacts. Plant and wild animal species under legal protection provides a basis to purpose EMPs for their conservation and for least damaging them during project implementation.

Nepal is signatory to this agreement, which classified species according to criteria where access or control is important (eg. I-species threatened with extinction; II-species which could become endangered; III-species that are protected)

4.8 International Labor Organization (ILO) Convention of Indigenous and Tribal Peoples (No. 169)

Nepal ratified ILO Convention No. 169 on September 14, 2007. In 2007 the UN Declaration on the Rights of Indigenous Peoples was adopted by the General Assembly. The declaration reaffirms the importance of the principle and approaches provided for under Convention No. 169 and its adoption therefore provide a fresh impetus for promoting the ratification and implementation of 169. ILO Convention No. 169 highlights the need to recognize indigenous and tribal people's specific knowledge, skills and technologies as the basis for their traditional economies and self-determined development process. Article-1 of the convention provides definition of the tribal indigenous people. Article-6 deals the consultation of the people concerned through appropriate procedure in particular through their representative institutions. Whenever, consideration is being given to legislative or administrative measures which may affect them directly.

In Article 15, the rights of the people concerned to the natural resources pertaining to their lands shall be covers the total environments of the areas which the peoples concerned occupy or other use. The peoples concerned shall wherever possible participate in the benefit of such activities and shall receive fair compensation for any damage which they may sustain as a result of such activities. Article 16 (2) clearly mention that where the relocation of these peoples is considered necessary as an exceptional measures such as relocation shall take place only with their free and inform consent.

Where their consent cannot obtained, such relocation shall take place only following appropriate procedures established by national laws and regulations, including public inquiries where appropriate, which provide the opportunity for effective representation of the peoples concerned. Article 16 (3) mention that whenever possible these peoples shall have the right to return their traditional land as soon as the grounds for relocation cease to exist. Article 16 (5) elaborated the persons thus relocated shall be fully compensated for any resulting loss or injury.

The ILO Convention on Indigenous and Tribal Peoples, 1989 (No.169) is relevant for the proposed project as there are indigenous and tribal families in the project affected area. The project will acquire and utilize most of the natural resources belonging to those families. Hence, the project has obligation to have consultation and taking consensus from them before the implementation of the project.

Article-15 states that the rights of the people concerned to the natural resources pertaining to their lands shall be specifically safeguarded. Provision includes the people to participate in the use, management and conservation of these resources. This provision creates some confusion and ultimately brings conflict between the project proponent and resources owners. Project share distribution and employment priority to these people will somehow reduce the possible conflict. The provision made in the ILO Convention on Indigenous and Tribal Peoples, 1989 (No.169) is not line fully with the prevailing acts and rules regarding environmental study of the proposed project.

5 EXISTING ENVIRONMENTAL CONDITION

5.1 Physical Environment

5.1.1 Topography

The project has been divided into two section and discussed as below.

a. Khimti-Barhabise Section

The proposed route of this section of length 42.638 km 400 KV Transmission Line traverses through the Middle Mountain and hills. The alignment runs through several topographic features comprising of rugged hills with mild and steep slope, undulating land forms and flat terrain near those bajar. The altitudinal variation of the TL is between 2719 masl to 639 masl at Dobate, Lakuri Dada VDC and Sitali, Phulasi VDC respectively. The altitude of the starting point at Ghumaune, Phulasi VDC is 653 masl and terminal point of the TL at Sano Palati, Barhabise is 1415 masl. Line length is same as per approved IEE. The altitudinal variation including the location and land use of the AP's are given in the Table 5-1 below.

Table 5-1: Altitudinal Variation including location and land use of Khimti-Barhabise Section

S.N	Angle Points	Elevation, masl	Land Use	Landmark	Address		
					Village	Old VDC	District
1	S/S Khimti	663	Cultivated Land	Boulder	Ghumaune	Phulasi-1	Ramechhap
2	AP 0	653		Concrete Pillar			
3	AP 1	639			Sitali		
4	AP 2	642	Cultivated Land	Concrete Pillar	Sitali	Melun-1	Dolakha
5	AP 3	716			Tinkhoria		
6	AP 4	718			Khanigaun		
7	AP 5	875			Khadakathok	Melun-4	
8	AP 6	829			Dumre Dada		
9	AP 7	810		Boulder	Batule, Sorhabesi	Melun-5	
10	AP 8	774		Concrete Pillar	Piple Dhunga	Bhedapu-2	
11	AP 9	704		Boulder	Sakhe	Ghang Sukathokar -1	
12	AP 10	772		Concrete Pillar	Kaichale		
13	AP 11	744		Boulder	Dhulebeshi		
14	AP 12	755	Barren Land	Concrete Pillar	Dhulebeshi	Pawati-1	
15	AP 13	754			Bagar		
16	AP 14	831			Jholunge	Pawati-2	
17	AP 15	943			Maddhe Shera		
18	AP 16	823			Chandra Khola		
19	AP 17	870		Cultivated Land	Baluwa	Pawati-3	
20	AP 18	893			Boulder	Dhamire	Pawati-6
21	AP 19	899					
22	AP 20	899	Cultivated Land	Concrete Pillar	Odare	Pawati-6	
23	AP 21	1044	Charnawati CF			Fasku-1	
24	AP 22	1115	Cultivated Land		Gulmu Thumka		
25	AP 23	1114			Piple Dada		
26	AP 24	1106			Bagairo Dada	Bhimeswor Municipality-6	
27	AP 25	1140	Sita Kunda CF		Kiratechhap		
28	AP 26	1205	Barren land		Thulochaur		
29	AP 27	1228			Gau Dada		

S.N	Angle Points	Elevation, masl	Land Use	Landmark	Address		
					Village	VDC	District
30	AP 28	1234	Cultivated Land		Dobate Chaur	Bhimeswor M-8	
31	AP 29	1287			Ghogshila		
32	AP 30	1226			Sugurephat	Bhimeswor M-1	
33	AP 31	1230	Barren land		Bisuntol		
34	AP 32	1296			Birauta		
35	AP 33	1221			Seraphat		
36	AP 34	1232	Cultivated Land		Kaule		
37	AP 35	1265			Kavre Bagar	Bhimeswor Municipality 11	
38	AP 36	1260					
39	AP 37	1311	Kupri Salleri CF		Baluwathumki		
40	AP 38	1298	Barren land	Boulder	Charnawati		
41	AP 39	1339			Simbari		
42	AP 40	1392			Sano Phurlung		
43	AP 41	1396	Cultivated Land	Concrete Pillar	Serabesi	Bocha-6	
44	AP 42	1426			Ghatte Khola		
45	AP 43	1575		Boulder	Khurpate		
46	AP 44	1633	Barren land	Concrete Pillar	Khahare Khola		Lakure Dada-2
47	AP 45	1738	Cultivated Land		Pani Umrane		
48	AP 46	2004		Barren land	Peheridada	Lakure Dada-1	
49	AP 47	2123			Gagrenbari		
50	AP 48	2239	Namke Yan Mara CF		Namke Yan Mara CF		
51	AP 49	2205		Cultivated Land	Yanmara		
52	AP 50	2190	Barren land	Concrete Pillar	Tallo Pakha	Lakure Dada-8	
53	AP 51	2296	Cultivated Land		Phulbari Ghumti	Lakure Dada-9	
54	AP 52	2514	Dadar CF		Dobate		
55	AP 53	2719	Cultivated Land	Concrete Pillar	Gaude	Piskar-1	
56	AP 54	2375			Kyala	Piskar-3	
57	AP 55	2429			Pakhure	Piskar-2	
58	AP 56	2593			Hile	Ghuskun-8	
59	AP 57	2590	Chokati GF	Boulder	Rani Pokhari	Choukati-5	Sindhupalchok
60	AP 58	2087					
61	AP 59	1618	Barren land; Dware Khalde CF;	Concrete Pillar	Champate		
62	AP 60	1233	Cultivated Land		Tathghaderi		
63	AP 61	1245	Barren;Shewase Okhrreni CF		Unichaur	Karthali-6	
64	AP 62	1549	Cultivated Land		Dadakharka	karthali-8	
65	AP 63	1785	Tunibote CF	Boulder	Chyandada	Barhabise-5	
66	AP 64	1415	Cultivated Land		Phalate	Barhabise-6	
67	S/S Barhabise	1415					

Source: Survey Report, PDD and Field Verification



Figure 5.1: Google Image of Topography of Khimti-Barhabise Section

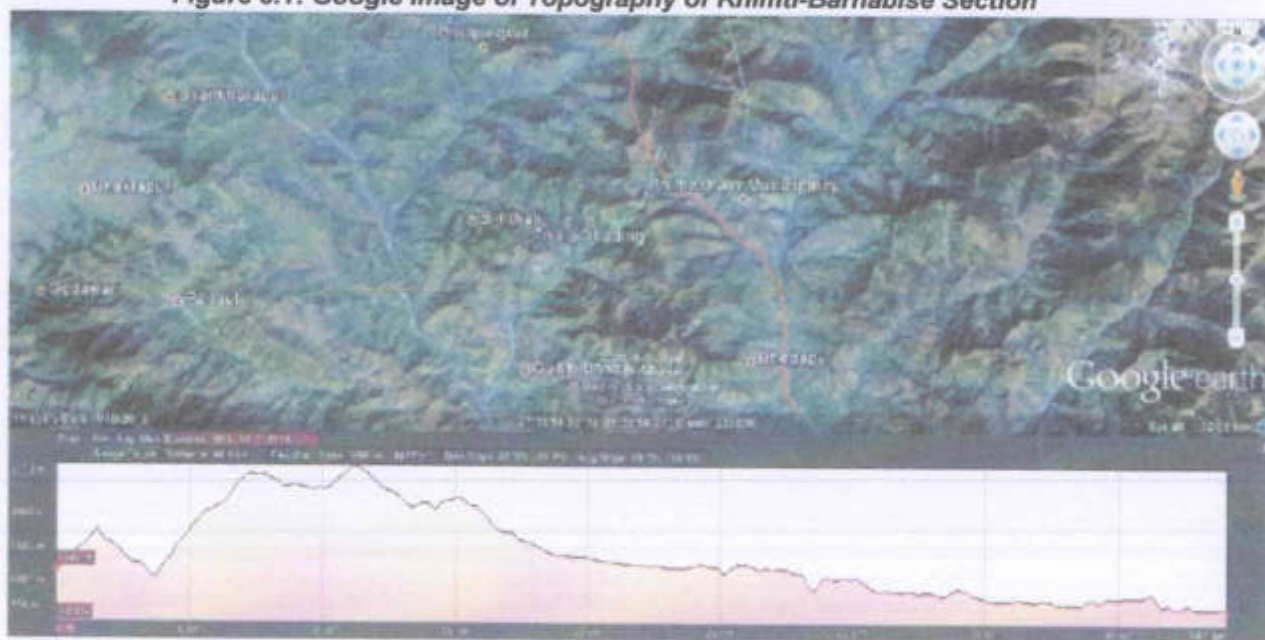


Figure 5.2: Longitudinal Profile of Khimti-Barhabise Section



b. Barhabise-Kathmandu Section

The proposed route of this section of length 55.722 km 400 KV Transmission line (Barhabise-Kathmandu), in which 10 km 132KV Transmission Line. 4 Km LILO Transmission Line is added from end point at changunarayan substation to duwakot for tapping in existing 132 kV line. TL traverses through the Middle Mountain and hill. The alignment runs through several topographic features comprising of rugged hills with mild and steep slope, undulating land forms and flat terrain. The altitudinal variation of the TL is between 1820 masl to 723 masl at Baluwapati Deupur VDC and Chandeni VDC respectively. The altitude of the starting point at Barhabise VDC is 1202 masl and terminal point of the TL at Changunarayan Municipality is 1352 m. The altitudinal variation including the location and land use of the AP's are given in Table 5-2 below.

Table 5-2: Altitudinal Variation including Location and Landuse of Barhabise-Kathmandu Section

Angle Points	Elevation, masl	Landuse	Name of Settlement/Village	OldVDC/Municipality*	District
SS-B	1202	Cultivated land	Sano Palati	Barhabise-6	Sindhupalchowk
AP-0	1202	Cultivated land	Sano Palati	Barhabise-6	
AP-1	1124	Cultivated land	Sano Palati	Barhabise-1	
AP-2	973	Cultivated land	Jaletar, Thulo Palati	Barhabise-1	
AP-3	974	Cultivated land	Bakre	Ramche-8	
AP-4	1087	Cultivated land	Sayale		
AP-5	1181	Jogi Khoriya CF	Sayale		
AP-6	1325	Cultivated land	Sayale, Devithandada		
AP-7	1287	Cultivated land	Badare	Ramche-6	
AP-8	1325	Cultivated land	Birauta	Ramche-3	
AP-9	1269	Cultivated land	Gairigaun	Ramche-5	
AP-10	1329	Cultivated land	Gairigaun		
AP-11	1187	Cultivated land	Topka	Mankha-1	
AP-12	1183	Cultivated land	Topka		
AP-13	1177	Cultivated land	Purano Gaun, Kanle dada	Mankha-6	
AP-14	942	Cultivated land	Dumrichaur		
AP-15	984	Cultivated land	Kamitar, Chimlingbesi		
AP-16	974	Cultivated land	Charghare, Chimlingbesi		
AP-17	903	Cultivated land	Chimlingbesi		
AP-18	909	Cultivated land	Sanataar, Chimlingbesi	Mankha-9	
AP-19	1067	Forest land,	Jurethumka		
AP-20	1251	Devasthan CF	Jogidada, Jalbari	Phulpingdada-8	
AP-21	1055	Cultivated land	Binjel, Ghummadada		
AP-22	1159	Barren land, Dharampani CF	Binjel, Chiyandada	Phulpingdada-6	
AP-23	851	Forest land, Phalate Kalika CF	Sundhe		
AP-24	879	Cultivated land	Dadakhet	Irkhu-7	
AP-25	1102	Cultivated land	Chilaunedada		
AP-26	1547	Cultivated land	Chilaune, Aduwabari	Irkhu-7	
AP-27	1684	Forest area; Rani Pokhari CF	Chipchipe, Chihandada	Irkhu-2	
AP-28	1510	Cultivated land	Dadaghar, Newargau	Irkhu-5	
AP-29	1449	Cultivated land	Panichaur		
AP-30	1451	Cultivated land	Majhgaun, Lamidada		
AP-30A	1261	Cultivated land	Anje dada		



Angle Points	Elevation, masl	Landuse	Name of Settlement/Village	Old VDC/Municipality	District
AP-31	1259	Cultivated land	Harare	Thulo Sirubari-6	
AP-32	1273	Cultivated land	Bhulbhule	Thulo Sirubari-5	
AP-33	1305	Cultivated land	Kamidada		
AP-34	1393	Bushes, Rolpakha CF	Deurali, Narsingdada	Thulo Sirubari-4	
AP-35	1322	Cultivated land	Patpat, Narsingdada	Thulo Sirubari-3	
AP-36	1182	Tamakhani CF	Bajini, Tamakhani	Thulo Sirubari-4	
AP-37	728	Cultivated land	Jholunge	Bhotesipa-9	
AP-38	997	Thulitar CF	Thumla 3 Pakha	Bhotesipa-7	
AP-39	789	Cultivated land	Kabre, Majhi	Bhotesipa-3	
AP-40	723	Cultivated land	Bhairungtaar, Jogitar	Chandeni-3	
AP-41	776	Cultivated land	Krantitaar village	Chandeni-1	
AP-42	885	Cultivated land	Rayobari, Pauwa Akase	Mahadevsthan-1	
AP-43	1150	Pauwa CF	Baarko Chautarar	Mahadevsthan-3	
AP-44	847	Cultivated land	Siduntar, Archhale	Mahadevsthan-4	
AP-45	811	Cultivated land	Ganesh Thumka		
AP-46	846	Forest land, Dhaitar Dudpakha CF	Dhaitar, Dudpakha	Mahadevsthan-2	Kavrepalanchowk
AP-47	888	Cultivated land	Thulichaur	Nayagau-1	
AP-48	979	Cultivated land	Dadapakha	Nayagau-7	
AP-49	1028	Cultivated land	Nwarkhet		
AP-50	1252	Cultivated land	Masagaun, Jorgothdada	Baluwapati Deupur-4	
AP-51	1583	Cultivated land	Dadakheth	Baluwapati Deupur-2	
AP-52	1820	Batase CF	Naldun, Dhadgau	Baluwapati Deupur-6	
AP-53	1714	Cultivated land	Dhiblo, Dhadgau		
AP-54	1499	Cultivated land	Bimire		
SS	1450	Cultivated land	laphsephedi	Shankharapur*	Kathmandu
AP-55	1789	Barren land, Kusum CF	Daksamdada, Kartike Bhanjyang		
AP-56	1501	Cultivated land	Ghatte khet		
AP-57	1421	Cultivated land	Beshi	Mahamanjushree Nagarkot*	Bhaktapur
AP-58	1397	Cultivated land	Beshi		
AP-59	1405	Cultivated land	Kartike khola	Shankharapur *	Kathmandu
AP-60	1394	Barren land	Paluwabari		
AP-61	1383	Barren land	Khoriya		
AP-62	1379	Forest land, Manedada CF	Chiyandada, Khoriya	Chagunarayan *	Bhaktapur
AP-63 (SS)	1352	Cultivated land	Mayaldada		

Source: Survey Report (2018), contractor and Field Verification

Note: In Barhabise-Kathmandu section, the landmark for all APs is concrete pillar



Figure 5.3: Google Image of Topography of Barhabise-Kathmandu Section

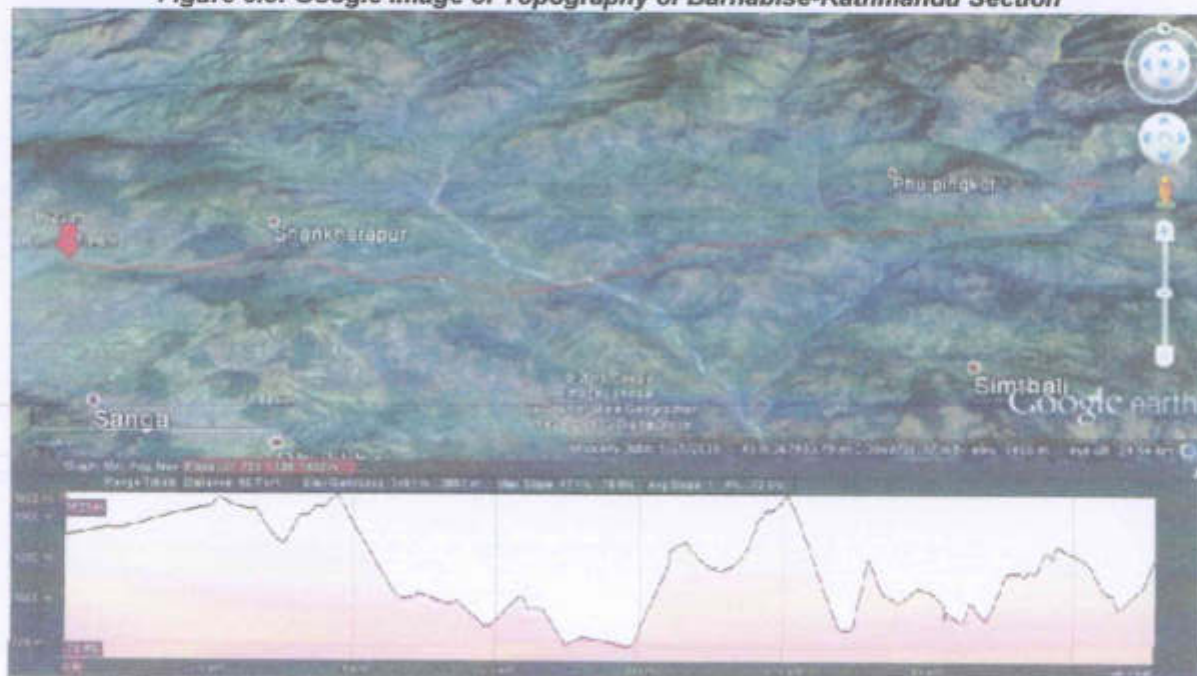


Figure 5.4: Longitudinal Profile of Barhabise-Kathmandu Section

5.1.2 Land Use

The main land use pattern of the project area is cultivated land, forest (community, government and private), grazing land and barren land. The alignment avoids densely populated areas, major structures, protected areas and dense forests. The other land uses along the alignment consists of road crossings, rivers, rivulets, river beaches and TL. Along the alignment, approximately 64.067 % of the TL alignment passes through the cultivated land, 18.283% through forest and

17.65% through others (barren land, Bush, Grassland, Cutting Cliff, Sand, Water Body, road crossings and river crossings etc.). The land use is presented as Table 5-3, 5-4 and 5-5 below. Figure 5.5 and Figure 5.6 is the land use Map of the affected VDCs and Municipality along the TL alignment. Figure 5.7 shows the typical land use pattern along the alignment.

Table 5-3: Land Use of Khimti-Barhabise Section

S.N	Land System	Land Type	Area (ha)	Percentage (%)
1	Agricultural	Cultivation	100.05	51.00
2	Vegetation	Forest	42.4	21.60
		Bush	28.28	14.40
		Grassland	13.48	6.86
3	Others	Barren	5.02	2.55
		Cutting Cliff	0.00	0.00
		Sand	5.68	2.90
		Water Body	1.37	0.69
Total			196.28	100.00

Table 5-4: Land Use of Barhabise-Kathmandu Section

S.N	Land System	Land Type	Area (ha)	Percentage (%)
1	Agricultural	Cultivation	189.9192	74.09
2	Vegetation	Forest	40.3510	15.74
		Bush	12.8733	5.02
		Grass	4.1586	1.62
3	Others	Cutting Cliff	4.0572	1.58
		Sand	3.2586	1.27
		Water Body	0.9887	0.39
		Barren land	0.7150	0.28
Total			256.3216	100.00

Table 5-5: Land Use of Tamakoshi-Kathmandu TL along the alignment

S.N	Land System	Land Type	Khimti-Barhabise Section	Barhabise-Kathmandu Section	Total	Percentage %
1	Agriculture	Cultivation	100.050	189.919	289.969	64.067
2	Vegetation	Forest	42.400	40.351	82.751	18.283
		Bush	28.280	12.873	41.153	9.093
		Grass	13.480	4.159	17.639	3.897
3	Others	Cutting Cliff	5.020	4.057	9.077	2.006
		Sand	0.000	3.259	3.259	0.720
		Water Body	5.680	0.989	6.669	1.473
		Barren land	1.370	0.715	2.085	0.461
Total			196.280	256.322	452.602	100.00

Source: GIS Analysis



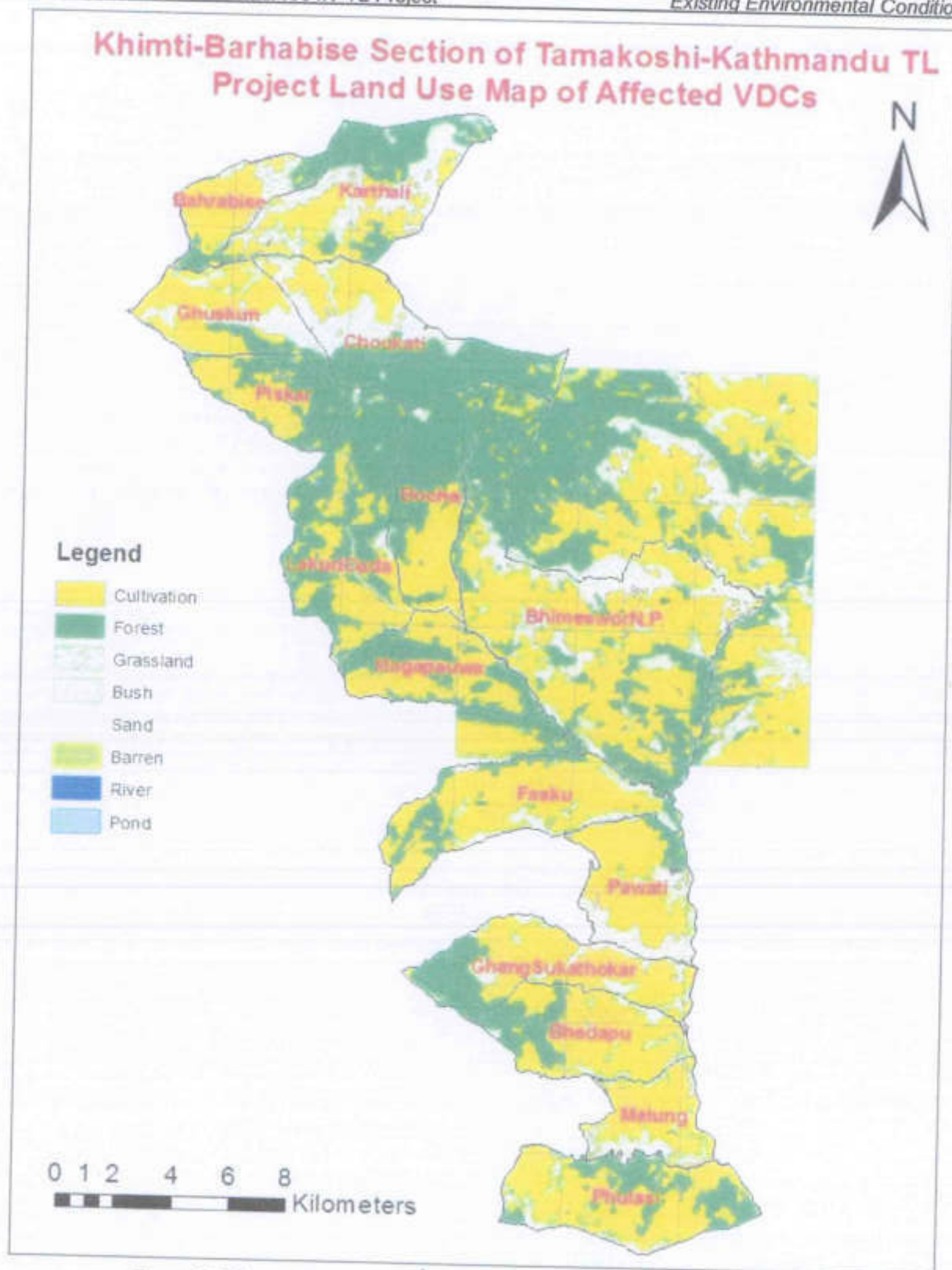


Figure 5.5: Land Use Map of Affected VDCs of Khimti-Barhabise Section

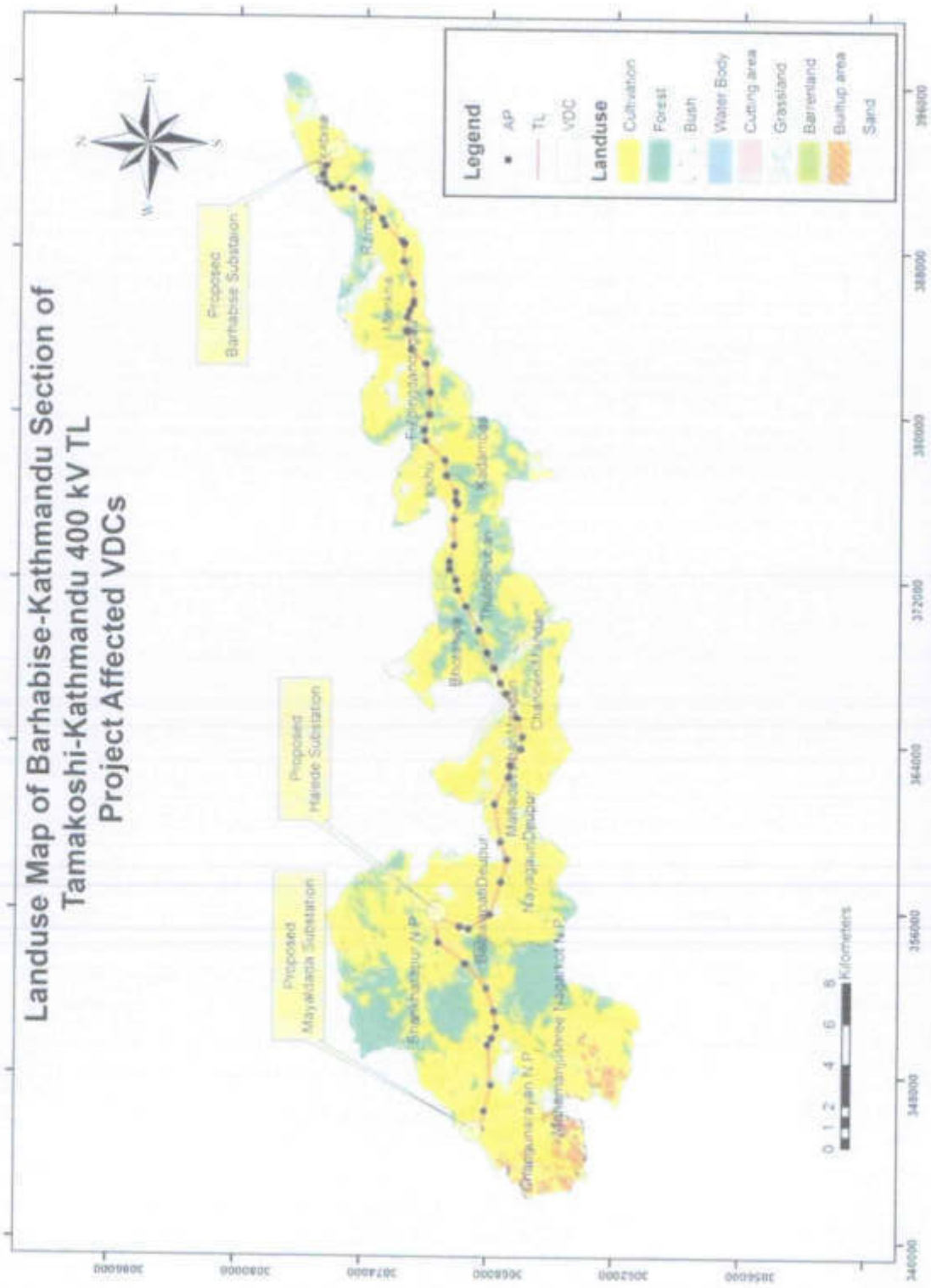


Figure 5.6: Land Use Map of Affected VDCs of Barhabise-Kathmandu Section





Figure 5.7: Land Use Pattern along the Alignment

5.1.3 Climate

Sub-tropical and tropical climates prevail in the project area. The project area experiences seasonal variations, with wet monsoons from June to September and dry weather from October

to May. The Table 5-6 below lists the climatic data such as minimum and maximum temperature, maximum monthly rainfall of the project affected districts.

Table 5-6: Climatological Data of the Project Area

S.No.	District	Climatic Zone	Temperature (°C)		Max. Monthly rainfall (mm)
			Max.	Min.	
1	Ramechhap	Sub-tropical-Temperate	34.0	2.3	444 in August
2	Dolakha	Sub-Tropical, Tropical	36.5	6.2	327 in July
3	Sindhupalchowk	Sub-tropical-Temperate	32.5	5.0	347 in August
4	Kavrepalanchowk	Sub-Tropical, Tropical	21.8	12.2	588 in July
5	Bhaktapur	Sub-tropical	18.8	10.4	588.9 in July
6	Kathmandu	Sub-tropical	25.9	13.1	382.4 in August

Source: District Profile of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu

5.1.4 Geomorphology and Geology

The proposed alignment of TL passes through the Middle mountains and Hill represented by low grade metamorphic rocks such as phyllite, quartzite and slate. During the field visit it was observed that some APs of the TL are located at relatively flat and stable areas covered by colluvial and alluvial deposit. Landslide event was noticed along RoW near AP 29 and AP 14, which may pose risk to the towers.

The major part of Barhabise-Kathmandu Section passes along Ranimatta formation. Similarly, other geology formation types found along the stretch are Sarung Khola formation, Galyang formation, Ghanapokhara formation, Lakharpata formation, Naudanda formation, Shiprin Khola formation, Syangja Khola formation, Ulleru formation, etc. The physiography, geological formation and soil type along the TL route is presented in figures below.

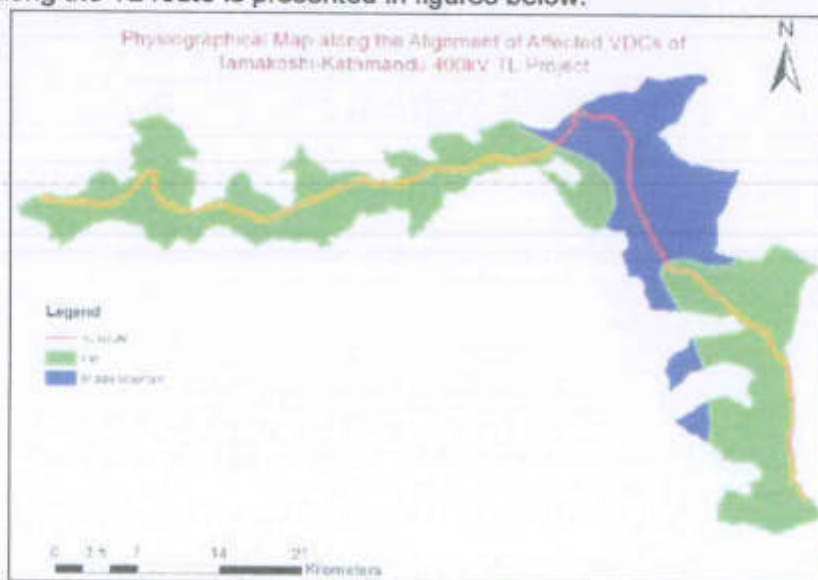


Figure 5.8: Physiographical Map along the Alignment

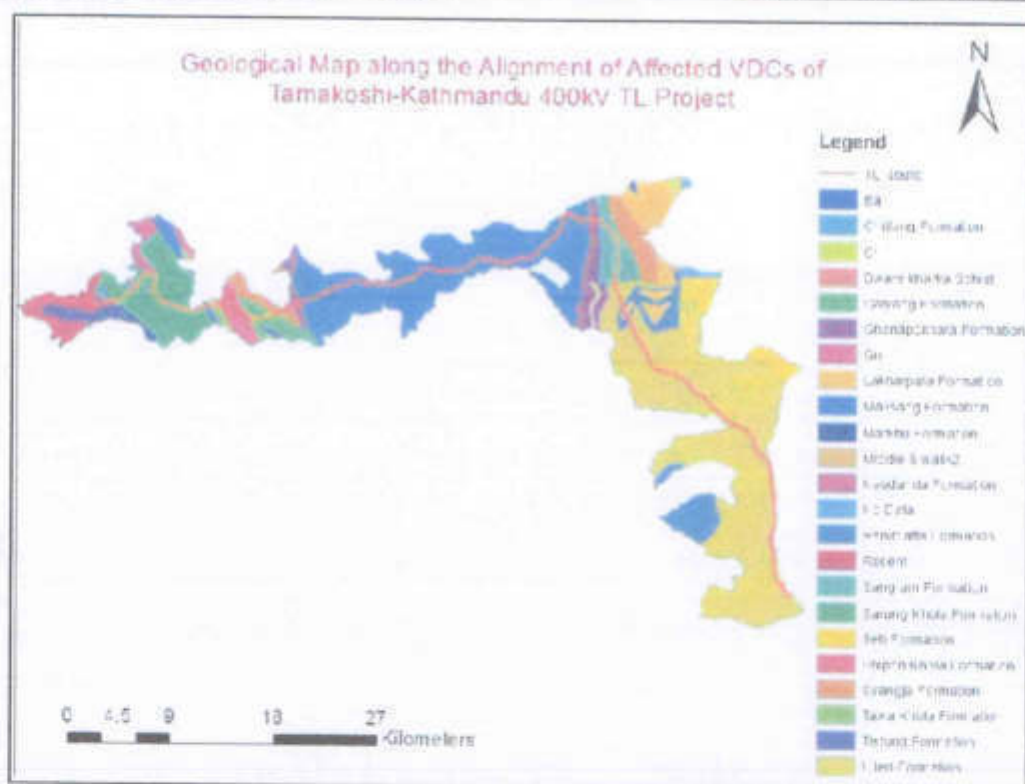


Figure 5.9: Geological Map along the Alignment

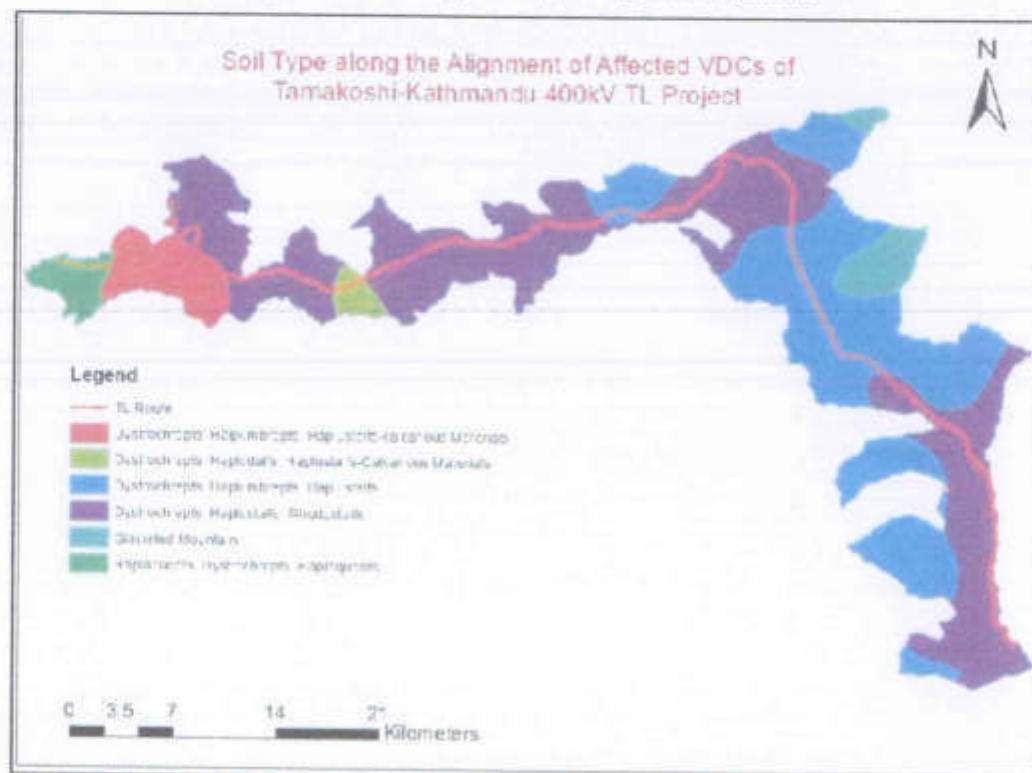


Figure 5.10: Soil Type along the Alignment

5.1.5 Seismology

Nepal is the 11th most earthquake-prone country in the world. Ever since the first recorded earthquake of 1225 AD that killed one-third of the population of Kathmandu Valley, Nepal has experienced a major earthquake every few generations. Earthquake of Baisakh 12, 2072 is evident of such incidents. This project is situated in seismic zone factor of 1 which is not good from the seismic point of view but as a whole of country Nepal it is satisfactory that this alignment does not pass through the most dangerous seismic zone.

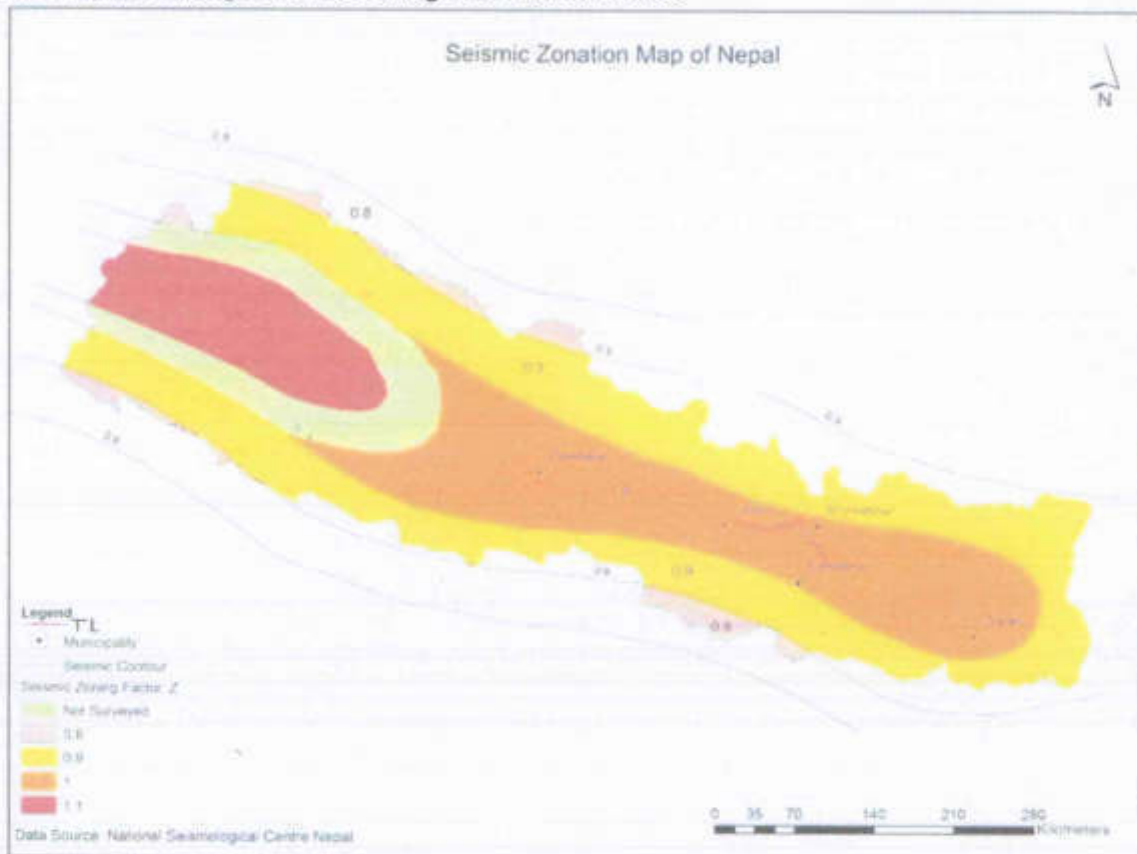


Figure 5.11: Seismic Map of Nepal

The following figure shows the seismic zone factor in Nepal and where this project alignment lies in the map. As the seismic zoning factor increases the level of seismicity increases. So from above map, the proposed Tamakoshi-Kathmandu 400 kV transmission line alignment passes through the zone which has seismic zone factor 1.

5.1.6 Air and Noise Quality

The proposed TL passes mainly through the hill ridge, nose of the hills avoiding roads and settlements and market centers. However, at some stretches, it traverses along the right-of-way of motorable gravel and earthen roads and even the highway.

During the field visit it was observed that the major stretch of the linear project stretch traverses through rural setting with minimum industrial activities. The main source of air pollution along the alignment is due to the vehicular movement along the earthen road. Other sources of air pollution along the alignment are household fire, fugitive dust particles created by the movement of public

vehicles along the access road to the settlements and vehicular emissions. However, the transportation density and frequency of the vehicles along the road is not very high. Therefore, the overall status of air quality at the immediate project area can be considered to be satisfactory and within the range of acceptable limits.

However, air and noise pollution may be felt by the local people of market places residing in market areas like Ghumaune village, Kharidhunga, Sano Palati, Halede, Nagarkot Bazar, Changunarayan area etc. The overall noise levels along the alignment can be considered to be within the acceptable limits.

5.1.7 Water Quality

The water quality of river and other water bodies along the TL route appear to be unpolluted. However, dumping of solid wastes into the river was observed at some stretches. But, the water quality of the streams close to the settlement areas has a high potential of microbiological contamination as the banks are used for open defecation and other household purposes by the local people. The other sources of water pollution along the alignment where pollution is evident is due to soil erosion, open defecation in water bodies, dumping of household waste near the river and construction of road etc.

5.1.8 Watershed Conditions and Drainage Patterns

a. Khimti-Barhabise Section

The alignment traverse through the middle hilly region to high hill of Nepal. The watershed condition of the project area as per Watershed condition in the districts of Nepal, ICIMOD is as follows.

Table 5-7: Watershed Condition of the Districts along Khimti-Barhabise Section

S.No.	District	Watershed Condition
1	Ramechhap	Fairly Good
2	Dolakha	Good
3	Sindhupalchowk	Good

The watershed of the proposed TL route including the substations proposed at Khimti and Barhabise is observed to be fairly intact and stable. The major rivers which cross the alignment of this section include Tamakoshi River, Charnawati River and Sunkoshi River. The river crossing along the alignment are presented in the Table 5-8 below.

Table 5-8: River Crossing along Khimti-Barhabise Section

S.N	Stretch between		Major and Minor River Crossing		Number of Small Rivulets
	From	To	Name	Number	
1	S/S Khimti	AP 0	-	-	1
2	AP 1	AP 2	Milti River	1	-
3	AP 5	AP 6	Simpani Khola	1	-
4	AP 7	AP 8	Phadke Khola	1	-
5	AP 8	AP 9	Ladke Khola	1	-
6	AP 12	AP 13	Ghyan Khola	1	-
7	AP 13	AP 14	Tamakoshi River	1	-
8	AP 14	AP 15	-	-	2



S.N	Stretch between		Major and Minor River Crossing		Number of Small Rivulets
	From	To	Name	Number	
9	AP 15	AP 16	Chandra Khola	1	2
10	AP 16	AP 17	-	-	2
11	AP 17	AP 18	Baluwa Khola	1	-
12	AP 18	AP 19	-	-	2
13	AP 19	AP 20	-	-	1
14	AP 20	AP 21	Adheri Khola	1	-
15	AP 22	AP 23	Adheri Khola	1	-
16	AP 23	AP 24	-	-	1
17	AP 24	AP 25	Charange Khola	1	-
18	AP 27	AP 28	-	-	2
19	AP 28	AP 29	Ghayane Khola	1	2
20	AP 30	AP 31	-	-	1
21	AP 31	AP 32	-	-	2
22	AP 32	AP 33	-	-	1
23	AP 34	AP 35	Kai Khola	1	-
24	AP 36	AP 37	Charnawati River	1	1
25	AP 37	AP 38	-	-	1
26	AP 38	AP 39	Charnawati River	2	-
27	AP 39	AP 40	-	-	1
28	AP 40	AP 41	Charnawati River	2	1
29	AP 41	AP 42	Ghatte Khola	2	-
30	AP 42	AP 43	-	-	4
31	AP 43	AP 44	Bhalo Khola	1	-
32	AP 44	AP 45	Khahare Khola	1	-
33	AP 49	AP 50	Yanmara Khola	1	-
34	AP 50	AP 51	Halhale Khola	1	-
35	AP 52	AP 53	-	-	1
36	AP 53	AP 54	-	-	2
37	AP 59	AP 60	-	-	1
38	AP 60	AP 61	Sunkoshi River	1	-
39	AP 61	AP 62	-	-	3
40	AP 64	S/S Barhabise	-	-	1
Total				25	35

b. Barhabise-Kathmandu Section

The alignment traverse through the middle hilly region to high hill of Nepal. The watershed condition of the project area as per Watershed condition in the districts of Nepal, ICIMOD is as follows.

Table 5-9: Watershed Condition of the District along Barhabise-Kathmandu Section

S.N	District	Watershed Condition
1	Sindhupalchowk	Fairly Good
2	Kavrepalanchowk	Good
3	Bhaktapur	Good
4	Kathmandu	Good

The watershed of the proposed TL route including the substations proposed at Barhabise, BaluwapatiDeupur and Changunarayan is observed to be fairly intact and stable. The major rivers

which cross the alignment of this section include Bhotekosi River, Balephi River, Indrawati River and Manahara River. The river crossing along the alignment are presented in the Table 5-10.

Table 5-10: River Crossing along Barhabise-Kathmandu Section

S.N	Stretch between		Major and Minor River Crossing		No. of Rivulet	Others
	From	To	Name	No.		
1	AP 0	AP 1	Sachi Khola	1	1	
2	AP 1	AP 2			2	
3	AP 2	AP 3	Bhotekosi River	1	-	
4	AP 4	AP 5			2	
5	AP 6	AP 7			1	
6	AP 7	AP 8			2	
7	AP 8	AP 9	God Khola	1	1	
8	AP 9	AP 10	Amale Khola Archale Khola	1 1		
9	AP 10	AP 11	Kanle Khola	1		
10	AP 12	AP 13	-	-	2	
11	AP 13	AP 14	Khukure Khola Gothe Khola	1 1	2	
12	AP 14	AP 15	-	-	2	
13	AP 17	AP 18	-	-	1	
14	AP 18	AP 19	Adheri Khola	1	-	
15	AP 19	AP 20	Khahare Khola	1	-	
16	AP 20	AP 21	-	-	1	
17	AP 21	AP 22			3	
18	AP 22	AP 23	-	-	1	
19	AP 23	AP 24	Balephi Khola	1		
20	AP 25	AP 26	-	-	1	
21	AP 27	AP 28	-	-	1	
22	AP 28	AP 29	-	-	1	
23	AP 30	AP 30A	-		1	
24	AP 30A	AP 31	Dalma Khola Kaule Khola	1 1	1	
25	AP 31	AP 32	-	-	2	
26	AP 32	AP 33	-	-	1	



S.N	Stretch between		Major and Minor River Crossing		No. of Rivulet	Others
	From	To	Name	No.		
27	AP 36	AP 37	Jhyari Khola	1	1	
28	AP 37	AP 38	-	-	4	
29	AP 38	AP 39	-	-	2	
30	AP 39	AP 40	Indrawati River	1	-	
31	AP 40	AP 41	-	-	1	
32	AP 41	AP 42	-	-	2	
33	AP 44	AP 45	Cha Khola	1	-	Pond -1
34	AP 45	AP 46			-	Fish Pond-1
35	AP 46	AP 47	Cha Khola	2	1	
36	AP 47	AP 48	-	-	7	
37	AP 48	AP 49	-	-	4	
38	AP 49	AP 50	Cha Khola	2	5	
39	AP 50	AP 51	Harre Khola	1	7	
40	AP 51	AP52	-	-	3	
41	AP 53	SS-1(H)	Saglo Khola	1	3	

5.1.9 Land Stability/ Erosion

a. Khimti-Barhabise Section

One major landslide has occurred near AP 29 causing instabilities for tower foundation. Due to earthquake of Baishak 12 and 29, area near AP 29 has been swayed away leading to transfer of this point to the next one. And one landslide due to erosion of bank by Tamakoshi River near AP 14 was observed. This landslide has not affected the AP but if proper measures not applied in time, may cause the instabilities in near future. The figure below shows the landslide and its crack near AP 29 and AP 14.



Figure 5.12: (a) Landslide and its Crack near AP 29 and (b) Bank Erosion near AP 14

Although most of the angle towers are located on relatively stable areas, some angle towers are located on sites susceptible to erosion and instabilities, some near the feeder road and some near the pole of distribution lines. The Table 5-11 below shows lists of the angle towers located on fragile topography observed during the field visit.

Table 5-11: List of Critical Angle Points of Khimti-Barhabise Section

S.No.	Angle Points	Type of problem	Remarks
1	AP 14	Bank erosion near AP about 35m downhill	River band protection measure required
2	AP 29	Major Landslide	Point need to be shifted
3	AP 46	Distribution pole within 5m periphery	Pole need to be shifted
4	AP 54	Located down Feeder Road	Protection works needed along some stretch

b. Barhabise-Kathmandu Section

Although most of the angle towers are located on relatively stable areas, some angle towers are located on sites susceptible to erosion and instabilities, some near the feeder road and some near the pole of distribution lines. The Table 5-12 below shows lists of the angle towers located on fragile topography observed during the field visit.

Table 5-12: List of Critical Angle Points of Barhabise-Kathmandu Section

S.No.	Angle Points	Type of problem	Remarks
1	AP 10	Located near Jure landslide	
2	AP 20	Located at ridge and cracks are seen about 20 m above the point	Ridge cutting is necessary.
3	AP 14, AP 15 and AP 52	Distribution pole within 12m, 4m and 7m periphery respectively	Poles need to be shifted
4	AP 22, AP 44	Located above Feeder Road	Protection works needed along some stretch

5.1.10 Crossings of Other Utilities

Apart from the land use and river crossing, this section of alignment of Tamakoshi-Kathmandu 400kV TL crosses highways, feeder roads, foot track, existing 132kV TL, 66kV TL, 33kV, 11kV TL, 220V distribution lines, some physical structures like Settlement, Hut, Towers, Canal, Fish Ponds, Goths, Desander, Toilets etc.



Figure 5.13: Jure Landslide between AP 10 and AP 11

5.2 Biological Environment

According to Forest and Vegetation Types of Nepal (TISC, 2000), forest vegetation in the proposed project area consist of mainly Schima-Castonopsis, Hill Sal, Lower Temperate Oak, Chir Pine and Broadleaved forest. However, Khote salla (*Pinus roxburghii*) and Patula salla (*Pinus patula*) plantation forests are also found. The dominant species are few forming pure or mixed association of species. Due to the diversity of local topography and climate, the flora varies from place to place and from district to district.



Figure 5.14: TL passing through CF in Sindhupalchowk

Tree species are well represented by the deciduous and evergreen types. Major plants species found are Khote salla (*Pinus roxburghii*), Uttish (*Alnus nepalensis*), Chilaune (*Schima wallichii*), Bajh (*Quercus* sps), Sal (*Shorea robusta*) Kyamuno (*Cleistocalyx operculata*), Patula salla (*Pinus patula*) etc. Likewise, mainnon-timber forest products (NTFPs) including medicinal herbs found are Lokta (*Daphne bholua*), Argeli (*Edgeworthia grdeneri*), Kurilo (*Asparagus* sps), Nagbeli (*Lycopodium* sps), Chirayito (*Swertia chirayita*), Amala (*Emblica officinalis*) etc.

Mammals such as Salak (*Manis pantadactyla*), Barking deer (*Muntiacus muntjak*), Jackal (*Canis aureus*), Leopard (*Panthera pardus*), Porcupine (*HystrixIndica*), Rhesus Monkey (*Macaca mulata*), Malsapro (*Martes flavigula*), Squirrel (*Fuinambulas palmaurum*) etc. are reported in the forest of project affected area.

Kalij (*Lephura leucomelana*), Common Myna (*Acridotheres tristis*), House Swift (*Apus affinis*), House Crow (*Corvussplendens*), Spotted Dove (*Streptopelia chinensis*) and House Sparrow (*Passer domesticus*).Cuckoo (*Eudyanamus* sp), etc. are reported bird species along the forest of project area. Katle (*Neolissocheius hexagonolepsi*) and Asla (*Schizothorax* sps) are the fish found along the rivers where from TL RoW passes.

Based on the available detailed survey report of the TL alignment after contract award, out of 129angle points (APs)and 198 suspension Points, total tower 327,70 are located in the forest which will require ha forest area (area occupied by each tower pad = 35 m X 35 m).

The proposed project area does not fall in protected area (national parks, wildlife sanctuary, buffer zone and conservation area) or environmentally sensitive area.



Figure 5.16: TL passing through Sal forest in Kavre Palanchok district



Figure 5.15: TL passing through Pine forest in Dolakha

5.2.1 Community Forest/Leasehold Forest/Government Forest

Total number of community forests (CFs) in five districts is 1,667, out of which there are 53 community forest along the AP and TL RoW. Likewise, leasehold forests (LHF) are affected in Sindhupalchowk district 2 where total number of LHF is 396. In addition, there are 2 government forests in Sindhupalchowk and 2 LHF in Sindhupalchowk district. Total 103.2202 ha of forest area will be acquired by the project at Right of Way (RoW) in which CFs area is 100.5112 ha, GFs area is 0.7678 ha and LHF's area is 1.9412

ha. List of forests is given in Table 5-15 and summary of forest status about type, number and area of the forests is given in Table 5-16. Refer Appendix B for the details about the individual forests.

Table 5-15: List of Project Affected CFs/LHF/GFs

District	VDC/Municipality	Ward	Name of CF/LHF/GF	Affected area (ha)	Total area (ha)
Dolakha	Melung	1	Sitalidevi	0.52	13.15
		3,4	Rumti Ramche	0.66	39.00
	Ghayng Sukathokar	1	Paleke Sajhe ko Sahukhoria	2.54	82.24
	Pawoti	8	Khahare Bhadaure	2.54	71.38
		2	Baluwaa Bhumethan	2.14	81.81
		2	Bhyakure Bhir	0.29	2.25
		6	Mulpani	2.28	61.25
	Fasku	1	Charnawoti	7.3	125
	Bhimeswor Municipality	6	Sitakund	7.12	154.92
		11	Amale Kharka	1.04	7.31
		11	Kupri Salleri	0.76	45.45
		8	Kamalamai	0.21	57.4
		8	Shim Sungure	0.77	31.00
		8	Bichaur	0.34	56.00
		11	Dhade	1.62	19.97
	Boch	6	Chitreshwor	1.61	2.28
	Lakuridada	1	Namke Yanmara	3.6	160.88
Sindhupalchowk	Dhuskun	2,8	Ratochaur	0.526	190.93

Kathmandu	Shankarapur Municipality		Lambu danda	1.29	68.66
			Kusum	0.74	170.00
	Total		57	103.2202	3,087.84

Source: Forest Survey, 2015 Source: Field survey, 2018 & DFO Profile of Bhaktapur, Kathmandu, Kavrepalanchowk, Sindhupalchowk and Dolakha districts.

Note: In Sindhupalchowk district, total no. of LHF is 396 covering 1958.4 ha of area with 3474 households.

Table 5-16: Summary of Forest Status in Project Affected Districts

District	Total forest area (ha)	Community Forest		Total hhs (no)	Affected CF		Affected GF		Affected LHF		Total	
		No	Area (ha)		No	Area (ha)	No	Area (ha)	No	Area (ha)	No	Area (ha)
Bhaktapur	2,133	62	1,937.08	9,193	1	0.2500					1	0.25
Kathmandu	14,118	173	6,143.34	20,372	2	2.0300					2	2.03
Kavrepalanchok	77,552	546	24,578.50	47,128	6	9.200					6	9.2
Sindhupalchowk	57,531	519	31,390.40	57,075	27	53.6912	2	0.7678	2	1.9412	31	56.4002
Dolakha	101,500	367	28,250.93	34,964	17	35.34					17	35.34
Total	252,834	1,667	92,300.25	168,732	53	100.5112	2	0.7678	2	1.9412	57	103.2202

Source: Field survey, 2015 & DFO Profile of Bhaktapur, Kathmandu, Kavrepalanchowk, Sindhupalchowk and Dolakha districts. Note: In Sindhupalchowk district, total no. of LHF is 396 covering 1958.4 ha of area with 3474 households

5.2.2 Protected Species of Flora and fauna

Table 5-17 shows the status of protected flora and fauna according the Government of Nepal legislation, CITES appendixes and IUCN red list data.

Table 5-17: Protected Species of Flora and Fauna

S. No.	Local Name	Scientific Name	IUCN Red list data	CITES category	GoN
1	Monkey	<i>Macaca mulatta</i>	LC		
2	Fox	<i>Canis aureus</i>	LC		
3	Leopard	<i>Panthera pardus</i>	NT		
4	Chinese pangolin (Salak)	<i>Manis pentadactyla</i>		II	Protected by National Park and Wildlife and Conservation Act, 2020 (1973)
5	Dumsi	<i>Hystrix indica</i>	LC		
6	Kalij	<i>Lophura leucomelanos</i>	LC		
7	Sal	<i>Shorea robusta</i>	LC		Banned for commercial extraction, transportation and export

8	Walnut	<i>Juglans regia</i>	NT		Banned for commercial extraction, transportation and export
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LC – Least Concern, NT – Not Threatened

5.2.3 Ethno Botany/ Plant Resource Use Pattern

The major timber yielding trees of the project area are Sal (*Shorea robusta*), Khote Salla (*Pinus roxburghii*) and Chilaune (*Schima wallichii*). Common fodder species are Kutmero (*Litsea monopetala*), Khaniyo (*Ficus semicordata*), Kavro (*Ficus lacor*), Dabdabe (*Garuga pinnata*), Tanki (*Bauhinia purpurea*), and Bamboo (*Dendrocalamus* sp.). Almost all the trees are used as firewood depending upon their availability. Chiraito (*Swertia chiraita*), Lokta (*Daphne bholua*), Amala (*Embllica officinalis*), Kurilo (*Asparagus racemosus*), Bans (*Dendrocalamus* sp.), Argeli (*Edgeworthia gardenieri*), Nagabeli (*Lycopodium* sp.) are the common Non Timber Forest Products (NTFP) of the project area. These NTFPs are the source of income for the local people for the improvement of their livelihood.

5.3 Socio-economic and Cultural Environment

5.3.1 General Introduction of the Project affected District

The proposed 400 kV TL project is located in six districts (Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu) of Janakpur and Bagmati Zone, Central Development Region of Nepal. The total area of 6 districts is 14,651 Sq. km.

According to the data of CBS 2011, the total population of the six districts is 31,07,829 with 15,69,561 male and 15,38,268 female which occupies 11.73% of the total population of the country (2,64,94,504). The average population density of six districts is 1263 (persons/km²). There are 7,41,986 HHs and the average household size of the six districts is 4.37. Similarly, the average literacy rate of the six districts is 70%. The economically active population of Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu districts are 54.15, 54.75, 56.11, 59.48, 67.72 and 70.19 respectively. The average urban population of six districts is 48.75% although there is no any municipality in Ramechhap (0 urban populations). The demographic Characteristics of the project affected districts are given in Table 5-18.

5.3.2 Socio-economic Features of the Project VDCs/ Municipalities

The proposed alignment traverses through the 26 VDCs and 4 municipalities of six districts of Central Development Region of Nepal. Government of Nepal has added 72 new municipalities across the country on May 8, 2015 (25, Baishakh 2072) under Local Self Governance Act 1999. The proposed TL passes through 3 new municipalities (Mahamanjushree Nagarkot, Changunarayan and Shankharapur). The map showing the project affected VDCs/Municipalities is presented in Figure 2.2. The 98.36 km long TL is started from proposed substation site of New Khimti at Ghumaune village, Phulasi VDC of Ramechhap district to proposed substation at Sano Palati Barhabise VDC of Sindhupalchowk district. From proposed Barhabise substation the line reaches to proposed lapsephedi substation and finally terminates at Chagunarayan substation and tapping at Duwakot of Bhaktapur district. As per Electricity Regulations, 2050 (1993), the right of way is taken as 23 meters on either side from the center of the TL.

5.3.2.1 Demography

According to the National Population Census 2011, the total population of the project VDCs/ Municipalities is 215784 with 101823 (47.19%) males and 113961 (52.81%) females. The female population is higher as compared with the male population. The population of the project





Table 5-18: Demographic Characteristics of the Project affected District

District	Ramechhap	Dolakha	Sindhupalc howk	Kavrepalanchow k	Bhaktapur	Kathmandu	Total
Total Population	202646	186,557	287798	381937	304651	1744240	3107829
Male	93386	87003	138351	182936	154884	913001	1569561
Female	109260	99554	149447	199001	149767	831239	1538268
Total No. of HHs	43910	45688	66688	80720	68636	436344	741986
Average HH size	4.62	4.08	4.32	4.73	4.44	4	4.37
Population Density (person/km ²)	131	85	113	274	2560	4416	1263
Sex Ratio (Male per 100 Females)	85.5	87.5	92.6	91.9	103.4	109.8	95
Urban Population (%)	—	12.08	5.42	26.25	100	100	48.75
Population below 5 years (%)	7.91	8.44	8.17	7.33	6.51	6.4	7
Elderly Population 75+Years (%)	3.03	3.05	2.73	2.42	1.91	1.51	2
% of Economically active population (15-60 yrs)	54.15	54.75	56.11	59.48	67.72	70.19	60
% of Literacy Rate (6 years & above)	62.24	62.78	59.59	69.8	81.68	86.25	70
Total Area of the Districts (Sq. km)	1546	2191	2542	1396	2560	4416	14651
% of District Population compared with Country's	0.76	0.7	1.09	1.44	1.15	6.58	11.73

Source: CBS 2011



Table 5-19: Demographic Characteristics of the Project affected VDCs/ Municipalities

District	VDC/ Municipality*	Population			Total HHs	Average HH size	Pop. Density (person/km ²)	Sex Ratio (Males /100 Females)
		Total	Male	Female				
Ramechhap	Phulsi	5,733	2,594	3,139	1,284	4.46	246	82.64
	Melung	3,566	1,596	1,970	836	4.27	319	81.02
	Bhedapu	3,705	1,596	2,109	918	4.04	201	75.68
	Pawati	4,573	2,049	2,524	1,109	4.12	270	81.18
Dolakha	Ghyang Sukathokar	4,230	1,942	2,288	1,032	4.10	207	84.88
	Fasku	4,338	1,877	2,461	1,117	3.88	179	76.27
	Magapauwa	2,950	1,339	1,611	780	3.78	188	83.12
	Bocha	2,799	1,182	1,617	775	3.61	156	73.1
	Lakunidada	3,713	1,734	1,979	924	4.02	134	87.62
	Bhimeshwor*	22,537	10,489	12,048	6,076	3.71	390	87.06
	Chokati	2,497	1,163	1,334	627	3.98	96	87.18
	Piskar	2,286	1,115	1,171	538	4.25	182	95.22
	Dhukun	2,926	1,336	1,590	759	3.86	181	84.03
	Karthali	3,347	1,608	1,739	836	4.00	128	92.47
	Barhabise	7,117	3,519	3,598	1,683	4.23	678	97.8
	Ramche	4,092	2,028	2,064	999	4.10	361	98.26
Sindhupalchowk	Mankha	7,752	3,698	4,054	1,860	4.17	501	91.22
	Fulpindada	4,802	2,305	2,497	1,054	4.56	256	92.31
	Kadambas	3,372	1,472	1,900	834	4.04	243	77.47
	Irkhu	3,443	1,555	1,888	751	4.58	277	82.36
	Thulo Sirubari	5,987	2,632	3,355	1,331	4.50	268	78.45
	Bhotasipa	4,618	2,084	2,534	994	4.65	316	82.24
	Tauthali	2,762	1,255	1,507	776	3.56	113	83.28
	Chandeni	3,265	1,500	1,765	782	4.18	343	84.99
Kavrepalanchowk	Mahadevsthan	8,166	3,890	4,276	1,873	4.36	369	90.97
	Naya gaun	4,417	1,984	2,433	951	4.64	346	81.55
	Baluwapati	6,023	2,943	3,080	1,292	4.66	295	95.55
	MahamanjushreNagarkot*	22,908	10,927	11,981	4936	4.64	659	91.55
Bhaktapur	Chagunaryan*	32,522	16,065	16,457	7,234	4.50	1165	97.14
Kathmandu	Shankarapur*	25,338	12,346	12,992	5,406	4.69	421	95.04
Total		215,784	101,823	113,961	50,367	4.28	316	111.92

नेपाल सरकार
जर्ना, जलस्रोत तथा सिंचाइ मन्त्रालय
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5.3.2.2 Settlements

Dense as well as scattered forest, barren land, cultivated land and scattered settlements are found in the project area. The main settlements of the VDCs/Municipalities through which the TL passes are Milti bazaar-Sitali, Tinkhoriya gau, Matyangri basti, Khanigaun, Kalleri basti, Kaichale gaun, Odare gaun, Gurung gaun, Kiratechhap basti, Thapa basti, Syasi, Okhre, Gagrenbari, Swara gaun, Tallo pakha gaun, Phulbarighumti, Kharidhunga, Beshi tole, Kuwapani basti, Kotabari gaun, Gairi gaun, Kamitar Tole, Chimling Besi gaun and others. The Table 5-20 shows the name of settlements and their locations by districts.

Table 5-20: List of Settlements through which TL passes

S.No.	Settlement	VDC/Municipality*/Ward No.	District
1	Milti bazaar, Sitali	Phulasi-1	Ramechhap
2	Sital besi basti	Melung-1	Dolakha
3	Kalleri basti, Thamidada basti	Bhedapu	Dolakha
4	Dihi gaun	Bhedapu	Dolakha
5	Odare gaun	Pawati	Dolakha
6	Gurung gaun	Fasku	Dolakha
7	Kiratechhap basti	Bhimeshwor*	Dolakha
8	Gaudada basti	Bhimeshwor*	Dolakha
9	Thapa basti	Mankha	Sindhupalchowk
10	Syasi	Lakuri dada	Dolakha
11	Okhre	Lakuri dada	Dolakha
12	Tallo pakha gaun	Lakuri dada	Dolakha
13	Phulbarighumti gaun	Lakuri dada	Dolakha
14	Kharidhunga	Lakuridada	Dolakha
15	Dadakharka	Piskar	Sindhupalchowk
16	Pokhare basti	Piskar	Sindhupalchowk
17	Manichaur	Karthali	Sindhupalchowk
18	Phalate	Barhabise	Sindhupalchowk
19	Sano palate	Barhabise	Sindhupalchowk
20	Beshi Tole	Ramche-8	Sindhupalchowk
21	Badare Tole	Ramche-6	Sindhupalchowk
22	Kotabari gau	Ramche-3	Sindhupalchowk
23	Gairigau	Ramche-5	Sindhupalchowk
24	Kanle dada	Mankha-1	Sindhupalchowk
25	Kamitar Tole	Mankha-6	Sindhupalchowk
26	Chimlingbeshi gaun	Mankha-6	Sindhupalchowk
27	Chilaune basti	Irkhu-6	Sindhupalchowk
28	Dada gau basti	Irkhu-5	Sindhupalchowk
29	Sahu tole	Irkhu	Sindhupalchowk
30	Goth basti	Irkhu	Sindhupalchowk
31	Bhulbhule gaun	Thulo sirubari	Sindhupalchowk
32	Bajini gaun	Thulo sirubari	Sindhupalchowk
33	Jholunge basti	Bhotesipa	Sindhupalchowk
34	Majhi gaun	Chandeni	Kavrepalanchowk
35	Rayobari	Mahadevsthan	Kavrepalanchowk

S.No.	Settlement	VDC/Municipality*/Ward No.	District
36	Kunta bazaar	Mahadevsthan	Kavrepalanchowk
37	Tallo Lapsephedi	Baluwapati	Kavrepalanchowk
38	Beshi gau	Mahamanjushreee Nagarkot *	Bhaktapur
39	Khoriya gau	Chagunaraya*	Bhaktapur
40	Ittakhel	Shankharapur*	Kathmandu

Source: Field Survey, 2015

5.3.2.3 Caste and Ethnicity

The project area is a multi-ethnic composition of different origins, cultures, language and religion. Altogether 26 castes/ethnic groups are found in the project area. The dominant caste groups in the project area are Chhetri (25.54%), Tamang (21.36%), Newar (19.70%) and Brahmin Hill (15.34%) which covers 81.94% of the total population.

Government of Nepal has categorized 59 castes/ethnic groups as indigenous and tribal group. Under this provision, there is 65.24% population in the project affected VDCs that fall under this category of Indigenous and Tribal groups. The identified indigenous and tribal groups of the project affected VDCs are Tamang, Newar, Magar, Gurung, Rai, Sherpa, Jirel, Bhujel, etc. The Dalits community (Kami, Damai and Sarki) covers 5.6% of total population of the project area. In the same way, the highly marginalized caste group Thami (2.45%), Danuwar (0.75%) and Majhi (0.56%) are also found in the project area. Hyolmo (0.12%) is the only caste group that is found in Phulasi VDC.

From the field visit and KII, it was observed that there are mixed cast groups residing besides the TL corridor. However, it was found that between AP59-AP60, within the distance of 150m, there is Thami Settlement. In the same way, near to AP40, there is Majhi Settlement. Besides this, it was not found any other special cast group settlement along the TL route.

5.3.2.4 Mother Tongue and Religion

Nepali (61.82%) is the main language widely spoken in the project area. Beside this, Tamang followed by Newar, Thami, Danuwar and others are main language used in project area.

In field observation we found that the main language is Nepali because most of the tribal people also use national language to communicate. Hindu and Bouddha are the major religion of the people of project area. According to district level information Hindu are 75.43%, followed by Bouddha (20.26%), Christian (2.09%), Muslim (0.77%) and Prakriti (0.78%) in the project affected districts. (Demographic Profile of Nepal 2013/14).

However, during field observation and KII, it was observed that Hinduism and Buddhism are the major religion adopted by the different caste group of the project area. Islam, Kirat and Christian are the other minor religion residing in the project area. Dashain, Tihar, Holi, Krishna Janmasthan, Lhosar, Udhauli, Ubhauri, Buddha Jayanti and different Jattras are the major festival celebrated by Hindus and Buddhists in the project area.

5.3.2.5 Education and Literacy

According to National population census 2011, the total population (5 years and above) of the project area is 199531. Of the total population (population of age 5 and above years), the average literacy rate of the project area is 63.29% consisting 72.54% male and 55.45% female literacy



rate. Women literacy is very low in comparison in male. Literacy status of affected VDCs/Municipalities is low in comparison of district 70.39% and slightly low in comparison to nation 65.94%.

In field observation we find most of the people are aware about education of their children either boy or girl. This shows the awareness towards education is increasing. This also indicates the educational status of the project affected VDC is satisfactory. However, dropout from school is seen high to girls rather than boys.

According to district source, there are 3785 primary schools, 2141 lower secondary schools, 1457 secondary schools, and 570 higher secondary schools in the project affected district. Bachelor and Masters' Degree education facility are also available in project affected districts.

However, from the field visit, it is observed that over 90% of school buildings in Sindhupalchowk and Kavrepalanchowk district have suffered damage due to the devastating earthquake occurred on April 25. Most of the schools have crumbled to the ground and the entire classroom is completely destroyed. Reconstruction and retrofitting of these school buildings may take 2-3 years.

Now these schools are operating with temporary and transitional learning centers without any physical facilities such as building/class room, toilet, drinking water, sports ground, furniture, athletics materials and library. As per the local people, almost all schools of the project area require external support for physical facility improvement.

5.3.2.6 Migration

Due to presence of infrastructures, better facilities, and fertile cultivated land, the in-migration pattern from hilly area to Terai region is common practice in the project area. The out-migration, especially the young generation migrates to abroad seeking for employment is also common. Malaysia, Qatar and Dubai are the main destinations in abroad to most of the migrant. Hence, remittance is the prominent source of income for most landless, poor, and marginalized households of the project area.

The in-migration to the center Kathmandu for various purposes like business, employment, study and medical services is also common in the project area.

Unemployment, lower educational level, low agricultural production and desire of improving quality of life as well as social trend are the main reasons of migration in the project area. Migration has helped to improve socio-economic status of the local people of the project area and positive impact on local economy.

5.3.2.7 Gender Status

The influence of the society is male dominated in the project area. However, the population of female (52.81%) is higher than male (47.19%) in the project area. There are fundamental challenges of gender equality in the project area. Domestic and social burden fall on the women as they are expected to undertake all the domestic chores like fetching water, cooking, washing, food processing, household maintenance, hygiene and sanitation activities and looking after the children in addition to feeding their families. The result is that rather than being able to concentrate on activities that earn income, many women spend majority of their time undertaking domestic activities. In regards to land and property ownership, women are known to have a say on them.



The literacy rate of women in the project area is low (55.45%) as compared with the male literacy rate (72.54%).

The decision making process on economic activities is mostly exercised by the both male and female. However, women have lack of access to land and property holding and restrictions on family inheritance. The result is that rather than being able to concentrate on activities that earn income, many women must spend the majority of their time undertaking domestic activities. The average daily wage/labor rate of women in the project affected area is only NRs. 300-500 which is low as compared with male NRs. 500-700.

5.3.2.8 Economically Active Population and Economic Activities

According to CBS 2011, the total population of age 15 to 59 years of the project affected VDCs/Municipalities is calculated to be 128474 which is 59.54% of the total population of the project affected VDCs/Municipalities. Hence, there is 59.54% population categorized as economically active. Similarly, there is 40.46% dependent population of which 31.45% are below 15 years and 9.01% are senior citizen (sixty years and above age). The dependency ratio in the area is 1:1.47; this is very high, as every 100 people who are working have to support 147 dependents unemployment.

Agricultural is the main source of income for the majority of people in the project area. Food crops such as rice, wheat, maize and millet are grown for food. Cash crops such as potato, beans and seasonal vegetables are grown by some subsistence farmers for their daily consumption purpose. Livestock is farmed for meat and milk.

From field observation, it is observed that potato farming is famous in Shankharapur Municipality, Kathmandu which is farmed two to three seasons a year. In the same way, Mahadevsthan VDC of Kavrepalanchok is also the pocket area for seasonal as well as offseasonal vegetable farming. The vegetables for Kathmandu valley is supplied from this VDC. The milk for DDC is also carried from the VDCs of Kavrepalanchowk district. Thus livestock farming is also a major income generating source for these VDCs.

5.3.2.9 Occupation and Employment

The major occupation of the people of the project area is subsistence as well as professional farming. The Kavrepalanchowk district is the pocket area for food crops and vegetable farmings. After farming, the people are engaged in trade/business, service, labor, manufacturing, transportation and foreign employment. Since there are many new projects running in the project area (Sindhupalchowk and Dolakha district), the majority of unskilled people are engaged in daily wage activities in the projects operating there.

5.3.2.10 Public Health, Drinking Water and Sanitation

In the health sector, there is a district level hospital with posts of MBBS medical superintendents in the district headquarter of all the project affected districts and at least one sub-health post is available in each VDC.

However, after the devastating earthquake of April 25, the health facilities in the affected district have been severely damaged. The only one hospital of Ramechhap district is completely damaged. Out of total 321 health facilities of project affected districts, 43 health posts are completely damaged and 154 are partially damaged (Source: Gov. of Nepal, Disaster Risk Reduction Portal, NEOC, MoHA).

Tap/Piped water, spout water, uncovered as well as covered well/kuwa, river/stream and tube well are the sources of water for drinking and other purposes. About 73.40% of households use Tap/Piped water in the project area. Firewood is the major source of cooking. However, kerosene and LP gas are also being used by some households in the market area.

On the average 29719 households (77.35% of total households) in the project area are equipped with toilet facilities. This indicates that the level of awareness particularly towards the use of toilet is satisfactory in the project area. However, still a large portion of population of the project area use open defecation along the river or in the open fields (Source; CBS 2011). Recently Dolakha district has been declared "Open Defecation Free Area." So sanitation condition was found satisfactory in the project area. The prevailing diseases in the project areas reported are gastro-intestinal, TB, typhoid, jaundice, etc.

The finding of field visit and KIIs also indicates that most of the households in the project area use tap/piped water connected directly to the water sources. But the water supply and sanitation system of the project area has been disrupted due to devastating earthquake. All the toilets as well as houses are collapsed. The households, who are forced to live in temporary shelter, go to the open field, bushes and riversides for defecation.

5.3.2.11 Infrastructure

a. Transportation

The project area is accessible by road and facilitated through market centers, telecommunication, electricity and postal services. The project districts have direct road link to Kathmandu and all the affected VDCs have road network to district headquarters through gravel and earthen motorable road and some higher stretch through foot trail. The major roads that link the project area are Arniko highway, Barhabise-Budepa, Barhabise-Dhuskun-Piskar, BalefiTembathan, Lamosanghu-Jiri, Mudhe-Melung, Nayapul-Fasku-Pawati, Tamakoshi-Manthali and Jorpati-Mulpani-Sakhu. The bus service to Kathmandu is available from the nearest city Jiri, Manthali, Chautara, Dhulikhel, Melamchi and Nagarkot.

b. Communication

Communication services such as mobile, CDMA and landline phone are available in most of the VDCs of the project area. Modern communication facilities like television, cable-network, e-mail, internet and fax are available in the project area. Availability of some of the local and national newspapers and magazine are observed in all parts of project area, district headquarters and major markets. Local FM radio services are also available in the project area.

c. Energy

Electricity is one of the major sources of energy for lighting in the project area. Almost all project affected VDCs/Municipalities are fully electrified through the national grid system or through solar power. Similarly, fuel wood is the main source of energy for cooking in the project area. Kerosene and LP gas are also used particularly in market centers.



d. Market Centers and other Service Facility

Charikot, Kharidhunga, Barhabise, Jiro kilo, Kunta bazaar, Dhulikhel, Banepa, Nagarkot, Sankhu are the major markets and trade centers of the project area. The average distance of these market centers from the proposed TL corridor is ranged from 500m to 25 km. The other service facilities available in and around the project area are health post, health care centers, agriculture service center, veterinary center, postal service, educational institutions, police office, cooperative office and banking service, etc.

e. Others

Local irrigation programmes are also on work in project affected areas. Ghyang khola Irrigation Upper and Lower, Ghyangkhola Bhataghari, Ghyangkhola Khannagi Irrigation, Andheri khola Budhathoki Irrigation Canal, Andherikhola Irrigation Canal, Gairi khola Irrigation Canal, Fadkekhol irrigation project of Melung, Singe-Chainpur Irrigation project and Mahadevsthan Irrigation project are major irrigation project working in the project area.

The local governmental organizations are located in all VDCs. The agriculture, livestock and public health services centers are also located in the project areas. In the field of finance and Banking sector, various micro finance, saving and credit cooperation are working in the project area.

5.3.2.12 Law and Order

The existing law and order situation of the project area was observed to be normal. The District Administration Office and police office have maintained the law and order in the area.

5.3.2.13 Religious and Cultural Places

There are various religious/ cultural sites spreading over in the project area. They are Shiv mandirs, Devithan, Bhairavthan, Gumbas. Nagarkot is the famous touristic place in the project area. Chagunarayan temple (filed as World Heritage Centre) is also within the project area. However, there are no archaeological sites of significant importance in the core project area.

5.3.2.14 Mining Sites

The project area or the project district (Kharidhunga) is famous for slate stone mines in Nepal. There are many slate stone industries in settlement Kharidhunga through where the TL passes.

5.3.2.15 INGOs and NGOs Activities

There are many NGOs/INGOs, clubs, cooperatives, mother groups, etc. that are working in the field of water supply, sanitation, sports, women awareness, family planning, saving mobilization and income generating activities in the project area.

5.3.2.16 Tourism Activities

The project affected districts are rich in natural, cultural and historical touristic attractions. Kathmandu and Bhaktapur are the center for tourism. Dhulikhel, Kavre; Charikot, Dolakha are other attracted places for tourists. There are many viewpoints, trekking routes and other enjoyable places and things that attract the tourists in the project area.

5.3.3 Profile of the Project Affected Households

5.3.3.1 Population and Households

Households survey of 197 households from project affected VDCs/Municipalities have been conducted. The surveys reveal that the total population of the project affected sample household is 1170 of which 599 (51.97%) are male and 571 (48.80%) are female. Similarly, the average households size and sex ratio of the project affected households are 5.9 and 1.05 respectively. As per the broad age group classification, the majority of population falls in the age group of 15-59 year, which comprised of 65.73% population. Similarly, the total dependent population (population of the age group 0-14 years and senior citizen-age group of 60 year and above) is 401 (34.27%).

Table 5-21: Distribution of Surveyed Households and Population in the project area

Districts	Population				Households	
	Male	Female	Total	Sex Ratio	Total	Average HH Size
Ramechhap						
Dolakha	204	200	404	1.02	59	6.8
Sindhupalchowk	316	302	618	1.05	108	5.7
Kavrepalanchowk	43	39	82	1.10	15	5.5
Bhaktapur	27	23	50	1.17	10	5.0
Kathmandu	9	7	16	1.29	5	3.2
Total/Ave.	599	571	1170	1.05	197	5.9

Source: Household Survey, 2015

Table 5-22: Distribution of Population by Broad Age Groups

Districts	Broad Age Group			Population
	0-14 years	15-59 years	60 and above	
Ramechhap				
Dolakha	88	260	56	404
Sindhupalchowk	134	416	68	618
Kavrepalanchowk	24	47	11	82
Bhaktapur	9	28	7	44
Kathmandu	3	18	1	22
Total/Ave.	258	769	143	1170
Percentage	22.05	65.73	12.22	100.00

Source: Household Survey, 2015

Type of family

Nuclear type of family is dominant in the project affected households. Of the total 197 households, 116 (58.88%) households are categorized as nuclear type and the rest 81 (41.12%) are joint type.

Marital status

Of the total 1170 population, 599 (51.20%) are married and 516 (44.10%) are unmarried. Similarly, the population of widow/widower and separator are 53 and 2 (4.53% and 0.7%).



5.3.3.2 Religion

Hinduism and Buddhism are the two main religions followed by project affected households. The majority of the project affected households 85.79% are Hindu followed by Buddhist 13.71%. There are also some Christian households (0.51%) in the project affected area.

Table 5-23: Distribution of Surveyed Households by Religion

Districts	Religion						HHs
	Hinduism		Buddhism		Christian		
	HHs	%	HHs	%	HHs	%	
Ramechhap							
Dolakha	56	94.92	3	5.08		0.00	59
Sindhupalchowk	93	86.11	14	12.96	1	0.93	108
Kavrepalanchowk	11	73.33	4	26.67		0.00	15
Bhaktapur	4	40.00	6	60.00		0.00	10
Kathmandu	5	100.00		0.00		0.00	5
Total	169	85.79	27	13.71	1	0.51	197

Source: Household Survey, 2015

5.3.3.3 Mother Tongue

Nepali is the main mother tongue spoken by the surveyed households. About 85.79% of the surveyed households speak Nepali language and after Nepali Tamang language (13.71%) is also spoken. One household of Dolakha district speaks Thami language as its mother tongue.

Table 5-24: Distribution of Surveyed Households by Spoken Language

Districts	Spoken Language						HHs
	Nepali		Tamang		Thami		
	HHs	%	HHs	%	HHs	%	
Ramechhap							
Dolakha	55	93.22	3	5.08	1	1.69	59
Sindhupalchok	94	87.04	14	12.96		0.00	108
Kavrepalanchowk	11	73.33	4	26.67		0.00	15
Bhaktapur	4	40.00	6	60.00		0.00	10
Kathmandu	5	100.00		0.00		0.00	5
Total	169	85.79	27	13.71	1	0.51	197

Source: Household Survey, 2015

5.3.3.4 Occupation

Agriculture is the main occupation of the surveyed households. About 35.76% of the surveyed households have adopted agriculture as a main occupation. The percentage of households occupied other than agriculture is service; inside the country (11.05%), Labor wage 18.07 % (9.88%, inside the country and 8.19%, outside the country), and students (22.50%) business and small industry (6.11%) and households work (6.24%). The Table 5-25 depicts the detail of the occupational distribution of the surveyed households.

Table 5-25: Occupational Composition of Surveyed Population (14 to 59 years) by Sex

Major Occupations	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Agriculture	87	22.31	188	49.60	275	35.76
Business & Small Industry	35	8.97	12	3.17	47	6.11
Labor wage(In country)	59	15.13	17	4.49	76	9.88
Labor wage(Outside country)	48	12.31	15	3.96	63	8.19
Service(Inside country)	66	16.92	19	5.01	85	11.05
Student	93	23.85	80	21.11	173	22.50
Household Work	0	0.00	48	12.66	48	6.24
Unable	2	0.51		0.00	2	0.26
Total	390	100.00	379	100.00	769	100.00

Source: Household Survey, 2015

5.3.3.5 Literacy

From the household survey, it is revealed that 84.19% of the surveyed populations are literate with male literacy rate 89.82 % and female literacy rate 78.28%.

Table 5-26: Literacy Status (6 years and above) of Project affected Population

Literacy Status	Male		Female		Total	
	No.	%	No.	%	No.	%
Illiterate	57	10.18%	116	21.72%	173	15.81%
Literate	503	89.82%	418	78.28%	921	84.19%
Total	560	100.00	534	100.00	1094	100.00
Percentage	51.19		48.81		100.00	

Source: Household Survey, 2015

Of the literate population, percentage of having Primary Level, Lower Secondary Level, Secondary Level, SLC, Intermediate Level and Bachelors Level education are 24.86, 13.46, 18.13, 6.84, 13.25 and 8.03 respectively. Population having literate only is 15.42%. The Table 5-27 describes the educational attainment among the literate population of the sample households.

Table 5-27: Educational Attainment among the Literate Population of the Project Area

Educational Attainment	Male		Female		Total	
	No.	%	No.	%	No.	%
Literate only	60	11.93	82	19.62	142	15.42
Primary Level	128	25.45	101	24.16	229	24.86
Lower Secondary	67	13.32	57	13.64	124	13.46
Secondary	92	18.29	75	17.94	167	18.13
SLC	40	7.95	23	5.50	63	6.84
Intermediate	74	14.71	48	11.48	122	13.25
Bachelors and above	42	8.35	32	7.66	74	8.03
Total (Literate)	503	100.00	418	100.00	921	100.00

Source: Household Survey, 2015

5.3.3.6 Land Ownership status and Holding size

Households survey shows that hundred percent of the sampled households have their own land for cultivation. The average land holding size of the surveyed households is estimated to be 0.711ha. The higher landholding size is in the households of Dolakha district (0.862) and the lower landholding size is in the households of Kathmandu district (0.122). The Table 5-28 represents the average holdings size of the households of the surveyed population of the affected districts.

Table 5-28: Land Holding of the Surveyed Household

Districts	HHs	Irrigated Khet(ha)	Bari(ha)	Pakho-Bari(ha)	Total(ha)	ha/HH
Dolakha	59	25.995	22.729	2.143	50.867	0.862
Sindhupalchok	108	38.759	32.995	3.846	75.6	0.700
Kavrepalanchowk	15	3.814	4.056		7.87	0.525
Bhaktapur	10	2.615	2.5		5.115	0.512
Kathmandu	5	0.612			0.612	0.122
Total	197	71.795	62.28	5.989	140.064	0.711
Average		0.364	0.316	0.030	0.711	

Source: Household Survey, 2015

Land Holding Size

Surveyed households have been classified on the basis of different landholding categories such as marginal, small, medium, and large. Majority of the households i.e. 60.32% are categorized as small type families having own land ranges from 0.5 ha to 2.0 ha whereas 19.69% are marginal farmers having land less than 0.5 ha. 10.37 % of households are medium type having land 2.0 ha to 4.0 ha and the rest 9.63% are large type families having land more than 4 ha. The distribution of the land holding size on the basis of holding category is shown in Table 5-29.

Table 5-29: Distribution of Households by Landholding Size

Landholding Categories*		Households		Total Area	
Category	Size of holding(ha)	No.	%	Area(ha)	%
Marginal	Up to 0.5	97	49.24	27.577	19.69
Small	0.5 - 1.0	57	28.93	40.071	28.61
	1.0 - 1.5	25	12.69	29.384	20.98
	1.5 - 2.0	9	4.57	15.022	10.73
Medium	2.0- 4.0	6	3.05	14.527	10.37
Large	>4	3	1.52	13.482	9.63
Total	-	197	100.00	140.064	100.00

Source: Household Survey, 2015

*Landholding Categories based on Rural Credit Review Study 1991/92, Nepal Rastra Bank (Central Bank of Nepal), 1999

Land Holding size by type of land

Low land irrigated paddy field (khet), up land (bari) and sloppy land (pakho bari) are the main land types owned by surveyed households. On the basis of type of land, the holding size of irrigated paddy field is highest i.e.0.364ha followed by bari (0.316ha) and pakho bari (0.030ha).

Land Transaction

From the household survey, it is revealed that there was only in a few extent land transaction occurred during last year. The detail of the land transaction is given Table 5-30.

Table 5-30: Land Transaction of the Project Affected Households

Districts	Yes	No	Total
Dolakha	3	56	59
Sindhupalchowk		108	108
Kavrepalanchowk	1	14	15
Bhaktapur	1	9	10
Kathmandu		5	5
Total	5	192	197
Percentage	2.54	97.46	100.00

Source: Household Survey, 2015

5.3.3.7 Agriculture

The main cereal crops grown by the surveyed households are paddy, maize and millet. Similarly, cash crop like potatoes and oilseeds are also the major production to some surveyed households of project area. From the households' survey, the total production of paddy, maize, millet and potatoes are 186.180 MT, 70.040 MT, 36.460 MT and 151.470 MT respectively. Similarly, the average yield of paddy, maize, millet and potatoes are 3.06 MT/ha, 1.92 MT/ha, 1.17 MT/ha and 7.66 MT/ha respectively. The detail of the major crops, production and yield are presented in Table-5.31.

Table 5-31: Major Crop Area Coverage, Production and Yield for the Surveyed HH

Description	Major Crops			
	Paddy	Maize	Millet	Potato
Total Cropped Area	60.934	36.522	31.107	19.784
Total Production (MT)	186.180	70.040	36.460	151.470
Yield(MT/ha)	3.06	1.92	1.17	7.66

Source: Field Survey, 2015

5.3.3.8 Income Pattern

Households survey shows that the total average annual income of the surveyed households is Rs. 3,99,783. Of the total income share of agriculture and animal husbandry is highest i.e. Rs. 1,05,096 (26.29%) followed by remittance (23.11%), service (20.58%), business (15.33%), daily wages/porter (10.70%) and others. The Table 5-32 depicts the detail of the income sources of the surveyed households from different sectors.

Table 5-32: Annual Households Income by Type of Income in the Project Area

Income Source	Average Income	%
Agriculture and animal husbandry Income	105096	26.29
Service	82260	20.58
Business	61279	15.33
Daily Wages/Porter	42787	10.70
Pension/Briddha Bhatta	12538	3.14
Remittance	92401	23.11
Bonus	3421	0.86
Income Source	Average Income	%
Total Average Income	399783	100.00

Source: Household Survey, 2015

Table 5-33: Average Annual Income of Surveyed Households

Districts	Annual Average Income from Different Sources					
	Agriculture		Non-Agriculture		Total	
	Rs.	%	Rs.	%	Rs.	%
Ramechhap						
Dolakha	76370	16.21	394881	83.79	471251	100.00
Sindhupalchok	114229.4	29.16	277548	70.84	391778	100.00
Kavrepalanchowk	109780	43.41	143133	56.59	252913	100.00
Bhaktapur	173770	44.43	217300	55.57	391070	100.00
Kathmandu	95400	50.91	92000	49.09	187400	100.00
Average	1,05,096		2,94,686		3,99,783	
Percentage	26.29		73.71		100.00	

Source: Household Survey, 2015

5.3.3.9 Expenditure Pattern

The average expenditure of the surveyed households is Rs. 3,29,220. The share of expenditure on non-food item is higher i.e. 51.33% as compared to food item (48.67%). Among the non-food items, the larger portion of expenditure is for education i.e. 12.30%. After education, people spend more income on clothing (11.16%) and to celebrate festivals (11.12%). The distribution of expenditure pattern among the surveyed households is different in different VDCs. The income and expenditure pattern of the surveyed households shows that the total average annual saving is Rs. 70,563.

Table 5-34: Average Annual Expenditure of the Households

Districts	Expenditure Heading								Expense
	Food Items	Clothing	Education	Medicine	Festival	Fuel	Communication/ Electricity	Transport	
Dolakha	48.63	13.37	10.17	4.93	11.93	3.63	4.54	2.8	398123
Sindhupalchok	48.42	10.11	14.03	3.16	10.67	4.51	5.63	3.47	312152
Kavrepalanchowk	46.88	10.97	9.83	5.87	12.54	4.17	5.93	3.81	243510
Bhaktapur	52.72	8.96	10.16	3.17	10.28	5.87	4.71	4.13	308200
Kathmandu	51.75	12.83	11.91	2.11	8.56	6.12	3.78	2.94	184000
Avg./ Percent	48.67	11.16	12.30	3.87	11.12	4.33	5.23	3.32	329220

Source: Household Survey, 2015

5.3.3.10 Drinking Water

Public tap and Piped water Supply are the two major sources of drinking water of the surveyed population. Household survey shows that 52.79% of the surveyed households use public tap in their homes where 40.61% of surveyed households use pipe water supply for drinking purpose. 1.52% of surveyed households use Spout for drinking purpose. The household survey shows that the available supply of drinking water is sufficient throughout the year.

Table 5-35: Source of Drinking Water of the Households

Districts	Source							
	Piped Water		Well/Tube well		Public Tap		Spout	
	Hhs	%	Hhs	%	Hhs	%	Hhs	%
Dolakha	27	45.76	2	3.39	30	50.85		0.00
Sindhupalchok	42	38.89	3	2.78	60	55.56	3	2.78
Kavrepalanchok	6	40.00	1	6.67	8	53.33		0.00
Bhaktapur	3	30.00	4	40.00	3	30.00		0.00
Kathmandu	2	40.00		0.00	3	60.00		0.00
Total	80	40.61	10	5.08	104	52.79	3	1.52

Source: Household Survey, 2015



5.3.3.11 Source of Energy

Cooking Fuel

Fuel wood, LP gas and Bio-gas are the main sources of energy for cooking purpose of the surveyed households. About 53.81% of the surveyed households use fuel wood for cooking purpose while 45.69% use LP gas and 0.01% use Bio gas. The households who use LPG as main source of cooking also use fuel wood. Fuel wood is collected mostly from community forest and private forest. About 36.55% of the households collect fuel wood from community forest while 26.42% collect from own (private) forest and 6.60% of the households purchase from the market.

Table 5-36: Source of Energy for the HHs for Cooking Purpose

Districts	Source					
	Fuel wood		Biogas		LPG	
	No.	%	No.	%	HHs	%
Ramechhap						
Dolakha	40	67.80		0.00	19	32.20
Sindhupalchowk	52	48.15		0.00	56	51.85
Kavrepalanchok	11	73.33	1	0.07	3	20.00
Bhaktapur	2	20.00		0.00	8	80.00
Kathmandu	1	20.00		0.00	4	80.00
Total	106	53.81	1	0.01	90	45.69

Source: Household Survey, 2015

Note: The households who use LPG as main source of cooking also use fuel wood.

Lighting Fuel

Household survey shows that all the surveyed households (100%) use electricity for lighting purpose.

5.3.3.12 Health and Sanitation

On the average, 89.34% of the surveyed households have their own toilet for defecation. Similarly, nearby forest area and open field are used by only 10.66% households respectively. Management of solid waste disposal is seems to be satisfactory in the surveyed households.

Three methods such as dump at safe place, burn and buried have been adopted by the surveyed households for the management of solid waste disposal. About 39.09% of the households have dumped the solid waste at safe place, while 22.84% buried in nearby house and 27.92% burnt the solid waste.

Table 5-37: Households having Toilet in the Project Area

Districts	Toilet facility		
	Yes	No	HHs
Ramechhap			
Dolakha	56	3	59
Sindhupalchowk	93	15	108
Kavrepalanchok	12	3	15
Bhaktapur	10		10
Kathmandu	5		5
Total	176	21	197
Percentage	89.34	10.66	100.00

Source: Household Survey, 2015

Table 5-38: Methods of Solid Water Disposal in the Project Area

Districts	Location							
	Dump at Safe Location		Burn		Buried		Others	
	HHs	%	HHs	%	HHs	%	HHs	%
Ramechhap								
Dolakha	27	45.76	13	22.03	12	20.34	7	11.86
Sindhupalchowk	41	37.96	35	32.41	21	19.44	11	10.19
Kavrepalanchok	6	40.00	2	13.33	5	33.33	2	13.33
Bhaktapur	2	20.00	3	30.00	5	50.00		0.00
Kathmandu	1	20.00	2	40.00	2	40.00		0.00
Total	77	39.09	55	27.92	45	22.84	20	10.15

Source: Household Survey, 2015

5.3.3.13 Knowledge and Attitude Regarding the Project

Knowledge

Out of total 197 project affected households, 130 (65.99%) households have knowledge about the proposed project and its activities. According to the surveyed households, the main sources of information about the project activity are through the NEA employers, neighbors and others. About 50.77% of the households got information from NEA employers, 27.69% got information through neighbors and 21.54% have knowledge through newspapers and others.

Table 5-39: Knowledge about the Project

Districts	Yes	No	Total
Ramechhap			
Dolakha	32	27	59
Sindhupalchowk	78	30	108
Kavrepalanchok	14	1	15
Bhaktapur	3	7	10
Kathmandu	3	2	5
Total	130	67	197
Percentage	65.99	34.01	100.00

Source: Household Survey, 2015

Attitude

About 87.31% of the households have shown their positive attitude towards the proposed project while 6.60% of the households are against the project activities and 5.08% are neutral.

Table 5-40: Attitude Regarding the Project by Type

Districts	Type			
	Positive	Negative	Neutral	No detail Information
Ramechhap	3			
Dolakha	54	3	1	1
Sindhupalchowk	99	1	7	1
Kavrepalanchok	12	3		
Bhaktapur	5	3	2	
Kathmandu	2	3		
Total	172	13	10	2
Percentage	87.31	6.60	5.08	1.02

Source: Household Survey, 2015

5.3.3.14 Expectation from the Project

The expectations of the project affected families are mainly for good compensation for the land and property, employment, electricity facility and local development. However, majority (68.02%) of the households have shown their interest for good compensation. Similarly, 18.78% of the households have shown their expectation for employment and 13.20% for local development.

Table 5-41: Expectation from the Project

Districts	Expectation			
	Good Compensation	Employment	Electricity Facility	Local Development
Dolakha	37	13		9
Sindhupalchowk	79	18		11
Kavrepalanchok	7	4		4

Bhaktapur	7	1		2
Kathmandu	4	1		
Total	134	37		26
Percentage	68.02	18.78	0.00	13.20

Source: Household Survey, 2015

5.3.3.15 Description of the house of the Project affected Families

a. House

By wall type

Hundred percent of the surveyed households have their own house for residence. The wall of houses is usually constructed mud and stone/brick, wood, bamboo and galvanized zinc sheet. About 77.66% of the houses of the surveyed households are made up of mud and stone/brick wall followed by cement/stone/brick wall houses (17.26%) and wooden wall (5.08%).

Table 5-42: Houses by Type of Wall

District	Wall Type			
	Cement & Stone/Bricks	Mud and Stone Bricks	Wooden Wall	Total
Dolakha	8	45	6	59
Sindhupalchowk	20	86	3	109
District	Wall Type			
	Cement & Stone/Bricks	Mud and Stone Bricks	Wooden Wall	Total
Kavrepalanchok	3	12	0	15
Bhaktapur	2	7	1	10
Kathmandu	1	3	1	5
Total	34	153	10	197
Percentage	17.26	77.66	5.08	100

Source: Household Survey, 2015

By roof type

Wooden, zinc plates and stone type roof are prevalent in the surveyed households. Majority of the households (57.87%) have their house with galvanized zinc sheet followed by Tiles (15.23%) and RCC (14.21%). Stones are also used on roof by 12.69% households.

Table 5-43: Houses by Roof Type

District	Roof Type			
	Tiles	Zinc Plates	RCC	Stones
Dolakha	14	35	4	6
Sindhupalchok	7	64	18	19
Kavrepalanchok	1	11	3	
Bhaktapur	8		2	
Kathmandu		4	1	
Total	30	114	28	25
Percentage	15.23	57.87	14.21	12.69

Source: Household Survey, 2015

By floor type

Mud and Cement are used on floor by the surveyed households. About 81.73% of surveyed households use mud on their floor while the remaining 18.27% households use cement on their floor.

Table 5-44: Houses by Floor Type

Districts	Floor Type		
	Mud	Cement	Wooden
Dolakha	52	7	
Sindhupalchok	85	23	
Kavrepalanchok	12	3	
Bhaktapur	8	2	
Kathmandu	4	1	
Total	161	36	
Percentage	81.73	18.27	0.00

Source: Household Survey, 2015

By no. of Storey

Two storey houses are common among the surveyed households. About 52.28% of the households have their house with 2 storey where 39.09% of households have 3 storey houses and only 8.63%% households have one storey houses.

Table 5-45: Houses by No. of Storey

Districts	No. of Storeys		
	1	2	3
Dolakha	5	24	30
Sindhupalchok	6	58	44
Kavrepalanchok	4	9	2
Bhaktapur	2	7	1
Kathmandu		5	
Total	17	103	77
Percentage	8.63	52.28	39.09

Source: Household Survey, 2015

5.4 Public Consultation**5.4.1 Background**

As key stakeholders in development, the citizens have right to know and to be involved in information exchange and decision-making that affects their lives, resources and properties from implementation of a development project. This citizen right is protected by the Right to Information Act 2064 BS (2007), Right to Information Rules, 2065 BS (2009) and Environmental Protection Regulation 2054 BS (1997).



Public consultation and information disclosure from the beginning is also important to reduce misunderstandings and successful implementation of a project. It is a process of both information giving and listening issues and concerns of public for planning and successful implementation of project with full support of the stakeholders.

5.4.2 Consultation

A series of public consultations was carried out in different places during preparation of IEE for Tamakoshi-Kathmandu 220/400 kV TL project. Project affected people and other stakeholders were informed and consulted about the land acquisition, structures relocation and compensation issues, impact and mitigation measures.

PRA with local stakeholders of the affected VDCs were used as the main tools of community consultation and information dissemination for preparation the Updated IEE Report. Similarly, key informant interviews, household survey of the directly project affected households, and informal meeting/consultation with the key stakeholders of the project area were also used as other tools of community consultation.

During the consultations, the participants were requested to express their views, concerns/issues regarding the project as well as they were informed regarding the project and its activities. Information such as project purpose, project type, impact area, likely impacts and potential opportunities due to project implementation were provided to the people during the consultation. Checklists, topic guide and questionnaire were developed to facilitate the PRA, KIIs, and HHs survey. During the field visits, emphasis was placed on consultation with affected communities and people living in adjoining areas, to inform them about the proposed project and give them an opportunity to express their views. Altogether 28 VDC/Municipality level PRAs and 25 KIIs were conducted in the project area (Table 5-46).

Table 5-46: Sample distribution

District	VDC/Municipality*	Number	
		VDC level PRA	KIIs
Dolakha	Melung	1	1
	Bhedapu	1	1
	Ghang Sukathokar	1	1
	Pawati	1	1
	Fasku	1	1
	Bhimeswor*	1	1
	Lakuridanda	1	1
	Boch	1	1
	Piskar	1	1
Sindhupalchok	Chokati	1	1
	Karthali	1	1
	Barhabise	2	1
	Ramche	1	1



District	VDC/Municipality*	Number	
		VDC level PRA	Kills
Sindhupalchok	Mankha	1	1
	Fulpingdanda	2	1
	Irkhu	1	1
	Thulosirubari	1	1
	Bhotasipa	1	1
	Chandeni Mandan	1	1
	Mahadevstah	1	1
	Nayagaun	1	1
	Baluwapati Deupur	1	1
Kavrepalanchok	Mahamanjushree	1	1
	Nagarkot*	1	1
	Changunarayan*	1	1
	Shankharapur*	1	1
Bhaktapur	28	2	1
	28	2	1
Kathmandu	28	1	1
		28	25

5.4.3 Key Issues/Concerns Raised in PRA, Kills and Informal Meetings

During the community consultation several issues and concerns were raised by the people. All the local people of the project area have positive attitude regarding the construction of project. However some of the people in project area suggested transmission should be constructed with less impact on valuable land and go through riverside/barren land. The major issues/concerns are related to good compensation of assets on time, local development, shifting the route alignment from the emerging city, employment, livelihood support, transparency in project activities and environment protection. The project area is highly affected due to the recent earthquake so some of the participants raised the issue of project assistance in local development. The key issues/concern raised by the local people during community consultations is summarized in Table 5-47.

Table 5-47: Summary of Key Issues/Concerns of Local People

S. No.	Key Issues /concerns	Details of Issues/Concerns
1	Livelihood	<ul style="list-style-type: none"> • Employment to local people as per their skill • Skill development training (House wiring, Driving, Auto mobile repairing and maintenance) • Support for Agriculture • Fishery training to the locals of Majhi community

S. No.	Key Issues /concerns	Details of Issues/Concerns
2	Infrastructure development/ community support	<input type="checkbox"/> Support for Educational Institution (library, laboratory equipments, toilet, furniture, teaching and sports materials) <input type="checkbox"/> Support for drinking water (intake, source improvement) <input type="checkbox"/> Protect/conservate cultural and religious places. <input type="checkbox"/> Support for upgrading the exiting Ama Samuha, CFUGs offices
3	Compensation	<input type="checkbox"/> Compensation should be given on the basis of prevailing market price <input type="checkbox"/> Construction of the Project Should be started after completion of Compensation process
4	Alignment	<input type="checkbox"/> The route of transmission should go through riverside instead of cultivated land as far as possible.
5	Others	<input type="checkbox"/> Maintain transparency in project activities <input type="checkbox"/> Create trust among the local people <input type="checkbox"/> The TL should go by minimizing the environmental effect as well as damaging agricultural land. <input type="checkbox"/> Involved local people in project activities <input type="checkbox"/> Avoidance of false assurance to local people <input type="checkbox"/> The illegal hunting of wild animals and outer disturbance to community forest should be controlled.



6. IMPACT ASSESSMENT

This chapter assesses the likely adverse impacts during the construction and operation of the Tamakoshi-Kathmandu 220/400 kV TL, which will result in perturbations in the existing baseline conditions. The general discussions are organized in three categories, namely the physical, biological and socio-economic and cultural environment, and divided into construction and operation phases.

6.1 Physical Environment

The main physical impacts on the environment are those associated with land take for stringing of the line, for construction of tower pads and changes in slope stability and drainage patterns. The major impacts anticipated during the construction phase are discussed in the sections below.

6.1.1 Watershed and Drainage Condition

a. Construction Phase

The TL traverses through undulating landscape in the middle hills region of central Nepal. Most of the tower pads are located at the top of subdued hillocks, on the ridges and on flat agricultural land, the interference with drainage patterns due to the construction of the tower pads will be minimal. However, the activities like site clearing, stringing of the line, excavation for foundation, trail construction for material transportation and access road construction may disturb the watershed and increase erosion due to vegetation removal.

Though the area required for tower pad construction may vary depending on gradient, location and weight of towers, approximately 1225 m² of land will be disturbed for each tower pad. The earthwork associated with tower construction will be confined to the tower base area with low impact on the adjoining areas. Nevertheless, the cultivated area around the tower pads may be affected due to compaction during the construction and transportation of materials.

Disruption of natural drainage system and soil erosion while stringing the line across the river can be anticipated during the construction phase. However, since the Angle Points are not located near the river or streams except for some like AP-9, AP-11 and AP-12, the probability of the disruption of natural drainage will be insignificant. Since the requirement of land for the construction of tower foundation is limited the impact on drainage and soil erosion is envisaged to be low. Therefore, the impact is expected to be site specific, low in magnitude and for a short duration.

b. Operation Phase

No significant impact on the watershed and natural drainage is expected during the operation and maintenance period.

6.1.2 Topography, Land Use and Land Take

a. Construction Phase

The land interference during construction of the TL is related to the tower foundation, substations and lack of restraint of the RoW. This may result in the change in landscape. No other change in topography is envisaged during this phase. The visualized impact on topographic changes is considered to be low in magnitude, site specific and for long term.

b. Operation Phase

No impact on topography is expected during the operation phase except for the impact on natural scenery. The Impact is high in magnitude, local and for long term.

6.1.3 Land Use and Land Take

a. Construction Phase

The land use changes involved in the implementation of the project will be basically due to the permanent and temporary land acquisition under the RoW and for the construction of tower pads. The project will require 470.9218ha land for the placement of tower pads (angle and suspension), substations and RoW of the TL and temporary facilities. Out of this, 58.5575 ha land will be permanently acquired and 412.3643 ha will be restricted as RoW. The total number of angle towers will be 129 and the number of suspension tower is estimated as 198. Towers will typically require an area of 35m x 35m which is equal to 0.1225 ha per tower. Altogether 89, 30 and 10 number of APs are located on cultivated land, forest area and others area whereas 142 suspension towers are located in cultivated land followed by 40 towers in forest (Table 6-1). The summary of the land take and land use are given in the Table 6-2.

Table 6-1: Land Use at AP and Suspension Towers

S.No.	Land Use	No. of AP	No. of Suspension Tower	Area (ha)		Total Area (ha)
				AP	Suspension Tower	
1	Cultivation	89	142	10.9025	17.395	28.2975
2	Forest	30	40	3.675	4.9	8.575
3	Others	10	16	1.225	1.96	3.185
Total		129	198	15.8025	24.255	40.0575

Table 6-2: Land Requirement of Tamakoshi-Kathmandu TL Project

S.No.	Project Component	Land Types (ha)			Total Land Take (ha)		Total (ha)
		Cultivation	Forest	Others	Land Restriction	Permanent	
1	Land to be required under the RoW (excluding tower pads)	282.2232	94.6452	35.4959	412.3643	0.00	412.3643
2	Land to be acquired for the Tower Pad	28.2975	8.575	3.185	0.00	40.0575	40.0575
3	Substation and Camps	18.50	0.00	0.00	0.00	18.50	18.50
Total		329.0207	103.2202	38.6809	412.3643	58.5575	470.9218

The alignment passes through different type of land use and the major forest (community and national) that has been fragmented while passing through has been presented as in the Table 6-3 below.

Table 6-3: Fragmentation detail of forest due to alignment

Khimti-Barhabise Section			
APAP	District	VDC/Municipality	Fragmented Forest
16-17	Dolakha	Pawati-2	Baluwa Bhumethan CF
18-19		Pawati-8	Khahare Bhadaure CF
19-20		Pawati-6	Mulpanai CF
20-22		Phasku-1	Charnawoti CF
24-28		Bhimeshwor Mun-6	Sita Kunda CF
30-31		Bhimeshwor Mun-8	Kamalamai CF
49-50		Lakuri-1	Namke Yan mara (Okheti) CF
57-59	Sindhupalchok	Chokati-5,7	Rani Pokhari Mankhola NF
60-62		Karthali-6	Dware khalde CF



Barhabise-Kathmandu Section			
APAP	District	VDC/Municipality	Fragmented Forest
13-14	Sindhupalchok	Mankha-1	Salghari pakha CF
		Mankha-2	Phurkhesalla Mahabhir CF
18-20		Mankha-9	Jurethumka CF
21-22		Phulpindada-4,5,6	Chhapbote Binjel CF
		Phulpindada-8	Dharampani CF
22-24		Phulpindada-6,7,9	Phalate Kalika CF
37-38		Bhotsipa-9,7	Tinpakhe Dabi CF
38-39		Bhotsipa-7	Thulitar CF
41-42	Kavre Palanchok	Mahadevsthan-3	Salleni Baguwa Pakha CF
55-56	Kathmandu	Shankharapur Municipality-4	Kushum CF
		Shankharapur Municipality-4	Lambu Dada CF

b. Operation Phase

The impact on the land use changes of the permanent land take for the towers and substations is expected to be high. The land under the RoW will be restricted for the erection of any type of public and private structures except for plantation of dwarf trees species. However, cultivation will be allowed. All temporary land acquired will be converted to its original use or agreed new uses towards the end of the construction period and handed over to their owners. The impact can be classified as high in magnitude, local in terms of extent and of long-term in terms of duration.

6.1.4 Air and Noise Quality

a. Construction Phase

The construction activities consist of site clearance, excavation for the tower, concreting and stringing of the line. These activities will generate dust in the surrounding area. Apart from these activities, movement of transporting vehicles carrying the construction materials along the gravel roads will generate fugitive as well as combustion emissions and will cause temporary impact on air quality.

Since the construction activities are limited to small area, the impact on the ambient air quality will be low in magnitude, site specific in terms of extent and of short duration. The emission of noise and vibrations are inevitable during construction though only insignificant interruption in noise quality has been expected for TL projects. The location of the Angle Points especially in the hilly region are relatively far from the settlements except for angle points which are close to Ghumaune village, Kharidhunga, Sano Palati, Serabesi, Barhabise Bazar, Kuntabesi, Nagarkot Bazar, Changunarayan area etc. will feel the noise disturbances due to vehicular movement and construction activities. Noise pollution will be temporary and will not be different from the prevailing conditions due to low traffic movement along the roadside. The impact is expected to be low in magnitude, site specific and for a short duration.

b. Operation Phase

No major impact on air quality is envisaged during the operation phase. However, a kind of humming sound may be created at the substation area. The transmission overhead lines do create some noise in certain circumstances; for example during minor surface damage, dirt or change in weather conditions can cause the lines to crackle or hum slightly. This is due to a phenomenon called Corona effect. The effect of corona is conspicuous during rain. However, noise due to the corona effect of the proposed TL with voltage level of 400 kV will not be

significant since the alignment does not pass very close to the settlements. The impact is expected to be low in magnitude, long termed and site specific.

6.1.5 Water Quality

a. Construction Phase

During the construction period, water will be used from nearby river and streams. Therefore, there is possibility of water pollution especially in sectors where the line crosses the rivers and streams and where the tower pads are situated close to them. Soil disturbances associated with construction activities of tower pads, the improper disposal of solid wastes and chemicals such as cement slurry, construction materials, and human wastes into the river or streams may deteriorate the river water quality and other existing water bodies around the construction area. This may lead to water borne diseases and other problems especially in the adjacent villages where people use the flow from these streams for household chores. The impact is expected to be moderate in magnitude, site specific and for a short duration.

b. Operation Phase

The operation and maintenance activities of the transmission will not have impact on the water quality in the project impact area.

6.1.6 Waste and Spoil Generation

a. Construction Phase

The improper disposal of solid waste like cement bags, iron bar and other leftover construction materials, kitchen waste and waste generated by the temporary labour camp might cause adverse impact to the environment. The spoil generated due to the excavation of tower pad is also detrimental to land and water quality of the area. Muck volume of 16,550 cubic meter will be generated at substation area. However, more than 90% of the volume of muck will be used for back filling and compaction and remaining 10% of the volume of muck will be deposited near foundation site and river site and also will be used for feeder road gravelling and retaining wall. The magnitude of impact is considered to be low, extent is site specific and duration is short term.

b. Operation Phase

No impact on waste and spoil disposal is expected during the operation phase.

6.1.7 Crossing of Other Utilities and Interferences

Operation phase

The proposed TL alignment crosses roads, rivers, TLoF of different voltages and structures. Crossings of communication utilities and transmission and distribution lines will result in the interferences to the communication system. Radio interference can disrupt television and AM (amplitude modulated) radio reception close to a line. Interference can sometime be noticed at a distance of 150m away. By contrast, FM (frequency modulated) system is affected very little by interference. Interference varies according to the position of the TL between transmitter and receiver. In some cases, receiving conditions can be improved due to the reflections caused by a TL. Since the TL mostly passes more than 500m distance from most of the settlement areas the magnitude of the impact is considered to be insignificant. The impact will be low in magnitude, site specific and for short duration.

6.1.8 Storage of Construction Material and Camps

a. Construction Phase

Storage of construction materials will result to the land degradation of the particular area. Likewise, the area designated for the camps will also damage the leased or rented area. Both temporary mobile camps and storage sites are located nearby. The locations for temporary camps and storage sites of construction materials are listed below. The impact will be low in magnitude, site specific and for short duration.

Table 6-4: Location and Area of Storage and Camp sites

District	Old VDC/M	Area (ha)
Ramechhap	Phulasi	0.3
Dolakha	Melung	0.5
	Bhimeswor	0.5
Sindhupalchowk	Barhabise	0.5
	Irkhu	0.5
Kavrepalanchowk	Chandeni	0.3
	Mandan	
	Baluwapati	0.4
Bhaktapur	Changunarayan	0.3
Kathmandu	Shankharapur	0.3
Total area		3.6

b. Operation Phase

No impact is expected during the operation and maintenance period.

6.1.9 Air Traffic

a. Construction Phase

No impact is envisaged on the existing airport at Manthali and Tribhuvan International Airport at Kathmandu as the closest distance from the airport to the proposed line is approximately 11.9 km. and 8 km. south-west respectively.

b. Operation Phase

Since the entry path of the aeroplane towards the runway is in the perpendicular direction of the proposed line, no impact is envisaged on the route of the existing air traffic.

Table 6-5: Physical Environment Impact Assessment Matrix

S.N	Issues	Impacts	Identification and Evaluation of Impact				
Construction Phase			D	IND	M	E	Du
1	Watershed and Drainage	Angle Points such as AP-9, AP-11 and AP-12 are located near the river or streams, the probability of the disruption of natural drainage will be insignificant.	D		L	SS	ST
2	Topography	Topography of the tower foundation site will be changed due to excavation, fill and cut for leveling the tower pad area leading to the change in landscape.	D		L	SS	LT
3	Land take and Land Use	The project will require 470.9218 ha of land for placement of tower pads, substation and Row of Transmission Line.	D		L	SS	LT
4	Air Quality	Different construction activities and vehicular movements will generate dust/ smoke and affect air quality in the surrounding area	D		L	SS	ST

5	Noise Level	Use of Construction equipment and vehicles will increase noise level.	D		L	SS	ST
6	Water Quality	There is possibility of water pollution especially in sectors where the line crosses the rivers and streams and where the tower pads are situated close to them leading to deterioration of river water quality and other existing water bodies around the construction area.	D		M	SS	ST
7	Waste generation	The improper disposal of solid waste like cement bags, iron bar and other leftover construction materials, kitchen waste and waste generated by the temporary labour camp might cause adverse impact to the environment.	D		L	SS	ST
Operation Phase							
1	Noise Level	A kind of humming sound may be created at the substation area and corona effect might cause.	D		L	SS	LT

Note: D: Direct, IND: Indirect

Extent (E)

SS= Site Specific

L= Local

R= Regional

Magnitude (M)

L= Low M= Medium

H= High

Duration (Du)

LT= Long Term MT= Medium Term ST= Short Term

6.2 Biological Environment

The implementation of the project will affect the existing ecosystems in the project area. The major impacts on the biological environment will be the loss of individual trees and loss of vegetation cover including NTFPs due to site clearance in APs and under RoW of TL. There will be disturbance to the wildlife (mammals, bird and reptiles) because of change of vegetation cover and site disturbances.

6.2.1 Forest/ Vegetation Loss

a. Construction Phase

The total forest area falling under the RoW of TL alignment including area occupied by APs is 103.2202 ha. Based on the available detailed survey report of the proposed TL alignment, out of 129 angle points (APs) 30 are located in the forest which will require total 3.675 ha forest area (area occupied by each tower pad = 35 m x 35 m). The TL including AP passes through different community forest, leasehold forest and government forests as given in Table 6-6.

Since all trees will be removed, it will diminish the crown cover of the forest along the TL corridor. The impact due to the loss of vegetation during project implementation is expected to be moderate in magnitude, local in extent and long termed.

Table 6-6: Total Affected Forest (by Types)

S. No.	Forest Type	District	Forest area (ha) under		No. of AP
			TL RoW including AP	AP	
1	Community Forest (CF)	Kathmandu	2.030	0.245	2
		Bhaktapur	0.250	0.1225	1
		Kavre Palanchok	9.20	0.3675	3
		Sindhupalchok	53.6912	1.8375	15
		Dolakha	35.34	1.1025	9
		Sub-total	100.5112	3.675	30
2	Government Forest (GF)	Kathmandu			
		Bhaktapur			

2		Kavre Palanchok			
		Sindhupalchok	0.7678		
		Dolakha			
		Sub-total	0.07678		
3	Leasehold Forest (LHF)	Kathmandu			
		Bhaktapur			
		Kavre Palanchok			
		Sindhupalchok	1.9412		
		Dolakha			
		Sub-total	1.9412		
	Grand total		103.2202	8.875	30

Source: Field survey, 2015

In addition to 30 APs, a number of 40 suspension towers are to be placed in forest area, foundation is already constructed in private land.

There is no forest area in sub-station. So, there is no forest tree vegetation loss from the area proposed for the sub-station. However, AP and RoW of TL will pass from the different forest areas as given in Table 6-7.

Table 6-7: Component wise Tree loss

SN	Project component	Type of forest	Forest area (ha)	Loss of Vegetation		Crown cover (%)	Main Species
				Pole (5-12" dbh)	Trees (>12" dbh)		
1	AP and TL RoW	Community Forest	100.5112	13081	21629	40-80	Khote salla, Uttish, Sal
		Government Forest	0.7678	38	149	50	Chilaune, Angeri
		Leasehold Forest	1.9412	324	10	55	Uttish, Chilaune
		Total	103.2202	13443	21788		

Source: Field survey, 2018

Table 6-7: Component wise Tree loss (IEE)

SN	Project component	Type of forest	Forest area (ha)	Loss of Vegetation		Crown cover (%)	Main Species
				Pole (5-12" dbh)	Trees (>12" dbh)		
1	AP and TL RoW	Community Forest	118.7536	15652	6647	40-80	Khote salla, Uttish, Sal
		Government Forest	5.0186	2435	1046	50	Chilaune, Angeri
		Leasehold Forest	2.622	197	84	55	Uttish, Chilaune
		Total	126.3942	18284	7777		

Source: Field survey, 2015



Based on the total enumeration of forest vegetation in AP and under RoW of TL, total of 35,231 (including 13,443 pole size 21,788 tree size) trees of different species will be removed. Main dominant species are Sal (*Shorea rubusta*), Salla (*Pinus roxburghii*), Chilaune (*Schima wallichii*) and Uttis (*Alnus nepalensis*). Other tree species are Kyamuna (*Cleistocalyx operculata*), Bot dhayaro (*Lagerstroemia sp.*) etc. The table shows that very less area of GF and LHF will be affected in comparison to the CFs. Accordingly, there will be very less number of trees will be removed from GF and LGF and that will be from Sindhupalchowk and Kavrepalanchowk districts only.

Since all trees will be removed, it will diminish the crown cover of the forest along the TL corridor. The impact due to the loss of vegetation during project implementation is expected to be moderate in magnitude, local in extent and long termed.

Table 6-8: Total forest vegetation loss according to district and forest types

SN	Type of forest	District	Forest area (ha)	Loss of vegetation (no)			Crown cover (%)
				Dbh < 5" is not counted according to Article -7 Of forest regulation 2051	Pole (5-12" dbh)	Trees (>12" dbh)	
1	Community Forest	Bhaktapur	0.2500		86	10	68
		Kathmandu	2.030		90	748	70
		Kavrepalanchowk	9.200		1245	179	40-70
		Sindhupalchowk	53.6912		9344	18717	40-80
		Dolakha	35.34		2316	1975	65-80
		Sub-total	100.5112		13081	21788	
2	Government Forest	Bhaktapur	0.00				
		Kathmandu	0.00				
		Kavrepalanchowk	0.00				
		Sindhupalchowk	0.7678		38	149	50
		Dolakha	0.00				
		Sub-total	0.7678		38	149	
3	Leasehold Forest	Bhaktapur	0.00				
		Kathmandu	0.00				
		Kavrepalanchowk	0.00				
		Sindhupalchowk	1.9412		324	10	55
		Dolakha	0.00				
		Sub-total	1.9412		324	10	
	Grand total		103.2202		13443	21788	

Source: Field survey, 2018

b. Operation Phase

During operation phase of the project, only trees which grow under the RoW after some years might need to be cleared. Regular trimming of tall trees and allowing growing shrubs and short trees will change the vegetation cover. This impact is low, site specific (local), and long-termed.

In terms of the biological environment, the project area will reap beneficial impacts from the project's forestation program that will be implemented to replenish the loss of forest and vegetation especially in the project affected CFs/LHFs.

6.2.2 Changes of Demand for Fuel Wood and Timber

a. Construction Phase

There are 1,667 CFs in the five project districts which is found to be large enough to support the demand of forest resources such as firewood and timber to the dependent CFUG households. Therefore, even cutting down a large number of standing trees is of little significance to the livelihood of local people.

Supply of Timber for the Construction of Houses of Earthquake Victims

Almost all the houses along the settlement of proposed project have been destroyed by the recent earthquake of 12 Baisakh 2072 and aftershocks. There is an urgent need of timber for the building of the houses. So, the timber acquired from the cutting of the trees will be used by the local people which will reduce the further pressure on forests.

It is assumed that most of the labor force will be from local areas. There will be a few people from outside the project area for a short period of time. Due to this, the increase in demand of fuel wood and timber during the construction period is expected to be low in magnitude, site specific and short-termed.

b. Operation Phase

During the operation phase, site-specific and short-term effects such as increase in pressure on forest resources will settle down. Patrolling and maintenance activities along the TL will involve only a few people occasionally. This activity will not have a noticeable adverse impact on the forest and vegetation.

6.2.3 Exploitation of Non-Timber Forest Products (NTFPs)

a. Construction Phase

Since there will be a small number of work force involved in the project construction, collection and sale of NTFPs by workers will be negligible. CFUGs/LHFGs have imposed strict rules regarding the collection of NTFPs in their community/leasehold forests. However, only few commercially important species like Argeli, Lokta, Nagbeli and Dhasingare are found in some CFs only and will be removed during project construction as given in Table 6-9. Therefore, these impacts are considered as low in magnitude, site-specific and of a short duration.

Table 6-9: Loss of Non-timber Forest Products (NTFPs)

S.N.	Commercially Important species	Scientific Name	CF	GF	LF
1	Argeli	<i>Edgeworthia gardenieri</i>	Frequent in few cf	Rare	Rare
2	Lokta	<i>Daphne bholua</i>	Frequent in few cf	Rare	Rare
3	Nagbeli	<i>Lycopodium m sp</i>	Frequent in few cf	Rare	Rare
4	Chirayito	<i>Swertia Chirayita</i>	Rare	Rare	Rare
5	Dhasingare	<i>Gaultheria fragrantissima</i>	Frequent In some Cf	Rare	Rare
6	Amla	<i>Emblica officinalis</i>	Rare	Rare	Rare

b. Operation Phase

During the operation phase, there will be an occasional intervention of just a few people maintaining the TL. This will have an insignificant effect on the forest itself and the NTFPs along the TL alignment.

6.2.4 Wildlife and Avifauna**a. Construction Phase**

The possible adverse impacts on wildlife and avifauna population during the project construction phase are loss of physical habitat and food habitat, possibility of hunting and poaching by labor force and disturbance in the migratory movement of mammals and birds.

The construction disturbances resulting from digging of foundation, vehicle movement, transportation of materials, and other related activities would interrupt normal movements, feeding and other activities of mammals available in the surrounding areas. The linear clearance of a 46 m wide strip of habitat allows most species to migrate to adjoining areas. However, Construction activities may affect migratory movement of birds resulting in the temporary disturbance to their normal route. The possibilities of hunting and poaching by work force during the construction period will have some adverse impact on local wild fauna. However, such pressure on wildlife will be site specific and will decrease once the work is completed.

Since the project area is not observed to be the ecologically significant, core and undisturbed habitat; the magnitude of impact on wild animals and birds is considered to be low, extent is site specific and duration is of short term.

b. Operation Phase

During operations, there will be some adverse impact on wildlife. Towers might attract population of Primates in the project area as they are climbers and high voltage TL could pose a danger for such animals.

The TL may affect bird mobility to some extent. Inability of birds to notice the wires can cause fatal injuries from collisions. This type of impact is predicted to be high in low visibility conditions such as bad weather and foggy days and during nights. Since the TL route does not pass through any identified bird migration route, this impact is of low magnitude, site specific and will remain for long duration.

6.2.5 Impacts on Rare, Protected, Endangered and Threatened Species**a. Construction Phase**

Because of different construction activities and influx of outsiders, pressure on the vegetation and the forest will increase. Physical habitats, feeding habits, reproductive behaviors and movement of wild animals and birds might be disturbed due to construction activities and increased human presence in and around the project area. This might change the existing ecosystem diversity altering natural communities of plants and animals. Ultimately rare, endangered and threatened plant and animal species will be more prone to such adverse impacts. The magnitude of impact is considered to be medium, extent will be site specific and duration will be long-term.

b. Operation Phase

Clearance of trees along the RoW will create open linear stretches in the forest. Likewise, an open stretch in the forest may be barrier for propagation of plants. Thus, bio-diversity of the project area and the status of rare, endangered and threatened plants might be adversely affected. This impact is expected to be low in magnitude, site-specific and for a long duration.

Table 6-10: Physical Environment Impact Assessment Matrix

S. No.	Issues	Impacts	Identification and Evaluation of Impact				
			D	IND	M	E	Du
Construction Phase							
1	Vegetation loss	Total 21,788 trees and 13,443 poles from 103.2202 ha forest will be removed.	D		M	L	LT
2	Demand of timber and fuel wood	Demand of fuel wood and timber during construction period is expected less	D		L	SS	ST
3	Exploitation of NTFPs	Collection and sale of NTFPs by workers will be negligible due to less number of workers and strict rules of CFUGs.	D		L	SS	ST
4	Wildlife and avifauna	Possibility of poaching by work force during the construction period and movement of machinery will cause disturbance to wild life and bird.	D		L	SS	ST
5	Protected & threatened species	Protected and threatened plant and animal species may also get disturbed due to construction activities.	D		L	SS	ST
Operation Phase							
1	Trimming of tall trees and growing of shrubs	Change in vegetation cover under the transmission line.	D		L	SS	LT
2	Collision during bird mobility and primates attraction to TL	Possibility of bird injuries from collisions during their mobility. Towers might attract population of primates as they are climbers and high voltage TL could pose a danger for such animals.	D		L	SS	LT

Note: D: Direct, IND: Indirect

Extent (E) _____ SS= Site Specific

L= Local

R= Regional

Magnitude (M) _____ L= Low

M= Medium

H= High

Duration (Du) _____ LT= Long Term

MT= Medium Term

ST= Short Term

6.3 Socio-economic and Cultural Environment

The likely impacts due to project implementation are associated with land take, social and cultural problems, health and sanitation etc. The anticipated impacts regarding the socioeconomic and cultural environment of the project area are discussed below:

6.3.1 Acquisition of Land and Structures**a. Construction Phase****i. Households Losing Land**

Household survey of 197 HH affected by the project was carried out (Table 6-11). These HHs will be affected due to the location of different project components such as tower pad, structure falls under RoW, access road and substation. Though there are three proposed substations (Chagunarayan Substation, Lapsephedi Substation and Barhabise Substation) to be

constructed for 102.36km long TL, the census household survey of one substation (Barhabise substation) was done. In remaining two substations, representative household survey was carried out.

Table 6-11: Total Surveyed Households

S.N.	Project Components	Type of losing Structure	Surveyed HHs
Affected Households Due to Project (A)			
1	Substation	Land Only	38
		Land and structure Only	7
2	Angle Point	Land Only	123
3	RoW	Structure Only	10
4	Angle Point and RoW	Land due to AP and Structure due to RoW	4
5	RoW	Fish Pond	1
Sub-Total (A)			183
HHs under RoW but Destroyed by Earthquake (B)			14
Total Surveyed HHs (A+B)			197

Source: Field Survey, 2015

ii. Household Losing Structure

Out of total surveyed HHs, 20 households will lose their structures. A total of 30 structures (20 houses, 10 cow shed) will be affected due to implementation of the project.

There are 17 households whose structures are under RoW of the project but already damaged due to earthquake. The survey of these households has also been conducted. Among these 17 HHs, three HHs' land fall under the tower pad of the project. The list of these households is given in Table below.

Table 6-12: List of Structure under RoW but damaged due to Earthquake

S.N	District	VDC	Ward	Project Component	Name of Owner
1	Dolakha	Pawati	2	AP15-AP16	Prem BD Bhandari
2	Kavre	Chandeni	8	AP39-AP40	Gokul Parajuli
3	Bhaktapur	Nagarkot	11	AP58- AP 59	Singh Bd Tamang
4	Kathmandu	Sankharapur	7	AP58- AP 59	Krishna Kumari Bhujel
5	Sindhupalchok	Mankha	1	AP12- AP13	Tika Bd Bhandari
6	Sindhupalchok	Thulo Sirubari	5	AP31- AP 32	Indra Bd Shrestha
7	Sindhupalchok	Mankha	6	AP15-AP16	Tika Maya Parajuli*
8	Sindhupalchok	Mankha	6	AP15-AP16	Matrika Parajuli
9	Sindhupalchok	Mankha	6	AP18-AP19	Chitra Khar Parajuli*
10	Sindhupalchok	Irkhru	5	AP28-AP29	Hem Narayan Shrestha
11	Sindhupalchok	Irkhru	3	AP30-30A	Dil Bahadur Shrestha
12	Sindhupalchok	Thulo Sirubari	6	AP31- AP 32	Hom Nath Chaulagai*
13	Sindhupalchok	Barhabise	6	AP64- AP 65	Sambar Bd Thokar
14	Sindhupalchok	Barhabise	6	AP64- AP 65	Kamala Devi
15	Kavre	Mahadevsthan	4	AP44-AP45	Dek Bahadur BK
16	Dolakha	Pawati	1	AP15-AP16	Dilli Bd Budhathoki
17	Sindhupalchok	Thulo Sirubari	5	AP32-AP33	Tika Maya Tamang

Note * HH whose land fall under the tower pad of the project.

iii. Types of Structure

On the basis of structure type (according to the classification made by CBS), of the total 30 structures (20 houses and 10 cowsheds), 3 houses are Pakki, 2 houses are Semi-Pakki and remaining 15 houses are Kachchi type. And all the 10 cowsheds are Kachchi types.

Table 6-13: List of Project Affected Surveyed HHs by Area and Type of Structures

Area	No. of Affected Houses	Affected Area						
		Houses (sq.ft.)				Cowsheds (sq.ft.)		
		Kachchi	Semi Pakki	Pakki	Avg.	No.	Area	Avg.
<u>Single Floor</u>								
<100 Sq.ft.						2	177	88.5
100-150 Sq.ft.						2	255	127.5
150-200 Sq.ft.	1		180		180	1	180	180
> 200 Sq.ft.	4	840	360	600	450	5	1188	237.6
<u>Double Floor</u>	13	7002		3240	787.84			
Three Floor	2	1728			864			
Total:	20	9570	540	3840	697.5	10	1800	180
Other Structure								
Fish Pond	1							

The affected HHs are belonging to different caste and indigenous group.

Private/Public Infrastructure

One fish pond owned by Mr. Krishna Prasad Poudyal located under the RoW (between AP45-AP46) is affected by the project.

iv. Households Losing Land

Out of 197 surveyed HHs, 172 households will lose their land. They are likely to be affected due to the location of angle tower and substation on their lands. Out of the total affected households, 72.67% households will lose less than 10% of their land. Similarly, 15.12% of households will lose land in the range of 10% to 25%. Moreover, 5.81% of the households will lose land between 25 to 50% and 6.40% of the households more than 50% of land as well (Table 6-14).

Table 6-14: Affected Household (Surveyed) by Land Loss

% of loss of land	Type	
	HHs	%
< 10	125	72.67
10 - 25	26	15.12
25 - 50	10	5.81
>50	11	6.40
Total	172	100.00

Source: Field Survey, 2015

v. Land Requirement

The project will acquired 329.0207 (69.87%) ha of cultivated land along 102.86 km route. Out of total, 46.795 ha is permanent land (land required for angle tower, suspension towers and

substation area). Out of total towers (angle and suspension towers), 235 towers will be located in cultivated land. Area occupied by these towers is 28.395 ha. All the three Substations are located in cultivated land. The land under the RoW of TL will be restricted permanently for the construction of houses, cowsheds and plantation of timber size big trees, etc. However, there will be no restriction on agricultural farming after the construction work is over.

Table 6-15: Cultivated land and other type of private land use by project components

Project components/facilities	Quantity	Required (ha)	Cultivated (ha)	Percent age (%)	Remarks
Towers	327	40.0575	28.395	70.88	235 angle towers are in cultivated land
RoW	102.36 km	412.3643	282.2232	68.44	Total restriction cultivated area (Khimti-Barhabise-Kathmandu)
Substation	3 no.	18.5	18.5	100.00	Chagunarayan S/S.; Halade S/S; Barhabise S/S.
Mobile camp			3.6		Mobile camp; store
Total land		470.9218	329.0207	69.87	Total cultivate area
Total permanent area		58.5575	46.7975	79.91	Total permanent cultivated area

Households' survey of land owners related to suspension towers has not been conducted. Similarly, land loss of households regarding Chagunarayan substation, Nanglebhare substation has not been considered for land calculation since detail survey of these households has not conducted yet. In the same way, land loss of HHs of Khimti substation is also not calculated because it is beyond our scope. The magnitude of impact is considered to be moderate, site specific and long termed. The level of impact may vary with the proportion of land acquired.

b. Operation Phase

Land acquisition will not be required during operation and no significant impacts are expected during this phase. Due to safety reason, houses and other permanent structures are not allowed to be constructed within the RoW as per the Electricity Regulation, 2050. The land price under the RoW and in the vicinity of RoW, especially near to the highway and built up areas will be reduced significantly. It is difficult to quantify level of impact on the pricing of the land because there are other factors too that would play the significant role. The land used for camp will be returned to the respective land owners as in the previous condition. Thus, overall magnitude of impact is high, extent is site specific and duration is long term.

6.3.2 Loss of Crops

a. Construction Phase

i. Permanent Loss of Crops

Total annual crop loss of surveyed HHs due to the project implementation is estimated to be 47.52MT (Cereal crops 37.43 MT & Cash crop potato 10.09 MT). Similarly, loss of cereal crops like paddy, wheat and millet are 21.99 MT, 9.54 MT and 5.9 MT respectively. (Table 6-16 shows the details). This implies that the total loss percentage of cereal and cash crops is only 8.23. On the basis of this, total annual crop loss of project affected HHs is 129.74 MT.

Table 6-16: Permanent Loss of Agricultural Production (Due to Land Acquisition)

S.No.	Crop types	Surveyed HHs			Total Project affected HHs
		Actual production area (ha)	Production Loss (MT)	Productivity (MT/ha)	Production Loss (MT)
1	Paddy	7.186	21.99	3.06	60.03
2	Wheat	4.969	9.54	1.92	26.05
3	Millet	5.043	5.9	1.17	16.11
4	Potato	1.326	10.09	7.61	27.55
Total			47.52		129.74

Source: Field Survey, 2015

(Note: Actual production area loss seems to be higher than total cultivated land. This is due to multiple cropping pattern in the same land type; and study period is taken for one year not for one season.)

Production loss of crops is calculated only for 8.9 ha of land of the surveyed HHs which will be acquired permanently from project affected families. The actual cultivated land to be acquired permanently by the project is 46.7975 ha. Preferably the construction of TL is to be carried out during lean season so that standing crops will not be damaged due to construction activities. However, it is not completely ignored that construction activities will not take place during the cropping season. Therefore, the adjoining area of RoW may be disturbed due to movement of contractor's machine, labor force and stringing of the line.

ii. Temporary Loss of Crops

Similarly, about 1531.79 MT of crops (paddy 708.80MT, maize 307.531MT, millet 190.19 MT and potato 325.27 MT) will be lost due to the construction of TL. This loss is calculated considering that stringing of the line will be completed in one year and compensation will be paid for one seasonal cropping. The magnitude of this impact is considered to be high, extent is site specific and duration is long termed.

Table 6-17: Annual Loss of Agriculture Production (Temporary Land)

S.No.	Crops Types	Cultivated land	Actual production area loss (ha)	Production Loss (MT)	Productivity (MT/ha)
1	Paddy	284.6592	231.6341	708.80	3.06
2	Maize	284.6592	160.1712	307.53	1.92
3	Millet	284.6592	162.5565	190.19	1.17
4	Potato	284.6592	42.7424	325.27	7.61
Total				1531.79	

Source: Field Survey, 2015

b. Operation Phase

The towers constructed in cultivated area, especially those erected in the middle of land parcels will pose hindrance while tilling agricultural field. The field may be cultivated by using human labor that will increase the cost of agriculture production. The overall magnitude of impact is considered to be low, extent is site specific and duration is long term.

6.3.3 Health, Water Supply and Sanitation

a. Construction Phase

i. Health and Sanitation

The likely influx of construction forces during this phase may add further stress on the local health and sanitation situation. Besides, the increase in the noise level due to vehicular movement in the project area is likely to influence the physical and mental health of the local community. Discharge of wastes of various types including metals, paper, kitchen wastes etc. is potential to degrade the sanitary hygienic conditions particularly around the construction sites and campsites. Considering only 300 numbers of manpower and their short termed mobility at one site the impact is considered to be low, site specific and for short termed.

ii. Drinking Water

Similarly, with the increase in population along with the construction activities, a potential decline of the access to the drinking water and existing sanitation condition will occur in the project area. The overall impact on water supply and sanitary situation will be: shortage of drinking water, increase pressure on the existing water supply system, increase distance to the safe drinking water, increase in disease vectors, and reduced water quality due to increased sanitation problems etc. However, the impact on water supply and sanitation shall be low, short term and site specific.

b. Operation Phase

No impact is anticipated during the operation phase.

6.3.4 Occupational Hazards and Safety

a. Construction Phase

Work related injuries and vehicle accidents are likely impacts expected during the construction of the project. The magnitude of impact is low, the extent is site specific and the duration is short termed.

b. Operation Phase

The people residing in the vicinity of the TL will be vulnerable to electrical hazards. Similarly, lack of operation and maintenance skill and unavailability of the essential safety equipment may add further risk with safety regards. The public can be affected principally through their own activities, such as tendency of climbing towers by children; high vehicles attempt to pass beneath the TL, surveyors using metal leveling staffs under the conductors, etc. These risks have low probability of occurrences, but a great significance to individuals involved.

The overall magnitude of impacts is considered to be low, extent is local and duration is long termed. The magnitude of impact is moderate, extent is site specific and duration is long termed.

6.3.5 Impact on House, Settlements and Social Infrastructure

a. Construction Phase

Some tower pads including RoW are proposed to construct close to the house, settlements, social infrastructures and other private properties. The magnitude of impact on above mentioned private and social infrastructures are high, extent is local and duration is long term.

b. Operation Phase

The impact on settlements and community structures remain same in this period also. The magnitude of impact is high, extent is site specific/local and duration is long term.

6.3.6 Impact due to Crossing of Power Cables, Communication Lines, Foottrails, Roads/ Highways, etc.

a. Operation Phase

The baseline study shows the proposed TL alignment crosses inter-connected gravel/earthen/trails number of times. The TL also crosses irrigation canals and communication lines. Hence, there will be impact due to crossing over of power cables, communication lines, foot trails and road/highways on local infrastructures and facilities. The impact is expected to be high, regional and long term.

6.3.7 Impact on Communal Resources

a. Construction Phase

The proposed TL doesn't pass through communal resources like recreational areas and places of public congregation. Hence, there will be no impact on such resources due to construction of TL.

b. Operation Phase

Some settlements, markets, schools, temples and cremation sites are located close to the alignment and substation thus imposing impact on these structures/places. There will be likely impact on those structures and settlements due to the project implementation. The magnitude of impact is moderate, extent is site specific and duration is long term.

6.3.8 Impact on PAF due to Alteration of Land and Property Values

a. Operation Phase

The land and property values under the RoW and close proximity to house and settlement will be devalued due to the construction and operation of TL. The nature of impact is expected to be high, local and long term.

6.3.9 Impact due to Restriction of Future Landuse Development near to settlement

a. Operation Phase

The proposed TL mostly passes through rural and semi urban sections. However, the TL passes through some sections like, Ittakhel of Shankharapur Municipality, Kunta bazaar of Kavre Mahadevsthan VDC which belongs to growing up market setting. This creates the land devaluation.

Due to implementation of TL, land near by settlement and road will be affected mostly. It restricts the multipurpose land use potentiality of the area. Plan and programs proposed by concern VDCs/Municipalities and DDCs will be affected. Hence, impact is expected on future land use development. The nature of impact is high, local and long term.

b. Operation Phase

No impact is expected during the operation phase.

6.3.10 Disturbances to Radio, Television and Mobile/ cell phone Reception**a. Operation Phase**

There will be likely impact on radio, television, telephone, and mobile/cell phone due to creation of electromagnetic field interference in the conductor of 400 kV TL. The frequency of electrical gadgets will be disturbed. However, there are no proven findings of impact due to high voltage TL. Hence, the nature of impact is expected to be high, local and long termed.

6.3.11 Electric and Magnetic Field Effect**a. Construction Phase**

No significant impacts are expected during this phase.

b. Operation Phase

Electric power TL create electric and magnetic field together known as electromagnetic field or EMF. Electric field is created by the presence of voltage and is expressed in volt per meter (V/m). Magnetic field is produced by the present of current in the line and is expressed in terms of ampere per meter (A/m). Power lines EMFs are strongest beneath the lines and diminish rapidly with distance. Numerous researches have been done abroad to investigate the effect of EMF associated with TL but none has proved and quantify about the health risks. Scientific research on the effects of EMFs on public health has not demonstrated clearly the existence of a significant risk, nor has it proven the complete absence of risk.

Electric field of high voltage line gives rise to corona effect causing ionization leading to the generation of ozone and oxides of nitrogen, possible radio and television interference and audible noise at high levels. Such noise will increase under rain and smog conditions. Similarly, there will be impact on pacemaker users. The magnitude of overall impact is considered to be low, extent is local and duration is long termed.

6.3.12 Gender and Vulnerable Group**a. Construction Phase**

During the project construction people will be employed on daily wages for excavation, transportation of construction materials and other construction related works. The contractor, especially the sub-contractors, may discriminate the women and vulnerable group while hiring the worker. Despite, the Government of Nepal ban on child labor, it remains a potential temptation in an economically poor region such as the proposed project area for children to be exploited to pursue menial jobs. It is assumed that most of the labor force required for the construction of the TL will be farmers and landless people from the vicinity of the actual work place moving around the alignment as the construction proceeds.

Considering the nature of construction work and manpower employed the magnitude of impact is considered to be low, the extent is local and the duration is short termed.

b. Operation Phase

After the completion of the project most of the male population involved directly or indirectly in the project will be left without job, which will compel the female population to look for alternative source of income. This may add extra burden to their normal daily activities. This impact is expected to be medium in magnitude, local in extent and long termed in duration.

6.3.13 Economic Activities

a. Construction Phase

Some sections of the TL passes very near to market area like Charikot, Khadichaur, Barhabise, Kuntabazaar, Irkhu bazaar and Nagarkot where economic activities are high. Similarly, most of the section of the TL passes close to the rural roads which are considered as the semi-urban area. The interaction among different people/stakeholders and ethnic group may attract rural people towards more advance society. The experience with other project has revealed that sudden cash flow may cause unproductive spending earned by the workers. The availability of cash may divert some workers towards gambling and other awful habits like alcohol consumption. The magnitude of impact is low, extent is local and duration is short term.

b. Operation Phase

Local people will benefit from the project induced economic opportunities. After the project completion, these opportunities will be closed and the workers will lose their job. Demand for local agricultural production, community and local commodity transactions will be reduced. The withdrawal or decrease in economic activity during operation phase may affect the life of the local people after the habitual of spending more during construction phase. They will face difficulty in managing the lifestyle once the economic activities will be reduced and earning will drastically decline. However, due to the linear nature of the project, the local labors will be hired at the different locations only for the short duration of time. Thus, the magnitude of the impact is considered to be low because the economic activities are limited and are spread throughout the settlements of the alignment. The extent is local and duration is of long term.

6.3.14 Religious, Historical and Archeological Site

a. Construction Phase

Though there are numbers of temples, religious and cultural sites in the project area, none of them are located under the Row. Therefore, none of such structures need to be relocated due to the proposed pylon and TL construction. However, many temples, cremation area are found within the distance of 100-300m from the TL. List of the temples that are found within the area of 300m from the TL are given below.

Table 6-18: Name of the temples within the area of 300m from TL

TL Section (AP to AP)	VDC/ Municipality*	Infrastructures	Distance from the Conductor (m)
AP1-AP2	Melung	Sitali Devi Mandir	50
		Cremation center	75
AP3-AP4	Melung	Radhakrishna Mandir	50
AP5-AP6	Melung	Pashupati Mandir	70
AP8-AP9	Bhedapu	Cremation center	60
AP28-P29	Irkhu	Indrakamal Setidevi Mandir	5
AP30A-AP32	Irkhu	Mahadevsthan Mandir	300
AP34-AP35	Bhimeshwar*	Mahankal Mandir	50
AP36-AP37	Thulo sirubari	Devasthan Mandir; Kumeshwor Mahadev	300
AP58-AP59	Chokati	Nandala devi; Seti devi; Phabara kharedevi	300
AP61-AP62	Shankharapur*	Ganesh Mandir	300
AP64-65	Barhabise	Chhema devi Mandir; Barhabise Mandir	200

b. Operation Phase

No impact is expected during the operation phase.

6.3.15 Infrastructure and Service Facility

a. Construction Phase

i. Infrastructure

Charikot, Dolakha; Khadichaur, Barhabise and Irkhu bazaar of Sindhupalchok; Kuntabazaar, Kavrepalanchok, Nagarkot Bhaktapur and Sankhu bazaar of Kathmandu are the main markets/trade centers of the project area. The average distance of these market centers from the proposed TL is ranged from 500m to 2000m. The implementation of project will likely to affect these market centers. The magnitude of the impact is moderate, extent is local and duration is long termed.

ii. Service Facility

The construction work and related influx of population in the project area will make the existing institutions regarding health, water supply, telecommunication, electricity, etc. unable to deliver the required service. Besides, existing market and hotels will come under pressure. However, privately operated service is expected to cope-up with this situation considering the nature of job and limited workers staying with their families in the project area. The impact is expected to be low in magnitude, local in extent and short duration.

b. Operation Phase

No impact is anticipated during the operation phase.

6.3.16 Social and Cultural Practices

a. Construction Phase

During the project construction, the influence of the outside workforce on the local way of life and traditional cultural practice may result into cultural erosion, undesired social practices, disputes, conflicts and possible dilution of social bonds among the local people. However, the social and cultural life style of the local people will hardly be affected by the influx of workers due to nature of project. This is because of the linear type of the affected project area, low number of the construction workers from outside and their fast mobility. These impacts are expected to low in magnitude, local and short termed in duration.

b. Operation Phase

After completion of the construction work, the impact on culture by the construction work force will subside and will slowly return to its normal social condition.

6.3.17 Law and Order

a. Construction Phase

During the construction of the TL labor from different places with different religion and faiths will be employed by the contractor and there will be possibilities of conflict of interest thus affecting the law and order situation. The past experience reveals that local people have misunderstanding with the employer's and contractor's staff. Since the project is of linear type and the number of local labor for construction activities will be less the likely impact on law and order situation due to project is expected to be low in magnitude, local and short termed.

b. Operation Phase

No significant impacts are expected during this phase.

6.3.18 Impacts of Aesthetics

a. Construction Phase

No significant impacts are expected during this phase.

b. Operation Phase

Impacts to visual resources are examined in terms of changes between the existing landscape character and proposed actions, sensitivity of viewing points available to the general public, their viewing distances and visibility of proposed changes. Some section of the TL passes nearby market centers and settlements 80m. The existence of tower and TL will likely to create aesthetic impact on natural and manmade resources by hindering the mountain. Hence, the magnitude of impact on aesthetic will be moderate, local and long termed in nature.

6.4 Beneficial Impacts**6.4.1 Local Employment****a. Construction Phase**

One of the major beneficial impacts of the project during the construction phase is the creation of employment opportunity. Such employment opportunities to some extent may check out migration of the project area and promote in-migration. In this regard, the employment opportunities contribute to poverty alleviation to some extent. The availability of reliable power in the Central Development Region will assist in establishing new industries which will generate employment for the local people. The magnitude of impact is considered to be moderate, extent is local and duration is short termed.

6.4.2 Local Economy

The employment opportunity, income from shops, house rental, increase demand for fresh vegetables, fruits, meat and rental/lease of land etc. are the areas of income during construction period.

Furthermore, local contractor and local people will also be engaged for some construction work, which is considered as beneficial impacts for the local economy. As a result of increased trade and business, significant amount of cash will be introduced into local economy. This short term economic boom will contribute to the development of local economy. The increase in business will enhance the economic status of local people. The magnitude of impact is considered to be moderate, extent is local and duration is medium term.

The people of project area will have opportunity to sell their products to the construction workforce and project farmers in terms of cash economy. With the start of proposed project construction, visible and significant impact will be realized in the local economy of the area as whole and economic activities of the urban/semi urban centers like Khimti bazaar, Irkhu bazaar, Khadichaur, Barhabise, Kunta bazaar, Nagarkot and Sankhu bazaar.


6.4.3 National/ Regional Economy

The proposed project will evacuate the energy from Khimti and Tamakoshi River and other projects to be developed in Central Development Region of Nepal. The reliability in power distribution will enhance the production of the industries and boost the economic activity in the central Nepal.

6.4.4 Living Standard

Beneficial impacts of the development project are development of urban and semi urban area with better facilities and amenities, which avail short term economic benefits to the local community. Given the opportunity of job (300 locals) in the project, the unemployed people of the area and households depend upon labor will benefit immensely. Their purchasing power is expected to improve the living standard during the construction phase. People thriving in subsistent agriculture will have cash flow, then exposed to the direct cash earning economic activities will certainly lead to positive changes in the existing social relationships and socio-economic value.

Table 6-19: Socioeconomic and Cultural Environment Impact Assessment Matrix

Table 3: For Socio-Economic and Cultural Environment Impact Assessment Matrix							
S.	Issues	Impacts	Identification and				
No.			Evaluation of Impacts				
Construction Phase			D	IND	M	E	Du
1.	Acquisition of Land and Structure	The project will require 329.0207 ha cultivated land out of which 46.7975 ha private cultivated land is acquired permanently. Total 30 structures (20 houses, 10 cowsheds) will be affected.	D		M	SS	LT
2.	Loss of Crops	Loss of 129.74 MT food crops from permanent land acquisition.	D		L	SS	LT
3.	Health, Water Supply and sanitation	Likely impact on workers' health due to poor sanitary situation in labor camps	D		L	SS	ST
4.	Occupational Hazards and safety	Likely increase in construction related accidents.	D		L	SS	ST
5.	Impact on House, Settlements and Social Infrastructure	Likely impacts on house, settlements and social infrastructures.	D		H	L	LT
6.	Gender and Vulnerable group	Likely discrimination while hiring workers, compensation or other project related benefits.		IND	L	L	ST
7.	Economic Activities	Likely increase in economic activities as well as unproductive spending.	D		L	L	ST
8.	Religious, Historical and Archeological Site	No need to relocate any such sites, however, many temples, cremation area are found within the distance of 100-300m from TL.	IN		L	L	LT
9.	Infrastructure and Service Facility	Likely impact on infrastructures and service facilities.			M	L	LT
10.	Law and Order	Likely increase in pressure to maintain the law and order		IND	L	SS	ST
Operation Phase							
1.	Acquisition of Land & Structures	No significant impacts are expected on Land acquisition and houses and other structures are not allowed to be constructed within RoW.			H	SS	LT
2.	Loss of Crops	Placement of tower at center of field pose difficulty for the cultivation which further increase production cost			L	SS	LT

3.	Occupational health and safety	Likely increase risks with safety regards.	D		M	SS	LT
4.	Impacts due to Crossing of Power Cables, Communication Lines, Foot trails, Roads/Highways etc.	The project will cross highways 9 times, feeder roads 112 times, 2 canals, Jure Landslide, 11kV; 33kV; 220kV TL in many times.			H	R	LT
5.	Impact on PAF due to Alteration of Land and Property Values	Land and Property values under RoW will be devalued.	D		H	L	LT
6.	Impact due to Restriction of Future Land use	Restriction on the multipurpose land use potentiality for the growing up market area.	IN		H	L	LT
	Development near to settlement						
7.	Economic Activities	Withdrawal of economic activities. Negative impacts on locals.	D		L	L	LT
8.	Electric and magnetic field	Electromagnetic impact due to long term exposure		IND	L	SS	LT

Note: D: Direct, IND: Indirect

Extent (E) SS= Site Specific

L= Local

R= Regional

Magnitude (M) L= Low

M= Medium

H= High

Duration (Du) LT= Long Term

MT= Medium Term

ST= Short Term

7. MITIGATION AND ENHANCEMENT MEASURES

The mitigation and enhancement measures outlined in this chapter have been proposed to curtail potential adverse impacts and enhance beneficial impacts identified during the study. Those adverse and beneficial impacts not identified or predetermined during the study if later discovered during the construction phases will be explicitly mitigated or enhanced by the project. The discussion is organized into three categories of physical, biological, and socioeconomic and cultural aspects, and has been split into construction and operation phases in an equivalent manner as for Chapter 6– Impact Assessment.

Nepal Electricity Authority as the project proponent will implement all the proposed mitigation measures and enhancement measures, monitoring plans described in the respective chapters as NEA's prime responsibility. In addition, the project will take responsibility of compensating as per the prevailing law for any losses or damage caused to lives and property during construction and operation phases.

7.1 Physical Environment

Minimization of land-take and soil disturbances wherever feasible will be the primary mitigation measures of the project.

7.1.1 Watershed and Drainage Condition

a. Construction Phase

Proper management of the muck volume will be done. The muck generated during the excavation of tower pads and substation will be used for backfilling and the area will be restored.

The following mitigation measures will be anticipated during the construction phase:

- Vegetation clearing and ground disturbances will be confined within the foundation and required RoW.
- Proper compaction of the excavated soil will be done. After compaction 10% of the remaining soil will be disposed properly in the vicinity so as not to disturb the natural drainage.
- Adequate surface and sub-surface drainage will be provided at all the Angle Tower area and at substation area to drain away the excess water and prevent water logging.
- Excavation will be done in phases with higher number of laborers so that the required target stretch is completed on time.
- Restoration of the area around the tower pad for cultivation and regeneration of vegetation will be done.
- Erection of pole and stringing of line will be carried out in dry season if possible.
- Pile foundation or matt foundation will be used for Lattice towers at river crossings.

b. Operation Phase

Proper inspection and maintenance of tower pad areas will be done to reduce the risk of soil erosion. The annual costs for such site verifications will be borne by the project developer and thus included in operation and maintenance budget. If the amount of this title is included in the main project cost this amount can be reduced from the cost of environmental mitigation measures. No mitigation measures on the watershed and natural drainage is needed during the operation and maintenance period.

7.1.2 Topography, Land Use and Land Take

a. Construction Phase

- The natural slope disturbances will be minimized during the construction of tower pads.
- The stability of the tower locations will be examined before excavation and special foundation design will be selected for the susceptible locations.
- Erection of tower foundation in the unstable land and/or in steep slopes will be avoided.
- Re-vegetation and slope maintenance will be carried out in the disturbed areas to avoid erosion. Bio-engineering with combination of retaining structures will be done as per the requirement.
- Proper landscaping will be done at each tower site.

The permanent land use changes due to tower pad construction cannot be mitigated. However, the land under the RoW will not be restricted for the current use except that the construction of any type structure will be prohibited. The construction area will be reinstated to the present condition after the construction is over. Land for temporary facilities will be rehabilitated to original status to minimize the land use impacts. The camp sites are proposed mostly in barren land to minimize the impact on land use pattern of cultivated land. The private land required for the project will be compensated through rental in agreement with the land and property owners.

The following measures are proposed for the construction and operation phase.

- The natural slope disturbances will be minimized during the construction of tower pads
- In order to avoid the land fragmentation the tower will be located at the RoW of road and at the edge of the land parcel as far as possible.
- In order to avoid the hindrance to agricultural activities the construction activities will be done during the period of less agro- activities.
- Land acquiring will also be limited to the requisite.

b. Operation Phase

The impact on the land use changes under the RoW and permanent land-take for the towers will remain forever. The restriction for the erection of any type of structure of land under the RoW and plantation of trees of tall species cannot be mitigated. However, cultivation will be allowed. All temporary land acquired will be converted to its original use or agreed new uses towards the end of the construction period and handed over to their owners.

7.1.3 Air Quality

The construction and operation of the TL will not have significant impact on the air quality of the project impact area.

a. Construction Phase

The project will not lead to a significant deterioration in air quality except in much localized instances and localized areas during the construction phase. Vehicle utilized for construction will be complied with GoN mass emissions standards. Regular checkup; up keeping and maintenance of the equipment will be carried out as per the Manufacturer's Specifications to meet the emission standards. Proper maintenance of all vehicles and construction machinery will be done regularly.

Helmets and air mask will be provided to labor force working in areas susceptible to dust pollution. The working hours will be limited near the settlements and temporary relocation of particularly vulnerable people (old/sick, etc.) to acceptable locations will be done if required.



b. Operation Phase

There is no significant impact on air quality during the operation and maintenance period.

7.1.4 Noise and Vibrations**a. Construction Phase**

No construction work will be carried out during the night time so as to minimize the noise and vibrations. Ear muffers will be provided to labor force working in the areas susceptible to noise pollution.

b. Operation Phase

The impacts due to corona effect cannot be mitigated.

7.1.5 Water Quality**a. Construction Phase**

The waste generated from the mixing concrete will be disposed in pits and filled with soil. Such pits will be made in barren land at approximately 500 m distance from the water bodies. Dykes are proposed around the storage tanks to avoid water pollution. Toilets will be provided to the workforce. Care will be taken to locate the temporary construction worker sheds away from the water bodies. Garbage and solid wastes generated by the workforce will be dumped safely away from water bodies.

Good construction practices and site management will be adopted to avoid impacting soil and ground water, and pollution of water bodies from accidental spills from fuels and lubricants etc. All waste oils and chemicals will be collected and stored in suitable storage tanks and disposed through incineration.

b. Operation Phase

Since the impact on water quality during the operation period is expected to be minimal, no mitigation measure is proposed.

7.1.6 Waste and Spoil Disposal**Construction Phase**

The domestic waste will primarily consist of organic food waste. Because this is easily biodegradable and non-hazardous. It will be managed by burying in pits at reasonable distance from water bodies and subsequently covering with soil.

Waste generated from construction activities are usually inert material which are nonbiodegradable e.g. empty cement bags and containers, rejected material, plastic, wooden planks. These waste materials will be stored out and kept separated instead of throwing haphazardly elsewhere. Some of these items (cement bag, plastic drum etc.) can be sold in the markets in order to be re-used or recycled. The contractor will be responsible for the establishment of the waste management system at the construction and camp areas.

7.1.7 Storage of Construction material**Construction Phase**

The area for the substations will be used as the storage of construction materials in order to mitigate the land degradation. The locations for the temporary camps will be selected at degraded or the lower value lands. The area proposed for storage will be taken on lease at the prevailing market price based on the production loss. The temporary yards will be fenced

properly. Cement will be stored in private storage facilities taken on rent. The other materials will be stored properly at the designated storage site. The detail of storage of construction material has been presented in section 6.1.7.

7.1.8 Crossing of Other Utilities and Interference

Operation Phase

All crossings of existing transmission and distribution lines will be designed with standard safe vertical and horizontal clearances for 400kV lines. Design clearances for communication lines will be maintained. For this, the standards referred by the Electricity Regulation 1993 (Rule 48, 49, 50 and 55) shall be followed.

7.1.9 Use of Coolant Oil in the Transformer (Poly Chlorinated Biphenyls; PCB)

Operation Phase

Prior to 1995 PCB as a coolant in the transformer were used in Nepal. Since 1995 this type of oil is now prohibited legally in Nepal. The transformer oil used in Nepal now conforms to the international standards. However, to ensure that the PCBs are not used as the coolant oil in transformer a chemical certificate of the oil used will be provided by the supplier of the transformer prior to the installation of the transformer from an internationally accredited laboratory. A provision of oil filter on the drainage outlet of the substation will be installed to avoid leakage of oil from the substation. Timely maintenance and monitoring of the transformers will be done. During procurement process quality of the transformers will be ensured.

7.1.10 Summary of Mitigation Cost for Physical Environment

The total cost of the project is 1 billion. Detail of mitigation cost for physical environment is presented in table below.

Table 7-1: Detail of Cost Break Down

S.N	Description	Cost (NRs)
1	River Training Structures	20,00,000
2	Religious Place (Temples) Support	20,00,000
3	Construction of Physical Structure (Aqueduct, Temporary Bridge, Fencing, Sheds etc.) for social support	50,00,000
4	Soil Conservation Program (Land Protection Works)	15,00,000
5	Miscellaneous	15,00,000
Total		1,20,00,000

The detail of cost of physical environment along the different headings has been discussed below:

a. River Training Structures:

Along khimti-barhabise section, river training structures are needed below AP 14 due to the erosion of bank near river. Major landslides along with major cracks are observed near AP 29 due to the earthquake of Baisakh 12 so river training structures are needed just below landslide to prevent more erosion. Along Barhabise-Kathmandu section, heavy river training structures are needed along the stretches between AP 10 and AP 11 because of the massive Jure landslides.

b. Religious Place:

Temples are damaged by earthquake so the maintenance/ reconstruction works need to be carried out for one temple near AP 22, AP 34 and three temple between AP 58 and AP 59

along Khimti-Barhabise section. Similarly, the maintenance/ reconstruction works need to be carried out for one temple near AP 20 along Barhabise-Kathmandu Section.

c. Construction of Physical Structure:

Fencing should be done around the temples which are damaged by earthquake and also sheds need to be provided just near temples. Likewise, fencing along the school area of the project affected VDCs are of high priority. Temporary bridges (Hume Pipe bridges) are to be constructed where the feeder roads are swayed by the river and at some places causeways can be constructed as per public demand and necessity.

d. Soil Conservation Program:

Land protection works need to be done below AP 29 of Khimti-Barhabise section where landslides has swayed large agricultural land and also cracks has formed at long distance up to the village area. In order to protect more soil erosion, bio-engineering practice is must at that section. And along Barhabise-Kathmandu section above AP 34, land retention work need to be done so as to protect the feeder road.

e. Miscellaneous:

Other structure which may be necessary during the construction phase will be stated under miscellaneous section.

7.2 Biological Environment

7.2.1 Enhancement Measures

7.2.1.1 Assistance to Community Forest Users Group

Forest management training will be provided to the community forest users groups (CFUGs) affected by the proposed project. The program basically includes capacity building training, forest management training etc.

7.2.1.2 Non Timber Forest Products

Workers will be prohibited illegal collection of non-timber forest products (NTFPs). Informative and warning sign boards at each construction sites located in and around the forest area will be erected. Training for cultivation of NTFPs especially medicinal plants and agro forestry will be given to CFUGs. The members from the affected CFUGs will be encouraged for the plantation of NTFPs and other plants having economic values along the RoW of the line falling under community forests. This will provide them with the opportunities of long term income source as well as maintaining the vegetation cover under RoW. Seedling support will be provided to the concerned CFUG after giving them training. The detail of training program will be developed in consultation with concerned CFUGs and DFO.

7.2.1.3 Conservation Awareness Raising

Awareness raising program will be conducted for local people, workers and CFUG members of the project area about the importance of biodiversity, forest, wildlife and bird conservation, plantation and economic importance of forest and its role in rural livelihood improvement, existing rule regulations etc. The program will be implemented in close coordination with local NGOs, CBOs, District Forest Office and other concerned government organizations. Hoarding boards with slogan about various aspects of nature conservation will be displayed in public places and along the project area.

7.2.1.4 Forest based Income Generation and Entrepreneurship Training

Forest based income generation activities with entrepreneurship development will also be promoted. Since Dolakha, Sindhupalchowk, Kavrepalanchowk districts are pioneer in the

development of community based natural resource management like, community forestry, leasehold forestry and promotion of forest based industries like Nepali handmade paper making from lokta and argeli, chirayito cultivation and collection and processing of various types of NTFPs including medicinal herbs. Therefore, income generation activities and entrepreneurship development training will be provided to the community groups.

7.2.1.5 Orientation Workshop to Concerned DFO Staff

To maintain the close coordination with concerned forestry staff for the management of forests along the TL, orientation workshops will be conducted in each district. The main focus will be mutual understanding about environmental safeguard issues and their roles and responsibilities in addressing them.

7.2.2 Mitigation Measures

7.2.2.1 Minimizing the Forest Clearance

a. Construction Phase

During the project implementation, all the trees in the AP will be felled. However, trees along the RoW of TL will be selectively felled to minimize the forest loss in gulley and valley subject to enough vertical clearance from the ground. In such areas, it is proposed that the minimum forest clearance that need for the laying and stringing of conductor will be maintained and remaining trees of the RoW will be kept intact. Vegetation clearance along TL-RoW will be carried out manually. Transmission alignment has been fixed to avoid the forest vegetation as far as practicable. In addition, Angle Towers and Suspension Towers have been placed in ridges to avoid the forest clearance to the extent possible.

7.2.2.2 Forestry Clearance and Compensatory Plantation

a. Construction Phase

The Project will ensure compliance to provisions of all acts, rules, regulations and directives as applicable to the forest. Forestry clearance and tree cutting approval will be obtained according to Forest Act 2049, Forest Regulations 2051, Government of Nepal: **Work Procedure for Providing Forest Land for Other Use, 2063** (February 2007) and **Standard for Removing Trees from Government Forest, 2076**. Land needed for the construction of angle towers and substation in the forest area will be obtained from the cabinet decision of the Government of Nepal for the priority one projects (P-1) and tree cutting approval from the Ministry of Forest and Environment ministry (MoFE).

As a compensatory measure for the loss of trees due to the site clearance, plantation in 1:10 ratio plants plus equivalent to forest area cleared (1600 plants/ha) in the CFs, LHF and Government forests will be carried out in the area provided by the District Forest Offices/CFUGs/LHFGs according to new provision made in Environment change policy 2076 (it was at the ratio of 1:25 before).

Separate Plantation Action Plan will be prepared before implementing the plantation program. The Action Plan will figure out the potential plantation sites, seedling production and availability, plant species and mode of plantation program in consultation with affected CFUGs/LHFGs and District Forest Office.

DFO nurseries could be used in the project site to meet the seedling requirement for the compensatory plantation. As per the Government of Nepal: Work Procedure for Providing Forest Land for Other Use 2063, plantation site shall be managed by the proponent for five years or required cost for such management must be paid to Department of Forest. So, the compensatory plantation and protection cost (fencing provision) has been estimated according to MoFE Norms and will be provided to concerned CFUGs/LHFGs through DFO.

7.2.2.3 Harvesting Costs**a. Construction Phase**

The cost of harvesting, logging and transporting of the forest products in the forests will be provided as per the MoFE Norms (revised), 2070 following the provision made in Article 65 of Forest Regulations 2051. The compensation cost for the harvesting, logging and transportation of forest is part of construction work and included in construction cost hence not estimated separate in this Updated IEE Report.

7.2.2.4 Utilization of Forest Products**a. Construction Phase**

Trees will be harvested with the proper forest techniques by involving technical staffs from the District Forest Office of the concerned district in presence of CFUGs and LHFGs. Timber and other forest products extracted as part of the site clearance from the forest will be utilized as per the procedures as mentioned in the Forest Rules, Guidelines and Directives.

From CFs/LHFs, forest products will be utilized according to operational plan provisions of CFUGs/LHFGs.

7.2.2.5 Supply of Alternative Fuel**a. Construction Phase**

The construction contractors will be abided by tender clause to provide kerosene/LPG to the project workers to minimize the loss of forest. For the construction of temporary camps pole size timber felled by the project can be used with following due forestry procedures.

7.2.2.6 Management of the Plantation Sites**a. Operation Phase**

The plantation sites will be managed by the concerned CFUGs/LHFGs in community and leasehold forest plantation area. Replacement plantation will be conducted after one year based on the survival counts and cost for such sites will be borne by the project.

7.2.2.7 Clearance of Vegetation**a. Operation Phase**

All type of growing trees within the RoW will be trimmed regularly in every alternate year. The project will use Electricity Regulation, 1993 for the minimum clearance required for the transmission and distribution lines, which is generally 46 meter (23 meter on either side of the center line).

7.2.2.8 Wildlife Disturbance and Restriction on Hunting and Poaching**a. Construction Phase**

The clearing of trees will be done manually causing less impact on adjoining vegetation. As far as possible construction work will be labor based. The project proponent will be responsible to avoid unnecessary machinery disturbances and lighting. The construction work in community forest area will be coordinated through DFO and CFUGs. In addition, informative and warning sign boards will be placed at relevant construction sites. The workers will strictly be prevented from hunting and poaching.

b. Operation Phase

Installation of screens to prevent monkeys and other arboreal mammals from climbing towers will be considered in the design.

7.2.2.9 Avian Hazards

Measures to minimize bird injury and death associated with the TL will be considered in line design. Markers such as colour balls will be attached to conductors to improve line visibility for bird, if felt necessary. Required cost for it will be included in the contractor's cost.

a. Operation Phase

A monitoring program will be undertaken to determine the occurrence of fauna deaths during line operation, with additional measures implemented as necessary.

7.2.3 Biological Mitigation and Enhancement Cost

The total biological mitigation and enhancement cost is estimated to be NRs. 63,917,531 (Mitigation cost NRs 59,267,531 and Enhancement cost NRs. 4,650,000.00) as given in Table 7-2 and Table 7-3. Training programs will be provided to the selected users and members of the affected CFUGs/LHFGs. The number of training programs to be conducted will be determined depending upon the number of participants, demand from communities and availability of resource persons. Technical resource persons and experts shall be deployed for the training programs from DFOs and other relevant offices.

According to approved IEE, The total biological mitigation and enhancement cost is estimated to be NRs. 32,746,432.20 Mitigation cost NRs.28,096,431.20 and Enhancement cost NRs. 4,650,000.00).

Table 7-2: Benefit Enhancement Cost (NRs)

Benefit Augmentation Measures															
SN	Augmentation Measures	Unit rate	Districts												Total (NRs)
			Bhaktapur		Kathmandu		Kavre Palanchok		Sindhupalchok		Dolakha				
			Event	Cost	Event	Cost	Event	Cost	Event	Cost	Event	Cost			
1	Forest management training to CFUGs	100000	1	100,000	1	100,000	2	200,000	2	200,000	2	200,000	2	200,000	800,000
2	NTFPs cultivation training and seedling support under TL	200000	1	200,000	1	200,000	2	400,000	2	400,000	2	400,000	2	400,000	1,600,000
3	Conservation Awareness Raising training (Biodiversity, wildlife and bird conservation)	100000	1	100,000	1	100,000	2	200,000	2	200,000	2	200,000	2	200,000	800,000
4	Forest based income generation and entrepreneurship training	150000	1	150,000	1	150,000	2	300,000	2	300,000	2	300,000	2	300,000	1,200,000
5	Orientation workshop to concerned DFO staff	50,000	1	50,000	1	50,000	1	50,000	1	50,000	1	50,000	1	50,000	250,000
	Total		5	600,000	5	600,000	9	1,150,000	9	1,150,000	9	1,150,000	9	1,150,000	4,650,000

Note: Since there is no any forest area affected by the project in Ramechhap district, training programs are not proposed.

Table 7-3: Mitigation Measures Cost (NRs)

SN	District/Activities	Compensatory plantation in forest including protection						Cost for trees in private land	Signboard cost	Total cost (NRs)
		No. of trees	No. of trees to be planted	Area affected (ha)	No. of plants to be planted	Total plants for plantation +10% for replacement	Per plant cost			
1	Bhaktapur	96	960	0.25	400	440	110	48400	50000	113400
2	Kathmandu	838	8380	2.03	3248	3572.8	110	393008	50000	463008
3	Kavre Palanchok	1424	14240	9.2	14720	16192	110	1781120	75000	1896120
4	Sindhupalchok	28482	284820	56.4002	90240.32	99264.352	110	10919078.7	75000	11064079
5	Dolakha	4291	42910	35.34	56544	62198.4	110	11419716	75000	11554716
	Total	35231	352310	103.2202	165152.3	533977.55	110	58737530.7	325000	59267531

7.3 Socio-economic and Cultural Environment

7.3.1 Acquisition of Land and Structure

a. Construction Phase

□ Compensation for Permanently Acquired Land

The project will acquired 307.4467 ha of cultivated land. Out of total, 47.285 ha is permanent land (land required for angle tower, suspension towers and substation area) and 261.1585 ha is RoW.

However, in approved IEE compensation cost for 7.713 ha land of 172 surveyed households of 84 AP has been calculated for the study purpose. Hence, mitigation cost for 7.713 ha of land is estimated to be NRs. 17,57,35,560. Based on this cost, using prediction method, cost for 47.285 ha of permanently acquired land will be NRs. 37,92,85,480. In U-IEE cost for 47.285 ha of permanently acquired land will be NRs. 575,740,200. The detail of the cost of permanently acquired land is given in Table below.

Table 7-4: Cost for Calculation of Permanently Acquired Private Land

S. No.	Project Component	Description	Total HHs				Surveyed HHs			
			No. of Tower	Area (ha)	Rate (NRs./ha)	Amount (NRs.)	No. of Tower	Area (ha)	Rate (NRs./ha)	Amount (NRs.)
1	Angle Tower	AP0-AP62 (Khimti-Karthali)	106	12.985	4900000	63626500	40	0.900	4900000	44,10,000
		AP63-AP64-AP10 (Barhabise-Ramche)	28	3.43	11760000	40336800	10	0.225	11760000	26,46,000
		AP11-AP41 (Mankha-Chandeni)	63	7.7175	5880000	45378900	22	0.495	5880000	29,10,600
		AP42-AP62 (Mahadevsthan-Shankharapur)	38	4.655	19600000	91238000	12	0.27	19600000	52,92,000
2	Substation	Barhabise		8	23,520,000	188160000		6.823	23,520,000	160476960
		Lapsephedi		7.5	7840000	58800000				
		Chagunarayan		3	29400000	88200000				
		Total	235	47.285		575740200	84	7.713		175735560

□ Compensation for Restricted Land (RoW)

The land used for TL and camp sites is considered as restricted land. The total cultivated land to be restricted for use during project period is 261.1585 ha. On the basis of the surveyed households, the average price of the compensation cost of 261.1585 ha of land is calculated as NRs. 2,771,423,340. As per NEA practice, project will provide only 10% of the total land value for land use restriction (RoW). However, in recent practice, project will provide maximum amount to the land in accordance with their use and local market price. Here, 20% of total cost is preferred to compensate for two section which are near to market and high land value and 10% is preferred for other section which are in rural area. Therefore, the compensation cost for the land to be restricted to use is NRs. 417,295,662

Table 7-5: Cost for Calculation of Land Restriction (RoW)

S. No.	Project Components	Area (ha)	Rate (NRs.)	Total Cost (NRs.)	10% of Cost (NRs.)	20% of Cost (NRs.)
1	AP0-AP62 (KhimtiKarthali)	82.14	4900000	402486000	40248600	
2	AP63-AP64-AP10 (Barhabise-Ramche)	24.922	11760000	293082720		2352000
3	AP11-AP41 (MankhaChandeni)	68.8365	5880000	404758620	40475862	
4	AP42-AP62 (Mahadevsthan-Shankharapur)	85.26	19600000	1671096000		334219200
Total		261.1585		2771423340	417,295,662	

□ Total Compensation for Land

Hence, the total compensation of land to be acquired permanently and temporarily used is NRs 99,30,35,862.

□ Compensation for Structures

Compensation will be provided for 30 structures (house=20 and cowshed/shed=10). Compensation cost for structures has been calculated classifying into two categories i.e. cost for plinth area of the structures and construction cost of the structures.

□ Compensation Cost for Land occupied by Structures (Plinth area)

Since 11 structures (8 houses and 3 cowsheds) are located in the proposed Barhabise substation site and area occupied by structure is included in substation components so additional amount for plinth area (i.e.360 sq.ft) occupied by these structures will not be required. However, the total compensation for 19 structure i.e. 6296 sq.ft (4931 sq. ft. area occupied by 12 houses and 1365 sq.ft. area occupied by 7 cowsheds) is estimated to be Rs. 38,61,200.

Table 7-6: Compensation Cost for Land Occupied by Structures

Type of structures	No.	Plinth area (sq. ft.)	Rate (NRs./sq.ft.)	Amount (NRs.)
House	12	4931	500	2465500
Cowshed	7	1365	200	273000
Total	19	6296		3861200

□ Compensation of Structures Based on Construction Cost

The total compensation of 30 structures based on the construction cost is estimated to be NRs.1,98,00,000. Out of which compensation for 20 houses and 10 cowsheds are NRs. 1,92,60,000 and Rs. 5,40,000 respectively.

Table 7-7: Estimation of Construction Cost of Structures

Description	Type of structure	No.	Area (sq. ft)	Rate (NRs./sq.ft.)	Amount (NRs.)
A. House	Pakki	3	3840	1800	6912000
	Semi-pakki	2	540	1600	864000
	Kachchi	15	9570	1200	11484000
	Sub-total	20	13950		1,92,60,000

B. Other Structures					
Cowshed	Kachchi	10	1800	300	540000
Total (A+B)		30	15750		1,98,00,000

Hence, the total compensation (compensation for plinth area of structures and construction cost) of structures is estimated to be Rs. 2,31,21,200.

□ Compensation for Private Infrastructure

There is one fish pond under the RoW near to AP45 in Barhabise-Kathmandu Section. However there is no provision to give compensation for such structure, as there is no any significant impact on fish pond under RoW.

7.3.2 Compensation for Loss of Standing Crops

7.3.2.1 Production Loss in Permanent Land

The total compensation of the project affected HHs for production loss of 109.44MT is estimated to be Rs. 38,92,767. The value of total loss of crops is estimated based on their yield, production, and local market rate. The crop wise value with area is shown in Table 7-7.

Table 7-8: Value of Total Loss of Agriculture Production due to Land Acquisition

S. No.	Crop types	Surveyed HHs				Total affected HHs	
		Production area loss (ha)	Production Loss (MT)	Productivity (MT/ha)	Amount (NRs)	Production Loss (MT)	Amount (NRs)
1	Paddy	7.186	21.99	3.06	769650	50.64	1772614
2	Wheat	4.969	9.54	1.92	381600	21.97	878817.2
3	Millet	5.043	5.9	1.17	236000	13.59	543484.2
4	Potato	1.326	10.09	7.61	302700	23.24	697851.1
Total			47.52		1689950	109.44	38,92,767

Source: Household Survey, 2015

7.3.2.2 Production loss in Temporary Land

The project requires 287.8542 ha of cultivated land for RoW. The total loss of cereal crops produced in this land is estimated as 737.45 MT which value is estimated to be NRs. 2,62,65,654 for one year. The crop wise area allocation, production and value is shown in Table 7-9.

Table 7-9: Value of Total Loss of Agriculture Production due to Land Utilization (RoW)

S.No.	Crop Type	Cultivated land (ha)	Actual production area loss (ha)	Production Loss (MT)	Productivity (MT/ha)	Amount (NRs.)
1	Paddy	287.8542	111.667	341.7011	3.06	11960355
2	Wheat	287.8542	77.216	147.2545	1.92	5929640
3	Millet	287.8542	77.366	91.68803	1.17	3667049
4	Potato	287.8542	20.605	156.8072	7.61	4708609
Total				737.4509		2,62,65,654

Source: Field Survey 2015

7.3.3 Health, Water and Sanitation

a. Construction Phase

The project proponent will keep the project area clean and hygienic to ensure the project activities will not cause the spread of communicable diseases. The labor camp will be provided with simple dry pit toilet constructed on hard ground and far from water sources. Toilets will be made in temporary camps at the rate of approximately a single toilet for 6 people. First aid kits will be maintained for preliminary treatment in emergencies. The domestic solid waste generated in the project area will be either buried in designed landfill areas or converted in to compost.

A joint awareness program on health and sanitation will be launched in association with the existing NGOs and other local communities during the construction phase. Health check-up of workers and documentation of health status will be made periodically. Priority will be given to the local people in project works to minimize the impacts on health and sanitation.

The project must ensure adequate safety gears for workers (Personal Protective Equipment, accommodation, First Aid box, etc.). It must arrange the training for contractors and workers. It should provide temporary security fencing surrounding the construction site and safety signboard at all sites in Nepali languages should be put.

To minimize the impact on water supply at least one drinking water supply system will be installed at each camp site to cope the demand of the drinking water supply for the labors and technicians. The water supply of the project area will be strengthened by installation of new pipe lines, keeping taps at a regular interval, and by improving the storage of water at the source. The quantity of drinking water will be increased by distributing the water of existing perennial stream. This water supply system will be handed to the local community after the project is over.

b. Operation Phase

No mitigation measures are required during this phase.

7.3.4 Occupational Hazards and Safety

a. Construction Phase

The construction area will be cleared up and all the necessary precaution and warning signs will be placed at construction site. This area will be restricted for the entry of unauthorized people.

The contractor will provide safety helmet, eye glass, safety boot, safety belt, caution signals and other safety equipment as required at particular site or work area.

Safety training will be implemented and any loss of life or injury will also be compensated as per prevailing rules. The safety training for the project workers will be conducted prior to the construction work. Community safety awareness program about the TL and potential risks associated with TL construction will also be implemented in nearby settlements and school area. Hoarding board will be placed in the sensitive area (school and other public places). Project will fence the towers in the sensitive area through civil work. The project workers involved in construction work will also be trained for health and occupational measures.

b. Operation Phase

Safety equipment required for the operation of the TL will be provided. During the maintenance, the construction area will be restricted for entry of unauthorized person to avoid disturbances and risk. Safety helmet and glass, safety boot, ear plugs, good electric light system, good earthing devices, fire-fighting accessories, caution signals, safety belt and other safety equipment as



required at particular site and working area will be provided. The 46m RoW shall be strictly maintained to minimize the likely risks of conductor breakage, induced voltages, etc. Appropriate protection system and equipment will be installed at the substation to ensure the automatic isolation of the line in case of abnormal conditions.

7.3.5 House, Settlements and Social Infrastructures

a. Operation phase

Altogether 8 number of the proposed APs are found within the range of 30 m to 100 m from the existing house, settlements, and social infrastructures. Protection measures will be applied in around the tower pads and construction area after the consultation with local people/stakeholders. Fencing, sign and other appropriate tools of public awareness will be adopted to reduce the likely impact on people, their property and public infrastructures. Furthermore, following points will be considered:

- Design criteria
- RoW maintenance
- Fencing of tower area in critical location

7.3.6 Crossing of Power Cables, Communication Lines, Foot Trails, Roads/ Highways.

a. Operation Phase

The proposed TL crosses inter-connected gravel road /earthen road /foot trails number of times. Similarly, the alignment crosses 11 kV, 66kV, 132 kV and 400/220V distribution lines. The TL also crosses irrigation canals and communication lines. Hence, there will be impact due to crossing over of power cables, communication lines, foot trails and road/highways on local infrastructures and facilities. As mitigation measures following points will be considered:

- Maintenance of ground clearance;
- Avoidance of infrastructures as far as possible;
- Placement of signboard where necessary
- Public awareness program at critical location will be conducted.

7.3.7 Communal Resources

a. Construction Phase

The TL does not pass through communal resources/private properties. However, it passes close to the structures like suspension bridge over Tamakoshi River, Charnawati River, cremation sites, Chautara and other private properties. Such structures will be impacted due to the construction activities of the project. Protection measures like placement of signboard, fencing of structures, and community awareness program will be carried out during construction period. There are no recreation area and places of public congregation that lies under the proposed TL and close to it. Hence, no mitigation measures required.

7.3.8 Impact on PAFs due to Alteration of Land and Property Value

a. Construction Phase

Land fragmentation will be minimized as far as possible. Remaining portion of land that will not significant for agriculture purpose will be acquired for tower foundation. Compensation for permanently acquired and temporarily used lands will be provided. The temporarily used land will be return to respective land owner as in the previous condition.

7.3.9 Impact due to Restriction of Future Landuse Development near to Settlement



a. Construction Phase

Coordination with the project affected households, VDCs/Municipality/DDC authority and concern stakeholders will be done during to construction phase. Land Use Policy-2068 will be followed while designing of the project.

7.3.10 Gender and Vulnerable Group**a. Construction Phase**

The project will ensure not to discriminate the local people based on their gender, caste, color and place of origin. Similarly, priority for jobs will be given to the vulnerable group as per their ability and skills and willingness to work in the project area. Child labor will be prohibited in the project area. The project proponent will consult and assist the local NGO working for the welfare of the women and children to monitor and control Child Labor Act, 2049 will be effectively implemented during construction period.

b. Operation Phase

No mitigation measures required during operation phase.

7.3.11 Electric and Magnetic Field Effect**a. Construction Phase**

No mitigation measure is required during the construction phase since the TL will not be charged until the completion of the stringing.

b. Operation Phase

In order to reduce the impact of the EMF effect, phase split in either of the circuit will be considered during the Detail Design Stage. Market centers are far from the TL, will itself reduce the impact of EMF to certain extent. However, for the safeguard of the local people, an awareness program about the concept EMF and the risk of neglecting the maintenance of the RoW will be conducted.

7.3.12 Economic Activities**a. Construction Phase**

To minimize the adverse impacts on local economy and enhance the living standards of the affected households following measures will be implemented:

- Compensation for the hindrance due to use of land for the TL has been done through private negotiation route. Replacement value has been added to the average value of the land to bring it closer to or at par with the prevailing market rate. The disturbance allowances will be provided to the affected households;
- To minimize the impacts of loss of agricultural products due to the land acquisition, and any effect on the occupation will be compensated through appropriate agricultural extension program, livelihood skill training programs, etc.;
- Maximum job opportunities will be provided to the local people in prudential order and assistance to local communities into the planning through coordination with district level and local government office of the respective district.

b. Operation Phase

No mitigation measures required during operation phase.



7.3.13 Infrastructure and Service Facility

a. Construction Phase

To minimize the impacts on the existing institutions and service facilities following measures will be implemented:

- Provision of water supply,
- Separate communication facilities other than the existing facilities through extension
- Provision of health and support program;
- Provision of additional support police force (if required) through coordination with the District Administration Office, and District Police Office, etc.

b. Operation Phase

No mitigation measures are required during this phase.

7.3.14 Social and Cultural Practice

a. Construction Phase

The impacts on social structures and practices in the project area are related mostly with the influx of construction workforce and their number. Besides, to minimize the impacts on local communities, following code of conduct will be enforced to the outside construction workers:

- The labour force will be instructed about the conducts and manners to be maintained while working along the TL. No discrimination in terms of salary or nature of job among local and migrant workers will be allowed.
- Respecting the rights, properties and practices of local people;
- Prohibiting all the outside labours to live outside construction camps;
- Prohibiting the use of alcohol in the project site, camp and nearby villages.
- Management of the short term influx of the labours during construction and stringing phases will include communication about the technical aspect of the construction and operations, and to allay fears about any apprehensions of perceived accidents during the operational phase of the project.
- The project proponent will demonstrate its concerns about the health and safety of the workers as well as the community through awareness programmes and grievance redressed.
- The workers will be briefed about the health risk of communicable diseases due to unhygienic environment as well as sexually transmitted diseases.
- No child labour or the forced labour would be engaged by the project proponent.

b. Operation Phase

Employment in the substations and RoW maintenance will be given to the local people to reduce tension and potential conflicts with local residents.

7.3.15 Law and Order

a. Construction Phase

During the construction of the TL, labor from different places with different religions and faiths with their own norms and values will be employed by the project contractor and there may conflict of interest between locals and the outsiders affecting law and order situation in the project area. Local employment, wage/ labor rate, working hours, use of local resources by the project workers,

etc. are the major factors that may create conflict in the project area which may pose threat to law and order situation. The proponent will implement a strict code of conduct for the workforces. In case any worker is found as a drunkard or soliciting prostitution and gambling etc. will be penalized and terminated too. The existing facilities of GoN from Ramechhap, Dolakha, Sindhupalchowk, Kavrepalanchowk, Bhaktapur and Kathmandu districts will be used to maintain the law and order situation as when required basis. The proposed awareness program will also minimize this impact to some extent.

b. Operation Phase

No mitigation measures.

7.3.16 Resettlement and Rehabilitation Plan (RRP)

Household whose house needs to be relocated will receive a housing rehabilitation allowance. From the field observation, it is observed that majority of the SPAF don't want to resettle voluntarily. The reasons behind unwillingness for resettlement are nearby market service centers facility, possible loss of business and service, adaptation problem in new society and good neighborhood in current place.

□ Relocation of House

20 houses of 18 HHs are affected by the project. Out of the total 20, 13 houses of 13 households will be relocated as these households do not have any other houses. They lose their place of residence.

□ Applicable Policy and Legislation

Land Acquisition Act 2034 (1977) will be the main legislative system for land and other physical asset acquisition. The procedure defined in the Act will be followed for the acquisition; Compensation Fixation Committee (CFC) will determine the compensation rates of each unit at replacement cost. Project proponent is the responsible for the implementation of RRP.

□ Entitlement Framework

The entitlement framework accordingly specifies compensation and /or rehabilitation measures for two units of entitlement individuals including affected individuals and their households, and groups. Loss of private assets will be valued and compensated based on entitlement policy matrix (Table 7-19).

□ Government Property

Government infrastructures and facilities affected by the project will be repaired or replaced in consultation with the relevant department authorities. Government forest land will be acquired by getting approval from MoFE.

□ Displacement Allowance

In addition to the compensation for asset losses, households who are losing houses will qualify for the displacement allowances. Households, which required to be relocated, will receive a housing displacement allowance equal to per capita income (per capita income is taken as \$640 which is equivalent to NRs.64,160 (@ 1\$= NRs.100.25) of six month based on the calculation for a household. Hence, the total displacement allowance for 13 houses (13 households) is estimated to be NRs. 50,04,480. The customary practice in Nepal to pay allowances or related benefit is based on average household's size. Titleholders, tenants in own accommodation and squatters will be entitled to this allowance, to be paid at the time of compensation payment.



□ Transportation Allowance

Though 13 houses will be relocated as these houses do not have any other place of residence, the total 20 project affected houses will get transportation allowance. A total of NRs. 10,00,000 (@ NRs 50,000 per HH) has been allocated as transportation allowances.

Summary of Social Mitigation Cost

The total socio-economic mitigation cost is calculated to be NRs. 1,07,52,45,912. The detailed cost analysis is shown in Table 7-10.

Table 7-10: Summary of Mitigation Cost

Description	Amount (NRs.)
Land acquisition (47.285 ha)	57,57,40,200
Land restriction(261.1585 ha)	41,72,95,662
Compensation for house and structures (30)	2,31,21,200
Compensation for loss of crops	
• Permanent loss of crops in acquisition land=129.74MT	46,13,950
• Permanent loss of crops in land restriction=1531.79MT	5,44,74,900
Displacement and Transportation Cost	60,04,480
Total	1,07,52,45,912

7.3.17 Enhancement Measures

7.3.17.1 Vegetable Farming

The proposed project will itself provide the local communities and the region with numerous opportunities for socio-economic development. As more than 65% of the TL traverses through the cultivated land and agriculture farming is the major occupation of these areas, the environment team after the extensive field investigation has concluded that the project area will benefit from the training program on improved agricultural farming system.

Kavrepalanchowk district is the pocket area for agriculture farming. To increase the agricultural production in the area, improved techniques and methods need to be introduced. A training program on improved seasonal, off-seasonal vegetable farming, mushroom farming program will be conducted for the local affected farmers, which will provide opportunities for increasing agricultural production in their farmlands. This program is especially focused for those households who lose their land 10 – 50% in the assumption that they can improve production and productivity by applying new methods and techniques. The proposed training programs are: fruits cultivation, use of organic fertilizer; irrigation techniques; appropriate cropping patterns; and methods of harvesting, processing and storage. Such training programs will be conducted in coordination with District Agriculture Development Office, District Livestock Office, District Forest Office and District Development Committee of the corresponding VDCs. Since the TL route is very long, such vegetable farming programs should be done in 3 different places. The total cost allocated for training programs regarding agriculture is NRs 16,35,000 (including cost for trainee's allowance, expert hiring, training materials, logistic support, etc.).

Table 7-11: Cost for Vegetable Farming and Mushroom Farming

S.N.	Particulars	No. of persons	No. of days	Unit cost (daily allowance)	Total Cost (NRs)
1	Training Coordinator	1	5	5000	25,000
2	Local Farmers /participants	20	5	700	70,000
3	Agronomist/Horticulturist /trainer	4	5	2500	50,000
4	Distribution of seed/ improved materials			LS	2,00,000
5	Training Materials and Logistics			LS	2,00,000
Total Cost					5,45,000
Total Vegetable Farming Cost (3 places)					16,35,000

*Out of three places, seasonal and off-seasonal vegetable farming program will be conducted 2 places and in one mushroom farming program will be done.

7.3.17.2 Livestock and Fishery Program

Animal husbandry is mainstay and it plays significant role in cash income generation for the people of the project affected area. To increase the livestock production in the area, improved techniques and methods need to be introduced. A training program on improved livestock will be conducted for the local farmers, which will provide opportunities for increasing production. This program is especially focused for those households who lose their assets in the assumption that they can improve livestock production by applying new methods and techniques. In the same way, a special fishery training program shall be conducted targeting the Majhi community residing near AP 40 of Barhabise-Kathmandu Section.

The cost allocated for one livestock training program is NRs. 8,27,500 (including cost for trainee's allowance, expert hiring, training materials, logistic support, etc.). Along the TL route, such program on livestock training shall be done in 3 different places. Thus, the total cost for livestock training is NRs. 24,82,500; whereas the fishery training will be done only in one place for specific community and the total cost is NRs. 5,00,000.

Table 7-12: Cost for Livestock Training Program

S. No.	Particulars	No. of persons	No. of days	Unit cost (daily allowance)	Total Cost (NRs)
A. Livestock Training					
1	Training Coordinator	1	5	5000	25,000
1	Local Farmers /participants	15	5	700	52,500
2	Agronomist/Horticulturist/trainer	4	5	2500	50,000
3	Distribution of Livestock			LS	5,00,000
4	Training Materials and Logistics			LS	2,00,000
Sub- total Cost (one place)					8,27,500
A. Sub-total cost (three place)					24,82,500
B.	Fishery training			LS	5,00,000
Total-Cost (A+B)					29, 82,500

7.3.17.3 Micro Enterprise Creation Training

Micro Enterprise Creation Training program will be provided to the project affected families.



Altogether 15 participants will be trained. The main objective of raining is

- To motivate the women group of PAF create/start their own business
- To develop entrepreneurship competency
- To identify and select viable business of their own
- To help for preparation of their own business plan

Table 7-13: Cost for Micro Enterprise Creation Training

S.N o.	Particulars	No. of person	No. of days	Unit cost (daily allowance)	Total Cost (NRs)
1	Local Participants	15	5	700	1,05,000
2	Trainer	4	5	2500	50,000
3	Distribution of Materials	LS			4,00,000
4	Training Materials and Logistics	LS			2,00,000
Total Cost					9,55,000

7.3.17.4 Social Awareness (Health, Sanitation and Safety) Program

An awareness program will be conducted in the project area to alert local people to the potential dangers related to health, sanitation and safety. This program will be targeted to the people residing in and around the vicinity of the corridor. It is envisaged that the influx of construction crew will increase the pressure on the existing health facilities of the area. The project proponent will be responsible for providing mobile health and sanitation facilities to its work force and this will ease the pressure on the existing facilities. The project proponent will provide technical assistance and materials for building low-cost squatting type toilets. Priority will be given to relocates. In addition, awareness program on construction related safety issues and electrocution will also be conducted for the labor force and local residents. A joint program on health and sanitation can be launched in association with the existing NGOs of the project area and other local communities during the construction phase. After the devastating earthquake, almost all the toilets of the project area as well as the nearby area were collapsed. Thus, the project shall allocate NRs.10,00,000 for awareness program.

7.3.17.5 Skill Development Program

Construction related training programs such as electrical wiring, driving, masonry (with focus on earthquake resistant structure) and automobile maintenance and repairing training will be conducted for the affected people (special focus for those households who lose land more than 50% and households who lose their residential structure) to tackle the adverse impact of the project. Duration of training will be 2 months (390 hrs) and it aims to expertise them.

Table 7-14: Cost for Skill Development Training

Expenses	Quantity	Unit Price/Month	Amount for 2 months (NRs)
1.Electrical Wiring			
Competitive Cost			
Coordinator	1 Person	15,000	30,000
Trainer-1	1 person	20,000	40,000
Trainer-2	1 person	18,000	36,000
Sub Total A			106,000
Communication costs	1 month	2000	2,000
Reproduction of reports		LS	4,000

Rent of Training Venues, Equipment Hire, Water and Electricity	1 month	10000	10,000
Training Materials	15 persons	8000	120,000
Food and Accommodation	450 days(15 persons for 30 days)	700	630,000
Sub Total B			766,000
Non Competitive Cost			
Skills Test Costs	15	5,500.00	82,500
Sub Total C			82,500
Total (A+B+C)			954,500
2. Driving*			9,54,500
3. Automobile repairing*			9,54,500
4. Masonry*			9,54,500
Grand-Total			38,18,000

*Duration of wiring training and number of participants are also same so cost for this training is also NRs. 9,54,500. Hence total cost for skill development training is NRs. 38,18,000.

7.3.17.6 Summary of Enhancement Measures

The total enhancement measure cost for the socio-economic and cultural environment is NRs.1,03,90,500.

Table 7-15: Summary of Enhancement Measure Cost

S. No.	Description	Amount (NRs)
1.	Agriculture and Mushroom	16,35,000
1	Livestock and Fishery Training	29,82,500
2	Micro-Enterprises Training	9,55,000
4	Skill Development Training	38,18,000
5	Social awareness program	10,00,000
Total		1,03,90,500

7.3.18 Corporate Social Responsibility (CSR)

As a corporate responsibility the proponent has allocated some money for the betterment of local people. Money on different programs sectors like education, health, infrastructure, service facility and religious sites has been allocated. Following are the sectors covering as CSR:

7.3.17.1 Education Support Program

Schools which are located within 500 m from the proposed TL alignment will be supported through educational support program. Support will be provided for purchase of computer, library establishment, drinking water facility, ladies toilet construction, construction activities and extra curriculum activities. After the earthquake, almost all the schools with their physical facilities are destroyed. Thus additional supports for reestablishing these schools are needed. For this provision, the total amount recommended is NRs. 50,00,000. The following schools shall be benefitted by this program.

Table 7-16: List of Schools benefitted by Education Support Program

S.No.	Name of School	Address	Remarks
1	Kamala devi Lower Sec. School	Karthali-8	within 300m
2	Sunkoshi Higher Sec. School	Karthali	
3	Nandala Devi Primary School	Chokati-7	within 500m
4	Shree Janata Primary School	Piskar-2	
5	Shree Shurke Higher Sec. School	Lakuridada	within 100m
6	Shree Shyamtar Primary School	Melung-1	within 40m
7	Shree Saraswati Sec.School	Ramche-6	within 300m
8	Kalidevi Lower Sec. School	Mankha-1	within 80m
9	Shree Bal Jyoti Primary School	Mankha-6	within 100m
10	Setidevi Primary School	Irkhu-3	within 20m
11	Suryodaya Primary School	Bhotasipa-9	20m
12	Shree Mahakali Higher Sec. School	Nayagau-1	500m

Source: field survey 2015

7.3.17.2 Drinking Water Supply

Households of the affected area will be benefited by drinking water scheme. Schools, Temples and other social infrastructures of the affected VDCs will be preferred to support for the effective management of drinking water supply, construction of water tanks in the area. The total cost for this scheme is NRs. 25,00,000.

7.3.17.3 Infrastructure and Service Facility

Project also aims to support to people/stakeholders of each project affected VDCs in the infrastructures and service facility sector. Support will be provided for renovation of community building centers for study, furniture purchasing for community forest office buildings, renovation of the play-ground for the community, strengthening public meeting place in VDCs office, etc. For this NRs. 60,00,000 has been allocated.

7.3.17.4 Additional Support Allowance

Income generation and skill orient training program are needed to the severely project affected households and vulnerable families. According to baseline report, altogether 9.49% population of project affected VDCs falls under the category of vulnerable community (Dalit and Highly marginalized group), whereas 4.57% of surveyed households are of this group. From the field study, it is also observed that the highly marginalized caste group Thami and Majhi community is residing very close to TL corridor. In this case some additional support allowance will be provided for the betterment of their present living conditions. A total of NRs 5,00,000 has been allocated as additional support allowance.



Total CSR Cost

The total CSR cost is estimated to be NRs. 1,40,00,000. The breakdown cost of each sector is shown in Table 7-17.

Table 7-17 : Summary of CSR cost

S. No.	Description	Amount (NRs.)
1.	Education	50,00,000
2.	Drinking water supply	25,00,000
3.	Infrastructure and service facility	60,00,000
4.	Additional Support Allowance	5,00,000
Total		1,40,00,000

7.3.19 Socio-economic Cost

The mitigation cost, enhancement cost, and CSR cost for implementing the socio-economic and cultural environmental aspect described in this sub-chapter is estimated to be NRs. 1,09,96,36,412. Listing of the elements and a breakdown of the costs is given in Table 7-18 below.

Table 7-18: Total socio-economic cost(U-IEE)

S. No.	Description	Amount (NRs.)
1.	Mitigation Cost	1,07,52,45,912
2.	Enhancement Cost	1,03,90,500
3.	Corporate Social Responsibility (CSR) Cost	1,40,00,000
Total		1,09,96,36,412

Table 7-18: Total socio-economic cost(approved IEE)

S. No.	Description	Amount (NRs.)
1.	Mitigation Cost	95,35,76,587
2.	Enhancement Cost	1,03,90,500
3.	Corporate Social Responsibility (CSR) Cost	1,40,00,000
Total		97,79,67,087



Table 7-19: Entitlement Policy Matrix

Type of loss	Entitlement unit	Description of entitlements	Implementation Measures
1. House and other structures			
Loss of own house and residential plot	<ul style="list-style-type: none"> Titleholders Tenant Squatter 	Cash compensation for full or partial loss of house at replacement cost, according to house type	<ul style="list-style-type: none"> Land valuation undertaken by CDC, house and other structure valuation by project authorities, compensation rate established by CDC Material may be salvaged with no deduction from compensation Displaced HHs will receive a housing displacement allowance Notice to vacate will be served at least 35 days prior to acquisition date An appropriate compensation advance and housing displacement allowance to be paid at time of notice to vacate, balance payable prior to possession of property Compensation for partial losses payable prior to acquisition To ensure fair compensation, determination of rates will be done not more than one year prior to property acquisition All transfer costs and taxes will be responsibility of project Formal resettlement planning will be undertaken where more than 10 households from one settlements/ residential area are displaced
	Titleholder	Where displaced, cash compensation (at replacement value) for residential plot, or provision of suitable replacement residential plot in the vicinity, if available.	
	Tenant	Assistance with identification of alternative residential land	
Loss of commercial establishment	Titleholder	<ul style="list-style-type: none"> Cash compensation for full or partial loss at replacement cost, according to building type Where displaced, cash compensation for plot or provision of suitable replacement plot in the vicinity if available Assistance with identification of alternative business 	<ul style="list-style-type: none"> Compensation determination, notice to vacate and compensation payment Owners of displaced commercial establishments will receive a business displacement allowance

Loss of other privately owned structures	Titleholders, Tenant	<ul style="list-style-type: none"> Cash compensation for full or partial loss at replacement cost, according to building type Cash compensation for damages to structures resulting from temporary 	<ul style="list-style-type: none"> Other structures includes: sheds, water tank, etc. Loss of structures other than houses and commercial establishment does not entail payment or a displacement allowances Compensation determination, notice to vacate
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		occupation of land	
2. Cultivable land			
Loss of private land	Titleholder	<ul style="list-style-type: none"> Provide compensation at full replacement cost Provide full title to land of equal area and productivity acceptable to owner in the vicinity If land is not available elsewhere then provide cash compensation at full replacement cost based on current market rate or government rate whichever is higher Resettlement assistance in lieu of compensation for land occupied (land, other assets, employment) at least restore their livelihoods and standards of living of pre-displacement levels. In the case of farm land, the SPAFs will be entitled the cultivation disruption allowance equal one year production 	<ul style="list-style-type: none"> A list of affected and entitled persons and the area of land loss is required Notice to vacate will be served at least 35 days prior to acquisition date If any owner having significant impacts receives cash compensation for farm land and purchases replacement farmland within 1 year from the date of receiving compensation, all related land registration fees, taxes and duties will be borne by the project Case-wise compensation will be either by cash or by cheque, depending on the owner's preferences To ensure fair compensation, determination of rates will be established not more than one year prior to property acquisition
Vulnerable social categories	Adults 18 years and older in the vicinity	<ul style="list-style-type: none"> Assistance in reestablishment and improvement of livelihood Training in life skills Preferential employment on project construction and maintenance to the extent possible 	<input type="checkbox"/> Vulnerable social categories actually affected by the project will be identified <ul style="list-style-type: none"> Dalits Landless households Women headed households
3. Government property			

Loss of infrastructure and facilities	Relevant agency	<input type="checkbox"/> Facilities will be repaired or replaced	<input type="checkbox"/> To be undertaken in consultation with the relevant department or ministry
Loss of forest areas	Department of Forest	<input type="checkbox"/> Mitigation by means of a forestation	<ul style="list-style-type: none"> An assessment of maintaining that kind of vegetation To be undertaken in consultation with DoF
Loss of government land	Relevant agency	<input type="checkbox"/> No provision of compensation	<input type="checkbox"/> Consultation with relevant government agencies
4. Other privately owned resources			

Building and structures	Local community	<input type="checkbox"/> Restoration of affected community buildings and structures to at least previous conditions, or replacement in areas identified in consultation with affected communities and relevant authorities	<input type="checkbox"/> Community buildings and structures includes: tempos, water tank, irrigation canals trails and bridges
5. Rehabilitation Assistance			
Displacement of HH-tenant	Titleholders	Housing displacement allowance for loss of own residential accommodation	<ul style="list-style-type: none"> The housing displacement allowance will be based on two months per capita income. The value of the allowance will be adjusted annually for price escalation Allowance will be paid at the time of serving the notice to vacate Displacement allowances will be paid severely
6. General counselling			
All project impacts	HHs within RoW or outside the RoW	<input type="checkbox"/> General counseling on project impacts, construction schedules and acquisition dates, valuation compensation and grievance resolution mechanisms construction employment procedures and local development initiatives	<ul style="list-style-type: none"> This will be achieved through the periodic distribution of information sheets and consultation with local officials Cooperation with GoN line agencies such as District Agriculture Office, District Forest Office to support effective resource utilization and community development



8. ENVIRONMENTAL MONITORING PLAN

8.1 Introduction

This section discusses and outlines the environmental monitoring program of TamakoshiKathmandu 400 kV TL Project. It also assists to ensure compliance with environmental laws and in ameliorating and eliminating adverse impacts. This chapter on monitoring is formulated in accordance with Environmental Protection Rules, 1997 and its amendment.

8.2 Requirements for Environmental Monitoring in Nepal

An Environmental Monitoring Plan will be required to define the responsibilities for the monitoring, the parameters that will be monitored, where the monitoring will take place and its frequency. Effective monitoring of the whole project cycle, particularly the resettlement related aspects, will assist in the identification of unexpected problems/outcomes, and facilitate the correction of these. Monitoring of socio-economic impact indicators should wherever possible be participatory, involving local groups assessing their own situations as part of the process. This will assist local communities raise their awareness about their situations and the chain of causality bringing about their situations of relative gain or loss.

Social monitoring will also be incorporated in the scope of work for construction management, so that the local labor recruitment norms and requirements, their operating conditions, rights and penalties can be closely observed in order to avoid inequities and conflicts. Social monitoring is the most effective if local community leadership and administration structures are involved in a process that is participatory, and provides recourse to recognized authority structures. Involving community leaders and local authorities often provides the means to resolve social problems identified in a direct, efficient and effective manner.

The monitoring plan for this project will be prepared directly by Project Proponent during the construction phase. Project proponent will primarily be responsible for the implementation of monitoring program. MoEn, DoED, NGOs, CBOs and local bodies will also be involved during the monitoring.

The environmental monitoring will be carried out at all the project impact areas in a regular or intermittent schedule. Compliance monitoring will be carried out regularly whereas the impact monitoring will be done at the middle and at the end of construction phase or as prescribed in the monitoring plan and schedule. (In general, observation, inspection, review of official records, interview, counting and/or measurements will be used for monitoring. Furthermore, scientific methods will be used for the monitoring requirements, where and whenever necessary.

8.3 Environmental Monitoring Unit

An Environmental Monitoring Unit (EMU) will be formed which will consist of experts from ESSD, Ministries, local administrators and other qualified personnel from the local market. EMU will be responsible for day-to-day Environment monitoring works. This Unit will consist of experts including the following;

- Environmentalist
- Sociologist
- Civil Engineer



- Electrical Engineer
- Statistician
- Field technicians
- Public Relation Officer
- Legal Officer

This unit will have two principal functions. The first is to conduct community related mitigation measures on behalf of the project (which are not specifically related to the activities of the construction contractors); while the second is the implementation of mitigation measures. The Unit will work in close co-ordination with the Project Manager/Director and NEA-TKTLP. The Unit, in addition of foreseeing mitigation and monitoring will also take care of the community problems arising during project construction. Furthermore, the Unit will use EMP as the guideline for implementing the mitigation specified in IEE, Tender Documents and Technical Specifications such that the deleterious environmental impacts were minimized.

The co-ordination of the compliance monitoring and mitigation program allocated under the contractor will be the responsibility of the project proponent. As already stated, the Environmental Unit will work for the monitoring of compliance issues of construction contractors. The Unit will be responsible for the approval of contractors Environmental Protection Plan (EPP) and Environmental Safety Plans. In addition, the Unit in coordination of Project Manager will have the authority to penalize contractors for violation of environmental tender clauses and nonperformances.

8.4 Environmental Monitoring Plan

A monitoring program required for the project to evaluate the application and effectiveness of mitigation measures is formulated in three phases.

8.4.1 Baseline Monitoring

The primary concern during this phase will be to implement field data collection programs needed to enhance the knowledge of baseline conditions. Focus will be on the gathering of scientific and sociological information needed to verify and update the data provided by this IEE process.

8.4.2 Compliance Monitoring

In this monitoring, the GoN licensing entity (MoEn/DoED) oversees and ensures the implementation of the required mitigation measures according to GoN guidelines and approved mitigation plan. The Unit will be delegated the day-to day responsibilities in this respect.

8.4.3 Impact Monitoring

Impact monitoring will focus on key indicators to assess whether the impacts have been accurately predicted, and whether the mitigation measures are sufficient and effective. The monitoring of the proposed 400 kV TL Project will include:

8.4.3.1 Physical Environment

Watershed monitoring /Land use

□ Stability of the area around the tower pads

8.4.3.2 Biological Environment

- Vegetation Clearing
- Plantation
- Casualty replacement/ re-vegetation
- Tree management
- Stability along the river crossings



8.4.3.3 Socio-economic and Cultural Environment

- Employment monitoring
- Land-use along the RoW
- Economic status of the affected people and relocated people
- Adaptation of resettlement households to their new homes and communities
- Public safety and security monitoring
- Health and sanitation monitoring
- Compensation

8.5 Grievance Redress Mechanism (GRM)

The GRM for any infrastructure project provides an effective approach for complaints and resolution of issues made by the affected community in a reliable way. Considering this, a Grievance Redressal Cell (GRC) will be established at the district level to address the social issues associated with the project. The cell will have representation from the project, local administration, civil society and the Project Affected Families. The GRC will look into complaints and concerns about ownership disputes, inheritance of assets, distribution of compensation among heirs, missing affected assets and persons in the census etc. The GRC will seek to resolve the issues quickly in order to expedite the receipt of compensation, without resorting to expensive and time-consuming legal actions. The budget for setting up the grievance cell will be provided by the Project Manager Office itself.

In addition to the above, if there are any grievances related to environmental management issues in the project area, the GR cell will record these grievances and suggestions and pass it on to the relevant authorities for necessary action and follow-up.

Table 8-1: Monitoring Plan and Schedule

SN	Parameter	Indicators	Method	Location	Schedule
A Baseline Monitoring					
Physical Environment					
1	Land Use	Changes in land use pattern	Site observation	RoW and nearby areas	Once during the construction phase and operation phase
2	Stability	Stability at tower pads	Site observation	Near tower pads	Before and after rainy season prior to construction
Biological Environment					
3	Vegetation/ Forest cover	Observation of Vegetation and maintenance of RoW	Discussions with Users Group, observation, local people and District Forest Office	Under the RoW and in the vicinity of the corridor	Once each during preconstruction, construction and operational phase
4	Wildlife	Wildlife habitat and clearance	Observation, discussion with local people	RoW and near project area	Once each during preconstruction, construction and operational phase
Socio-economic and Cultural Environment					
5	Settlement/ infrastructure	Increase in settlements/infrastructure, migration	Discussion with local people, VDCs, observation	Project affected VDCs	Once each prior to construction and operation



6	Socioeconomic cultural baseline	Update socio-economic/cultural baseline	Discussion with local people, observation, review	Project affected areas	Once prior to construction
B Impact Monitoring					
Physical Environment					
1	Land use	Stability/ landuse changes from the baseline	Observation	Around the tower pad area	Continuous observation during construction, annually during operation
2	Waste disposal	Unpleasant odour and visual impact	Observation	Temporary camps/ construction sites	Weekly during construction
3	Air Quality/ water quality		observation	Project area	Weekly during construction
Biological Environment					
4	Vegetation Clearance	No. of trees felled, ground cover	Observation of the area, discussion, counting	Under the RoW	During construction
5	Pressure on Forest	Forest Cover	Observation and survey of forest area before and after construction, discussion with local people and FUGs.	Along TL	Regular basis during construction and annually during operation
6	Wildlife	No. of wildlife seen	Observation, keeping records on wildlife, birds and	In the vicinity of the corridor	Regular basis during construction and annually during

			reptiles killed		operation
Socio-economic and Cultural Environment					
7	Compensation	Socio-economic parameters like economic status, living conditions etc. of the affected people.	Housing assets, living conditions, income etc.	Affected local people	Regularly for at least three years following land acquisition
8	Land Loss	Acquisition of land, lease of land and temporary disturbances in land	Cross checking the compensation list	Tower pad, RoW and the leased area	Quarterly during construction and once during operation
9	Health issues	Types of Diseases and record of outbreak of diseases	Record of diseases, inspection of camps of camps	Project area and particularly camps	Continuous during construction period
10	Safety	No. of casualties	Records of accidents	Project area	Continuous during construction period/operation phase
11	Employment	No. of local people employed by project	Records kept by management	Project area	Continuous during construction period and annually during operation
12	Impact on Women/ Children	Status of women children	Record of women employment; children education; inspection on child labor	Project area	Continuous during construction period
13	Indirect economic benefits	Economic activities in the area	Trade and business revenues	Project affected VDCs	Once a year during construction and once during operation
C Compliance Monitoring					
1	Incorporation of recommendations of IEE into project documents	Yes/No	Review/cross checking of tender and design documents	Kathmandu Office	During and after the project design stage completion of tender documents
2	Incorporation of Environmental considerations mentioned in tender documents in the contractors proposed work plans	Yes/No	Review of proposed work plan submitted by the contractor	Kathmandu Office/site office	During contract negotiations
3	Integration of mitigation measures in the detail design and contract document	Yes/No	Review process	Kathmandu office	During project approval



4	Allocation of adequate budget for implementation of environmental		Review, inquiry and consultation	Kathmandu office	During detail design and contract agreement
	mitigation measures and monitoring works				
5	Clean-up and reinstatement of the project area	Muck disposal, drainage around the tower	Site observation, and inspection	A round tower area, substation area	At the end of construction period
6	Compensatory plantation of native species and conservation of planted seedlings for 5 years	Type of planted Species, survival of seedlings	Site observation/sampling	Corridor inspection, tower area, plantation areas	Periodically during construction and operation
7	Land/property acquisition procedures	Compliance with national legal requirements	Discussions with local people	Affected VDCs/site office	At the time of acquisition
8	Trainings and trainees	Number of trainings and trainees	Survey/observation	Project affected area/VDCs	Periodic during construction and operation

8.6 Monitoring Cost

The monitoring costs have been estimated in Table 8-2. The total cost for the monitoring activities (for preconstruction and construction phase) has been estimated as NRs.2,45,61,000/-

Table 8-2: Environmental Monitoring Cost

S.No.	Item	Man-month	Rate/Month(NRs.)	Amount (NRs.)
A. Pre-construction Phase				
1	Manpower			
	Project Coordinator	2	37000	74,000
	Team Leader	3	33000	99,000
	Environmental Expert	2	28000	56,000
	Socio-economist	2	28000	56,000
	Support Staff	4	24000	96,000
	Sub-total			3,81,000
2	Out of Pocket Expenses			
	TA/DA		LS	1,50,000
	Field Assistant		LS	1,00,000
	Transportation		LS	1,00,000
	Report Production		LS	25000
	Miscellaneous		LS	25000
	Sub -total			4,00,000
	Total of Pre-construction Phase			7,81,000

B. Construction Phase				
1	Manpower			
	Project Coordinator	8	37000	2,96,000
	Team Leader	12	33000	3,96,000
	Unit Chief	36	42000	15,12,000
	Civil Engineer	12	28000	3,36,000
	Environmental/ Forest Expert	18	28000	5,04,000
	Socio-economist	18	25000	5,04,000
	Community Liaison Officer	6	25000	1,50,000
	Supervisor/ Monitors -6	216	25000	54,00,000
	Support Staff site office -3	108	15000	16,20,000
	Support Staff Kathmandu office -1	36	12000	4,32,000
	Cost for line agencies monitoring		LS	2,00,000
	Joint monitoring team		LS	2,00,000
	Sub -total			1,15,50,000
2	Out of Pocket Expenses			
	TA/DA		LS	5,00,000
	Transportation Vehicle purchase - Pickup	1	45,00,000	45,00,000
	Motorcycle- 2 Nos	2	1,50,000	3,00,000
	Fuel and maintenance		LS	10,00,000
	Report Production		LS	1,50,000
	Field Assistant		LS	5,00,000
	Office Rent (site office)	36x3	10000	10,80,000
	Computer and Printer		LS	5,00,000
	Community Consultation		LS	2,00,000
	Office Accessories and operation cost(site office)		LS	5,00,000
	Miscellaneous		LS	5,00,000
	ESSD Strengthening		LS	25,00,000
	Sub-Total			1,22,30,000
	Total of Construction Phase Monitoring			2,37,80,000
	Grand Total (Pre-construction and construction monitoring)			2,45,61,000

8.7 Agencies Responsible for Environmental Monitoring

As per the EPR, Ministry of Energy will be responsible for monitoring. However, the project proponent NEA will have the prime responsibility for carrying out the monitoring activities. ESSD of NEA will be the organization responsible for pre-construction and construction phase monitoring of the proposed project. The Tamakoshi-Kathmandu 220/400 kV TL Environmental Management Unit comprising the staff from ESSD, among others will be established for the construction phase of monitoring of the project. This Unit will work on behalf of TamakoshiKathmandu 400 kV TL Project. The Unit will be responsible for compliance and impact monitoring works.



8.7 Summary of Cost Benefit Assessment

According to IEE, the total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs 1,04,27,54,118/- which is 9.93% of the total project cost.

But according to U-IEE, the total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs 1,20,01,14,943/- which is 11.43% of the total project cost.

The summary of environmental cost benefit analysis is shown in Table 8-3. The proponent has obligation to carry out the mitigation, enhancement and monitoring activities of the project.

Table 8-3: Environmental Cost Benefit Analysis(U-IEE)

S.No.	Description of cost	Amount(NRs.)
1	Physical mitigation Cost	1,20,00,000
2	Biological Mitigation Cost	5,92,67,531
3	Biological Enhancement cost	46,50,000
4	Socio-economic Mitigation cost	1,07,52,45,912
5	Socio-Economic Enhancement Cost	1,03,90,500
6	CSR	1,40,00,000
7	Monitoring Cost	2,45,61,000
Total environmental cost including monitoring cost		1,20,01,14,943
Total Project cost		10,50,00,00,000
Percentage of total environmental cost to the total project cost		11.43%

Table 8-3: Environmental Cost Benefit Analysis(IEE)

S.No.	Description of Cost	Amount(NRs.)
1	Cost for environmental mitigation measures	98,91,52,618
2	Cost for enhancement measures	1,50,40,500
3	Cost for other social support program and CSR cost	1,40,00,000
4	Cost for environmental monitoring	2,45,61,000
Total environmental cost including monitoring cost		1,04,27,54,118
Total Project cost		10,50,00,00,000
Percentage of total environmental cost to the total project cost		9.93%

Implementation of Mitigation Measures, Enhancement Measures, CSR and Monitoring Activity

The proponent has prime responsible for implementing the proposed mitigation/enhancement measures, CSR and the monitoring activities. Proponent has an obligation to carry out all these activities along with cost.

9. CONCLUSION

This chapter sums up the findings and conclusions of the Environmental Team responsible for carrying out the Updated Initial Environmental Examination (U-IEE) report of the Tamakoshi-Kathmandu 220/400 kV TL Project. An overall assessment is provided first, followed by sections giving specific conclusions and recommendations.

The total land requirement will be approximately 470.92 ha for tower pads, substation and RoW. Out of that, the project requires 329.0207 ha of cultivated land, 103.2202 ha of forest land and 36.0809 ha of other land. There will be loss of 35231 trees for the RoW clearance belonging to 53 different community forest; two government forest and two leasehold forest.

The environmental issues/impacts identified during the U-IEE study can be mitigated and manageable. The finding of U-IEE shows that the adverse impacts on physical, biological, socio economic and cultural environment due to the implementation of the proposed project low/medium, local and short term. Wherever possible, efforts have been made by the project planning team to limit adverse impacts on the environment by selecting environmentally benign design options and otherwise suggesting appropriate mitigation measures. Mitigation measures has been proposed for all identified/predicted adverse impacts and enhancement measures are developed for maximize the project benefits. However, those impacts/issues now not predicted/documented in this Updated IEE Report but might appear later; will be also undertaken by Environmental Management Unit during the construction phase.

The proponent NEA will have obligation to carry out the mitigation, enhancement and monitoring activities of the project. The environmental impact mitigation measures will be incorporated in detail design of the substation and so on, contract documents. The project proponent will be primarily responsible for following acts, rules, regulations (legislation and other relevant directive of GoN) while implementing the project.

The total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs. 1,20,01,14,943 which is about 11.43 % of the total project cost. This cost also includes compensation (NRs. 99,30,35,862) to the private land acquired for the proposed project.

According to IEE, the total environmental cost (mitigation, enhancement, CSR, and monitoring costs) of the proposed project is estimated to be NRs. 1,04,27,54,118 which is about 9.93 % of the total project cost. This cost also includes compensation (NRs. 86,53,62,057) to the private land acquired for the proposed project.

In overall, this U-IEE study concludes that the proposed Tamakoshi-Kathmandu 220/400 kV TL Project shall not have significant impacts on physical, biological; socio-economic and cultural environment of the project area. Therefore, the proposed project is environmentally and socially feasible, with adoption of suggested mitigation and enhancement measures. The U-IEE study is adequate and no further study is supposed to be required regarding environmental assessment of the proposed project.



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भूमि व्यवस्था, सहकारी तथा किसान बचत निवारण मन्त्रालय

भूमि व्यवस्था, सहकारी तथा किसान बचत निवारण मन्त्रालय

मान्यता कार्यालय

चौतारा, सिन्धुपाल्चोक।

पत्र संख्या :- ०७६/०७७

मिति :- २०७६/०४/२६

च. नं. :- २६६

विषय :- सूचना टाँस गरीएको सम्बन्धमा ।

श्री नेपाल विद्युत प्राधिकरण

तामाकोशी-काठमाण्डौ २२०/४०० के. भि. प्रसारण लाईन आयोजना

खरिपाटी, भक्तपुर ।

प्रस्तुत विषयमा तहस कार्यालयको च. नं. ४९ मिति २०७६/०४/२४ को पत्रको साथ प्राप्त सूचना यस कार्यालयको सूचना पाटीमा मिति २०७६/०४/२६ गते टाँस गरिएको व्यहोरा अनुरोध छ ।

टंक प्रसाद उपपाध्याय

प्रमुख मालपोत अधिकृत





उद्योग, पर्यटन, वन तथा वातावरण मन्त्रालय
वन निर्देशनालय
डिभिजन वन कार्यालय, सिन्धुपाल्चोक
चौतारा (नेपाल)
२०७५

पत्र संख्या : २०७५/०७६
च.नं.: ८९

मिति : २०७६/०४/२६

नेपाल विद्युत प्राधिकरण,
तामाकोशी-काठमाण्डौ २२०/४०० के.भि. प्रसारण लाइन आयोजना
खरिपाटी, भक्तपुर।

विषय : सूचना टाँसको जानकारी वारे।

प्रस्तुत विषयमा तहाँको च.नं. ४९ मिति २०७६/०४/२६ गतेको पत्र साथ प्राप्त सूचना यस कार्यालयको
सूचना पाटीमा टाँस गरिएको व्यहोरा जानकारीको लागि अनुरोध छ।

शंकर राज गिरी
(नि. डिभिजनल वन अधिकृत)





गृह मन्त्रालय
जिल्ला प्रशासन कार्यालय
सिन्धुपाल्चोक

visit Nepal
2020

संख्या: ०७६/०७७
मिति: २०७६/०४/२६

पत्र संख्या ०७६/०७७

च नः ३३४

मिति २०७६/०४/२६

श्री नेपाल विद्युत प्राधिकरण
तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण आयोजना
खरिवाटि भक्तपुर।

विषय:-सूचना टाँस गरिएको सम्बन्धमा

प्रस्तुत विषयमा त्यस कार्यालयको मिति २०७६/०५/२४ च नः ४९ को पत्रानुसार प्रसारण लाइन
आयोजनको सूचना यस कार्यालयको सूचना पाटिमा मिति २०७६/०४/२६ मा टाँस गरिएको व्यहोरा अनुरोध
छ।

चिन्तामणि न्यौपाने
लेखाप्रमुख



लिखितमा हामी तपसिल बमोजिमका व्यक्तिहरु आगे नेपाल बिद्युत प्राधिकरण, तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाबाट यस आयोजनाको अद्यावधिक प्रारम्भिक बातावरणीय परीक्षण (U-IEE) को विस्तृत अध्ययन कार्यको सिलसिलामा आयोजना प्रभावित क्षेत्रका सरोकारवालाहरुको रायसुझाव प्राप्त गर्ने उद्देश्यले मिति २०७६/०४/२४ गतेको सूचना थान-१ यस सि.पा. जिल्ला ~~परेदी~~ गाउँपालिका वडा नं. १ मा आज मिति २०७६/०४/२४ गते २ बजे टाँस गरिएको व्योहरा ठिक सँचो हो भनी यो मुचुल्कामा सहिछाप गरिदियो।

रोहवरमा सहिछाप गर्नेहरु:

सि.पा. जिल्ला ~~परेदी~~ ^{गाउँपालिका} वडा नं. १ बस्ने वर्ष... को मार्बेरा शेर्पा प्रमुख

सि.पा. जिल्ला ~~परेदी~~ ^{गाउँपालिका} वडा नं. २ बस्ने वर्ष... को कमला थापा प्रमुख

सि.पा. जिल्ला ~~परेदी~~ ^{गाउँपालिका} वडा नं. ३ बस्ने वर्ष... को शर्मिला भण्डारी प्रमुख

सि.पा. जिल्ला ~~परेदी~~ ^{गाउँपालिका} वडा नं. ४ बस्ने वर्ष... को कमला अधिकारी प्रमुख

सि.पा. जिल्ला ~~परेदी~~ ^{गाउँपालिका} वडा नं. ५ बस्ने वर्ष... को जीमा भण्डारी प्रमुख

काम तामेल गर्ने :-

ईति सम्बत् २०७६ साल ४ महिना २४ गते ६ रोज शुभम्



लिखितम हामी तपसिल बमोजिमका व्यक्तिहरु आगे नेपाल विद्युत प्राधिकरण, तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाबाट यस आयोजनाको अद्यावधिक प्रारम्भिक वातावरणीय परीक्षण (U-IEE) को विस्तृत अध्ययन कार्यको सिलसिलामा आयोजना प्रभावित क्षेत्रका सरोकारवालाहरुको रायसुझाव प्राप्त गर्ने उदेश्यले मिति २०७६/४/२४ गतेको सूचना थान-१ यस सि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. ८ मा आज मिति २०७६/०४/२४ गते २ बजे टाँस गरिएको व्योहरा ठिक साँघो हो भनी यो मुचुल्कामा सहिछाप गरिदियो।

रोहवरमा सहिछाप गर्नेहरु:

सि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. ६ बस्ने वर्ष ३४ को पुष्पल तामा

हि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. १० बस्ने वर्ष ४९ को श्री धर्जन व. महरा

हि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. ७ बस्ने वर्ष ३६ को अभिषेक नेपाल

सि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. ६ बस्ने वर्ष ३० को बन्जु मौला

सि.पा. जिल्ला खलौफी गाउँपालिका वडा नं. ८ बस्ने वर्ष ६२ को वीर प्रसाद पाण्डे

काम तामेल गर्ने :-

इति सम्बत् २०७६ साल ४ महिना २४ गते ६ रोज शुभम्





नेपाल विद्युत प्राधिकरण

(नेपाल सरकारको स्वामित्व)

आयोजना व्यवस्थापन निर्देशनालय

तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजना

प.स. ०३६।३३

ब.न. ४५

श्री

मिति: २०७६/०४/२४

.....सिन्धुपाल्चोक।

विषय: सूचना टाँस गरी मुचुल्का पठाई दिने सम्बन्धमा।

प्रस्तुत विषयमा तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाको जलविरे सब-डिभिजन वन कार्यालय अन्तर्गत पर्ने ROW खण्डमा रुख संख्या बढेको हुनाले अघावधिक प्रारम्भिक वातावरणीय परिक्षण (U-IEE) गर्नु पर्ने देखिन्छ। U-IEE को प्रक्रिया अगाडी बढाउन यसै पत्र साथ संलग्न सूचना यान-१ तहोत कार्यालयको सूचना पार्टीमा सूचना टाँस गरी सूचना टाँस गरेको मुचुल्का पठाई दिनु हुन अनुरोध गर्दछु।

(नवराज ओझा)

आयोजना प्रमुख

आयोजना प्रमुख





तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाको
अद्यावधिक प्रारम्भिक वातावरणीय परीक्षण (U-IEE) प्रतिवेदन तयारीको सिलसिलामा
राय सुझावको लागि
सार्वजनिक सूचना
मिति २०७६/०४/२४

नेपाल विद्युत प्राधिकरणद्वारा प्रस्तावित तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाको प्रारम्भिक वातावरणीय परीक्षण (IEE) प्रतिवेदन वातावरण संरक्षण नियमावली २०५४ अनुसार तत्कालीन श्री ऊर्जा मन्त्रालयबाट स्वीकृत भइसकेको छ। यो प्रसारण लाईन रामेछाप बाट सुरु भई दोलखा, सिन्धुपाल्चोक, काभ्रेपलाञ्चोक, काठमाडौं हुदै भक्तपुर सम्म कुल लम्बाई १०४ कि.मी. को हुनेछ। यस आयोजनाबाट निर्माण हुने प्रसारण लाईनको पूर्व निर्धारित Route परिवर्तन भएको छैन। स्वीकृत IEE मा रहेको कुल रुख संख्या २६०६१ र वन क्षेत्रको जग्गा भोगाधिकार तथा रुख कटान हेतु तयार पारिएको रुख विरुवा लगत रिपोर्टमा कुल रुख संख्या ३५२३१ रहेको छ जुन स्वीकृत IEE रिपोर्टमा उल्लेखित रुख विरुवाको संख्या भन्दा ९१७० ले बढ्न गएको छ। उक्त रुख संख्या बढ्नुको कारण सिन्धुपाल्चोक जिल्लाको जलविरे सब-डिभिजन वन कार्यालय अन्तर्गत आयोजनाको ROW मा पर्ने रुख संख्या IEE प्रतिवेदनमा उल्लेखित-संख्या भन्दा रुख विरुवा लगत रिपोर्टमा बृद्धि हुँदा हुन गएको हो।

रुखको संख्या फरक पर्दा वातावरणमा पर्न सक्ने प्रभावको सम्बन्धमा यो सूचना प्रकाशित भएको मितिले १५ (पन्ध्र) दिन भित्र सम्बन्धित जिल्ला समन्वय समिति, गाउँपालिका, नगरपालिका, वडा, सरोकारवाला व्यक्ति वा संघ-संस्थाहरुले तल उल्लेखित ठेगानामा लिखित रायसुझाव उपलब्ध गराई नेपाल विद्युत प्राधिकरणद्वारा प्रस्तावित तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाको दिनु हुन अनुरोध छ। साथै राय सुझावको प्रतिलिपि श्री ऊर्जा, जलस्रोत तथा सिंचाई मन्त्रालय तथा विद्युत विकास विभागमा समेत पठाउन सकिनेछ।

रायसुझाव पठाउने ठेगाना

नेपाल विद्युत प्राधिकरण
इन्जिनियरिङ सेवा निर्देशनालय
वातावरण तथा सामाजिक अध्ययन विभाग
खरीपाटी, भक्तपुर
फोन नं. : ०१-६६११५८०
फ्याक्स नं. : ०१-६६११५९०
email: env.social@nea.org.np



नेपाल विद्युत प्राधिकरण
आयोजना व्यवस्थापन निर्देशनालय
तामाकोशी-काठमाडौं २२०/४०० के.भी.
प्रसारण लाईन आयोजना, खरीपाटी, भक्तपुर
फोन नं. : ०१-६६२००१६
फ्याक्स नं. : ०१-६६२००१६
email: kk400kv@gmail.com





नेपाल विद्युत प्राधिकरण

(नेपाल सरकारको स्वामित्व)

आयोजना व्यवस्थापन निर्देशनालय

तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजना

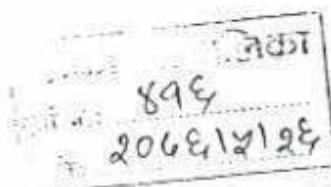
प.स. ०३६/०३७

प.न. १२३



मिति: २०७६/०५/२५

श्री बलेफी गाउँपालिका
बलेफी सिन्धुपाल्चोक।



बिषय: सिफारिस पत्र उपलब्ध गराई दिने बारे।

उपरोक्त विषयमा नेपाल विद्युत प्राधिकरणबाट प्रस्तावित तामाकोशी-काठमाडौं २२०/४०० के.भी. प्रसारण लाईन आयोजनाको अद्यावधिक प्रारम्भिक वातावरणीय परिक्षण (U-IEE) अध्ययन कार्यको मस्योदा तयार भई उक्त मस्योदाको नेपाली सारांश थान-१ जानकारीको लागि यसै पत्र साथ पठाईएको छ। यसै सन्दर्भमा यस आयोजनाको लागि राय सुझाव संकलनको लागि मिति २०७६/४/२७ गते राष्ट्रिय दैनिक गोरखापत्रमा प्रकाशित सूचना अनुसार तर्दाघाट प्राप्त गय सुझावहरू प्रतिवेदनमा समावेश गरिएको छ।

उक्त प्रतिवेदन स्वीकृतिको लागि पेश गर्न वातावरण संरक्षण नियमावली २०५४ (संशोधन सहित)को नियम १७ बमोजिम न्यस गाउँपालिकाको सिफारिस पत्र आवश्यक पर्ने भएकोले उपलब्ध गराई दिनु हुन अनुरोध गर्दछु।



(Signature)

(नवराज ओझा)

आयोजना प्रमुख

आयोजना प्रमुख



बलेफी गाउँपालिका गाउँ कार्यपालिकाको कार्यालय

प.सं. : प्र.०७६/०७७
च.नं. २०६

बलेफी,



३ नं प्रदेश, नेपाल
मिति : २०७६/०५/२६

विषय : सिफारिस गरिएको सम्बन्धमा ।

श्री तामाकोशी काठमाण्डौ २२०/४०० के.भी.प्रसारण लाइन आयोजना,
नेपाल विद्युत प्राधिकरण, खरिपाटी भक्तपुर ।

प्रस्तुत विषयमा तहांको च.नं.१२३ मिति २०७६/०५/२५ को पत्र मंगलन प्रारम्भिक वातावरणीय परिक्षण मस्यौदा प्रतिवेदनको सारांश प्राप्त भई व्यहोरा ब्रवगत भयो । नत सम्बन्धमा प्रस्तावित तामाकोशी काठमाण्डौ ४०० के.भी. प्रसारण लाईन आयोजनाका अध्यावधिक प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदन सम्बन्धमा सिफारिस गरि दिन त्यस आयोजनाबाट निवेदन दिनु भएकोले यो पत्र लेखिएको छ । उक्त प्रस्तावको अध्यावधिक प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदनमा उल्लेख भएका विषय तथा वातावरणीय प्रभाव र संरक्षणका उपायहरूको बारेमा यस कार्यालयलाई जानकारी भएकोले वातावरण संरक्षण नियमावली ०५४ को नियम १० बमोजिम उक्त प्रस्ताव कार्यान्वयन हुन सिफारिस साथ अनुरोध छ ।

२०७६/०५/२३
केदार खत्री

अध्यक्ष
केदार खत्री
अध्यक्ष



Appendix F

Route Alignment Map of TK 220/400 kV TL

Appendix A

Transmission Line License and concerned Letters





नेपाल सरकार

ऊर्जा मन्त्रालय

विद्युत विकास विभाग

अनुमतिपत्र महाशाखा

(.....)

दिनांक

०७/०८/७५
०७/०८/७५
०७/०८/७५

फ्याक्स (२७७-१)-४७८२२४९

पोष्ट बक्स नं. २५७७

बापानाउँ, अनामनगर

काठमाडौं, नेपाल

मिति

०७/०८/७५

पत्र संख्या :- ०७४/७५

चलानी नं. ६८०

विषय:- विद्युत प्रसारणको अनुमतिपत्र जारी गरिएको सम्बन्धमा।

✓ श्री नेपाल विद्युत प्राधिकरण

दरबारमार्ग, काठमाडौं।

पो.ब.नं. १००२०, प्रधान कार्यालय।

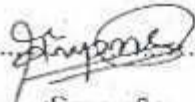
सम्पर्क फोन नं. ०१-४९५३९९४, ४९५३०५५

फ्याक्स: ०१-४९५३००९

ईमेल: neamd@nea.org.np

प्रस्तुत विषयमा तहोराट तामाकोशी - काठमाडौं २२०/४०० के.भी. विद्युत प्रसारण लाईन आयोजना (४०० के.भी. तथा १३२ के.भी.) को विद्युत प्रसारणको अनुमतिपत्र जारी गरिदिनुपर्ने सन्दर्भमा पेश गर्नुभएको दरखास्त उपर कारवाही हुँदा नेपाल सरकार, ऊर्जा मन्त्रालय, विद्युत विकास विभाग(महानिदेशकस्तर) को मिति २०७४/०७/२७ को निर्णयानुसार मिति २०७९/०७/२६ सम्म बहाल रहने गरि विद्युत प्रसारणको अनुमतिपत्र (संख्या: वि.वि.वि. ०७४/७५, वि.प्र. ९०) जारी गरिएको व्यहोरा जानकारी गराईन्छ।

संलग्न: विद्युत प्रसारणको अनुमतिपत्र (संख्या: वि.वि.वि. ०७४/७५, वि.प्र. ९०)



(विजय पुरी)

इन्जिनियर

बोधार्थ:

श्री ऊर्जा मन्त्रालय, सिंहदरबार

श्री महानिदेशकज्यू, विद्युत विकास विभाग

श्री विद्युत विकास विभाग

> आयोजना अध्ययन महाशाखा

> निरीक्षण तथा अनुगमन महाशाखा

> योजना महाशाखा

> आर्थिक प्रशासन शाखा: मिति २०७३/०४/०६ मा आ.र.नं. ४८३८ ने.स.बै.ध.भौ.नं. ०७०२०२ बाट विद्युत प्रसारणको अनुमतिपत्र बापत राखेको प्रौढी रकम रु. ४०,००,०००/- (रुपैया चालिस लाख मात्र) विद्युत प्रसारणको अनुमतिपत्र जारी गरिएकोले राजस्व खातामा जम्मा हुन।

श्री जिल्ला जलश्रोत समिति, रामेछाप।

श्री जिल्ला जलश्रोत समिति, दोलखा।

श्री जिल्ला जलश्रोत समिति, सिन्धुपाल्चोक।

श्री जिल्ला जलश्रोत समिति, काभ्रेपलाञ्चोक।

श्री जिल्ला जलश्रोत समिति, भक्तपुर।

श्री जिल्ला जलश्रोत समिति, काठमाडौं।





नेपाल सरकार
ऊर्जा मन्त्रालय
विद्युत विकास विभाग

विद्युत प्रसारणको अनुमतिपत्र

(तामाकोशी - काठमाण्डौ २२०/४०० के.भी. विद्युत प्रसारण लाईन आयोजना)

अनुमतिपत्र संख्या: वि.वि.वि. ०७४/७५, वि.प्र.१०

श्री नेपाल विद्युत प्राधिकरण

प्रधान कार्यालय, काठमाण्डौ ।

महाशयः

विद्युत प्रसारणको अनुमतिपत्र प्राप्त गर्नु मिति २०७४/०३/१९ मा पेश गर्नुभएको दरखास्त अनुसार देहायको विवरण छौं।
विद्युत ऐन, २०४९ को दफा ४ को उपदफा (२) र विद्युत नियमावली २०५० को नियम १३ बमोजिम यो अनुमतिपत्र प्रदान गरिएको छ।

१. विद्युत प्रसारणको सर्वेक्षण गर्न चाहने व्यक्ति वा संगठित संस्थाको पुरा नाम र हेतुमा
श्री नेपाल विद्युत प्राधिकरण
१२२२२२२२ काठमाण्डौ।
पो.ब.नं. १००२०, प्रधान कार्यालय।
सम्पर्क फोन नं. ०१-४४२१९४४९४३०४४
फ्याक्स: ०१-४९२९०७९
२. प्रसारण परियोजनाको नाम
नेपाल विद्युत प्राधिकरणको केन्द्रीय ग्रिड प्रणाली अन्तर्गतको तामाकोशी - काठमाण्डौ २२०/४०० के.वी. विद्युत प्रसारण
लाइन आयोजना।
३. विद्युत प्रसारण क्रान्तिबाट कति पुरानो हो सो को विवरण
जनकपुर अञ्चल रामेछाप जिल्लाको फुलेसी गा.वि.स.मा नेपाल विद्युत प्राधिकरणको निर्माणधन डिम्ती सबस्टेशनबाट सुरु
भई, सिन्धुपाल्चोक जिल्लाको बाह्रविशे गा.वि.स. मा प्रस्तावित बाह्रविशे सबस्टेशनसम्म (विन्ती - बाह्रविशे खण्ड) र गिरी
जायसिरे सबस्टेशनदेखि सिसुवा खण्डसम्मको जिल्लाको शक्रपुर देवपुर गा.वि.स. स्थित प्रस्तावित सप्तरीको सबस्टेशन हुने
भक्तपुर जिल्लाको चौधखेल गा.वि.स.को मपतडाँडा सबस्टेशन सम्म (बाह्रविशे - काठमाण्डौ खण्ड) सम्म करिब
११.३६ कि.मी।

४. विद्युत प्रसारणको पोस्टबोर्ड परिमाणहरू
पोस्टबोर्ड ४००/००० पोस्ट (विद्युत सर्किट) र १३२.००० पोस्ट (अडवाइजर मन्टिपन सर्किट)
परिमाण १०० मीटर हो।

५. अनुमतिपत्र महात्मा ज्योतिबा फुले प्रति
मिति: २४/०१/०३ तारीख: २०११-०७-२६ सम्म।

- (क) त्यसै संस्थाको विद्युत् प्रसारण विभाग सँगै नयाँ परीक्षण आयोजना सम्बन्धी निम्न प्रमाणपत्रहरू प्राप्त भएताले विद्युत् प्रसारण विभागको (Transmission Dept.) अनुमतिपत्र (आ) तामाकोशी-२ काठमाडौँ-४०० के.वी. विद्युत् प्रसारण लाईन आयोजनाको अन्तिम प्रतिवेदन (Final Report, New Kathmandu - Dharanish 400 KV Transmission Line Survey September, 2012) र (अ) तामाकोशी-२ काठमाडौँ-४०० के.वी. विद्युत् प्रसारण लाईन आयोजनाको अन्तिम प्रतिवेदन (Final Report, Detailed Survey of Dharanish-Kathmandu 400 KV Transmission Line Alignment (Received January 2016) तथा प्रारम्भिक प्रतिवेदन (Preliminary Report for Tanakoshi - Kathmandu 400 KV Transmission Line and Associated Feeder Lines July 2015) (अ) नेपाल सरकारको सूची संशुद्धि (संशुद्धि) को मिति २०७३.०२.०९ को विद्युत् प्रसारण विभागको तामाकोशी-२ काठमाडौँ-४०० के.वी. प्रसारण लाईन आयोजनाको प्रारम्भिक चर्चाबरावीपरीक्षण (अ) प्रतिवेदन (Initial Interim/Preliminary Examination (IEE) Report of Tanakoshi - Kathmandu 400 KV TL Project April 2015) को

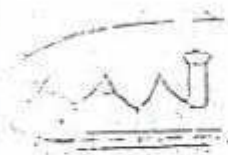
विधुता परागना समुत्पिने (संकेत) वि. वि. वि. ७५४/७२ वि. प. ९०१



2004

पाना - १/१

मिति: २२/०९/२०२०



नेपाल नागरिक उड्डयन प्राधिकरण

प्रधान कार्यालय, चक्रसहस्र, काठमाडौं, नेपाल।

फाइल नं.- ०६२/०६३/११५

ATM

मिति:- २०७२/१२/१६

(ए.टि.एम. विभाग)

श्री नेपाल विद्युत प्राधिकरण,
इन्जिनियरिङ्ग सेवा निर्देशनालय
वतावरण तथा सामाजिक अध्ययन विभाग।

नेपाल विद्युत प्राधिकरण	
वतावरण तथा सामाजिक अध्ययन विभाग	
दर्ता:	६४३
मिति:	०६२/१२/२९

विषय:- तामाकोशी-काठमाण्डौ ४०० के.मि. प्रसारण लाईन आयोजनाको Route Alignment सम्बन्धमा।

प्रस्तुत विषयमा तहाँ कार्यालयको मिति २०७१/९/३० च.नं. ३१३ को पत्रको ब्यहारा अवगत भयो। प्रस्तावित तामाकोशी-काठमाण्डौ ४०० के.मि. प्रसारण लाईन आयोजनाको Route Alignment बाट वायुयानहरूको रुटमा पर्नसक्ने प्रभावको सम्बन्धमा निम्नानुसार हुनुपर्ने ब्यहोरा आदेशानुसार अनुरोध गरिन्छ।

१. SS-M, AP121 देखि 125 सम्म काठमाण्डौ एयरपोर्टको Aerodrome Traffic Zone भित्र पर्ने तथा AP101 देखि SS-M, काठमाण्डौ एयरपोर्टको Control Zone भित्र पर्ने र Mountain Flight को Approach Track corss गर्ने देखिएको।

२. खिम्ती-बाह्रबिसे प्रसारण लाईनले काठमाण्डौ-लुक्ला Track र G348 Route corss गर्ने देखिएको। यो लाईन जिरी एयरपोर्टको Aerodrome Reference Point (ARP) बाट 259° को bearing मा करिब 8.1 NM को दुरीमा पर्ने तथा रामेछाप एयरपोर्टको ARP बाट 017° को bearing मा करिब 6.3 NM को दुरीमा पर्ने देखिएको।

३. Flight movement को हिसाबले Obstacle हुने त्यस्ता स्थानहरूमा Marker Ball अनिवार्य रुपमा राख्नुपर्ने र Pylon को Colouring रातो र सेतो Strip हुनुपर्ने।

४. Aerodrome Traffic Zone (ATZ) भित्र पर्ने टावरहरूको अधिकतम उचाई 15 meter, ATZ भन्दा बाहिर 10 NM सम्म 20 meter र सो भन्दा बाहिरको Area हरूमा 25-30 meter भन्दा बढिको उचाई हुन नहुने।

५. त्यसका साथै एक डाँडाको टुप्पाबाट अर्को डाँडाको टुप्पामा सोफो तार नतार्ने पहिले एक डाँडाको टुप्पाबाट तल फेदीमा स्थापित र सो स्थानबाट मात्र अर्को डाँडाको टुप्पामा तार लैजाने व्यवस्था हुनुपर्ने।



घोषणा

नेपाल विद्युत प्राधिकरण

वतावरण तथा सामाजिक अध्ययन विभाग

मिति: २०७२/१२/१६

स्थान: काठमाडौं

संकेत: २५५

२५५

२५५

२५५

देवनाथ सिटोला

नि. निर्देशक

ए.टि.एम. विभाग

श्री Air Navigation Service निर्देशनालय, ने.ना.उ.प्रा.का।

Appendix B
Summary of Tree Enumeration Report of Concerned
District in Tippani Pana





डिभिजनल वन कार्यालय, दोलखा

गो संख्या :-

३ न प्रदेश चरिकोट, नेपाल

मिति: २०८२/११/०६

विषय:-

टिप्पणी र आदेश

निम्न :

सि.नं	सा.ब.उ.सको नाम	ठेगाना	सामुहिको निर्णय मिति	पत्रको च न र मिति	आयोजनाले प्रयोग गर्ने वन क्षेत्र तथा हटाउनु पर्ने रुख बिरुवा संख्या			
					रुख संख्या	पोत	प्रयोग हुने वनको क्षेत्रफल(हे)	
							स्थायी	अस्थायी
१	कृषि सल्लेरी सा.ब.उ.स	भि.न.पा.-७ दोलखा	२०७४/०१/०५	७-२०७५/०२/२८	१५७	०	०.९४	०.६२
२	बिचौर सा.ब.उ.स	भि.न.पा.-५ दोलखा	२०७५/०१/२९	७/२०७५/०२/२२	५२	०	०.००	०.३४
३	सिलाकुण्ड सा.ब.उ.स	भि.न.पा.-५ दोलखा	२०७५/०८/२५	३/२०७५/०८/२५	४४४	०	०.४५	१.६७
४	जमलेखर्क सा.ब.उ.स	भि.न.पा.-७ दोलखा	२०७५/०१/२०	५/२०७५/०१/२०	६७	०	०.९४	०.९०
५	डाढे सा.ब.उ.स	भि.न.पा.-७ दोलखा	२०७५/०१/१५	६८/२०७५/०१/२०	१५२	०	०.९४	१.४८
६	शिमसुंगुरे सा.ब.उ.स	भि.न.पा.-५ दोलखा	२०७५/०१/२३	१/२०७५/०२/२८	१३३	०	०.०८	०.६९
७	जमलामाई सा.ब.उ.स	भि.न.पा.-५ दोलखा	२०७५/०१/१६	१९/२०७५/०१/३१	३२	०	०.०७	०.१४
८	धिपेखवर सा.ब.उ.स	भि.न.पा.-८ दोलखा	२०७५/०१/०३	१/२०७५/०१/१८	३१	०	०.१७	१.४४
९	नाफे वानमारा सा.ब.उ.स	भि.न.पा.-९ दोलखा	२०७५/०२/२४	०७५/०९/०१	४५	१८८	०.१८	३.४२
१०	चर्नावर्ती सा.ब.उ.स	शैलुङ-७ दोलखा	२०७५/०२/१९	४६/२०७५/०२/२४	२८७	८६९	०.५८	६.७२
११	सिल्लीदबी सा.ब.उ.स	मैलुङ-७ दोलखा	२०७५/०१/०३	०१/२१/७०/२०७५/०३/३	२	२३	०.००	०.४२
१२	रुम्टीराम्चे सा.ब.उ.स	मैलुङ-७ दोलखा	२०७५/०१/२१	१७४४०/२०७५/०२/२२	४	१००	०.०७	०.४९
१३	वानेको साभोको सा.ब.उ.स	मैलुङ-७ दोलखा	२०७५/०२/२०	/२०७५/०३/२०	६६	८८	०.२२	२.३२
१४	मूलपानि सा.ब.उ.स	मैलुङ-१ दोलखा	२०७५/०५/२३	७/२०७५/०२/१९	१५७	३९०	०.१८	२.१०
१५	घहरेभदौरे सा.ब.उ.स	मैलुङ-१ दोलखा	२०७५/१२/२९	१५१/२०७५/०२/२१	१५३	१९८	०.२५	२.२१
१६	बालुवा भसुमेस्थान सा.ब.उ.स	मैलुङ-१ दोलखा	२०७५/१२/१९	०५/२०७५/०२/२०	१३७	३५३	०.०९	२.१३
१७	भ्याकुरे ढोकेभिर सा.ब.उ.स	मैलुङ-१ दोलखा	२०७५/१२/१६	२०/२०७५/०५/१८	४६	१०७	०.००	०.२९
जम्मा					१९७५	२३१६	२.६९	३२.६५

प्रदेश सरकार

प्रदेश तृतीय

उद्योग, पर्यटन, वन तथा वातावरण मन्त्रालय

वन निवेदनालय

डिभिजन वन कार्यालय, सिन्धुपाल्चोक



मिति: २०७५/११/०६

विषय: भोगाधिकार सम्बन्धमा

टिप्पणी आदेश

मान्,

तुल विषयमा तहो जिल्लामा कार्यालय वन तामाकोशी काठमाण्डौ ४०० के.मि. प्रसारण लाइन जलावेष्ट आयोजनालाई वन वको जग्गा भोगाधिकार उपलब्ध गराउने सम्बन्धमा तपसित वमोजिमको विवरण अपुग मएकलो खुवाइ प्रलाइ दिनुन भनि वन तथा सरक्षण विभागको चन २४९ मिति २०७५/११/१२ गतेको प्राप्त पत्रादेशानुसार प्रसारण लाइनमा पर्ने वन भवसग सम्बन्धित व.का.हरुलाई तामाकोशी काठमाण्डौ ४०० के.मि. प्रसारण लाइन जलावेष्ट आयोजना कार्यालयको लागि अर्जुनभन्ज्या पर्ने सामुदायिक वनको काँडाइवेष्ट नक्सा, हटारनु पर्ने खुवाइरुवाको प्रमाणित लगत विवरण, सम्बन्धित सन डिभिजन वन कार्यालयको मिल्ड प्रतिवेदन र सामुदायिक वन उपभोक्ता समूहको साधारणसभाको निर्णय समेत प्राप्त गरी राखे जाय पठाउनु यस कार्यालयको चन ०७३ मिति २०७५/०९/२३ को पत्रबाट लेखि पठाएको रहेछ।

समा आयोजनाको आयोजना सरकार जग्गाको जग्गा भना गरी सो स्थानमा खुवाइरुवा राख्नु पर्ने २४ को जग्गा र वन सरक्षण र खुवाइरुवाको जग्गा सम्बन्धित आयोजनाबाट रहे गरी राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन वन उपयोग गर्ने सम्बन्धित सायविधि, २०७३ बमोजिम वन वको जग्गा प्रस्ताव तामाकोशी काठमाण्डौ ४०० के.मि. प्रसारण लाइन आयोजनालाई भोगाधिकार उपलब्ध गराउनु र अर्जुनभन्ज्या पर्ने तपसित वमोजिमका २७ वटा सामुदायिक वन र विटा र वनियत वन र २ वटा सरकारदारा व्यवस्थित वनको खुवाइरुवा हटारनु मनाशिव देहि आचार्यक निम्न योग राखे साथ भरी गएको छ।

आपरा

संज्ञा	वनायक नाम	ठेगाना		नजारेट नफाको रकम		पुनः वन भवस तस्मा	सोपानित
		ठाकाना	नजारेट	मिल्लो	जयतन		
१	श्री. ज्ञानेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
२	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
३	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
४	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
५	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
६	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
७	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
८	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
९	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन
१०	श्री. राजेश्वर राय	इलावती गाउँपालिका-१०	१०	१०	१०	१०	सुन



१९७१ मङ्सिर

संयोजक, वन विभाग, काठमाडौं

वन विभाग, काठमाडौं

१९७१ मङ्सिर

१९७१ मङ्सिर १९



डिमिजन् वन कार्यालय काभ्रेपलाञ्चोक

कार्यालय, मुनिपल, काभ्रेपलाञ्चोक जिल्ला

१९७१ मङ्सिर १९

१९७१

१९७१ मङ्सिर १९

विषय - वन क्षेत्रको जग्गा भोगाधिकार तथा रूख हटाउने सम्बन्धमा ।

टिप्पणी र आदेश

श्रीमान् महानिर्देशकजी,

प्रस्तुत विषयमा साविक वन विभागको च.न. २४६ मिति २०७३/११/१३ गतेको प्राप्त पत्रानुसार तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण आयोजनाको फाईल प्राप्त भई सो पत्र सम्बन्धमा यस जिल्लामा कार्यान्वयन हुने तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन जलविद्युत आयोजना लाई वन क्षेत्रको जग्गाको भोगाधिकार उपलब्ध गराउने सम्बन्धमा यस विवरण खुलाई सो वन क्षेत्रको जग्गा भोगाधिकार उपलब्ध गराउने सम्बन्धमा बुदागत रूपमा उल्लेख गरी सम्पूर्ण प्रक्रिया पूरा गरी साविक जिल्ला वन अधिकृतको एकित राय पेश गर्नु भन्ति लेखि साविक जिल्ला वन कार्यालय काभ्रेबाट पठाइएको सबैकले फाइल सहित फिर्ता आएको देखिन्छ । सो सम्बन्धमा व्यतावित तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन निर्माणका क्रममा काभ्रेपलाञ्चोक जिल्ला भित्र ६ वटा सामुदायिक वन क्षेत्र पर्ने देखिन्छ । ती सामुदायिक वन क्षेत्रमा हटाउनु पर्ने विभिन्न जातका पौल साइजका (रुख) १२४५ र रुख १७९ गरि जम्मा १४२४ वटा रुख हटाउनु पर्ने देखिन्छ । जनु स्विकृत IEE प्रतिवेदनमा सामुदायिक वन र साविकमा सरकारबाट खरिदीत भएका पाल ८१५ र रुख २३४८ गरि जम्मा १७६३ वटा रुख हटाउनु पर्ने भनिएको छ । आएको दस्तावेजमा उल्लेखित अधिकृतको कमचारीहरूको हस्तमा माथि उल्लेखित ६ वटा सामुदायिक वन क्षेत्रमा जलवायुको स्तयाक अनुसार स्विकृत IEE प्रतिवेदनमा उल्लेख गरिएको भन्दा पाल ४२२ वटा र रुख १२४५ वटा कम हटाउनु पर्ने देखिन्छ । सो आयोजना निर्माणका क्रममा भएका जलवायुको स्तयाक अनुसार हटाउनु पर्ने पाल तथा रुख साइजको रूख विवरणहरूको सम्बन्धमा यस्ता जिल्लाको जलवायुको स्तयाक अनुसार तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइनको स्तयाक अनुसार गरी हटाउनु पर्ने वन सामुदायिक वन क्षेत्रको कुल १२४५ वटा रुख जम्मा उपयोग हुने देखिन्छ ।

स्वतन्त्र प्रतिवेदन अनुसार ६ वटा सामुदायिक वन क्षेत्रको रूख हटाउनु पर्ने पाल तथा रुख विवरण सम्बन्धी तथ्यांक विवरण तल नमोजिम रहेको छ ।

सामुदायिक वन क्षेत्र	जलवायुको स्तयाक अनुसार	पाल	रुख
१. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	१. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५
२. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	२. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५
३. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	३. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५
४. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५
५. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	५. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५
६. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	६. तामाकोशी-काठमाण्डौ ४०० के.भि. प्रसारण लाइन	४२२	१२४५



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संक्षेपः प्रश्नः, ३३. नमः राजाधर्या, मन्त्रालय

Figure 1. Schematic diagram of the experimental setup.

प्रत्यक्ष न. :

डिभिजनल कले कार्यालय काभ्रेपलाञ्चोक

संस्कृत-विश्वविद्यालय, काठमाडौं, नेपाल



मिति - २०७५/१२/०७

विषय

टिप्पणी र आदेश

तपसिल

३	पौवा	मण्डनदेउपुर-७	१५	१६७	०	०.८८	०.८८
४	धाइतार हुडेपाखा	मण्डनदेउपुर-८	१	१२७	०.१४४९	०.११५१	०.२६
५	नौलेडाँडा	मण्डनदेउपुर-४	१५	२५६	०.१०५८	०.३६४२	०.४७
६	घारवादे	मण्डनदेउपुर-४	४	२०८	०	०.४०	०.४०
जम्मा			१७९	१२४४	०.५५४९	८.६४५९	९.२

उल्लेखित तालिका बमोजिमका पोल तथा रुखहरूको प्रमाणित लगत यसै टिप्पणी फाइलमा सलग्न छ । नेपाल सरकार उर्जा मन्त्रालय माफत जारी उर्जा संकट निवारण अवधारण पत्र २०७२ को वृदा नं. २७ मा विद्युत उत्पादन, प्रसारण तथा वितरण सम्बन्धी यसै आयोजनाहरू राष्ट्रिय प्राथमिकता प्राप्त आयोजना हुने छ भनि उल्लेख प्रारणको देखिन्छ । सम्बन्धित आयोजनाको तर्फबाट आयोजना निर्माणका क्रममा चर्चो हुने गरी उर्जा मन्त्रालय र यस कटान समितिको नेपाल सरकारबाट भएका सम्पूर्ण निर्णयहरू आयोजनाबाट माफत उर्जा मन्त्रालय र उर्जा प्राप्ति प्राप्त भनाको सति निवेदित पत्रको प्रतिनिपी यसै साथ सलग्न छ ।

[illegible]

9

प्रदेश सरकार

३ नं प्रदेश

उद्योग, पर्यटन, वन तथा वातावरण मन्त्रालय

वन निदेशालय

डिभिजन वन कार्यालय, काठमाडौं

(टिप्पणी र आदेश)



हात्तीसार

काठमाडौं, नेपाल

मिति: २०७५.११.२३

र मिति :-

विषय:- वन क्षेत्रको जग्गा भोगाधिकार तथा रुख विरुवा हटाउने सम्बन्धमा ।

श्रीमान महानिर्देशकज्यू,
वन तथा भू-संरक्षण विभाग
बबरमहल, काठमाडौं

प्रस्तुत विषयमा नेपाल विद्युत प्राधिकरणबाट प्रस्तावित तामाकोशी-काठमाडौं ४०० के.भी. प्रसारण लाईन आयोजनाको स्वीकृत प्रारम्भिक वातावरणीय प्रतिवेदन (IEE) अनुसार आयोजना निर्माणको क्रममा प्रयोग हुने वन क्षेत्रको जग्गाको भोगाधिकार तथा हटाउनु पर्ने रुखहरूको सम्बन्धमा, सो आयोजनाको तर्फबाट तत्कालीन वन तथा भू-संरक्षण मन्त्रालयमा पेश भएकोमा तत्कालीन वन विभाग, बबरमहल, काठमाडौंको च.नं ४९३ मिति २०७५.१२.१४ गतेको पत्र मार्फत थप विवरण सुताई सो आयोजनालाई वन क्षेत्रको जग्गा भोगाधिकार उपलब्ध गराउने सम्बन्धमा बुदागत रूपमा उल्लेख गरी सम्पूर्ण प्रक्रिया पूरा गरी जिल्ला वन अधिकृतको एकीन राय पेश गर्नु भनी लेखी आएको । सो सम्बन्धमा प्रस्तावित तामाकोशी-काठमाडौं ४०० के.भी. प्रसारण लाईन निर्माणको क्रममा काठमाडौं जिल्ला भित्रका २ वटा सामुदायिक वन क्षेत्र पर्ने देखिन्छ । साथै ती सामुदायिक वन क्षेत्रमा हटाउनु पर्ने विभिन्न जात र नाप साईजका रुख प्रोतको संख्या ८५५ निम्ति जन स्वीकृत IEE प्रतिवेदनमा समावेश गरिएको भन्दा २६२ ले कम हो । सो आयोजना निर्माणको क्रममा प्रयोग हुने वनक्षेत्रको जग्गा तथा हटाउनु पर्ने रुख विरुवाको सम्बन्धमा स्थलगत निरीक्षणमा जाटने भएकोमा श्री धुब कुमार ब्रष्टको स्थलगत प्रतिवेदनबाट २ वटा सामुदायिक वन क्षेत्रको स्थलगत निरीक्षणको क्रममा प्रयोग हुने देखिन्छ । स्थलगत प्रतिवेदन अनुसार वन क्षेत्रको प्रयोग हुने जग्गा तथा हटाउनु पर्ने रुख विरुवाको सम्बन्धी तथ्यांक विवरण तपसिल बमोजिम रहेको देखिन्छ ।

सि.नं	सावउसको नाम	ठेगाना	सावउसको क्षेत्रफल (वर्ग मीटर)	पत्रको च.नं	आयोजनाको प्रयोग हुने वन क्षेत्रको जग्गा तथा रुख विवरण	
					जग्गा (वर्ग मीटर)	रुखको क्षेत्रफल हे. (वर्ग मीटर)
१	कुसुम सावउस	राखारपु	२०७५.११.१३	४३१७५/१३	२०७५.११.२३	७६५५२
२	लम्बेडाडा सावउस	राखारपु	२०७५.११.१३	४३१७५/१३	२०७५.११.२३	११०४
		जम्मा			४१५३५६	



राज्य टिप्पणी, भक्तपुर, नेपाल
टिप्पणी र आदेश

मिति : २०७५.११.२१०४

विषयः वनस्पतः रक्षायाः प्राथमिकतया रक्ष तटारुने सावधानता ।

श्रीमान् महानिदेशकज्यू
वन तथा भू-संरक्षण विभाग ।

प्रस्तुत विषयमा साविक विभागको चन २४९ मिति २०७३/१९२ गतेको प्राप्ति पत्रानुसार तामाकोशी-काठमाण्डौ ४०० के.मि. प्रसारण लाईन आयोजनाको फायल-प्राप्त भई सो पत्र सम्बन्धमा यस जिल्ला भित्र कार्यान्वयन हुने तामाकोशी-काठमाण्डौ २२०/४०० के.मि. प्रसारण लाईन आयोजनालाई बत क्षेत्रको जग्गाको भोगाधिकार उपलब्ध गराउन बुदायत रूपमा उल्लेखित सम्पन्न प्रक्रिया पुरा गरी पेश गर्न लेखिआएको हुँदा उक्त प्रस्तावित तामाकोशी-काठमाण्डौ २२०/४०० के.मि. प्रसारण लाईन आयोजनाका कम्पमा यस जिल्लाको निचोटा सामुदायिक वन क्षेत्र पर्ने देखिन्छ । उक्त सामुदायिक वनको जग्गा तथा हस्तान्तरण गर्ने स्थ विरुदाको विवरण तामा अनुसार रहेको देखिन्छ ।

प्रयोग प्रति प्रयोग गर्ने वन क्षेत्रको जम्मा तथा स्व विरुवाको वितरण			
सि.नं	सा.व.को नाम	ठेगावा	प्रयोग गर्ने वन क्षेत्रको क्षेत्रफल हे
			स्थायी
१	माने डाँडा	१०	०.२५०० हे

[illegible][illegible][illegible]

Appendix C

Public Notice



Appendix D

Letter of Approved IEE





३१०००



राष्ट्रिय श्रमजीवन आयोगको
सचिवालय

पत्र नं. १२५५
पत्र नं. १२५५/११३
पत्र नं. १२५५/११३
पत्र नं. १२५५/११३
पत्र नं. १२५५/११३
पत्र नं. १२५५/११३

१२५५/११३

राष्ट्रिय श्रमजीवन आयोगको सचिवालय

१२५५/११३

सम्बन्धमा जलविद्युत क्षेत्र अन्तर्गत राष्ट्रिय प्राथमिकता प्राप्त आयोजनाहरूको सिफारिस
गर्दा २०७५/०७/०७ मा राप्ती नदीको माथिल्लो तटस्थानमा बर्तमान परिदृश्यमा जलविद्युत
आयोजनाहरूको सिफारिस गर्दा प्राथमिकता प्राप्त आयोजनाको रूपमा लिई भर्ती नीतिगत
अनुसार भर्ती गर्दा हुने गर्दछ।

१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३

१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३
१२५५/११३





उर्जा मन्त्रालय

प.सं.

०७३/१२/२४

५४२४४

नेपाल विद्युत प्राधिकरण	
वातावरण तथा सामाजिक जलवायु विभाग	
दस्तावेज नं. ५५९	मिति ०७/३१/२०७४
मिति ५५९/२१/२४	

विषय: तामाकोशी - काठमाण्डौ ४०० के.वि. विद्युत प्रसारण लाइन आयोजनाको प्राथमिक वातावरणीय परीक्षण प्रतिवेदन स्वीकृत सम्बन्धमा।

श्री नेपाल विद्युत प्राधिकरण,

काठमाण्डौ प्रशासकीय :

उपरोक्त विषयमा तहसिलाद्वारा पेश भएको तामाकोशी - काठमाण्डौ ४०० के.वि. प्रसारण लाइन आयोजनाको प्राथमिक वातावरणीय परीक्षण प्रतिवेदन वातावरण संरक्षण ऐन, २०५२ को दफा ६(१) एवं वातावरण संरक्षण नियमावली, २०५४ को नियम ११(१) बमोजिम उर्जा मन्त्रालयको मिति ०७/३१/२०७४ को निर्णय (सचिवालय) अनुसार निम्न शर्तहरू सहित स्वीकृत भएको अहोरा अनुमति छ। (स्वीकृत प्रतिवेदनको एक प्रति संलग्न छ।)

शर्तहरू

- आयोजना निर्माण एवं सञ्चालनको समयमा प्रतिवेदनमा पहिचान भएका प्रभावहरूको अवस्था प्रतिवेदनमा हाल पहिचान वा आँकलन नभएका प्रभावहरू देखिने सम्भावना भएमा तत्पक्ष देखिएका अनुकूल प्रभावहरू लाई अधिकतम गर्ने र प्रतिकूल प्रभावहरू लाई न्यून गर्ने कार्य प्रस्तावकले प्राथमिकतामा गर्नुपर्ने छ।
- स्वीकृत प्राथमिक वातावरणीय परीक्षण प्रतिवेदनमा उल्लेख भए अनुसारको वातावरणीय अनुगमन योजना लाई आधार बनाई प्रस्तावकले निर्माण कार्यको मध्यमा "मध्यावधि" र निर्माण कार्य सम्पन्न भएपछि "अन्तिम" आन्तरिक वातावरणीय अनुगमन प्रतिवेदन सन्चालक तथा विद्युत विकास विभागमा पेश गर्नुपर्ने छ।
- प्रतिवेदनमा आयोजनाको विस्तृत डिजाइनमा समावेश गर्ने पर्ने गरी प्रस्ताव गरिएको निराकरणको उपायहरू विस्तृत डिजाइनमा अनिवार्य रूपमा समावेश गर्ने साथै, निर्माणको चरणमा ठेकेदारको पालना गर्ने गरी प्रस्ताव भएका तथा ठेकेदारको दायित्वभित्र पर्ने प्रभाव निराकरण लगायतका सम्पूर्ण दायित्वहरू ठेकेदारसँग गरिने सम्झौतामा अनिवार्य रूपमा समावेश गर्नुपर्नेछ र तिनको पालना सुनिश्चित गर्नुपर्ने छ।

(हस्ताक्षर)





सं. १०८३

२०७४

०३

२०७४

विषय: तामाकोशी बाटमाण्डौ ६०० व. भि. विस्तृत प्रसारण लाइन आयोजनाको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन स्वीकृत सम्बन्धमा।

१. वन क्षेत्रको जग्गा अन्य उपयोगका लागि उपलब्ध गराउने कार्यविधि, २०६३ र आनुवंशिक तथा शारीरिक संरचनाको सुरक्षात्मक कार्यविधि, २०६३ अन्तर्गत प्रसारण निर्माण गर्दा जग्गाको १०० मि. भि. DBH भन्दा ठुला रुखमा गह्वारको २ गुणा विस्थापन गर्ने गरी हुर्काउने र भौतिक सम्पत्तिको अभावबाट क्षेत्रफल बराबरको वन क्षेत्रको जग्गामा वृद्धिको गरी हुर्काउने र स्थावर सम्पत्ति गर्ने विषयमा सम्बन्धित जिल्ला वन कार्यालयसँग सहमति र समन्वयका आधारमा कार्य गर्ने गराउने व्यवस्था गर्नुपर्ने छ।
२. प्रतिवेदनमा आयोजनाको विस्तृत डिजाइनिंगमा समावेश गर्नु पर्ने गरी प्रस्ताव गरिएको निराकरणको उपायहरू विस्तृत डिजाइनिंगमा अनिवार्य रूपमा समावेश गर्ने। साथै, निर्माणको बरगमा ठेकेदारको पालना गर्ने गरी प्रस्ताव भएका तथा ठेकेदारको दायित्वभित्र पर्ने प्रभाव निराकरण लगायतका सम्पूर्ण दायित्वहरू ठेकेदारले गरिने सम्झौतामा अनिवार्य रूपमा समावेश गर्नुपर्नेछ र तिनको पालना सुनिश्चित गर्नुपर्ने छ।
३. श्रमिकहरू तथा को ल्याबोरेटरीमा प्रस्तावित सम्पत्तिको तथा को गुनायायण तथा भा प्रस्तावित सम्पत्तिको सम्बन्धमा सामाजिक गान्त्वित्वको तर्फको प्रत्यक्ष गर्न प्रतिवेदनमा भन्दा गर्ने प्रस्तावको पेश गर्ने।

कल्प मोहन मोदी
मि. दि. २

बोधार्थ

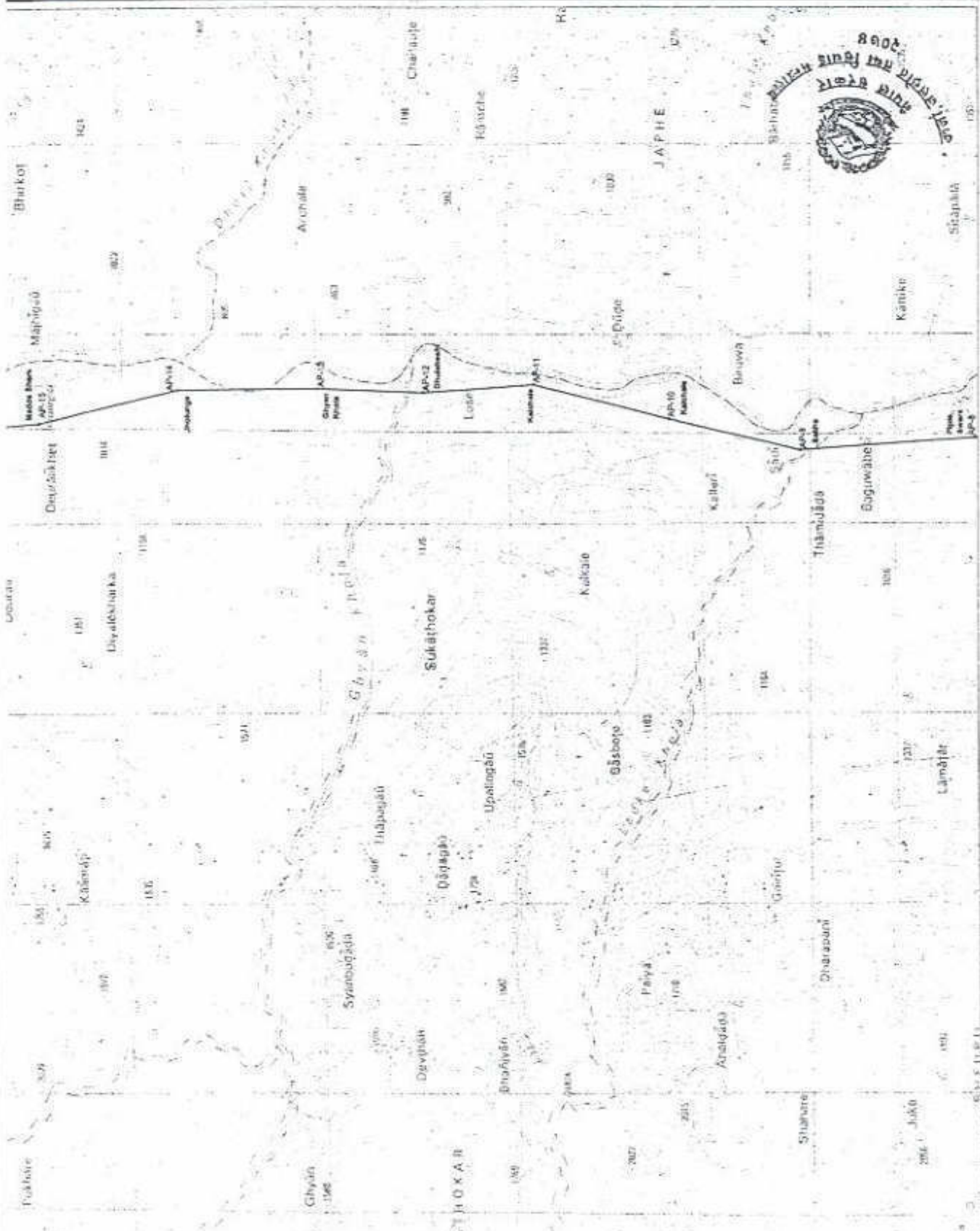
१. श्री वन तथा भू संरक्षण मन्त्रालय,
सिंहदरबार, काठमाण्डौ।
२. श्री विद्युत विकास विभाग,
भक्तमनगर, काठमाण्डौ।



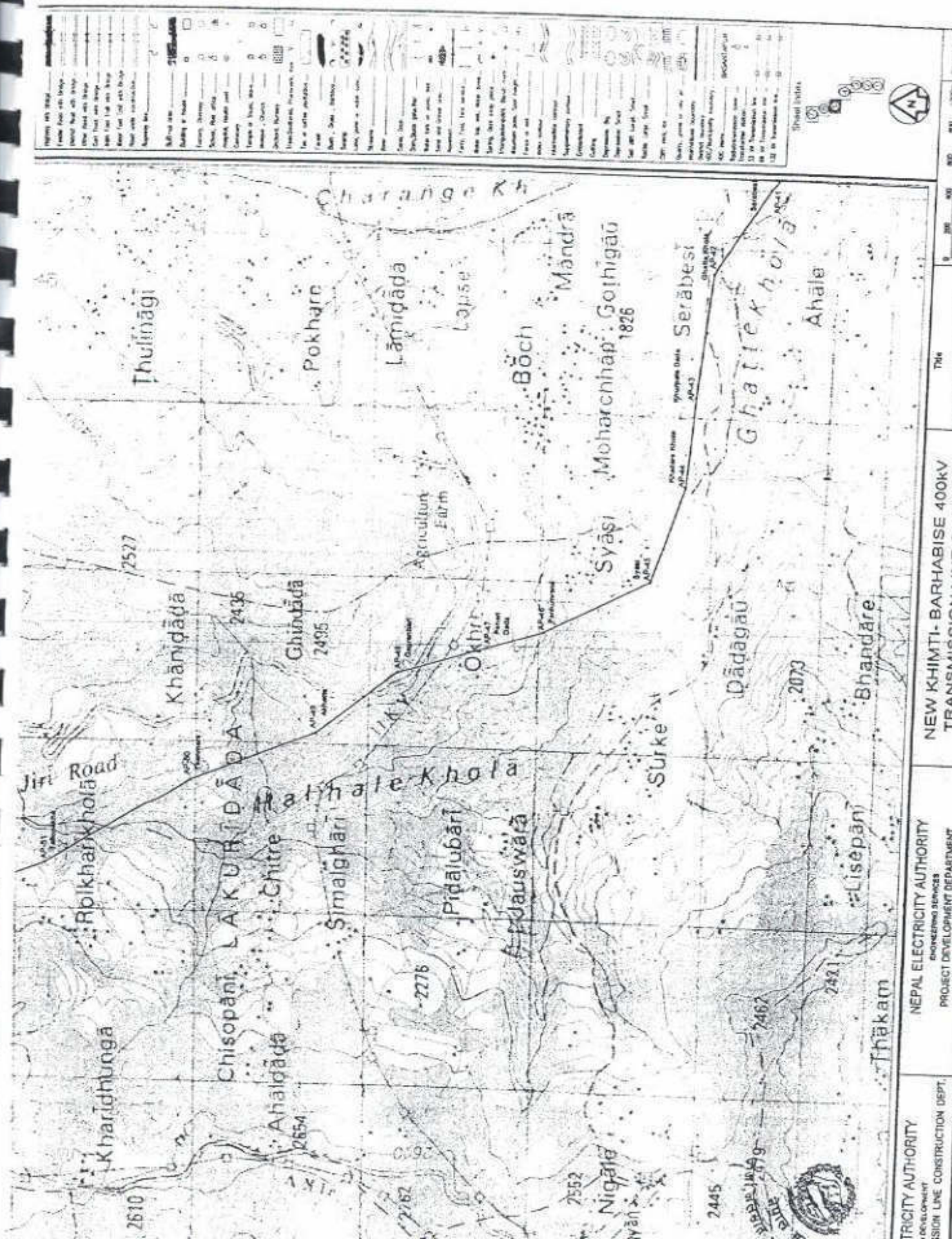
Appendix E

Recommendation and Approval letters





<p>Project No. RAP-02</p>	<p>Scale 1:2000</p>	<p>DATE: June, 2012</p>	<p>Sheet No.</p>
<p>NEPAL ELECTRICITY AUTHORITY CHIEF DEVELOPMENT TRANSMISSION LINE CONSTRUCTION DEPT.</p>	<p>NEPAL ELECTRICITY AUTHORITY ENGINEERING SERVICES PROJECT DEVELOPMENT DEPARTMENT</p>	<p>NEW KHIMTI-BARHABISE 400KV TRANSMISSION LINE SURVEY</p>	<p>Route Alignment Plan</p>



TRICITY AUTHORITY
DEVELOPMENT
CONSTRUCTION DEPT.

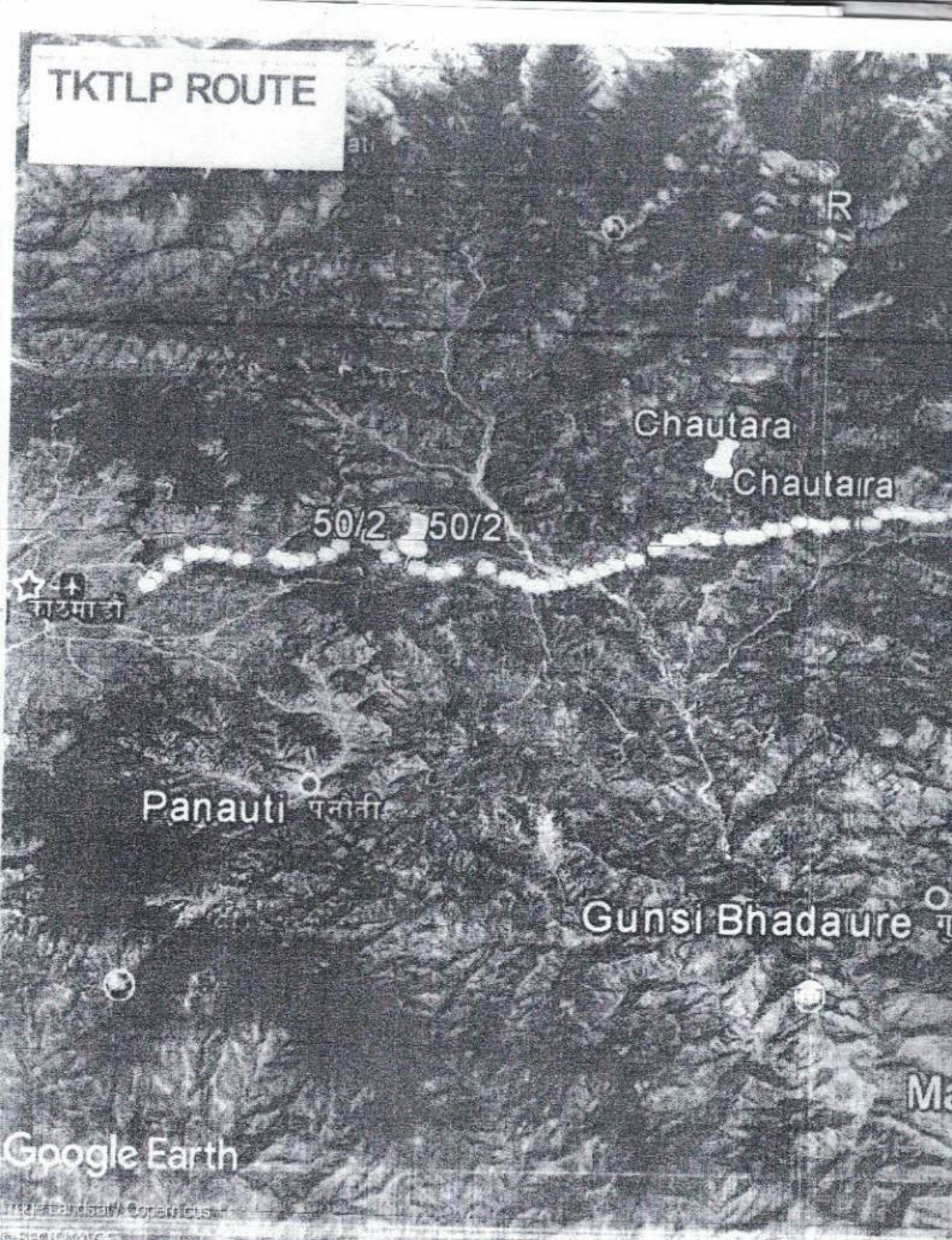
NEPAL ELECTRICITY AUTHORITY
ENGINEERING SERVICES
PROJECT DEVELOPMENT DEPARTMENT

NEW KHMITI-BARHABISE 400KV
TRANSMISSION LINE SURVEY

The
Route Alignment

Scale
0 200 400 600 800 1000
Kilometers

TKTLP ROUTE



Panauti पलौती

Chautara

Chautaira

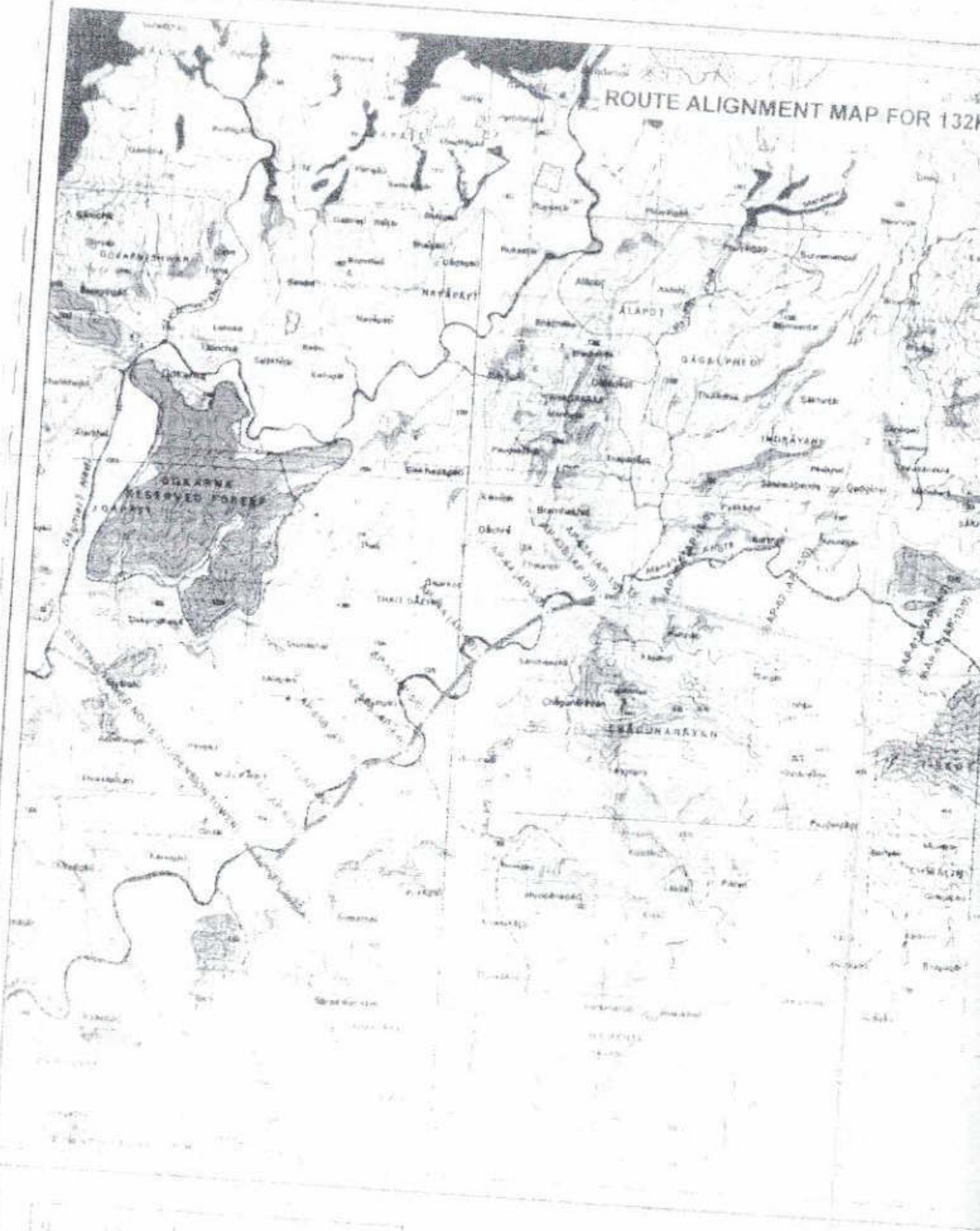
50/2 50/2

Gunsir Bhadaure

Google Earth

TKTLP ROUTE

ROUTE ALIGNMENT MAP FOR 132K



Appendix G

Comparison Chart of Tree and Forest Area Between Approved IEE and U-IEE



Comparison Chart of forestland and tree between IEE Report and Tree Enumeration Report in Tamakoshi-Kathmandu 220/400 K.V. Transmission Line Way below in table 1-1 and 1-2:

Table 1-1 detail of Tree and Forest Land in Updated IEE Report

S.N	Name of Forest division Office	Area of forest (ha)		Total Forest Area(ha)	No. of Tree	No of Pole	Total No. of Tree and Pole
		ROW Excluding Tower	Tower Foundation Area				
1	Dolakha	32.65	2.69	35.34	1975	2316	4291
2	Sindhupalchowk	50.9766	5.4236	56.4002	18876	9706	28582
3	Kavrepalanchowk	8.6459	0.5541	9.2000	179	1245	1424
4	Kathmandu	1.8356	0.1944	2.0300	748	90	838
5	Bhaktapur	0.2176	0.0324	0.2500	10	86	96
Total		94.3257	8.8945	103.2202	21788	13443	35231

Table 1-2 detail of Tree and Forest Land in Approved IEE Report

S.N	Name of Forest division Office	Area of forest (ha)		Total Forest Area(ha)	No. of Tree	No of Pole	Total No. of Tree and Pole
		ROW Excluding Tower	Tower Foundation Area				
1	Dolakha	51.0824	0.18	51.2624	2030	4769	6799
2	Sindhupalchowk	60.6575	0.2925	60.9503	5024	11823	16847
3	Kavrepalanchowk	7.3298	0.09	7.4198	348	815	1163
4	Kathmandu	5.7275	0.0225	5.75	330	770	1100
5	Bhaktapur	1.012	-	1.012	45	107	152
Total		125.8092	0.585	126.3942	7777	18284	26061

